GW - 199

MONITORING REPORTS

DATE:

2001

Transmittal Document:

Re: Champion Chemical Co. Discharge Plan GW-199

Subject/Items: Documents received by NMOCD District I

1. Video May 16, 1997 Champion Video.
2. 3 pages of written testimony including a map.

Comments:

The above items were received at the HOBBS NMOCD District I office by Linda Williams on May 21 & 22 1998. The items were brought in by a relative of the person making the complaint who has signed the testimony letter. It is my understanding they wish to remain anonymous. Linda Williams gave these items to Wayne Price NMOCD Environmental Engineer.

District Supervisor Chris Williams & Wayne Price have reviewed the documents and it is our opinion that discharge plan violations may have occurred and maybe other activities that may be criminal in nature and therefore we are transferring these information items to the NMOCD Environmental Bureau for further investigations and safe keeping.

Received By: (print) LINDA WILLIAMS (sign) Linda Williams date 5/21/98 5/22/98
relinquished By: (print) LINDA WILLIAMS (sign) Linda Williams date 5/21/98 5/22/98

Received By: (print) WAYNE PRICE (sign) Wayne Price date 5/21/98 5/22/98
Relinquished By: (print) WAYNE PRICE (sign) Wayne Price date 6/3/98

Received By: (print) MARK ASHLEY (sign) Mark Ashley date 6-3-98
Relinquished By: (print) MARK ASHLEY (sign) Mark Ashley date 6-8-98

Received By: (print) R C ANDERSON (sign) date 6-8-98
Relinquished By: (print)__________ (sign)__________ date______

Received By: (print) T. M. MONAHAN #701 M Monahan (sign) M Monahan date 3-30-99
Relinquished By: (print) ROGER ANDERSON (sign) date 3-30-99

Relinquished by T M Monahan 4/5/97
Rec by Roger Anderson 4/5/99

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

MAY 1998
Received
Hobbs
OCD

January 30, 1998

Tommy Morrison
District Manager
Champion Technologies, Inc.
P.O Box 2187
Hobbs, NM 88240

RE: **Letter of Violation**
NMD 986674869

Dear Mr. Morrison:

On November 6, 1997, the New Mexico Environment Department (NMED) - Hazardous and Radioactive Materials Bureau (HRMB) conducted a compliance evaluation inspection of your facility, Champion Technologies, Inc. (CTI). Based on review of the information obtained, NMED has determined that CTI has violated the New Mexico Hazardous Waste Management Regulations (20 NMAC 4.1) as specified below.

In accordance with §74-4-10 NMSA 1978 (Repl. Pamp. 1993), NMED may: (1) issue a compliance order requiring compliance immediately or within a specified time period or assessing a civil penalty for any past or current violations of up to $10,000 per day of noncompliance with each violation or both; or (2) commence a civil action in district court for appropriate relief, including a temporary or permanent injunction. Any such order issued may include a suspension or revocation of any permit issued by NMED.

At this time, NMED is suspending the enforcement options listed above if CTI can provide NMED with a satisfactory resolution to the violations or a detailed plan of corrective action acceptable to NMED within fifteen (15) working days of receipt of this letter. If NMED does not receive satisfactory information, then NMED reserves the right to initiate formal enforcement action.

The following violations were noted:

1. CTI has failed to keep two, 5-gallon containers of waste closed at a satellite accumulation point located in the laboratory. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(c)(1)(i).

2. CTI has failed to mark ten boxes located in the hazardous waste storage area, which contain approximately 480 (200ml) bottles of corrosive waste with the words "Hazardous Waste", and with accumulation start dates. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

3. CTI has failed to label five, 5-gallon buckets of spent chlorinated solvents located in the hazardous waste storage area with the words "Hazardous Waste", and with accumulation start dates.. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

4. CTI has failed to label one 55-gallon drum containing spent chlorinated solvents located in the hazardous waste storage area with the words "Hazardous Waste", and with the accumulation start date. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

5. CTI has failed to label one 55-gallon drum of "chromate" waste located in the hazardous waste storage area with the words "Hazardous Waste", and with the accumulation start date. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

6. CTI has failed to keep the container noted in ¶5 closed. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(2).

7. CTI has failed to perform a hazardous waste determination on the contents of an approximately 200-gallon storage tank located in the southwest portion of the yard near the a drum storage area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

8. CTI has failed to perform a hazardous waste determination on the contaminated soil underneath and around the tank noted in ¶7. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

9. CTI has failed to perform a hazardous waste determination on the contents in approximately fiftysix, 5-gallon buckets stored on pallets in the southwest portion of the yard near the drum storage area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

10. CTI has failed to perform a hazardous waste determination on an area of ground contamination near the drum storage area on the west end of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

11. CTI has failed to perform a hazardous waste determination on contaminated soil which leaked from a large, white tank that has been decommissioned. The tank is located centrally in the yard closer to the western boundary of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

12. CTI has failed to perform a hazardous waste determination on the contents stored in two, cut, poly drums located centrally in the yard near the western boundary. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

13. CTI has failed to perform a hazardous waste determination on the contents of three, ~30-gallon plastic catch basins located randomly near the drum storage area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

14. CTI has failed to perform a hazardous waste determination on an open, 55-gallon drum of contaminated soil located centrally, near the western boundary of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

15. CTI has failed to perform a hazardous waste determination on the contents of a white, ~40-gallon poly drum located centrally near the west fence of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR 262.11.

16. CTI has failed to perform a hazardous waste determination on the contents of one 55-gallon poly drum with the lid cut off. The poly drum is located next to one of the plastic catch basins noted in ¶13. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

17. CTI has failed to perform a hazardous waste determination on the content of one 55-gallon drum (half-full) located centrally in the yard due west of the facility parking lot. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

18. CTI has failed to perform a hazardous waste determination on the content of a cube-shaped storage tank located in the decommissioned tank area in the northwest portion of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

19. CTI has failed to perform a hazardous waste determination of contaminated soil derived from a leaking product tank located next to the loading pad in the bulk, chemical storage tank area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

Any action taken in response to this letter does not relieve CTI of its obligation to comply with 20 NMAC 4.1 in other activities which it conducts, nor does it relieve CTI of its obligation to comply with any other applicable laws or regulations. In addition, CTI will have to pay the annual hazardous waste fees for calendar year 1997 in accordance with AHWFR-1, Part V, which will be due August 1, 1998.

Once again, if you have any questions regarding this notice, please contact Mr. John Tymkowych of my staff or me at (505) 827-1557. Please address your response to Mr. Tymkowych's attention at the address on the letterhead.

Sincerely,

Benito J. Garcia, Chief
Hazardous and Radioactive Materials Bureau

cc: Gary McCaslin, NMED District IV
Tom Burt, NMED Carlsbad Field Office

ENERCON SERVICES, INC.
An Employee Owned Company

8866 Gulf Freeway
Suite 380
Houston, TX 77017
(713) 941-0401
Fax: (713) 941-0402

RECEIVED
JUN 03 2001
Environmental Bureau
Oil Conservation Division

June 25, 2001

Mr. Wayne Price
NM Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Subject: Addendum I to Site Investigation Report (SIR) for Champion Technologies Hobbs, NM Facility

Dear Mr. Price:

Please find enclosed two (2) copies of the *Champion Technologies, Inc., 4001 South Highway 18, Hobbs, New Mexico, Addendum I to Site Investigation Report.* If you have any questions or comments pertaining to the SIR Addendum please feel free to contact me at (713) 941-0401.

Sincerely,

ENERCON SERVICES, INC.

Paul Brodin
Project Manager

WORKING COPY

RECEIVED
L
JUN 0 3 2001
Environmental Bureau
Oil Conservation Division

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

ADDENDUM I TO SITE INVESTIGATION REPORT

June 22, 2001

Submitted to:
Champion Technologies, Inc.
3130 FM 521
Fresno, Texas 77545

Prepared by:
Enercon Services, Inc.
8866 Gulf Freeway, Suite 380
Houston, TX 77017

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

ADDENDUM I TO SITE INVESTIGATION REPORT

June 22, 2001

Prepared by:

Paul Brodin
Project Manager

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1.0 OBJECTIVES

Enercon Services, Inc. (Enercon) has been retained to prepare an addendum to the Site Investigation Report (SIR, November 10, 2000) submitted for the Champion Technologies, Inc. (Champion) facility located at 4001 South Highway 18 in Hobbs, New Mexico. This addendum to the SIR is prepared pursuant to the guidance letter issued by the New Mexico Oil Conservation Division (NMOCD) on February 20, 2001.

This addendum will focus on further evaluation of the nature and extent of potentially hazardous material contamination in the soil on site, and the potential for groundwater impact on site.

The objective of the project is to provide additional information concerning the SIR as outlined in the NMOCD's guidance letter. Additionally, further investigation will be performed to evaluate any potential soil and groundwater contamination on the site pursuant to New Mexico Water Quality Control Commission (WQCC) Regulations 20 NMAC 6.2 4106.C. This objective was accomplished through the following activities:

1. Performing a survey, including a location map and any available records, of all water wells within a one-mile radius of the site.

2. Generating a potentiometric surface map showing the direction of groundwater flow on the site, groundwater depth contour lines, and the location of all monitoring wells.

3. Providing additional information pertaining to past clean-ups for the area around the bulk tank area called Area 4.

4. Correcting the Well Construction Diagrams included in the SIR to reflect the actual 15-foot screened interval.

5. Evaluating all analytical data with respect to the NMOCD TPH screening level of 100 mg/kg and the WQCC groundwater standards.

6. Developing and executing a soil-sampling program to further evaluate and delineate the old pit area on the west side of the warehouse called Area 2 and other areas of concern.

7. Installing monitoring wells and developing and executing a groundwater-sampling program to identify any potential impact to the groundwater and establish an accurate groundwater gradient on the site.

8. Sampling and cleaning out the on-site septic tank, and disposing of the waste at a NMOCD approved facility.

The data obtained from the site investigation was used to present recommendations, if warranted, for future investigation and remedial action at the site. A work plan for any further activities that may be deemed necessary, based on the results of the site assessment, will be prepared as a subsequent addendum to the SIR.

2.0 REQUESTED SUPPLEMENTAL INFORMATION

2.1 Water Well Survey

A survey was performed of all water wells within a one-mile radius of the site. Eight water wells were reported within the search radius. Six wells were listed as unused, the seventh was classified as an irrigation well, and the final well was classified as a stock well. Of the eight reported water wells only one was downgradient of the site. Joe Tarbet owns an unused well approximately 0.88 miles (4,646 feet) southeast. The water well survey was performed on June 13, 2001 by Banks Information Solutions, Inc., and the results of the survey including a location map and all available records are included in Appendix A. Drilling logs and other pertinent information was not available at the time of the survey, but will be provided when it has been accessed by Banks Information Solutions, Inc.

2.2 Potentiometric Surface Map

A groundwater potentiometric surface map was generated for the site. The map includes the direction of groundwater flow, groundwater surface contour lines, and the elevation and location of each monitoring well. The potentiometric map is included in Appendix B, Figure 1. Groundwater beneath the site flows generally to the southeast.

2.3 Past Clean-Ups for Area 4

Previous sampling, excavation and clean-up activities have occurred throughout the site, including the areas around the bulk tank area (Area 4). All information that was provided by Champion regarding past remediation activities at the site was included in the Revised Abatement Plan Proposal (September 8, 2000). At Enercon's request additional file review was performed by Champion regarding remediation of Area 4. However, no further documentation was discovered. Therefore, Enercon evaluated Area 4 in the previous investigation by the placement and sampling of SB-19. The results of the Area 4 investigation are included in the SIR.

2.4 Well Construction Diagrams

The Well Construction Diagrams for MW-1 through MW-5 (SIR, Appendix E) erroneously showed a 10-foot screened interval. A review of field notes from the monitoring well installation indicated that 15 feet of screen was installed in each well. Additionally, inquiries performed with the drilling contractor, Eades Drilling & Pump Service, and the invoice received for drilling activities confirmed the installation of 15 feet of screen in each well. The Well Construction Diagrams were corrected to reflect the actual 15-foot screened interval required by NMOCD, and are included in Appendix C of this addendum.

2.5 Screening Levels and Areas of Concern

Analytical results for constituents of concern in the SIR were compared to the Texas Natural Resource Conservation Commission (TNRCC) Texas Risk Reduction Program (TRRP) Tier 1 Residential Soil Protective Concentration Levels (PCLs) for a 30-acre Source. In conjunction with recent NMOCD guidance, the TRRP PCLs will no longer be used to determine which constituents are reported and to make appropriate conclusions and recommendations. Data evaluation, conclusions and recommendations in this addendum will be based upon the NMOCD TPH screening level of 100 mg/kg and the established WQCC groundwater standards. A summary of the WQCC groundwater standards in included in Appendix B, Table 1.

Additionally, areas of concern that were not fully delineated during previous investigations were further evaluated during the recent site investigation. Appropriate findings, conclusions and recommendations are included in this addendum following a description of the field activities and analytical results.

3.0 SITE INVESTIGATION

3.1 Septic Tank Investigation

The Champion facility utilizes a septic system for disposal of sanitary waste. The septic system is located approximately 20 feet west of the facility's office building. On May 8, 2001 an investigation was performed to determine the exact location of the septic tank and establish appropriate methods for clean out and disposal of any sanitary waste inside the tank. The septic tank was located and uncovered using a backhoe, and the location of the septic tank is shown in Appendix B, Figure 2.

When the septic tank was partially uncovered it was discovered that the top of the tank was compressed due to the weight of vehicles driving on top of it. The tank was plastic, and the plastic lid of the tank was damaged and could not be removed. Further removal of cover material would have caused soil to fall into the tank through the opening in the damaged lid. Therefore, no additional investigation was performed to prevent further disturbance to the tank. The top of the tank was covered with plastic to prevent rainwater from entering the tank, and a barricade was placed around the tank to prevent vehicular damage to the tank.

3.1.1 Sample Analysis

A grab sample (SW-1) was collected of the liquid from the tank using a decontaminated scoop. The sample was collected through the opening in the top of the tank where the lid was damaged. No significant sludge was identified in the tank. The septic tank sample was analyzed for the constituents listed below:

- Toxicity characteristic leaching procedure (TCLP) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver).

- TCLP Volatile Organic Compounds (VOCs).

- TCLP Semi-volatile Organic Compounds (SVOCs).

- Reactive Sulfide/Cyanide.

3.1.2 Analytical Methods

Analytical methods used for septic tanks sample were in accordance with USEPA SW-846 prescribed or comparable methodologies. The following analytical methods were used in septic tank sample analysis:

- TCLP Metals - 1311/6020 (mercury 1311/7470A).

- TCLP VOCs – 1311/8260B.

- TCLP SVOCs – 1311/8270C.

- Reactive Cyanide – 7.3.3.2.

- Reactive Sulfide – 7.3.4.2.

- Ignitability – 1010.

- pH – 150.1.

3.1.3 Chain-of-Custody Procedures

Chain-of-custody procedures included:

- Samples collected by field personnel were accompanied by a Chain-of-Custody Record Form which included date and time of collection, container type, preservatives used, number of samples, sample descriptions, and others.

- Sample identification labels and Chain-of-Custody Records were completed with waterproof ink, and placed in a waterproof bag for shipment.

Chain-of-Custody documentation was completed at the sample location.

3.2 Soil Investigation

3.2.1 Background Samples

Background samples were collected using an air rotary drill rig with a decontaminated split-spoon sampler (SB-35) and a decontaminated trowel (SB-37 through SB-40). The samples were collected from portions of the site that have not have been impacted by any facility operations or activities. The purpose of the samples was to further investigate elevated chloride levels on the site.

Samples were collected from the ground surface to 45 feet below ground surface (bgs) in SB-35 and from the ground surface to 1-foot bgs in SB-37 through SB-40. Sample location SB-35 was converted to an off-gradient piezometer (MW-7) to assist in determining the direction of subsurface water flow at the site. Sample locations SB-37 through SB-40 (Area 5) were backfilled with native material. Area 5 was characterized by brown silty sand. Soil sample locations are shown in Appendix B, Figure 2.

3.2.2 Area 2

Soil samples in Area 2 were collected using an air rotary drill rig and a decontaminated split-spoon sampler. The purpose of the samples was to delineate the horizontal and vertical extent of the former pit. Soil sample locations in Area 2 consisted of SB-22 through SB-31 and SB-36. Samples were collected at 5-foot intervals from 0 to 25 feet bgs in SB-22, SB-23, SB-28 and SB-31, from 0 to 30 feet bgs in SB-25, from 0 to 35 feet bgs in SB-26 and SB-30, from 0 to 40 feet bgs in SB-24 and SB-29, and from 0 to 45 feet bgs in SB-36. Hard rock-like material and caliche interfered and prevented split-spoon sampling at some sample depths. Therefore, grab samples of the drill cuttings were collected at those depths. One sample was collected from 0 to 5 feet bgs in SB-27. Drilling in SB-27 was terminated at 5 feet bgs because the drilling rig was sinking due to very soft ground. Soil samples were collected from beneath the concrete slab adjacent to the warehouse in SB-26 and SB-30.

The soil in Area 2 was characterized mainly by fine to medium grained brown silty sand. Black stained fill material was encountered from approximately 10 to 18.5 feet bgs in SB-25, 3 to 5 feet bgs in SB-27, and 3 to 17 feet bgs in SB-29. No black stained material was observed in any other soil borings in Area 2. Caliche and sandstone material was encountered at approximately 20 feet bgs. The sample locations were backfilled with cement-bentonite slurry. Soil sample locations are shown in Appendix A, Figure 2 and soil boring logs are included in Appendix D.

Samples were screened with an organic vapor meter (OVM). Additionally, soil samples were field screened for total petroleum hydrocarbons (TPH). TPH screening was performed using an Infracal CVH Analyzer.

3.2.3 Area 3

Soil samples in Area 3 were collected using an air rotary drill rig and a decontaminated split-spoon sampler. The purpose of the samples was to further evaluate the area where previous borings and trenching indicated impacted soils from a suspected former pit. Sample locations in Area 3 consisted of SB-32, SB-33 and SB-34. Soil borings SB-32 and SB-33 were terminated at 25 feet bgs. Soil boring SB-34 was terminated at 40 feet bgs. Soil samples were collected at 5-feet intervals in all three borings. Grab samples were collected at depths where split-spoon sample recoveries were inadequate.

The soil in Area 3 was characterized mainly by fine to medium grained brown sand and silty sand. No indications of impact were identified in SB-32, SB-33 or SB-34. Caliche and sandstone material was encountered at approximately 22 feet bgs. The sample locations were backfilled with cement-bentonite slurry. Soil sample locations are shown in Appendix A, Figure 2 and soil boring logs are included in Appendix D.

Samples were screened with an organic vapor meter (OVM). Additionally, soil samples were field screened for total petroleum hydrocarbons (TPH). TPH screening was performed using Infracal CVH Analyzer.

3.3 Soil Sample Analysis

3.3.1 Analyses Performed

Background soil samples collected on the site from SB-37, SB-38, SB-39 and SB-40 were analyzed for chlorides. Background soil samples collected from SB-35 were analyzed for the constituents listed below:

- Arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, silver and zinc (WQCC Metals).
- Calcium, chloride, potassium, magnesium and sodium (General Chemistry).

Due to a chain of custody error, soil samples from SB-36 were only analyzed for chloride. All other soil samples collected in Area 2 and Area 3 were analyzed for the constituents listed below.

- WQCC Metals.
- General Chemistry

Additionally, select soil samples from Area 2 and Area 3 were analyzed for the following constituents:

- Total petroleum hydrocarbons (TPH).
- Benzene, toluene, ethylbenzene and xylene (BTEX).

A variety of samples were submitted from both unaffected and impacted soils, including samples with readings less than 100 ppm and greater than 100 ppm, in order to verify the accuracy of the field screened TPH values.

3.3.2 Analytical Methods

Analytical methods used for soil samples were in accordance with USEPA SW-846 prescribed or comparable methodologies. The following analytical methods were used in soil sample analysis:

- WQCC Metals - 3050B/6020 (mercury 7471A).
- Calcium, potassium, magnesium, sodium - 3050B/6020.
- Chloride – EPA 300.0.
- TPH – 418.1.
- BTEX – 5030B/8021B.

3.3.3 Chain-of-Custody Procedures

Chain-of-custody procedures included:

- Samples collected by field personnel were accompanied by a Chain-of-Custody Record Form which included date and time of collection, container type, preservatives used, number of samples, sample descriptions, and others.
- Sample identification labels and Chain-of-Custody Records were completed with waterproof ink, and placed in a waterproof bag for shipment.
- Chain-of-Custody documentation was completed at each sample location prior to sampling at the next site.

3.4 Monitoring Well/Piezometer Installation and Groundwater Sampling

3.4.1 Monitoring Well/Piezometer Installation

To evaluate the potential impact to ground water one additional monitoring well (MW-6) was installed on the site. The monitoring well was placed downgradient of Area 2, outside of the former pit. Additionally, an off-gradient piezometer (MW-7) was installed on the site to assist in determining the direction of subsurface water flow at the site. The piezometer was placed in the southwest corner of the site. The locations of MW-6 and MW-7 are shown on Figure 2, Appendix B. The following describes the monitoring well installation procedures and specifications:

- Wells were drilled using the air-rotary drilling method. MW-6 was drilled to an approximate depth of 62 feet bgs, and MW-7 was drilled to an approximate depth of 63 feet bgs.

- Fifteen feet of screen was installed in each well with 10 feet of screen below the water table level, and 5 feet above the water table level. Screen placement was determined in the field by the field geologist. Screening zones were based on field observations and logging data.

- The wells were constructed with Schedule 40 PVC casing and screen.

- Screened zones had appropriate filter pack placed in a matter to avoid any bridging. Filter pack was placed 3-4 feet above the top of the screened zone. Wells were properly sealed with bentonite 3-5 feet above the filter pack and cement grout.

- The wells had surface completions that will protect the well from any damage or unauthorized access.

Well construction diagrams are included in Appendix C. Monitoring well boring logs (SB-35 and SB-36) are included in Appendix D.

3.4.2 Monitoring Well Purging

Monitoring well purging activities included the following:

- A measuring point was established on the well casing as a consistent measuring point. Each well was sounded three times for depth to water.

- Wells were purged with a decontaminated submersible pump.

- A minimal volume of water was purged, taking into consideration the stabilization of pH, electrical conductance (EC), and oxidation-reduction potential (ORP) over two to three casing volumes.

- The rate of purging was calculated and recorded.

- Purge water was containerized and stored.

Groundwater elevation and purge data are summarized in Appendix 2, Table 2.

3.4.3 Groundwater Sampling Techniques

In order to ensure that proper groundwater samples were collected, the following procedures were followed:

- Groundwater samples were collected with disposable bailers and nylon cord. New bailers and cord were used for each well, and the bailers and cord were disposed of after sample collection.

- Samples were placed in laboratory supplied, clean containers. Each container was marked with the sample designation, date and time, sampler's initials, and required analysis.

- Samples were placed in a cooler after collection and kept chilled until delivered to the laboratory.

3.5 Groundwater Sample Analysis

3.5.1 Analyses Performed

The groundwater sample from MW-4 was analyzed for chromium. Groundwater samples from MW-6 were analyzed for the constituents listed below.

- Arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, silver and zinc (WQCC Metals).

- Anion/cation balance, bicarbonate, calcium, carbonate, chloride, fluoride, nitrate-N, nitrite, magnesium, potassium, sodium, sulfate (General Chemistry).

- Volatile organic compounds (VOCs).

MW-7 was installed as a piezometer for use in groundwater gradient determination, and therefore was not sampled.

3.5.2 Analytical Methods

Analytical methods used for groundwater samples were in accordance with USEPA SW-846 prescribed or comparable methodologies. The following analytical methods were used in groundwater sample analysis:

- WQCC Metals – 3010A/6020 (mercury 7470A).

- Calcium, magnesium, potassium, sodium - 3010A/6020.

- Chloride, fluoride, nitrate-N, nitrite, sulfate - EPA 300.0.

- Bicarbonate/carbonate – EPA 310.1.

- Anion/cation balance – 1030-F.

- VOCs – 5030B/8260B.

3.5.3 Chain-of-Custody Procedures

Chain-of-custody procedures included:

- Samples collected by field personnel were accompanied by a Chain-of-Custody Record Form which included date and time of collection, container type, preservatives used, number of samples, sample descriptions, and others.
- Sample identification labels and Chain-of-Custody Records were completed with waterproof ink, and placed in a waterproof bag for shipment.
- Chain-of-Custody documentation was completed at each sample location prior to sampling at the next site.

3.6 Equipment Decontamination

All field sampling equipment and sample preparation equipment was decontaminated between samples using a non-phosphatic detergent wash, tap water rinse, a deionized water rinse and the guidance given in ASTM Standard D 5088-90: *Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites.*

4.0 ANALYTICAL RESULTS

4.1 Septic Tank

This section discusses the analytical results of septic tank samples collected during the site investigation. One unique septic liquid sample was collected and submitted for analysis (SW-1). Analytical results for TCLP VOCs reported toluene, xylene and napthalene concentrations of 0.006 mg/L, 0.008 mg/L and 0.006 mg/L, respectively. All other TCLP VOCs were below detection limits. Analytical results for reactive sulfide/cyanide reported sample ignitability greater than 212 8F and a pH of 6.90. Analytical results for reactive sulfide and reactive cyanide were below detection limits. All TCLP metals and TCLP SVOCs were below detection limits. The complete analytical results are included in Appendix E.

The results of the septic tank sample were submitted to NMOCD on May 17, 2001. A request to dispose of the liquid in the septic tank at the Hobbs publicly owned treatment works (POTW) and the damaged tank at the Lea County Landfill was submitted to NMOCD on May 23, 2001. Champion's request was approved by Mr. Wayne Price of NMOCD on May 23, 2001 with the conditions that the waste be RCRA non-hazardous, the tank be EPA clean and cut-up prior to disposal pursuant to NMOCD rule 712, and records be maintained of all disposal activities.

4.2 Soils

This section discusses the analytical results of soil samples collected during the site investigation. A total of 55 unique soil samples were collected and submitted for analysis. For delineation of Area 2 and Area 3 soil samples were field screened for TPH. Select soil samples were submitted to the laboratory for TPH analysis to confirm the results of the field screening. A TPH action level of 100 mg/Kg will be used as outlined in New Mexico Oil Conservation Division's, *Guidelines for Remediation of Leaks, Spills, and Releases* (1993). A summary of field TPH screening levels is included in Appendix B, Table 3. The soil analytical results are summarized in Appendix B, Tables 4 through 6, and the complete analytical results are included in Appendix E.

All soil samples were assigned a unique sample identifier. Each identifier was comprised of a numeric sample location, a four number depth descriptor, and an alpha character sample type descriptor. The components of the sample designations are described below.

- *Sample Location.* This component consists of a single number unique to each sample location. These numbers start at 22, and increase sequentially at each sample location.

- *Sample Depth Zone.* The sample depth descriptor consists of four numbers. The first two numbers signify the top of the sample zone (feet bgs), and the last two numbers signify the bottom of the sample zone (feet bgs).

- *Sample Type.* The letter designation and its associated sample type are as follows:

    -A unique

For example, the designation of a unique sample collected at Location No. 22 from 13 to 15 feet bgs would be 22-1315-A.

4.2.1 Background

A total of 9 background samples were collected. Analytical results for SB-35 reported WQCC metals concentrations of arsenic, barium, copper, iron, lead, manganese and zinc. These constituents averaged 5.46 mg/Kg, 236 mg/Kg, 2.36 mg/Kg, 2,071 mg/Kg, 2.20 mg/Kg, 41.0 mg/Kg and 14.5 mg/Kg, respectively. Maximum concentrations of WQCC metals reported were 5.46 mg/Kg of arsenic, 380 mg/Kg of barium, 3.20 mg/Kg of copper, 3,278 mg/Kg of iron, 2.77 mg/Kg of lead, 65.4 mg/Kg of manganese and 28.1 mg/Kg of zinc.

Average results of background general chemistry constituents reported in SB-35 included 123,060 mg/Kg of calcium, 1,838 mg/Kg of chloride, 11,560 mg/Kg of magnesium, 859 mg/Kg of potassium and 2,538 mg/Kg of sodium. Maximum reported general chemistry concentrations were 157,033 mg/Kg of calcium, 3,388 mg/Kg of chloride, 16,344 mg/Kg of magnesium, 1,806 mg/Kg of potassium and 4,376 mg/Kg of sodium. Analytical results for SB-37 through SB-40 reported chloride concentrations averaging 2,535 mg/kg, with a maximum concentration of 3,511 mg/Kg in SB-39.

4.2.2 Area 2

A total of 31 unique samples were collected in this area. Analytical results reported WQCC metals concentrations of arsenic, barium, chromium, copper, iron, lead, manganese and zinc throughout Area 2. These constituents averaged 6.27 mg/Kg, 369 mg/Kg, 23. 5 mg/Kg, 7.24 mg/Kg, 2059 mg/Kg, 15.4 mg/Kg, 33.5 mg/Kg and 123 mg/Kg, respectively. Maximum concentrations of WQCC metals reported were 7.42 mg/Kg of arsenic, 1,688 mg/Kg of barium, 34.2 mg/Kg of chromium, 11.3 mg/Kg of copper, 5,997 mg/Kg of iron, 29.0 mg/Kg of lead, 103 mg/Kg of manganese and 314 mg/Kg of zinc.

Average results of general chemistry constituents that were reported in Area 2 included 176,799 mg/Kg of calcium, 343 mg/Kg of chloride, 12,722 mg/Kg of magnesium, 779 mg/Kg of potassium and 535 mg/Kg of sodium. Maximum reported general chemistry concentrations were 330, 231 mg/Kg of calcium, 1,251 mg/Kg of chloride, 43,413 mg/Kg of magnesium, 1,599 mg/Kg of potassium and 1,868 mg/Kg of sodium.

Field screening of 37 soil samples from Area 2 reported TPH levels greater than 100 ppm in SB-25, SB-26, SB-27 and SB-29. Additionally, select samples were submitted for laboratory analysis to confirm the field screened levels. Analytical results for TPH in Area 2 were greater than 100 ppm in SB-25, SB-26 and SB-29. The sample from SB-27 was not submitted for laboratory analysis. The approximate horizontal extent of impact in Area 2 is shown on Appendix B Figure 3.

OVM readings in Area 2 ranged from 0 to 175 ppm.

4.2.3 Area 3

A total of 10 unique samples were collected from this area. Analytical results reported WQCC metals concentrations of arsenic, barium, iron and manganese throughout Area 3. These constituents averaged 5.92 mg/Kg, 275 mg/Kg, 1,707 mg/Kg and 126 mg/Kg, respectively. Maximum concentrations of WQCC metals reported were 6.62 mg/Kg of arsenic, 513 mg/Kg of barium, 2,546 mg/Kg of iron and 628 mg/Kg of manganese.

Average results of general chemistry constituents that were reported in Area 3 included 173,199 mg/Kg of calcium, 2251 mg/Kg of chloride, 14,054 mg/Kg of magnesium, 637 mg/Kg of potassium and 1740 mg/Kg of sodium. Maximum reported general chemistry concentrations were 235,047 mg/Kg of calcium, 5,218 mg/Kg of chloride, 22,056 mg/Kg of magnesium, 915 mg/Kg of potassium and 4,849 mg/Kg of sodium.

Field screening of 10 soil samples from Area 3 reported a TPH level greater than 100 ppm from 3 to 5 feet bgs in SB-33 (33-0305-A). This sample was submitted to the laboratory for TPH analysis. Analytical of sample 33-0305-A was reported below detection limits. The approximate horizontal extent of impact in Area 3 is shown on Appendix B Figure 3.

OVM readings in Area 3 ranged from 0.3 to 5.1 ppm.

4.3 Groundwater

This section discusses the analytical results of groundwater samples collected during the site investigation. A total of 2 unique groundwater samples were collected and submitted for analysis. All detected groundwater concentrations were compared to the WQCC standards. A summary of applicable WQCC Standards is included in Appendix A, Table 1. The groundwater analytical results are summarized in Appendix B, Tables 7 through 9, and the complete analytical results are included in Appendix E.

Groundwater samples have the following sample identifiers:

- Monitoring Well 4 – MW-4
- Monitoring Well 6 – MW-6

4.3.1 MW-4

Analytical results for MW-4 reported a chromium concentration of 0.254 mg/L. This result exceeded the WQCC groundwater standard for chromium of 0.05 mg/L.

4.3.2 MW-6

Analytical results for MW-6 were reported in concentrations exceeding the WQCC standards for the following constituents: 421 mg/L of chloride; 2.15 mg/L of fluoride; 14.1 mg/L of nitrate-N, 1.7 mg/L of iron, and 0.079 mg/L of silver.

5.0 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The following findings, conclusions, and recommendations are based on review of records and evaluation of the investigation data.

5.1 Findings

Analytical results from the septic tank liquid sample indicated that the waste in the tank is non-hazardous and suitable for disposal at the Hobbs POTW. This assertion was confirmed by NMOCD on May 23, 2001. However, the current condition of the tank deems it unfit for continued use.

Analysis of soil samples for general chemistry indicated elevated levels of several constituents throughout the entire site. Reported concentrations ranged from 46,074 to 330,231 mg/Kg for calcium and from 11.2 to 5,218 mg/Kg for chloride. Concentrations of magnesium reported on the site ranged from 3,282 to 43,413 mg/Kg. Potassium was reported between 247 and 1,599 mg/Kg, and sodium was reported between 35.6 and 4,849 mg/Kg.

Analysis of soil samples for WQCC metals indicated elevated levels of a number of metals on the site, primarily in Area 2 and Area 3. Analytical results reported the following ranges for constituents of concern: 5.22 to 7.42 mg/Kg of arsenic; 40.1 to 1,688 mg/Kg of barium; 7.56 to 34.2 mg/Kg of chromium; 1.01 to 11.3 mg/Kg of copper; 723 to 5,997 mg/Kg of iron; 1.71 to 29 mg/Kg of lead; 16.6 to 283 mg/Kg of manganese, and; 6.2 to 314 mg/Kg of zinc.

Field screening of soil samples and the subsequent confirmation sampling confirmed TPH levels above the NMOCD standard of 100 ppm in SB-25, SB-26, SB-27 and SB-29. These results were used in combination with the previous data included in the SIR to determine the approximate boundaries of Area 2 and Area 3. The approximate horizontal extent of impacts in Area 2 and Area 3 are shown in Appendix B, Figure 3.

The sample from MW-4 exceeded the WQCC standards for the following: 0.254 mg/L of chromium.

The sample from MW-6 exceeded the WQCC standards for the following: 421 mg/L of chloride; 1.6 mg/L of fluoride; 14.1 mg/L of nitrate-N; 1.7 mg/L of iron, and; 0.079 mg/L of silver.

5.2 Conclusions

Figure 1 shows that subsurface water beneath the site flows generally to the east and southeast. However, the gradient was determined based on only one set of data (June 20, 2001), with some portions of the site having only one data point. Groundwater gradients may fluctuate based on rainfall and other environmental conditions in the region. Therefore, future data may suggest a slightly different gradient than depicted in Figure 1.

Elevated levels of chlorides and other general chemistry constituents were identified throughout the site. Efforts are currently being made to acquire background data for these constituents to determine if these elevated levels are regional or site-specific in nature.

Detected concentrations of WQCC metals were also identified throughout the site. However, the higher concentrations of these constituents appear to be present within Area 2 and Area 3. Lower concentrations detected outside of Area 2 and Area 3 do not appear to present a significant risk to human health or the environment.

WQCC metals and TPH concentrations reported in Area 2 and Area 3 have been horizontally delineated. Area 2 appears to be somewhat ovular in shape, measuring approximately 110 feet by 130 feet at its widest points. The Area 3 trenched area described in the SIR measures approximately 40 feet by 60 feet, and the impacted area surrounding SB-21 measures a maximum of 30 feet by 25 feet at its widest points.

The vertical extent of Area 2 impact in SB-22 through SB-31 ranged from approximately 15 to 30 feet bgs. The vertical extent of impact in the previous borings described in the SIR was not fully delineated due to adverse drilling conditions and auger refusal. The vertical extent of impact in Area 3 ranged from approximately 10 to 20 feet bgs based on the results of SB-21 and trenching described in the SIR. Impact in SB-21 appears to be due to a surface release in the area unrelated to the trenched area.

A groundwater sample from MW-4 indicated a concentration of chromium in excess of the WQCC standards. A groundwater sample from MW-6 showed detected concentrations of chloride, fluoride, nitrate-N, iron and silver in excess of the WQCC standards. These constituents were also detected in soils on the site. Not enough groundwater data has been collected to accurately determine if the detected concentrations exceeding the WQCC standards are from an on-site or off-site source, or if these constituents present a significant risk to human health or the environment.

5.3 Recommendations

The on-site septic tank should be replaced. The RCRA non-hazardous waste in the tank should be cleaned out and disposed at the Hobbs POTW. Removal of the tank must follow the guidelines of all applicable regulations. The tank must be EPA clean, cut up, and disposed at the Lea County landfill. A licensed contractor should install a new septic tank, and barriers should be installed around the tank to prevent damage from vehicular traffic. Confirmation samples from the tank pit should be analyzed for chromium.

Remediation is recommended to remove all impacted soils in Area 2. Confirmation sampling should be performed during remediation to insure that all TPH impacted soils greater than 100 ppm and WQCC metals impacted soils in concentrations that pose a risk to human health or the environment are removed.

The trenched area in Area 3 was delineated horizontally and vertically, and detected concentrations of constituents of concern were relatively low. Due to the shallow depth of the impact, approximately 10 to 15 feet bgs, and the hard caliche layers and rock cap above the water table, permeation of the detected concentrations to the groundwater appears unlikely. Impact in SB-21 extends deeper, but was not delineated vertically due to auger refusal. However, the impact is isolated and has been delineated horizontally. Again, permeation of the detected concentrations from SB-21 to the groundwater appears unlikely. Leaving the impacted soils in place in Area 3 does not appear to present a significant risk to human health or the environment.

Quarterly monitoring for one year is recommended for MW-1 through MW-7 to determine if detected constituents in the soil present a risk of contamination to the groundwater, and determine if detected concentrations in the groundwater pose a significant risk to human health or the environment. All seven wells should be analyzed for general chemistry. Additionally, MW-4 and MW-5 should be analyzed for chromium and MW-6 should be analyzed for WQCC metals, TPH and BTEX.

6.0 REFERENCES

Enercon Services, Inc., *Revised Abatement Plan Proposal.* September 10, 2000

Enercon Services, Inc., *Site Investigation Report*, November 10, 2000

New Mexico Oil Conservation Division, *Guidelines for Remediation of Leaks, Spills and Releases.* August 13, 1993

University of Texas Bulletin #3232, Geology of Texas, Austin, TX 1932

USEPA. *Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies.* Office of Research and Development, Washington, D.C. 1992. EPA/600/R-92/128.

USEPA. *Soil Screening Guidance. User's Guide.* Office of Emergency and Remedial Response. Washington, D.C. 1996. EPA/540/R-96/018.

USEPA. *Test Methods for Evaluating Solids Waste, Physical/Chemical Methods.* Publication SW-846, 1996

APPENDIX A

WATER WELL SURVEY

Banks
Information
Solutions, Inc

Water Well Report™

June 13, 2001

CLIENT

Enercon Services, Inc.
8866 Gulf Freeway, Suite 380
Houston, TX 77017

SITE

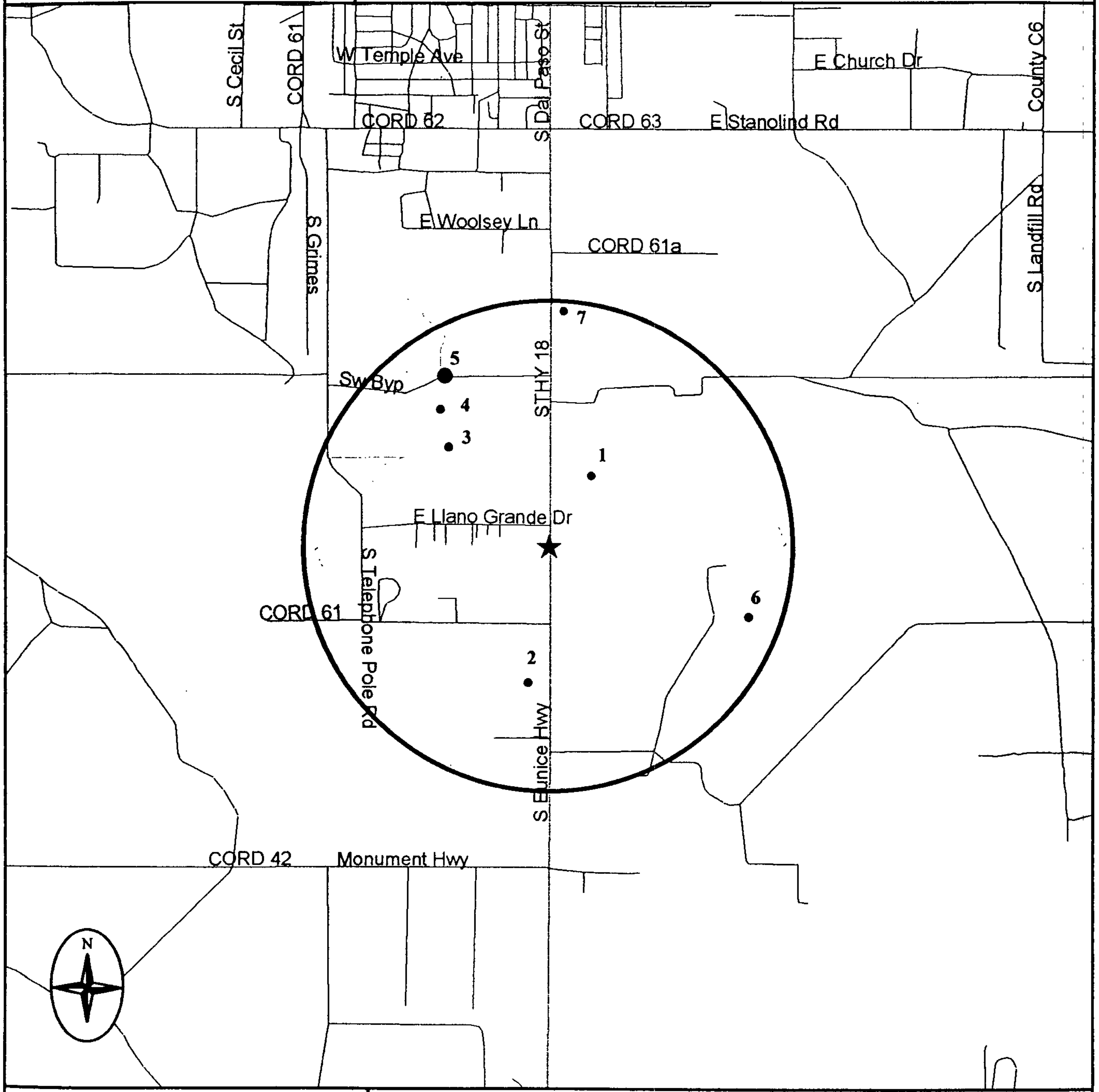
Champion Technologies, Inc.
4001 South Highway 18
Hobbs, NM 88240
061301-008

P.O. Box 12851, Capitol Station, Austin, TX 78711
1701 Nueces, Austin, TX 78701
512.478.0059 FAX 512.478.1433 e-mail banks@banksinfo.com

Banks
Information
Solutions, Inc.

Water Well Report™

Map of Wells within One Mile



★ Subject Site
● Ground Water Wells (Cluster)
• Ground Water Well
Airport
Hospital
Highway
Primary road
Secondary and connecting road
Local road
Access road
Water body
Park
State

0 0.25 0.5 Miles

Banks Information Solutions, Inc.
P.O. Box 12851, Capitol Station Austin, Texas 78711
1701 Nueces Austin, Texas 78701
512-478-0059 FAX 512-478-1433 E Mail: BANKS@BANKSINFO.COM
June 13, 2001

Banks Information Solutions, Inc.

Water Well Report™

DETAILS

State ID	323942103072901	**MAP ID**
Banks ID	3502501228	1
Owner Of Well	SELMAN, FRANK	
Type Of Well	Unused	
Depth Drilled	59 '	
Completion Date	N/A	
Longitude	-103.12472222	
Latitude	32.6616666667	

State ID	323858103074501	**MAP ID**
Banks ID	3502501201	2
Owner Of Well	EDWARDS, D.D.	
Type Of Well	Irrigation	
Depth Drilled	123 '	
Completion Date	N/A	
Longitude	-103.12916667	
Latitude	32.6494444444	

State ID	323948103080501	**MAP ID**
Banks ID	3502501233	3
Owner Of Well	WALKER OIL CORP.	
Type Of Well	Unused	
Depth Drilled	58 '	
Completion Date	N/A	
Longitude	-103.13472222	
Latitude	32.6633333333	

P.O. Box 12851, Capitol Station, Austin, TX 78711
1701 Nueces, Austin, TX 78701
512.478.0059 FAX 512.478.1433 e-mail banks@banksinfo.com

Water Well Report™

DETAILS

State ID	323956103080701
Banks ID	3502501238
Owner Of Well	MIDWEST OIL CO.
Type Of Well	Unused
Depth Drilled	N/A '
Completion Date	N/A
Longitude	-103.13527778
Latitude	32.6655555556

MAP ID
4

State ID	324003103080601
Banks ID	3502501242
Owner Of Well	SHELL OIL CO.
Type Of Well	Unused
Depth Drilled	37 '
Completion Date	N/A
Longitude	-103.135
Latitude	32.6675

MAP ID
5

State ID	324003103080602
Banks ID	3502501243
Owner Of Well	SHELL OIL CO.
Type Of Well	Unused
Depth Drilled	49 '
Completion Date	N/A
Longitude	-103.135
Latitude	32.6675

MAP ID
5

Banks
Information
Solutions, Inc.

Water Well Report™

DETAILS

State ID	323912103064901
Banks ID	3502501211
Owner Of Well	TARBET, JOE
Type Of Well	Unused
Depth Drilled	N/A '
Completion Date	12/15/1990
Longitude	-103.11361111
Latitude	32.6533333333

MAP ID
6

State ID	324017103073601
Banks ID	3502501256
Owner Of Well	DUNNAM
Type Of Well	Stock
Depth Drilled	N/A '
Completion Date	N/A
Longitude	-103.12666667
Latitude	32.6713888889

MAP ID
7

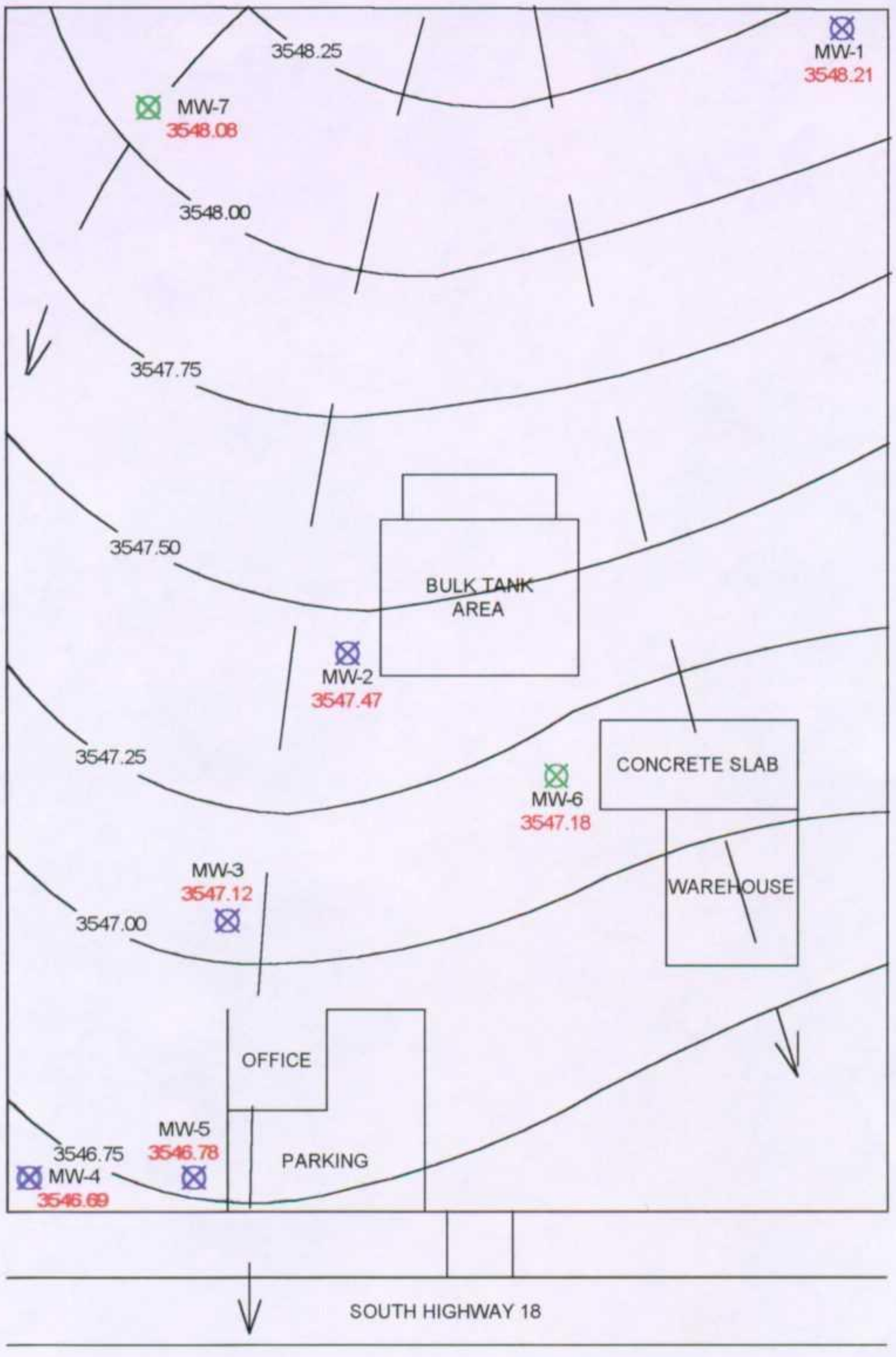
Water Well Report™ Research Mapping Protocol

Banks Information Solutions, Inc. Water Well Report™ is prepared from existing state water well databases and/or additional file data/records research conducted at the State Engineers Office located in Santa Fe, New Mexico. In New Mexico, water wells are located within a grid system using section, township, and range. The locations of these wells on the enclosed map were plotted using a GIS program, ArcView 3.2, with the aid of the section, township, and range of the wells provided by the drillers logs.

Banks Information Solutions, Inc. has performed a thorough and diligent search of all groundwater well information provided and recorded with the New Mexico State Engineers Office. All mapped locations are based on information obtained from the NMSEO. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or the actual driller. It may be possible that some water well schedules and logs have never been submitted to the regulatory authority by the water driller and, thus, may explain the possible unaccountability of privately drilled wells. It is uncertain if the above listing provides 100% of the existing wells within the area of review. Therefore, Banks Information Solutions, Inc. cannot fully guarantee the accuracy of the data or well location(s) of those maps and records maintained by the New Mexico State Engineer regulatory authorities.

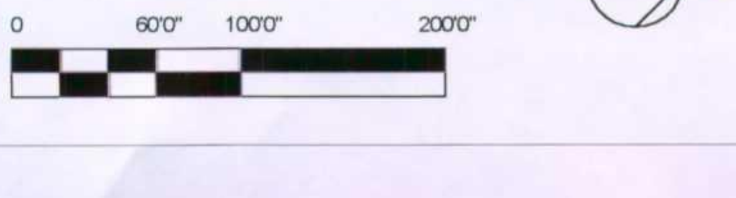
APPENDIX B

FIGURES AND TABLES



⊠ = MONITORING WELLS INSTALLED 9/00

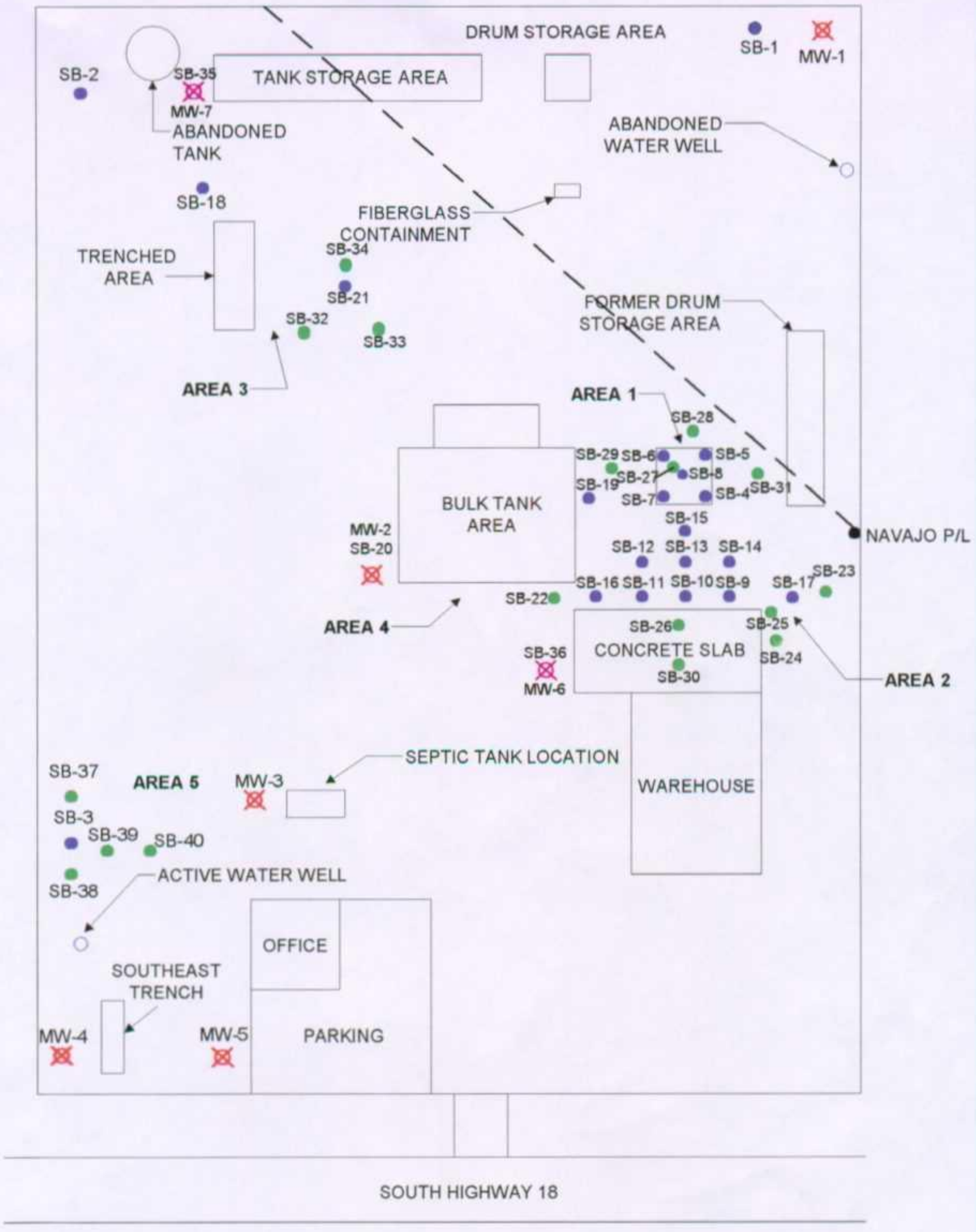
⊠ = MONITORING WELLS INSTALLED 5/01



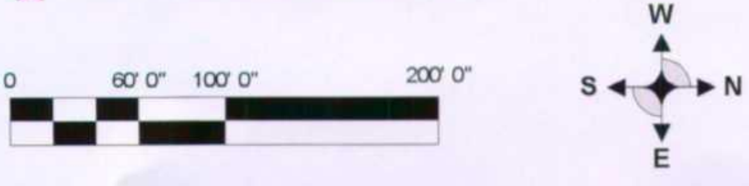
ENERCON SERVICES, INC.

FIGURE 1
GROUNDWATER POTENTIOMETRIC
SURFACE MAP (6-20-01)
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.: PH-334 DATE: 6/22/01 BY: JKB



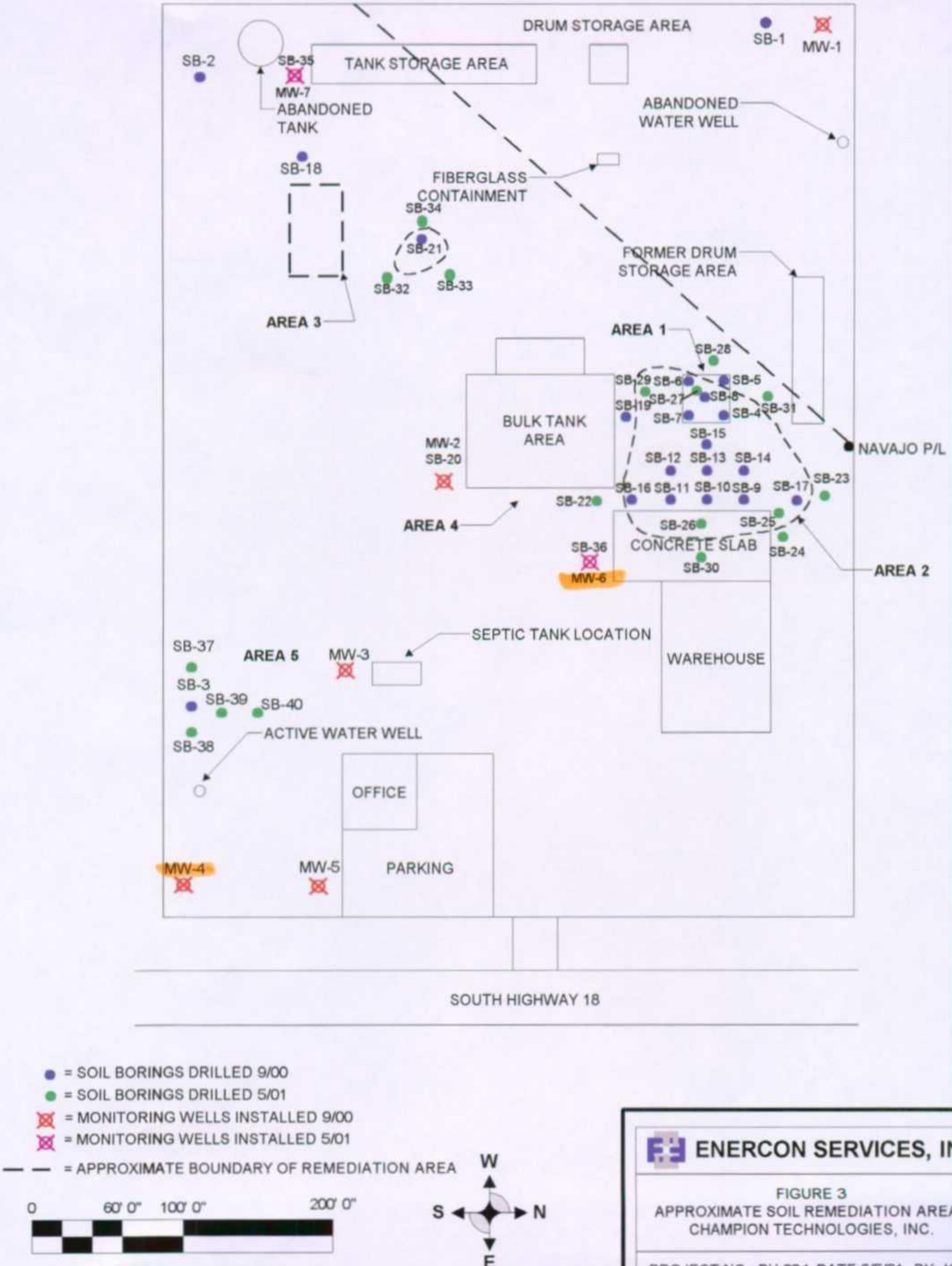
● = SOIL BORINGS DRILLED 9/00
● = SOIL BORINGS DRILLED 5/01
☒ = MONITORING WELLS INSTALLED 9/00
☒ = MONITORING WELLS INSTALLED 5/01



ENERCON SERVICES, INC.

FIGURE 2
SOIL SAMPLE AND
MONITOR WELL LOCATIONS
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.: PH-334 DATE:6/5/01 BY: KAH



ENERCON SERVICES, INC.

FIGURE 3
APPROXIMATE SOIL REMEDIATION AREAS
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.: PH-334 DATE:6/5/01 BY: KAH

TABLE 1

New Mexico Water Quality Control Commission (WQCC) Groundwater Standards

Constituent	Standards (mg/L)
Benzene	0.01
Toluene	0.75
Ethylbenzene	0.75
Xylenes, total	0.62
Benzo-a-pyrene	0.0007
Carbon tetrachloride	0.01
Chloroform	0.1
Ethylene dibromide	0.0001
Methylene chloride	0.1
PAHs	0.03
Phenols	0.005
Polychlorinated biphenyls	0.001
Vinyl chloride	0.001
1,1-Dichloroethane	0.025
1,1-Dichloroethylene	0.005
1,2-Dichloroethane	0.001
1,1,2,2-Tetrachloroethane	0.01
1,1,1-Trichloroethane	0.06
1,1,2-Trichloroethane	0.01
1,1,2,2-Tetrachloroethylene	0.02
1,1,2-Trichloroethylene	0.1
Mercury	0.002
Arsenic	0.1
Barium	1.0
Cadmium	0.01
Chromium	0.05
Copper	1.0
Iron	1.0
Lead	0.05
Manganese	0.2
Selenium	0.05
Silver	0.05
Zinc	10
Fluoride	1.6
Chloride	250
Sulfate	600
Nitrate-N	10
Total Dissolved Solids	1000

TABLE 2

Summary of Groundwater Elevation & Purge Data
Champion Technologies, Inc.
Hobbs, NM

Well ID	Date Purged	Depth to Water (ft bgs)	TOC (ft msl)	Groundwater Elevation (ft msl)	Gallons Purged
MW-1	18-Sep-00	49.63	3597.836	3548.206	28
MW-2	18-Sep-00	55.25	3602.717	3547.467	13
MW-3	18-Sep-00	55.68	3602.797	3547.117	12
MW-4	18-Sep-00	56.00	3602.687	3546.687	16
MW-5	18-Sep-00	55.84	3602.615	3546.775	16
MW-6	14-May-01	55.33	3602.510	3547.180	20
MW-7	14-May-01	52.16	3600.240	3548.080	Not sampled

*** All seven wells were gauged for depth to water on June 20, 2001.**

TABLE 3

Total Petroleum Hydrocarbon (TPH) Meter Readings
May, 2001

Sample ID	TPH	Sample ID	TPH
22-0507-A	4	29-2021-A	1510
22-1517-A	23	29-2325-A	520
22-2325-A	5	29-3032-A	165
23-0305-A	24	29-3840-A	65
23-1012-A	20	30-0305-A	5
23-2325-A	15	30-1517-A	10
24-0305-A	20	30-2830-A	0
24-1012-A	22	30-3335-A	0
24-2325-A	8	31-0305-A	11
25-0305-A	20	31-1517-A	10
25-1012-A	1780	31-2325-A	8
25-2022-A	128	32-0305-A	9
26-0305-A	20	32-1315-A	8
26-1012-A	19	32-2325-A	25
26-1517-A	1736	33-0305-A	1039
26-2022-A	1848	33-1315-A	52
26-2527-A	930	33-2325-A	47
26-3235-A	70	34-0810-A	29
27-0305-A	1825	34-1820-A	25
28-0305-A	54	34-2830-A	20
28-1012-A	77	34-3840-A	25
28-2325-A	2	36-0305-A	21
29-0305-A	1857	36-1315-A	24
29-0507-A	1863	36-2325-A	18
29-1012-A	1818	36-3335-A	10
29-1517-A	1769	36-4345-A	18

TABLE 4

WQCC Metals in Soil
(mg/kg)
May, 2001

Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Selenium	Silver	Zinc
22-0507-A	09-May-01	<5.00	280	<0.500	<5.00	<1.00	1,816	<1.00	30.2	<0.200	<5.00	<5.00	<1.00
22-1517-A	09-May-01	<5.00	294	<0.500	<5.00	<1.00	3,316	<1.00	36.6	<0.200	<5.00	<5.00	<1.00
22-2325-A	09-May-01	<5.00	75.2	<0.500	<5.00	<1.00	2,826	<1.00	36.2	<0.200	<5.00	<5.00	<1.00
23-0305-A	09-May-01	5.71	378	<0.500	<5.00	<1.00	1,815	<1.00	26.1	<0.200	<5.00	<5.00	<1.00
23-1012-A	09-May-01	<5.00	59.5	<0.500	<5.00	<1.00	1,638	<1.00	28	<0.200	<5.00	<5.00	<1.00
23-2325-A	09-May-01	<5.00	696	<0.500	<5.00	<1.00	1,201	<1.00	27.2	<0.200	<5.00	<5.00	<1.00
24-0305-A	09-May-01	<5.00	387	<0.500	<5.00	<1.00	1,429	<1.00	25.1	<0.200	<5.00	<5.00	<1.00
24-1012-A	09-May-01	<5.00	40.1	<0.500	<5.00	11.3	2,311	<1.00	28.4	<0.200	<5.00	<5.00	57.4
24-2325-A	09-May-01	<5.00	49.2	<0.500	<5.00	<1.00	1,820	<1.00	72	<0.200	<5.00	<5.00	314
24-3840-A	09-May-01	<5.00	42.4	<0.500	<5.00	<1.00	1,003	<1.00	21.2	<0.200	<5.00	<5.00	<1.00
25-0305-A	09-May-01	6.08	371	<0.500	<5.00	<1.00	1,787	<1.00	23.7	<0.200	<5.00	<5.00	<1.00
25-1012-A	09-May-01	7.10	261	<0.500	7.56	<1.00	3,028	8.2	31.5	<0.200	<5.00	<5.00	75.6
25-2022-A	09-May-01	<5.00	247	<0.500	<5.00	<1.00	1,437	<1.00	33.2	<0.200	<5.00	<5.00	<1.00
26-0305-A	09-May-01	6.50	367	<0.500	<5.00	<1.00	2,287	<1.00	34.3	<0.200	<5.00	<5.00	172
26-1012-A	09-May-01	5.62	144	<0.500	<5.00	<1.00	2,937	<1.00	97.2	<0.200	<5.00	<5.00	<1.00
26-2527-A	09-May-01	<5.00	194	<0.500	<5.00	<1.00	1,929	<1.00	25.4	<0.200	<5.00	<5.00	<1.00
26-3235-A	09-May-01	<5.00	124	<0.500	<5.00	<1.00	1,514	<1.00	27.7	<0.200	<5.00	<5.00	<1.00
27-0305-A	10-May-01	6.28	763	<0.500	21.3	<1.00	3,629	5.34	61.8	<0.200	<5.00	<5.00	25.2
28-0305-A	10-May-01	5.95	371	<0.500	<5.00	<1.00	1,199	<1.00	23.6	<0.200	<5.00	<5.00	<1.00
28-1012-A	10-May-01	7.32	1418	<0.500	<5.00	<1.00	1,565	<1.00	29.4	<0.200	<5.00	<5.00	<1.00
28-2325-A	10-May-01	<5.00	229	<0.500	<5.00	<1.00	1,516	<1.00	28.7	<0.200	<5.00	<5.00	<1.00
29-0305-A	10-May-01	6.63	1325	<0.500	30.8	<1.00	4,069	19.2	60.7	<0.200	<5.00	<5.00	61.1
29-1012-A	10-May-91	7.42	1688	<0.500	34.2	3.17	5,997	29	73	<0.200	<5.00	<5.00	157
29-2325-A	10-May-01	<5.00	159	<0.500	<5.00	<1.00	723	<1.00	16.6	<0.200	<5.00	<5.00	<1.00
29-3840-A	10-May-01	<5.00	197	<0.500	<5.00	<1.00	1,108	<1.00	103	<0.200	<5.00	<5.00	<1.00
30-0305-A	10-May-01	5.4	536	<0.500	<5.00	<1.00	1,388	<1.00	24.2	<0.200	<5.00	<5.00	<1.00
30-1517-A	10-May-01	<5.00	93.4	<0.500	<5.00	<1.00	1,413	<1.00	32.3	<0.200	<5.00	<5.00	<1.00
30-3335-A	10-May-01	<5.00	76.8	<0.500	<5.00	<1.00	1,373	<1.00	19.8	<0.200	<5.00	<5.00	<1.00
31-0305-A	10-May-01	<5.00	251	<0.500	<5.00	<1.00	2,267	<1.00	81.9	<0.200	<5.00	<5.00	<1.00
31-1517-A	10-May-01	5.24	136	<0.500	<5.00	<1.00	2,441	<1.00	57.1	<0.200	<5.00	<5.00	<1.00
31-2325-A	10-May-01	<5.00	193	<0.500	<5.00	<1.00	1,052	<1.00	23.0	<0.200	<5.00	<5.00	<1.00
32-0305-A	10-May-01	6.06	242	<0.500	<5.00	<1.00	1,550	<1.00	17.8	<0.200	<5.00	<5.00	<1.00
32-1315-A	10-May-01	<5.00	174	<0.500	<5.00	<1.00	2,242	<1.00	44.1	<0.200	<5.00	<5.00	<1.00
32-2325-A	10-May-01	<5.00	236	<0.500	<5.00	<1.00	1,282	<1.00	283	<0.200	<5.00	<5.00	<1.00
33-0305-A	10-May-01	6.62	369	<0.500	<5.00	<1.00	1,847	<1.00	25.9	<0.200	<5.00	<5.00	<1.00
33-1315-A	10-May-01	6.06	513	<0.500	<5.00	<1.00	1,864	<1.00	30.9	<0.200	<5.00	<5.00	<1.00
33-2325-A	10-May-01	5.65	261	<0.500	<5.00	<1.00	1,788	<1.00	628	<0.200	<5.00	<5.00	<1.00
34-0810-A	10-May-01	5.22	215	<0.500	<5.00	<1.00	2,546	<1.00	32.1	<0.200	<5.00	<5.00	<1.00
34-1820-A	10-May-01	<5.00	485	<0.500	<5.00	<1.00	1,468	<1.00	32.1	<0.200	<5.00	<5.00	<1.00
34-2830-A	10-May-01	<5.00	142	<0.500	<5.00	<1.00	1,307	<1.00	18.9	<0.200	<5.00	<5.00	<1.00
34-3840-A	10-May-01	<5.00	116	<0.500	<5.00	<1.00	1,179	<1.00	146	<0.200	<5.00	<5.00	<1.00
35-0305-A	11-May-01	5.46	380	<0.500	<5.00	3.2	3,278	2.77	30.8	<0.200	<5.00	<5.00	15.5
35-1315-A	11-May-01	<5.00	191	<0.500	<5.00	1.01	2,241	2.02	30.3	<0.200	<5.00	<5.00	8.09
35-2325-A	11-May-01	<5.00	212	<0.500	<5.00	2.88	1,356	2.29	37.5	<0.200	<5.00	<5.00	28.1
35-3335-A	11-May-01	<5.00	162	<0.500	<5.00	<1.00	1,410	1.71	65.4	<0.200	<5.00	<5.00	6.2

TABLE 5

BTEX TPH In Soil
(mg/kg)
May, 2001

Sample ID	Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes, total	TPH (418.1)
22-0507-A	09-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
22-2325-A	09-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
23-1012-A	09-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
23-2325-A	09-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
24-1012-A	09-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
24-2325-A	09-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
25-2022-A	09-May-01	<0.125	<0.125	<0.125	<0.125	208
26-2527-A	09-May-01	<0.125	<0.125	<0.125	<0.125	286
28-0305-A	10-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
28-1012-A	10-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
29-1012-A	10-May-01	4.11	19.7	16.7	42.3	26000
30-1517-A	10-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
30-3335-A	10-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
31-1517-A	10-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
31-2325-A	10-May-01	<0.125	<0.125	<0.125	<0.125	<10.0
33-0305-A	10-May-01	<0.125	<0.125	<0.125	<0.125	<10.0

TABLE 6

General Chemistry in Soil
(mg/kg)
May, 2001

Sample ID	Sample Date	Calcium	Chloride	Magnesium	Potassium	Sodium
22-0507A	09-May-01	147,909	1,251	4,409	805	1,552
22-1517-A	09-May-01	88,545	910	35,367	1,171	1,073
22-2325-A	09-May-01	90,272	355	43,413	975	957
23-0305-A	09-May-01	271,408	118	22,683	747	634
23-1012-A	09-May-01	68,006	791	3,816	885	562
23-2325-A	09-May-01	238,760	355	18,454	443	481
24-0305-A	09-May-01	297,924	198	3,556	615	495
24-1012-A	09-May-01	46,074	220	6,724	1,112	633
24-2325-A	09-May-01	252,456	821	16,651	796	688
24-3840-A	09-May-01	92,371	166	3,753	247	253
25-0305-A	09-May-01	212,454	39.5	15,900	818	292
25-1012-A	09-May-01	198,123	75.8	7,358	1,044	272
25-2022-A	09-May-01	197,312	173	19,955	575	185
26-0305-A	09-May-01	295,815	18.6	9,185	920	241
26-1012-A	09-May-01	90,456	66.2	20,265	1,599	751
26-2527-A	09-May-01	167,153	102	13,300	678	151
26-3235-A	09-May-01	139,675	95.9	12,214	547	141
27-0305-A	10-May-01	180,029	240	8,993	1,300	486
28-0305-A	10-May-01	254,455	378	2,750	585	387
28-1012-A	10-May-01	308,142	341	13,621	728	360
28-2325-A	10-May-01	123,744	120	11,724	525	292
29-0305-A	10-May-01	159,609	236	6,872	1,080	583
29-1012-A	10-May-01	116,878	1,154	7,529	1,391	1,868
29-2325-A	10-May-01	330,231	233	13,908	252	327
29-3840-A	10-May-01	144,573	57.4	4,532	346	104
30-0305-A	10-May-01	274,834	<3.00	8,727	587	120
30-1517-A	10-May-01	120,495	33.1	5,326	1,029	506
30-0305-A	10-May-01	77,730	11.2	8,064	380	164
31-0305-A	10-May-01	151,169	707	3,282	826	1,046
31-1517-A	10-May-01	133,532	594	23,876	829	652

NA = Not Analyzed

TABLE 6

General Chemistry in Soil
(mg/kg)
May, 2001

Sample ID	Sample Date	Calcium	Chloride	Magnesium	Potassium	Sodium
31-2325-A	10-May-01	210,643	419	18,162	318	342
32-0305-A	10-May-01	235,047	4,460	13,347	809	2,715
32-1315-A	10-May-01	79,930	1,507	19,392	827	857
32-2325-A	10-May-01	146,665	194	15,283	390	312
33-0305-A	10-May-01	201,557	5,166	5,706	865	4,849
33-1315-A	10-May-01	212,130	5,218	19,716	861	3,045
33-2325-A	10-May-01	185,751	1,712	14,915	809	1,299
34-0810-A	10-May-01	132,036	2,713	9,750	915	2,558
34-1820-A	10-May-01	213,081	1339	22,056	386	1,523
34-2830-A	10-May-01	165,158	175	14,931	257	202
34-3840-A	10-May-01	160,630	27.1	5,443	247	35.6
35-0305-A	11-May-01	120,727	1,339	12,858	1,806	4,376
35-1315-A	11-May-01	105,792	3,388	11,280	1,066	3,488
35-2325-A	11-May-01	157,033	1,579	16,344	293	1,222
35-3335-A	11-May-01	108,689	1,480	5,759	272	1,065
35-4345-A	11-May-01	N/A	1,405	N/A	N/A	N/A
36-0305-A	11-May-01	N/A	3,582	N/A	N/A	N/A
36-1315-A	11-May-01	N/A	1,195	N/A	N/A	N/A
36-2325-A	11-May-01	N/A	197	N/A	N/A	N/A
37-0001-A	11-May-01	N/A	2,076	N/A	N/A	N/A
38-0001-A	11-May-01	N/A	2,093	N/A	N/A	N/A
39-0001-A	11-May-01	N/A	3,511	N/A	N/A	N/A
40-0001-A	11-May-01	N/A	2,460	N/A	N/A	N/A

NA = Not Analyzed

TABLE 7

WQCC Metals in Groundwater
(mg/L)
May, 2001

Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MW-6	14-May-01	<0.050	<2.00	<0.005	<0.050	<0.050	1.7	<0.015	0.134	<0.002	<0.050	0.079	<0.050
MW-4	12-May-01				0.254								

TABLE 8

VOCs in Groundwater
(mg/L)
May, 2001

Sample ID	Sample Date	Benzene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	Bromomethane	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	Chloroform	Chloromethane	2-Chlorotoluene	4-Chlorotoluene	cis-1,2-Dichloroethene
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	cis-1,3 Dichloropropene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	Dibromomethane	1,2-Dichlorobenzene
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane
MW-6	14-May-01	<0.005	<0.005	<0.005	0.012	<0.005

Sample ID	Sample Date	1,1-Dichlorethene	1,2-Dichloropropane	1,3-Dichloropropane	1,1-Dichloropropene	Ethylbenzene
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

TABLE 8

VOCs in Groundwater
(mg/L)
May, 2001

Sample ID	Sample Date	Hexachlorobutadiene	Isopropylbenzene	Methyl tert-butyl ether	2,2-Dichloropropane	Methylene Chloride
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	Naphthalene	n-Butylbenzene	n-Propylbenzene	p-Isopropyltoluene	sec-butylbenzene
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	Styrene	tert-Butylbenzene	Tetrachloroethene	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane
MW-6	14-May-01	<0.005	<0.005	0.015	<0.005	<0.005

Sample ID	Sample Date	Toluene	trans-1,2-Dichloroethene	trans-1,2-Dichloropropene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,2,3-Trichloropropane
MW-6	14-May-01	<0.005	<0.005	<0.005	<0.005	<0.005

Sample ID	Sample Date	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Vinyl Chloride	Xylenes, total
MW-6	14-May-01	<0.005	<0.005	<0.002	<0.005

TABLE 9

General Chemistry in Groundwater
(mg/L)
May, 2001

Sample ID	Sample Date	Anion/Cation Balance	Bicarbonate/ Carbonate	Calcium	Chloride	Fluoride	Magnesium
MW-6	14-May-01	90.3	398.6/0.382	264	421	2.15	38

Sample ID	Sample Date	Nitrate-N	Nitrite	Potassium	Sodium	Sulfate
MW-6	14-May-01	14.1	<0.100	7.79	331	163

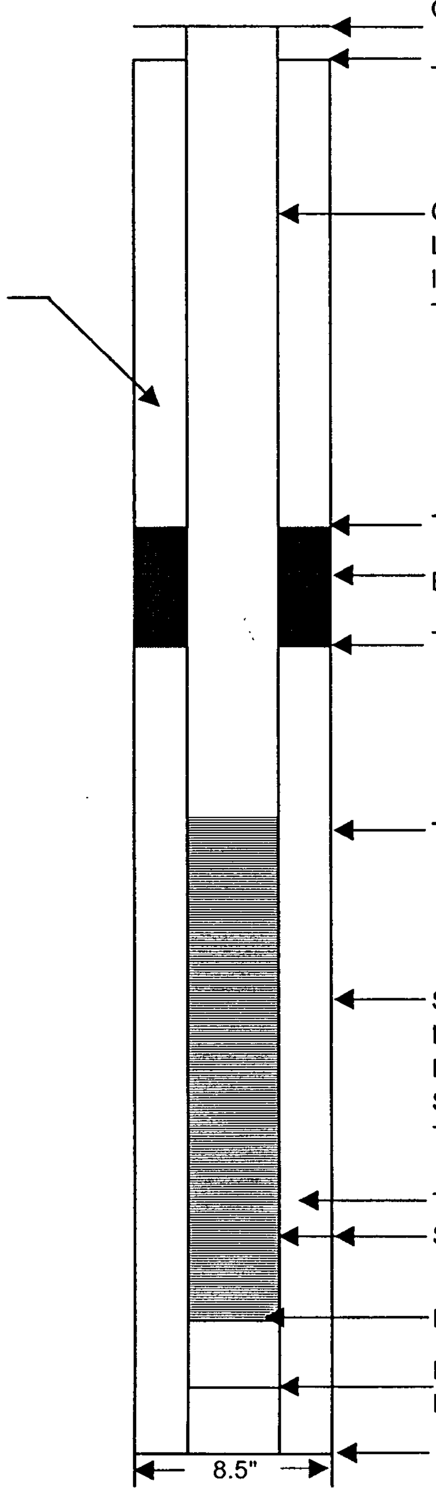
APPENDIX C

WELL CONSTRUCTION DIAGRAMS

Project No: ES-705	**Client:** Champion Tech.	**Site:** Hobbs, NM	**WELL No.** MW-1
Well Location:	605167.996 Northing, 911708.178 Easting		**Date Installed:** 9/11/2000
[illegible]tractor: Eades Drilling	**Method:** Air Rotary		**Inspector:** M. Amabisco

MONITORING WELL CONSTRUCTION DETAIL

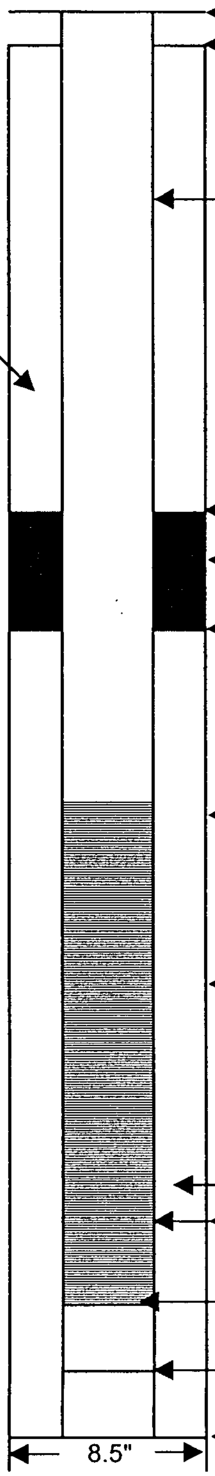
Cement-Bentonite
or Bentonite Slurry
Grout
95 % Cement
5 % Bentonite



		Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)		0	3597.836
Top of Casing (TOC)		0.005	3597.831
Casing			
Length	62.995		
Inside Diameter (ID)	4"		
Type of Material	Sch 40 PVC		
Top of Bentonite Seal		41	3556.836
Bentonite Seal Thickness	2.25"		
Top of Sand		45	3552.836
Top of Screen			
Screen:			
Length	15 ft.		
Inside Diameter (ID)	4"		
Slot Size	0.01		
Type of Material	Sch 40 PVC		
Type/Size of Sand	10/20		
Sand Pack Thickness	2.25"		
Bottom of Screen		62.5	3535.336
Bottom of Tail Pipe Length	0.5	63	3534.836
Total Depth		63	3534.836

Project No: ES-705	**Client:** Champion Tech.	**Site:** Hobbs, NM	**WELL No.** MW-2
Well Location: 604919.491 Northing, 912042.393 Easting		**Date Installed:** 9/11/2000	
[illegible]tractor: Eades Drilling	**Method:** Air Rotary	**Inspector:** M. Amabisco	

MONITORING WELL CONSTRUCTION DETAIL

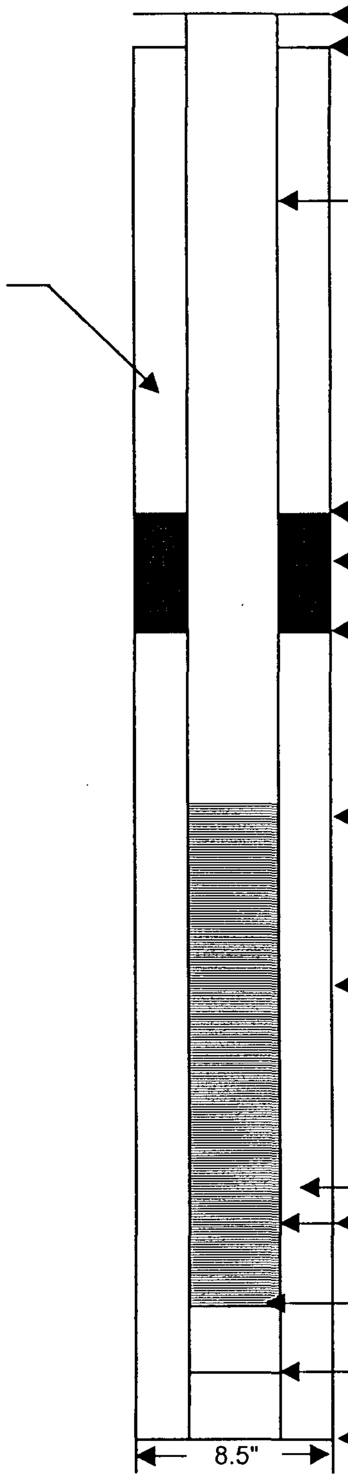


Cement-Bentonite or Bentonite Slurry Grout
95 % Cement
5 % Bentonite

		Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)		0	3602.894
Top of Casing (TOC)		0.177	3602.717
Casing			
Length	62.823		
Inside Diameter (ID)	4"		
Type of Material	Sch 40 PVC		
Top of Bentonite Seal		45	3557.894
Bentonite Seal Thickness	2.25"		
Top of Sand		47	3555.894
Top of Screen			
Screen:			
Length	15 ft.		
Inside Diameter (ID)	4"		
Slot Size	0.01		
Type of Material	Sch 40 PVC		
Type/Size of Sand	10/20		
Sand Pack Thickness	2.25"		
Bottom of Screen		62.5	3540.394
Bottom of Tail Pipe Length	0.5	63	3539.894
Total Depth		63	3539.894

Project No: ES-705	**Client:** Champion Tech.	**Site:** Hobbs, NM	**WELL No.** MW-3
Well Location: 604862.943 Northing, 912160.378 Easting		**Date Installed:** 9/12/2000	
tractor: Eades Drilling	**Method:** Air Rotary	**Inspector:** M. Amabisco	

MONITORING WELL CONSTRUCTION DETAIL



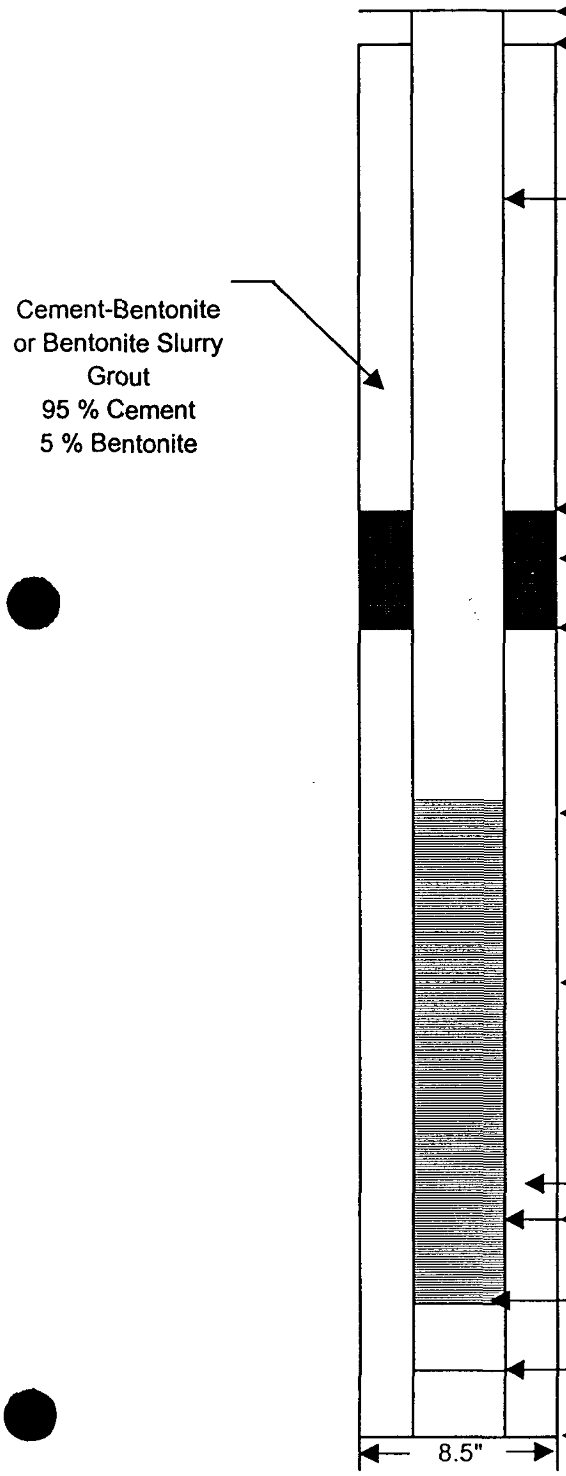
		Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)		0	3603.137
Top of Casing (TOC)		0.340	3602.797
Casing			
Length	62.903		
Inside Diameter (ID)	4"		
Type of Material	Sch 40 PVC		
Top of Bentonite Seal		44	3559.137
Bentonite Seal Thickness	2.25"		
Top of Sand		46	3557.137
Top of Screen			
Screen:			
Length	15 ft.		
Inside Diameter (ID)	4"		
Slot Size	0.01		
Type of Material	Sch 40 PVC		
Type/Size of Sand	10/20		
Sand Pack Thickness	2.25"		
Bottom of Screen		62.5	3540.637
Bottom of Tail Pipe Length	0.5	63	3539.894
Total Depth		63	3540.137

Project No: ES-705 **Client:** Champion Tech. **Site:** Hobbs, NM **WELL No.** MW-4

Well Location: 604740.442 Northing, 912307.654 Easting **Date Installed:** 9/12/2000

[illegible]ractor: Eades Drilling **Method:** Air Rotary **Inspector:** M. Amabisco

MONITORING WELL CONSTRUCTION DETAIL



		Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)		0	3602.916
Top of Casing (TOC)		0.229	3602.687
Casing			
Length	62.793		
Inside Diameter (ID)	4"		
Type of Material	Sch 40 PVC		
Top of Bentonite Seal		44	3558.916
Bentonite Seal Thickness	2.25"		
Top of Sand		46	3556.916
Top of Screen			
Screen:			
Length	15 ft.		
Inside Diameter (ID)	4"		
Slot Size	0.01		
Type of Material	Sch 40 PVC		
Type/Size of Sand	10/20		
Sand Pack Thickness	2.25"		
Bottom of Screen		62.5	3540.416
Bottom of Tail Pipe Length	0.5	63	3539.894
Total Depth		63	3539.916

Project No: ES-705 **Client:** Champion Tech. **Site:** Hobbs, NM **WELL No.** MW-5

Well Location: 604834.674 Northing, 912311.063 Easting **Date Installed:** 9/13/2000

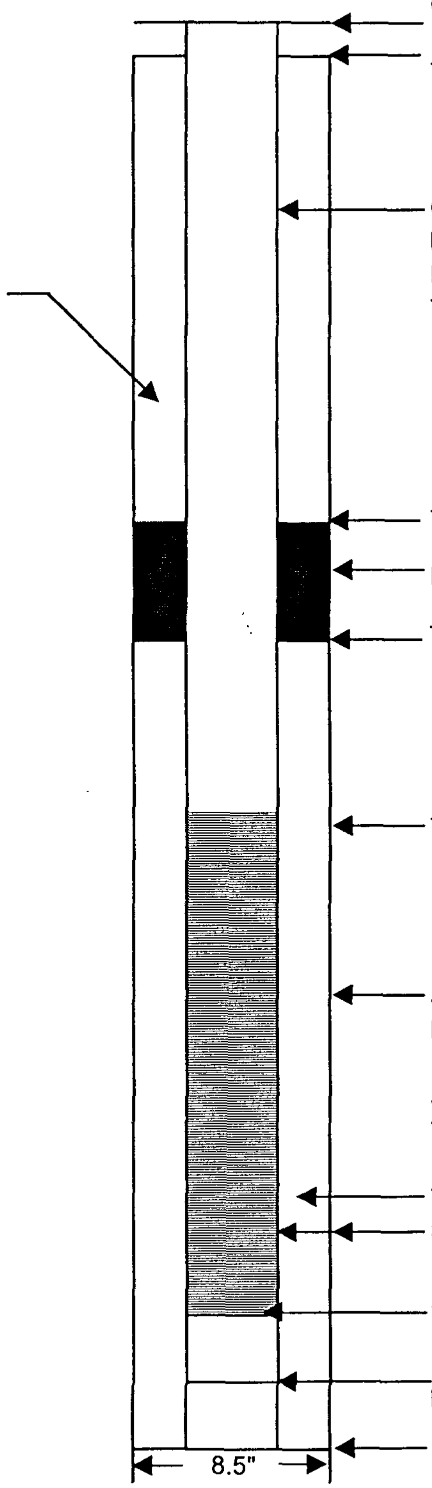
[illegible]tractor: Eades Drilling **Method:** Air Rotary **Inspector:** M. Amabisco

MONITORING WELL CONSTRUCTION DETAIL

		Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)		0	3602.815
Top of Casing (TOC)		0.200	3602.615
Casing			
Length	62.721		
Inside Diameter (ID)	4"		
Type of Material	Sch 40 PVC		
Top of Bentonite Seal		42.5	3560.315
Bentonite Seal Thickness	2.25"		
Top of Sand		45	3557.815
Top of Screen			
Screen:			
Length	15 ft.		
Inside Diameter (ID)	4"		
Slot Size	0.01		
Type of Material	Sch 40 PVC		
Type/Size of Sand	10/20		
Sand Pack Thickness	2.25"		
Bottom of Screen		62.5	3540.315
Bottom of Tail Pipe Length	0.5	63	3539.894
Total Depth		63	3539.815

Project No:	PH-334	**Client:**	Champion	**Site:**	Hobbs, NM	**WELL No.**	MW-6
Well Location:	605010.612 Northing, 912128.412 Easting					**Date Installed:**	5/11/2001
tractor:	Eades Drilling	**Method:**	Air Rotary			**Inspector:**	P. Brodin

MONITORING WELL CONSTRUCTION DETAIL



Cement-Bentonite
or Bentonite Slurry
Grout
95 % Cement
5 % Bentonite

		Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)		0	3602.790
Top of Casing (TOC)		0.28	3602.510
Casing			
Length	61.792		
Inside Diameter (ID)	4"		
Type of Material	Sch 40 PVC		
Top of Bentonite Seal		40	3562.790
Bentonite Seal Thickness	2.25"		
Top of Sand		43	3559.790
Top of Screen		47	3555.790
Screen:			
Length	15 ft.		
Inside Diameter (ID)	4"		
Slot Size	0.01		
Type of Material	Sch 40 PVC		
Type/Size of Sand	10/20		
Sand Pack Thickness	2.25"		
Bottom of Screen		61.5	3541.290
Bottom of Tail Pipe Length	0.5	62	3540.790
Total Depth		62	3540.790

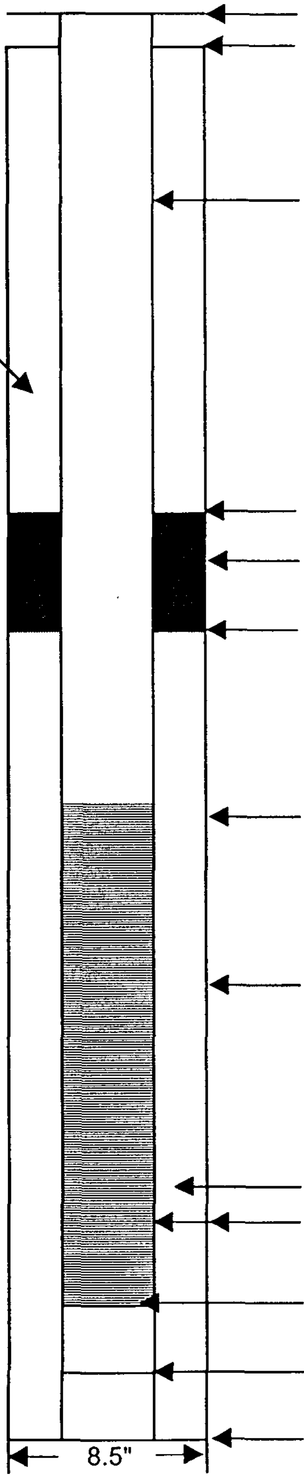
Project No: PH-334 **Client:** Champion **Site:** Hobbs, NM **WELL No.** MW-7

Well Location: 604.823.490 Northing, 911735.024 Easting **Date Installed:** 5/11/2001

tractor: Eades Drilling **Method:** Air Rotary **Inspector:** P. Brodin

MONITORING WELL CONSTRUCTION DETAIL

Cement-Bentonite
or Bentonite Slurry
Grout
95 % Cement
5 % Bentonite



		Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)		0	3600.700
Top of Casing (TOC)		0.460	3600.240
Casing			
Length	62.833		
Inside Diameter (ID)	4"		
Type of Material	Sch 40 PVC		
Top of Bentonite Seal		40	3560.700
Bentonite Seal Thickness	2.25"		
Top of Sand		45.5	3555.700
Top of Screen		48	3552.700
Screen:			
Length	15 ft.		
Inside Diameter (ID)	4"		
Slot Size	0.01		
Type of Material	Sch 40 PVC		
Type/Size of Sand	12/20		
Sand Pack Thickness	2.25"		
Bottom of Screen		62.5	3538.200
Bottom of Tail Pipe Length	0.5	63	3537.700
Total Depth		63	3537.700

APPENDIX D

SOIL BORING AND MONITORING WELL LOGS

ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-22	Date Drilled:	5/9/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS
0.0					
2.5					
5.0	Silty sand-light brown, fine to medium grained, some gravel (0.1-0.5")				
		22-0507-A	SS	0	100% recovery
7.5					
10.0	Same		SS	0	100% recovery
12.5					
15.0	Same				
		22-1517-A	SS	0.7-1.1	25% recovery
17.5					
20.0					

ABBREVIATIONS AND SYMBOLS

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
AR - Air Rotary
CT-5' - Continous Sampler

HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-22	Date Drilled: 5/9/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0	Not logged		SS		0% recovery	20.0
22.5						22.5
	Same					
		22-2325-A	SS		100% recovery	
25.0	Boring terminated at 25' bgs.					25.0
27.5						27.5
30.0						30.0
32.5						32.5
35.0						35.0
37.5						37.5
40.0						40.0

ABBREVIATIONS AND SYMBOLS

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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-23	Date Drilled: 5/9/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine to medium grained, some gravel (0.1-0.5")	23-0305-A	Grab	0	100% recovery	
5.0	Same		SS	0	100% recovery	5.0
7.5						7.5
10.0	Sandy silt - reddish orange, fine to medium grained	23-1012-A	SS	0	100% recovery, slightly moist	10.0
12.5						12.5
15.0	Not logged		SS		0% recovery	15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

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DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-23	Date Drilled: 5/9/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0	Silty sand - light brown, fine to medium grained		SS		100% recovery	20.0
22.5						22.5
	Same					
		23-2325-A	SS		25% recovery	
25.0	Boring terminated at 25' bgs.					25.0
27.5						27.5
30.0						30.0
32.5						32.5
35.0						35.0
37.5						37.5
40.0						40.0

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DC - Driving Casing
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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-24	Date Drilled:	5/9/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine to medium grained, some gravel (0.1 - 0.5")	24-0305-A	Grab	0.4 - 1.1		
5.0	Same		SS	0	100% recovery	5.0
7.5						7.5
10.0	Sandy silt - reddish orange, fine grained					10.0
		24-1012-A	SS	0	100% recovery	
12.5						12.5
15.0	Same, some gravel and rocks		SS		10% recovery	15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

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CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-24	Date Drilled:	5/9/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0			SS			20.0
22.5						22.5
	Same					
		24-2325-A	SS		100% recovery	
25.0						25.0
27.5						27.5
	Same		Grab		Very dry	
30.0						30.0
32.5						32.5
35.0						35.0
37.5	Same					37.5
		24-3840-A	Grab		Very dry	
40.0	Boring terminated at 40' bgs.					40.0

ABBREVIATIONS AND SYMBOLS

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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-25	Date Drilled: 5/9/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS
0.0					
2.5					
	Silty sand - light brown, fine to medium grained, some gravel (0.1 to 0.5")	25-0305-A	Grab		
5.0	Sand - light gray, medium grained, rock		SS		10% recovery
7.5					
10.0	Silty sand - light brown, some black material	25-1012-A	SS	14.1	10% recovery, odor
12.5					
15.0	Same, black material		SS		10% recovery, odor
17.5					
20.0					

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HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-25	Date Drilled: 5/9/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS
20.0	Silty sand - light gray, fine to medium grained				
		25-2022-A	SS	0	100% recovery, very hard
22.5					
25.0					
27.5					
	Not logged		SS		0% recovery
30.0	Boring terminated at 30' bgs.				
32.5					
35.0					
37.5					
40.0					

ABBREVIATIONS AND SYMBOLS

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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-26	Date Drilled:	5/9/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0	Concrete (0 - 0.5')					0.0
2.5						2.5
	Silty sand - light brown, fine to medium grained, some gravel (0.1 - 0.5")	26-0305-A	Grab			
5.0	Same		SS	5.4 -10.1	100% recovery	5.0
7.5						7.5
10.0	Same, rock					10.0
		26-1012-A	SS	3.2 - 7.8	100% recovery	
12.5						12.5
15.0	Silty sand - light gray, fine to medium grained		Grab			15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

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HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-26	Date Drilled:	5/9/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS
20.0	Silty sand - dark gray, medium grained, some gravel		SS		5% recovery, odor
22.5					
25.0	Silty sand - light gray, medium grained, some gravel				
		26-2527-A	Grab		
27.5					
30.0					
32.5					
	Same	26-3335-A	Grab		
35.0	Boring terminated at 35' bgs.				
37.5					
40.0					

ABBREVIATIONS AND SYMBOLS

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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-27	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - dark brown, fine to medium grained, some gravel and black material	27-0305-A	SS	1.1	100% recovery, moist	
5.0	Boring terminated at 5' bgs due to very soft ground.					5.0
7.5						7.5
10.0						10.0
12.5						12.5
15.0						15.0
17.5						17.5
20.0						20.0

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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
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RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-28	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine to medium grained, some gravel (0.1 - 0.5")	28-0305-A	Grab	12.9		
5.0	Silty sand - dark brown, fine to medium grained		SS	2.3 - 3.0	50% recovery	5.0
7.5						7.5
10.0	Silty sand - light brown, fine to medium grained, some gravel (0.1 - 0.5")	28-1012-A	SS	2.0	100% recovery	10.0
12.5						12.5
15.0	Same		Grab			15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

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AR - Air Rotary
CT-5' - Continous Sampler

HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-28	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0	Same		Grab			20.0
22.5						22.5
	Same	28-2325-A	Grab			
25.0	Boring terminated at 25' bgs.					25.0
27.5						27.5
30.0						30.0
32.5						32.5
35.0						35.0
37.5						37.5
40.0						40.0

ABBREVIATIONS AND SYMBOLS

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CT-5' - Continous Sampler

HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-29	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Sandy silt - dark brown					
		29-0305-A	Grab	30	Odor	
5.0	Same, heavy in black material		SS	50-164	100% recovery, odor	5.0
7.5						7.5
10.0	Same, heavy in black material					10.0
		29-1012-A	SS	80-175	100% recovery, odor	
12.5						12.5
15.0	Same, heavy in black material		SS	118-147	100% recovery, odor	15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

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CT-5' - Continous Sampler

HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-29	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0	Silty sand - light gray, fine to med. grained, some gravel (0.1 - 0.5")		Grab			20.0
22.5						22.5
	Silty sand - white, chalky, fine grained					
		29-2325-A	SS	25	50% recovery	
25.0						25.0
27.5						27.5
30.0	Same		Grab			30.0
32.5						32.5
35.0						35.0
37.5						37.5
	Same					
		29-3840-A	Grab			
40.0	Boring terminated at 40' bgs.					40.0

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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-30	Date Drilled: 5/10/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine to medium grained, some gravel (0.1 - 0.5")	30-0305-A	Grab	0.8		
5.0	Same		SS	1.1-9.5	100% recovery	5.0
7.5						7.5
10.0	Same		Grab	0.4		10.0
12.5						12.5
15.0	Silty sand - light brown, fine to medium grained, some gravel					15.0
		30-1517-A	Grab	0.3	Slightly moist	
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
AR - Air Rotary
CT-5' - Continous Sampler

HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-30	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0	Same		Grab			20.0
22.5						22.5
25.0						25.0
27.5						27.5
	Silty sand - light gray, medium grained		SS	0.4	100% recovery	
30.0						30.0
32.5						32.5
	Same					
		30-3335-A	SS	0.1	100% recovery	
35.0	Boring terminated at 35' bgs.					35.0
37.5						37.5
40.0						40.0

ABBREVIATIONS AND SYMBOLS

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MD - Mud Drilling

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HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-31	Date Drilled: 5/10/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS
0.0					
2.5					
	Silty sand - dark brown, fine to medium grained, some gravel (0.1 - 0.5")	31-0305-A	Grab	5	
5.0	Same		SS	11-20	100% Recovery
7.5					
10.0	Sand - light gray, fine grained		Grab		
12.5					
15.0	Same				
		31-1517-A	Grab	5.2	
17.5					
20.0					

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CFA - Continous Flight Augers
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RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-31	Date Drilled: 5/10/01	
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR	
	Driller: Fred Root	Logged By: P. Brodin	

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0	Same		Grab	4.4		20.0
22.5	Same	31-2325-A	Grab	3		22.5
25.0	Boring terminated at 25' bgs.					25.0
27.5						27.5
30.0						30.0
32.5						32.5
35.0						35.0
37.5						37.5
40.0						40.0

ABBREVIATIONS AND SYMBOLS

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ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-32	Date Drilled: 5/10/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine to medium grained, some gravel (0.1 - 0.5")	32-0305-A	Grab	4.6		
5.0	Same, very rocky		SS	4.7	100% recovery	5.0
7.5	Same, very rocky		SS	5.1	100% recovery	7.5
10.0						10.0
12.5	Same, very rocky					12.5
		32-1315-A	SS	5	100% recovery	
15.0						15.0
17.5	Silty sand - light gray, fine grained, very rocky		SS	3.7	100% recovery	17.5
20.0						20.0

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CFA - Continous Flight Augers
DC - Driving Casing
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RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-32	Date Drilled: 5/10/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0						20.0
22.5						22.5
	Same	32-2325-A	SS	1.1	100% recovery	
25.0	Boring terminated at 25' bgs.					25.0
27.5						27.5
30.0						30.0
32.5						32.5
35.0						35.0
37.5						37.5
40.0						40.0

ABBREVIATIONS AND SYMBOLS

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DC - Driving Casing
MD - Mud Drilling

ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-33	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine to medium grained, some gravel (0.1 - 0.5")	33-0305-A	Grab	1.1		
5.0						5.0
7.5						7.5
	Sand - reddish brown, fine grained, some gravel		SS		5% recovery	
10.0						10.0
12.5						12.5
	Silty sand, light gray, fine to medium grained, very rocky	33-1315-A	Grab	0.6	Very dry	
15.0						15.0
17.5						17.5
	Same, very rocky		Grab	0.4	Very dry	
20.0						20.0

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CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-33	Date Drilled: 5/10/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0						20.0
22.5						22.5
	Same, very rocky					
		33-2325-A	Grab	0.4	Very dry	
25.0	Boring terminated at 25' bgs.					25.0
27.5						27.5
30.0						30.0
32.5						32.5
35.0						35.0
37.5						37.5
40.0						40.0

ABBREVIATIONS AND SYMBOLS

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CFA - Continous Flight Augers
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HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-34	Date Drilled:	5/10/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - dark brown, medium grained, some gravel (0.25 - 1.0")		SS	0.6	100% recovery	
5.0						5.0
7.5						7.5
	Silty sand - light brown, medium grained, some gravel (0.1- 0.5")	34-0810-A	SS	1.2	100% recovery	
10.0						10.0
12.5						12.5
	Sand - light gray, medium grained, very rocky		Grab		Very dry	
15.0						15.0
17.5						17.5
	Same, very rocky					
		34-1820-A	Grab	0.9	Very dry	
20.0						20.0

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RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-34	Date Drilled: 5/10/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0						20.0
22.5						22.5
	Same, very rocky		Grab		Very dry	
25.0						25.0
27.5						27.5
	Same, very rocky					
		34-2830-A	Grab	0.3	Very dry	
30.0						30.0
32.5						32.5
	Same, very rocky		Grab		Very dry	
35.0						35.0
37.5						37.5
	Silty sand - light brown, fine grained					
		34-3840-A	Grab	1	100% recovery	
40.0	Boring terminated at 40' bgs.					40.0

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CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

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HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-35/MW-7	Date Drilled:	5/11/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine grained					
		35-0305-A	Grab			
5.0						5.0
7.5						7.5
10.0						10.0
12.5						12.5
	Same					
		35-1315-A	Grab			
15.0						15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

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CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-35/MW-7		Date Drilled: 5/11/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.		Drilling Method: AR
	Driller: Fred Root		Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS
20.0					
22.5					
	Sand - light gray, medium grained, some gravel (0.1 - 0.25"), hard rock layer at 23'				
		35-2325-A	Grab		Very dry
25.0					
27.5					
30.0					
32.5					
	Silty sand - light brown, fine grained; hard rock layer at 35'				
		35-3335-A	Grab		
35.0					
37.5					
40.0					

ABBREVIATIONS AND SYMBOLS

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RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-35/MW-7	Date Drilled:	5/11/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
40.0						40.0
42.5						42.5
	Same, hard rock layer 45 to 52'					
		35-4345-A	Grab		Slightly moist	
45.0						45.0
47.5						47.5
50.0						50.0
52.5						52.5
	Sand - light brown, medium grained		Grab		Water encountered at 53'	
55.0	Same				Moist	55.0
57.5						57.5
60.0	Boring terminated at 63' bgs.					60.0

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CFA - Continous Flight Augers
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MD - Mud Drilling

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8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-36/MW-6		Date Drilled: 5/11/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.		Drilling Method: AR
	Driller: Fred Root		Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
	Silty sand - light brown, fine grained, some gravel (0.1 - 0.5")	36-0305-A	Grab	0.1		
5.0						5.0
7.5						7.5
10.0						10.0
12.5						12.5
	Same, some gravel	36-1315-A	Grab	0.2		
15.0						15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

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CT-5' - Continous Sampler

HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Project #:	PH-334	Well/Boring #:	SB-36/MW-6	Date Drilled:	5/11/01
Project:	Champion Technologies Hobbs, NM	Drilling Company:	Eades Drilling & Pump Svc.	Drilling Method:	AR
		Driller:	Fred Root	Logged By:	P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
20.0						20.0
22.5						22.5
	Sand - light gray, fine grained, some gravel, hard rock layer 23 to 26'					
		36-2325-A	Grab	0.1	Very dry	
25.0						25.0
27.5						27.5
30.0						30.0
32.5						32.5
	Silty sand - light gray, fine to medium grained, some gravel					
		36-3335-A	Grab	0		
35.0						35.0
37.5						37.5
40.0						40.0

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RECORD OF SUBSURFACE EXPLORATION

Project #: PH-334	Well/Boring #: SB-36/MW-6	Date Drilled: 5/11/01
Project: Champion Technologies Hobbs, NM	Drilling Company: Eades Drilling & Pump Svc.	Drilling Method: AR
	Driller: Fred Root	Logged By: P. Brodin

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
40.0						40.0
42.5						42.5
	Same, some gravel, hard rock layer 43 - 53'					
		36-4345-A	Grab	0.4		
45.0						45.0
47.5						47.5
50.0						50.0
52.5						52.5
	Sand - light brown, medium grained		Grab		Water encountered at 53'	
55.0						55.0
	Same				Moist	
57.5						57.5
60.0	Boring terminated at 62'					60.0

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MD - Mud Drilling

APPENDIX E

ANALYTICAL RESULTS

● *MILLENNIUM Laboratories, Inc.*
1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Paul Brodin
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2001050065
Report Date: 05/15/2001

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: PH334
Received: 05/09/2001

Sampled by: Lee Nunn

Lab Number	Sample Identification
2001050065-1	SW-1
2001050065-2	SW-1
2001050065-3	SW-1
2001050065-4	SW-1

Technical - QA/QC review by :
[illegible]

MILLENNIUM LABORATORIES, Inc.
Amanda Bourgeois
Amanda Bourgeois/Daniel Duplechien
Project Manager

MILLENNIUM
LABORATORIES, INC.

May 23, 2001

Paul Brodin
Enercon
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2001050065
Project Name: Hobbs
Project Number: PH334

Dear Mr. Brodin:

Enclosed you will find the results of the samples submitted to Millennium Laboratories on 05/09/01 from the site referenced above.

Your sample "SW-1" (Millennium ID: 2001050065-1) was randomly chosen for use in Millennium's Quality Control Program for TCLP Metals Analysis by method 6020. The Matrix Spike (MS) recovery was outside the quality control limit for TCLP Cadmium and TCLP Lead, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

This report retains its validity and integrity only when reproduced in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories. All samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Amanda Bourgeois

Amanda Bourgeois
Project Manager

Report No.: 2001050065
05/30/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 1 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
TCLP Mercury	SW-846 1311/7470A	<0.002	mg/L	0.002	05/15/2001	GN
TCLP Arsenic	SW-846 1311/6020	<0.050	mg/L	0.050	05/14/2001	KF
TCLP Barium	SW-846 1311/6020	<2.00	mg/L	2.000	05/14/2001	KF
TCLP Cadmium	SW-846 1311/6020	<0.005	mg/L	0.005	05/14/2001	KF
TCLP Chromium	SW-846 1311/6020	<0.100	mg/L	0.100	05/14/2001	KF
TCLP Lead	SW-846 1311/6020	<0.015	mg/L	0.015	05/14/2001	KF
TCLP Selenium	SW-846 1311/6020	<0.050	mg/L	0.050	05/14/2001	KF
TCLP Silver	SW-846 1311/6020	<0.050	mg/L	0.050	05/14/2001	KF

Sample No.: 2 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
TCLP Dichlorodifluoromethane	SW-846 1311/8260B	<0.010	mg/L	0.010	05/14/2001	SCS
TCLP Chloromethane	SW-846 1311/8260B	<0.010	mg/L	0.010	05/14/2001	SCS
TCLP Vinyl Chloride	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Bromomethane	SW-846 1311/8260B	<0.010	mg/L	0.010	05/14/2001	SCS
TCLP Chloroethane	SW-846 1311/8260B	<0.010	mg/L	0.010	05/14/2001	SCS
TCLP Trichlorofluoromethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,1-Dichloroethene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Methylene Chloride	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP trans-1,2-Dichloroethene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,1-Dichloroethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP cis-1,2-Dichloroethene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Bromochloromethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Chloroform	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 2,2-Dichloropropane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2-Dichloroethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,1,1-Trichloroethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,1-Dichloropropene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Carbon Tetrachloride	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Benzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Dibromomethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2-Dichloropropane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Trichloroethene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Bromodichloromethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP cis-1,3-Dichloropropene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP trans-1,3-Dichloropropene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,1,2-Trichloroethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Toluene	SW-846 1311/8260B	0.006	mg/L	0.005	05/14/2001	SCS
TCLP 1,3-Dichloropropane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS

Report No.: 2001050065
05/30/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 2 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
TCLP Chlorodibromomethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2-Dibromoethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Tetrachloroethene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,1,1,2-Tetrachloroethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Chlorobenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Ethylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Xylenes, total	SW-846 1311/8260B	0.008	mg/L	0.005	05/14/2001	SCS
TCLP Bromoform	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Styrene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,1,2,2-Tetrachloroethane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2,3-Trichloropropane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Isopropylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Bromobenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP n-Propylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 2-Chlorotoluene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 4-Chlorotoluene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,3,5-Trimethylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP tert-Butylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2,4-Trimethylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP sec-Butylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,3-Dichlorobenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,4-Dichlorobenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP p-Isopropyltoluene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2-Dichlorobenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP n-Butylbenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2-Dibromo-3-chloropropane	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2,4-Trichlorobenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP Naphthalene	SW-846 1311/8260B	0.006	mg/L	0.005	05/14/2001	SCS
TCLP Hexachlorobutadiene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS
TCLP 1,2,3-Trichlorobenzene	SW-846 1311/8260B	<0.005	mg/L	0.005	05/14/2001	SCS

Sample No.: 3 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
TCLP N-Nitrosodimethylamine	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Phenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Bis(2-chloroethyl)ether	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2-Chlorophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 1,3-Dichlorobenzene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 1,4-Dichlorobenzene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE

Report No.: 2001050065
05/30/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 3 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
TCLP 1,2-Dichlorobenzene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2-Methylphenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Bis(2-chloroisopropyl)ether	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 4-Methylphenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP N-Nitrosodi-n-propylamine	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Hexachloroethane	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Nitrobenzene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Isophorone	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2-Nitrophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2,4-Dimethylphenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Bis(2-chloroethoxy)methane	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2,4-Dichlorophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 1,2,4-Trichlorobenzene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Naphthalene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 4-Chloroaniline	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Hexachlorobutadiene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 4-Chloro-3-methylphenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2-Methylnaphthalene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Hexachlorocyclopentadiene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2,4,6-Trichlorophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2,4,5-Trichlorophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2-Chloronaphthalene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2-Nitroaniline	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Dimethyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2,6-Dinitrotoluene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Acenaphthylene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 3-Nitroaniline	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Acenaphthene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2,4-Dinitrophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 4-Nitrophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Dibenzofuran	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2,4-Dinitrotoluene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Diethyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Fluorene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 4-Chlorophenylphenyl ether	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 4-Nitroaniline	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 2-Methyl-4,6-dinitrophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Azobenzene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP 4-Bromophenylphenyl ether	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Hexachlorobenzene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Pentachlorophenol	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE

Report No.: 2001050065
05/30/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 3 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
TCLP Phenanthrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Anthracene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Carbazole	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Di-n-butyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Fluoranthene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Pyrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Butylbenzyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(a)anthracene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Chrysene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Bis(2-ethylhexyl)phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Di-n-octyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(b)fluoranthene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(k)fluoranthene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(a)pyrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Indeno(1,2,3-cd)pyrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Dibenzo(a,h)anthracene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(ghi)perylene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE

Sample No.: 4 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Ignitability	SW-846 1010	>212	°F	50.000	05/14/2001	KF
Reactive Cyanide	7.3.3.2	<0.050	mg/L	0.050	05/11/2001	KF
Reactive Sulfide	7.3.4.2	<10.0	mg/L	10.000	05/14/2001	KF
pH	150.1	6.90	pH units	0.000	05/09/2001	KF

QC SUMMARY REPORT

Volatile Organics Compounds by GC/MS - Water

Batch: 653 w

Sample Lab Control Spikes (LCS/LCSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*LCS*		*LCSD*		MS/D RPD (%)	*QC Acceptance Criteria*	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	Spike % Recovery (Low - High Limit)
1,1-Dichloroethene	<0.005	0.100	0.103	103.2%	0.100	100.4%	3%	± 30	70 - 130
Chloroform	<0.005	0.100	0.096	95.6%	0.095	94.6%	1%	± 30	70 - 130
Trichloroethylene	<0.005	0.100	0.094	94.0%	0.100	99.8%	6%	± 30	70 - 130
1,2-Dichloropropane	<0.005	0.100	0.094	94.4%	0.100	100.2%	6%	± 30	70 - 130
Toluene	<0.005	0.100	0.092	91.6%	0.100	99.6%	8%	± 30	70 - 130
Chlorobenzene	<0.005	0.100	0.096	96.2%	0.096	95.6%	1%	± 30	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS*		*MSD*		LS/D RPD (%)	*QC Acceptance Criteria*	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	Spike % Recovery (Low - High Limit)
1,1-Dichloroethene	<0.005	0.100	0.115	114.8%	0.088	87.8%	27%	± 30	70 - 130
Chloroform	<0.005	0.100	0.106	106.0%	0.086	86.2%	21%	± 30	70 - 130
Trichloroethylene	<0.005	0.100	0.114	114.2%	0.089	89.0%	25%	± 30	70 - 130
1,2-Dichloropropane	<0.005	0.100	0.106	106.2%	0.091	90.8%	16%	± 30	70 - 130
Toluene	<0.005	0.100	0.105	105.4%	0.086	86.0%	20%	± 30	70 - 130
Chlorobenzene	<0.005	0.100	0.101	101.2%	0.089	89.0%	13%	± 30	70 - 130

Sample Spiked: 2001050087-1

Project(s) In Batch:

2001050055
2001050076
2001050078
2001050087

2001050065(tclp)

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 0160094

Semi-Volatile Organic Compounds by GC/MS - TCLP
SW-846 8270C

Laboratory Control Sample (LCS/LCSD)
Method Blank Results

CONSTITUENT	Method Blank Result (ppm)	Spike Added (ppm)	LCS Result (ppm)	LCS Recovery (%)	LCSD Result (ppm)	LCSD Recovery (%)	LCS/D RPD (%)	QC Acceptance Criteria RPD (%)	QC Acceptance Criteria Spike % Recovery (Low - High Limit)
Acenaphthene	<0.100	0.500	0.420	84.0%	0.437	87.4%	4%	± 30	40 - 130
1,4-Dichlorobenzene	<0.100	0.500	0.415	83.0%	0.444	88.8%	7%	± 30	40 - 130
2,4-Dinitrotoluene	<0.100	0.500	0.543	108.6%	0.547	109.4%	1%	± 30	40 - 130
N-Nitrosodi-n-propylamine	<0.100	0.500	0.420	84.0%	0.446	89.2%	6%	± 30	40 - 130
Pyrene	<0.100	0.500	0.376	75.2%	0.372	74.4%	1%	± 30	40 - 130
1,2,4-Trichlorobenzene	<0.100	0.500	0.369	73.8%	0.401	80.2%	8%	± 30	40 - 130
2-Chlorophenol	<0.100	0.500	0.418	83.6%	0.441	88.2%	5%	± 30	40 - 130
4-Chloro-3-methylphenol	<0.100	0.500	0.412	82.4%	0.460	92.0%	11%	± 30	40 - 130
4-Nitrophenol	<0.100	0.500	0.491	98.2%	0.531	106.2%	8%	± 30	15 - 130
Pentachlorophenol	<0.100	0.500	0.471	94.2%	0.494	98.8%	5%	± 30	40 - 130
Phenol	<0.100	0.500	0.418	83.6%	0.396	79.2%	5%	± 30	15 - 130

Sample Matrix Spike (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	MS Result (ppm)	MS Recovery (%)	QC Acceptance Criteria Spike % Recovery (Low - High Limit)
Acenaphthene	<0.100	0.500	0.419	83.8%	40 - 130
1,4-Dichlorobenzene	<0.100	0.500	0.397	79.4%	40 - 130
2,4-Dinitrotoluene	<0.100	0.500	0.414	82.8%	40 - 130
N-Nitrosodi-n-propylamine	<0.100	0.500	0.388	77.6%	40 - 130
Pyrene	<0.100	0.500	0.295	59.0%	40 - 130
1,2,4-Trichlorobenzene	<0.100	0.500	0.375	75.0%	40 - 130
2-Chlorophenol	<0.100	0.500	0.361	72.2%	40 - 130
4-Chloro-3-methylphenol	<0.100	0.500	0.484	96.8%	40 - 130
4-Nitrophenol	<0.100	0.500	0.496	99.2%	15 - 130
Pentachlorophenol	<0.100	0.500	0.486	97.2%	40 - 130
Phenol	<0.100	0.500	0.377	75.4%	15 - 130

Sample Spiked: 2001050065-3

Batch Extraction/Prep Date: 05/11/01

Project(s) In Batch: 2001050065 (3)

QC Batch ID: 0160096

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by GC/MS - TCLP

SW-846 8270C

CONSTITUENT	Results mg/L	mg/L	RPD	CONSTITUENT	Results mg/L	mg/L	RPD
N-Nitrosodimethylamine	<0.100	<0.100	N/A	3-Nitroaniline	<0.100	<0.100	N/A
Phenol	<0.100	<0.100	N/A	Acenaphthene	<0.100	<0.100	N/A
Bis(2-chloroethyl)ether	<0.100	<0.100	N/A	2,4-Dinitrophenol	<0.100	<0.100	N/A
2-Chlorophenol	<0.100	<0.100	N/A	4-Nitrophenol	<0.100	<0.100	N/A
1,3-Dichlorobenzene	<0.100	<0.100	N/A	Dibenzofuran	<0.100	<0.100	N/A
1,4-Dichlorobenzene	<0.100	<0.100	N/A	2,4-Dinitrotoluene	<0.100	<0.100	N/A
1,2-Dichlorobenzene	<0.100	<0.100	N/A	Diethyl phthalate	<0.100	<0.100	N/A
2-Methylphenol	<0.100	<0.100	N/A	Fluorene	<0.100	<0.100	N/A
Bis(2-chloroisopropyl)ether	<0.100	<0.100	N/A	4-Chlorophenylphenylether	<0.100	<0.100	N/A
4-Methylphenol	<0.100	<0.100	N/A	4-Nitroaniline	<0.100	<0.100	N/A
N-Nitrosodi-n-propylamine	<0.100	<0.100	N/A	2-Methyl-4,6-dinitrophenol	<0.100	<0.100	N/A
Hexachloroethane	<0.100	<0.100	N/A	Azobenzene	<0.100	<0.100	N/A
Nitrobenzene	<0.100	<0.100	N/A	4-Bromophenylphenylether	<0.100	<0.100	N/A
Isophorone	<0.100	<0.100	N/A	Hexachlorobenzene	<0.100	<0.100	N/A
2-Nitrophenol	<0.100	<0.100	N/A	Pentachlorophenol	<0.100	<0.100	N/A
2,4-Dimethylphenol	<0.100	<0.100	N/A	Phenanthrene	<0.100	<0.100	N/A
Bis(2-chloroethoxy)methane	<0.100	<0.100	N/A	Anthracene	<0.100	<0.100	N/A
2,4-Dichlorophenol	<0.100	<0.100	N/A	Carbazole	<0.100	<0.100	N/A
1,2,4-Trichlorobenzene	<0.100	<0.100	N/A	Di-n-butyl phthalate	<0.100	<0.100	N/A
Naphthalene	<0.100	<0.100	N/A	Fluoranthene	<0.100	<0.100	N/A
4-Chloroaniline	<0.100	<0.100	N/A	Pyrene	<0.100	<0.100	N/A
Hexachlorobutadiene	<0.100	<0.100	N/A	Butylbenzyl phthalate	<0.100	<0.100	N/A
4-Chloro-3-methylphenol	<0.100	<0.100	N/A	Benzo(a)anthracene	<0.100	<0.100	N/A
2-Methylnaphthalene	<0.100	<0.100	N/A	Chrysene	<0.100	<0.100	N/A
Hexachlorocyclopentadiene	<0.100	<0.100	N/A	Bis(2-ethylhexyl)phthalate	<0.100	<0.100	N/A
2,4,6-Trichlorophenol	<0.100	<0.100	N/A	Di-n-octyl phthalate	<0.100	<0.100	N/A
2,4,5-Trichlorophenol	<0.100	<0.100	N/A	Benzo(b)fluoranthene	<0.100	<0.100	N/A
2-Chloronaphthalene	<0.100	<0.100	N/A	Benzo(k)fluoranthene	<0.100	<0.100	N/A
2-Nitroaniline	<0.100	<0.100	N/A	Benzo(a)pyrene	<0.100	<0.100	N/A
Dimethyl phthalate	<0.100	<0.100	N/A	Indeno(1,2,3-cd)pyrene	<0.100	<0.100	N/A
2,6-Dinitrotoluene	<0.100	<0.100	N/A	Dibenzo(a,h)anthracene	<0.100	<0.100	N/A
Acanaphthylene	<0.100	<0.100	N/A	Benzo(g,h,i)perylene	<0.100	<0.100	N/A

Sample Duplicated: 2001050065-3

Batch Extraction/Prep Date: 05/11/01

Project(s) In Batch: 2001050065 (3)

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 51401

Metals by EPA Method 6020
Mercury by Method 7470A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
TCLP Arsenic	0.262J	10.00	9.923	99.0%	75 - 125
TCLP Barium	0.006J	10.00	9.132	91.0%	75 - 125
TCLP Cadmium	<DL	10.00	9.341	93.0%	75 - 125
TCLP Chromium	<DL	10.00	9.620	96.0%	75 - 125
TCLP Lead	<DL	10.00	8.846	88.0%	75 - 125
TCLP Mercury	0.075J	0.10	0.160	85.0%	75 - 125
TCLP Selenium	<DL	10.00	10.022	100.0%	75 - 125
TCLP Silver	<DL	0.05	0.049	99.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
TCLP Arsenic	<0.050	1.00	1.084	108.0%	75 - 125
TCLP Barium	<2.00	1.00	0.860	80.0%	75 - 125
TCLP Cadmium	<0.005	1.00	0.693	69.0%	75 - 125
TCLP Chromium	<0.100	1.00	1.091	109.0%	75 - 125
TCLP Lead	<0.015	1.00	0.194	19.0%	75 - 125
TCLP Mercury	<0.002	0.25	0.205	82.0%	75 - 125
TCLP Selenium	<0.050	1.00	1.107	111.0%	75 - 125
TCLP Silver	<0.050	1.00	0.946	95.0%	75 - 125

Sequence Date(s): 5/14/01 **Batch Extraction/Prep Date:** 5/14/01

Sample ID - MS/MSD: 2001050065-1

Data Qualifiers: "J" denotes analyte recovery above the MDL but below the reporting limit.
No contamination is associated with this value.

Project(s) In Batch: 2001050065

QC Summary Report

QC Batch ID: 51401

Reactive Sulfide by EPA Method 7.3.4.2/9034

Laboratory Control Sample (LCS)

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Reactive Sulfide	18.6	500	471	94.0%	80 - 120

Sample/Sample Duplicate

CONSTITUENT	Sample Result (ppm)	Sample Dup (ppm)	Dup Recovery (%)	QC Acceptance Criteria % Recovery (Low - High Limit)
Reactive Sulfide	<10.0	<10.0	100.0%	75 - 125

Sequence Date(s): 5/14/01

Batch Extraction/ Prep Date: 5/14/01

Sample ID - Sample/Dup 2001050065-4

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2001050065

QC Summary Report

QC Batch ID: 51401

Reactive Cyanide by EPA Method 7.3.3.2/9014

Laboratory Control Sample (LCS)

CONSTITUENT	Method Blank (ppm)	Spike Added (ppm)	LCS		QC Acceptance Criteria
			Result (ppm)	Recovery (%)	% Recovery (Low - High Limit)
Reactive Cyanide	<0.050	0.04	0.0296	74.0%	70 - 130

Sample/Sample Duplicate

CONSTITUENT	Sample Result (ppm)	Sample Dup (ppm)	Dup Recovery (%)	QC Acceptance Criteria % Recovery (Low - High Limit)
Reactive Cyanide	<0.050	<0.050	100.0%	75 - 125

Sequence Date(s): 5/14/01 **Batch Extraction/ Prep Date:** 5/14/01

Sample ID - Sample/Dup 2001050065-4

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2001050065

MILLENNIUM LABORATORIES
CHAIN OF CUSTODY RECORD

1544 Sawdust Road, Suite 402
The Woodlands, Texas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number

Page 1
of 1

LAB USE ONLY
200__-_____ 05

Number each chain per project

☐	**PAH-Soil:** If, C_6-C_{28} total >100 ppm	Analyze one sample with the highest C_{10}-C_{28} concentration
☐	**PAH-Water:** If, C_6-C_{28} total >5.0 ppm	

SPECIAL REPORTING REQUIREMENTS:

Fax Results: **Yes** ____ **No** ____

Level II ____ **Level III** ____ **TRPP**____

REPORT TO:	**INVOICING INFORMATION**	**PROJECT INFORMATION**
Company Enercon Services	Company Same	Project Number PH 334
Mailing Address 8866 Gulf Freeway Ste. 380	Address:	Site Name Hobbs
City Houston ST TX Zip 77017	City ST Zip	
Phone # (713) 941-0401	Phone #:	**Sampled by:** Print Name(s) Below
Fax # (713) 941-0402	Fax #:	Lee Nunn
Report Attn: Paul Brodin	Invoice Attn:	

Remarks:
Please fax results to (505)393-5447 Attn: Paul Brodin

P.O. #:

Turnaround Time
☐ 10 Working Days
☒ 5 Working Days
☐ Other: ______

Lab No.	**Sample Identification**	**Collected** Date	**Collected** Time	**Matrix** W	**Matrix** S	**Matrix** X	**Method** G	**Method** C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	TCLP Metals	TCLP VOCs	TCLP SVOCs	RCI			**Comments**	Preserved	Total Number of Sample Containers
1	SW-1	5/8/01	1320	X											X							ice	1
2	SW-1	↓	↓	X												X						HCl	1
3	SW-1	↓	↓	X													X					ice	1
4	SW-1	↓	↓	X														X				ice	1

Relinquished by: Al Brodin	Date: 5/8/01	Time: ~~[illegible]~~ 1600	Received by:	Date:	Time:	**Condition of Sample(s) Rec'd At Lab**
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Custody Seal Intact ☐ Yes ☐ No
Method of Shipment: [see back copy for shipping address & instructions]			**Received by Millennium Labs:**	**Date:** 5-8-01	**Time:** 9:30	Sample(s) Rec'd Iced/Cool ☑ Yes ☐ No
☐ Greyhound Exp ☒ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client						☒ Temperature of Sample(s): 2.6

MILLENNIUM Laboratories, Inc.
1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Paul Brodin
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2001050118
Report Date: 05/31/2001

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: PH334
Received: 05/15/2001

Sampled by: Paul Brodin

Lab Number	Sample Identification
2001050118-1	35-0305-A
2001050118-2	35-1315-A
2001050118-3	35-2325-A
2001050118-4	35-3335-A
2001050118-5	35-4345-A
2001050118-6	36-0305-A
2001050118-7	36-1315-A
2001050118-8	36-2325-A
2001050118-9	36-3335-A
2001050118-10	36-4345-A
2001050118-11	37-0001-A
2001050118-12	38-0001-A
2001050118-13	39-0001-A
2001050118-14	40-0001-A
2001050118-15	MW-4
2001050118-16	MW-6
2001050118-17	MW-6
2001050118-18	MW-6

MILLENNIUM LABORATORIES, Inc.

Amanda Bourgeois

Technical - QA/QC review by :
Mac Steere/Theresa Sorrells

Amanda Bourgeois/Daniel Duplechien
Project Manager

MILLENNIUM
LABORATORIES, INC.

June 5, 2001

Paul Brodin
Enercon
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2001050118
Project Name: Hobbs
Project Number: PH334

Dear Mr. Brodin:

Enclosed you will find the results of the samples submitted to Millennium Laboratories on 05/15/01 from the site referenced above.

Your samples "35-0305-A and MW-6" (Millennium ID: 2001050118-1 and 18) were randomly chosen for use in Millennium's Quality Control Program for Metals Analysis by method 6020. The Matrix Spike (MS) recovery was outside the quality control limit for several analytes, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "MW-6" (Millennium ID: 2001050118-17) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride and Sulfate, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "36-1315-A" (Millennium ID: 2001050118-7) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

This report retains its validity and integrity only when reproduced in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories. All

MILLENNIUM
LABORATORIES, INC.

samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Amanda Bourgeois

Amanda Bourgeois, Project Manager

TEST RESULTS BY SAMPLE

Sample No.: 1 Date Collected: 05/11/2001 Time Collected: 07:50:00 Matrix: Soil
Description: 35-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,339	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	120,727	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,806	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	12,858	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	4,376	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	3.20	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	3,278	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.8	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	15.5	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	5.46	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	380	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.77	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 2 Date Collected: 05/11/2001 Time Collected: 07:55:00 Matrix: Soil
Description: 35-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,388	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	105,792	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,066	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	11,280	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	3,488	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	1.01	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	2,241	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.3	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	8.09	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	191	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.02	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 3 Date Collected: 05/11/2001 Time Collected: 08:30:00 Matrix: Soil
Description: 35-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,579	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	157,033	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	293	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	16,344	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,222	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	2.88	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,356	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	37.5	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	28.1	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	212	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.29	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 4 Date Collected: 05/11/2001 Time Collected: 08:35:00 Matrix: Soil
Description: 35-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,480	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	108,689	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	272	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	5,759	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,065	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,410	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	65.4	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	6.20	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	162	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	1.71	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 5 Date Collected: 05/11/2001 Time Collected: 08:50:00 Matrix: Soil
Description: 35-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,405	mg/Kg	0.100	05/31/2001	KF

Sample No.: 6 Date Collected: 05/11/2001 Time Collected: 12:10:00 Matrix: Soil
Description: 36-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,582	mg/Kg	0.100	05/31/2001	KF

Sample No.: 7 Date Collected: 05/11/2001 Time Collected: 12:15:00 Matrix: Soil
Description: 36-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,195	mg/Kg	0.100	05/31/2001	KF

Sample No.: 8 Date Collected: 05/11/2001 Time Collected: 12:30:00 Matrix: Soil
Description: 36-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	197	mg/Kg	0.100	05/31/2001	KF

Sample No.: 9 Date Collected: 05/11/2001 Time Collected: 12:35:00 Matrix: Soil
Description: 36-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	68.5	mg/Kg	0.100	05/31/2001	KF

Sample No.: 10 Date Collected: 05/11/2001 Time Collected: 12:45:00 Matrix: Soil
Description: 36-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	57.2	mg/Kg	0.100	05/31/2001	KF

Sample No.: 11 Date Collected: 05/11/2001 Time Collected: 15:00:00 Matrix: Soil
Description: 37-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,076	mg/Kg	0.100	05/31/2001	KF

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 12 Date Collected: 05/11/2001 Time Collected: 15:05:00 Matrix: Soil
Description: 38-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,093	mg/Kg	0.100	05/31/2001	KF

Sample No.: 13 Date Collected: 05/11/2001 Time Collected: 15:10:00 Matrix: Soil
Description: 39-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,511	mg/Kg	0.100	05/31/2001	KF

Sample No.: 14 Date Collected: 05/11/2001 Time Collected: 15:15:00 Matrix: Soil
Description: 40-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,460	mg/Kg	0.100	05/31/2001	KF

Sample No.: 15 Date Collected: 05/12/2001 Time Collected: 14:50:00 Matrix: Groundwater
Description: MW-4 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3010A/6020	0.254	mg/L	0.100	05/17/2001	KF

Sample No.: 17 Date Collected: 05/14/2001 Time Collected: 15:30:00 Matrix: Groundwater
Description: MW-6 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Fluoride	EPA 300.0	2.15	mg/L	0.100	05/15/2001	KF
Chloride	EPA 300.0	421	mg/L	0.100	05/17/2001	KF
Sulfate	EPA 300.0	163	mg/L	1.000	05/17/2001	KF
Nitrate-N	EPA 300.0	14.1	mg/L	0.100	05/15/2001	KF
Nitrite	EPA 300.0	<0.100	mg/L	0.100	05/15/2001	KF
Bicarbonate/Carbonate	EPA 310.1	398.6/0.3	mg/L	0.000	05/29/2001	KF
Anion/Cation Balance	1030-F	90.3	%	0.000	05/31/2001	KF
Calcium	SW-846 3010A/6020	264	mg/L	0.100	05/31/2001	KF
Magnesium	SW-846 3010A/6020	38.0	mg/L	0.100	05/31/2001	KF
Potassium	SW-846 3010A/6020	7.79	mg/L	0.100	05/31/2001	KF
Sodium	SW-846 3010A/6020	331	mg/L	0.100	05/31/2001	KF

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 18	Date Collected: 05/14/2001	Time Collected: 15:30:00	Matrix: Groundwater
Description: MW-6	Project Name: Hobbs		

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3010A/6020	328	mg/L	0.100	05/23/2001	KF
Potassium	SW-846 3010A/6020	12.8	mg/L	0.100	05/17/2001	KF
Magnesium	SW-846 3010A/6020	40.0	mg/L	0.100	05/17/2001	KF
Sodium	SW-846 3010A/6020	323	mg/L	0.100	05/23/2001	KF
Copper	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Iron	SW-846 3010A/6020	1.70	mg/L	0.100	05/17/2001	KF
Manganese	SW-846 3010A/6020	0.134	mg/L	0.050	05/17/2001	KF
Zinc	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Mercury	SW-846 7470A	<0.002	mg/L	0.002	05/18/2001	GN
Arsenic	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Barium	SW-846 3010A/6020	<2.00	mg/L	2.000	05/17/2001	KF
Cadmium	SW-846 3010A/6020	<0.005	mg/L	0.005	05/17/2001	KF
Chromium	SW-846 3010A/6020	<0.100	mg/L	0.100	05/17/2001	KF
Lead	SW-846 3010A/6020	<0.015	mg/L	0.015	05/17/2001	KF
Selenium	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Silver	SW-846 3010A/6020	0.079	mg/L	0.050	05/17/2001	KF

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 16 Date Collected: 05/14/2001 Time Collected: 15:30:00 Matrix: Groundwater
Description: MW-6 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Dichlorodifluoromethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Chloromethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Vinyl Chloride	SW-846 5030B/8260B	<0.002	mg/L	0.002	05/19/2001	SCS
Bromomethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Chloroethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Trichlorofluoromethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,1-Dichloroethene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Methylene Chloride	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
trans-1,2-Dichloroethene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Methyl tert-butyl ether	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,1-Dichloroethane	SW-846 5030B/8260B	0.012	mg/L	0.005	05/19/2001	SCS
cis-1,2-Dichloroethene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Bromochloromethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Chloroform	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
2,2-Dichloropropane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2-Dichloroethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,1,1-Trichloroethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,1-Dichloropropene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Carbon Tetrachloride	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Benzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Dibromomethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2-Dichloropropane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Trichloroethene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Bromodichloromethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
cis-1,3-Dichloropropene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
trans-1,3-Dichloropropene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,1,2-Trichloroethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Toluene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,3-Dichloropropane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Chlorodibromomethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2-Dibromoethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Tetrachloroethene	SW-846 5030B/8260B	0.015	mg/L	0.005	05/19/2001	SCS
1,1,1,2-Tetrachloroethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Chlorobenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Ethylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Xylenes, total	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Bromoform	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Styrene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,1,2,2-Tetrachloroethane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2,3-Trichloropropane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 16 Date Collected: 05/14/2001 Time Collected: 15:30:00 Matrix: Groundwater
Description: MW-6 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Isopropylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Bromobenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
n-Propylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
2-Chlorotoluene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
4-Chlorotoluene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,3,5-Trimethylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
tert-Butylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2,4-Trimethylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
sec-Butylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,3-Dichlorobenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,4-Dichlorobenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
p-Isopropyltoluene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2-Dichlorobenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
n-Butylbenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2-Dibromo-3-chloropropane	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2,4-Trichlorobenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Naphthalene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Hexachlorobutadiene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
1,2,3-Trichlorobenzene	SW-846 5030B/8260B	<0.005	mg/L	0.005	05/19/2001	SCS
Dibromofluoromethane	8260 Surrogate	92.7	% Rec.	0.000	05/19/2001	SCS
Toluene-d8	8260 Surrogate	97.9	% Rec.	0.000	05/19/2001	SCS
p-Bromofluorobenzene	8260 Surrogate	101	% Rec.	0.000	05/19/2001	SCS

Millennium Laboratories, Inc.

QC SUMMARY REPORT

Volatile Organics Compounds by GC/MS - Water

Batch: 669 w

Sample Lab Control Spikes (LCS/LCSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	LCS		LCSD		MS/D RPD (%)	QC Acceptance Criteria	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	Spike % Recovery (Low - High Limit)
1,1-Dichloroethene	<0.005	0.100	0.106	106.0%	0.104	104.0%	2%	± 30	70 - 130
Chloroform	<0.005	0.100	0.101	101.4%	0.100	99.8%	2%	± 30	70 - 130
Trichloroethylene	<0.005	0.100	0.109	108.6%	0.107	106.8%	2%	± 30	70 - 130
1,2-Dichloropropane	<0.005	0.100	0.099	98.8%	0.103	103.2%	4%	± 30	70 - 130
Toluene	<0.005	0.100	0.107	107.0%	0.104	104.4%	2%	± 30	70 - 130
Chlorobenzene	<0.005	0.100	0.108	108.0%	0.096	96.2%	12%	± 30	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	MS		MSD		LS/D RPD (%)	QC Acceptance Criteria	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	Spike % Recovery (Low - High Limit)
1,1-Dichloroethene	<0.005	0.100	0.108	107.6%	0.094	94.4%	13%	± 30	70 - 130
Chloroform	<0.005	0.100	0.104	103.8%	0.098	98.4%	5%	± 30	70 - 130
Trichloroethylene	<0.005	0.100	0.115	115.0%	0.100	99.8%	14%	± 30	70 - 130
1,2-Dichloropropane	<0.005	0.100	0.120	120.0%	0.106	106.4%	12%	± 30	70 - 130
Toluene	<0.005	0.100	0.114	114.2%	0.095	94.6%	19%	± 30	70 - 130
Chlorobenzene	<0.005	0.100	0.110	110.0%	0.099	98.8%	11%	± 30	70 - 130

Sample Spiked: 2001050102-2

Project(s) In Batch:		
	2001050102	2001050118
	2001050079	2001050136
	2001050114(tclp)	
	2001050122	

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 51701

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	***Spike Added*** (ppm)	***LCS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<DL	0.05	0.049	98.0%	75 - 125
Barium	<DL	0.05	0.048	97.0%	75 - 125
Cadmium	<DL	0.05	0.048	96.0%	75 - 125
Chromium	<DL	0.05	0.047	95.0%	75 - 125
Lead	<DL	0.05	0.043	86.0%	75 - 125
Mercury	0.035J	0.10	0.150	115.0%	75 - 125
Selenium	<DL	0.05	0.049	98.0%	75 - 125
Silver	<DL	0.05	0.048	97.0%	75 - 125
Sodium	<DL	0.50	0.496	99.0%	75 - 125
Magnesium	<DL	0.50	0.476	95.0%	75 - 125
Potassium	<DL	0.50	0.493	99.0%	75 - 125
Calcium	0.005J	0.50	0.518	104.0%	75 - 125
Iron	0.018J	0.50	0.481	96.0%	75 - 125
Manganese	<DL	0.05	0.041	82.0%	75 - 125
Copper	<DL	0.05	0.049	98.0%	75 - 125
Zinc	<DL	0.05	0.051	101.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	***Sample Result*** (ppm)	***Spike Added*** (ppm)	***MS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	5.46	1.00	6.520	106.0%	75 - 125
Barium	380	1.00	380.590	59.0%	75 - 125
Cadmium	<0.500	1.00	1.071	107.0%	75 - 125
Chromium	<5.00	1.00	5.944	108.0%	75 - 125
Lead	2.77	1.00	3.660	89.0%	75 - 125
Mercury	<0.200	0.25	0.275	106.0%	75 - 125
Selenium	<5.00	1.00	1.559	110.0%	75 - 125
Silver	<5.00	1.00	0.841	71.0%	75 - 125
Sodium	4,376	1.00	<4,376	0.0%	75 - 125
Magnesium	12,858	1.00	<12,858	0.0%	75 - 125
Potassium	1,806	1.00	<1,806	0.0%	75 - 125
Calcium	120,727	1.00	246,727	12600.0%	75 - 125
Iron	3,278	1.00	<3,278	0.0%	75 - 125
Manganese	30.8	1.00	31.680	88.0%	75 - 125
Copper	3.20	1.00	4.200	100.0%	75 - 125
Zinc	15.5	1.00	16.540	104.0%	75 - 125

Sequence Date(s): 5/17/01 **Batch Extraction/Prep Date:** 5/17/01

Sample ID - MS/MSD: 2001050118-1
2001050118-4 (Hg only)

Data Qualifiers: "J" denotes analyte recovery above the MDL but below the reporting limit.

No contamination is associated with this value.

Project(s) In Batch: 2001050118

QC SUMMARY REPORT

QC Batch ID: 51701

Metals by EPA Method 6020
Mercury by Method 7470A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	***Spike Added*** (ppm)	***LCS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.163	116.0%	75 - 125
Barium	0.005J	1.00	1.062	106.0%	75 - 125
Cadmium	<DL	1.00	1.173	117.0%	75 - 125
Chromium	<DL	1.00	1.094	109.0%	75 - 125
Lead	<DL	1.00	0.889	89.0%	75 - 125
Mercury	0.075J	0.10	0.175	100.0%	75 - 125
Selenium	<DL	0.05	0.049	97.0%	75 - 125
Silver	<DL	0.05	0.048	96.0%	75 - 125
Sodium	0.023J	0.50	0.512	102.0%	75 - 125
Magnesium	0.006J	1.00	1.071	107.0%	75 - 125
Potassium	<DL	0.50	0.505	101.0%	75 - 125
Calcium	0.045J	0.50	0.491	98.0%	75 - 125
Iron	0.006J	0.50	0.495	99.0%	75 - 125
Manganese	<DL	1.00	1.047	105.0%	75 - 125
Copper	0.001J	1.00	1.113	111.0%	75 - 125
Zinc	0.003J	1.00	1.254	125.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	***Sample Result*** (ppm)	***Spike Added*** (ppm)	***MS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<0.050	1.00	1.179	117.0%	75 - 125
Barium	<2.00	1.00	2.170	108.0%	75 - 125
Cadmium	<0.005	1.00	1.167	117.0%	75 - 125
Chromium	<0.100	1.00	0.741	74.0%	75 - 125
Lead	<0.015	1.00	0.902	88.0%	75 - 125
Mercury	<0.002	0.25	0.240	96.0%	75 - 125
Selenium	<0.050	1.00	1.232	123.0%	75 - 125
Silver	0.079	1.00	0.103	2.0%	75 - 125
Sodium	323	1.00	351.000	2825.0%	75 - 125
Magnesium	40.0	1.00	<40.0	0.0%	75 - 125
Potassium	12.8	1.00	13.194	39.0%	75 - 125
Calcium	328	1.00	<328	0.0%	75 - 125
Iron	1.70	1.00	2.873	117.0%	75 - 125
Manganese	0.134	1.00	1.101	97.0%	75 - 125
Copper	<0.050	1.00	1.139	114.0%	75 - 125
Zinc	<0.050	1.00	1.038	104.0%	75 - 125

Sequence Date(s): 5/17/01 **Batch Extraction/Prep Date:** 5/16/01

Sample ID - MS/MSD: 2001050118-18
2001050122-9 (Hg only)

Data Qualifiers: "J" denotes analyte recovery above the MDL but below the reporting limit.
No contamination is associated with this value.

Project(s) In Batch:

2001050055
2001050078
2001050079
2001050076
2001050116
2001050071
2001050118
2001050032
2001050101

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 051501/051701

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS*** Result (ppm)	Recovery (%)	***QC Acceptance Criteria*** Spike % Recovery (Low - High Limit)
Fluoride	<DL	10.00	9.458	95.0%	90 - 110
Chloride	<DL	50.00	45.581	91.0%	90 - 110
Nitrite	<DL	15.00	14.058	94.0%	90 - 110
Nitrate	<DL	10.00	10.933	109.0%	90 - 110
Sulfate	<DL	50.00	45.757	92.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Sample Dup Result (ppm)	Spike Added (ppm)	***MS*** Result (ppm)	Recovery (%)	***QC Acceptance Criteria*** Spike % Recovery (Low - High Limit)
Fluoride	2.15	2.34	10.00	11.865	97.0%	80 -120
Chloride	421	420	10.00	<421	0.0%	80 -120
Nitrite	<0.100	<0.100	10.00	9.087	91.0%	80 -120
Nitrate	14.1	14.3	10.00	22.477	84.0%	80 -120
Sulfate	163	167	10.00	<163	0.0%	80 -120

Sequence Date(s): 5/15/01 & 5/17/01 **Batch Extraction/Prep Date:** 5/15/2001

Sample ID - MS/DUP: 2001050118-17

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2001050118

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,195	1,022	10.00	1202.6	76.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050118-7

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,251	1,157	10.00	1,258.30	73.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050123-1

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

MILLENN[illegible]M LABORATORIES
CHAIN OF CUSTODY RECORD

1544 Sawdust R[illegible], Suite 402
The Woodlands, [illegible]exas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number
LAB USE ONLY
200 1-050118

[illegible]ge 1 of 2

Number each chain per project

REPORT TO:	INVOICING INFORMATION	PROJECT INFORMATION
Company Enercon Services	Company Same	Project Number PH334
Mailing Address 8866 Gulf Frwy #380	Address:	Site Name Hobbs
City Houston ST TX Zip 77017	City ST Zip	
Phone # 713-941-0401	Phone #:	Sampled by: Print Name(s) Below
Fax # 713-941-0402	Fax #:	Paul Brodin
Report Attn: Paul Brodin	Invoice Attn:	

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm
☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ Level III ____ TRPP ____

Remarks:

P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ________

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	Chlorides	WQCC Metals					Comments	Preserved	Total Number of Sample Containers
1	35-0305-A	5/11/01	0750		↓			↓							X	X						Ice	1
2	35-1315-A		0755												X	X							1
3	35-2325-A		0830												X	X							1
4	35-3335-A		0835												X	X							1
5	35-4345-A		0850												X								1
6	36-0305-A		1210												X								1
7	36-1315-A		1215												X								1
8	36-2325-A		1230												X								1
9	36-3335-A		1235												X								1
10	36-4345-A		1245		↓			↓							X							↓	1

Relinquished by:	Date: 5/14/00	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Received by Millennium Labs: **Date:** **Time:**

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☑ Yes ☐ No
☐ Temperature of Sample(s):

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

MILLENNIUM LABORATORIES
CHAIN OF CUSTODY RECORD

1544 Sawdust R Suite 402
The Woodlands, Texas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number
LAB USE ONLY
200 1 - 050118

Page 2 of 2
Number each chain per project

REPORT TO:	**INVOICING INFORMATION**	**PROJECT INFORMATION**
Company	Company	Project Number PH 334
Mailing Address	Address:	Site Name Hobbs
City ST Zip	City ST Zip	
Phone #	Phone #:	**Sampled by:** Print Name(s) Below
Fax #	Fax #:	Paul Brodin
Report Attn:	Invoice Attn:	

☐ **PAH-Soil:** If, C_6-C_{28} total >100 ppm
☐ **PAH-Water:** If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ **Level III** ____ **TRPP**____

Remarks:
P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ______

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	Chlorides	Chromium	General Chem	WQCC Metals			Comments	Preserved	Total Number of Sample Containers
11	37-0001-A	5/11/01	1500		↓			↓							X							Ice	1
12	38-0001-A	↓	1505		↓			↓							X							↓	1
13	39-0001-A	↓	1510		↓			↓							X							↓	1
14	40-0001-A	↓	1515		↓			↓							X							↓	1
15	MW-4	5/12/01	1450	X			X									X						HNO_3	1
16	MW-6	5/14/01	1530	↓			↓		X													HCl	3
17	MW-6	↓	1530	↓			↓										X					ice	1
18	MW-6	↓	1530	↓			↓											X				HNO_3	1

Relinquished by:	Date: 5/14/01	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
☐ Temperature of Sample(s):

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

Received by Millennium Labs: **Date:** **Time:**

MILLENNIUM
LABORATORIES, INC.

June 13, 2001

Paul Brodin
Enercon
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2001050118
Project Name: Hobbs
Project Number: PH334

Dear Mr. Brodin:

Enclosed you will find the results of the samples submitted to Millennium Laboratories on 05/15/01 from the site referenced above.

As per your request, the detection limits have been lowered for Chromium on your samples "MW-4 and MW-6" (Millennium ID: 2001050118-17 and 18).

Your samples "35-0305-A and MW-6" (Millennium ID: 2001050118-1 and 18) were randomly chosen for use in Millennium's Quality Control Program for Metals Analysis by method 6020. The Matrix Spike (MS) recovery was outside the quality control limit for several analytes, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "MW-6" (Millennium ID: 2001050118-17) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride and Sulfate, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "36-1315-A" (Millennium ID: 2001050118-7) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

MILLENNIUM
LABORATORIES, INC.

This report retains its validity and integrity only when reproduced in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories. All

samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Amanda Bourgeois

Amanda Bourgeois
Project Manager

REVISED

MILLENNIUM Laboratories, Inc.

1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Paul Brodin
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2001050118
Report Date: 06/13/2001

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: PH334
Received: 05/15/2001

Sampled by: Paul Brodin

Lab Number	Sample Identification
2001050118-1	35-0305-A
2001050118-2	35-1315-A
2001050118-3	35-2325-A
2001050118-4	35-3335-A
2001050118-5	35-4345-A
2001050118-6	36-0305-A
2001050118-7	36-1315-A
2001050118-8	36-2325-A
2001050118-9	36-3335-A
2001050118-10	36-4345-A
2001050118-11	37-0001-A
2001050118-12	38-0001-A
2001050118-13	39-0001-A
2001050118-14	40-0001-A
2001050118-15	MW-4
2001050118-16	MW-6
2001050118-17	MW-6
2001050118-18	MW-6

REVISED

MILLENNIUM LABORATORIES, Inc.

Technical - QA/QC review by :
Matt Steere/Theresa Sorrells

Amanda Bourgeois
Amanda Bourgeois/Daniel Duplechien
Project Manager

Report No.: 2001050118
06/13/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 1 Date Collected: 05/11/2001 Time Collected: 07:50:00 Matrix: Soil
Description: 35-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,339	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	120,727	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,806	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	12,858	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	4,376	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	3.20	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	3,278	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.8	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	15.5	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	5.46	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	380	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.77	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 2 Date Collected: 05/11/2001 Time Collected: 07:55:00 Matrix: Soil
Description: 35-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,388	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	105,792	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,066	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	11,280	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	3,488	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	1.01	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	2,241	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.3	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	8.09	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	191	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.02	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Report No.: 2001050118
06/13/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 3 Date Collected: 05/11/2001 Time Collected: 08:30:00 Matrix: Soil
Description: 35-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,579	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	157,033	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	293	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	16,344	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,222	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	2.88	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,356	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	37.5	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	28.1	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	212	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.29	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 4 Date Collected: 05/11/2001 Time Collected: 08:35:00 Matrix: Soil
Description: 35-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,480	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	108,689	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	272	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	5,759	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,065	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,410	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	65.4	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	6.20	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	162	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	1.71	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Report No.: 2001050118
06/13/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 5 Date Collected: 05/11/2001 Time Collected: 08:50:00 Matrix: Soil
Description: 35-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,405	mg/Kg	0.100	05/31/2001	KF

Sample No.: 6 Date Collected: 05/11/2001 Time Collected: 12:10:00 Matrix: Soil
Description: 36-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,582	mg/Kg	0.100	05/31/2001	KF

Sample No.: 7 Date Collected: 05/11/2001 Time Collected: 12:15:00 Matrix: Soil
Description: 36-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,195	mg/Kg	0.100	05/31/2001	KF

Sample No.: 8 Date Collected: 05/11/2001 Time Collected: 12:30:00 Matrix: Soil
Description: 36-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	197	mg/Kg	0.100	05/31/2001	KF

Sample No.: 9 Date Collected: 05/11/2001 Time Collected: 12:35:00 Matrix: Soil
Description: 36-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	68.5	mg/Kg	0.100	05/31/2001	KF

Sample No.: 10 Date Collected: 05/11/2001 Time Collected: 12:45:00 Matrix: Soil
Description: 36-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	57.2	mg/Kg	0.100	05/31/2001	KF

Sample No.: 11 Date Collected: 05/11/2001 Time Collected: 15:00:00 Matrix: Soil
Description: 37-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,076	mg/Kg	0.100	05/31/2001	KF

Report No.: 2001050118
06/13/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 12 Date Collected: 05/11/2001 Time Collected: 15:05:00 Matrix: Soil
Description: 38-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,093	mg/Kg	0.100	05/31/2001	KF

Sample No.: 13 Date Collected: 05/11/2001 Time Collected: 15:10:00 Matrix: Soil
Description: 39-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,511	mg/Kg	0.100	05/31/2001	KF

Sample No.: 14 Date Collected: 05/11/2001 Time Collected: 15:15:00 Matrix: Soil
Description: 40-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,460	mg/Kg	0.100	05/31/2001	KF

Sample No.: 15 Date Collected: 05/12/2001 Time Collected: 14:50:00 Matrix: Groundwater
Description: MW-4 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3010A/6020	0.254	mg/L	0.050	05/17/2001	KF

Sample No.: 17 Date Collected: 05/14/2001 Time Collected: 15:30:00 Matrix: Groundwater
Description: MW-6 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Fluoride	EPA 300.0	2.15	mg/L	0.100	05/15/2001	KF
Chloride	EPA 300.0	421	mg/L	0.100	05/17/2001	KF
Sulfate	EPA 300.0	163	mg/L	1.000	05/17/2001	KF
Nitrate-N	EPA 300.0	14.1	mg/L	0.100	05/15/2001	KF
Nitrite	EPA 300.0	<0.100	mg/L	0.100	05/15/2001	KF
Bicarbonate/Carbonate	EPA 310.1	398.6/0.3	mg/L	0.000	05/29/2001	KF
Anion/Cation Balance	1030-F	90.3	%	0.000	05/31/2001	KF
Calcium	SW-846 3010A/6020	264	mg/L	0.100	05/31/2001	KF
Magnesium	SW-846 3010A/6020	38.0	mg/L	0.100	05/31/2001	KF
Potassium	SW-846 3010A/6020	7.79	mg/L	0.100	05/31/2001	KF
Sodium	SW-846 3010A/6020	331	mg/L	0.100	05/31/2001	KF

Report No.: 2001050118
06/13/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 18　Date Collected: 05/14/2001　Time Collected: 15:30:00　Matrix: Groundwater
Description: MW-6　Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3010A/6020	328	mg/L	0.100	05/23/2001	KF
Potassium	SW-846 3010A/6020	12.8	mg/L	0.100	05/17/2001	KF
Magnesium	SW-846 3010A/6020	40.0	mg/L	0.100	05/17/2001	KF
Sodium	SW-846 3010A/6020	323	mg/L	0.100	05/23/2001	KF
Copper	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Iron	SW-846 3010A/6020	1.70	mg/L	0.100	05/17/2001	KF
Manganese	SW-846 3010A/6020	0.134	mg/L	0.050	05/17/2001	KF
Zinc	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Mercury	SW-846 7470A	<0.002	mg/L	0.002	05/18/2001	GN
Arsenic	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Barium	SW-846 3010A/6020	<2.00	mg/L	2.000	05/17/2001	KF
Cadmium	SW-846 3010A/6020	<0.005	mg/L	0.005	05/17/2001	KF
Chromium	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Lead	SW-846 3010A/6020	<0.015	mg/L	0.015	05/17/2001	KF
Selenium	SW-846 3010A/6020	<0.050	mg/L	0.050	05/17/2001	KF
Silver	SW-846 3010A/6020	0.079	mg/L	0.050	05/17/2001	KF

Millennium Laboratories, Inc.

QC SUMMARY REPORT

Volatile Organic Compounds by GC/MS - Water

Batch: 669 w

Sample Lab Control Spikes (LCS/LCSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*LCS*		*LCSD*		MS/D RPD (%)	*QC Acceptance Criteria*	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	Spike % Recovery (Low - High Limit)
1,1-Dichloroethene	<0.005	0.100	0.106	106.0%	0.104	104.0%	2%	± 30	70 - 130
Chloroform	<0.005	0.100	0.101	101.4%	0.100	99.8%	2%	± 30	70 - 130
Trichloroethylene	<0.005	0.100	0.109	108.6%	0.107	106.8%	2%	± 30	70 - 130
1,2-Dichloropropane	<0.005	0.100	0.099	98.8%	0.103	103.2%	4%	± 30	70 - 130
Toluene	<0.005	0.100	0.107	107.0%	0.104	104.4%	2%	± 30	70 - 130
Chlorobenzene	<0.005	0.100	0.108	108.0%	0.096	96.2%	12%	± 30	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS*		*MSD*		LS/D RPD (%)	*QC Acceptance Criteria*	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	Spike % Recovery (Low - High Limit)
1,1-Dichloroethene	<0.005	0.100	0.108	107.6%	0.094	94.4%	13%	± 30	70 - 130
Chloroform	<0.005	0.100	0.104	103.8%	0.098	98.4%	5%	± 30	70 - 130
Trichloroethylene	<0.005	0.100	0.115	115.0%	0.100	99.8%	14%	± 30	70 - 130
1,2-Dichloropropane	<0.005	0.100	0.120	120.0%	0.106	106.4%	12%	± 30	70 - 130
Toluene	<0.005	0.100	0.114	114.2%	0.095	94.6%	19%	± 30	70 - 130
Chlorobenzene	<0.005	0.100	0.110	110.0%	0.099	98.8%	11%	± 30	70 - 130

Sample Spiked: 2001050102-2

Project(s) In Batch:

2001050102
2001050079
2001050114(tclp)
2001050122
2001050118
2001050136

QC SUMMARY REPORT

QC Batch ID: 51701

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	<DL	0.05	0.049	98.0%	75 - 125
Barium	<DL	0.05	0.048	97.0%	75 - 125
Cadmium	<DL	0.05	0.048	96.0%	75 - 125
Chromium	<DL	0.05	0.047	95.0%	75 - 125
Lead	<DL	0.05	0.043	86.0%	75 - 125
Mercury	0.035J	0.10	0.150	115.0%	75 - 125
Selenium	<DL	0.05	0.049	98.0%	75 - 125
Silver	<DL	0.05	0.048	97.0%	75 - 125
Sodium	<DL	0.50	0.496	99.0%	75 - 125
Magnesium	<DL	0.50	0.476	95.0%	75 - 125
Potassium	<DL	0.50	0.493	99.0%	75 - 125
Calcium	0.005J	0.50	0.518	104.0%	75 - 125
Iron	0.018J	0.50	0.481	96.0%	75 - 125
Manganese	<DL	0.05	0.041	82.0%	75 - 125
Copper	<DL	0.05	0.049	98.0%	75 - 125
Zinc	<DL	0.05	0.051	101.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	5.46	1.00	6.520	106.0%	75 - 125
Barium	380	1.00	380.590	59.0%	75 - 125
Cadmium	<0.500	1.00	1.071	107.0%	75 - 125
Chromium	<5.00	1.00	5.944	108.0%	75 - 125
Lead	2.77	1.00	3.660	89.0%	75 - 125
Mercury	<0.200	0.25	0.275	106.0%	75 - 125
Selenium	<5.00	1.00	1.559	110.0%	75 - 125
Silver	<5.00	1.00	0.841	71.0%	75 - 125
Sodium	4,376	1.00	<4,376	0.0%	75 - 125
Magnesium	12,858	1.00	<12,858	0.0%	75 - 125
Potassium	1,806	1.00	<1,806	0.0%	75 - 125
Calcium	120,727	1.00	246,727	12600.0%	75 - 125
Iron	3,278	1.00	<3,278	0.0%	75 - 125
Manganese	30.8	1.00	31.680	88.0%	75 - 125
Copper	3.20	1.00	4.200	100.0%	75 - 125
Zinc	15.5	1.00	16.540	104.0%	75 - 125

Sequence Date(s): 5/17/01 **Batch Extraction/Prep Date:** 5/17/01

Sample ID - MS/MSD: 2001050118-1
2001050118-4 (Hg only)

Data Qualifiers: "J" denotes analyte recovery above the MDL but below the reporting limit.
No contamination is associated with this value.

Project(s) In Batch: 2001050118

QC SUMMARY REPORT

QC Batch ID: 51701

Metals by EPA Method 6020
Mercury by Method 7470A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS*		*QC Acceptance Criteria*
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.163	116.0%	75 - 125
Barium	0.005J	1.00	1.062	106.0%	75 - 125
Cadmium	<DL	1.00	1.173	117.0%	75 - 125
Chromium	<DL	1.00	1.094	109.0%	75 - 125
Lead	<DL	1.00	0.889	89.0%	75 - 125
Mercury	0.075J	0.10	0.175	100.0%	75 - 125
Selenium	<DL	0.05	0.049	97.0%	75 - 125
Silver	<DL	0.05	0.048	96.0%	75 - 125
Sodium	0.023J	0.50	0.512	102.0%	75 - 125
Magnesium	0.006J	1.00	1.071	107.0%	75 - 125
Potassium	<DL	0.50	0.505	101.0%	75 - 125
Calcium	0.045J	0.50	0.491	98.0%	75 - 125
Iron	0.006J	0.50	0.495	99.0%	75 - 125
Manganese	<DL	1.00	1.047	105.0%	75 - 125
Copper	0.001J	1.00	1.113	111.0%	75 - 125
Zinc	0.003J	1.00	1.254	125.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Spike Added* (ppm)	*MS*		*QC Acceptance Criteria*
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<0.050	1.00	1.179	117.0%	75 - 125
Barium	<2.00	1.00	2.170	108.0%	75 - 125
Cadmium	<0.005	1.00	1.167	117.0%	75 - 125
Chromium	<0.100	1.00	0.741	74.0%	75 - 125
Lead	<0.015	1.00	0.902	88.0%	75 - 125
Mercury	<0.002	0.25	0.240	96.0%	75 - 125
Selenium	<0.050	1.00	1.232	123.0%	75 - 125
Silver	0.079	1.00	0.103	2.0%	75 - 125
Sodium	323	1.00	351.000	2825.0%	75 - 125
Magnesium	40.0	1.00	<40.0	0.0%	75 - 125
Potassium	12.8	1.00	13.194	39.0%	75 - 125
Calcium	328	1.00	<328	0.0%	75 - 125
Iron	1.70	1.00	2.873	117.0%	75 - 125
Manganese	0.134	1.00	1.101	97.0%	75 - 125
Copper	<0.050	1.00	1.139	114.0%	75 - 125
Zinc	<0.050	1.00	1.038	104.0%	75 - 125

Sequence Date(s):	5/17/01	**Batch Extraction/Prep Date:**	5/16/01
Sample ID - MS/MSD:	2001050118-18 2001050122-9 (Hg only)		

Data Qualifiers: "J" denotes analyte recovery above the MDL but below the reporting limit.

No contamination is associated with this value.

Project(s) In Batch:		
	2001050055	**2001050071**
	2001050078	**2001050118**
	2001050079	2001050032
	2001050076	2001050101
	2001050116	

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 051501/051701

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	<DL	10.00	9.458	95.0%	90 - 110
Chloride	<DL	50.00	45.581	91.0%	90 - 110
Nitrite	<DL	15.00	14.058	94.0%	90 - 110
Nitrate	<DL	10.00	10.933	109.0%	90 - 110
Sulfate	<DL	50.00	45.757	92.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Sample Dup Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	2.15	2.34	10.00	11.865	97.0%	80 -120
Chloride	421	420	10.00	<421	0.0%	80 -120
Nitrite	<0.100	<0.100	10.00	9.087	91.0%	80 -120
Nitrate	14.1	14.3	10.00	22.477	84.0%	80 -120
Sulfate	163	167	10.00	<163	0.0%	80 -120

Sequence Date(s): 5/15/01 & 5/17/01 **Batch Extraction/Prep Date:** 5/15/2001

Sample ID - MS/DUP: 2001050118-17

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2001050118

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,195	1,022	10.00	1202.6	76.0%	80 -120

Sequence Date(s): 5/29/01

Batch Extraction/Prep Date: 5/29/01

Sample ID - MS/DUP: 2001050118-7

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS*		*QC Acceptance Criteria*
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS*		*QC Acceptance Criteria*
				Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Chloride	1,251	1,157	10.00	1,258.30	73.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050123-1

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

MILLENN[illegible]M LABORATORIES
CHAIN OF CUSTODY RECORD

1544 Sawdust R[illegible] Suite 402
The Woodlands, [illegible]xas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number

LAB USE ONLY
200 1-05-118

[illegible]ge 1 of 2

Number each chain per project

REPORT TO:	
Company	Enercon Services
Mailing Address	8866 Gulf Frwy #380
City	Houston ST TX Zip 77017
Phone #	713-941-0401
Fax #	713-941-0402
Report Attn:	Paul Brodin
INVOICING INFORMATION	
Company	Same
Address:	
City ST Zip	
Phone #	
Fax #:	
Invoice Attn:	
PROJECT INFORMATION	
Project Number	PH 334
Site Name	Hobbs
Sampled by: Print Name(s) Below	Paul Brodin

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm
☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:

Fax Results: Yes ____ No ____

Level II ____ **Level III** ____ **TRPP** ____

Remarks:

P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ______

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	Chlorides	WQCC Metals					Comments	Preserved	Total Number of Sample Containers
	35-0305-A	5/11/01	0750		↓			↓							X	X						ice	1
	35-1315-A		0755												X	X						↓	1
	35-2325-A		0830												X	X							1
	35-3335-A		0835												X	X							1
5	35-4345-A		0850												X								1
6	36-0305-A		1210												X								1
7	36-1315-A		1215												X								1
8	36-2325-A		1230												X								1
9	36-3335-A		1235												X								1
10	36-4345-A		1245												X								1

Relinquished by:	Date: 5/14/00	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
			Received by Millennium Labs:	**Date:** 5-15-01	**Time:** 10:00

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
☐ Temperature of Sample(s): [illegible]

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

MILLENN[illegible]M LABORATORIES
CHAIN OF CUS[illegible]DY RECORD

1544 Sawdust R[illegible]d, Suite 402
The Woodlands, [illegible]as 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number
LAB USE ONLY
200 1 - 050118

[illegible]ge 2 of 2

Number each chain per project

REPORT TO:	INVOICING INFORMATION	PROJECT INFORMATION
Company	Company	Project Number PH 334
Mailing Address	Address:	Site Name Hobbs
City ST Zip	City ST Zip	
Phone #	Phone #:	Sampled by: Print Name(s) Below
Fax #	Fax #:	Paul Brodin
Report Attn:	Invoice Attn:	

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm
☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes _____ No _____
Level II _____ Level III _____ TRPP _____

Remarks:
P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ________

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	Chlorides	Chromium	General Chem	WQCC Metals			Comments	Preserved	Total Number of Sample Containers
1	37-0001-A	5/11/01	1500		↓			↓							X							ice	1
2	38-0001-A	↓	1505		↓			↓							X							↓	1
[illegible]	39-0001-A	↓	1510		↓			↓							X							↓	1
[illegible]	40-0001-A	↓	1515		↓			↓							X							↓	1
[illegible]	MW-4	5/12/01	1450	X			X									X						HNO3	1
6	MW-6	5/14/01	1530	↓			↓		X													HCl	3
[illegible]	MW-6	↓	1530	↓			↓										X					ice	1
8	MW-6	↓	1530	↓			↓											X				HNO3	1

Relinquished by:	Date: 5/14/01	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced ☐ Yes ☐ No
☐ Temperature of Sample(s): [illegible]

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

Received by Millennium Labs:	Date:	Time:
	[illegible]	[illegible]

● *MILLENNIUM* **Laboratories, Inc.**
1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Paul Brodin
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2001050123
Report Date: 06/01/2001

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: PH 334
Received: 05/15/2001

Sampled by: Paul Brodin

Lab Number	Sample Identification
2001050123-1	22-0507-A
2001050123-2	22-1517-A
2001050123-3	22-2325-A
2001050123-4	23-0305-A
2001050123-5	23-1012-A
2001050123-6	23-2325-A
2001050123-7	24-0305-A
2001050123-8	24-1012-A
2001050123-9	24-2325-A
2001050123-10	24-3840-A
2001050123-11	25-0305-A
2001050123-12	25-1012-A
2001050123-13	25-2022-A
2001050123-14	26-0305-A
2001050123-15	26-1012-A
2001050123-16	26-2527-A
2001050123-17	26-3235-A

MILLENNIUM LABORATORIES, Inc.

Amanda Bourgeois

Technical - QA/QC review by :
[illegible]/Theresa Sorrells

Amanda Bourgeois/Daniel Duplechin
Project Manager

MILLENNIUM
LABORATORIES, INC.

June 8, 2001

Paul Brodin
Enercon
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2001050123
Project Name: Hobbs
Project Number: PH334

Dear Mr. Brodin:

Enclosed you will find the results of the samples submitted to Millennium Laboratories on 05/15/01 from the site referenced above.

Your samples "22-0507-A and 23-0305-A" (Millennium ID: 2001050123-1and 11) were randomly chosen for use in Millennium's Quality Control Program for Metals Analysis by method 6020. The Matrix Spike (MS) recovery was outside the quality control limit for several analytes, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "22-0507-A and 25-2022-A" (Millennium ID: 2001050123-1 and 13) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

This report retains its validity and integrity only when reproduced in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories. All

Samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Amanda Bourgeois

Amanda Bourgeois, Project Manager

1544 Sawdust Road, Suite 402 · The Woodlands · Texas 77380 · Office (281) 362-8490 · Fax (281) 362-8491

TEST RESULTS BY SAMPLE

Sample No.: 1 Date Collected: 05/09/2001 Time Collected: 08:50:00 Matrix: Soil
Description: 22-0507-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Bromofluorobenzene	8021 Surrogate	105	% Rec.	0.000	05/18/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Chloride	EPA 300.0	1,251	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	147,909	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	805	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	4,409	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	1,552	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,816	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	30.2	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	280	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 2 Date Collected: 05/09/2001 Time Collected: 09:10:00 Matrix: Soil
Description: 22-1517-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	910	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	88,545	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,171	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	35,367	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	1,073	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	3,316	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	36.6	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	294	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 2 Date Collected: 05/09/2001 Time Collected: 09:10:00 Matrix: Soil
Description: 22-1517-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 3 Date Collected: 05/09/2001 Time Collected: 09:45:00 Matrix: Soil
Description: 22-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Bromofluorobenzene	8021 Surrogate	106	% Rec.	0.000	05/18/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Chloride	EPA 300.0	355	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	90,272	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	975	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	43,413	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	957	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	2,826	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	36.2	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	75.2	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 4 Date Collected: 05/09/2001 Time Collected: 10:20:00 Matrix: Soil
Description: 23-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	118	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	271,408	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	747	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	22,683	mg/Kg	1.000	05/30/2001	KF

Report No.: 2001050123
06/01/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 4 Date Collected: 05/09/2001 Time Collected: 10:20:00 Matrix: Soil
Description: 23-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Sodium	SW-846 3050B/6020	634	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,815	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	26.1	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	5.71	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	378	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 5 Date Collected: 05/09/2001 Time Collected: 10:35:00 Matrix: Soil
Description: 23-1012-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/18/2001	MEP
Bromofluorobenzene	8021 Surrogate	104	% Rec.	0.000	05/18/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Chloride	EPA 300.0	791	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	68,006	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	885	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	3,816	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	562	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,638	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	28.0	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	59.5	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

QC SUMMARY REPORT

BTEX by EPA Method 8021B - Soil

QC Batch ID: 0120020C

Laboratory Control Sample (LCS/LCSD)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*LCSD* Result (ppm)	*LCSD* Recovery (%)	LCS/D RPD (%)	*QC Acceptance Criteria* RPD (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Benzene	<0.125	2.50	1.87	74.7%	2.14	85.6%	14%	± 30	70 - 130
Toluene	<0.125	2.50	2.14	85.7%	2.25	89.8%	5%	± 30	70 - 130
Ethylbenzene	<0.125	2.50	2.07	83.0%	1.97	78.8%	5%	± 30	70 - 130
Xylenes, total	<0.125	7.50	6.26	83.5%	6.04	80.5%	4%	± 30	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*MSD* Result (ppm)	*MSD* Recovery (%)	MS/D RPD (%)	*QC Acceptance Criteria* RPD (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Benzene	<0.125	2.50	1.97	79.0%	2.01	80.4%	2%	± 30	65 - 135
Toluene	<0.125	2.50	2.22	88.8%	2.24	89.8%	1%	± 30	65 - 135
Ethylbenzene	<0.125	2.50	2.16	86.5%	2.19	87.5%	1%	± 30	65 - 135
Xylenes, Total	<0.125	7.50	6.36	84.8%	6.41	85.4%	1%	± 30	65 - 135

Sequence Date(s): 05/16/01, 05/18/01

Batch Extraction/Prep Date:

Sample ID - MS/MSD: 2001050133-2

Data Qualifiers:

Project(s) In Batch: 2001050123 (1,3,5-6,8-9,13,16)
2001050133 (1-4)
2001050124 (2-3,6,10-11,13-14,18)

QC Batch ID: 053001W

QC SUMMARY REPORT

TPH by 418.1 Method

Laboratory Control Sample (LCS/LCSD) Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS***		***LCSD***		LCS/D	***QC Acceptance Criteria***	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)	RPD (%)	RPD (%)	Spike % Recovery (Low - High Limit)
TPH - 418.1	<1.0	50.0	52.1	104.2%	48.6	97.2%	7%	± 30	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	***MS***		***MSD***		MS/D	***QC Acceptance Criteria***	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)	RPD (%)	RPD (%)	Spike % Recovery (Low - High Limit)
TPH - 418.1	<1.0	50.0	42.5	85.0%	44.1	88.2%	4%	± 30	70 - 130

Sample Used for MS/MSD: 2001050123-1

Sequence Date(s): 5/30/2001 **Batch Extraction/Prep Date:** 5/30/2001

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:
2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 052901/053001

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.121	112.0%	75 - 125
Barium	<DL	1.00	0.995	99.0%	75 - 125
Cadmium	<DL	1.00	1.051	105.0%	75 - 125
Chromium	<DL	1.00	1.149	115.0%	75 - 125
Lead	<DL	1.00	1.071	107.0%	75 - 125
Mercury	0.055J	0.10	0.175	120.0%	75 - 125
Selenium	<DL	1.00	1.243	124.0%	75 - 125
Silver	<DL	1.00	1.075	108.0%	75 - 125
Manganese	<DL	1.00	1.244	124.0%	75 - 125
Magnesium	<DL	1.00	1.164	116.0%	75 - 125
Calcium	<DL	0.50	0.439	88.0%	75 - 125
Potassium	<DL	0.50	0.445	89.0%	75 - 125
Sodium	<DL	0.50	0.465	93.0%	75 - 125
Zinc	<DL	0.05	0.048	97.0%	75 - 125
Iron	<DL	0.50	0.455	93.0%	75 - 125
Copper	<DL	1.00	0.978	98.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	***MS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<5.00	1.00	5.279	110.0%	75 - 125
Barium	280	1.00	281.340	134.0%	75 - 125
Cadmium	<0.500	1.00	1.012	101.0%	75 - 125
Chromium	<5.00	1.00	1.120	112.0%	75 - 125
Lead	<1.00	1.00	0.990	99.0%	75 - 125
Mercury	<0.200	0.25	0.265	104.0%	75 - 125
Selenium	<5.00	1.00	1.126	113.0%	75 - 125
Silver	<5.00	1.00	0.338	34.0%	75 - 125
Manganese	30.2	1.00	31.360	116.0%	75 - 125
Magnesium	4,409	1.00	4,411	237.0%	75 - 125
Calcium	147,909	1.00	<147,909	0.0%	75 - 125
Potassium	805	1.00	807.430	243.0%	75 - 125
Sodium	1,552	1.00	1555.250	325.0%	75 - 125
Zinc	<1.00	1.00	1.065	107.0%	75 - 125
Iron	1,816	1.00	1822	612.0%	75 - 125
Copper	<1.00	1.00	0.929	93.0%	75 - 125

Sequence Date(s):	5/29/01 & 5/30/01	**Batch Extraction/Prep Date:**	5/24/01
Sample ID - MS/MSD:	2001050123-1		

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: **2001050123**
2001050124

QC SUMMARY REPORT

QC Batch ID: 052901/053001

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.121	112.0%	75 - 125
Barium	<DL	1.00	0.995	99.0%	75 - 125
Cadmium	<DL	1.00	1.051	105.0%	75 - 125
Chromium	<DL	1.00	1.149	115.0%	75 - 125
Lead	<DL	1.00	1.071	107.0%	75 - 125
Mercury	0.055J	0.10	0.175	120.0%	75 - 125
Selenium	<DL	1.00	1.243	124.0%	75 - 125
Silver	<DL	1.00	1.075	108.0%	75 - 125
Manganese	<DL	1.00	1.244	124.0%	75 - 125
Magnesium	<DL	1.00	1.164	116.0%	75 - 125
Calcium	<DL	0.50	0.439	88.0%	75 - 125
Potassium	<DL	0.50	0.445	89.0%	75 - 125
Sodium	<DL	0.50	0.465	93.0%	75 - 125
Zinc	<DL	0.05	0.048	97.0%	75 - 125
Iron	<DL	0.50	0.455	93.0%	75 - 125
Copper	<DL	1.00	0.978	98.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	6.08	1.00	7.220	114.0%	75 - 125
Barium	371	1.00	371.923	92.0%	75 - 125
Cadmium	<0.500	1.00	1.030	103.0%	75 - 125
Chromium	<5.00	1.00	1.109	111.0%	75 - 125
Lead	<1.00	1.00	1.031	103.0%	75 - 125
Mercury	<0.200	0.25	0.270	102.0%	75 - 125
Selenium	<5.00	1.00	1.202	120.0%	75 - 125
Silver	<5.00	1.00	1.048	105.0%	75 - 125
Manganese	23.7	1.00	24.820	112.0%	75 - 125
Magnesium	15,900	1.00	<15,900	0.0%	75 - 125
Calcium	212,454	1.00	<212,454	0.0%	75 - 125
Potassium	818	1.00	<818	0.0%	75 - 125
Sodium	292	1.00	292.926	93.0%	75 - 125
Zinc	<1.00	1.00	1.100	110.0%	75 - 125
Iron	1,787	1.00	1787.48	48.0%	75 - 125
Copper	<1.00	1.00	0.966	97.0%	75 - 125

Sequence Date(s): 5/29/01 & 5/30/01 **Batch Extraction/Prep Date:** 5/24/01

Sample ID - MS/MSD: 2001050123-11

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: **2001050123**
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,251	1,157	10.00	1,258.30	73.0%	80 -120

Sequence Date(s): 5/29/01

Batch Extraction/Prep Date: 5/29/01

Sample ID - MS/DUP: 2001050123-1

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	173	N/A	10.00	180.90	79.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050123-13

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	120	106	10.00	127.3	73.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050124-4

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

MILLENN[illegible]M LABORATORIES
CHAIN OF CUS[illegible]ODY RECORD

1544 Sawdust R[illegible]d, Suite 402
The Woodlands, [illegible]exas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number

LAB USE ONLY
200___-050123

[illegible]ge 1 of 2

Number each chain per project

REPORT TO:	INVOICING INFORMATION	PROJECT INFORMATION
Company Enercon Services	Company Same	Project Number PH 334
Mailing Address 8266 Gulf Frwy # 380	Address:	Site Name Hobbs
City Houston ST TX Zip 77017	City ST Zip	
Phone # 713-941-0401	Phone #:	**Sampled by:** Print Name(s) Below
Fax # 713-941-0402	Fax #:	Paul Brodin
Report Attn: Paul Brodin	Invoice Attn:	

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm
☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ **Level III** ____ **TRPP** ____

Remarks:
P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ______

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX (8260) 8021B+MTBE	TPH (418.1) 1005/1006	PAH 8310 / 8270	WQCC Metals	Chlorides					Comments	Preserved	Total Number of Sample Containers
1	22-0507-A	5/9/01	0850		↓			↓				X	X		X	X						Ice	1
2	22-1517-A		0910												X	X							1
3	22-2325-A		0945									X	X		X	X							1
4	23-0305-A		1020												X	X							1
5	23-1012-A		1035									X	X		X	X							1
6	23-2325-A		1105									X	X		X	X							1
7	24-0305-A		1305												X	X							1
8	24-1012-A		1325									X	X		X	X							1
9	24-2325-A		1400									X	X		X	X							1
	~~24-2931-A~~		~~1405~~																				~~1~~
10	24-3840-A	↓	1410		↓			↓							X	X						↓	1

Relinquished by: Al Brodin	Date: 5/14/01	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
☐ Temperature of Sample(s): [illegible]

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

Received by Millennium Labs: [illegible] **Date:** [illegible] **Time:** [illegible]

MILLENNIUM LABORATORIES
CHAIN OF CUSTODY RECORD

1544 Sawdust Road, Suite 402
The Woodlands, Texas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number

Page 2 of 2

LAB USE ONLY
200 1-05-123

Number each chain per project

REPORT TO:	**INVOICING INFORMATION**	**PROJECT INFORMATION**
Company	Company	Project Number PH334
Mailing Address	Address:	Site Name Hobbs
City ST Zip	City ST Zip	
Phone #	Phone #:	**Sampled by:** Print Name(s) Below
Fax #	Fax #:	Paul Brodin
Report Attn:	Invoice Attn:	

☐ **PAH-Soil:** If, C_6-C_{28} total >100 ppm
☐ **PAH-Water:** If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:

Fax Results: Yes ____ No ____

Level II ____ **Level III** ____ **TRPP** ____

Remarks:

P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ______

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX [✓ 8260] 8021B+MTBE	TPH [✓ 418.1] 1005/1006	PAH 8310 / 8270	WQCC Metals	Chlorides					Comments	Preserved	Total Number of Sample Containers
11	25-0305-A	5/9/01	1440		↓			↓							X	X						ice	1
12	25-1012-A	↓	1500		↓			↓							X	X						↓	1
13	25-2022-A	↓	1520		↓			↓				X	X		X	X						↓	1
14	26-0305-A	↓	1650		↓			↓							X	X						↓	1
15	26-1012-A	↓	1710		↓			↓							X	X						↓	1
16	26-2527-A	↓	1730		↓			↓				X	X		X	X						↓	1
17	26-3235-A	↓	1740		↓			↓							X	X						↓	1

Relinquished by: Al Brodi	Date: 5/14/01	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
☐ Temperature of Sample(s): [illegible]

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

Received by Millennium Labs: **Date:** [illegible] **Time:** [illegible]

Report No.: 2001050065
05/30/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 3 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
TCLP Phenanthrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Anthracene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Carbazole	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Di-n-butyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Fluoranthene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Pyrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Butylbenzyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(a)anthracene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Chrysene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Bis(2-ethylhexyl)phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Di-n-octyl phthalate	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(b)fluoranthene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(k)fluoranthene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(a)pyrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Indeno(1,2,3-cd)pyrene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Dibenzo(a,h)anthracene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE
TCLP Benzo(ghi)perylene	SW-846 1311/8270C	<0.100	mg/L	0.100	05/14/2001	TRE

Sample No.: 4 Date Collected: 05/08/2001 Time Collected: 13:20:00 Matrix: Groundwater
Description: SW-1 Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Ignitability	SW-846 1010	>212	°F	50.000	05/14/2001	KF
Reactive Cyanide	7.3.3.2	<0.050	mg/L	0.050	05/11/2001	KF
Reactive Sulfide	7.3.4.2	<10.0	mg/L	10.000	05/14/2001	KF
pH	150.1	6.90	pH units	0.000	05/09/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 7 Date Collected: 05/09/2001 Time Collected: 13:05:00 Matrix: Soil
Description: 24-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 8 Date Collected: 05/09/2001 Time Collected: 13:25:00 Matrix: Soil
Description: 24-1012-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	8021 Surrogate	106	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Chloride	EPA 300.0	220	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	46,074	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,112	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	6,724	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	633	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	11.3	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	2,311	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	28.4	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	57.4	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	40.1	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 9 Date Collected: 05/09/2001 Time Collected: 14:00:00 Matrix: Soil
Description: 24-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP

TEST RESULTS BY SAMPLE

Sample No.: 9 Date Collected: 05/09/2001 Time Collected: 14:00:00 Matrix: Soil
Description: 24-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Bromofluorobenzene	8021 Surrogate	104	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Chloride	EPA 300.0	821	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	252,456	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	796	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	16,651	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	688	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,820	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	72.0	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	314	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	49.2	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 10 Date Collected: 05/09/2001 Time Collected: 14:10:00 Matrix: Soil
Description: 24-3840-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	166	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	92,371	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	247	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	3,753	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	253	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,003	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	21.2	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	42.4	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 11 Date Collected: 05/09/2001 Time Collected: 14:40:00 Matrix: Soil
Description: 25-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	39.5	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	212,454	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	818	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	15,900	mg/Kg	1.000	05/03/2001	KF
Sodium	SW-846 3050B/6020	292	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,787	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	23.7	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	6.08	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	371	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 12 Date Collected: 05/09/2001 Time Collected: 15:00:00 Matrix: Soil
Description: 25-1012-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	75.8	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	198,123	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,044	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	7,358	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	272	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	3,028	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	31.5	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	75.6	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	7.10	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	261	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	7.56	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	8.20	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

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06/01/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 13	Date Collected: 05/09/2001	Time Collected: 15:20:00	Matrix: Soil
Description: 25-2022-A	Project Name: Hobbs		

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	8021 Surrogate	104	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	208	mg/Kg	10.000	05/30/2001	MAT
Chloride	EPA 300.0	173	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	197,312	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	575	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	19,955	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	185	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,437	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	33.2	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	247	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 14	Date Collected: 05/09/2001	Time Collected: 16:50:00	Matrix: Soil
Description: 26-0305-A	Project Name: Hobbs		

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	18.6	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	295,815	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	920	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	9,185	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	241	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	2,287	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	34.3	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	172	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	6.50	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	367	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 14 Date Collected: 05/09/2001 Time Collected: 16:50:00 Matrix: Soil
Description: 26-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 15 Date Collected: 05/09/2001 Time Collected: 17:10:00 Matrix: Soil
Description: 26-1012-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	66.2	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	90,456	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,599	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	20,265	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	751	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	2,937	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	97.2	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	5.62	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	144	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 16 Date Collected: 05/09/2001 Time Collected: 17:30:00 Matrix: Soil
Description: 26-2527-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	8021 Surrogate	109	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	286	mg/Kg	10.000	05/30/2001	MAT
Chloride	EPA 300.0	102	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	167,153	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	678	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	13,300	mg/Kg	1.000	05/30/2001	KF

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06/01/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 16 Date Collected: 05/09/2001 Time Collected: 17:30:00 Matrix: Soil
Description: 26-2527-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Sodium	SW-846 3050B/6020	151	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,929	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	25.4	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	194	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 17 Date Collected: 05/09/2001 Time Collected: 17:40:00 Matrix: Soil
Description: 26-3235-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	95.9	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	139,675	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	547	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	12,214	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	141	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,514	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	27.7	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/21/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	124	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

MILLENNIUM Laboratories, Inc.

1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Paul Brodin
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2001050124
Report Date: 06/01/2001

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: PH 334
Received: 05/15/2001

Sampled by: Paul Brodin

Lab Number	Sample Identification
2001050124-1	27-0305-A
2001050124-2	28-0305-A
2001050124-3	28-1012-A
2001050124-4	28-2325-A
2001050124-5	29-0305-A
2001050124-6	29-1012-A
2001050124-7	29-2325-A
2001050124-8	29-3840-A
2001050124-9	30-0305-A
2001050124-10	30-1517-A
2001050124-11	30-3335-A
2001050124-12	31-0305-A
2001050124-13	31-1517-A
2001050124-14	31-2325-A
2001050124-15	32-0305-A
2001050124-16	32-1315-A
2001050124-17	32-2325-A
2001050124-18	33-0305-A
2001050124-19	33-1315-A
2001050124-20	33-2325-A
2001050124-21	34-0810-A
2001050124-22	34-1820-A
2001050124-23	34-2830-A
2001050124-24	34-3840-A

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Technical - QA/QC review by :
Matt Steere/Theresa Sorrells

MILLENNIUM LABORATORIES, Inc.
Amanda Bourgeois
Amanda Bourgeois/Daniel Duplechien
Project Manager

MILLENNIUM
LABORATORIES, INC.

June 8, 2001

Paul Brodin
Enercon
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2001050124
Project Name: Hobbs
Project Number: PH334

Dear Mr. Brodin:

Enclosed you will find the results of the samples submitted to Millennium Laboratories on 05/15/01 from the site referenced above.

Your samples "28-2325-A, 31-2325-A and 34-3840-A" (Millennium ID: 2001050124-4, 14 and 24) were randomly chosen for use in Millennium's Quality Control Program for Metals Analysis by method 6020. The Matrix Spike (MS) recovery was outside the quality control limit for several analytes, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "28-2325-A" (Millennium ID: 2001050124-4) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

This report retains its validity and integrity only when reproduced in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories. All

Samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Amanda Bourgeois

Amanda Bourgeois, Project Manager

TEST RESULTS BY SAMPLE

Sample No.: 1 Date Collected: 05/10/2001 Time Collected: 08:15:00 Matrix: Soil
Description: 27-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	180,029	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,300	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	8,993	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	486	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	3,629	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	61.8	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	25.2	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	240	mg/Kg	0.100	05/31/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	6.28	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	763	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	21.3	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	5.34	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 2 Date Collected: 05/10/2001 Time Collected: 08:30:00 Matrix: Soil
Description: 28-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	254,455	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	585	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	2,750	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	387	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,199	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	23.6	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	378	mg/Kg	0.100	05/31/2001	KF
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	8021 Surrogate	104	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	5.95	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	371	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 2 Date Collected: 05/10/2001 Time Collected: 08:30:00 Matrix: Soil
Description: 28-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 3 Date Collected: 05/10/2001 Time Collected: 08:50:00 Matrix: Soil
Description: 28-1012-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	308,142	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	728	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	13,621	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	360	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,565	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	29.4	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	341	mg/Kg	0.100	05/31/2001	KF
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	8021 Surrogate	104	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	7.32	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	1,418	mg/Kg	5.000	05/30/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 4 Date Collected: 05/10/2001 Time Collected: 09:05:00 Matrix: Soil
Description: 28-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	123,744	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	525	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	11,724	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	292	mg/Kg	1.000	05/29/2001	KF

Report No.: 2001050124
06/01/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 4 Date Collected: 05/10/2001 Time Collected: 09:05:00 Matrix: Soil
Description: 28-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,516	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	28.7	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	120	mg/Kg	0.100	05/31/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	229	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 5 Date Collected: 05/10/2001 Time Collected: 09:35:00 Matrix: Soil
Description: 29-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	159,609	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,080	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	6,872	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	583	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	4,069	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	60.7	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	61.1	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	236	mg/Kg	0.100	05/31/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	6.63	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	1,325	mg/Kg	5.000	05/30/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	30.8	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	19.2	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Report No.: 2001050124
06/01/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 6 Date Collected: 05/10/2001 Time Collected: 09:50:00 Matrix: Soil
Description: 29-1012-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	116,878	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,391	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	7,529	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	1,868	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	3.17	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	5,997	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	73.0	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	157	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	1,154	mg/Kg	0.100	05/31/2001	KF
Benzene	SW-846 5030B/8021B	4.11	mg/Kg	0.125	05/21/2001	MAT
Toluene	SW-846 5030B/8021B	19.7	mg/Kg	0.125	05/21/2001	MAT
Ethylbenzene	SW-846 5030B/8021B	16.7	mg/Kg	0.125	05/21/2001	MAT
Xylenes, total	SW-846 5030B/8021B	42.3	mg/Kg	0.125	05/21/2001	MAT
Bromofluorobenzene	8021 Surrogate	120	% Rec.	0.000	05/21/2001	MAT
TPH (418.1)	418.1	26000	mg/Kg	1000.000	05/30/2001	MAT
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	7.42	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	1,688	mg/Kg	5.000	05/30/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	34.2	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	29.0	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 7 Date Collected: 05/10/2001 Time Collected: 10:30:00 Matrix: Soil
Description: 29-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	330,231	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	252	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	13,908	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	327	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	723	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	16.6	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	233	mg/Kg	0.100	05/31/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	159	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF

Report No.: 2001050124
06/01/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.:	7	Date Collected:	05/10/2001	Time Collected:	10:30:00	Matrix:	Soil
Description:	29-2325-A	Project Name:	Hobbs				

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.:	8	Date Collected:	05/10/2001	Time Collected:	10:45:00	Matrix:	Soil
Description:	29-3840-A	Project Name:	Hobbs				

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	144,573	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	346	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	4,532	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	104	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,108	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	103	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	57.4	mg/Kg	0.100	05/31/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	197	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.:	9	Date Collected:	05/10/2001	Time Collected:	11:25:00	Matrix:	Soil
Description:	30-0305-A	Project Name:	Hobbs				

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	274,834	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	587	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	8,727	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	120	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,388	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	24.2	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	<3.00	mg/Kg	3.000	05/31/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN

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TEST RESULTS BY SAMPLE

Sample No.: 9 Date Collected: 05/10/2001 Time Collected: 11:25:00 Matrix: Soil
Description: 30-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Arsenic	SW-846 3050B/6020	5.40	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	536	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 10 Date Collected: 05/10/2001 Time Collected: 11:35:00 Matrix: Soil
Description: 30-1517-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	120,495	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	1,029	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	5,326	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	506	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,413	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	32.3	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	33.1	mg/Kg	0.100	05/31/2001	KF
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	SW-846 5030B/8021B	95.5	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	93.4	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 14 Date Collected: 05/10/2001 Time Collected: 13:50:00 Matrix: Soil
Description: 31-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,052	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	23.0	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	419	mg/Kg	0.100	06/01/2001	KF
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	8021 Surrogate	104	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	193	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 15 Date Collected: 05/10/2001 Time Collected: 14:30:00 Matrix: Soil
Description: 32-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	235,047	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	809	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	13,347	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	2,715	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,550	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	17.8	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	4,460	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	6.06	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	242	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

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TEST RESULTS BY SAMPLE

Sample No.: 16 Date Collected: 05/10/2001 Time Collected: 14:40:00 Matrix: Soil
Description: 32-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	79,930	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	827	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	19,392	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	857	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	2,242	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	44.1	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	1,507	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	174	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 17 Date Collected: 05/10/2001 Time Collected: 14:50:00 Matrix: Soil
Description: 32-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	146,665	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	390	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	15,283	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	312	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,282	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	283	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	194	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	236	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 18 Date Collected: 05/10/2001 Time Collected: 15:15:00 Matrix: Soil
Description: 33-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	201,557	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	865	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	5,706	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	4,849	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,847	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	25.9	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	5,166	mg/Kg	0.100	06/01/2001	KF
Benzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Toluene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Ethylbenzene	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Xylenes, total	SW-846 5030B/8021B	<0.125	mg/Kg	0.125	05/19/2001	MEP
Bromofluorobenzene	8021 Surrogate	104	% Rec.	0.000	05/19/2001	MEP
TPH (418.1)	418.1	<10.0	mg/Kg	10.000	05/30/2001	MAT
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	6.62	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	369	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 19 Date Collected: 05/10/2001 Time Collected: 15:25:00 Matrix: Soil
Description: 33-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	212,130	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	861	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	19,716	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	3,045	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,864	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	30.9	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	5,218	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	6.06	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	513	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 19 Date Collected: 05/10/2001 Time Collected: 15:25:00 Matrix: Soil
Description: 33-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 20 Date Collected: 05/10/2001 Time Collected: 15:35:00 Matrix: Soil
Description: 33-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	185,751	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	809	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	14,915	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	1,299	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,788	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	628	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	1,712	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	5.65	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	261	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 21 Date Collected: 05/10/2001 Time Collected: 15:55:00 Matrix: Soil
Description: 34-0810-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	132,036	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	918	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	9,750	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	2,558	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	2,546	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	32.1	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	2,713	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN

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TEST RESULTS BY SAMPLE

Sample No.: 21 Date Collected: 05/10/2001 Time Collected: 15:55:00 Matrix: Soil
Description: 34-0810-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Arsenic	SW-846 3050B/6020	5.22	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	215	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 22 Date Collected: 05/10/2001 Time Collected: 16:05:00 Matrix: Soil
Description: 34-1820-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	213,081	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	386	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	22,056	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	1,523	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,468	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	32.1	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	1,339	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	485	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 23 Date Collected: 05/10/2001 Time Collected: 16:15:00 Matrix: Soil
Description: 34-2830-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	165,158	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	257	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	14,931	mg/Kg	1.000	05/30/2001	KF
Sodium	SW-846 3050B/6020	202	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,307	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	18.9	mg/Kg	1.000	05/29/2001	KF

Report No.: 2001050124
06/01/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 23 Date Collected: 05/10/2001 Time Collected: 16:15:00 Matrix: Soil
Description: 34-2830-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	175	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	142	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

Sample No.: 24 Date Collected: 05/10/2001 Time Collected: 16:25:00 Matrix: Soil
Description: 34-3840-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	160,630	mg/Kg	1.000	05/30/2001	KF
Potassium	SW-846 3050B/6020	247	mg/Kg	1.000	05/29/2001	KF
Magnesium	SW-846 3050B/6020	5,443	mg/Kg	1.000	05/29/2001	KF
Sodium	SW-846 3050B/6020	35.6	mg/Kg	1.000	05/29/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Iron	SW-846 3050B/6020	1,179	mg/Kg	1.000	05/29/2001	KF
Manganese	SW-846 3050B/6020	146	mg/Kg	1.000	05/29/2001	KF
Zinc	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Chloride	EPA 300.0	27.1	mg/Kg	0.100	06/01/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/30/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Barium	SW-846 3050B/6020	116	mg/Kg	5.000	05/29/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/29/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Lead	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/29/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/29/2001	KF

QC SUMMARY REPORT

BTEX by EPA Method 8021B - Soil

QC Batch ID: 0120020C

Laboratory Control Sample (LCS/LCSD)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS*** Result (ppm)	***LCS*** Recovery (%)	***LCSD*** Result (ppm)	***LCSD*** Recovery (%)	LCS/D RPD (%)	***QC Acceptance Criteria*** RPD (%)	***QC Acceptance Criteria*** Spike % Recovery (Low - High Limit)
Benzene	<0.125	2.50	1.87	74.7%	2.14	85.6%	14%	± 30	70 - 130
Toluene	<0.125	2.50	2.14	85.7%	2.25	89.8%	5%	± 30	70 - 130
Ethylbenzene	<0.125	2.50	2.07	83.0%	1.97	78.8%	5%	± 30	70 - 130
Xylenes, total	<0.125	7.50	6.26	83.5%	6.04	80.5%	4%	± 30	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	***MS*** Result (ppm)	***MS*** Recovery (%)	***MSD*** Result (ppm)	***MSD*** Recovery (%)	MS/D RPD (%)	***QC Acceptance Criteria*** RPD (%)	***QC Acceptance Criteria*** Spike % Recovery (Low - High Limit)
Benzene	<0.125	2.50	1.97	79.0%	2.01	80.4%	2%	± 30	65 - 135
Toluene	<0.125	2.50	2.22	88.8%	2.24	89.8%	1%	± 30	65 - 135
Ethylbenzene	<0.125	2.50	2.16	86.5%	2.19	87.5%	1%	± 30	65 - 135
Xylenes, Total	<0.125	7.50	6.36	84.8%	6.41	85.4%	1%	± 30	65 - 135

Sequence Date(s): 05/16/01, 05/18/01

Batch Extraction/Prep Date:

Sample ID - MS/MSD: 2001050133-2

Data Qualifiers:

Project(s) In Batch:
2001050123 (1,3,5-6,8-9,13,16)
2001050133 (1-4)
2001050124 (2-3,6,10-11,13-14,18)

QC SUMMARY REPORT

TPH by 418.1 Method

QC Batch ID: 053001W

Laboratory Control Sample (LCS/LCSD)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS***		***LCSD***		LCS/D RPD (%)	***QC Acceptance Criteria***	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	Spike % Recovery (Low - High Limit)
TPH - 418.1	<1.0	50.0	52.1	104.2%	48.6	97.2%	7%	± 30	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	***MS***		***MSD***		MS/D RPD (%)	***QC Acceptance Criteria***	
			Result (ppm)	Recovery (%)	Result (ppm)	Recovery (%)		RPD (%)	*Spike % Recovery (Low - High Limit)*
TPH - 418.1	<1.0	50.0	42.5	85.0%	44.1	88.2%	4%	± 30	70 - 130

Sample Used for MS/MSD: 2001050123-1

Sequence Date(s): 5/30/2001 **Batch Extraction/Prep Date:** 5/30/2001

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:
2001050123
2001050124

QC Batch ID: 0120020

QC SUMMARY REPORT

TPH by TX1005 Method

Soil Q.C.

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS*** Result (ppm)	Recovery (%)	***QC Acceptance Criteria*** Spike % Recovery (Low - High Limit)
TPH - C_6 to C_{10}	<50.0	1000	976	97.6%	70 - 130
TPH - $>C_{10}$ to C_{28}	<50.0	1000	1057	105.7%	70 - 130

Sample Matrix Spikes (MS/MSD)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	***MS*** Result (ppm)	Recovery (%)	***MSD*** Result (ppm)	Recovery (%)	MS/D RPD (%)	***QC Acceptance Criteria*** RPD (%)	Spike % Recovery (Low - High Limit)
TPH - C_6 to C_{10}	<50.0	1000	1039	103.9%	1235	123.5%	17%	± 30	70 - 130
TPH - $>C_{10}$ to C_{28}	<50.0	1000	919	91.9%	1199	119.9%	26%	± 30	70 - 130

Sample Used for MS/MSD 5/20/01

Sequence Date(s): 5/20/01 **Batch Extraction/Prep Date:** 5/16/01

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:
2001050123
2001050124
2001050133

QC SUMMARY REPORT

QC Batch ID: 052901/053001

Metals by EPA Method 6020

Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.121	112.0%	75 - 125
Barium	<DL	1.00	0.995	99.0%	75 - 125
Cadmium	<DL	1.00	1.051	105.0%	75 - 125
Chromium	<DL	1.00	1.149	115.0%	75 - 125
Lead	<DL	1.00	1.071	107.0%	75 - 125
Mercury	0.055J	0.10	0.175	120.0%	75 - 125
Selenium	<DL	1.00	1.243	124.0%	75 - 125
Silver	<DL	1.00	1.075	108.0%	75 - 125
Manganese	<DL	1.00	1.244	124.0%	75 - 125
Magnesium	<DL	1.00	1.164	116.0%	75 - 125
Calcium	<DL	0.50	0.439	88.0%	75 - 125
Potassium	<DL	0.50	0.445	89.0%	75 - 125
Sodium	<DL	0.50	0.465	93.0%	75 - 125
Zinc	<DL	0.05	0.048	97.0%	75 - 125
Iron	<DL	0.50	0.455	93.0%	75 - 125
Copper	<DL	1.00	0.978	98.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	6.08	1.00	7.220	114.0%	75 - 125
Barium	371	1.00	371.923	92.0%	75 - 125
Cadmium	<0.500	1.00	1.030	103.0%	75 - 125
Chromium	<5.00	1.00	1.109	111.0%	75 - 125
Lead	<1.00	1.00	1.031	103.0%	75 - 125
Mercury	<0.200	0.25	0.270	102.0%	75 - 125
Selenium	<5.00	1.00	1.202	120.0%	75 - 125
Silver	<5.00	1.00	1.048	105.0%	75 - 125
Manganese	23.7	1.00	24.820	112.0%	75 - 125
Magnesium	15,900	1.00	<15,900	0.0%	75 - 125
Calcium	212,454	1.00	<212,454	0.0%	75 - 125
Potassium	818	1.00	<818	0.0%	75 - 125
Sodium	292	1.00	292.926	93.0%	75 - 125
Zinc	<1.00	1.00	1.100	110.0%	75 - 125
Iron	1,787	1.00	1787.48	48.0%	75 - 125
Copper	<1.00	1.00	0.966	97.0%	75 - 125

Sequence Date(s):	5/29/01 & 5/30/01	**Batch Extraction/Prep Date:**	5/24/01
Sample ID - MS/MSD:	2001050123-11		

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: **2001050123**
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 052901/053001

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.121	112.0%	75 - 125
Barium	<DL	1.00	0.995	99.0%	75 - 125
Cadmium	<DL	1.00	1.051	105.0%	75 - 125
Chromium	<DL	1.00	1.149	115.0%	75 - 125
Lead	<DL	1.00	1.071	107.0%	75 - 125
Mercury	0.055J	0.10	0.175	120.0%	75 - 125
Selenium	<DL	1.00	1.243	124.0%	75 - 125
Silver	<DL	1.00	1.075	108.0%	75 - 125
Manganese	<DL	1.00	1.244	124.0%	75 - 125
Magnesium	<DL	1.00	1.164	116.0%	75 - 125
Calcium	<DL	0.50	0.439	88.0%	75 - 125
Potassium	<DL	0.50	0.445	89.0%	75 - 125
Sodium	<DL	0.50	0.465	93.0%	75 - 125
Zinc	<DL	0.05	0.048	97.0%	75 - 125
Iron	<DL	0.50	0.455	93.0%	75 - 125
Copper	<DL	1.00	0.978	98.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	<5.00	1.00	5.273	114.0%	75 - 125
Barium	229	1.00	229.666	67.0%	75 - 125
Cadmium	<0.500	1.00	1.033	103.0%	75 - 125
Chromium	<5.00	1.00	1.120	112.0%	75 - 125
Lead	<1.00	1.00	1.048	105.0%	75 - 125
Mercury	<0.200	0.25	0.255	90.0%	75 - 125
Selenium	<5.00	1.00	1.197	120.0%	75 - 125
Silver	<5.00	1.00	1.051	105.0%	75 - 125
Manganese	28.7	1.00	29.910	121.0%	75 - 125
Magnesium	11,724	1.00	<11,724	0.0%	75 - 125
Calcium	123,744	1.00	<123,744	0.0%	75 - 125
Potassium	525	1.00	526.850	185.0%	75 - 125
Sodium	292	1.00	293.360	136.0%	75 - 125
Zinc	<1.00	1.00	1.066	107.0%	75 - 125
Iron	1,516	1.00	1518.44	344.0%	75 - 125
Copper	<1.00	1.00	0.989	99.0%	75 - 125

Sequence Date(s):	5/29/01 & 5/30/01	**Batch Extraction/Prep Date:**	5/24/01
Sample ID - MS/MSD:	2001050124-4 2001050124-1 (Hg)		
Data Qualifiers:	NONE - associated with this batch of samples.		

Project(s) In Batch: 2001050123
2001050124

QC SUMMARY REPORT

QC Batch ID: 052901/053001

Metals by EPA Method 6020

Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.121	112.0%	75 - 125
Barium	<DL	1.00	0.995	99.0%	75 - 125
Cadmium	<DL	1.00	1.051	105.0%	75 - 125
Chromium	<DL	1.00	1.149	115.0%	75 - 125
Lead	<DL	1.00	1.071	107.0%	75 - 125
Mercury	0.055J	0.10	0.175	120.0%	75 - 125
Selenium	<DL	1.00	1.243	124.0%	75 - 125
Silver	<DL	1.00	1.075	108.0%	75 - 125
Manganese	<DL	1.00	1.244	124.0%	75 - 125
Magnesium	<DL	1.00	1.164	116.0%	75 - 125
Calcium	<DL	0.50	0.439	88.0%	75 - 125
Potassium	<DL	0.50	0.445	89.0%	75 - 125
Sodium	<DL	0.50	0.465	93.0%	75 - 125
Zinc	<DL	0.05	0.048	97.0%	75 - 125
Iron	<DL	0.50	0.455	93.0%	75 - 125
Copper	<DL	1.00	0.978	98.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	***MS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<5.00	1.00	5.364	111.0%	75 - 125
Barium	193	1.00	194.040	104.0%	75 - 125
Cadmium	<0.500	1.00	1.001	100.0%	75 - 125
Chromium	<5.00	1.00	1.133	113.0%	75 - 125
Lead	<1.00	1.00	1.031	103.0%	75 - 125
Mercury	<0.200	0.25	0.255	102.0%	75 - 125
Selenium	<5.00	1.00	1.202	120.0%	75 - 125
Silver	<5.00	1.00	0.918	92.0%	75 - 125
Manganese	23.0	1.00	24.140	114.0%	75 - 125
Magnesium	18,162	1.00	<18,162	0.0%	75 - 125
Calcium	210,643	1.00	<210,643	0.0%	75 - 125
Potassium	318	1.00	318.823	82.0%	75 - 125
Sodium	342	1.00	345.280	328.0%	75 - 125
Zinc	<1.00	1.00	6.460	646.0%	75 - 125
Iron	1,052	1.00	1054.03	203.0%	75 - 125
Copper	<1.00	1.00	0.975	98.0%	75 - 125

Sequence Date(s): 5/29/01 & 5/30/01 **Batch Extraction/Prep Date:** 5/24/01

Sample ID - MS/MSD: 2001050124-14
2001050124-11 (Hg)

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2001050123
2001050124

QC SUMMARY REPORT

QC Batch ID: 052901/053001

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	***Method Blank*** (ppm)	Spike Added (ppm)	***LCS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<DL	1.00	1.121	112.0%	75 - 125
Barium	<DL	1.00	0.995	99.0%	75 - 125
Cadmium	<DL	1.00	1.051	105.0%	75 - 125
Chromium	<DL	1.00	1.149	115.0%	75 - 125
Lead	<DL	1.00	1.071	107.0%	75 - 125
Mercury	0.055J	0.10	0.175	120.0%	75 - 125
Selenium	<DL	1.00	1.243	124.0%	75 - 125
Silver	<DL	1.00	1.075	108.0%	75 - 125
Manganese	<DL	1.00	1.244	124.0%	75 - 125
Magnesium	<DL	1.00	1.164	116.0%	75 - 125
Calcium	<DL	0.50	0.439	88.0%	75 - 125
Potassium	<DL	0.50	0.445	89.0%	75 - 125
Sodium	<DL	0.50	0.465	93.0%	75 - 125
Zinc	<DL	0.05	0.048	97.0%	75 - 125
Iron	<DL	0.50	0.455	93.0%	75 - 125
Copper	<DL	1.00	0.978	98.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	***MS***		***QC Acceptance Criteria***
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<5.00	1.00	5.134	111.0%	75 - 125
Barium	116	1.00	116.966	97.0%	75 - 125
Cadmium	<0.500	1.00	1.030	103.0%	75 - 125
Chromium	<5.00	1.00	1.165	117.0%	75 - 125
Lead	<1.00	1.00	1.052	105.0%	75 - 125
Mercury	<0.200	0.25	0.255	102.0%	75 - 125
Selenium	<5.00	1.00	1.116	112.0%	75 - 125
Silver	<5.00	1.00	1.078	108.0%	75 - 125
Manganese	146	1.00	147.290	129.0%	75 - 125
Magnesium	5,443	1.00	5,443.015	2.0%	75 - 125
Calcium	160,630	1.00	<160,630	0.0%	75 - 125
Potassium	247	1.00	248.770	177.0%	75 - 125
Sodium	35.6	1.00	26.860	126.0%	75 - 125
Zinc	<1.00	1.00	1.056	106.0%	75 - 125
Iron	1,179	1.00	1181.30	230.0%	75 - 125
Copper	<1.00	1.00	0.977	98.0%	75 - 125

Sequence Date(s):	5/29/01 & 5/30/01	**Batch Extraction/Prep Date:**	5/24/01
Sample ID - MS/MSD:	2001050124-24 2001050124-21 (Hg)		

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery *(Low - High Limit)*
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	120	106	10.00	127.3	73.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050124-4

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	4,460	4,092	10.00	4,468.0	80.0%	80 -120

Sequence Date(s): 5/29/01

Batch Extraction/Prep Date: 5/29/01

Sample ID - MS/DUP: 2001050124-15

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,339	1,197	10.00	1,347.4	84.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050124-22

Data Qualifiers: *NONE - associated with this batch of samples.*

Project(s) In Batch:

2001050118
2001050123
2001050124

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The Woodlands, Texas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

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REPORT TO:
Company Emerson Services
Mailing Address 8866 Gulf Frwy #380
City Houston ST TX Zip 77017
Phone # 713-941-0401
Fax # 713-941-0402
Report Attn: Paul Brodin

INVOICING INFORMATION
Company Same
Address:
City ST Zip
Phone #:
Fax #:
Invoice Attn:

PROJECT INFORMATION
Project Number PH 334
Site Name Hobbs
Sampled by: Print Name(s) Below
Paul Brodin

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm
☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ Level III ____ TRPP____

Remarks:

P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ________

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	WQCC Metals	Chlorides					Comments	Preserved	Total Number of Sample Containers
1	27-0305-A	5/10/01	0815		↓			↓							X	X						Ice	1
2	28-0305-A		0830									X	X		X	X							1
3	28-1012-A		0850									X	X		X	X							1
4	28-2325-A		0905												X	X							1
5	29-0305-A		0935												X	X							1
6	29-1012-A		0950									X	X		X	X							1
7	29-2325-A		1030												X	X							1
8	29-3840-A		1045												X	X							1
9	30-0305-A		1125												X	X							1
10	30-1517-A		1135									X	X		X	X							1
11	30-3335-A	↓	1200		↓			↓				X	X		X	X						↓	1

Relinquished by:	Date: 5/14/01	Time: 1700	Received by:	Date:	Time:	**Condition of Sample(s) Rec'd At Lab**	
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Custody Seal Intact	☐ Yes ☐ No
Method of Shipment: [see back copy for shipping address & instructions]			**Received by Millennium Labs:**	**Date:** 5-15-1	**Time:** 10	Sample(s) Rec'd Iced/Cool	☑ Yes ☐ No
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client						☒ Temperature of Sample(s): 2.4°C	

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REPORT TO:
Company
Mailing Address
City ST Zip
Phone #
Fax #
Report Attn:

INVOICING INFORMATION
Company
Address:
City ST Zip
Phone #:
Fax #:
Invoice Attn:

PROJECT INFORMATION
Project Number PH 334
Site Name Hobbs

Sampled by: Print Name(s) Below
Paul Brodin

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm
☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ Level III ____ TRPP ____

Remarks:
P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ______

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	WQCC Metals	Chlorides					Comments	Preserved	Total Number of Sample Containers
12	31-0305-A	5/10/01	1315												X	X						ICE	1
13	31-1517-A		1340									X	X		X	X							1
14	31-2325-A		1350									X	X		X	X							1
15	32-0305-A		1430												X	X							1
16	32-1315-A		1440								AB	~~X~~	~~X~~		X	X							1
17	32-2325-A		1450												X	X							1
18	33-0305-A		1515									X	X		X	X							1
19	33-1315-A		1525												X	X							1
20	33-2325-A	↓	1535		↓			↓			AB	~~X~~	~~X~~		X	X						↓	1

Relinquished by: AB Brodin Date: 5/11/01 Time: 1700 Received by: Date: Time:
Relinquished by: Date: Time: Received by: Date: Time:

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
☐ Temperature of Sample(s): < 4°C

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

Received by Millennium Labs: **Date:** [illegible] **Time:** [illegible]

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Number each chain per project

REPORT TO:	**INVOICING INFORMATION**	**PROJECT INFORMATION**
Company	Company	Project Number PH 334
Mailing Address	Address:	Site Name Hobbs
City ST Zip	City ST Zip	
Phone #	Phone #:	**Sampled by:** Print Name(s) Below
Fax #	Fax #:	Paul Brodin
Report Attn:	Invoice Attn:	

☐ **PAH-Soil:** If, C_6-C_{28} total >100 ppm
☐ **PAH-Water:** If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ **Level III** ____ **TRPP** ____

Remarks:

P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ________

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	WQCC Metals	Chlorides					Comments	Preserved	Total Number of Sample Containers
21	34-0810-A	5/10/01	1555		↓			↓			~~AB~~	~~X~~	~~X~~		X	X						ICE	1
22	34-1820-A	↓	1605		↓			↓							X	X						↓	1
23	34-2830-A	↓	1615		↓			↓							X	X						↓	1
24	34-3840-A	↓	1625		↓			↓							X	X						↓	1

Relinquished by: Paul Brodin	Date: 5/14/01	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☑ Yes ☐ No
☐ Temperature of Sample(s): 2°C

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

Received by Millennium Labs:
Date: 5-15-01
Time: 10:20

RECEIVED

FEB 07 2002

Environmental Bureau
Oil Conservation Division

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

STAGE 2 ABATEMENT PLAN PROPOSAL

February 5, 2002

Submitted to: Champion Technologies, Inc.
3130 FM 521
Fresno, Texas 77545

Prepared by: Enercon Services, Inc.
8866 Gulf Freeway, Suite 380
Houston, TX 77017

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

STAGE 2 ABATEMENT PLAN PROPOSAL

February 5, 2002

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Champion Technologies, Inc.
3130 FM 521
Fresno, Texas 77545

Prepared by:
Enercon Services, Inc.
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Houston, TX 77017

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1.0 OBJECTIVES

Enercon Services, Inc. (Enercon) has been retained to prepare a Stage 2 Abatement Plan Proposal (APP) for the Champion Technologies, Inc. (Champion) facility located at 4001 South Highway 18 in Hobbs, New Mexico (site). This Stage 2 APP is prepared pursuant to the New Mexico Oil Conservation Division (NMOCD) letter dated November 15, 2001. The NMOCD letter approved Enercon's Stage 1 Site Investigation Report (SIR) dated November 10, 2000 and the subsequent SIR Addendum 1 (June 22, 2001).

This Stage 2 APP was prepared pursuant to the New Mexico Water Quality Control Commission (WQCC) Regulations set forth in 20 NMAC 6.2. This Stage 2 APP will focus on selecting and designing an abatement option that, when implemented, will result in attainment of the abatement standards and requirements of 20 NMAC 6.2.4103.

The Stage 2 APP describes the procedures that will be used to remediate and monitor the existing soil and groundwater impacts at the site, and fulfill the public notice and participation requirements of 20 NMAC 6.2.4108. The APP contains the following:

1. A detailed description of the site.
2. A summary of site history and usage.
3. A summary of past investigations and incidences on the site.
4. A detailed soil remediation plan.
5. A detailed groundwater investigation plan.
6. Sample collection, handling and analysis procedures.
7. A Site Safety & Health Plan to be implemented for field activities.
8. A detailed public notice and participation plan.
9. A schedule for implementation of the Stage 2 APP and a summary of reporting requirements.

The main objective of the project will be to remediate impacted soils at the site to the maximum extent practicable. The project will also focus on sampling and monitoring the groundwater beneath the site to evaluate if detected concentrations in the soil present a risk of contamination to the groundwater, and determine if detected concentrations in the groundwater pose a significant risk to human health or the environment. This objective will be accomplished through the following activities:

1. Excavation, transportation and disposal of impacted soils in Area 2 to the maximum extent practicable.

2. Field screening and visual observation of impacted soils in Area 2 to determine the limits of excavation.

3. Backfilling the excavated area with clean fill material to approximately the current elevation and grade of the area.

4. Developing and executing a monitoring well installation and groundwater sampling program, including annual groundwater monitoring, to evaluate the quality of the groundwater beneath the site.

5. Developing and executing a soil sampling program to assist in establishing background data for the site and vicinity.

6. Developing and executing a plan for fulfillment of all public notice and participation requirements.

The results of soil remediation activities and groundwater monitoring data collected during implementation of the Stage 2 APP will be used to prepare an Abatement Completion Report. Subsequent groundwater monitoring data will be submitted as addenda to the Abatement Completion Report. Upon completion of all procedures described in the Stage 2 APP appropriate steps, if warranted, will be implemented to obtain site closure. If closure is not warranted, a revision to the APP will be developed and submitted to the NMOCD detailing abatement procedures for any remaining soil impacts or groundwater impacts on the site.

1.1 Project Contacts

The following is a reference list of project contacts:

Client:	Champion Technologies, Inc. Mr. Melvin Davis (281) 431-2561
Champion Technologies Project Manager:	Mr. Ralph Corry (281) 431-2561
Enercon Services, Inc. Project Manager:	Mr. Paul Brodin (713) 941-0401

2.0 SITE DESCRIPTION AND BACKGROUND

2.1. Site Location and Description

The Champion facility's physical address is 4001 South Highway 18 in Hobbs, Lea County, New Mexico. The location of the property is NE/4 of SE/4, Section 15, Township 19 South, Range 38 East, West Hobbs Quadrangle (Appendix A, Figure 1).

The Champion facility stores and distributes chemicals for the petroleum industry. The property is rectangular in shape, approximately 500 feet by 640 feet, or an estimated 7.35 acres. The facility consists of an office building, manufacturing, and storage areas, as well as parking and undeveloped areas (Appendix A, Figure 2). The site is enclosed by a fence with a locking gate along South Highway 18. The facility uses a septic system for sanitary waste disposal and water is supplied by an on-site domestic well. The site is generally flat with a slight gradient in the westerly direction. There are no bodies of surface water on the site.

The facility is bordered by South Highway 18 to the east, residential and undeveloped property to the south, undeveloped land to the west, and an oil field service company to the north.

2.1.1. Regional Geologic Setting

The geology of the Southern High Plains of Texas and New Mexico consists of the Tertiary Ogallala Formation, which is overlain by Quaternary eolian, fluvial, and lacustrine sediments. The Quaternary deposits range in age from 1.4 million years old to recent, and extend to a maximum depth of 80 feet below ground (bgs) surface regionally. The Tertiary Ogallala Formation contains coarse fluvial conglomerates, sandstone, and fine-grained eolian siltstone and clay. The depositional environment of the Ogallala Formation and overlying Quaternary deposits produce overlapping alluvial fans. Exposed along dry riverbeds in the region, the Quaternary alluvium deposits consist of sands, silts, and gravels. Locally, a resistant calcitic layer known as caprock overlies the Ogallala Formation. The caprock is exposed along the northwestern portion of Lea County.

2.1.2. Regional Hydrogeology

The Ogallala aquifer is the primary drinking water and irrigation source for the Southern High Plains of Texas and Eastern New Mexico. The Ogallala aquifer occurs within the Tertiary Ogallala Formation that is comprised of terrigenous sediments such as sands, gravels, and finer sediments. The aquifer is covered by Quaternary deposits and unconformably overlies Cretaceous, Triassic, and Permian rocks. Water table elevations approximately parallel the regional land surface, which dips southeasterly. The general hydraulic conductivity (K) for the aquifer is approximately 200 gal/day/ft^2 with a porosity of 43% and a specific yield of 23% for fined grained sands. However, at the time of this abatement plan proposal, the local hydraulic conductivity, storativity, and transmissivity have not been determined at the site.

2.2. Site Background

2.2.1. Site History and Usage

Champion Technologies, Inc. has occupied the 4001 South Highway location for approximately 30 years. In that time, the site has been used for the distribution of chemicals used in the petroleum industry.

A review of available aerial photographs of the Hobbs area was conducted. Available aerial photographs of the area were not extensive. Photographs from 1949, 1954, and 1967 were found and reviewed. The 1967 photograph showed a possible pond in the southwest portion of the site (Area 3), and a pit near a structure (Area 2). More recent photographs were not available. Aerial photographs are included in Appendix G of Enercon's Revised Abatement Plan Proposal (APP) (September 8, 2000).

2.2.2. Chemical List

Chemicals of primary concern in regards to the APP are stored on the site. A list of stored chemicals is included in Appendix A, Table 1.

2.3 Past Investigations and Incidences

In 1995 a new water well was constructed at the site. Water quality samples were collected and analyzed. Results showed elevated concentrations of chloride and total dissolved solids. Analytical results from the sampling are included in Appendix B of the Revised APP.

Previous soil sampling was performed in 1996 in connection with modification to the facility's septic system. Both soil and groundwater samples were collected for the septic area. Analytical results showed detectable concentrations of total petroleum hydrocarbons, arsenic, barium, chromium, and lead. Analytical results are included in Appendix G of the Revised APP.

Soil sampling was also performed in April 1998 in relation to the removal of contaminated soils due to minor releases near the drum storage areas and product tanks. All actions were addressed and approved by the New Mexico Environmental Department (NMED). The areas were sampled for volatile and semi-volatile organic compounds after excavation of the contaminated soils. All areas sampled were below analytical detection limits. Information pertaining to this sampling event, including the soil removal report and sample analytical results, can be found in Appendix G of the Revised APP.

On December 8, 1998, the NMOCD conducted an inspection at the Hobbs facility. During the inspection, department personnel collected a soil sample from a "yellow stained" area. The location of the soil sample collection was reportedly 105 feet west of the concrete pad adjacent to the warehouse and 71 feet south of the north fence line. Department personnel also collected a water sample from a faucet inside the break room in the office building. Analytical results from these samples showed concentrations of lead, chromium, manganese, nickel, chloride, and soluble sulfates that exceeded groundwater standards. The soil sample analytical results also showed detected concentrations of polyaromatic hydrocarbon compounds. A summary of detected concentrations is presented in Appendix A, Tables 2 and 3 of the Revised APP.

In a letter dated December 29, 1999 from the NMOCD, several areas of alleged buried waste were identified. Each of these NMOCD areas of concern was addressed in the Revised APP, and is shown in Appendix A, Figure 3 of Enercon's Site Investigation Report (SIR) (November 10, 2000). All previous sample locations up to this point are shown in Appendix A, Figure 4 of the SIR.

Enercon performed an investigation on the site in September 2000 in accordance with the procedures described in the Revised APP. The investigation focused on determining the nature and extent of potentially hazardous material contamination in the soil and evaluating the potential for groundwater impact on the site. The site investigation included the following activities:

- Reviewing documents relevant to the site and vicinity;
- Developing a report of the hydrogeologic conditions beneath the site;
- Conducting a geophysical (magnetic and electromagnetic) survey over the entire site;
- Developing and executing a soil sampling program to identify any potential soil impacts on the site;
- Developing and executing a monitoring well installation and sampling program to identify any potential groundwater impacts on the site; and
- Evaluating information and data collected to present conclusions and recommendations for future investigations and remedial actions at the site.

A detailed description of the results of the site investigation, including the hydrogeology report, the geophysical survey, monitoring well construction diagrams and analytical results, can be found in the SIR. All soil boring and monitoring well locations, as well as all other areas of investigation, are shown in Appendix A, Figure 3 of this Stage 2 APP.

Enercon performed a second site investigation in May 2001 based upon the results and recommendations presented in the SIR, and additional information and investigation requested by the NMOCD in a letter dated February 20, 2001. The second investigation focused on further evaluation of the nature and extent of potentially hazardous material contamination in the soil and the potential for groundwater impact on the site. Enercon's second site investigation included the following activities:

- Performing a survey of all water wells located within a one-mile radius of the site;
- Developing a groundwater potentiometric surface map;
- Providing additional information regarding previous sampling, excavation and cleanup activities on the site;
- Providing modified Well Construction Diagrams for MW-1 through MW-5 with the screened intervals corrected from 10 feet to 15 feet;
- Modifying analytical data evaluation practices to include the NMOCD TPH screening level and the WQCC groundwater standards rather than the Texas Risk Reduction Program (TRRP) Tier 1 Residential Soil Protective Concentration Levels (PCLs);
- Further investigation and sampling of the facility's septic tank in preparation for tank removal and sanitary waste disposal;
- Developing and executing a soil sampling program to further evaluate and delineate soil impacts identified on the site in the SIR;
- Developing and executing a monitoring well installation and sampling program to identify any potential groundwater impacts on the site and establish an accurate groundwater gradient; and
- Evaluating information and data collected to present conclusions and recommendations for future investigations and remedial actions at the site.

A detailed description of the results of the second site investigation, including the water well survey, monitoring well construction diagrams and analytical results, can be found in Enercon's Addendum I to Site Investigation Report (SIR) (June 22, 2001). All soil boring and monitoring well locations, as well as all other areas of investigation, are shown in Appendix A, Figure 3 of this Stage 2 APP.

In accordance with the recommendations contained in Addendum I to SIR, Champion cleaned out and removed the facility's damaged septic system in October 2001. The septic system consisted of two approximately1,500-gallon polyethylene tanks installed in series. Analytical results of samples from the septic system demonstrated that it contained RCRA non-hazardous waste suitable for disposal at a wastewater treatment facility. Champion submitted a disposal request to the NMOCD that was approved on May 23, 2001. In accordance with the procedures described in the disposal request and the additional conditions imposed by the NMOCD, all sanitary waste from the septic system was removed by a licensed waste transporter and disposed at the Hobbs, New Mexico Publicly Owned Treatment Works (POTW). The septic tanks were EPA clean and cut-up pursuant to OCD Rule 712, and transported to the Lea County Landfill for disposal. A new septic system, consisting of two approximately 1,000-gallon concrete tanks in series, was installed at the facility once the old system was removed, and is currently in operation. The new septic system was installed by a licensed contractor, and concrete tanks were used to avoid damage from vehicular traffic.

The NMOCD approved the SIR and subsequent Addendum I to SIR on November 15, 2001, and authorized preparation of a Stage 2 APP in accordance with the requirements of 20 NMAC 6.2. Recommendations for further investigation and remedial action described in Addendum I to SIR have been incorporated into the abatement procedures described in the following sections.

3.0 SOIL REMEDIATION

3.1. Soil Excavation

After reviewing several abatement options, it was determined that the most cost effective and time efficient method of soil remediation is excavation and disposal of impacted soils. Impacted soils in Area 2 will be excavated to the maximum extent achievable without affecting the structural integrity of existing improvements on the site (bulk tank area, warehouse). However, the concrete slab adjacent to the warehouse to the west will be removed to allow for increased access to impacted soils. A site map showing the location of Area 2, all site improvements, and the locations of previous soil borings, monitoring wells and other investigations is included in Appendix A, Figure 3. A 1.5:1 slope will be maintained in the excavation to ensure the structural integrity of the improvements is not affected. For example, in order to excavate to a depth of 20 feet bgs, a lateral distance of 30 feet must be maintained from the nearest existing structure. Additionally, no soil excavation will occur within 10 feet of the Navajo pipeline that crosses the site northwest of Area 2. Impacted soils that cannot be accessed due to the restrictions of the bulk tank area, the warehouse and the pipeline will be left in place. The approximate boundaries of the proposed excavation area are shown on Appendix A, Figure 4.

Total petroleum hydrocarbon (TPH) impacted soils in Area 2 will be removed laterally and vertically to the maximum practicable. Lateral excavation will be restricted on the southern, eastern and northwestern sides due to the improvements on the site and the pipeline. Vertical excavation may be restricted in some areas due to hard caliche and rock layers encountered during excavation. The limits of the excavation will be determined based upon field screening of impacted soils with an organic vapor meter (OVM) and visual observations.

3.2 Waste Disposal

All impacted soils excavated from Area 2 will be disposed at the Lea Land, Inc. landfill. Lea Land, Inc. has pre-approved disposal of the impacted soils based upon analytical results from previous sampling events. Lea Land, Inc. is located approximately 32 miles west of Hobbs, NM at Mile Marker 64 on U.S. Highway 62/180 East. All impacted soils to be disposed will be transported to the landfill by a Department of Transportation (DOT) licensed waste transporter using 12-yard dump trucks or 18-yard trailers.

Lea Land, Inc. is a licensed non-hazardous industrial surface waste management facility that is approved by the U.S. Environmental Protection Agency (USEPA) Region VI and the New Mexico Environment Department (NMED). According to information provided by Lea Land, Inc., extensive testing has identified no usable groundwater beneath the facility, and the facility has leachate collection and groundwater monitoring systems in place. Lea Land, Inc. recently opened a new landfill with a liner system that is permitted to accept non-hazardous oil field wastes. Final approval for the new landfill was received from the NMOCD on April 27, 2001. All impacted soils excavated from the site will be disposed in the NMOCD approved landfill.

3.3 Backfilling

The excavation in Area 2 will be backfilled once impacted soils have been removed to the maximum extent achievable given the restrictions imposed by the bulk tank area, the warehouse and the pipeline. Impacted soils will be considered any TPH contaminated soils as determined by field OVM screening and visual observations. The excavation will be backfilled to approximately its original elevation and grade. The excavation will be backfilled with certified clean materials transported to the site by a DOT licensed transporter.

3.4 Post-Abatement Maintenance Activities

No post-abatement maintenance activities are anticipated at the site in conjunction with soil remediation activities.

4.0 MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

4.1 Monitoring Well Installation

To further evaluate potential impacts to groundwater, the installation of two additional monitoring wells is proposed. An off-site well (MW-8), upgradient of the site, is proposed near the northwest corner. MW-8 will be placed in a location, if possible, that has not been affected by industrial, agricultural or other surface activities. The upgradient well will be utilized to determine the quality of the groundwater entering the site. Installation of MW-8 will be dependent upon obtaining permission from the appropriate landowner within one-half mile of the site. A second off-site monitoring well (MW-9) is proposed downgradient of the site near the southeast corner along South Highway 18. The downgradient well will be utilized to establish the quality of the groundwater leaving the site. Again, installation of MW-9 will be dependent upon obtaining permission from the City of Hobbs, DOT or other appropriate landowner within one-half mile. The proposed locations of MW-8 and MW-9 are shown on Appendix A, Figure 5. The following describes the monitoring well installation procedures and specifications:

- Wells will be drilled using an air-rotary drilling method. Wells will be drilled to an approximate depth of 60 feet bgs, depending on the depth of the water table in the monitoring well locations;

- Drill cuttings will be containerized and stored on-site until analytical results are evaluated;

- Approximately 15 feet of screen will be installed in each well, with 10 feet of screen below the water table level, and 5 feet of screen above the water table level. Screen placement will be determined in the field by the field geologist. Screening zones will be based on field observations and logging data;

- The well will be constructed with Schedule 40 PVC casing and screen;

- Screened zones will have appropriate filter pack placed in a matter to avoid any bridging. Filter pack will be placed 2 to 3 feet above the top of the screened zone. Wells will be properly sealed with bentonite 2 to 3 feet above the filter pack and cement grout to the ground surface;

- After installation is complete, the monitoring wells will be properly developed to remove any soil cuttings and other materials in the wellbore to the maximum extent practicable. Monitoring wells will be allowed to recharge for 24 hours prior to sampling;

- The wells will have flush to the ground, surface mounted completions that will protect the well from any damage or unauthorized access; and

- Soil Boring Logs and Well Construction Diagrams (Appendix B) will be completed for each monitoring well.

4.2 Monitoring Well Purging

Monitoring well purging activities for each well sampled will include the following:

- A measuring point will be established on the well casing as a consistent measuring point. Each well will be sounded three times for depth to water;

- Wells will be purged with a decontaminated submersible pump;

- A minimal volume of water will be purged, taking into consideration the stabilization of pH, electrical conductance (EC), and oxidation reduction potential (ORP) over at least two to three casing volumes;

- Purge pumping may possibly draw the water down to a level that the pump will shut off due to lack of water. If this occurs, the well will be allowed to recover to 80% of the original static water level, or for 24 hours before samples will be collected;

- The rate of purging will be calculated and recorded; and

- Purge water will be containerized and stored on-site until analytical results are evaluated.

Additionally, MW-8 and MW-9 will be surveyed for top of casing (TOC) elevation. The TOC elevation will be used in conjunction with the measured depth to water to determine the top of water (TOW) elevation. Additionally, the depth to water will be measured in MW-1 through MW-7 at the time of sampling and combined with known TOC elevations to determine the current TOW elevation for each well. All TOC and TOW elevations will be used to create an updated groundwater potentiometric surface map for the site and vicinity.

4.3 Groundwater Sampling Techniques

In order to ensure that proper groundwater samples are collected, the following procedures will be followed:

- Groundwater samples will be collected with disposable bailers and nylon cord. The bailer and cord will be disposed of after the sample has been collected;

- Samples will be placed in laboratory supplied, clean containers. Each container will be marked with the sample designation, date and time, sampler's initials, and required analysis; and

- Samples will be placed in a cooler after collection and kept chilled until delivered to the laboratory.

4.4 Groundwater Sample Identifiers

Groundwater samples from the two new monitoring wells, if landowner permission is granted, will have the following sample identifiers:

- Monitoring Well 8 – MW-8

- Monitoring Well 9 – MW-9

Groundwater samples from the monitoring wells currently in place will be identified according to their previously assigned sample identifier (MW-1 through MW-7).

4.5 Groundwater Sampling Frequency

The initial groundwater samples from MW-8 and MW-9, as well as samples from wells currently in place, will be collected approximately two days after monitoring well installation is complete.

To date, not enough data has been collected to accurately assess the quality of the groundwater beneath the site. Therefore, monitoring wells on the site will be sampled during soil remediation activities and annually afterwards until a minimum of four sampling events have been conducted. The monitoring period will be utilized to ensure that no groundwater impacts have occurred as a result of the impacted soils left in place on the site, and determine if a significant threat to human health or the environment exists.

Upon completion of the groundwater monitoring period appropriate steps, if warranted, will be implemented to obtain site closure. If closure is not warranted, a revised abatement plan will be developed and submitted to the NMOCD to determine treatment options for any remaining soil impacts or impacted groundwater beneath the site.

5.0 SOIL SAMPLING PROCEDURES AND EQUIPMENT

5.1 Sample Collection Technique

Soil samples will be collected during the monitoring well installation activities described in Section 4.0 of this document. All samples will be collected in accordance with the guidance given in ASTM Standard D 4700-91: *Standard Guide for Soil Sampling from the Vadose Zone* (Appendix C) as well as the procedures described below.

- During monitoring well installation, the sampler will be advanced to an approximate depth of 60 feet bgs. A continuous core sampler will be used and advanced in 5-foot intervals. The split-spoon sampler will be removed and opened. An OVM will be used to screen each sample.
- Soil samples will be placed in laboratory supplied clean 4-oz. and 8-oz. glass jars, sealed, labeled, placed in a cooler and kept chilled prior to laboratory delivery;
- Each container will be marked with the sample designation, date and time, sampler's initials, and required analysis;
- A Field Data Form (Appendix D) will be utilized at each sample location, and completed during sample preparation; and
- Duplicate samples will be collected to confirm laboratory results of soil sampling. The number of duplicate samples collected will equal approximately 10% of the total number of unique samples.

Additionally, an OVM will be used to screen impacted soils in Area 2 to assist in determination of the limits of excavation. Field screening samples will be collected using a decontaminated trowel.

5.2 Soil Sample Identifier

All soil samples will be assigned a unique sample identifier. Each identifier will be comprised of a numeric sample location, a four number depth descriptor, and an alpha character sample type descriptor. The components of the sample designations are described below.

- *Sample Location.* This component consists of a single number unique to each sample location. These numbers will start at 41 to prevent confusion with previous sampling events, and increase sequentially at each sample location.
- *Sample Depth Zone.* The sample depth descriptor consists of four numbers. The first two numbers signify the top of the sample zone (feet bgs), and the last two numbers signify the bottom of the sample zone (feet bgs).

- *Sample Type*. The letter designation and its associated sample type are as follows:

  -A unique

  -B duplicate/replicate

  -C equipment blank

For example, the designation of a unique sample collected at Location No. 41 from 14 to 15 feet bgs would be 41-1415-A.

5.3 Equipment Decontamination

All field sampling equipment and sample preparation equipment will be decontaminated between samples using a non-phosphatic detergent wash, tap water rinse, and a deionized water rinse in accordance with the guidance given in ASTM Standard D 5088-90: *Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites* (Appendix E).

6.0 SAMPLE ANALYSIS AND HANDLING

6.1 Groundwater Sample Analyses

Groundwater samples will be analyzed for the constituents listed below.

- Fluoride, calcium, potassium, magnesium, sodium, bicarbonate, carbonate, chloride, sulfate, nitrate and nitrite (General Chemistry): MW-8;
- Total Dissolved Solids (TDS): MW-8, MW-9;
- Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, copper, iron, magnesium, and zinc (WQCC Metals): MW-6, MW-8;
- Total petroleum hydrocarbons (TPH): MW-6; and
- Chromium: MW-4, MW-9.

6.2 Groundwater Sample Analytical Methods

Analytical methods used for groundwater samples will be in accordance with USEPA SW-846 prescribed or comparable methodologies. Analytical protocols are included in Appendix F. The following analytical methods will be used for groundwater sample analysis.

- WQCC Metals – 3010A/6020 (mercury 7470A);
- Calcium, potassium, magnesium and sodium – 3010A/6020;
- Chloride, fluoride, sulfate, nitrate and nitrite – 300.0;
- Bicarbonate/carbonate – 310.1;
- TDS – 160.1; and
- TPH – 418.1.

The constituents and analytical methods are summarized in Appendix A, Table 2.

6.3 Soil Sample Analyses

Samples collected during installation of MW-8 will be analyzed for the following constituents:

- WQCC Metals; and
- General Chemistry.

Samples from MW-8 will be used to establish background data for the site and vicinity, assuming access to a location unaffected by industrial, agricultural or other surface activities can be obtained. Soil samples will not be collected from MW-9 due to potential impacts of runoff from South Highway 18 and/or nearby properties, and possible contamination from highway traffic.

Additionally, all soil samples will be screened using an OVM.

6.4 Soil Sample Analytical Methods

Analytical methods used for soil samples will be in accordance with USEPA SW-846 prescribed or comparable methodologies. Analytical protocols are included in Appendix F. The following analytical methods will be used for soil sample analysis.

- WQCC Metals – 3050B/6020 (mercury 7471A);
- Calcium, potassium, magnesium and sodium – 3050B/6020;
- Chloride, fluoride, sulfate, nitrate and nitrite – 300.0;
- Bicarbonate/carbonate – 310.1;

The constituents and analytical methods are summarized in Appendix A, Table 2.

6.5 Sample Containers, Preservatives and Shipping

The laboratory will provide sample containers and preservatives. All container preparation by the laboratory will be done in a designated area. Containers will be labeled to indicate the added preservative. Sample containers, preservatives, and holding times are summarized in Appendix A, Table 2. Preparation will be accomplished using the following Standard Operating Procedures (SOPs) for bottle preservation:

- The laboratory will provide bottles for analyses. These will be purchased from suppliers who certify the containers to have been cleaned by protocols as prescribed by the USEPA;
- The laboratory will also provide coolers and applicable Chain-of-Custody forms;
- All sample containers will be delivered at least 1 day before sample collection;
- After a sample is collected and labeled, it will be stored in a cooler and kept chilled prior to laboratory delivery;

- All samples will be wrapped in plastic packing, when necessary, to avoid breakage and will be clearly labeled and sealed to prevent tampering; and

- All samples will have a label containing (at a minimum) the following information.
    - Sample designation;
    - Project name and number;
    - Date and time of collection; and
    - Comments - these may include parameters to be analyzed.

6.6 Chain-of-Custody

Chain-of-custody procedures will include:

- Samples collected by field personnel will be accompanied by a Chain-of-Custody Record Form, which will include date and time of collection, container type, preservatives used, number of samples, sample descriptions, and required analysis;

- Sample identification labels and Chain-of-Custody Records will be completed with waterproof ink, and placed in a waterproof bag for shipment;

- Chain-of-Custody documentation will be completed at each sample location prior to sampling at the next site; and

- The integrity of the samples will be examined, and the final signature on the Chain-of-Custody Form will be completed by a receiving agent of the selected laboratory.

6.7 Quality Assurance/Quality Control (QA/QC)

Analytical methods and SOPs, in accordance with the USEPA, will be consistently maintained by the laboratory to satisfy the required level of QA/QC protocol. One solid sample will be subjected to duplicate or replicate analysis. One equipment blank from soil sampling equipment will be submitted for analysis.

All of the samples will be analyzed under a QC package which includes a case narrative, field identification/laboratory sample number cross-reference summary, analytical results, method blank results, laboratory control sample recoveries, matrix spike/spike duplicate recoveries, and Chain-of-Custody Record.

The laboratory project manager (LPM) will be responsible for analytical results, sample tracking, sample container order, courier requests, turnaround time requests, and explanation of reports. The LPM will also be responsible for tracking the analytical work of the project throughout the laboratory and ensuring the efficient transition of samples through sample control.

6.8 Data Management

Field and laboratory data management, data review, protocols, and procedures are provided to create a centralized working system and to maintain data quality. The following includes a discussion of field and laboratory data management and data review.

Field Data Management. Field data and completed Chain-of-Custody Forms will be completed in the field for each sampling location. These records will be produced, copied, and filed under the appropriate site location nomenclature for each selected site location. The Field Manager will forward these forms to the Project Manager at the conclusion of each sampling round.

The following field documentation will be completed.

- Completed field data forms (Appendix D) and Chain-of-Custody forms; and
- Samples will be described in the field according to procedures established in this document.

Laboratory Data Management. Analytical results and QC data relating to analytical precision and accuracy will be obtained from the laboratory. Laboratory data forms will specify sampling location and method of analysis. Chain-of-Custody Forms will be filed with the laboratory reports.

Data Review. Field data will be reviewed for measurements collected during sampling, order of sample collection, and the observations and notes recorded during the course of the sampling day. Laboratory data forms will be reviewed for the completion of required measurements including parameter results, limits of detection, and dilution factors. Validity of both the field and laboratory data will be determined by evaluating the completeness of the data for the required parameters as documented on the Chain-of-Custody Form. The following data will also be reviewed.

- use of USEPA or SW-846 methods with detection limits below applicable standards, where applicable;
- chemical data of control matrix blanks, control matrix spikes, standards, control matrix duplicates; and
- confirmation of sample analyses within specific holding times.

7.0 SITE SAFETY & HEALTH PLAN

Enercon personnel will review the Site Safety & Health Plan (SSHP) prior to initiation of the remediation and sampling events. The SSHP for conducting this Stage 2 Abatement Plan is on file at the Enercon office in Houston, Texas and is attached here as Appendix G. A copy of this plan will be maintained on-site during abatement activities.

8.0 PUBLIC NOTICE AND PARTICIPATION

8.1 Public Notice

In accordance with 20 NMAC 6.2.4108, Champion will notify the following persons, groups and organizations of the abatement plan:

- The general public in Hobbs and Lea County, New Mexico;
- Owners and residents of all surface property located within a one-mile radius of the site;
- The New Mexico Trustee for Natural Resources and any other affected local, state or federal governmental agencies as identified by the secretary;
- The Governor or President of each Indian Tribe, Pueblo or Nation within the state of New Mexico as identified by the secretary; and
- Any additional persons, as identified by the secretary, who have requested notification.

The general public will be notified through publication of a notice in the Hobbs and Albuquerque, New Mexico newspapers, and airing of the notice as a public service announcement on a local radio station in the predominant non-English language in the area. Surface property owners and residents will be notified by mail or hand delivery. All local, state or federal governmental agencies will be notified by certified mail. All Indian Tribes, Pueblos or Nations, as well as all others identified by the secretary, will be notified by mail. Surface property owners and residents within a one-mile radius will be identified by a subcontracted local title company.

The public notice will be approved in advance by the secretary, and will include, at a minimum, the following information:

- The name and address of the responsible party;
- The location of the proposed abatement;
- A brief description of the nature of the soil and water pollution, and of the proposed abatement action;
- A brief description of the procedures followed by the secretary in making a final determination;
- A statement on the public comment period;

- A statement that a copy of the abatement plan can be viewed by the public at the department's main office or at the department field office for the area where the abatement will occur;
- A statement that written comments on the abatement plan, and requests for a public meeting or hearing that include the reasons why a meeting should be held, will be accepted for consideration if sent to the secretary within 60 days after the determination of administrative completeness; and
- The address and phone number at which interested persons may obtain further information.

Proof of fulfillment of the public notice requirements will be provided to the secretary within 30 days of filing of this Stage 2 APP.

8.2 Public Participation

Upon completion of the public notice requirements, and verification of completion by the secretary, a 60-day public comment period will be recognized. After the comment period, a public meeting or hearing will be held if the secretary determines that significant public interest exists. Notice of the time and place of the meeting or hearing will be given a minimum of 30 days prior to occurrence.

The public meeting or hearing, if necessary, will allow all interested persons a reasonable chance to submit data, views or arguments, orally or in writing, and to ask questions of the secretary or the secretary's designee, and of the responsible party or their authorized representative. All necessary fact sheets or other documents, as required by the secretary, will be prepared for distribution at the public meeting or hearing and afterwards upon request. All fact sheets or other documents will be written in English and Spanish, if required, and an approved translator will be provided if requested by the secretary. A record of the meeting or hearing will be tape recorded or transcribed, provided that the cost of a court reporter will be paid by the person requesting the transcript.

9.0 REPORTING

The following reports will be submitted to the NMOCD over the duration of the project, according to the schedule presented in Appendix A, Table 3:

1. Quarterly progress reports over the duration of field activities.
2. An Abatement Completion Report detailing the results of the remediation and monitoring activities once field activities are complete.
3. Annual groundwater monitoring reports, submitted as addenda to the Abatement Completion Report, describing the results of groundwater monitoring activities.

Upon completion of the groundwater monitoring period appropriate steps, if warranted, will be implemented to obtain site closure. If closure is not warranted, a revised abatement plan will be developed and submitted to the NMOCD to determine treatment options for any remaining soil impacts or impacted groundwater beneath the site.

10.0 SCHEDULE

A schedule for the implementation of the abatement procedures described in this Stage 2 APP is included in Appendix A, Table 3. The NMOCD will be notified at least 5 days in advance of any investigative work that will be performed at the site.

11.0 REFERENCES

University of Texas Bulletin #3232, *Geology of Texas*, Austin, TX 1932.

United States Department of Agriculture, Natural Resources Conservation Service, *Soil Survey of Lea County, New Mexico*, 1974.

United States Department of the Interior, Geological Survey, Hobbs West Quadrangle 7.5-Minute Series topographic map, 1979.

New Mexico Water Quality Control Commission Regulations, 20.6.2 NMAC, January 15, 2001.

USEPA. *Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies.* Office of Research and Development, Washington, D.C. 1992. EPA/600/R-92/128.

USEPA. *Soil Screening Guidance. User's Guide,.* Office of Emergency and Remedial Response. Washington, D.C. 1996. EPA/540/R-96/018.

USEPA. *Test Methods for Evaluating Solids Waste, Physical/Chemical Methods.* Publication SW-846, 1996.

ASTM Standard D5088: *Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Sites*, 1990.

ASTM Standard D4700: *Standard Guide for Soil Sampling from the Vadose Zone*, 1991.

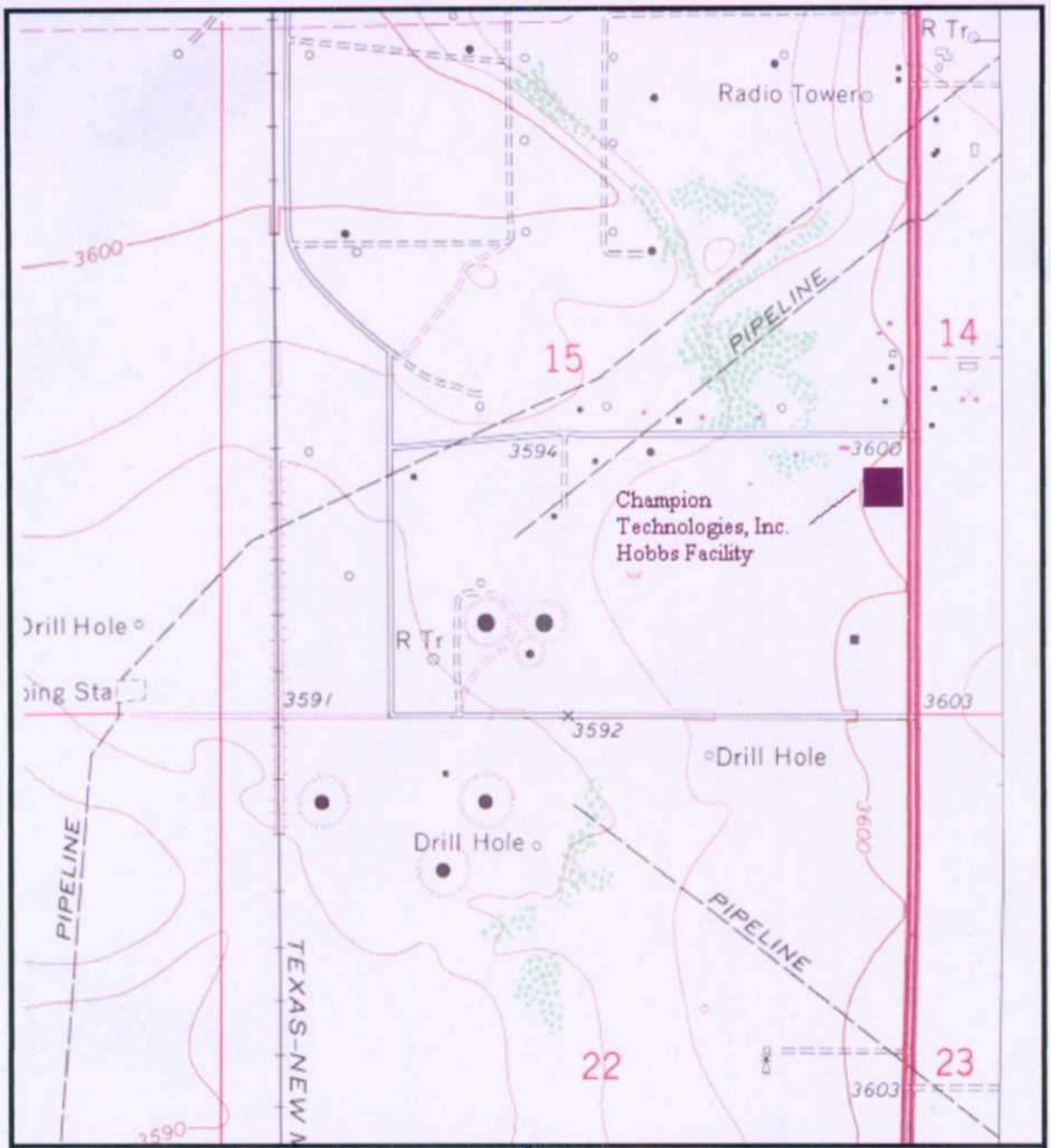
Enercon Services, Inc., *Revised Abatement Plan Proposal*, September 8, 2000.

Enercon Services, Inc., *Site Investigation Report*, November 10, 2000.

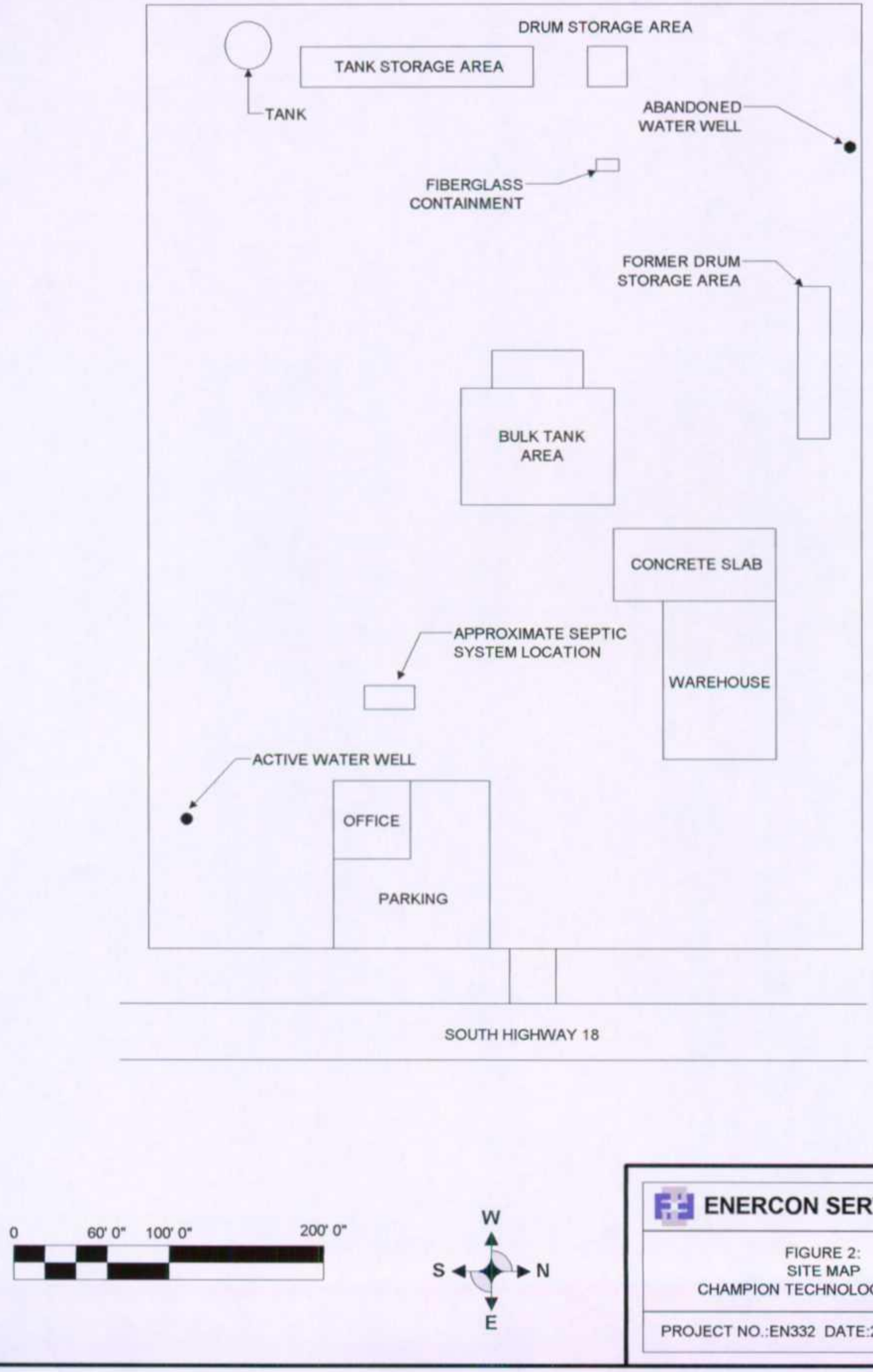
Enercon Services, Inc., *Addendum I to Site Investigation Report*, June 22, 2001.

APPENDIX A

FIGURES AND TABLES



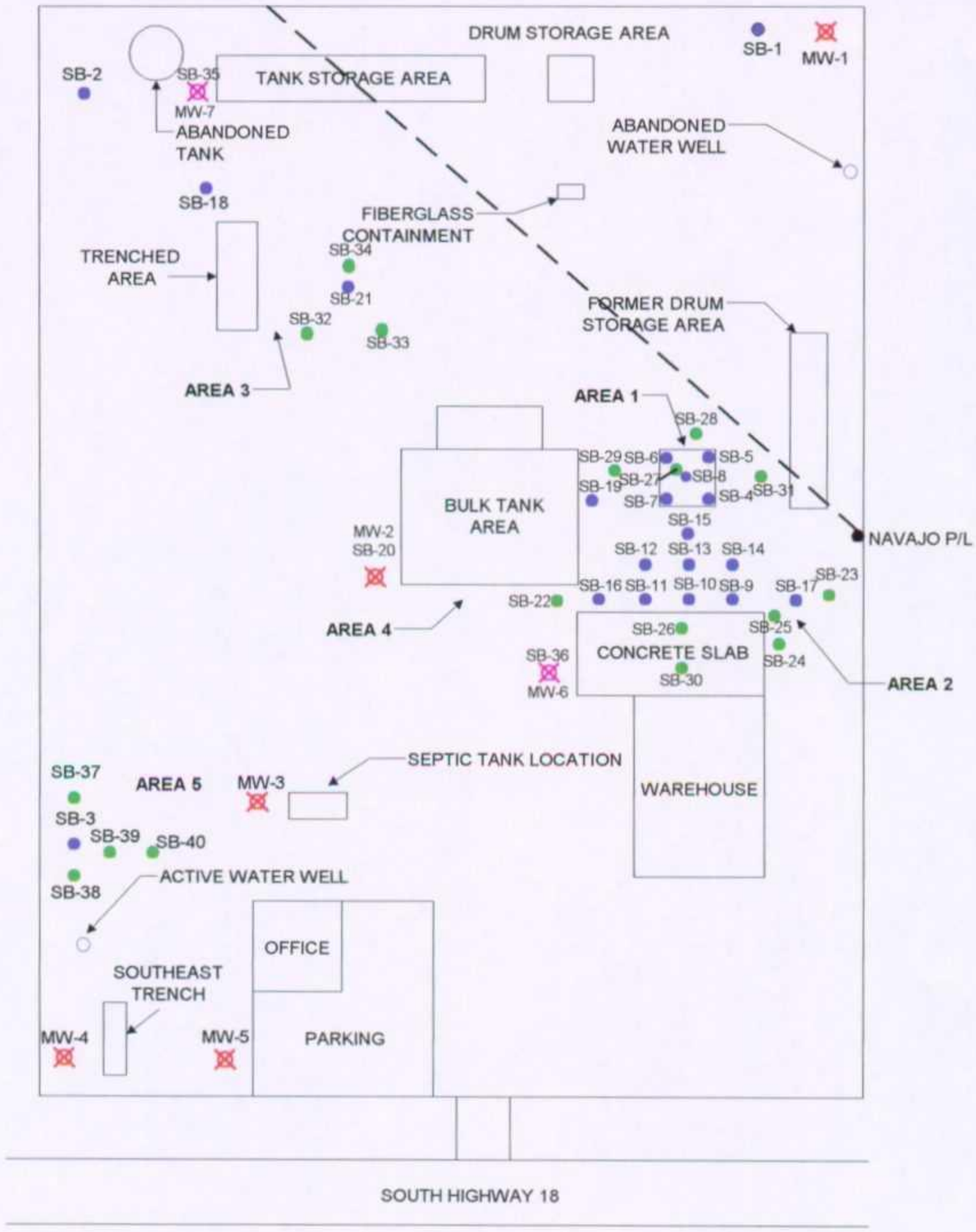
ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 1:** **Topographic Map** **Hobbs West, NM Quad** **(No scale)**
Site Location: **Champion Technologies, Inc.** **4001 South Hwy. 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc.** **3130 FM 521** **Fresno. Texas**



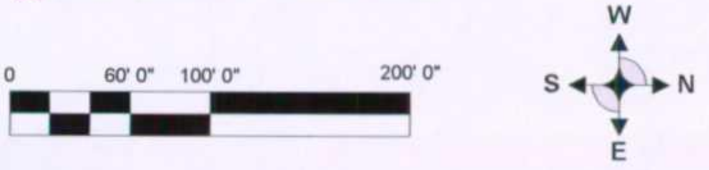
ENERCON SERVICES, INC.

FIGURE 2:
SITE MAP
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.:EN332 DATE:2/4/02 BY: APB



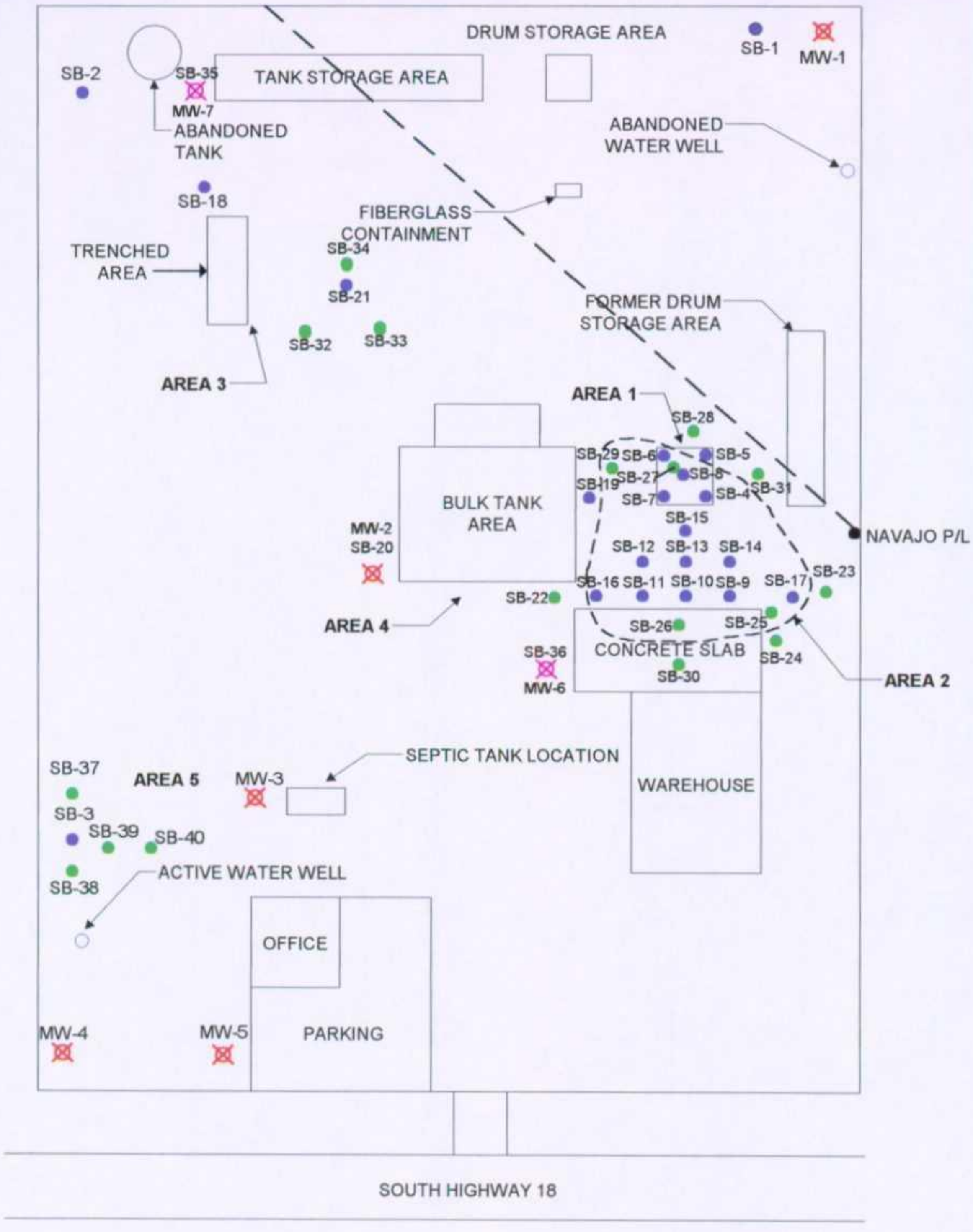
● = SOIL BORINGS DRILLED 9/00
● = SOIL BORINGS DRILLED 5/01
☒ = MONITORING WELLS INSTALLED 9/00
☒ = MONITORING WELLS INSTALLED 5/01



ENERCON SERVICES, INC.

FIGURE 3:
PREVIOUS SOIL SAMPLE AND
MONITORING WELL LOCATIONS
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.: EN332 DATE: 2/04/02 BY: APB



● = SOIL BORINGS DRILLED 9/00

● = SOIL BORINGS DRILLED 5/01

☒ = MONITORING WELLS INSTALLED 9/00

☒ = MONITORING WELLS INSTALLED 5/01

— — = APPROXIMATE BOUNDARY OF REMEDIATION AREA

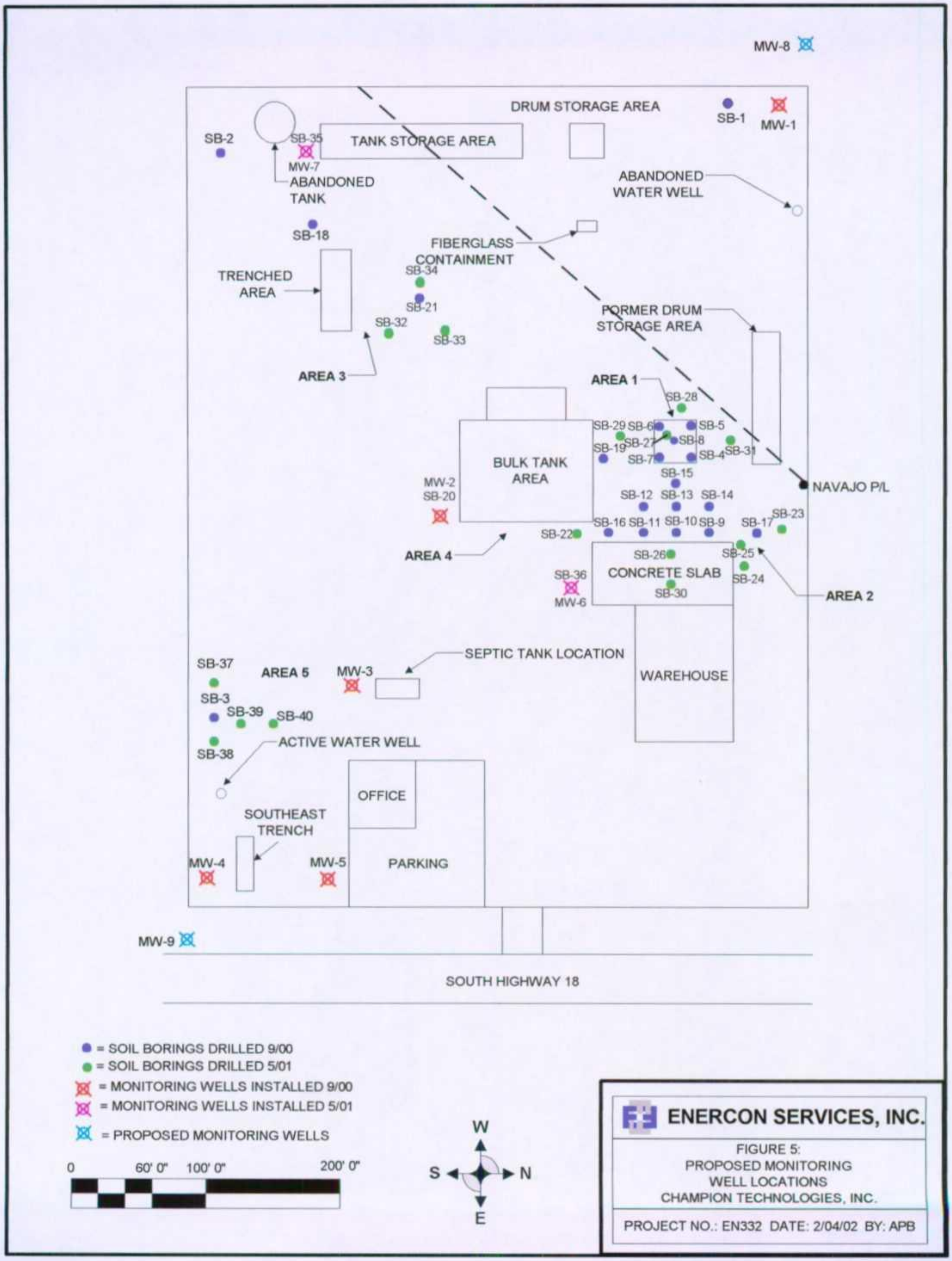
0 60' 0" 100' 0" 200' 0"

W
S N
E

ENERCON SERVICES, INC.

FIGURE 4:
PROPOSED REMEDIATION AREA
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.:EN332 DATE:2/4/02 BY: APB



ENERCON SERVICES, INC.

FIGURE 5:
PROPOSED MONITORING
WELL LOCATIONS
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.: EN332 DATE: 2/04/02 BY: APB

TABLE 1

Production Chemicals Stored at the Facility
Champion Technologies, Inc.
Hobbs, NM

Description of Chemicals

Name	Description
Cortrons	Corrosion inhibitors for the oilfield that normally consists of Imadazolines, amines, fatty acids, and various organic solvents. Sometimes the solvent is water. The organic solvents are usually mixed alcohols or heavy aromatic naphthas.
Scortrons	Combination scale and corrosion inhibitors that normally consist of the same things found in corrosion with the addition of phosphonates, amides, and bisulfites.
Gyptrons	Scale treating compounds for the oilfield that are used either to prevent scale from forming or removing it. This line normally consiss of products based on water soluble phosphonates either in the neutralized or unneutralized form.
Emulsotrons	Chemicals for treating oilfield oil and water emulsions will normally consist of surfactants in an organic solvent such as heavy aromatic naphtha.
Flexoils	Paraffin treating compounds for the oilfield. Normally consists of high molecular weight polymers in an organic solvent such as xylene, toluene, or heavy aromatic naphtha.
Flotrons	Paraffin treating compounds for the oilfield that generally consist of surfactants in either aqueous or organic solvent. Solvents for organic blends are heavy aromatic naphtha or xylene, etc. Aqueous blends consist of water, methanol, or isoporopanol as the solvent system.
Gas Treat	Amine based chemicals for treating sour gas
Foamatrons	Blends much like Surfatrons chemistry
Defoamers	Organic solvent based chemicals for preventing or removing foam problems in the oilfield
Bactrons	Bacteriocides for treating oilfield corrosion problems. These normally consist of aldehyde or quaternary amine chemistry.
Cleartrons	Used for water clarification in the oilfield to remove residual amounts of oil from water. These chemicals normally consist of polymers in an aqueous solvent system.
Xylene & Han	Oil base hydrocarbons used as solvents in oilfield chemical treatment mixtures
Methanol & IPA	Alcohol used as solvents in oilfield treatment mixtures

Table 2: Summary of Sample Identifiers and Analyses
Champion Technologies, Inc., Hobbs, New Mexico

Location	Constituent	Test Method	Container	Preservative	Hold Time
Soil Samples					
MW-8	WQCC Metals	EPA 3050B/6020 7471A – Mercury	8-oz glass	Ice	180 days 28 days
MW-8	General Chemistry	EPA 3050B/6020 EPA 300.0 EPA 310.1	8-oz glass	Ice	180 days 28 days 28 days
Groundwater Samples					
MW-8	General Chemistry	EPA 3010A/6020 EPA 300.0 EPA 310.1	500 mL plastic	Ice	7 days
MW-8, MW-9	TDS	EPA 160.1	500 mL plastic	Ice	7 days
MW-4, MW-9	Chromium	EPA 3010A/6020	500 mL plastic	HNO_3	180 days
MW-6, MW-8	WQCC Metals	EPA 3010A/6020 7470A – Mercury	1 L plastic	HNO_3	180 days
MW-6	TPH	418.1	1 L amber	HCl	28 days

NOTES:

WQCC Metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, copper, iron, magnesium, and zinc.
General Chemistry: fluoride, calcium, potassium, magnesium, sodium, bicarbonate, carbonate, chloride, sulfate, nitrate, nitrite.
TPH: total petroleum hydrocarbons
TDS: total dissolved solids

Table 3: Anticipated Schedule for Implementation of Stage 2 Abatement Plan Proposal Champion Technologies, Inc. Hobbs, New Mexico

Item	Description	Anticipated Schedule
1	Submit Stage 2 Abatement Plan Proposal (APP) to NMOCD	February 5, 2002
2	Complete public notice and participation	March 7, 2002
3	Public comment period	March 8 - May 6, 2002
4	Public meeting or hearing (if required)	≥ 30 days from Item 3
5	NMOCD approval of Stage 2 APP (if no public meeting held)	≤ 90 days from Item 3
6	NMOCD approval of Stage 2 APP (if public meeting held)	≤ 60 days from Item 4
7	Re-submit Stage 2 APP (if deficiencies are noted)	≤ 30 days from Item 5 or 6 (as applicable)
8	NMOCD re-approval of Stage 2 APP (if required)	≤ 30 days from Item 7
9	Begin implementation of abatement field activities (soil remediation, monitoring well installation, groundwater sampling)	30 – 60 days from Item 5, 6 or 8 (as applicable)
10	Complete abatement field activities	30 – 60 days from Item 9
11	Submit Abatement Completion Report to NMOCD	≤ 60 days from Item 10
12	Annual groundwater monitoring (2nd sampling)	≤ 1 year from Item 10
13	Submit Addendum 1 to Abatement Completion Report	≤ 30 days from Item 12
14	Annual groundwater monitoring (3rd sampling)	≤ 1 year from Item 12
15	Submit Addendum 2 to Abatement Completion Report	≤ 30 days from Item 14
16	Annual groundwater monitoring (4th sampling)	≤ 1 year from Item 14
17	Submit Addendum 3 to Abatement Completion Report	≤ 30 days from Item 16

APPENDIX B

SOIL BORING LOGS & WELL CONSTRUCTION DIAGRAMS

ENERCON SERVICES, INC.
8866 GULF FREEWAY, STE. 380
HOUSTON, TEXAS 77017

RECORD OF SUBSURFACE EXPLORATION

Project #:	Well/Boring #:	Date Drilled:
Project:	Drilling Company:	Drilling Method:
	Driller:	Logged By:

DEPTH (FEET)	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	REMARKS	
0.0						0.0
2.5						2.5
5.0						5.0
7.5						7.5
10.0						10.0
12.5						12.5
15.0						15.0
17.5						17.5
20.0						20.0

ABBREVIATIONS AND SYMBOLS

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
AR - Air Rotary
CT-5' - Continous Sampler

HSA - Hollow Stem Auger
CFA - Continous Flight Augers
DC - Driving Casing
MD - Mud Drilling

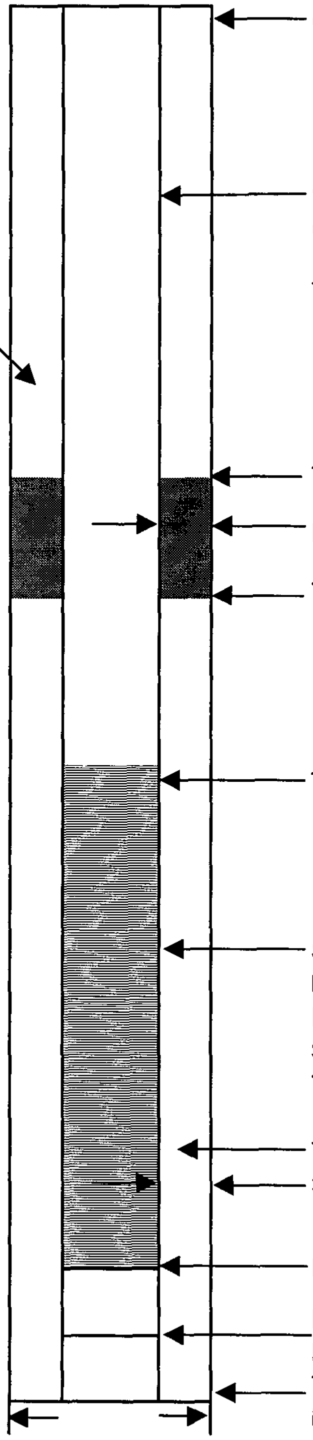
Project No: ________ **Client:** ________ **Site:** ________ **WELL No.**

Well Location: ________ **Date Installed:** ________

Contractor: **Method:** **Inspector:**

MONITORING WELL CONSTRUCTION DETAIL

Cement-Bentonite or
Bentonite Slurry Grout
________% Cement
________ % Bentonite



	Depth from G.S. (feet)	Elevation (MSL)
Ground Surface (G.S.)	________	________
Casing:		
Length ________		
Inside Diameter (ID) ________		
Type of Material ________		
Top of Bentonite Seal	________	________
Bentonite Seal Thickness ________		
Top of Sand	________	________
Top of Screen		
Screen:		
Length ________		
Inside Diameter (ID) ________		
Slot Size ________		
Type of Material ________		
Type/Size of Sand ________		
Sand Pack Thickness ________		
Bottom of Screen	________	________
Bottom of Tail Pipe	________	________
Length ________		
Total Depth	________	________
Borehole Thickness ________		

APPENDIX C

SOIL SAMPLING PROCEDURES

Designation: D 4700 - 91

Standard Guide for Soil Sampling from the Vadose Zone[1]

This standard is issued under the fixed designation D 4700; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

Scope

1 This guide addresses procedures that may be used for taining soil samples from the vadose zone (unsaturated ·:). Samples can be collected for a variety of reasons uding the following:

ι.1.1 Stratigraphic description,
1.1.2 Hydraulic conductivity testing,
1.3 Moisture content measurement,
1.4 Moisture release curve construction,
1.1.5 Geotechnical testing,
1.1.6 Soil gas analyses,
1.7 Microorganism extraction, or
1.8 Pore liquid and soils chemical analyses.

1.2 This guide focuses on methods that provide soil ples for chemical analyses of the soil or contained liquids ontaminants. However, comments on how methods may modified for other objectives are included.

1.3 This guide does not describe sampling methods for fied deposits and rocks (for example, sandstone, shale, granite).

ι.4 In general, it is prudent to perform all field work with least two people present. This increases safety and itates efficient data collection.

.5 The values stated in inch-pound units are to be arded as the standard. The SI units given in parentheses for information only.

6 *This standard does not purport to address all of the ety problems, if any, associated with its use. It is the onsibility of the user of this standard to establish appro te safety and health practices and determine the applica y of regulatory limitations prior to use.*

eferenced Documents

:.1 *ASTM Standards:*

420 Practice for Investigating and Sampling Soil and Rock for Engineering Purposes[2]
)653 Terminology Relating to Soil, Rock, and Contained Fluids[2]
1452 Practice for Soil Investigation and Sampling by Auger Borings[2]
D 1586 Method for Penetration Test and Split-Barrel Sampling of Soils[2]
D 1587 Method for Thin-Walled Tube Sampling of Soils[2]
D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)[2]
D 2607 Classification of Peats, Mosses, Humus, and Related Products[2]
D 3550 Method for Ring-Lined Barrel Sampling of Soils[2]
D 4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)[2]
D 4220 Practice for Preserving and Transporting Soil Samples[2]

3. Terminology

3.1 *Definitions:*

3.1.1 Except where noted, all terms and symbols in this guide are in accordance with the following publications. In order of consideration they are:

3.1.1.1 Terminology D 653.

3.1.1.2 *Compilation of ASTM Standard Terminology,*[3] and

3.1.1.3 *Webster's New Collegiate Dictionary.*[4]

3.1.2 For definitions and classifications of soil related terms used, refer to Practice D 2488 and Terminology D 653. Additional terms that require clarification are defined in 3.2.

3.2 *Descriptions of Terms Specific to This Standard:*

3.2.1 *cascading water*—perched ground water that enters a well casing via cracks or uncovered perforations, trickling, or pouring down the inside of the casing.

3.2.2 *sludge*—a water charged sedimentary deposit.

3.2.2.1 *Discussion*—The water-formed sedimentary deposit may include all suspended solids carried by the water and trace elements that were in solution in the water. Sludge usually does not cohere sufficiently to retain its physical shape when mechanical means are used to remove it from the surface on which it deposits, but it may be baked in place and be adherent.

4. Summary of Guide

4.1 Sampling vadose zone soil involves inserting into the ground a device that retains and recovers a sample. Devices and systems for vadose zone sampling are divided into two general groups, namely the following: samplers used in conjunction with hand operated devices; and samplers used

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'his guide is under the jurisdiction of ASTM Committee D-18 on Soil and and is the direct responsibility of Subcommittee D18.21 on Ground Water Vadose Zone Investigations
[illegible]
Innual B[illegible] ASTM Standards, Vol 04.08

[3] *Compilation of ASTM Standard Terminology,* Sixth edition, ASTM, 1916 [illegible]

[4] *Webster's New Collegiate Dictionary,* Fifth edition, 1977.

Type of Sampler	Obtain Core Sample Yes	Obtain Core Sample No	Most Suitable Core Types Cas	Most Suitable Core Types Casless	Operation in Stoney Soils Fav	Operation in Stoney Soils Unfav	Most Suitable Soil Moisture Conditions Wet	Most Suitable Soil Moisture Conditions Dry	Most Suitable Soil Moisture Conditions Inter	Access to Sample Sites During Poor Soil Conditions Yes	Access to Sample Sites During Poor Soil Conditions No	Relative Sample Size Sm	Relative Sample Size Lg	Labor Regimts Sngl	Labor Regimts 2/More
A. Drill Rig Samplers															
1 Multipurpose Drill Rig	◆		◆	◆	◆		◆	◆	◆	◆		◆	◆		
2 Split barrel Drive Sampler	◆		◆		◆			◆			◆		◆		◆
3 Thin Walled Tube Sampler	◆		◆			◆			◆	◆			◆		◆
4 Piston Sampler	◆		◆			◆	◆			◆			◆		◆
5 Continuous Sample Tube system	◆		◆		◆		◆	◆	◆	◆		◆	◆		◆
6 Hand Held Power Auger		◆			◆					◆			◆		◆
B. Hand Operated Samplers															
1 Screw Type Auger		◆				◆	◆			◆		◆		◆	
2 Barrel Auger															
a Post Hole Auger		◆	◆		◆		◆			◆			◆	◆	
b Dutch Auger		◆	◆		◆		◆								
c Regular Barrel Auger		◆	◆		◆				◆	◆		◆		◆	
d Sand Auger		◆		◆	◆				◆	◆			◆	◆	
e Mud Auger		◆	◆		◆		◆			◆			◆	◆	
3. Tube-Type Sampler															
a Soil Sampling Tube															
(1) Wet Tip	◆					◆	◆			◆				◆	
(2) Dry Tip	◆					◆	◆			◆		◆		◆	
b Veihmeyer Tube	◆								◆			◆		◆	

FIG. 1 Criteria for Selecting Soil Sampling Equipment

in conjunction with multipurpose or auger drill rigs. This guide discusses these groups and their associated practices.

4.2 The discussion of each device is organized into three sections, describing the device, describing sampling methods, and limitations and advantages of its use.

4.3 This guide identifies and describes a number of sampling methods and samplers. It is advisable to consult available site-specific geological and hydrological data to assist in determining the sampling method and sampler best suited for a specific project. It is also advisable to contact a local firm providing the services required as not all sampling and drilling methods described in this guide are available nationwide.

5. Significance and Use

5.1 Chemical analyses of liquids, solids, and gases from the vadose zone can provide information on the presence, possible source, migration route, and physical-chemical behavior of contaminants. Remedial or mitigating measures can be formulated based on this information. This guide describes devices and procedures that can be used to obtain vadose zone soil samples.

5.2 Soil sampling is useful for the reasons presented in Section 1. However, it should be recognized that the general method is destructive, and that resampling at an exact location is not possible. Therefore, if a long term monitoring program is being designed, other methods for obtaining samples should be considered.

6. Criteria for Selecting Soil Samplers

6.1 Important criteria to consider when selecting devices for vadose zone soil sampling include the following:

6.1.1 Type of sample: An encased core sample, an uncased core sample, a depth-specific representative sample, or a sample according to requirements of the analyses,

6.1.2 Sample size requirements,

6.1.3 Suitability for sampling various soil types,

6.1.4 Maximum sampling depth,

6.1.5 Suitability for sampling soils under various mois conditions,

6.1.6 Ability to minimize cross contamination,

6.1.7 Accessibility to the sampling site, and

6.1.8 Personnel requirements.

6.2 The sampling devices described in this guide h been evaluated for these criteria. The results are summar in Fig. 1.

7. Sampling with Hand Operated Devices

7.1 These devices, that have mostly been developed agricultural purposes, include:

7.1.1 Screw-type augers,

7.1.2 Barrel augers,

7.1.3 Tube-type samplers,

7.1.4 Hand held power augers, and

7.1.5 Trench sampling with shovels in conjunction machine excavations.

7.2 The advantages of using hand operated devices o drill rigs are the ease of equipment transport to locat with poor vehicle access, and the lower costs of setup a decontamination. However, a major disadvantage is t these devices are limited to shallower depths than drill ri

7.3 *Screw-Type Augers:*

7.3.1 *Description*—The screw or ship auger is essentiall small diameter (for example, 1.5 in. (3.81 cm)) wood au from which the cutting side flanges and tip have be removed (1)[5] (see Fig. 2(*a*)). According to the Soil Sur Staff (1), the spiral part of the auger should be about 7 in. (cm) long, with the distances between flights about the sa as the diameter (for example, 1.5 in.) of the auger. T facilitates measuring the depth of penetration of the t Variations on this design include the closed spiral auger a the Jamaica open spiral auger (2) (see Fig. 2(*b*) and 1(*c*)). T

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[5] The boldface numbers in parentheses refer to the list of references at the of the text.

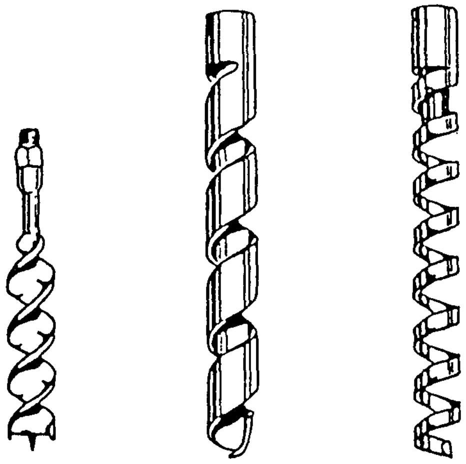
(a) Ship Auger (b) Closed Auger (c) Jamaica Open Spiral Auger

FIG. 2 Screw Type Augers

auger is welded onto a length of solid or tubular rod. The upper end of this rod is threaded, to accept a handle or extension rods. As many extensions are used as are required to reach the target sampling depth. The rod and the extensions are marked in even increments (for example, in 6-in. (15.24-cm) increments) above the base of the auger to aid in determining drilling depth. A wooden or metal handle fits into a tee-type coupling, screwed into the uppermost extension rod.

7.3.2 *Sampling Method*—For drilling, the auger is rotated manually. The operator may have to apply downward pressure to start and embed the auger; afterwards, the auger screws itself into the soil. The auger is advanced to its full length, and then pulled up and removed. Soil from the deepest interval penetrated by the auger is retained on the auger flights. A sample can be collected from the flights using a spatula. A foot pump operated hydraulic system has been developed to advance augers up to 4.5 in. (11.43 cm) in diameter. This larger diameter allows insertion of other sampling devices into the drill hole, once the auger is removed, if desired (3).[6]

7.3.3 *Comments*—Samples obtained with screw-type samplers are disturbed and are not truly core samples. Therefore, the samples are not suitable for tests requiring undisturbed samples, such as hydraulic conductivity tests. In addition, soil structures are disrupted and small scale lithologic features cannot be examined. Nevertheless, screw-type samplers are still suitable for use in collecting sampl for the purpose of detecting contaminants. However, it difficult to avoid transporting shallow soils downward whe reentering a drill hole. When representative samples a desired from a discrete interval, the borehole must be mad large enough to insert a sampler and extend it to the botto of the borehole without touching the sides of the borehole. is suggested that a larger diameter auger be used to advan and clear the borehole, then a smaller diameter aug sampler be used to obtain the sample. Screw-type auger work better in wet, cohesive soils than in dry, loose soil Sampling in very dry (for example, powdery) soils may n be possible with these augers as soils will not be retained o the auger flights. Also, if the soil contains gravel or roc fragments larger than about one tenth of the hole diamete drilling may not be possible (4).

7.4 *Barrel Augers:*

7.4.1 *Description*—The barrel auger consists of a bit wit cutting edges welded to a short tube or barrel within whic the soil sample is retained, welded in turn to shanks. Th shanks are welded to a threaded rod at the other en Extension rods are attached as required to reach the targ sampling depth. Extensions are marked in increments abo the base of the tool. The uppermost extension rod contains tee-type coupling for a handle. The auger is available carbon steel and stainless steel with hardened steel cutti edges (5, 6).

7.4.2 *Sampling Method*—The auger is rotated to advan the barrel into the ground. The operator may have to app downward pressure to keep the auger advancing. When th barrel is filled, the unit is withdrawn from the soil cavity an a sample may be collected from the barrel.

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[6] This reference is manufacturer's literature, and it has not been subjected to technical review.

7.4.3 *Comments*—Barrel augers generally provide larger samples than screw-type augers. The augers can penetrate shallow clays, silts, and fine grained sands (7).[6] The augers do not work well in gravelly soils, caliche, or semi-lithified deposits. Samples obtained with barrel augers are disturbed and are not core samples. Therefore, the samples are not suitable for tests requiring undisturbed samples, such as hydraulic conductivity tests. Nevertheless, the samplers are still suitable for use in collecting samples for the purpose of detecting contaminants. Because the sample is retained inside the barrel, there is less of a chance of mixing it with soil from a shallower interval during insertion or withdrawal of the sampler. The following are five common barrel augers:

7.4.3.1 Post-hole augers (also called Iwan-type augers),
7.4.3.2 Dutch-type augers,
7.4.3.3 Regular or general purpose barrel augers,
7.4.3.4 Sand augers, and
7.4.3.5 Mud augers.

7.4.4 *Post-Hole Augers*—The most readily available barrel auger is the post-hole auger (also called the Iwan-type auger) (8). As shown in Fig. 3, the barrel consists of two-part cylindrical leaves rather than a complete cylinder and is slightly tapered toward the cutting bit. The taper and the cupped bit help to retain soils within the barrel. The barrel is available with a 3 to 12-in. (7.62 to 30.48-cm) diameter. There are two types of drilling systems, one has a single rod and handle, and the other has two handles. In stable, cohesive soils, the auger can be advanced up to 25 ft (7.62 m) (8).

7.4.5 *Dutch-Type Augers*—The Dutch-type auger (commercially developed by Eijkelkamp) is a smaller variation of the post-hole auger design. As shown in Fig. 4, the pointed bit is continuous with two, narrow part-cylindrical barrel segments, welded onto the shanks. The barrel generally has a 3 in. (7.62 cm) outside diameter. This tool is best suited for sampling wet, clayey soils.

7.4.6 *Regular or General Purpose Barrel Augers*—A sion of the barrel auger commonly used by soil scientist county agricultural agents is depicted in Fig. 5(*a*) and (shown, the barrel is a complete cylinder. As with post-hole auger, the cutting blades are cupped so that so loosened and forced into the barrel as the unit is rotated pushed into the ground. Each filling of the barrel co sponds to a depth of penetration of 3 to 5 in. (7.62 to 1 cm) (1). The most popular barrel diameter is 3.5 in. (cm), but sizes ranging from 1.5 to 7 in. (3.81 to 17.78 cm) available (6).[6] Plastic, stainless steel, PTFE (polyte fluoroethylene) or aluminum liners can also be used (6 Extension rods are available in 4 ft (1.22 m) lengths. rods can be made from standard black pipe, from lightwei conduit or from seamless steel tubing. The extensions h evenly spaced marks to facilitate determining sample dep The regular barrel auger is suitable for use in loam type so

7.4.7 *Sand Augers*—For dry, sandy soils it may be ne sary to use a variation of the regular barrel auger t includes a specially-formed bit to retain the sample in barrel (see Fig. 5(*c*)). Sand augers with 2, 3, or 4-in. (5 7.62, or 10.16-cm) diameters are available (5).[6]

7.4.8 *Mud Augers*—Another variation on the regu barrel auger design is available for sampling wet, clayey so As shown in Fig. 5(*d*), the barrel is designed with open si to facilitate extraction of samples. The bits are the same those used on the regular barrel auger (6).[6] Mud augers w 2, 3, or 4-in. (5.08, 7.62, or 10.16-cm) diameters are availa (5).[6]

7.5 *Tube-Type Samplers:*

7.5.1 Tube-type samplers generally have proportion smaller diameters and greater body lengths than those barrel augers.

7.5.2 For sampling, these units are perched into the causing the tube to fill with material from the inte penetrated. The assembly is then pulled to the surface an sample can be collected from the tube. Since the device is

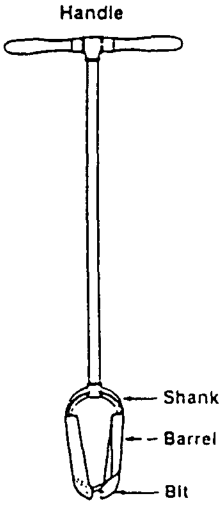


FIG. 3 Post-Hole Type Barrel Auger

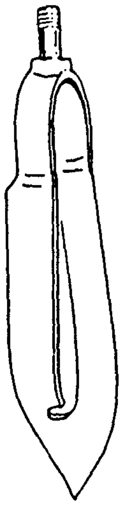
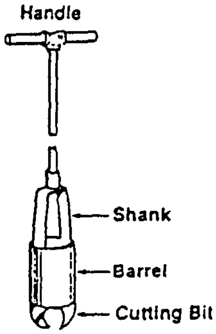
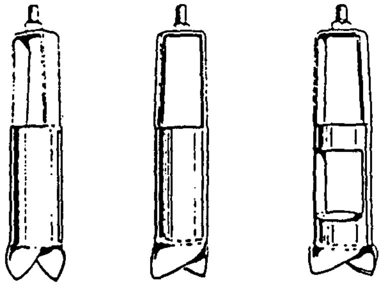


FIG. 4 Dutch Type Auger



(a) Regular Barrel Auger



(b) Regular Barrel Auger (c) Sand Auger (d) Mud Auger

FIG. 5 Barrel Auger Variations and Soil Moisture

rotated, a nearly undisturbed sample can be obtained. Commercial units are available with foot lever attachments, a hydraulic apparatus, or drop-hammers to aid in driving the sampler into the ground (5)[6]. Vibratory heads have also been developed to advance tube-type samplers (9).[6]

7.5.3 These units are not as suitable for sampling in compacted, gravelly soils as are the barrel augers. They are preferred if an undisturbed sample is required. Commonly used varieties of the tube type samplers include:

7.5.3.1 Soil sampling tubes (also called Lord samplers),

7.5.3.2 Veihmeyer tubes (also called King tubes),

7.5.3.3 Thin-walled tube samplers (also called Shelby tubes).

7.5.3.4 Ring-lined barrel samplers, and

7.5.3.5 Piston samplers.

7.5.4 *Soil Sampling Tubes:*

7.5.4.1 *Description*—As depicted in Fig. 6, the soil sampling tube consists of a hardened cutting tip, a cut-away barrel, and an uppermost threaded segment. The cut-away barrel allows textural examination and easy removal of soil samples. Generally, the tube is constructed from high strength alloy steel (10).[6] The samplers are available with 6, 12, 15, 18, and 24-in. (15.24, 30.48, 38.10, 45.72, 60.96-cm) lengths (5, 6). The tubes are available with 1.13 or 0.88-in. (2.87 or 2.22 cm) outside diameter. Two modified versions of the tip are available, for sampling in wet or dry soils. The

7.5.6.3 *Comments*—Shelby tubes are best used in clays, silts, and fine-grained sands. If the soils are cohesionless, they may not be retained in the tube. If firm to very hard soils are encountered, driving (hammering) the sampler may be required. However, this should be avoided as the tube may buckle under the drive stress.

7.5.7 *Ring-Lined Barrel Samplers:*

7.5.7.1 *Description*—As described in Practice D 3550, the ring-lined barrel sampler consists of a one piece barrel or two split barrel halves, a drive shoe, rings, and a sampler head (see Fig. 9). The rings, that are usually brass, fit snugly inside the barrel and are designed to be directly inserted into geotechnical testing apparatuses when removed from the barrel. Most samplers are designed to hold at least two rings. The barrel is commonly 3.5 in. (8.89 cm) inside diameter and 3.94 to 5.91 in. (10 to 15 cm) long (5).[6] With these lengths, the barrel can be fitted with a variety of liners ranging in length from 1 to 2.36 in. (2.54 to 6 cm).

7.5.7.2 *Sampling Method*—The ring-lined barrel sampler can be driven or pushed into soil. Once retrieved, the sampler is disassembled, and the sample-filled rings are removed. The rings are usually removed as one unit and placed into a capped container. Alternately, the individual soil-filled rings can be capped with plastic or PTFE and then sealed with wax or adhesive tape (refer to Practice D 4220).

7.5.7.3 *Comments*—Because barrel samplers are more rigid than thin-walled tubes, they can be driven into hard soils and soils containing sands and gravels that might damage thin-walled tubes. The sampler provides samples rings which can be handled without further disturbance the soil. Because of this, these devices are most often us when geotechnical or chemical analyses are to be performe

7.5.8 *Piston Samplers:*

7.5.8.1 *Description*—Locally saturated (for example, perched ground water), or cohesionless soils, and very so soils or sludges may not be retained in most samplers, eve when fitted with retainer baskets or flap valves. Pisto samplers can be used in these situations. The sample consists of a sampling tube, extension pipe attached to th tube, an internal piston, and rods connected to the pisto and running through the extension pipe (see Fig. 10). These samplers are often built, as needed, out of common PVC (fo use in sludge) or steel pipe fittings. The sampling tube commonly has a 0.75 to 3-in. (1.91 to 7.62-cm) insid diameter and is 8 in. to 9 ft (20.32 cm to 2.74 m) long (13) A variation designed for sampling peat has a cone shape piston (8).

7.5.8.2 *Sampling Method*—The sampler can be pushed into the ground with the handle or driven into the ground with a drop hammer (13). As the tube is advanced, the piston is held stationary or pulled upward with the attached rods Once the tube has been advanced through the sampling interval, it is rotated to break suction that might have developed between the soil and the outside wall of the tube The sampler is then pulled to the surface keeping the piston rod fixed with respect to the extension pipe. The sample is retained because of suction that develops between the piston and the sample. Upon retrieval, the sample is extruded by

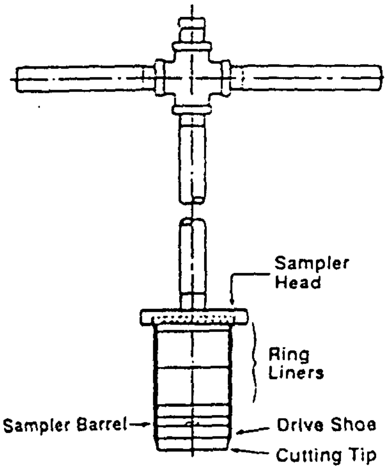


FIG. 9 Hand Operated Ring-Lined Barrel Sampler

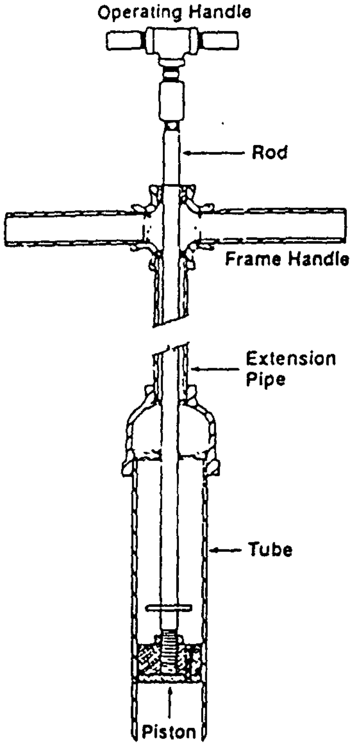


FIG. 10 Hand Operated Piston Sampler

using the piston to force the sample out of the tube. Sharma and De Dalta (**14**) described a cylindrical sampler for use in puddled soils that would flow back out of most samplers. The design includes a basal shutter that retains the sample while the sampler is withdrawn from the soil.

7.5.8.3 *Comments*—Because the sampler depends on development of suction between the sample and the piston, it may not work in unsaturated, coarse-grained sands and gravels. This is due to the high air permeability of such material that prevents the creation of high suction.

7.6 *Hand Held Power Augers:*

7.6.1 *Description*—A very simple, commercially available auger consists of a solid flight auger attached to and driven by a small air-cooled engine (see Fig. 11). Two handles on the head assembly allow two operators to guide the auger into the soil. Throttle and clutch controls are integrated into grips on the handles. Augers are available with diameters ranging from 2 to 16 in. (5.08 to 40.64 cm). The auger sections are commonly 3 ft (0.91 m) long.

7.6.2 *Sampling Method*—As the auger rotates into soil, cuttings advance up the flights and are discharged at the surface. Soil samples can be collected from the surface discharge, or from the auger flights after pulling the auger out of the ground. Alternatively, samples can be collected with other samplers (for example, a thin-walled tube) after auger removal.

7.6.3 *Comments*—As discussed in 7.3, if samples are collected from surface discharge or from the flights, they are disturbed and are not suitable for some uses. In addition, if samples are collected from surface discharge, it is difficult to

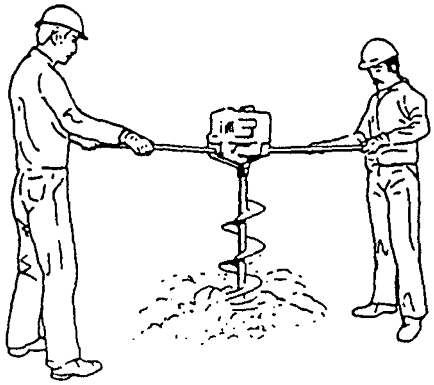


FIG. 11 Hand Held Power Auger

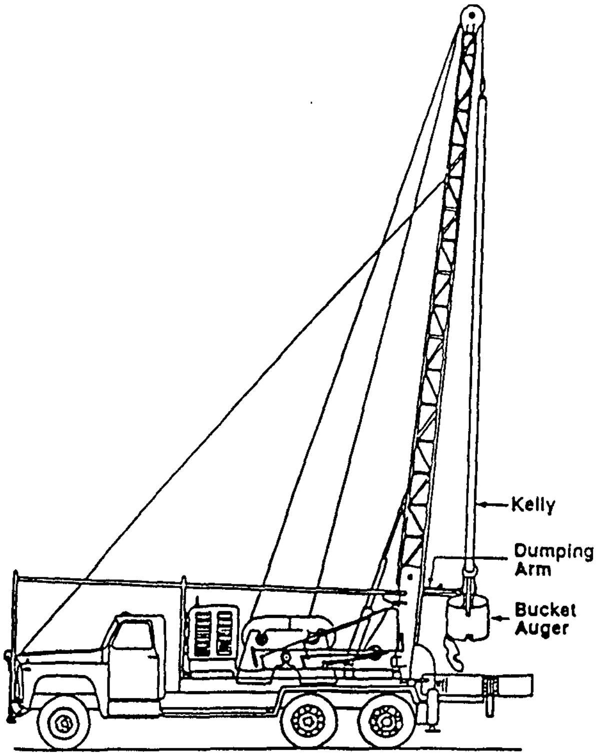


FIG. 13 Bucket Auger and Drilling Rig

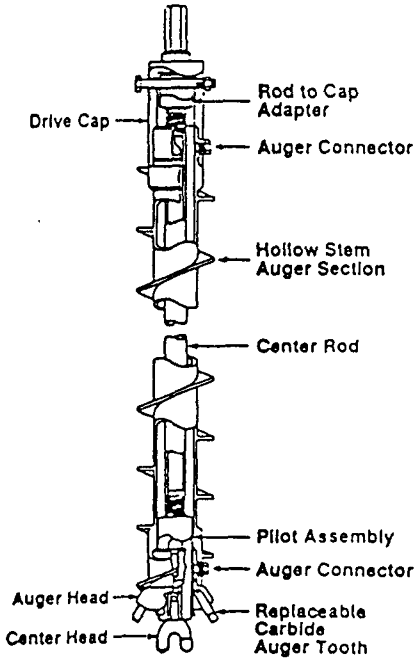


FIG. 14 Hollow-Stem Auger Components

column rotation. The cutting diameter is somewhat greater than the flighting diameter because of the protruding teeth. Auger sections are typically 5 ft (1.52 m) long and are interchangeable for assembly in an articulated but continuously flighted column. Drilling progresses in 5 ft (1.52 m) or shorter increments and sampling can be accomplished at any depth within that increment. Upon advancement of a 5 f (1.52 m) increment, another 5 ft (1.52 m) section o hollow-stem auger and center rod is added. Hollow-stem augers are readily available with 2.25, 2.75, 3.25, 3.75, 4.2 6.25, and 8.25 in. (5.72, 6.99, 8.26, 9.53, 10.80, 15.88, 20.96-cm) inside diameters.

9.3.2 *Sampling Method*—The auger column and pilot assembly are advanced to the top of the desired sampling interval. Sampling is accomplished by removing the pilot assembly and center rod, if they are used, and inserting the sampler through the hollow stem of the auger column (see Fig. 15). The sampler may be lowered to the sampling depth by attaching it to center rods or by using a wireline assembly (12). When the sampler is attached to center rods, a sample is collected by pushing or driving the sampler into undisturbed soil with the rig hydraulic system or with a drop hammer. When a wireline is used, the sampler is locked into place ahead of the lower-most auger and advanced into the sampling interval by rotating the auger column (18).[6] Hollow stem augers with a 6.25-in. (15.88-cm) inside diameter allow the use of 5-in. (12.70-cm) outside diameter Shelby tubes and 4.5-in. (11.43-cm) outside diameter split barrel samplers (see 9.4).

9.3.3 *Comments*—The purpose of the center head (pilot) assembly is to prevent soils from entering the auger column as it is advanced (19). Driscoll (17) suggests that the assembly may be omitted when drilling through hard, silty and clayey soils as these materials will usually form a 2 to 4 in. (5.08 to 10.16 cm) long plug at the auger opening. However, Hackett (19) recommends that the pilot assembly be used when detailed samples are required. When perched water is encountered, "heaving sands" that move up into the auger column upon pilot assembly removal during sampling, may be a concern. Various one-way plugs that allow sampling, but that prevent sand from moving into the auger column, are described in Hackett (19). The important capability of being able to obtain samples that do not contain mixed material from shallow sources in the hole is enhanced by using the hollow-stem auger method. However, because the sections are hollow, decontamination of the auger interiors between holes to prevent cross contamination is difficult. High pressure steam cleaners are usually necessary to remove caked-on soils and contaminants. Hollow stem augers may advance rapidly through unconsolidated materials.

9.4 *Sampling Devices:*

9.4.1 Sampling devices used in conjunction with hollow stem augers and occasionally in holes advanced by solid stem augers include:

9.4.1.1 Thin-walled tube samplers (also called Shelby tubes),

9.4.1.2 Split-barrel drive samplers (also called Split spoons),

9.4.1.3 Ring-lined barrel samplers,

9.4.1.4 Continuous sample tube systems, and

9.4.1.5 Piston samplers.

9.4.2 These samplers are either pushed or driven in sequence with an increment of drilling or advanced simultaneously with the advance of a hollow stem auger column.

9.4.3 *Thin-Walled Tube Samplers:*

9.4.3.1 *Description*—The thin-walled tube sampler consists of a tube connected to a head with screws. The head is threaded to connect with standard drill rods. The head contains a ball check valve. Thin-walled tube (Shelby tube) samplers are readily available with 2, 3, and 5-in. (5.08, 7.62, and 12.70-cm) outside diameter and are commonly 30 in. (76.20 cm) long. The 3 by 30 in. (7.62 by 76.20 cm) outside diameter long sampler is most common. The advancing end of the sampler is constructed with an inward lip, machined to a cutting edge, that has a smaller diameter than the tube inside diameter. The cutting edge inside diameter reduction, defined as a "clearance ratio," is usually in the range of 0.0050 to 0.0150 or 0.50 to 1.50 % (refer to Practice D 1587). PTFE or plastic sealing caps and other sealing devices for use after sampling are readily available for the 2, 3, and 5-in. (5.08, 7.62 and 12.70-cm) diameter tubes (refer to Practice D 4220). Shelby tubes are commonly available in carbon steel but can be manufactured from other metal (see Fig. 8).

9.4.3.2 *Sampling Methods*—When a Shelby tube is pushed into soil, the length of the sample recovered is often less than the distance pushed, that is, the recovery ratio is less than 1.0 (see 7.5.6.2). In addition, a portion of the sample frequently remains in the borehole after retrieval of the sampler. This is due to suction that develops at the sampler-soil interface. This suction may be broken by twisting the

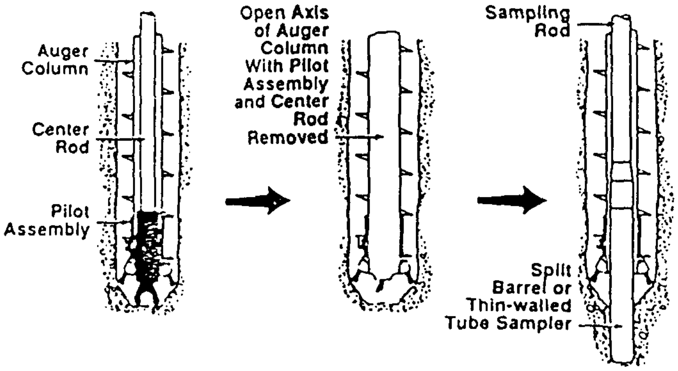


FIG. 15 Hollow-Stem Auger Sampling

sampler prior to retrieval or by advancing the auger column below the base of the sampler before retrieval (20). Samples are extruded from the Shelby tube with a hydraulic ram. As with all sampling devices, the portion of the sample in contact with the tube is considered disturbed and unrepresentative. Wilson et al. (12) developed a paring device to remove this outer layer of the core during extrusion.

9.4.3.3 *Comments*—The ball check valve was originally intended to provide a vent for drilling fluids when pushing the tube into soil, and also to prevent the column of fluid within the drill stem from forcing the sample out of the tube during retrieval. Since drilling fluids are not used when sampling in the vadose zone, these considerations are not important. However, the valve does provide a vent for air displaced as the sampler is pushed into soil. Shelby tubes are best used in clays, silts, and fine grained sands. They can be pushed with the hydraulic system of most drill rigs in fine grained sands that are loose to moderately consolidated or in clays and silts that are soft to firm. If the soils are cohesionless, they may not be retained in the tube. If consolidated or hard soils are encountered, driving the sampler may be required. However, some tubes may buckle under the drive stress. A spring-loaded barrel has been developed to protect the Shelby tube from buckling when sampling these soils (21).[6]

9.4.4 *Split-Barrel Drive Samplers:*

9.4.4.1 *Description*—The split-barrel drive sampler consists of two split-barrel halves, a drive shoe, and a sample head containing a ball check valve, all of which are threaded together (see Fig. 15). The most common size has a 2-in. (5.08-cm) outside diameter and a 1.5-in. (3.81-cm) inside diameter split barrel with a 1.375-in. (3.49-cm) inside diameter drive shoe. This sampler is used extensively in geotechnical exploration (Refer to Method D 1586). When fitted with a 16 gage liner for encased cores, the sampler has a 1.375-in. (3.49-cm) inside diameter throughout. A 3-in. (7.62-cm) outside diameter by 2.5-in. (6.35-cm) inside diameter split-barrel sampler with a 2.375-in. (6.03-cm) inside diameter drive shoe is also available (22).[6] Other split-barrel samplers in the size range of 2.5-in. (6.35-cm) to 4.5-in. (11.43-cm) outside diameter are manufactured but are less common. A plastic or metal retainer basket, or a flap valve is often fitted into the drive shoe to prevent samples from falling out during retrieval.

9.4.4.2 *Sampling Method*—As described in Method D 1586 the sampler is threaded onto drilling rods and is lowered to the bottom of the boring. The sampler is then driven into the soil with blows from a drop hammer attached to the drill rig. The hammer usually weighs 140 lb and is operated by the driller. The sampler is extracted from the soil in a manner that will ensure maximum sample recovery. A

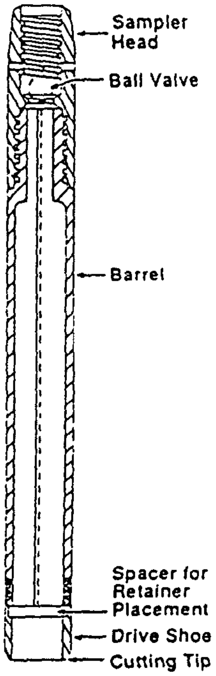


FIG. 16 Split-Barrel Drive Sampler

sample is obtained by disassembling the drive shoe and head, and splitting the barrel to expose the core of soil. Material disturbed by contact with the barrel can be scraped away, or a less disturbed interior portion collected with a spatula.

9.4.4.3 *Comments*—Split barrel drive samplers can be used in all soil types if the larger grain sizes can enter through the opening of the drive shoe. Because the sampler can be fitted with a retainer basket, it is typically used in place of thin-walled tubes when cohesionless soils are to be sampled.

9.4.5 *Ring-Lined Barrel Samplers:*

9.4.5.1 *Description*—As described in Practice D 3550, the ring-lined barrel sampler consists of a one piece barrel or two split-barrel halves, a drive shoe, rings, a waste barrel and a sampler head containing a ball check valve (see Fig. 17). The rings fit snugly inside the barrel and are designed to be directly inserted into geotechnical testing apparatus when removed from the barrel. Most samplers are designed to hold at least six rings. The waste barrel provides a space above the rings into which disturbed soil, originally at the bottom of the hole, can move. The samplers are commonly available with 2, 3, and 4-in. (5.08, 7.62, and 10.16-cm) outside diameter.

9.4.5.2 *Sampling Method*—The ring-lined barrel sampler can be driven or pushed into soil. It is important to insert the sampler deep enough to allow all disturbed soil to move through the rings and into the waste barrel. Once retrieved, the sampler is disassembled, and the sample filled rings are carefully removed. The rings are usually removed as one unit and placed into a capped container. Alternately, the individual soil filled rings can be capped with plastic or PTFE and even sealed with wax or adhesive tape (refer to Practice D 4220).

9.4.5.3 *Comments*—Because ring-lined barrel samplers are more rigid than thin-walled tubes, they can be driven into soils containing sands and gravels that might damage thin-walled tubes. The sampler provides samples in rings that can be handled without further disturbance of the soil. Because of this, these devices are most often used when geotechnical or chemical analyses are to be performed.

9.4.6 *Continuous Sample Tube System:*

9.4.6.1 *Description*—Continuous sample tube systems that fit within a hollow-stem auger column are readily available in North America. The barrel is typically 5 ft (1.52 m) long, and fits within the lead auger of the hollow auger column. The sampler is prevented from rotating as the auger column is turned (20). For many conditions the sampler provides continuous, 5-ft (1.52-m) samples (see Fig. 18). The assembly can be split- or solid-barrel and can be used with or without liners of various metallic and nonmetallic materials (20). Two clear, plastic, 30 in. (76.20 cm) long liners are often used. The sampler may also be fitted with a plastic or metal retainer basket, or a falp valve to prevent cohesionless soils from falling out of the sampler during retrieval (20).

9.4.6.2 *Sampling Method*—The sampler is locked in place inside the auger column with its open end protruding a short distance beyond the end of the column. While advancing the column, soil enters the non-rotating sampling barrel. After a 5-ft (1.52-m) advance, the sampler is withdrawn, and the liner (if used) is removed and capped.

9.4.6.3 *Comments*—The continuous sample tube system replaces the pilot head assembly in the hollow-stem auger column. Because of this, sampling speed is greatly increased since the pilot assembly does not have to be removed before taking a sample. The continuous sample tube system is best used in clays, silts, and in fine grained sands. It can be used to sample soils that are much more consolidated or harder than can be sampled with Shelby tubes.

9.4.7 *Piston Samplers:*

9.4.7.1 *Description*—Locally saturated (for example, perched ground water), or cohesionless soils, and very soft soils or sludges may not be retained in most samplers, even when they have been fitted with retainer baskets or flap valves. Piston samplers are often used under these conditions. The sampler consists of a sampling tube, an internal piston, and a drive head. The piston fits snugly inside the tube. The piston is attached to a rod assembly or a cable that leads to the surface. Tubes made of steel are available in 5.5 and 30-in. (13.97 and 76.20-cm) and 5-ft (1.5-m) lengths with 0.75, 2, 3, 4, and 5-in. (1.91, 5.08, 7.62, 10.16, and 12.70-cm) inside diameter (22, 23). When equipped with a hardened steel drive shoe, the tube can be fitted with a liner made of aluminum clear PVC, or another material (see Fig. 19) (24). A version of the sampler designed for peat sampling has a cone shaped piston (8).

9.4.7.2 *Sampling Method*—Prior to sampling, the piston is placed at the base (advancing end) of the tube. The sampler is then attached to drill rods and lowered down the borehole or hollow-stem auger column to the bottom of the hole (top of the sampling interval). The sampler is then pushed or driven into the sampling interval. As the tube

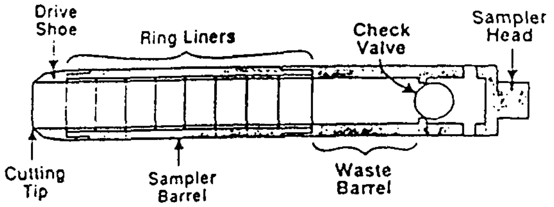


FIG. 17 Ring-Lined Barrel Sampler

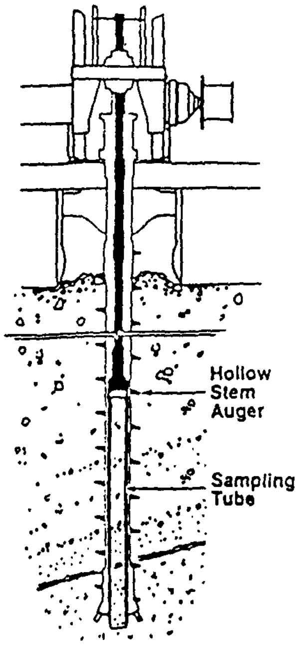


FIG. 18 Continuous Sample Tube System

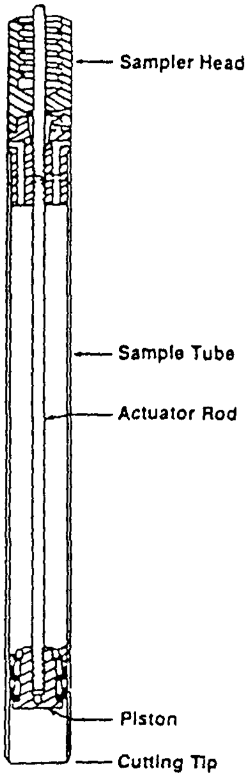


FIG. 19 Piston Sampler

moves downward, the piston remains stationary and in contact with the top of the soil sample. When the sampler is withdrawn, soil is retained because of suction that develops between the piston and the soil core within the sampler. This suction is stronger than the suction at the bottom of the [illegible] from the sampler and ensure that the sample will not be pulled sampler.

[illegible] *Comments*—Average recovery ratios f 0.9 can be attained with this sampling [illegible] However, because the sampler depends on de suction between the sample and the piston, it [illegible] coarse grained sands and gra creation of suction with the sampler. Samples collected with piston samplers are relatively undisturbed. Zapico et al. (24) described techniques for extracting fluid samples directly from liners, and for converting liners into permeameters.

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APPENDIX D

FIELD DATA FORMS

FIELD DATA FORM

Sample location:

Sample Location Sketch

Sample Designation:

Sample Date/Time:

Sampler(s):

Sample Depths:

Sample Collection Technique:

Field Preparation /Date

Sample Preservation:

Analysis:

Sample Location Description:

Soil Description/Classification:

APPENDIX E

EQUIPMENT DECONTAMINATION PROCEDURES

Designation: D 5088 - 90

Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites[1]

1. Scope

1.1 This practice covers the decontamination of field equipment used in the sampling of soils, soil gas, sludges, surface water, and ground water at waste sites which are to undergo both physical and chemical analyses.

1.2 This practice is applicable only at sites where chemical (organic and inorganic) wastes are a concern and is not intended for use at radioactive or mixed (chemical and radioactive) waste sites.

1.3 Procedures are included for the decontamination of equipment which comes into contact with the sample matrix (sample contacting equipment) and for ancillary equipment that has not contacted the portion of sample to be analyzed (non-sample contacting equipment).

1.4 This practice is based on recognized methods by which equipment may be decontaminated. When collecting environmental matrix samples, one should become familiar with the site specific conditions. Based on these conditions and the purpose of the sampling effort, the most suitable method of decontamination can be selected to maximize the integrity of analytical and physical testing results.

1.5 This practice is applicable to most conventional sampling equipment constructed of metallic and synthetic materials. The manufacturer of a specific sampling apparatus should be contacted if there is concern regarding the reactivity of a decontamination rinsing agent with the equipment.

1.6 *This standard does not purport to address the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Document

2.1 *ASTM Standard:*

D 653 Terminology Relating to Soil, Rock, and Contained Fluids[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *contaminant*—an undesirable substance not normally present or an unusually high concentration of a naturally occurring substance in water or soil.

3.1.2 *control rinse water*—water used for equipment washing and rinsing having a known chemistry.

3.1.3 *decontamination*—the process of removing or reducing to a known level undesirable physical or chemical constituents, or both, from a sampling apparatus to maximize the representativeness of physical or chemical analyses proposed for a given sample.

3.1.4 *non-sample contacting equipment*—related equipment associated with the sampling effort, but that does not directly contact the sample (for example, augers, drilling rods, excavations machinery).

3.1.5 *quality assurance/quality control (QA/QC)*—the efforts completed to evaluate the accuracy and precision of a sampling or testing procedure, or both.

3.1.6 *sample contacting equipment*—equipment that comes in direct contact with the sample or portion of sample that will undergo chemical analyses or physical testing (for example, ground water well bailer, split-spoon sampler, soil gas sampling probe).

3.1.7 For definitions of other terms used in this practice, see Terminology D 653.

4. Summary of Practice

4.1 Two different procedures are presented for the decontamination of sample-contacting and non-sample contacting equipment. The procedures have been developed based on a review of current state and federal guidelines, as well as a summary of commonly employed procedures. In general, sample contacting equipment should be washed with a detergent solution followed by a series of control water, desorbing agents and deionized water rinses. Nonsample contacting equipment should be washed with a detergent solution and rinsed with control water. Although such techniques may be difficult to perform in the field, they may be necessary to most accurately evaluate low concentrations of the chemical constituent(s) of interest.

4.2 Prior to initiating a field program that will involve equipment decontamination, a site specific equipment decontamination protocol should be prepared for distribution to the individuals involved with the particular sampling program. Information to be presented in the protocol should include:

4.2.1 Site location and description,

4.2.2 Statement of the sampling program objective and desired precision and accuracy, that is, is sampling effort for gross qualitative evaluation or for trace concentration, parameter specific evaluations,

4.2.3 Summary of available information regarding soil types, hydrogeology and anticipated chemistry of the materials to be sampled,

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[1] This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.14 on Geotechnics of Waste Management.

[illegible]

[2] *Annual Book of ASTM Standards*, Vol 04.08.

4.2.4 Listing of equipment to be used for sampling and materials needed for decontamination,

4.2.5 Detailed step by step procedure for equipment decontamination for each piece or type of equipment to be utilized and procedures for rinse fluids containment and disposal as appropriate,

4.2.6 Summary of QA/QC procedures and QA/QC samples to be collected to document decontamination completeness including specific type of chemical analyses and their associated detection limit, and

4.2.7 Outline of equipment decontamination verification report.

5. Significance and Use

5.1 An appropriately developed, executed and documented equipment decontamination procedure is an integral and essential part of waste site investigations. The benefits of its use include:

5.1.1 Minimizing the spread of contaminants within a study area and from site to site,

5.1.2 Reducing the potential for worker exposure by means of contact with contaminated sampling equipment, and

5.1.3 Improved data quality and reliability.

5.2 This practice is not a substitute for a well-documented Quality Assurance/Quality Control (QA/QC) program. Because the ultimate test of a decontamination procedure is its ability to minimize erroneous data, a reasonable QA/QC program must be implemented.

5.3 This practice may not be applicable to all waste sites. When a sampling effort is completed to determine only the general range of chemical concentrations of interest less rigorous decontamination procedures can be adequate. Investigators should have the flexibility to modify the decontamination procedures with due consideration for the sampling objective or if QA/QC documentation supports alternative decontamination methods.

5.4 At sites where the reactivity of sampling equipment to decontamination washes creates concern for the generation of undesirable chemical by-products, the use of dedicated sampling equipment should be considered.

5.5 This practice, where applicable, should be used before, between, and after the completion of sampling events.

6. Reagents

6.1 *Detergent*, non-phosphate detergent solution.[3]

6.2 *Acid rinse (inorganic desorbing agent)*, 10 % nitric or hydrochloric acid solution-made from reagent grade nitric or hydrochloric acid and deionized water (1 % is to be applied to low-carbon steel equipment).

6.3 *Solvent rinse (organic desorbing agent)*, isopropanol, acetone, or methanol; pesticide grade.

6.4 *Control rinse water*, preferably from a water system of known chemical composition.

6.5 *Deionized water*, organic-free reagent grade.

7. Procedure for Sample Contacting Equipment

7.1 At a minimum, sample contacting equipment should be washed with a detergent solution and rinsed with co water.

7.2 For programs requiring more rigorous decontam tion to meet the sampling or QA/QC objectives, the lowing procedures are indicated:

7.2.1 Wash with detergent solution, using a brush mad inert material to remove any particles or surface film.

7.2.1.1 For equipment that, because of internal mec nism or tubing cannot be adequately cleaned with a bru the decontamination solutions should be circulated thro the equipment.

7.2.2 Rinse thoroughly with control water.

7.2.3 Rinse with an inorganic desorbing agent (may deleted if samples will not undergo inorganic chem analysis).

7.2.4 Rinse with control water.

7.2.5 Rinse with organic desorbing agent (may be dele if samples will not undergo organic chemical analyses).

7.2.6 Rinse with deionized water.

7.2.7 Allow equipment to air dry prior to next use.

7.2.8 Wrap equipment for transport with inert mater (aluminum foil or plastic wrap) to direct contact w potentially contaminated material.

7.3 *Nonsample Contact Equipment:*

7.3.1 Clean the equipment with portable power washer steam cleaning machine. Alternatively, hand wash w brush using detergent solution.

7.3.2 Rinse with control water.

7.3.3 The more rigorous decontamination procedur may be employed if necessary to meet sampling or QA/Q objectives.

7.4 Depending on site conditions, it may be appropria to contain spent decontamination rinse fluids. If this is th case the appropriate vessel[4] for fluid containment should used depending on the ultimate disposition of the materia.

7.5 Depending on site conditions, it may be desirable perform all equipment decontamination at a centraliz location as opposed to the location where the equipment w used. If this is the case, care must be taken to transport th equipment to the decontamination area such that the spre of contaminants is minimized.

8. Quality Assurance/Quality Control

8.1 It is important to document the effectiveness of th decontamination procedure. To that end the projects Q QC program should include provisions for the collection samples to evaluate the completeness of a specific decontam ination procedure. This could include:

8.1.1 Collection of rinse or wipe samples before the init equipment decontamination prior to its use for sampling establish a base line level of contaminants residing on or the equipment,

8.1.2 Collection of final rinse or wipe samples afte equipment decontamination following its use, and

8.1.3 The frequency of sampling to demonstrate th completeness of equipment decontamination is depender upon objectives of the project as they relate to QA/QC. A

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[3] [illegible] Liquinox or similar solution has been found suitable for this purp

[4] A drum approved by the Department of Transportation or similar conta has been found suitable for this pur

minimum it is recommended after every ten decontamination washings.

9. Report

9.1 The activities completed for each equipment decontamination should be documented in writing. Included in this report should be the following information:

9.1.1 Site location, date, time, and weather,

9.1.2 Sample location where equipment was employed,

9.1.3 Location where decontamination was performed,

9.1.4 Individuals performing the decontamination,

9.1.5 Decontamination procedures,

9.1.6 Source of materials (solutions) used for decontamination,

9.1.7 Handling of rinse fluids and accumulates solids, if any, and

9.1.8 QA/QC sampling performed and analytical results of QA/QC samples whether completed in the field or laboratory subsequent to sampling event.

10. Keywords

10.1 contaminant; decontamination; sampling; waste

APPENDIX F

ANALYTICAL METHODS

METHOD 3050B

ACID DIGESTION OF SEDIMENTS, SLUDGES, AND SOILS

1.0 SCOPE AND APPLICATION

1.1 This method has been written to provide two separate digestion procedures, one for the preparation of sediments, sludges, and soil samples for analysis by flame atomic absorption spectrometry (FLAA) or inductively coupled plasma atomic emission spectrometry (ICP-AES) and one for the preparation of sediments, sludges, and soil samples for analysis of samples by Graphite Furnace AA (GFAA) or inductively coupled plasma mass spectrometry (ICP-MS). The extracts from these two procedures are not interchangeable and should only be used with the analytical determinations outlined in this section. Samples prepared by this method may be analyzed by ICP-AES or GFAA for all the listed metals as long as the detecion limits are adequate for the required end-use of the data. Alternative determinative techniques may be used if they are scientifically valid and the QC criteria of the method, including those dealing with interferences, can be achieved. Other elements and matrices may be analyzed by this method if performance is demonstrated for the analytes of interest, in the matrices of interest, at the concentration levels of interest (See Section 8.0). The recommended determinative techniques for each element are listed below:

FLAA/ICP-AES

Aluminum
Antimony
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Vanadium
Magnesium
Manganese
Molybdenum
Nickel
Potassium
Silver
Sodium
Thallium
Vanadium
Zinc

GFAA/ICP-MS

Arsenic
Beryllium
Cadmium
Chromium
Cobalt
Iron
Lead
Molybdenum
Selenium
Thallium

1.2 This method is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become "environmentally available." By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment. If absolute total digestion is required use Method 3052.

2.0 SUMMARY OF METHOD

2.1 For the digestion of samples, a representative 1-2 gram (wet weight) or 1 gram (dry weight) sample is digested with repeated additions of nitric acid (HNO_3) and hydrogen peroxide (H_2O_2).

2.2 For GFAA or ICP-MS analysis, the resultant digestate is reduced in volume while heating and then diluted to a final volume of 100 mL.

2.3 For ICP-AES or FLAA analyses, hydrochloric acid (HCl) is added to the initial digestate and the sample is refluxed. In an optional step to increase the solubility of some metals (see Section 7.3.1: NOTE), this digestate is filtered and the filter paper and residues are rinsed, first with hot HCl and then hot reagent water. Filter paper and residue are returned to the digestion flask, refluxed with additional HCl and then filtered again. The digestate is then diluted to a final volume of 100 mL.

2.4 If required, a separate sample aliquot shall be dried for a total percent solids determination.

3.0 INTERFERENCES

3.1 Sludge samples can contain diverse matrix types, each of which may present its own analytical challenge. Spiked samples and any relevant standard reference material should be processed in accordance with the quality control requirements given in Sec. 8.0 to aid in determining whether Method 3050B is applicable to a given waste.

4.0 APPARATUS AND MATERIALS

4.1 Digestion Vessels - 250-mL.

4.2 Vapor recovery device (e.g., ribbed watch glasses, appropriate refluxing device, appropriate solvent handling system).

4.3 Drying ovens - able to maintain 30°C ± 4°C.

4.4 Temperature measurement device capable of measuring to at least 125°C with suitable precision and accuracy (e.g., thermometer, IR sensor, thermocouple, thermister, etc.)

4.5 Filter paper - Whatman No. 41 or equivalent.

4.6 Centrifuge and centrifuge tubes.

4.7 Analytical balance - capable of accurate weighings to 0.01 g.

4.8 Heating source - Adjustable and able to maintain a temperature of 90-95°C. (e.g., hot plate, block digestor, microwave, etc.)

4.9 Funnel or equivalent.

4.10 Graduated cylinder or equivalent volume measuring device.

4.11 Volumetric Flasks - 100-mL.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination. If the purity of a reagent is questionable, analyze the reagent to determine the level of impurities. The reagent blank must be less than the MDL in order to be used.

5.2 Reagent Water. Reagent water will be interference free. All references to water in the method refer to reagent water unless otherwise specified. Refer to Chapter One for a definition of reagent water.

5.3 Nitric acid (concentrated), HNO_3. Acid should be analyzed to determine level of impurities. If method blank is < MDL, the acid can be used.

5.4 Hydrochloric acid (concentrated), HCl. Acid should be analyzed to determine level of impurities. If method blank is < MDL, the acid can be used.

5.5 Hydrogen peroxide (30%), H_2O_2. Oxidant should be analyzed to determine level of impurities. If method blank is < MDL, the peroxide can be used.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples must have been collected using a sampling plan that addresses the considerations discussed in Chapter Nine of this manual.

6.2 All sample containers must be demonstrated to be free of contamination at or below the reporting limit. Plastic and glass containers are both suitable. See Chapter Three, Section 3.1.3, for further information.

6.3 Nonaqueous samples should be refrigerated upon receipt and analyzed as soon as possible.

6.4 It can be difficult to obtain a representative sample with wet or damp materials. Wet samples may be dried, crushed, and ground to reduce subsample variability as long as drying does not affect the extraction of the analytes of interest in the sample.

7.0 PROCEDURE

7.1 Mix the sample thoroughly to achieve homogeneity and sieve, if appropriate and necessary, using a USS #10 sieve. All equipment used for homogenization should be cleaned according to the guidance in Sec. 6.0 to minimize the potential of cross-contamination. For each digestion procedure, weigh to the nearest 0.01 g and transfer a 1-2 g sample (wet weight) or 1 g sample (dry weight) to a digestion vessel. For samples with high liquid content, a larger sample size may be used as long as digestion is completed.

> NOTE: All steps requiring the use of acids should be conducted under a fume hood by properly trained personnel using appropriate laboratory safety equipment. The use of an acid vapor scrubber system for waste minimization is encouraged.

7.2 For the digestion of samples for analysis by GFAA or ICP-MS, add 10 mL of 1:1 HNO_3, mix the slurry, and cover with a watch glass or vapor recovery device. Heat the sample to 95°C ± 5°C and reflux for 10 to 15 minutes without boiling. Allow the sample to cool, add 5 mL of concentrated HNO_3, replace the cover, and reflux for 30 minutes. If brown fumes are generated, indicating oxidation of the sample by HNO_3, repeat this step (addition of 5 mL of conc. HNO_3) over and over until no brown fumes are given off by the sample indicating the complete reaction with HNO_3. Using a ribbed watch glass or vapor recovery system, either allow the solution to evaporate to approximately 5 mL without boiling or heat at 95°C ± 5°C without boiling for two hours. Maintain a covering of solution over the bottom of the vessel at all times.

NOTE: Alternatively, for direct energy coupling devices, such as a microwave, digest samples for analysis by GFAA or ICP-MS by adding 10 mL of 1:1 HNO_3, mixing the slurry and then covering with a vapor recovery device. Heat the sample to 95°C ± 5°C and reflux for 5 minutes at 95°C ± 5°C without boiling. Allow the sample to cool for 5 minutes, add 5 mL of concentrated HNO_3, heat the sample to 95°C ± 5°C and reflux for 5 minutes at 95°C ± 5°C. If brown fumes are generated, indicating oxidation of the sample by HNO_3, repeat this step (addition of 5 mL concentrated HNO_3) until no brown fumes are given off by the sample indicating the complete reaction with HNO_3. Using a vapor recovery system, heat the sample to 95°C ± 5°C and reflux for 10 minutes at 95°C ± 5°C without boiling.

7.2.1 After the step in Section 7.2 has been completed and the sample has cooled, add 2 mL of water and 3 mL of 30% H_2O_2. Cover the vessel with a watch glass or vapor recovery device and return the covered vessel to the heat source for warming and to start the peroxide reaction. Care must be taken to ensure that losses do not occur due to excessively vigorous effervescence. Heat until effervescence subsides and cool the vessel.

NOTE: Alternatively, for direct energy coupled devices: After the Sec. 7.2 "NOTE" step has been completed and the sample has cooled for 5 minutes, add slowly 10 mL of 30% H_2O_2. Care must be taken to ensure that losses do not occur due to excessive vigorous effervesence. Go to Section 7.2.3.

7.2.2 Continue to add 30% H_2O_2 in 1-mL aliquots with warming until the effervescence is minimal or until the general sample appearance is unchanged.

NOTE: Do not add more than a total of 10 mL 30% H_2O_2.

7.2.3 Cover the sample with a ribbed watch glass or vapor recovery device and continue heating the acid-peroxide digestate until the volume has been reduced to approximately 5 mL or heat at 95°C ± 5°C without boiling for two hours. Maintain a covering of solution over the bottom of the vessel at all times.

NOTE: Alternatively, for direct energy coupled devices: Heat the acid-peroxide digestate to 95°C ± 5°C in 6 minutes and remain at 95°C ± 5°C without boiling for 10 minutes.

7.2.4 After cooling, dilute to 100 mL with water. Particulates in the digestate should then be removed by filtration, by centrifugation, or by allowing the sample to settle. The sample is now ready for analysis by GFAA or ICP-MS.

7.2.4.1 Filtration - Filter through Whatman No. 41 filter paper (or equivalent).

7.2.4.2 Centrifugation - Centrifugation at 2,000-3,000 rpm for 10 minutes is usually sufficient to clear the supernatant.

7.2.4.3 The diluted digestate solution contains approximately 5% (v/v) HNO_3. For analysis, withdraw aliquots of appropriate volume and add any required reagent or matrix modifier.

7.3 For the analysis of samples for FLAA or ICP-AES, add 10 mL conc. HCl to the sample digest from 7.2.3 and cover with a watch glass or vapor recovery device. Place the sample on/in the heating source and reflux at 95°C ± 5°C for 15 minutes.

NOTE: Alternatively, for direct energy coupling devices, such as a microwave, digest samples for analysis by FLAA and ICP-AES by adding 5 mL HCl and 10 mL H_2O to the sample digest from 7.2.3 and heat the sample to 95°C ± 5°C, Reflux at 95°C ± 5°C without boiling for 5 minutes.

7.4 Filter the digestate through Whatman No. 41 filter paper (or equivalent) and collect filtrate in a 100-mL volumetric flask. Make to volume and analyze by FLAA or ICP-AES.

NOTE: Section 7.5 may be used to improve the solubilities and recoveries of antimony, barium, lead, and silver when necessary. These steps are optional and are not required on a routine basis.

7.5 Add 2.5 mL conc. HNO_3 and 10 mL conc. HCl to a 1-2 g sample (wet weight) or 1 g sample (dry weight) and cover with a watchglass or vapor recovery device. Place the sample on/in the heating source and reflux for 15 minutes.

7.5.1 Filter the digestate through Whatman No. 41 filter paper (or equivalent) and collect filtrate in a 100-mL volumetric flask. Wash the filter paper, while still in the funnel, with no more than 5 mL of hot (~95°C) HCl, then with 20 mL of hot (~95°C) reagent water. Collect washings in the same 100-mL volumetric flask.

7.5.2 Remove the filter and residue from the funnel, and place them back in the vessel. Add 5 mL of conc. HCl, place the vessel back on the heating source, and heat at 95°C ± 5°C until the filter paper dissolves. Remove the vessel from the heating source and wash the cover and sides with reagent water. Filter the residue and collect the filtrate in the same 100-mL volumetric flask. Allow filtrate to cool, then dilute to volume.

NOTE: High concentrations of metal salts with temperature-sensitive solubilities can result in the formation of precipitates upon cooling of primary and/or secondary filtrates. If precipitation occurs in the flask upon cooling, do not dilute to volume.

7.5.3 If a precipitate forms on the bottom of a flask, add up to 10 mL of concentrated HCl to dissolve the precipitate. After precipitate is dissolved, dilute to volume with reagent water. Analyze by FLAA or ICP-AES.

7.6 Calculations

7.6.1 The concentrations determined are to be reported on the basis of the actual weight of the sample. If a dry weight analysis is desired, then the percent solids of the sample must also be provided.

7.6.2 If percent solids is desired, a separate determination of percent solids must be performed on a homogeneous aliquot of the sample.

8.0 QUALITY CONTROL

8.1 All quality control measures described in Chapter One should be followed.

8.2 For each batch of samples processed, a method blank should be carried throughout the entire sample preparation and analytical process according to the frequency described in Chapter One. These blanks will be useful in determining if samples are being contaminated. Refer to Chapter One for the proper protocol when analyzing method blanks.

8.3 Spiked duplicate samples should be processed on a routine basis and whenever a new sample matrix is being analyzed. Spiked duplicate samples will be used to determine precision and bias. The criteria of the determinative method will dictate frequency, but 5% (one per batch) is recommended or whenever a new sample matrix is being analyzed. Refer to Chapter One for the proper protocol when analyzing spiked replicates.

8.4 Limitations for the FLAA and ICP-AES optional digestion procedure. Analysts should be aware that the upper linear range for silver, barium, lead, and antimony may be exceeded with some samples. If there is a reasonable possibility that this range may be exceeded, or if a sample's analytical result exceeds this upper limit, a smaller sample size should be taken through the entire procedure and re-analyzed to determine if the linear range has been exceeded. The approximate linear upper ranges for a 2 gram sample size:

Ag	2,000 mg/kg
As	1,000,000 mg/kg
Ba	2,500 mg/kg
Be	1,000,000 mg/kg
Cd	1,000,000 mg/kg
Co	1,000,000 mg/kg
Cr	1,000,000 mg/kg
Cu	1,000,000 mg/kg
Mo	1,000,000 mg/kg
Ni	1,000,000 mg/kg
Pb	200,000 mg/kg
Sb	200,000 mg/kg
Se	1,000,000 mg/kg
Tl	1,000,000 mg/kg
V	1,000,000 mg/kg
Zn	1,000,000 mg/kg

NOTE: These ranges will vary with sample matrix, molecular form, and size.

9.0 METHOD PERFORMANCE

9.1 In a single laboratory, the recoveries of the three matrices presented in Table 2 were obtained using the digestion procedure outlined for samples prior to analysis by FLAA and ICP-AES. The spiked samples were analyzed in duplicate. Tables 3-5 represents results of analysis of NIST Standard Reference Materials that were obtained using both atmospheric pressure microwave digestion techniques and hot-plate digestion procedures.

10.0 REFERENCES

1. Rohrbough, W.G.; et al. Reagent Chemicals, American Chemical Society Specifications, 7th ed.; American Chemical Society: Washington, DC, 1986.

2. 1985 Annual Book of ASTM Standards, Vol. 11.01; "Standard Specification for Reagent Water"; ASTM: Philadelphia, PA, 1985; D1193-77.

3. Edgell, K.; USEPA Method Study 37 - SW-846 Method 3050 Acid Digestion of Sediments, Sludges, and Soils. EPA Contract No. 68-03-3254, November 1988.

4. Kimbrough, David E., and Wakakuwa, Janice R. Acid Digestion for Sediments, Sludges, Soils, and Solid Wastes. A Proposed Alternative to EPA SW 846 Method 3050, Environmental Science and Technology, Vol. 23, Page 898, July 1989.

5. Kimbrough, David E., and Wakakuwa, Janice R. Report of an Interlaboratory Study Comparing EPA SW 846 Method 3050 and an Alternative Method from the California Department of Health Services, Fifth Annual Waste Testing and Quality Assurance Symposium, Volume I, July 1989. Reprinted in Solid Waste Testing and Quality Assurance: Third Volume, ASTM STP 1075, Page 231, C.E. Tatsch, Ed., American Society for Testing and Materials, Philadelphia, 1991.

6. Kimbrough, David E., and Wakakuwa, Janice R. A Study of the Linear Ranges of Several Acid Digestion Procedures, Environmental Science and Technology, Vol. 26, Page 173, January 1992. Presented Sixth Annual Waste Testing and Quality Assurance Symposium, July 1990.

7. Kimbrough, David E., and Wakakuwa, Janice R. A Study of the Linear Ranges of Several Acid Digestion Procedures, Sixth Annual Waste Testing and Quality Assurance Symposium, Reprinted in Solid Waste Testing and Quality Assurance: Fourth Volume, ASTM STP 1076, Ed., American Society for Testing and Materials, Philadelphia, 1992.

8. NIST published leachable concentrations. Found in addendum to certificate of analysis for SRMs 2709, 2710, 2711 - August 23, 1993.

9. Kingston, H.M. Haswell, S.J. ed., Microwave Enhanced Chemistry, Professional Reference Book Series, American Chemical Society, Washington, D.C., Chapter 3, 1997.

TABLE 1

STANDARD RECOVERY (%) COMPARISON FOR METHODS 3050A AND 3050B[a]

Analyte	METHOD 3050A[a]	METHOD 3050B w/option[a]
Ag	9.5	98
As	86	102
Ba	97	103
Be	96	102
Cd	101	99
Co	99	105
Cr	98	94
Cu	87	94
Mo	97	96
Ni	98	92
Pb	97	95
Sb	87	88
Se	94	91
Tl	96	96
V	93	103
Zn	99	95

[a] All values are percent recovery. Samples: 4 mL of 100 mg/mL multistandard; n = 3.

TABLE 2

PERCENT RECOVERY COMPARISON FOR METHODS 3050A AND 3050B

	Percent Recovery[a,c]							
Analyte	Sample 4435		Sample 4766		Sample HJ		Average	
	3050A	3050B	3050A	3050B	3050A	3050B	3050A	3050B
Ag	9.8	103	15	89	56	93	27	95
As	70	102	80	95	83	102	77	100
Ba	85	94	78	95	b	b	81	94
Be	94	102	108	98	99	94	99	97
Cd	92	88	91	95	95	97	93	94
Co	90	94	87	95	89	93	89	94
Cr	90	95	89	94	72	101	83	97
Cu	81	88	85	87	70	106	77	94
Mo	79	92	83	98	87	103	83	98
Ni	88	93	93	100	87	101	92	98
Pb	82	92	80	91	77	91	81	91
Sb	28	84	23	77	46	76	32	79
Se	84	89	81	96	99	96	85	94
Tl	88	87	69	95	66	67	74	83
V	84	97	86	96	90	88	87	93
Zn	96	106	78	75	b	b	87	99

a - Samples: 4 mL of 100 mg/mL multi-standard in 2 g of sample. Each value is percent recovery and is the average of duplicate spikes.

b - Unable to accurately quantitate due to high background values.

c - Method 3050B using optional section.

Table 3
Results of Analysis of Nist Standard Reference Material 2704 "River Sediment" Using Method 3050B (µg/g ± SD)

Element	Atm. Pressure Microwave Assisted Method with Power Control	Atm. Pressure Microwave Assisted Method with Temperature Control (gas-bulb)	Atm. Pressure Microwave Assisted Method with Temperature Control (IR-sensor)	Hot-Plate	NIST Certified Values for Total Digestion (µg/g ±95% CI)
Cu	101 ± 7	89 ± 1	98 ± 1.4	100 ± 2	98.6 ± 5.0
Pb	160 ± 2	145 ± 6	145 ± 7	146 ± 1	161 ± 17
Zn	427 ± 2	411 ± 3	405 ± 14	427 ± 5	438 ± 12
Cd	NA	3.5 ± 0.66	3.7 ± 0.9	NA	3.45 ± 0.22
Cr	82 ± 3	79 ± 2	85 ± 4	89 ± 1	135 ± 5
Ni	42 ± 1	36 ± 1	38 ± 4	44 ± 2	44.1 ± 3.0

NA - Not Available

Table 4
Results of Analysis of NIST Standard Reference Material 2710 "Montana Soil (Highly Elevated Trace Element Concentrations)" Using Method 3050B (µg/g ± SD)

Element	Atm. Pressure Microwave Assisted Method with Power Control	Atm. Pressure Microwave Assisted Method with Temperature Control (gas-bulb)	Atm. Pressure Microwave Assisted Method with Temperature Control (IR-sensor)	Hot-Plate	NIST Leachable Concentrations Using Method 3050	NIST Certified Values for Total Digestion (µg/g ±95% CI)
Cu	2640 ± 60	2790 ± 41	2480 ± 33	2910 ± 59	2700	2950 ± 130
Pb	5640 ± 117	5430 ± 72	5170 ± 34	5720 ± 280	5100	5532 ± 80
Zn	6410 ± 74	5810 ± 34	6130 ± 27	6230 ± 115	5900	6952 ± 91
Cd	NA	20.3 ± 1.4	20.2 ± 0.4	NA	20	21.8 ± 0.2
Cr	20 ± 1.6	19 ± 2	18 ± 2.4	23 ± 0.5	19	39*
Ni	7.8 ± 0.29	10 ± 1	9.1 ± 1.1	7 ± 0.44	10.1	14.3 ± 1.0

NA - Not Available

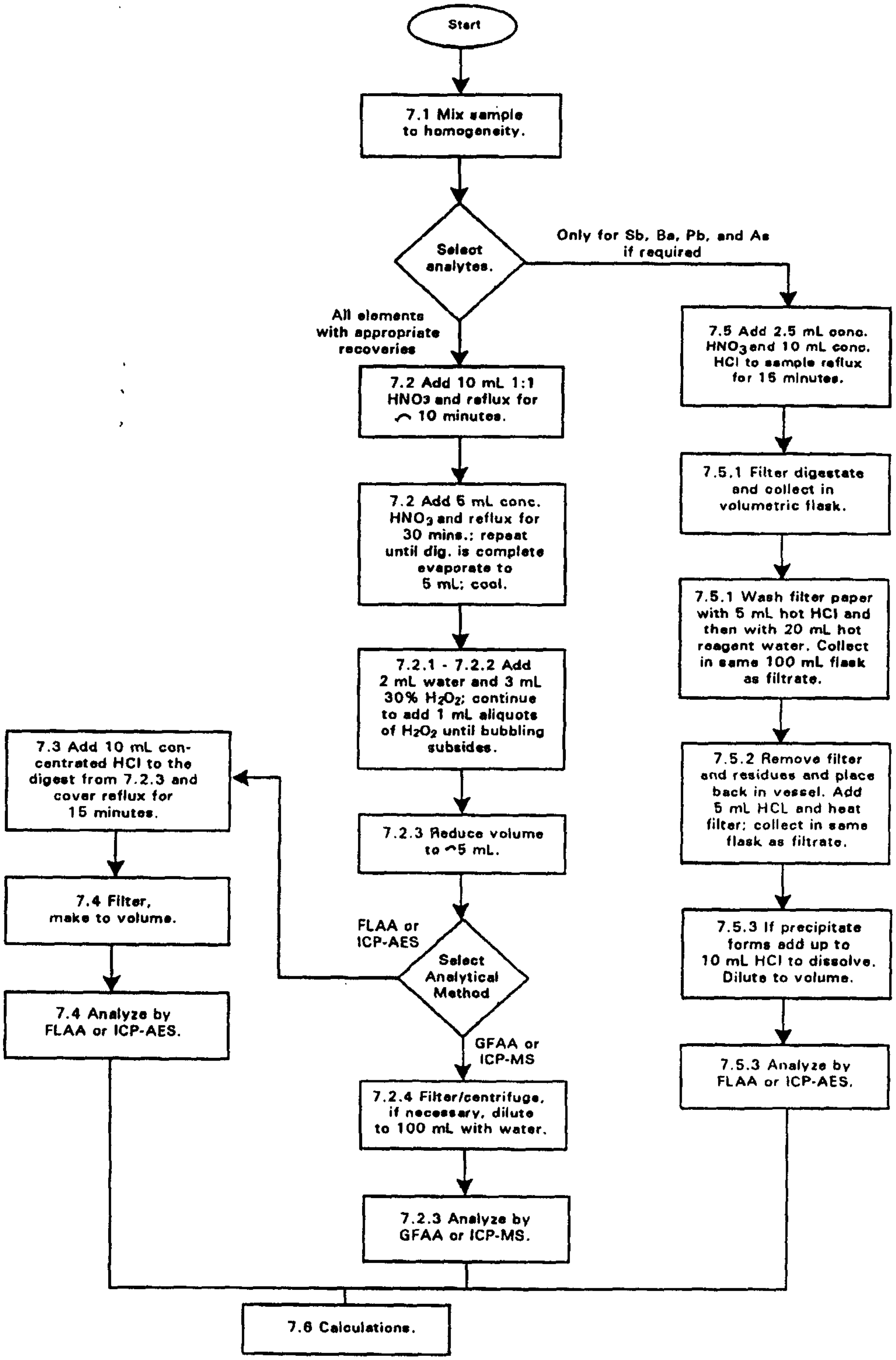
* Non-certified values, for information only.

Table 5
Results of Analysis of NIST Standard Reference Material 2711 "Montana Soil (Moderately Elevated Trace Element Concentrations)" Using Method 3050B
(µg/g ± SD)

Element	Atm. Pressure Microwave Assisted Method with Power Control	Atm. Pressure Microwave Assisted Method with Temperature Control (gas-bulb)	Atm. Pressure Microwave Assisted Method with Temperature Control (IR-sensor)	Hot-Plate	NIST Leachable Concentrations Using Method 3050	NIST Certified Values for Total Digestion (µg/g ±95% CI)
Cu	107 ± 4.6	98 ± 5	98 ± 3.8	111 ± 6.4	100	114 ± 2
Pb	1240 ± 68	1130 ± 20	1120 ± 29	1240 ± 38	1100	1162 ± 31
Zn	330 ± 17	312 ± 2	307 ± 12	340 ± 13	310	350.4 ± 4.8
Cd	NA	39.6 ± 3.9	40.9 ± 1.9	NA	40	41.7 ± 0.25
Cr	22 ± 0.35	21 ± 1	15 ± 1.1	23 ± 0.9	20	47*
Ni	15 ± 0.2	17 ± 2	15 ± 1.6	16 ± 0.4	16	20.6 ± 1.1

NA - Not Available
* Non-certified values, for information only.

METHOD 3050B
ACID DIGESTION OF SEDIMENTS, SLUDGES, AND SOILS



METHOD 3010A

ACID DIGESTION OF AQUEOUS SAMPLES AND EXTRACTS FOR TOTAL METALS FOR ANALYSIS BY FLAA OR ICP SPECTROSCOPY

1.0 SCOPE AND APPLICATION

1.1 This digestion procedure is used for the preparation of aqueous samples, EP and mobility-procedure extracts, and wastes that contain suspended solids for analysis, by flame atomic absorption spectroscopy (FLAA) or inductively coupled argon plasma spectroscopy (ICP). The procedure is used to determine total metals.

1.2 Samples prepared by Method 3010 may be analyzed by FLAA or ICP for the following:

Aluminum
*Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Nickel
Potassium
*Selenium
Sodium
Thallium
Vanadium
Zinc

* Analysis by ICP

NOTE: See Method 7760 for the digestion and FLAA analysis of Silver.

1.3 This digestion procedure is not suitable for samples which will be analyzed by graphite furnace atomic absorption spectroscopy because hydrochloric acid can cause interferences during furnace atomization. Consult Method 3020A for samples requiring graphite furnace analysis.

2.0 SUMMARY OF METHOD

2.1 A mixture of nitric acid and the material to be analyzed is refluxed in a covered Griffin beaker. This step is repeated with additional portions of nitric acid until the digestate is light in color or until its color has stabilized. After the digestate has been brought to a low volume, it is refluxed with hydrochloric acid and brought up to volume. If sample should go to dryness, it must be discarded and the sample reprepared.

3.0 INTERFERENCES

3.1 Interferences are discussed in the referring analytical method.

4.0 APPARATUS AND MATERIALS

4.1 Griffin beakers - 150-mL or equivalent.

4.2 Watch glasses - Ribbed and plain or equivalent.

4.3 Qualitative filter paper or centrifugation equipment.

4.4 Graduated cylinder or equivalent - 100mL.

4.5 Funnel or equivalent.

4.6 Hot plate or equivalent heating source - adjustable and capable of maintaining a temperature of 90-95°C.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Reagent Water. Reagent water will be interference free. All references to water in the method refer to reagent water unless otherwise specified. Refer to Chapter One for a definition of reagent water.

5.3 Nitric acid (concentrated), HNO_3. Acid should be analyzed to determine levels of impurities. If method blank is < MDL, the acid can be used.

5.4 Hydrochloric acid (1:1), HCl. Prepared from water and hydrochloric acid. Hydrochloric acid should be analyzed to determine level of impurities. If method blank is < MDL, the acid can be used.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples must have been collected using a sampling plan that addresses the considerations discussed in Chapter Nine of this manual.

6.2 All sample containers must be prewashed with detergents, acids, and water. Plastic and glass containers are both suitable. See Chapter Three, Step 3.1.3, for further information.

6.3 Aqueous wastewaters must be acidified to a pH of < 2 with HNO_3.

7.0 PROCEDURE

7.1 Transfer a 100-mL representative aliquot of the well-mixed sample to a 150-mL Griffin beaker and add 3 mL of concentrated HNO_3. Cover the beaker with a ribbed watch glass or equivalent. Place the beaker on a hot plate or equivalent heating source and cautiously evaporate to a low volume (5 mL), making certain that the sample does not boil and that no portion of the bottom of the beaker is allowed to go dry. Cool the beaker and add another 3-mL portion of concentrated HNO_3. Cover the beaker with a nonribbed watch glass and return to the hot plate. Increase the temperature of the hot plate so that a gentle reflux action occurs.

<u>NOTE</u>: If a sample is allowed to go to dryness, low recoveries will result. Should this occur, discard the sample and reprepare.

7.2 Continue heating, adding additional acid as necessary, until the digestion is complete (generally indicated when the digestate is light in color or does not change in appearance with continued refluxing). Again, uncover the beaker or use a ribbed watch glass, and evaporate to a low volume (3 mL), not allowing any portion of the bottom of the beaker to go dry. Cool the beaker. Add a small quantity of 1:1 HCl (10 mL/100 mL of final solution), cover the beaker, and reflux for an additional 15 minutes to dissolve any precipitate or residue resulting from evaporation.

7.3 Wash down the beaker walls and watch glass with water and, when necessary, filter or centrifuge the sample to remove silicates and other insoluble material that could clog the nebulizer. Filtration should be done only if there is concern that insoluble materials may clog the nebulizer. This additional step can cause sample contamination unless the filter and filtering apparatus are thoroughly cleaned. Rinse the filter and filter apparatus with dilute nitric acid and discard the rinsate. Filter the sample and adjust the final volume to 100 mL with reagent water and the final acid concentration to 10%. The sample is now ready for analysis.

8.0 QUALITY CONTROL

8.1 All quality control measures described in Chapter One should be followed.

8.2 For each analytical batch of samples processed, blanks should be carried throughout the entire sample-preparation and analytical process. These blanks will be useful in determining if samples are being contaminated. Refer to Chapter One for the proper protocol when analyzing blanks.

8.3 Replicate samples should be processed on a routine basis. A replicate sample is a sample brought through the whole sample preparation and analytical process. A replicate sample should be processed with each analytical batch or every 20 samples, whichever is greater. Refer to Chapter One for the proper protocol when analyzing replicates.

8.4 Spiked samples or standard reference materials should be employed to determine accuracy. A spiked sample should be included with each batch of samples processed and whenever a new sample matrix is being analyzed. Refer to Chapter One for the proper protocol when analyzing spikes.

8.5 The method of standard addition shall be used for the analysis of all EP extracts and delisting petitions (see Method 7000, Step 8.7). Although not required, use of the method of standard addition is recommended for any sample that is suspected of having an interference.

9.0 METHOD PERFORMANCE

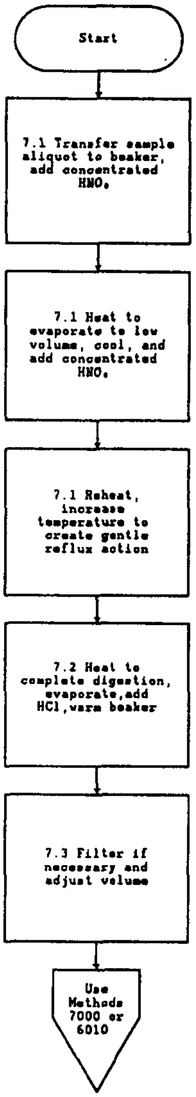
9.1 No data provided.

10.0 REFERENCES

1. Rohrbough, W.G.; et al. Reagent Chemicals, American Chemical Society Specifications, 7th ed.; American Chemical Society: Washington, DC, 1986.

2. 1985 Annual Book of ASTM Standards, Vol. 11.01; "Standard Specification for Reagent Water"; ASTM: Philadelphia, PA, 1985; D1193-77.

METHOD 3010A
ACID DIGESTION OF AQUEOUS SAMPLES AND EXTRACTS FOR TOTAL METALS ANALYSIS BY FLAA OR ICP SPECTROSCOPY



METHOD 6020

INDUCTIVELY COUPLED PLASMA - MASS SPECTROMETRY

1.0 SCOPE AND APPLICATION

1.1 Inductively coupled plasma-mass spectrometry (ICP-MS) is applicable to the determination of sub-µg/L concentrations of a large number of elements in water samples and in waste extracts or digests [1,2]. When dissolved constituents are required, samples must be filtered and acid-preserved prior to analysis. No digestion is required prior to analysis for dissolved elements in water samples. Acid digestion prior to filtration and analysis is required for groundwater, aqueous samples, industrial wastes, soils, sludges, sediments, and other solid wastes for which total (acid-leachable) elements are required.

1.2 ICP-MS has been applied to the determination of over 60 elements in various matrices. Analytes for which EPA has demonstrated the acceptability of Method 6020 in a multi-laboratory study on solid wastes are listed in Table 1. Acceptability of the method for an element was based upon the multi-laboratory performance compared with that of either furnace atomic absorption spectroscopy or inductively coupled plasma-atomic emission spectroscopy. It should be noted that the multi-laboratory study was conducted in 1986. Multi-laboratory performance data for the listed elements (and others) are provided in Section 9. Instrument detection limits, sensitivities, and linear ranges will vary with the matrices, instrumentation, and operating conditions. In relatively simple matrices, detection limits will generally be below 0.02 µg/L.

1.3 If Method 6020 is used to determine any analyte not listed in Table 1, it is the responsibility of the analyst to demonstrate the accuracy and precision of the Method in the waste to be analyzed. The analyst is always required to monitor potential sources of interferences and take appropriate action to ensure data of known quality (see Section 8.4).

1.4 Use of this method is restricted to spectroscopists who are knowledgeable in the recognition and in the correction of spectral, chemical, and physical interferences in ICP-MS.

1.5 An appropriate internal standard is required for each analyte determined by ICP-MS. Recommended internal standards are ^{6}Li, ^{45}Sc, ^{89}Y, ^{103}Rh, ^{115}In, ^{159}Tb, ^{165}Ho,and ^{209}Bi. The lithium internal standard should have an enriched abundance of ^{6}Li, so that interference from lithium native to the sample is minimized. Other elements may need to be used as internal standards when samples contain significant amounts of the recommended internal standards.

2.0 SUMMARY OF METHOD

2.1 Prior to analysis, samples which require total ("acid-leachable") values must be digested using appropriate sample preparation methods (such as Methods 3005 - 3051).

2.2 Method 6020 describes the multi-elemental determination of analytes by ICP-MS. The method measures ions produced by a radio-frequency inductively coupled plasma. Analyte species originating in a liquid are nebulized and the resulting aerosol transported by argon gas into the plasma torch. The ions produced are entrained in the plasma gas and introduced, by means of an interface, into a mass spectrometer. The ions produced in the plasma are sorted according to their mass-to-charge ratios and quantified with a channel electron multiplier. Interferences must be assessed and valid corrections applied or the data flagged to indicate problems. Interference correction must include compensation for background ions contributed by the plasma gas, reagents, and constituents of the sample matrix.

3.0 INTERFERENCES

3.1 Isobaric elemental interferences in ICP-MS are caused by isotopes of different elements forming atomic ions with the same nominal mass-to-charge ratio (m/z). A data system must be used to correct for these interferences. This involves determining the signal for another isotope of the interfering element and subtracting the appropriate signal from the analyte isotope signal. Since commercial ICP-MS instruments nominally provide unit resolution at 10% of the peak height, very high ion currents at adjacent masses can also contribute to ion signals at the mass of interest. Although this type of interference is uncommon, it is not easily corrected, and samples exhibiting a significant problem of this type could require resolution improvement, matrix separation, or analysis using another verified and documented isoptope, or use of another method.

3.2 Isobaric molecular and doubly-charged ion interferences in ICP-MS are caused by ions consisting of more than one atom or charge, respectively. Most isobaric interferences that could affect ICP-MS determinations have been identified in the literature [3,4]. Examples include $ArCl^+$ ions on the ^{75}As signal and MoO^+ ions on the cadmium isotopes. While the approach used to correct for molecular isobaric interferences is demonstrated below using the natural isotope abundances from the literature [5], the most precise coefficients for an instrument can be determined from the ratio of the net isotope signals observed for a standard solution at a concentration providing suitable (<1 percent) counting statistics. Because the ^{35}Cl natural abundance of 75.77 percent is 3.13 times the ^{37}Cl abundance of 24.23 percent, the chloride correction for arsenic can be calculated (approximately) as follows (where the $^{38}Ar^{37}Cl^+$ contribution at m/z 75 is a negligible 0.06 percent of the $^{40}Ar^{35}Cl^+$ signal):

> corrected arsenic signal (using natural isotopes abundances for coefficient approximations) =
>
> (m/z 75 signal) - (3.13) (m/z 77 signal) + (2.73) (m/z 82 signal), (where the final term adjusts for any selenium contribution at 77 m/z),
>
> NOTE: Arsenic values can be biased high by this type of equation when the net signal at m/z 82 is caused by ions other than $^{82}Se^+$, (e.g., $^{81}BrH^+$ from bromine wastes [6]).

Similarly,

> corrected cadmium signal (using natural isotopes abundances for coefficient approximations) =
>
> (m/z 114 signal) - (0.027)(m/z 118 signal) - (1.63)(m/z 108 signal), (where last 2 terms adjust for any tin or MoO^+ contributions at m/z 114).
>
> <u>NOTE</u>: Cadmium values will be biased low by this type of equation when $^{92}ZrO^+$ ions contribute at m/z 108, but use of m/z 111 for Cd is even subject to direct ($^{94}ZrOH^+$) and indirect ($^{90}ZrO^+$) additive interferences when Zr is present.
>
> <u>NOTE</u>: As for the arsenic equation above, the coefficients in the Cd equation are ONLY illustrative. The most appropriate coefficients for an instrument can be determined from the ratio of the net isotope signals observed for a standard solution at a concentration providing suitable (<1 percent) counting precision.

<u>The accuracy of these types of</u> equations is based upon the constancy of the OBSERVED isotopic ratios for the interfering species. Corrections that presume a constant fraction of a molecular ion relative to the "parent" ion have not been found [7] to be reliable, e.g., oxide levels can vary. If a correction for an oxide ion is based upon the ratio of parent-to-oxide ion intensities, the correction must be adjusted for the degree of oxide formation by the use of an appropriate oxide internal standard previously demonstrated to form a similar level of oxide as the interferant. This type of correction has been reported [7] for oxide-ion corrections using ThO^+/Th^+ for the determination of rare earth elements. The use of aerosol desolvation and/or mixed plasmas have been shown to greatly reduce molecular interferences [8]. These techniques can be used provided that method detection limits, accuracy, and precision requirements for analysis of the samples can be met.

3.3 Physical interferences are associated with the sample nebulization and transport processes as well as with ion-transmission efficiencies. Nebulization and transport processes can be affected if a matrix component causes a change in surface tension or viscosity. Changes in matrix composition can cause significant signal suppression or enhancement [9]. Dissolved solids can deposit on the nebulizer tip of a pneumatic nebulizer and on the interface skimmers (reducing the orifice size and the instrument performance). Total solid levels below 0.2% (2,000 mg/L) have been currently recommended [10] to minimize solid deposition. An internal standard can be used to correct for physical interferences, if it is carefully matched to the analyte so that the two elements are similarly affected by matrix changes [11]. When the intensity level of an internal standard is less than 30 percent or greater than 120 percent of the intensity of the first standard used during calibration, the sample must be reanalyzed after a fivefold (1+4) or greater dilution has been performed.

3.4 Memory interferences can occur when there are large concentration differences between samples or standards which are analyzed sequentially. Sample deposition on the sampler and skimmer cones, spray chamber design, and the type of nebulizer affect the extent of the memory interferences which are observed. The rinse period between samples must be long enough to eliminate significant memory interference.

4.0 APPARATUS AND MATERIALS

4.1 Inductively coupled plasma-mass spectrometer:

4.1.1 A system capable of providing resolution, better than or equal to amu at 10% peak height is required. The system must have a mass range from at least 6 to 240 amu and a data system that allows corrections for isobaric interferences and the application of the internal standard technique. Use of a mass-flow controller for the nebulizer argon and a peristaltic pump for the sample solution are recommended.

4.1.2 Argon gas supply: high-purity grade (99.99%).

5.0 REAGENTS

5.1 Acids used in the preparation of standards and for sample processing must be of high purity. Redistilled acids are recommended because of the high sensitivity of ICP-MS. Nitric acid at less than 2 per cent (v/v) is required for ICP-MS to minimize damage to the interface and to minimize isobaric molecular-ion interferences with the analytes. Many more molecular-ion interferences are observed on the analytes when hydrochloric and sulfuric acids are used [3,4]. Concentrations of antimony and silver between 50-500 µg/L require 1% (v/v) HCl for stability; for concentrations above 500 µg/L Ag, additional HCl will be needed.

5.2 Reagent water: All references to water in the method refer to reagent water unless otherwise specified. Refer to Chapter One for a definition of reagent water.

5.3 Standard stock solutions may be purchased or prepared from ultra-high purity grade chemicals or metals (99.99 or greater purity). See Method 6010A, Section 5.3, for instructions on preparing standard solutions from solids.

5.3.1 Bismuth internal standard solution, stock, 1 mL = 100 µg Bi: Dissolve 0.1115 g Bi_2O_3 in a minimum amount of dilute HNO_3 . Add 10 mL conc. HNO_3 and dilute to 1,000 mL with reagent water.

5.3.2 Holmium internal standard solution, stock, 1 mL = 100 µg Ho: Dissolve 0.1757 g $Ho_2(CO_3)_2 \cdot 5H_2O$ in 10 mL reagent water and 10 mL HNO_3. After dissolution is complete, warm the solution to degas. Add 10 mL conc. HNO_3 and dilute to 1,000 mL with reagent water.

5.3.3 Indium internal standard solution, stock, 1 mL = 100 µg In: Dissolve 0.1000 g indium metal in 10 mL conc. HNO_3. Dilute to 1,000 mL with reagent water.

5.3.4 Lithium internal standard solution, stock, 1 mL = 100 µg ^{6}Li: Dissolve 0.6312 g 95-atom-% ^{6}Li, Li_2CO_3 in 10 mL of reagent water and 10 mL HNO_3. After dissolution is complete, warm the solution to degas. Add 10 mL conc. HNO_3 and dilute to 1,000 mL with reagent water.

5.3.5 Rhodium internal standard solution, stock, 1 mL = 100 µg Rh: Dissolve 0.3593 g ammonium hexachlororhodate (III) $(NH_4)_3RhCl_6$ in 10 mL reagent water. Add 100 mL conc. HCl and dilute to 1,000 mL with reagent water.

5.3.6 Scandium internal standard solution, stock, 1 mL = 100 µg Sc: Dissolve 0.15343 g Sc_2O_3 in 10 mL (1+1) hot HNO_3. Add 5 mL conc. HNO_3 and dilute to 1,000 mL with reagent water.

5.3.7 Terbium internal standard solution, stock, 1 mL = 100 µg Tb: Dissolve 0.1828 g $Tb_2(CO_3)_3 \cdot 5H_2O$ in 10 mL (1+1) HNO_3. After dissolution is complete, warm the solution to degas. Add 5 mL conc. HNO_3 and dilute to 1,000 mL with reagent water.

5.3.8 Yttrium internal standard solution, stock, 1 mL = 100 µg Y: Dissolve 0.2316 g $Y_2(CO_3)_3 \bullet 3H_2O$ in 10 mL (1+1) HNO_3. Add 5 mL conc. HNO_3 and dilute to 1,000 mL with reagent water.

5.3.9 Titanium solution, stock, 1 mL = 100 µg Ti: Dissolve 0.4133 g $(NH_4)_2TiF_6$ in reagent water. Add 2 drops conc. HF and dilute to 1,000 mL with reagent water.

5.3.10 Molybdenum solution, stock, 1 mL = 100 µg Mo: Dissolve 0.2043 g $(NH_4)_2MoO_4$ in reagent water. Dilute to 1,000 mL with reagent water.

5.4 Mixed calibration standard solutions are prepared by diluting the stock-standard solutions to levels in the linear range for the instrument in a solvent consisting of 1 percent (v/v) HNO_3 in reagent water. The calibration standard solutions must contain a suitable concentration of an appropriate internal standard for each analyte. Internal standards may be added on-line at the time of analysis using a second channel of the peristaltic pump and an appropriate mixing manifold.) Generally, an internal standard should be no more than 50 amu removed from the analyte. Recommended internal standards include ^{6}Li, ^{45}Sc, ^{89}Y, ^{103}Rh, ^{115}In, ^{159}Tb, ^{169}Ho, and ^{209}Bi. Prior to preparing the mixed standards, each stock solution must be analyzed separately to determine possible spectral interferences or the presence of impurities. Care must be taken when preparing the mixed standards that the elements are compatible and stable. Transfer the mixed standard solutions to freshly acid-cleaned FEP fluorocarbon bottles for storage. Fresh mixed standards must be prepared as needed with the realization that concentrations can change on aging. Calibration standards must be initially verified using a quality control standard (see Section 5.7) and monitored weekly for stability.

5.5 Blanks: Three types of blanks are required for the analysis. The calibration blank is used in establishing the calibration curve. The preparation blank is used to monitor for possible contamination resulting from the sample preparation procedure. The rinse blank is used to flush the system between all samples and standards.

5.5.1 The calibration blank consists of the same concentration(s) of the same acid(s) used to prepare the final dilution of the calibrating solutions of the analytes [often 1 percent HNO_3 (v/v) in reagent water] along with the selected concentrations of internal standards such that there is an appropriate internal standard element for each of the analytes. Use of HCl for antimony and silver is cited in Section 5.1

5.5.2 The preparation (or reagent) blank must be carried through the complete preparation procedure and contain the same volumes of reagents as the sample solutions.

5.5.3 The rinse blank consists of 1 to 2 percent HNO_3 (v/v) in reagent water. Prepare a sufficient quantity to flush the system between standards and samples.

NOTE: The ICS solutions in Table 2 are intended to evaluate corrections for known interferences on only the analytes in Table 1. If Method 6020 is used to determine an element not listed in Table 1, it is the responsibility of the analyst to modify the ICS solutions, or prepare an alternative ICS solution, to allow adequate verification of correction of interferences on the unlisted element (see section 8.4).

5.6 The interference check solution (ICS) is prepared to contain known concentrations of interfering elements that will demonstrate the magnitude of interferences and provide an adequate test of any corrections. Chloride in the ICS provides a means to evaluate software corrections for chloride-related interferences such as $^{35}Cl^{16}O^+$ on $^{51}V^+$ and $^{40}Ar^{35}Cl^+$ on $^{75}As^+$. Iron is used to demonstrate adequate resolution of the spectrometer for the determination of manganese. Molybdenum serves to indicate oxide effects on cadmium isotopes. The other components are present to evaluate the ability of the measurement system to correct for various molecular-ion isobaric interferences. The ICS is used to verify that the interference levels are corrected by the data system within quality control limits.

5.6.1 These solutions must be prepared from ultra-pure reagents. They can be obtained commercially or prepared by the following procedure.

5.6.1.1 Mixed ICS solution I may be prepared by adding 13.903 g $Al(NO_3)_3 \cdot 9H_2O$, 2.498 g $CaCO_3$ (dried at 180 C for 1 h before weighing), 1.000 g Fe, 1.658 g MgO, 2.305 g Na_2CO_3, and 1.767 g K_2CO_3 to 25 mL of reagent water. Slowly add 40 mL of (1+1) HNO_3. After dissolution is complete, warm the solution to degas. Cool and dilute to 1,000 mL with reagent water.

5.6.1.2 Mixed ICS solution II may be prepared by slowly adding 7.444 g 85 % H_3PO_4, 6.373 g 96% H_2SO_4, 40.024 g 37% HCl, and 10.664 g citric acid $C_6O_7H_8$ to 100 mL of reagent water. Dilute to 1,000 mL with reagent water.

5.6.1.3 Mixed ICS solution III may be prepared by adding 1.00 mL each of 100-µg/mL arsenic, cadmium, chromium, cobalt, copper, manganese, nickel, silver, and zinc stock solutions to about

50 mL reagent water. Add 2.0 mL concentrated HNO_3, and dilute to 100.0 mL with reagent water.

5.6.1.4 Working ICS Solutions

5.6.1.4.1 ICS-A may be prepared by adding 10.0 mL of mixed ICS solution I (5.7.1.1), 2.0 mL each of 100-µg/mL titanium stock solution (5.3.9) and molybdenum stock solution (5.3.10), and 5.0 mL of mixed ICS solution II (5.7.1.2). Dilute to 100 mL with reagent water. ICS solution A must be prepared fresh weekly.

5.6.1.4.2 ICS-AB may be prepared by adding 10.0 mL of mixed ICS solution I (5.7.1.1), 2.0 mL each of 100-µg/mL titanium stock solution (5.3.9) and molybdenum stock solution (5.3.10), 5.0 mL of mixed ICS solution II (5.7.1.2), and 2.0 mL of Mixed ICS solution III (5.7.1.3). Dilute to 100 mL with reagent water. Although the ICS solution AB must be prepared fresh weekly, the analyst should be aware that the solution may precipitate silver more quickly.

5.7 The quality control standard is the initial calibration verification solution (ICV), which must be prepared in the same acid matrix as the calibration standards. This solution must be an independent standard near the midpoint of the linear range at a concentration other than that used for instrument calibration. An independent standard is defined as a standard composed of the analytes from a source different from those used in the standards for instrument calibration.

5.8 Mass spectrometer tuning solution. A solution containing elements representing all of the mass regions of interest (for example, 10 µg/L of Li, Co, In, and Tl) must be prepared to verify that the resolution and mass calibration of the instrument are within the required specifications (see Section 7.5). This solution is also used to verify that the instrument has reached thermal stability (See Section 7.4).

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Sample collection procedures should address the considerations described in Chapter Nine of this Manual.

6.2 See the introductory material in Chapter Three, Inorganic Analytes, Sections 3.1.3 for information on sample handling and preservation. Only polyethylene or fluorocarbon (TFE or PFA) containers are recommended for use in Method 6020.

7.0 PROCEDURE

7.1 Solubilization and digestion procedures are presented in the Sample Preparation Methods (e.g., Methods 3005 - 3051).

7.2 Initiate appropriate operating configuration of the instruments computer according to the instrument manufacturer's instructions.

7.3 Set up the instrument with the proper operating parameters according to the instrument manufacturer's instructions.

7.4 Operating conditions: The analyst should follow the instructions provided by the instrument manufacturer. Allow at least 30 minutes for the instrument to equilibrate before analyzing any samples. This must be verified by analyzing a tuning solution (Section 5.8) at least four times with relative standard deviations of ≤ 5% for the analytes contained in the tuning solution.

> <u>NOTE</u>: Precautions must be taken to protect the channel electron multiplier from high ion currents. The channel electron multiplier suffers from fatigue after being exposed to high ion currents. This fatigue can last from several seconds to hours depending on the extent of exposure. During this time period, response factors are constantly changing, which invalidates the calibration curve, causes instability, and invalidates sample analyses.

7.5 Conduct mass calibration and resolution checks in the mass regions of interest. The mass calibration and resolution parameters are required criteria which must be met prior to any samples being analyzed. If the mass calibration differs more than 0.1 amu from the true value, then the mass calibration must be adjusted to the correct value. The resolution must also be verified to be less than 0.9 amu full width at 10 percent peak height.

7.6 Calibrate the instrument for the analytes of interest (recommended isotopes for the analytes in Table 1 are provided in Table 3), using the calibration blank and at least a single initial calibration standard according to the instrument manufacturer's procedure. Flush the system with the rinse blank (5.5.3) between each standard solution. Use the average of at leastthree integrations for both calibration and sample analyses.

7.7 All masses which could affect data quality should be monitored to determine potential effects from matrix components on the analyte peaks. The recommended isotopes to be monitored are liste in Table 3.

7.8 Immediately after the calibration has been established, the calibration must be verified and documented for every analyte by the analysis of the calibration verification solution (Section 5.7). When measurements exceed ± 10% of the accepted value, the analyses must be terminated, the problem corrected, the instrument recalibrated, and the new calibration verified. Any samples analyzed under an out-of-control calibration must be reanalyzed. During the course of an analytical run, the instrument may be "resloped" or recalibrated to correct for instrument drift. A recalibration must then be followed immediately by a new analysis of a CCV and CCB before any further samples may be analyzed.

7.9 Flush the system with the rinse blank solution (5.5.3) until the signal levels return to the method's levels of quantitation (usually about 30 seconds) before the analysis of each sample (see Section 7.7). Nebulize each sample until a steady-state signal is achieved (usually about 30 seconds) prior to collecting data. Analyze the calibration verification solution (Section 5.6) and the calibration blank (Section 5.5.1) at a frequency of at least once every 10 analytical samples. Flow-injection systems may be used as long as they can meet the performance criteria of this method.

7.10 Dilute and reanalyze samples that are more concentrated than the linear range for an analyte (or species needed for a correction) or measure an alternate less-abundant isotope. The linearity at the alternate mass must be confirmed by appropriate calibration (see Sec. 7.6 and 7.8).

7.11 Calculations: The quantitative values shall be reported in appropriate units, such as micrograms per liter (µg/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. If dilutions were performed, the appropriate corrections must be applied to the sample values.

7.11.1 If appropriate, or required, calculate results for solids on a dry-weight basis as follows:

(1) A separate determination of percent solids must be performed.

(2) The concentrations determined in the digest are to be reported on the basis of the dry weight of the sample.

$$\text{Concentration (dry weight)(mg/kg)} = \frac{C \times V}{W \times S}$$

Where,

C = Digest Concentration (mg/L)
V = Final volume in liters after sample preparation
W = Weight in kg of wet sample

$$S = \frac{\%\ \text{Solids}}{100}$$

Calculations should include appropriate interference corrections (see Section 3.2 for examples), internal-standard normalization, and the summation of signals at 206, 207, and 208 m/z for lead (to compensate for any differences in the abundances of these isotopes between samples and standards).

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and be available for easy reference or inspection.

8.2 Instrument Detection Limits (IDLs) in µg/L can be estimated by calculating the average of the standard deviations of the three runs on three non-consecutive days from the analysis of a reagent blank solution with seven consecutive measurements per day. Each measurement must be performed as though it were a separate analytical sample (i.e., each measurement must be followed by a rinse and/or any other procedure normally performed between the analysis of separate samples). IDLs must be determined at least every three months and kept with the instrument log book. Refer to Chapter One for additional guidance.

8.3 The intensities of all internal standards must be monitored for every analysis. When the intensity of any internal standard fails to fall between 30 and 120 percent of the intensity of that internal standard in the initial calibration standard, the following procedure is followed. The sample must be diluted fivefold (1+4) and reanalyzed with the addition of appropriate amounts of internal standards. This procedure must be repeated until the internal-standard intensities fall within the prescribed window. The intensity levels of the internal standards for the calibration blank (Section 5.5.1) and instrument check standard (Section 5.6) must agree within ± 20 percent of the intensity level of the internal standard of the original calibration solution. If they do not agree, terminate the analysis, correct the problem, recalibrate, verify the new calibration, and reanalyze the affected samples.

8.4 To obtain analyte data of known quality, it is necessary to measure more than the analytes of interest in order to apply corrections or to determine whether interference corrections are necessary. If the concentrations of interference sources (such as C, Cl, Mo, Zr, W) are such that, at the correction factor, the analyte is less than the limit of quantification and the concentration of interferents are insignificant, then the data may go uncorrected. Note that monitoring the interference sources does not necessarily require monitoring the interferant itself, but that a molecular species may be monitored to indicate the presence of the interferent. When correcttion equations are used, all QC criteria must also be met. Extensive QC for interference corrections are required at all times. The monitored masses must include those elements whose hydrogen, oxygen, hydroxyl, chlorine, nitrogen, carbon and sulfur molecular ions could impact the analytes of interest. Unsuspected interferences may be detected by adding pure major matrix components to a sample to observe any impact on the analyte signals. When an interference source is present, the sample elements impacted must be flagged to indicate (a) the percentage interference correction applied to the data or (b) an uncorrected interference by virtue of the elemental equation used for quantitation. The isotope proportions for an element or molecular-ion cluster provide information useful for quality assurance.

> NOTE: Only isobaric elemental, molecular, and doubly charged interference corrections which use the observed isotopic-response ratios or parent-to-oxide ratios (provided an oxide internal standard is used as described in Section 3.2) for each instrument system are acceptable corrections for use in Method 6020.

8.5 Dilution Test: If the analyte concentration is within the linear dynamic range of the instrument and sufficiently high (minimally, a factor of at least 100 times greater than the concentration in the reagent blank, refer to Section 5.5.2), an analysis of a fivefold (1+4) dilution must agree within ± 10% of the original determination. If not, an interference effect must be suspected. One dilution test must be included for each twenty samples (or less) of each matrix in a batch.

8.6 Post-Digestion Spike Addition: An analyte spike added to a portion of a prepared sample, or its dilution, should be recovered to within 75 to 125 percent of the known value or within the laboratory derived acceptance criteria. The spike addition should be based on the indigenous concentration of each element of interest in the sample. If the spike is not recovered within the specified limits, the sample must be diluted and reanalyzed to compensate for the matrix effect. Results must agree to within 10% of the original determination. The use of a standard-addition analysis procedure may also be used to compensate for this effect (Refer to Method 7000).

8.7 A Laboratory Control Sample (LCS) should be analyzed for each analyte using the same sample preparations, analytical methods and QA/QC procedures employed for the test samples. One LCS should be prepared and analyzed for each sample batch at a frequency of one LCS for each 20 samples or less.

8.8 Check the instrument calibration by analyzing appropriate quality control solutions as follows:

8.8.1 Check instrument calibration using a calibration blank (Section 5.5.1) and the initial calibration verification solution (Sections 5.7 and 7.9).

8.8.2 Verify calibration at a frequency of every 10 analytical samples with the instrument check standard (Section 5.6) and the calibration blank (Section 5.5.1). These solutions must also be analyzed for each analyte at the beginning of the analysis and after the last sample.

8.8.3 The results of the initial calibration verification solution and the instrument check standard must agree within ± 10% of the expected value. If not, terminate the analysis, correct the problem, and recalibrate the instrument. Any sample analyzed under an out-of-control calibration must be reanalyzed .

8.8.4 The results of the calibration blank must be less than 3 times the current IDL for each element. If this is not the case, the reason for the out-of-control condition must be found and corrected, and affected samples must be reanalyzed. If the laboratory consistently has concentrations greater than 3 times the IDL, the IDL may be indicative of an estimated IDL and should be re-evaluated.

8.9 Verify the magnitude of elemental and molecular-ion isobaric interferences and the adequacy of any corrections at the beginning of an analytical run or once every 12 hours, whichever is more frequent. Do this by analyzing the interference check solutions A and AB. The analyst should be aware that precipitation from solution AB may occur with some elements, specifically silver. Refer to Section 3.0 for a discussion on intereferences and potential solutions to those intereferences if additional guidance is needed.

8.10 Analyze one duplicate sample for every matrix in a batch at a frequency of one matrix duplicate for every 20 samples.

8.10.1 The relative percent difference (RPD) between duplicate determinations must be calculated as follows:

$$RPD = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \times 100$$

where:

RPD = relative percent difference.
D_1 = first sample value.
D_2 = second sample value (duplicate)

A control limit of 20% RPD should not be exceeded for analyte values greater than 100 times the instrumental detection limit. If this limit is exceeded, the reason for the out-of-control situation must be found and corrected, and any samples analyzed during the out-of-control condition must be reanalyzed.

9.0 METHOD PERFORMANCE

9.1 In an EPA multi-laboratory study, 10 laboratories applied the ICP-MS technique to both aqueous and solid samples. TABLE 4 summarizes the method performance data for aqueous samples. Performance data for solid samples is provided in TABLE 5.

10.0 REFERENCES

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TABLE 1. ELEMENTS APPROVED FOR ICP-MS DETERMINATION

Element	CAS* #
Aluminum	7429-90-5
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Lead	7439-92-1
Manganese	7439-96-5
Nickel	7440-02-0
Silver	7440-22-4
Thallium	7440-28-0
Zinc	7440-66-6

TABLE 2. RECOMMENDED INTERFERENCE CHECK SAMPLE COMPONENTS AND CONCENTRATIONS

Solution component	Solution A Concentration(mg/L)	Solution AB Concentration (mg/L)
Al	100.0	100.0
Ca	100.0	100.0
Fe	100.0	100.0
Mg	100.0	100.0
Na	100.0	100.0
P	100.0	100.0
K	100.0	100.0
S	100.0	100.0
C	200.0	200.0
Cl	1000.0	1000.0
Mo	2.0	2.0
Ti	2.0	2.0
As	0.0	0.0200
Cd	0.0	0.0200
Cr	0.0	0.0200
Co	0.0	0.0200
Cu	0.0	0.0200
Mn	0.0	0.0200
Ni	0.0	0.0200
Ag	0.0	0.0200
Zn	0.0	0.0200

TABLE 3. RECOMMENDED ISOTOPES FOR SELECTED ELEMENTS

Mass	Element of interest
27	Aluminum
121, **123**	Antimony
75	Arsenic
138, 137, 136, **135**, 134	Barium
9	Beryllium
209	Bismuth (IS)
114, 112, **111**, 110, 113, 116, 106	Cadmium
42, 43, **44**, 46, 48	Calcium (I)
35, 37, (77, 82)[a]	Chlorine (I)
52, **53**, **50**, 54	Chromium
59	Cobalt
63, **65**	Copper
165	Holmium (IS)
115, 113	Indium (IS)
56, **54**, **57**, 58	Iron (I)
139	Lanthanum (I)
208, **207**, **206**, 204	Lead
6[b], 7	Lithium (IS)
24, **25**, **26**	Magnesium (I)
55	Manganese
98, 96, 92, **97**, 94, (108)[a]	Molybdenum (I)
58, **60**, 62, **61**, 64	Nickel
39	Potassium (I)
103	Rhodium (IS)
45	Scandium (IS)
107, **109**	Silver
23	Sodium (I)
159	Terbium (IS)
205, 203	Thallium
120, **118**	Tin (I)
89	Yttrium (IS)
64, **66**, **68**, **67**, 70	Zinc

NOTE: Method 6020 is recommended for only those analytes listed in Table 1. Other elements are included in this table because they are potential interferents (labeled I) in the determination of recommended analytes, or because they are commonly used internal standards (labeled IS). Isotopes are listed in descending order of natural abundance. The most generally useful isotopes are underlined and in boldface, although certain matrices may require the use of alternative isotopes. [a] These masses are also useful for interference correction (Section 3.2). [b] Internal standard must be enriched in the ^{6}Li isotope. This minimizes interference from indigenous lithium.

TABLE 4. ICP-MS MULTI-LABORATORY PRECISION AND ACCURACY DATA FOR AQUEOUS SOLUTIONS

Element	Comparability[a] Range	%RSD Range	N[b]	S[c]
Aluminum	95 - 100	11 - 14	14 - 14	4
Antimony	d	5.0 - 7.6	16 - 16	3
Arsenic	97 - 114	7.1 - 48	12 - 14	4
Barium	91 - 99	4.3 - 9.0	16 - 16	5
Beryllium	103 - 107	8.6 - 14	13 - 14	3
Cadmium	98 - 102	4.6 - 7.2	18 - 20	3
Calcium	99 - 107	5.7 - 23	17 - 18	5
Chromium	95 - 105	13 - 27	16 - 18	4
Cobalt	101 - 104	8.2 - 8.5	18 - 18	3
Copper	85 - 101	6.1 - 27	17 - 18	5
Iron	91 - 900	11 - 150	10 - 12	5
Lead	71 - 137	11 - 23	17 - 18	6
Magnesium	98 - 102	10 - 15	16 - 16	5
Manganese	95 - 101	8.8 - 15	18 - 18	4
Nickel	98 - 101	6.1 - 6.7	18 - 18	2
Potassium	101 - 114	9.9 - 19	11 - 12	5
Selenium	102 - 107	15 - 25	12 - 12	3
Silver	104 - 105	5.2 - 7.7	13 - 16	2
Sodium	82 - 104	24 - 43	9 - 10	5
Thallium	88 - 97	9.7 - 12	18 - 18	3
Vanadium	107 - 142	23 - 68	8 - 13	3
Zinc	93 - 102	6.8 - 17	16 - 18	5

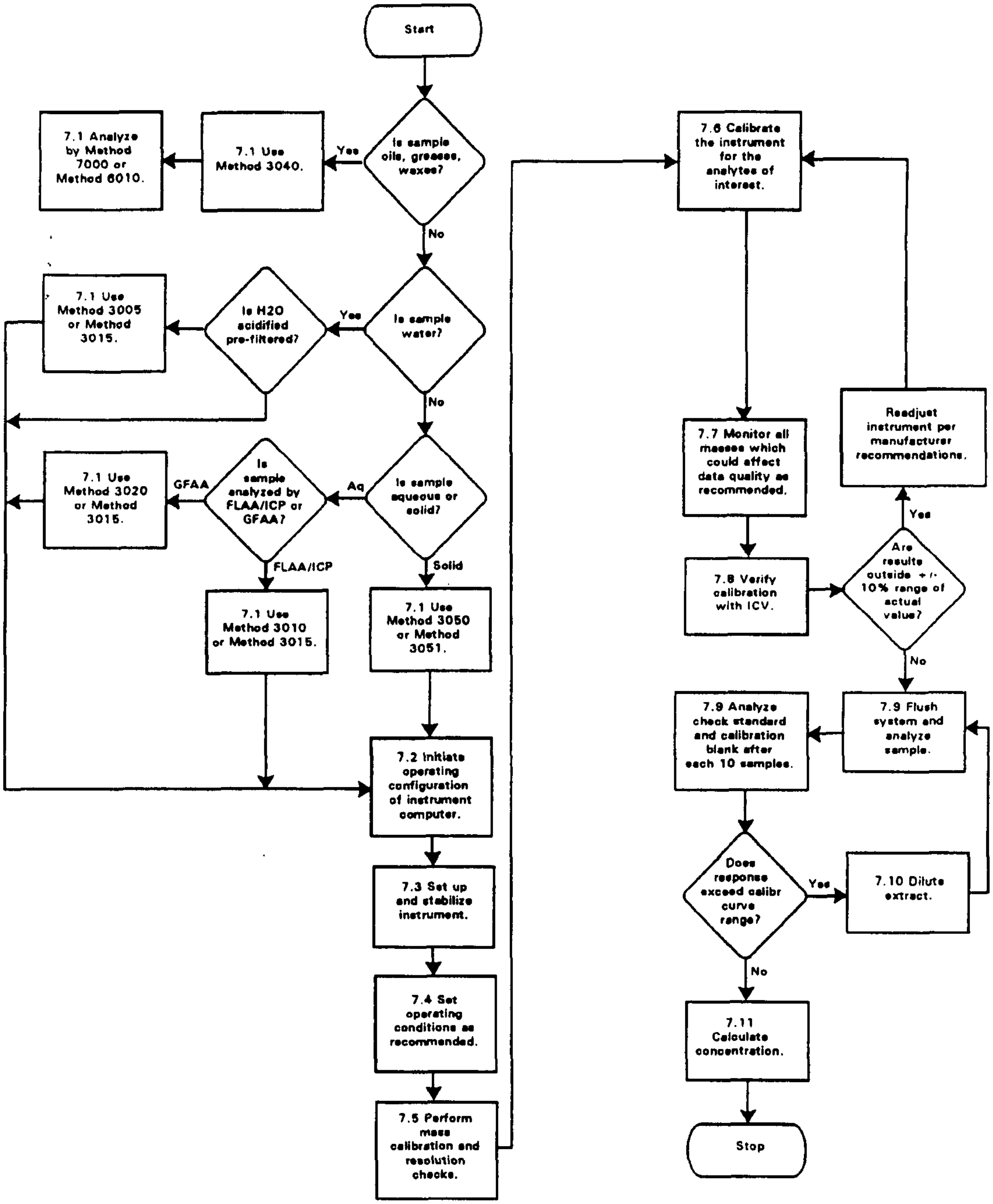
[a] Comparability refers to the percent agreement of mean ICP-MS values to those of the reference technique. [b] N is the range of the number of ICP-MS measurements where the analyte values exceed the limit of quantitation (3.3 times the average IDL value). [c] S is the number of samples with results greater than the limit of quantitation. [d] No comparability values are provided for antimony because of evidence that the reference data is affected by an interference.

TABLE 5. ICP-MS MULTI-LABORATORY PRECISION AND ACCURACY DATA FOR SOLID MATRICES

Element	Comparability[a] Range	%RSD Range	N[b]	S[c]
Aluminum	83 - 101	11 - 39	13 - 14	7
Antimony	d	12 - 21	15 - 16	2
Arsenic	79 - 102	12 - 23	16 - 16	7
Barium	100 - 102	4.3 - 17	15 - 16	7
Beryllium	50 - 87	19 - 34	12 - 14	5
Cadmium	93 - 100	6.2 - 25	19 - 20	5
Calcium	95 - 109	4.1 - 27	15 - 17	7
Chromium	77 - 98	11 - 32	17 - 18	7
Cobalt	43 - 102	15 - 30	17 - 18	6
Copper	90 - 109	9.0 - 25	18 - 18	7
Iron	87 - 99	6.7 - 21	12 - 12	7
Lead	90 - 104	5.9 - 28	15 - 18	7
Magnesium	89 - 111	7.6 - 37	15 - 16	7
Manganese	80 - 108	11 - 40	16 - 18	7
Nickel	87 - 117	9.2 - 29	16 - 18	7
Potassium	97 - 137	11 - 62	10 - 12	5
Selenium	81	39	12	1
Silver	43 - 112	12 - 33	15 - 15	3
Sodium	100 - 146	14 - 77	8 - 10	5
Thallium	91	33	18	1
Vanadium	83 - 147	20 - 70	6 - 14	7
Zinc	84 - 124	14 - 42	18 - 18	7

[a] Comparability refers to the percent agreement of mean ICP-MS values to those of the reference technique. [b] N is the range of the number of ICP-MS measurements where the analyte values exceed the limit of quantitation (3.3 times the average IDL value). [c] S is the number of samples with results greater than the limit of quantitation. [d] No comparability values are provided for antimony because of evidence that the reference data is affected by an interference.

METHOD 6020
INDUCTIVELY COUPLED PLASMA - MASS SPECTROMETRY



METHOD 7470A

MERCURY IN LIQUID WASTE (MANUAL COLD-VAPOR TECHNIQUE)

1.0 SCOPE AND APPLICATION

1.1 Method 7470 is a cold-vapor atomic absorption procedure approved for determining the concentration of mercury in mobility-procedure extracts, aqueous wastes, and ground waters. (Method 7470 can also be used for analyzing certain solid and sludge-type wastes; however, Method 7471 is usually the method of choice for these waste types.) All samples must be subjected to an appropriate dissolution step prior to analysis.

2.0 SUMMARY OF METHOD

2.1 Prior to analysis, the liquid samples must be prepared according to the procedure discussed in this method.

2.2 Method 7470, a cold-vapor atomic absorption technique, is based on the absorption of radiation at 253.7-nm by mercury vapor. The mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance (peak height) is measured as a function of mercury concentration.

2.3 The typical detection limit for this method is 0.0002 mg/L.

3.0 INTERFERENCES

3.1 Potassium permanganate is added to eliminate possible interference from sulfide. Concentrations as high as 20 mg/L of sulfide as sodium sulfide do not interfere with the recovery of added inorganic mercury from reagent water.

3.2 Copper has also been reported to interfere; however, copper concentrations as high as 10 mg/L had no effect on recovery of mercury from spiked samples.

3.3 Seawaters, brines, and industrial effluents high in chlorides require additional permanganate (as much as 25 mL) because, during the oxidation step, chlorides are converted to free chlorine, which also absorbs radiation of 253.7 nm. Care must therefore be taken to ensure that free chlorine is absent before the mercury is reduced and swept into the cell. This may be accomplished by using an excess of hydroxylamine sulfate reagent (25 mL). In addition, the dead air space in the BOD bottle must be purged before adding stannous sulfate. Both inorganic and organic mercury spikes have been quantitatively recovered from seawater by using this technique.

3.4 Certain volatile organic materials that absorb at this wavelength may also cause interference. A preliminary run without reagents should determine if this type of interference is present.

4.0 APPARATUS AND MATERIALS

4.1 Atomic absorption spectrophotometer or equivalent: Any atomic absorption unit with an open sample presentation area in which to mount the absorption cell is suitable. Instrument settings recommended by the particular manufacturer should be followed. Instruments designed specifically for the measurement of mercury using the cold-vapor technique are commercially available and may be substituted for the atomic absorption spectrophotometer.

4.2 Mercury hollow cathode lamp or electrodeless discharge lamp.

4.3 Recorder: Any multirange variable-speed recorder that is compatible with the UV detection system is suitable.

4.4 Absorption cell: Standard spectrophotometer cells 10 cm long with quartz end windows may be used. Suitable cells may be constructed from Plexiglas tubing, 1 in. O.D. x 4.5 in. The ends are ground perpendicular to the longitudinal axis, and quartz windows (1 in. diameter x 1/16 in. thickness) are cemented in place. The cell is strapped to a burner for support and aligned in the light beam by use of two 2-in. x 2-in. cards. One-in.-diameter holes are cut in the middle of each card. The cards are then placed over each end of the cell. The cell is then positioned and adjusted vertically and horizontally to give the maximum transmittance.

4.5 Air pump: Any peristaltic pump capable of delivering 1 liter air/min may be used. A Masterflex pump with electronic speed control has been found to be satisfactory.

4.6 Flowmeter: Capable of measuring an air flow of 1 liter/min.

4.7 Aeration tubing: A straight glass frit with a coarse porosity. Tygon tubing is used for passage of the mercury vapor from the sample bottle to the absorption cell and return.

4.8 Drying tube: 6-in. x 3/4-in.-diameter tube containing 20 g of magnesium perchlorate or a small reading lamp with 60-W bulb which may be used to prevent condensation of moisture inside the cell. The lamp should be positioned to shine on the absorption cell so that the air temperature in the cell is about 10°C above ambient.

4.9 The cold-vapor generator is assembled as shown in Figure 1 of reference 1 or according to the instrument manufacturers instructions. The apparatus shown in Figure 1 is a closed system. An open system, where the mercury vapor is passed through the absorption cell only once, may be used instead of the closed system. Because mercury vapor is toxic, precaution must be taken to avoid its inhalation. Therefore, a bypass has been included in the system either to vent the mercury vapor into an exhaust hood or to pass the vapor through some absorbing medium, such as:

1. Equal volumes of 0.1 M $KMnO_4$ and 10% H_2SO_4; or

2. 0.25% Iodine in a 3% KI solution.

A specially treated charcoal that will adsorb mercury vapor is also available from Barnebey and Cheney, East 8th Avenue and North Cassidy Street, Columbus, Ohio 43219, Cat. #580-13 or #580-22.

4.10 Hot plate or equivalent - Adjustable and capable of maintaining a temperature of 90-95°C.

4.11 Graduated cylinder or equivalent.

5.0 REAGENTS

5.1 Reagent Water: Reagent water will be interference free. All references to water in this method will refer to reagent water unless otherwise specified.

5.2 Sulfuric acid (H_2SO_4), concentrated: Reagent grade.

5.3 Sulfuric acid, 0.5 N: Dilute 14.0 mL of concentrated sulfuric acid to 1.0 liter.

5.4 Nitric acid (HNO_3), concentrated: Reagent grade of low mercury content. If a high reagent blank is obtained, it may be necessary to distill the nitric acid.

5.5 Stannous sulfate: Add 25 g stannous sulfate to 250 mL of 0.5 N H_2SO_4. This mixture is a suspension and should be stirred continuously during use. (Stannous chloride may be used in place of stannous sulfate.)

5.6 Sodium chloride-hydroxylamine sulfate solution: Dissolve 12 g of sodium chloride and 12 g of hydroxylamine sulfate in reagent water and dilute to 100 mL. (Hydroxylamine hydrochloride may be used in place of hydroxylamine sulfate.)

5.7 Potassium permanganate, mercury-free, 5% solution (w/v): Dissolve 5 g of potassium permanganate in 100 mL of reagent water.

5.8 Potassium persulfate, 5% solution (w/v): Dissolve 5 g of potassium persulfate in 100 mL of reagent water.

5.9 Stock mercury solution: Dissolve 0.1354 g of mercuric chloride in 75 mL of reagent water. Add 10 mL of concentrated HNO_3 and adjust the volume to 100.0 mL (1 mL = 1 mg Hg). Stock solutions may also be purchased.

5.10 Mercury working standard: Make successive dilutions of the stock mercury solution to obtain a working standard containing 0.1 ug per mL. This working standard and the dilutions of the stock mercury solution should be prepared fresh daily. Acidity of the working standard should be maintained at

0.15% nitric acid. This acid should be added to the flask, as needed, before addition of the aliquot.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples must have been collected using a sampling plan that addresses the considerations discussed in Chapter Nine of this manual.

6.2 All sample containers must be prewashed with detergents, acids, and reagent water. Plastic and glass containers are both suitable.

6.3 Aqueous samples must be acidified to a pH <2 with HNO_3. The suggested maximum holding times for mercury is 28 days.

6.4 Nonaqueous samples shall be refrigerated, when possible, and analyzed as soon as possible.

7.0 PROCEDURE

7.1 Sample preparation: Transfer 100 mL, or an aliquot diluted to 100 mL, containing <1.0 g of mercury, to a 300-mL BOD bottle or equivalent. Add 5 mL of H_2SO_4 and 2.5 mL of concentrated HNO_3, mixing after each addition. Add 15 mL of potassium permanganate solution to each sample bottle. Sewage samples may require additional permanganate. Ensure that equal amounts of permanganate are added to standards and blanks. Shake and add additional portions of potassium permanganate solution, if necessary, until the purple color persists for at least 15 min. Add 8 mL of potassium persulfate to each bottle and heat for 2 hr in a water bath maintained at 95°C. Cool and add 6 mL of sodium chloride-hydroxylamine sulfate to reduce the excess permanganate. After a delay of at least 30 sec, add 5 mL of stannous sulfate, immediately attach the bottle to the aeration apparatus, and continue as described in Paragraph 7.3.

7.2 Standard preparation: Transfer 0-, 0.5-, 1.0-, 2.0-, 5.0-, and 10.0-mL aliquots of the mercury working standard, containing 0-1.0 ug of mercury, to a series of 300-mL BOD bottles. Add enough reagent water to each bottle to make a total volume of 100 mL. Mix thoroughly and add 5 mL of concentrated H_2SO_4 and 2.5 mL of concentrated HNO_3 to each bottle. Add 15 mL of $KMnO_4$ solution to each bottle and allow to stand at least 15 min. Add 8 mL of potassium persulfate to each bottle and heat for 2 hr in a water bath maintained at 95°C. Cool and add 6 mL of sodium chloride-hydroxylamine sulfate solution to reduce the excess permanganate. When the solution has been decolorized, wait 30 sec, add 5 mL of the stannous sulfate solution, immediately attach the bottle to the aeration apparatus, and continue as described in Paragraph 7.3.

7.3 Analysis: At this point the sample is allowed to stand quietly without manual agitation. The circulating pump, which has previously been adjusted to a rate of 1 liter/min, is allowed to run continuously. The absorbance will increase and reach a maximum within 30 sec. As soon as the recorder pen levels off (approximately 1 min), open the bypass valve and continue the aeration until the absorbance returns to its minimum value. Close the bypass valve, remove the stopper and frit from the BOD bottle, and continue the aeration. Because of instrument variation refer to the manufacturers recommended operating conditions when using this method.

7.4 Construct a calibration curve by plotting the absorbances of standards versus micrograms of mercury. Determine the peak height of the unknown from the chart and read the mercury value from the standard curve. Duplicates, spiked samples, and check standards should be routinely analyzed.

7.5 Calculate metal concentrations (1) by the method of standard additions, or (2) from a calibration curve. All dilution or concentration factors must be taken into account. Concentrations reported for multiphased or wet samples must be appropriately qualified (e.g., 5 ug/g dry weight).

8.0 QUALITY CONTROL

8.1 Refer to section 8.0 of Method 7000.

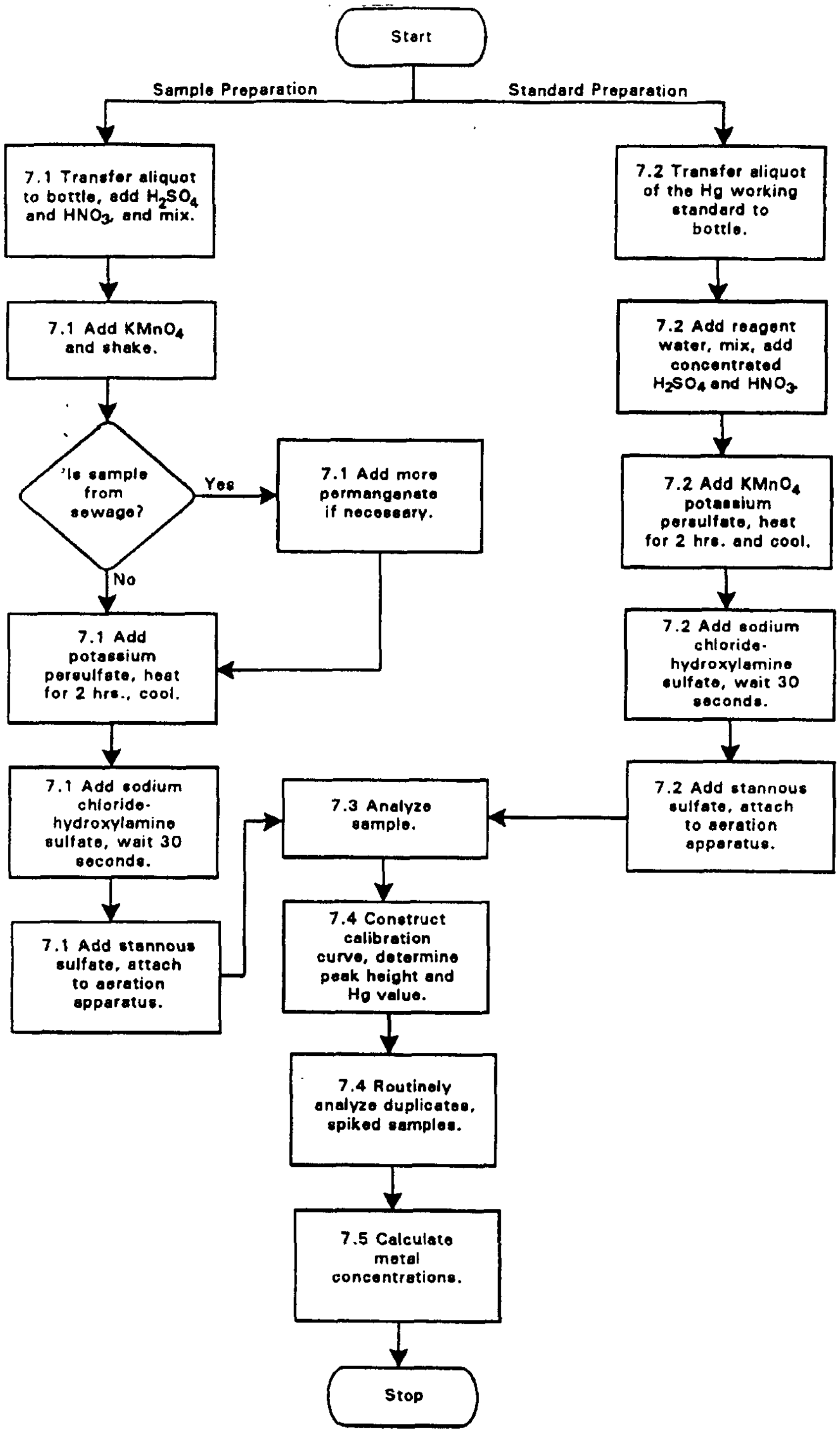
9.0 METHOD PERFORMANCE

9.1 Precision and accuracy data are available in Method 245.1 of Methods for Chemical Analysis of Water and Wastes.

10.0 REFERENCES

1. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055, December 1982, Method 245.1.

METHOD 7470A
MERCURY IN LIQUID WASTE (MANUAL COLD-VAPOR TECHNIQUE)



METHOD 7471A

MERCURY IN SOLID OR SEMISOLID WASTE (MANUAL COLD-VAPOR TECHNIQUE)

1.0 SCOPE AND APPLICATION

1.1 Method 7471 is approved for measuring total mercury (organic and inorganic) in soils, sediments, bottom deposits, and sludge-type materials. All samples must be subjected to an appropriate dissolution step prior to analysis. If this dissolution procedure is not sufficient to dissolve a specific matrix type or sample, then this method is not applicable for that matrix.

2.0 SUMMARY OF METHOD

2.1 Prior to analysis, the solid or semi-solid samples must be prepared according to the procedures discussed in this method.

2.2 Method 7471, a cold-vapor atomic absorption method, is based on the absorption of radiation at the 253.7-nm wavelength by mercury vapor. The mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance (peak height) is measured as a function of mercury concentration.

2.3 The typical instrument detection limit (IDL) for this method is 0.0002 mg/L.

3.0 INTERFERENCES

3.1 Potassium permanganate is added to eliminate possible interference from sulfide. Concentrations as high as 20 mg/Kg of sulfide, as sodium sulfide, do not interfere with the recovery of added inorganic mercury in reagent water.

3.2 Copper has also been reported to interfere; however, copper concentrations as high as 10 mg/Kg had no effect on recovery of mercury from spiked samples.

3.3 Samples high in chlorides require additional permanganate (as much as 25 mL) because, during the oxidation step, chlorides are converted to free chlorine, which also absorbs radiation of 253 nm. Care must therefore be taken to ensure that free chlorine is absent before the mercury is reduced and swept into the cell. This may be accomplished by using an excess of hydroxylamine sulfate reagent (25 mL). In addition, the dead air space in the BOD bottle must be purged before adding stannous sulfate.

3.4 Certain volatile organic materials that absorb at this wavelength may also cause interference. A preliminary run without reagents should determine if this type of interference is present.

4.0 APPARATUS AND MATERIALS

4.1 Atomic absorption spectrophotometer or equivalent: Any atomic absorption unit with an open sample presentation area in which to mount the absorption cell is suitable. Instrument settings recommended by the particular manufacturer should be followed. Instruments designed specifically for the measurement of mercury using the cold-vapor technique are commercially available and may be substituted for the atomic absorption spectrophotometer.

4.2 Mercury hollow cathode lamp or electrodeless discharge lamp.

4.3 Recorder: Any multirange variable-speed recorder that is compatible with the UV detection system is suitable.

4.4 Absorption cell: Standard spectrophotometer cells 10 cm long with quartz end windows may be used. Suitable cells may be constructed from Plexiglas tubing, 1 in. O.D. x 4.5 in. The ends are ground perpendicular to the longitudinal axis, and quartz windows (1 in. diameter x 1/16 in. thickness) are cemented in place. The cell is strapped to a burner for support and aligned in the light beam by use of two 2-in. x 2-in. cards. One-in.-diameter holes are cut in the middle of each card. The cards are then placed over each end of the cell. The cell is then positioned and adjusted vertically and horizontally to give the maximum transmittance.

4.5 Air pump: Any peristaltic pump capable of delivering 1 L/min air may be used. A Masterflex pump with electronic speed control has been found to be satisfactory.

4.6 Flowmeter: Capable of measuring an air flow of 1 L/min.

4.7 Aeration tubing: A straight glass frit with a coarse porosity. Tygon tubing is used for passage of the mercury vapor from the sample bottle to the absorption cell and return.

4.8 Drying tube: 6-in. x 3/4-in.-diameter tube containing 20 g of magnesium perchlorate or a small reading lamp with 60-W bulb which may be used to prevent condensation of moisture inside the cell. The lamp should be positioned to shine on the absorption cell so that the air temperature in the cell is about 10°C above ambient.

4.9 The cold-vapor generator is assembled as shown in Figure 1 of reference 1 or according to the instrument manufacturers instructions. The apparatus shown in Figure 1 is a closed system. An open system, where the mercury vapor is passed through the absorption cell only once, may be used instead of the closed system. Because mercury vapor is toxic, precaution must be taken to avoid its inhalation. Therefore, a bypass has been included in the system either to vent the mercury vapor into an exhaust hood or to pass the vapor through some absorbing medium, such as:

1. equal volumes of 0.1 M $KMnO_4$ and 10% H_2SO_4, or
2. 0.25% iodine in a 3% KI solution.

A specially treated charcoal that will adsorb mercury vapor is also available from Barneby and Cheney, East 8th Avenue and North Cassidy Street, Columbus, Ohio 43219, Cat. #580-13 or #580-22.

4.10 Hot plate or equivalent - Adjustable and capable of maintaining a temperature of 90-95°C.

4.11 Graduated cylinder or equivalent.

5.0 REAGENTS

5.1 Reagent Water: Reagent water will be interference free. All references to water in this method refer to reagent water unless otherwise specified.

5.2 Aqua regia: Prepare immediately before use by carefully adding three volumes of concentrated HCl to one volume of concentrated HNO_3.

5.3 Sulfuric acid, 0.5 N: Dilute 14.0 mL of concentrated sulfuric acid to 1 liter.

5.4 Stannous sulfate: Add 25 g stannous sulfate to 250 mL of 0.5 N sulfuric acid. This mixture is a suspension and should be stirred continuously during use. A 10% solution of stannous chloride can be substituted for stannous sulfate.

5.5 Sodium chloride-hydroxylamine sulfate solution: Dissolve 12 g of sodium chloride and 12 g of hydroxylamine sulfate in reagent water and dilute to 100 mL. Hydroxylamine hydrochloride may be used in place of hydroxylamine sulfate.

5.6 Potassium permanganate, mercury-free, 5% solution (w/v): Dissolve 5 g of potassium permanganate in 100 mL of reagent water.

5.7 Mercury stock solution: Dissolve 0.1354 g of mercuric chloride in 75 mL of reagent water. Add 10 mL of concentrated nitric acid and adjust the volume to 100.0 mL (1.0 mL = 1.0 mg Hg).

5.8 Mercury working standard: Make successive dilutions of the stock mercury solution to obtain a working standard containing 0.1 ug/mL. This working standard and the dilution of the stock mercury solutions should be prepared fresh daily. Acidity of the working standard should be maintained at 0.15% nitric acid. This acid should be added to the flask, as needed, before adding the aliquot.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples must have been collected using a sampling plan that addresses the considerations discussed in Chapter Nine of this manual.

6.2 All sample containers must be prewashed with detergents, acids, and reagent water. Plastic and glass containers are both suitable.

6.3 Non-aqueous samples shall be refrigerated, when possible, and analyzed as soon as possible."

7.0 PROCEDURE

7.1 Sample preparation: Weigh triplicate 0.2-g portions of untreated sample and place in the bottom of a BOD bottle. Add 5 mL of reagent water and 5 mL of aqua regia. Heat 2 min in a water bath at 95°C. Cool; then add 50 mL reagent water and 15 mL potassium permanganate solution to each sample bottle. Mix thoroughly and place in the water bath for 30 min at 95°C. Cool and add 6 mL of sodium chloride-hydroxylamine sulfate to reduce the excess permanganate.

> <u>CAUTION</u>: Do this addition under a hood, as Cl_2 could be evolved. Add 55 mL of reagent water. Treating each bottle individually, add 5 mL of stannous sulfate and immediately attach the bottle to the aeration apparatus. Continue as described under step 7.4.

7.2 An alternate digestion procedure employing an autoclave may also be used. In this method, 5 mL of concentrated H_2SO_4 and 2 mL of concentrated HNO^3 are added to the 0.2 g of sample. Add 5 mL of saturated $KMnO_4$ solution and cover the bottle with a piece of aluminum foil. The samples are autoclaved at 121°C and 15 lb for 15 min. Cool, dilute to a volume of 100 mL with reagent water, and add 6 mL of sodium chloride-hydroxylamine sulfate solution to reduce the excess permanganate. Purge the dead air space and continue as described under step 7.4. Refer to the caution statement in section 7.1 for the proper protocol in reducing the excess permanganate solution and adding stannous sulfate.

7.3 Standard preparation: Transfer 0.0-, 0.5-, 1.0-, 2.0-, 5.0-, and 10-mL aliquots of the mercury working standard, containing 0-1.0 ug of mercury, to a series of 300-mL BOD bottles or equivalent. Add enough reagent water to each bottle to make a total volume of 10 mL. Add 5 mL of aqua regia and heat 2 min in a water bath at 95°C. Allow the sample to cool; add 50 mL reagent water and 15 mL of $KMnO_4$ solution to each bottle and return to the water bath for 30 min. Cool and add 6 mL of sodium chloride-hydroxylamine sulfate solution to reduce the excess permanganate. Add 50 mL of reagent water. Treating each bottle individually, add 5 mL of stannous sulfate solution, immediately attach the bottle to the aeration apparatus, and continue as described in Step 7.4.

7.4 Analysis: At this point, the sample is allowed to stand quietly without manual agitation. The circulating pump, which has previously been adjusted to a rate of 1 L/min, is allowed to run continuously. The absorbance, as exhibited either on the spectrophotometer or the recorder, will increase and reach maximum within 30 sec. As soon as the recorder pen levels off (approximately 1 min), open the bypass valve and continue the aeration until the absorbance returns to its minimum value. Close the bypass valve, remove the fritted tubing from the BOD bottle, and continue the aeration.

7.5 Construct a calibration curve by plotting the absorbances of standards versus micrograms of mercury. Determine the peak height of the unknown from the chart and read the mercury value from the standard curve. Duplicates, spiked samples, and check standards should be routinely analyzed.

7.6 Calculate metal concentrations: (1) by the method of standard additions, (2) from a calibration curve, or (3) directly from the instrument's concentration read-out. All dilution or concentration factors must be taken into account. Concentrations reported for multiphased or wet samples must be appropriately qualified (e.g., 5 ug/g dry weight).

8.0 QUALITY CONTROL

8.1 Refer to section 8.0 of Method 7000.

9.0 METHOD PERFORMANCE

9.1 Precision and accuracy data are available in Method 245.5 of Methods for Chemical Analysis of Water and Wastes.

9.2 The data shown in Table 1 were obtained from records of state and contractor laboratories. The data are intended to show the precision of the combined sample preparation and analysis method.

10.0 REFERENCES

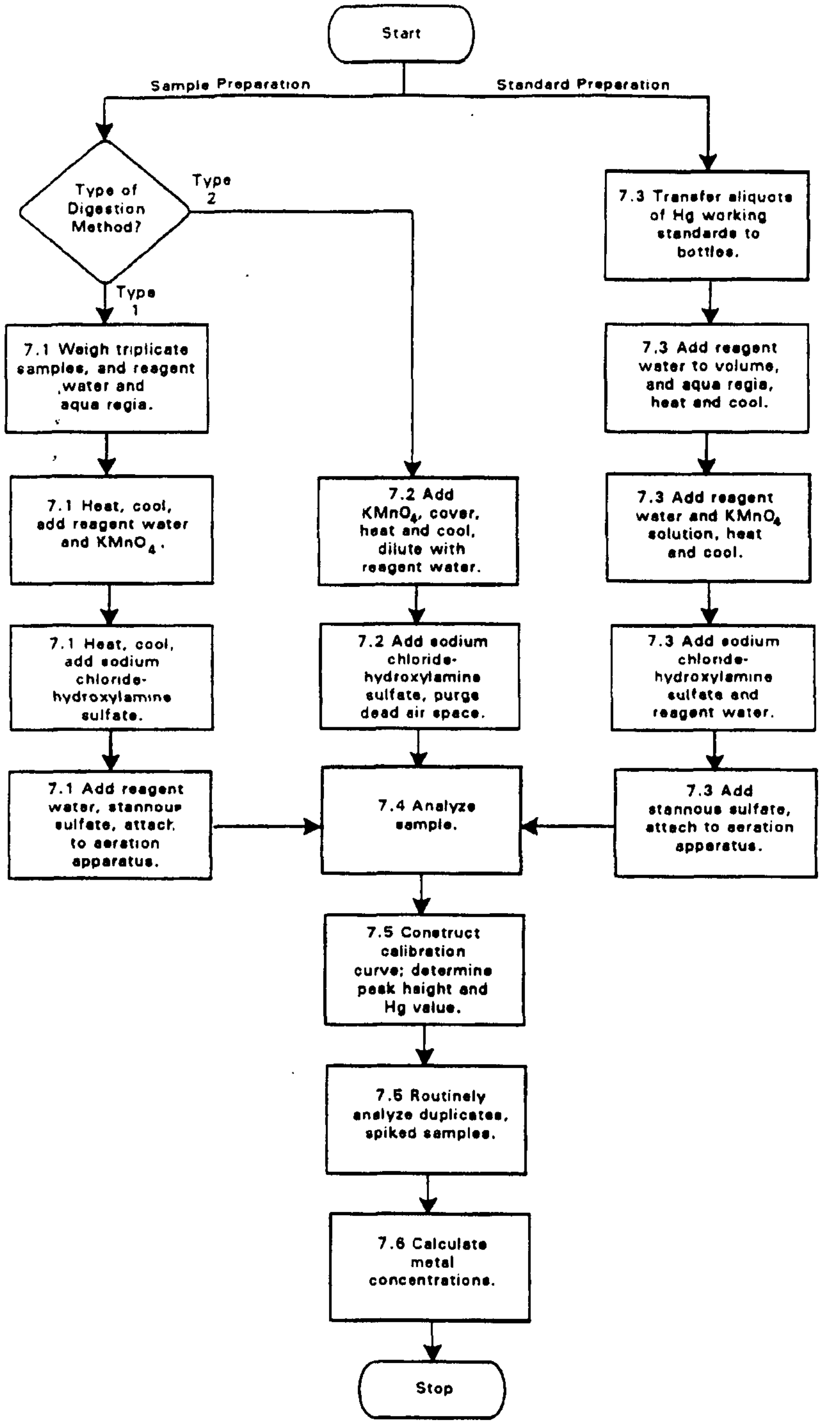
1. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055, December 1982, Method 245.5.

2. Gaskill, A., Compilation and Evaluation of RCRA Method Performance Data, Work Assignment No. 2, EPA Contract No. 68-01-7075, September 1986.

TABLE 1. METHOD PERFORMANCE DATA

Sample Matrix	Preparation Method	Laboratory Replicates
Emission control dust	Not known	12, 12 ug/g
Wastewater treatment sludge	Not known	0.4, 0.28 ug/g

METHOD 7471A
MERCURY IN SOLID OR SEMISOLID WASTE (MANUAL COLD-VAPOR TECHNIQUE)



APPENDIX G

SITE SAFETY HEALTH PLAN

ENERCON SERVICES, INC.
SITE SAFETY & HEALTH PLAN

For

CHAMPION TECHNOLOGIES, INC.
STAGE 2 ABATEMENT PLAN
HOBBS, NEW MEXICO

PROJECT NO. EN332

Prepared by: Paul Brodin Date: February 4, 2002

Reviewed/Approved by: ______________ Date: 2-5-02

Mr. Paul Brodin
Project Manager

EFFECTIVE DATES: February 5, 2002 through February 5, 2003

ENERCON SERVICES, INC.
SITE SAFETY & HEALTH PLAN

This site safety & health plan (SSHP) was prepared by Enercon Services, Inc. (Enercon) to address health and safety issues for Enercon work conducted at the Champion Technologies, Inc. (Champion) facility in Hobbs, New Mexico. The majority of this work is associated with soil remediation and groundwater investigation fieldwork. Environmental testing and investigation will be accomplished in accordance with applicable laws and regulations. Changes and amendments to this SSHP will be added in attached addenda. Field safety meetings should include review of changing conditions and addenda to the plan

1.0 SITE HISTORY

Champion Technologies, Inc. has occupied the 4001 South Highway 18 location for approximately 30 years. In that time, the site has been used for the manufacturing, production, and distribution of chemicals used in the petroleum industry.

1.2 SITE DESCRIPTION

The Champion facility's physical address is 4001 South Highway 18 in Hobbs, Lea County, New Mexico. The location of the property is NE/4 of SE/4, Section 15, Township 19 South, Range 38 East, West Hobbs Quadrangle (Figure 1.)

The Champion facility produces and manufactures chemicals for the petroleum industry. The property is rectangular in shape, approximately 500 feet by 640 feet, or an estimated 7.35 acres. The facility consists of an office building, manufacturing, and storage areas, as well as parking and undeveloped areas (Figure 2.). The site is enclosed by a fence with a locking gate along South Highway 18. The facility uses a septic system for sanitary waste disposal and water is supplied by an on-site domestic well. The site is generally flat with a slight gradient in the westerly direction. There are no bodies of surface water on the site.

The facility is bordered by the South Highway 18 on the east side, residential and undeveloped property to the south, undeveloped land on the west side, and an oil field service company to the north.

1.3 PROJECT OBJECTIVES

Enercon's general field objective is to provide the services listed below.

1. Excavation, transportation and disposal of impacted soils.
2. Backfilling the excavated area with clean fill material to approximately the current elevation and grade of the area.

3. Developing and executing a monitoring well installation and groundwater sampling program to evaluate the quality of the groundwater beneath the site.
4. Developing and executing a soil sampling program to assist in establishing background data for the site and vicinity.

2.0 KEY PERSONNEL AND RESPONSIBILITIES

Mr. Paul Brodin is project manager (PM) for the project. Mr. Brodin will also serve as Field Coordinator and site safety officer (SSO) for the abatement portion of the project. Mr. Douglas Hagemeier is the Health and Safety Officer (HSO). All project field staff have completed 40 hours of comprehensive health and safety training which meets the requirements of 29 CFR 1910.120. A SSO having completed the 1910.120 Supervisor Course and with the appropriate experience for the project will have the authority to monitor and correct health and safety problems as noticed on-site will be appointed to each project.

2.1 PM RESPONSIBILITIES

The PM is responsible for generating, organizing, and compiling the SSHP that describes all planned field activities and potential hazards that may be encountered at the site. The PM is also responsible for assuring that adequate training and site safety briefing(s) are provided to the project field team. The PM will provide a copy of this SSHP to each member of the project field team and each subcontractor prior to field activities.

2.2 HSO RESPONSIBILITIES

For specific projects, the HSO is responsible for reviewing and approving the SSHP for accuracy and incorporating new information or guidelines that aid the PM and SSO in further definition and control of the potential health and safety hazards associated with the project.

2.3 SSO RESPONSIBILITIES

The SSO has on-site responsibility for ensuring that all team members comply with the SSHP. It is the SSO's responsibility to inform the subcontractor(s) and other field personnel of chemical and physical hazards, as he/she becomes aware of them. Additional SSO responsibilities include:

1. Providing safety briefings and coordinating a site safety orientation meeting for team members.
2. Updating equipment or procedures to be used on-site based on new information gathered during the site investigation.
3. Inspecting all personal protective equipment (PPE) prior to on-site use.
4. Assisting the PM in documenting compliance with the safety plan by completing the standard Enercon and OSHA forms.
5. Assisting in and evaluating the effectiveness of decontamination procedures for personnel, protective equipment, sampling equipment and containers, and heavy equipment and vehicles.
6. Enforcing the "buddy system" as appropriate for site activities.

7. Posting location and route to the nearest medical facility and arranging for emergency transportation to the nearest medical facility.
8. Posting the telephone numbers of local public emergency services; i.e., emergency personnel, police, and fire.
9. Stopping operations that threaten the health and safety of the field team or surrounding populace.
10. Entering the exclusion area in emergencies after he/she has notified emergency services.
11. Observing field team members for signs of exposure, stress, or other conditions related to pre-existing physical conditions or site work activities.

2.4 PROJECT FIELD STAFF RESPONSIBILITIES

The project field staff is responsible for ensuring that all data acquisition is performed in accordance with the work plan and SSHP, and that any deviations from the plans are based upon field conditions encountered and are well documented in the field notes. The project field staff's health and safety responsibilities include:

1. Following the SSHP.
2. Reporting to the SSO any unsafe conditions or practices.
3. Reporting to the SSO all facts pertaining to incidents that result in injury or exposure to toxic materials.
4. Reporting to the SSO equipment malfunctions or deficiencies.

2.5 PROJECT CONTACTS

The following is a reference list of project contacts:

Client:	Champion Technologies, Inc. Mr. Ralph Corry (281) 431-2561
Enercon PM, Field Coordinator and SSO:	Paul Brodin (713) 941-0401
Enercon HSO:	Douglas Hagemeier (713) 941-0401

2.6 EMERGENCY TELEPHONE NUMBERS

The following emergency telephone numbers will be used to call for assistance:

Fire/Ambulance:	911
Hospital:	Lea County Regional Hospital 5419 Lovington Hwy. Hobbs, NM **(505) 392-6581** Exit facility on Hwy 18. Head north on Hwy 18 for approximately 1.5 miles to hospital

A comprehensive listing of all of the emergency numbers for this project is included in Appendix C.

2.7 SUBCONTRACTOR RESPONSIBILITIES

All subcontractors are responsible for their own health and safety program and the health and safety of their own employees. This requirement is based on OSHA regulations, which recognize the employer-to-employee responsibility for health and safety. A copy of their written program must be submitted for review to Enercon, if requested. In an effort to assist the subcontractors, and to comply with hazard communication requirements, Enercon will provide a copy of the SSHP for this project to each subcontractor for implementation by the subcontractor's employees.

3.0 HAZARD ANALYSIS

The potential hazards to personnel working on the site have been identified as chemical hazards and physical hazards such as uneven terrain, snakes, gila monsters, insects, cacti, severe thunder storms and heat stress. Each potential chemical and physical hazard relative to the potential for exposure is described below.

3.1 CHEMICAL HAZARDS

Health hazards associated with potential chemical exposures at the sites include flammability and toxicity. Toxicity may occur following inhalation of chemicals from dust or vapors that could potentially be released from soil, and direct contact with soil that could potentially contain hazardous materials. Tables 1 through 3 present summaries of the chemical exposure limits and characteristics associated with fuels and related compounds, metals and metal ions, and oxygenated and halocarbon solvents. Material safety data sheets have been provided for additional information (Appendix A).

In order to understand the potential chemical hazards associated with this project, it is necessary to review what chemicals were used and which, if any, chemicals may exist and pose a threat to workers. During the facility's operation a number of different chemicals may have been used, transported and stored at the site.

Based on site history, past operational use, recent environmental assessments of similar properties, site visits and project briefings, a preliminary list of potential chemical hazards for this project includes fuels and related compounds such as gasoline, benzene, toluene, ethylbenzene, xylenes, and total petroleum hydrocarbons. The primary chemicals of concern are metals and metal ions such as manganese, lead, chromium, and nickel. Additional chemicals of concerns are: Bis (2-ethylhexyl) phthalate, benzo(a)pyrene, benzo(b)fluorathane, benzo(k)fluorathane, chrysene, dibenzo(a,h)anthracene, fluorene, naphthalene, pyrene, and 1-methylnaphthalene.

3.2 FUELS AND RELATED COMPOUNDS

3.2.1 Benzene, Toluene, Ethylbenzene and Xylenes (BTEX)

Benzene is regulated by OSHA as an occupational carcinogen and has been associated with leukemia. Acute health effects include irritation to the eyes, nose and respiratory system, headache, giddiness, nausea, and anorexia. Benzene exposure can also lead to disturbances in gait, dermatitis, and bone marrow depression.

The other BTEX compounds (toluene, ethylbenzene, and xylenes) may cause irritation to the eyes, nose and respiratory system, and dermatitis. Acute exposure can lead to central nervous system (CNS) effects including headache, dizziness, confusion, and irritability. Exposure to toluene may also result in pupil dilatation, nervousness, insomnia and reproductive toxicity. Elevated concentrations of xylene isomers may lead to corneal damage and gastrointestinal symptoms including abdominal pain, nausea and vomiting.

3.2.2 Gasoline Vapors (50 - 100 Octane)

Gasoline vapors (50-100 Octane) are moderately to highly toxic via inhalation. Inhalation of gasoline vapors can CNS depression, pneumonitis, fatal pulmonary edema, and some addiction. The vapors are considered moderately toxic and may cause eye disturbances. The current Threshold Limit Value (TLV) for gasoline vapor in air is 300 ppm. OSHA has not established a Permissible Exposure Limit (PEL). Gasoline contains benzene.

Oils are not considered flammable, only combustible. Because of their low vapor pressure, they do not typically constitute an inhalation hazard unless working conditions include extremely hot temperatures or create excessive oil-contaminated airborne dust. These conditions are not anticipated.

3.2.3 Total Petroleum Hydrocarbons (TPH)

TPH refers to heavy hydrocarbons that may present a fire hazard in extreme circumstances, such as the presence of flame, excessive heat or strong oxidizers. An exposure limit for TPH has not been established due to the varied chemical composition. Presently, there are no known chronic health hazards associated with TPH.

Table 1. Chemical Exposure Limits and Characteristics for Fuels and Related Compounds

Chemical	IP[1]	OVA[2] Relative Response Percent	TLV-TWA[3] (ppm)	IDLH[4]Level (ppm)	Flammable Range Percent	Odor Threshold (ppm)	Note[5]
Benzene	9.24	150	1[6]	Ca	1.2 - 7.8	4.68	C, F
Toluene	8.82	110	50	500	1.1 - 7.1	0.17 - 40	T, F
Ethylbenzene	8.76	100	100	800	0.8 - 6.7	0.25 - 200	T, F
Xylenes	8.56	111	100	900	0.9 - 7 .0	0.05 - 200	T, F
Gasoline	?	?	300	Ca	1.4 - 7.6	low ppm	F, T

[1] Ionization potential in electron volts (eV).

[2] Century Organic Vapor Analyzer relative response to the compound in percent.

[3] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[4] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[5] C-Carcinogen, F-Flammable, T-Toxic.

[6] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the NIOSH Pocket Guide to Chemical Hazards, 1994 edition.

3.3 METALS AND METAL IONS

Metal and metal ions present no volatility or flammability hazards. They can present acute or chronic effects if the host material is inhaled in the form of dust or fumes. Metals such as chromium and cadmium and their ions can cause irritation of mucous membranes and lung tissues. To minimize inhalation of metals, host dusts should be minimized as much as possible. In addition, personal protective equipment (PPE) and safe work practices will be used to limit exposure.

3.3.1 Manganese

Manganese has toxic health effects that include irritation to eyes, nose, and throat, CNS disorder, mottling of lungs, and benign pneumoconiosis. The current PEL for manganese is 10 mg/m^3 as an 8-hour time-weighted average (TWA) airborne dust concentration. The regulatory action level is 0.2 mg/m^3 TWA dust concentration.

3.3.2 Nickel

Nickel has toxic health effects that include headaches, vertigo, nausea, vomiting, epigatric pain, cough, weakness, delirium, and convulsions. Nickel is a suspected carcinogen. The current PEL for nickel is 0.01 mg/m^3 as an 8-hour TWA airborne dust concentration.

3.3.3 Chromium

Chromium has toxic health effects that can range from allergic skin reactions to mild, and eventually severe, respiratory system irritation. Chromium may exist in one of three valence states in compounds (+2, +3, or +6). Toxic health effects are primarily associated with Cr+6 (hexavalent chromium) exposure. Chromium is a suspected carcinogen as Cr+6. Symptoms of acute exposure include coughing, wheezing, painful deep inspiration and fever. Pulmonary edema may persist after other symptoms subside. Other effects include dermatitis, ulceration of the skin, conjunctivitis and asthma. Chronic exposure may be associated with lung cancer. The current TLV for chromium as water-soluble Cr+6 is 0.05 mg/m^3 as an 8-hour TWA airborne dust concentration.

3.3.4 Lead

Lead in its elemental form is a heavy, ductile, soft gray metal. The PEL for lead is 0.05 mg/m^3 in air based on an 8-hour TWA. The regulatory action level is 0.005 mg/m^3 in air. Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, neuropathy, encephalopathy, gingival lead line, hypotension, anorexia and weight loss. Target organs are the CNS, kidneys, eyes, blood, reproductive tissue, gingival tissue and the gastrointestinal tract.

Table 2. Chemical Exposure Limits and Characteristics for Metals and Metal Ions

Chemical	OSHA PEL[1] (mg/m^3)	TLV TWA[2] (mg/m^3)	IDLH[3] Level (mg/m^3)	Physical Description	Note[4]
Manganese	1	0.2	None	metallic gray material	T
Nickel	1	1	None	Silver gay material	C
Chromium (VI)	0.1	0.05	15, Ca	appearance and odor vary depending upon the specific compound	C
Lead	0.05	0.05	100	heavy, ductile, soft, gray solid	T

[1] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the NIOSH Pocket Guide to Chemical Hazards, 1994 edition.

[2] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[3] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[4] C-Carcinogen, F-Flammable, T-Toxic.

3.4 SEMIVOLATILE ORGANIC COMPOUNDS

3.4.1 Bis (2-ethylhexyl) phthalate

Acute health effects include irritation to the eyes, nose, skin, and respiratory system.

3.4.2 Benzo (a) pyrene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) pyrene is recognized as a possible mutagen.

3.4.3 Benzo(b)fluoranthene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) fluoranthene is recognized as an animal carcinogen.

3.4.4 Benzo(k)fluoranthene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) fluoranthene is recognized as an animal carcinogen.

3.4.5 Chrysene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Chrysene is recognized as an animal carcinogen.

3.4.6 Fluorene

Acute health effects include irritation to the eyes, nose, skin and respiratory system.

3.4.7 Naphthalene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Other symptoms include nausea, headaches, diarrhea and cramps.

3.4.8 Pyrene

Acute health effects include hematopoietic changes, dermatitis, and damage to skin and blood systems.

3.4.9 1-Methylnaphthalene

Acute health effects include irritation to the eyes, nose, skin and respiratory system.

Table 3. Chemical Exposure Limits and Characteristics for Semivolatile Organic Compounds

Chemical	TLV TWA[3] (ppm)	PEL[4] Level (ppm)	Flammable Range Percent	Note[5]
2-ethylhexyl) phthalate	5	5	N/A	N/A
o (a) pyrene	N/A	N/A	N/A	T
o (b) fluoranthene	N/A	N/A	N/A	C
o (k) fluoranthene	N/A	N/A	N/A	C
sene	N/A	0.2	N/A	C
nzo (a,h) anthracene	N/A	N/A	N/A	T
rene	N/A	N/A	N/A	T
thalene	10	10	N/A	T
ne	N/A	N/A	N/A	T
thylnaphthalene	N/A	N/A	N/A	T

[1] Ionization potential in electron volts (eV).

[2] Century Organic Vapor Analyzer relative response to the compound in percent.

[3] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[4] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[5] C-Carcinogen, F-Flammable, T-Toxic.

[6] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the Federal Register, January 1997.

3.5 PHYSICAL HAZARDS

Accidents involving physical hazards can directly injure field personnel and can create additional hazards such as increased exposure to chemicals due to damaged PPE. Working at heights, in limited access areas, or around open excavations and heavy equipment present physical hazards. Field personnel should maintain awareness for potential safety hazards, and should immediately inform the SSO of any new hazards so that corrective measures can be taken.

3.5.1 Excavation/Trenching

Excavation and trenching work can present several significant physical hazards (e.g., trip/fall hazards, collapse of trench or excavation walls, pinching or crushing from heavy equipment and tools, tipping hazards, oxygen deficiency). For this reason, all such work must be performed in compliance with the regulations on excavations, trenches and earthwork, 29 CFR 1926, Subpart P - Trenching and Excavation. Permits are required for construction of trenches and excavations four feet or deeper into which a person is required to descend. The contractor performing the excavation must assure that the OSHA district office nearest the job site is notified prior to work commencement. An on-site "competent person" will be provided by Enercon and should be capable of identifying existing and predictable hazards in the surroundings or working conditions and have authorization to take prompt corrective measures to eliminate identified hazards. Be aware that the possibility of an oxygen-deficient or hazardous atmosphere could exist or occur in excavations, especially when excavating in previously existing industrial areas. A trench could be a confined space where gases heavier than air can collect. It is anticipated that the work conducted under this plan will require significant trenching and excavation, and therefore monitoring will be conducted.

The following general rules must be observed when working in trenches or excavation areas:

- no one should enter a trench or excavation without proper access, such as with ladders, ramps or stairs;
- there should be no more than 25 feet lateral distance in the trench/excavation between the worker and the nearest means of egress;
- a means of protection from collapse of trench/excavation walls must be provided for all workers either by sloping, benching, shoring, sheeting or by some other type of support system if excavation or trench is four feet or greater in depth;
- employees should not work in excavations where water has accumulated or is accumulating and adequate precautions (e.g., installation of special supports or shields or use of water removal equipment) must be taken to protect employees from the hazards of groundwater infiltration;
- employees should never enter a trench/excavation when parts or materials (e.g., pipes, valves) are being lifted/moved in the vicinity by heavy machinery; and

- daily inspections of the excavation area and protective systems should be performed by a competent person who can identify existing or potential unsanitary or hazardous conditions, and who has the authority to take prompt corrective measure to eliminate such conditions.

3.5.2 Limited Access Areas

Limited access areas can interfere with planned field operations and enhance the potential of physical hazards to personnel working in the field. Limited access areas include interior building spaces, sensitive manufacturing operations, access restrictions, and obstructions to digging or drilling such as subsurface and overhead interference's (utilities). These interferences must be clearly identified and marked prior to any digging or drilling operations.

3.5.3 Heavy Equipment

The SSO will be present on a regular basis during all drilling and excavation operations involving the use of heavy equipment to ensure that appropriate protection and safety procedures are utilized. Hard hats, steel-toed boots, ear and eye protection will be required at all times when working around heavy equipment. The proximity of chemical, water, sewer, and electrical lines will be identified before any digging or drilling is attempted. Additionally, hazards associated with working around heavy equipment can be effectively managed by the employee if a constant awareness of these hazards is maintained. These hazards include the risk of becoming physically entangled in the equipment or being run over, slipping and falling, impact injury to eyes, head and body, and injury from machinery operations. Constant visual or verbal contact with the equipment operator will facilitate such awareness.

3.5.4 Noise

Noise is a potential hazard in areas where heavy equipment including backhoes, power tools, pumps or generators are operated. Heavy equipment operation may produce noise levels that reach or exceed 85 decibels (dBA), the action level established by OSHA. Elevated noise levels will be evaluated by the SSO when equipment is operated. Exposure to elevated noise levels can lead to temporary or permanent hearing loss. The SSO will ensure hearing protection is utilized when noise levels are elevated, e.g. when the excavator is in operation.

3.5.5 Sunburn

Working outdoors or on roofs on sunny days for extended periods of time can cause sunburn to the skin. Excessive exposure to sunlight is associated with the development of skin cancer. Field staff should take precautions to prevent sunburn by using sunscreen lotion and/or wearing hats and long-sleeved garments.

3.5.6 Heat Stress

The potential for heat stress is a concern when field activities are performed on warm, sunny days, and is accentuated when chemical protective clothing is worn. Heat stress prevention measures and monitoring will be implemented if ambient temperatures are above 70 degrees Fahrenheit (F).

General Precautions. Precautions to prevent heat stress will include work/rest cycles so that rest periods are taken before excessive fatigue occurs, and regular intake of water to replace that lost from sweating. Work/rest cycles will be based on monitoring the heart rate (pulse) of each individual worker. Rest breaks will be long enough to reduce the heart rate (HR) below levels calculated according to the following method:

1. Workers will initially determine their resting HR prior to starting work activities.

2. At the start of the first rest period, workers will determine their initial HR. This initial HR should not exceed the individual's age-adjusted maximum HR, which equals [(0.7)(220 - age in years)]. At 1 minute into the rest period, the recovery HR will be determined. The recovery HR should not exceed 110 beats per minute.

3. If the initial HR exceeds the age-adjusted maximum HR, or the 1-minute recovery HR is greater than 110 beats per minute, then the next work period will be decreased by 10 minutes.

An initial work/rest cycle of 1-hour work and 15 minutes rest is recommended for protection of staff when the heat stress hazard is high. The recommended cycle will be adjusted up or down based upon worker monitoring, environmental conditions, and the judgment of the SSO. If at any time the field team members recognize the signs or symptoms of heat stress prior to a scheduled rest period, they will notify the SSO immediately in order that a rest period can be called.

Heat stress due to water loss can be prevented. To prevent dehydration, water intake must approximate sweat loss. Water intake guidelines are as follows:

1. The sense of thirst is not an adequate indicator of water replacement needs during heat exposure. Therefore, water must be replaced at prescribed intervals.

    a. Before work begins, drink two 8-ounce glasses of water.
    b. During each rest period, drink at least two 8-ounce glasses of water.

2. Plain water, served cool, is excellent. An adequate supply of drinking water (at least one gallon per person per day) and clean cups will be readily available (i.e., at the support vehicle) to provide water during rest periods.

3. Adding salt to water is <u>not</u> recommended. However, other fluids, in addition to water, could include fruit juices and diluted electrolyte replacement drinks (diluted 3:1 with water). **Do not use salt tablets!**

Heat stress, if not prevented, results in heat stress illnesses. Two critical illnesses, if not recognized and treated immediately, can become life threatening. These are heat exhaustion and heat stroke. Heat exhaustion will result if the prevention measures described above are not implemented. Ignoring the signs and symptoms of heat exhaustion will lead to the development of heat stro7ke. Heat stroke is an immediate, life-threatening condition that results because the body's heat regulating mechanisms shut down, and the body cannot cool itself sufficiently. As heat is excessively stored in the body, brain damage can result causing permanent disability or death.

Heat Exhaustion. The signs and symptoms of heat exhaustion are: headache; dizziness; nausea; weakness; fainting; profuse sweating; loss of appetite; approximately normal body temperature; dilated pupils; weak and rapid pulse; shallow and rapid breathing; possible cramps in abdomen and extremities; possible vomiting; difficulty walking; and **skin that is cool and sweaty to the touch with pale to ashen-gray coloring.**

First aid for heat exhaustion is as follows:

1. Immediately move the victim to the support area. If you are the victim, go to the support area.
2. Decontaminate, if practical, before entering support area.
3. Start cooling, but be careful not to cause a chill (i.e., rest in shade and apply wet towel to forehead, open up and/or remove clothing as much as practical, and remove chemical-resistant clothing).
4. Drink cool water slowly, but only if conscious and not in shock.
5. If vomiting and/or the signs and symptoms are not lessening within an hour, call for emergency help and/or transport the victim to the emergency room.
6. It is likely that a heat exhaustion victim will be unable to work for the remainder of the day.

Heat Stroke (aka sunstroke). The signs and symptoms of heat stroke are: **hot, dry skin to the touch with reddish coloring**; body temperature >105 degrees F; no sweating; mental confusion; deep, rapid breathing that sounds like snoring progressing to shallow, weak breathing; headache; dizziness; nausea; vomiting; weakness; dry mouth; convulsions; muscular twitching; sudden collapse; possible unconsciousness.

First aid for heat stroke is as follows:

1. Immediately move the victim to the support area. Prior to entering the support area, remove and dispose the victim's chemical-resistant clothing.
2. Cool the victim rapidly using whatever means are available such as shade, opening up and/or removing clothing, soaking clothing/skin with water and fanning, placing victim in vehicle using air conditioning on maximum.
3. Do not give drinking water to victim.
4. Treat for shock, if needed.
5. Transport the victim **to the emergency room** or call for emergency help; **no exceptions** for heat stroke victim.

3.5.7 Lightning - Severe Storm Conditions

In the event of an electrical storm in which lightning is in and around the facility, all personnel should make the appropriate provisions to minimize and/or eliminate the potential for shock from a nearby or direct lightning strike. The following procedures should be followed if a lightning hazard exists:

- Turn off all electrical powered equipment and tools;
- Move to a safe location until the storm passes;
- Do not seek refuge under trees;
- Do not stand in an open area;
- Do not hold any type of metal tools in hands; and
- Do not go near electrical transformer, switch gear, or distribution boxes.

3.5.8 Slips, Trips and Falls

Site activities pose a variety of slip, trip and fall hazards due to uneven and potentially slippery surfaces on which personnel will walk. Personnel should be cognizant at all times of their position and work activities in relation to other site activities. During activities that require personnel to walk on slippery or uneven surfaces, personnel need to be careful and should always wear a shoe with a non-slip bottom and good tread.

3.5.9 Ergonomic Hazards

Ergonomic injuries to muscles, joints, backs, tendons, etc. occur during lifting, moving heavy objects, maintaining static body positions or performing repetitive motions. Ergonomic injuries can be prevented by evaluating job activities before the start of work, and ensuring that adequate tools and equipment are available for the job. Particular attention should be paid to jobs requiring bending, squatting or kneeling positions, transporting heavy loads, exerting heavy forces or maintaining static positions. For further job analysis, contact the HSO.

3.5.10 Fires

There is a concern for possible entrapment by large brush fires that could sweep the entire area. Consideration needs to be given to the following issues:

- The potential for excessive wild fire over the area;
- The amount of advance warning one could anticipate of a fire advancing;
- A place of refuge, safe from the advancing fire; and
- An alternative evacuation/escape route, if needed.

3.5.11 Animal/Insect/Reptile Bites

Since the potential exists for possible serious insect/reptile bites from rattlesnakes, scorpions, and gila monsters, care and preparation should be taken to handle the potential for injury to our employees and subcontractors. Certain protective equipment should be on hand, such as individual snakebite kits, for each person on-site.

Snakes

The most common types of poisonous snakes in New Mexico are rattlesnakes (pit vipers) and coral snakes. Any snake that inflicts a bite should be precisely identified, if possible. Many people are injured by unnecessary treatment for bites of non-poisonous snakes. More significantly, a bite by a Mojave rattlesnake may produce very little reaction in the hours immediately after it occurs, when treatment is most effective. Only if the species of snake is known can optimal therapy be started without delay. Preferably, the snake should be killed and brought to a medical center with the person who was bitten so that the exact species can be determined.

Snakebites are best avoided, not treated.

Pit Vipers

Pit vipers are so named because they have a small pit located between the eye and the nostril, a feature found only in these poisonous species. The pit is an infrared sensing organ instrumental in detecting the small, warm-blooded animals these snakes eat. They have a characteristic triangular head and heavy body. Rattlesnakes in New Mexico belong to the pit viper species. If fangs are present the snake is undoubtedly poisonous, however, searching for fangs is hazardous. If they have rattles they are obviously rattlesnakes and poisonous. However, the lack of rattles is not a good identifier since they can get broken off or even shed with the skin.

The reaction following the bite of a pit viper is one of the best indications that the snake was poisonous, and is the only indication that envenomation has occurred and treatment may be needed. This reaction begins within minutes after the bite, but is usually less marked after other pit viper bites. The reaction severity also varies depending on the species of snake. The earliest symptom is pain or burning at the site of the bite, although some people experience relatively little pain. Shortly afterward the area begins to swell as fluid pours into the tissues. Bleeding usually produces a purple or green discoloration, but this change may take several hours to appear.

Following moderate envenomation, the swelling and discoloration extend further from the location of the bite, large blisters that contain clear or bloody fluid appear, and the regional lymph nodes, particularly in the armpit or the inguinal crease, become enlarged and tender. Severe envenomation is heralded by the development of a systemic reaction. The subject becomes weak and dizzy and develops signs of shock, particularly cold, clammy skin and a weak pulse.

When a subject can be hospitalized within two hours time, the only treatment needed is limiting the spread of the venom and immobilizing the extremity. No other measures, particularly incision and suction, should be attempted. Tourniquets are not recommended to help reduce the spread of the venom because they are rarely applied correctly and commonly do more harm than good. The immobilized extremity should be kept at the same level as the heart, and the person should be transported to a hospital with as little effort on his/her part as possible. No other treatment should be attempted. Wrapping of the wound should not be applied unless envenomation is known to be moderate or severe.

Coral Snakes

Coral snakes are small, thin, brightly colored snakes with small heads. They can be identified by the adjacent red and yellow bands. The non-poisonous king snakes and other harmless species with similar coloration have adjacent red and black bands. A helpful reminder is: "Red and Yellow--kill a fellow. Red and black--venom lack".

Coral snakes tend to bite and hang on, sometimes chewing for as long as a minute. The bites are rarely associated with the local reaction, severe pain and swelling, typical of pit viper bites. Some pain may be present and may radiate up the limb. Often the first sign of envenomation is painful enlargement of the regional lymph nodes. Severe envenomation may include numbness and weakness of the limb within one to two hours or less. Anti-venom is the only effective therapy for coral snake bites. The limb should be wrapped to immobilize the venom and should be splinted. The individual should be rapidly transported to a hospital with as little effort on his/her part as possible. Incision and suction or other forms of non-hospital treatment are of no value.

Spiders and Other Insects

Almost all spiders produce toxic venoms, but their fangs are too small and weak to penetrate the skin, the venom is too weak, or the volume of venom is too small to pose a significant threat to humans. The black widow is the only spider found in the U.S. that is capable of routinely producing serious illness by its bite. The "tarantula" native to the southwest U.S. bites only after extreme provocation. Its weak and ineffective fangs can only penetrate thin skin, such as that on the sides of the fingers. The effects of the bite are no worse than an insect sting.

The female black widow typically is coal black and has a prominent, spherical abdomen that may be as large as one-half inch in diameter. A red or orange marking resembling an hourglass shape is present on the underside of the abdomen. The black widow weaves a coarse, crudely constructed web in dark corners, both indoors and out. They exist in secluded areas beneath objects, under toilet seats, in dark corners of buildings, on window sills, etc.

The black widow bite may feel like a pin prick, may produce a mild burning, or may not be noticed at all. Small puncture wounds, slight redness, or no visible marks may be found at the site of the bite. Within about 15 minutes painful muscle cramps develop at the point of the bite and rapidly spread to involve the entire body. Weakness and tremors may also be present.

Treatment for black widows consists of efforts to relieve the painful muscle spasms and anti-venom for small children. No treatment at all should be directed to the site of the bite, with the possible exception of applying an ice cube to relieve pain. Incision and suction is damaging and useless, and should not be performed. Essentially, nothing can be done outside a hospital. This applies to other types of spider bites too.

Scorpion Stings

Scorpions are found throughout the U.S. but the species lethal to humans are limited to Arizona, New Mexico, Texas, southern California, and northern Mexico. The problems with scorpions are related to their tendency to live in the vicinity of human habitation where children are frequently playing. Stings can be avoided by exercising care when picking up stones, logs, or similar objects. Shoes and clothing should be shaken vigorously before dressing in the morning. Scorpions are nocturnal creatures.

The lethal scorpion species are typically yellow to greenish-yellow in color and can be distinguished from other species by a small, knob like projection at the base of their stingers. Adults measure about 3 inches in length and 3/8 inch in width. One sub-species has two irregular dark stripes down its back. Lethal scorpion bites are usually painful, but fatalities are generally limited to small children.

Symptoms of a scorpion sting include a prickling sensation initially. Pain follows in 5 to 60 minutes and may be severe. The sting is sensitive to the touch. Tapping the site produces a painful tingling or burning sensation that travels up the extremity toward the body. Sensitivity may persist for up to 10 days.

Only a medical facility has the equipment and supplies necessary to monitor and deal with any complications that may arise. An ice cube may be applied to the site to help reduce pain, but no other therapy is possible outside a hospital.

3.5.12 Animal Droppings

Due to buildings that have been vacated and have become a haven for animals or birds, there may be a significant amount of droppings in some areas. In areas where there is evidence of particularly bird droppings, those persons entering should be equipped with and required to use dust type respirator or a PPE device. Unless the individual is not crawling or doing excessive hands-on touching in the area, there should not be a need for other protective clothing. If, however, there is excessive time, touching, sampling, or movement in the immediate area of the droppings, then gloves and coveralls should be used.

3.5.13 Hanta Virus

Enercon personnel and subcontractors working at the site where there is evidence of a rodent population, particularly the deer mouse, must be made aware of an increased level of concern regarding the transmission of "Hanta Virus" associated diseases. The Hanta Virus is believed to be associated with rodents, especially the deer mouse that serves as the primary reservoir host, and can result in fatalities. The Hanta Virus is responsible for an increasing number of deaths in the southwestern U.S.

The Hanta Virus can be spread by the saliva, urine, and feces of infected rodents. Human infection may occur when infected wastes are inhaled as aerosols produced directly from the animals, or as dried materials introduced into broken skin or onto mucous membranes. Known infections of humans occur mostly in adults and are associated with activities that provide contact with infected rodents in rural/semi-rural areas. Activities to be avoided are sweeping, dusting and other cleaning activities unless precautions are taken. Areas should be sprayed with a 5% solution of bleach and water, allowed to sit for a minimum of 15 minutes and then the debris may be swept up and thrown away. High hazard areas will be decontaminated by approved vendors prior to the entry of Enercon personnel.

Illness caused by the Hanta Virus begins with one or more flu-like symptoms (i.e., fever, muscle aches, headache and/or cough), and progresses rapidly to severe lung disease and may cause death. Early diagnosis and treatment are vital.

Field Precautions to Avoid Hanta Virus: Personnel entering areas where rodents and the presence of the Hanta Virus is known or suspected need to take proactive measures and notify the PM or SSO. If simple precautionary measures are needed, field personnel will wear respirators with P-100 filters, eye protection, chemical resistant coveralls, chemical resistant gloves and disposable boot covers if there is any potential for direct contact with rodents or their wastes. Strict decontamination requirements must be followed. When working in rural/semi-rural areas, the following risk reduction strategies should be implemented:

1. Eliminate rodents and reduce availability of food sources and nesting sites used by rodents.
2. Store trash/garbage in rodent-proof metal or thick plastic containers with tight lids.
3. Cut tall grass/underbrush in close proximity to buildings.
4. Prevent rodents from entering buildings.

3.5.14 Bloodborne Pathogens

While it is policy to provide first aid and CPR training to field workers, no employee is designated as a first aid provider. If necessary, emergency services will be summoned. Employees have the option to render aid until help arrives. First aid kits should include latex gloves, alcohol wipes, and CPR isolation devices. These devices should be used when rendering aid.

Should an employee provide first aid or CPR to an individual during the course of his/her duties, the incident must be reported immediately after occurrence. All such personnel will be offered the Hepatitis B vaccination and medical follow-up without cost. Recent medical developments may allow for intervention following contamination with the HIV virus that reduces the possibility of infection if received within hours of the incident.

4.0 TRAINING REQUIREMENTS

All Enercon staff working on the site must have completed training in hazard recognition and basic health and safety issues as required by the occupational safety and health regulations contained in 29 CFR 1910.120 (e). This training is accomplished through an initial 40-hour classroom program, which includes hazard communication training, and 24-hour on-the-job training. The 8-hour refresher training is conducted annually. In addition, Enercon field personnel will be familiar with the requirements of this SSHP, and will participate in site activity and safety briefings provided by the project SSO, particularly on site-specific conditions and potential contaminants. The SSO will complete the required 8 hours of additional supervisory training for this assignment prior to project commencement.

Personnel performing oversight of asbestos abatement activities will also be required to have competent person training (EPA approved contractor/supervisor) and must remain on site during all removal activities.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Based on the hazard analysis for this project, the following PPE will be required and used on the site. Changes to these specified items of PPE will not be made without the approval of the SSO.

Level D PPE is the minimum protection required for this job. Level D consists of a hard hat, steel-toed work boots, gloves, long pants and shirts with sleeves. Safety glasses must be worn when chemical and/or eye hazards are present and must be American National Standards Institute (ANSI) approved. Ear protection will be worn if, at any time, verbal communication is difficult to comprehend within a radius of three feet. All respirator fit tests will be current within one year. Fit tests for asbestos will be accomplished on a semi-annual basis.

During any sampling activities involving soils with excessive fugitive dust emissions, the sampling area will be misted with a spray bottle to preclude fugitive dust emissions and unnecessary exposures to site soils. Gloves will be utilized during all sampling activities. All re-usable work clothes and footwear will be bagged at the end of each work shift to avoid potential for secondary exposures or cross-contamination. The clothes will then be either decontaminated (by approved laundering) or sampled to verify that no contamination exists.

If field conditions indicate potential exposure to dust not suppressed by the above-referenced methods, PPE will be upgraded to Level C PPE. Level C consists of Level D and the following additional items of PPE:

- Air Purifying Respirator (APR) half-masks with P100 particulate filters will be used. Additional filters that may be used in applicable situations will include acid/organic vapor cartridges. When using these devices, care shall be taken to follow device instructions carefully. In all cases, the equipment must be of the type approved by the National Institute of Occupational Safety and Health (NIOSH).
- Disposable Tyvek coveralls taped at the wrist and ankles, boot covers, and disposable latex examination gloves.

Field Precautions to Avoid Hanta Virus: Personnel entering areas where rodents and the presence of the Hanta Virus are known or suspected need to take personal protective measures. Field personnel must contact the PM and HSD to determine the level of hazard involved and if a specialist should be contracted to clean the area prior to starting work. PPE may include respirators with P100 particulate filters, eye protection, coveralls, latex gloves, and disposable boot covers.

6.0 ENVIRONMENTAL MONITORING PLAN

The potential hazards identified in the Hazard Analysis portion of this SSHP determined the need for initial and/or ongoing monitoring for assessment of exposure to the hazards as follows.

A no dust policy will be implemented for all activities being accomplished at the site, to include sampling demolition and excavation to ensure that potential exposure to contaminants identified in site soils is being controlled. If activities indicate elevated levels of dust, a real time dust monitor will be utilized to keep track of employee dust exposure.

If at any time during the sampling it is suspected that a hazardous condition exists, if sampling data, odors, symptoms or visual observations (i.e., staining) indicate the potential for exposure, or if visible dust is evident and weather conditions do not allow for the suppression of dust during sampling, work will be stopped and monitoring efforts and PPE choices will be re-evaluated. Action levels and changes to the health and safety protocol for the site will be documented in addenda to this plan.

Heat stress and noise will be monitored as described in the Hazard Analysis portion of this SSHP.

7.0 MEDICAL SURVEILLANCE REQUIREMENTS

Medical surveillance is conducted as a routine program for Enercon field staff that meets the requirements of HAZWOPER regulations described in 29 CFR 1910.120 (f) and Respiratory Protection regulations in accordance with 29 CFR 1910.134. Any additional tests or examinations and Tetanus shots required for staff involved in this project will be performed on an as needed basis.

All subcontractor personnel directly involved with the field work must also meet the medical surveillance requirements of 29 CFR 1910.120.

8.0 SITE CONTROL MEASURES

This section describes the general practices and site-specific control measures for this project. The potential chemical and physical hazards have been identified in this SSHP, however, should unexpected conditions arise the SSO will stop all work at the site and notify the PM and HSO. Work will not resume until the SSHP and working conditions have been re-evaluated and the SSHP revised accordingly.

Communication between field team members will consist of verbal communications, hand signals, and portable radios.

It is not anticipated that the PEL for any of the potential contaminants in this plan will be exceeded on-site. However, if this does occur, a regulated area must be established and posted with warning signs with regulation specific language. A no dust policy will be enforced during all site activities. If activities indicate the generation of dust, wetting procedures and real time dust monitoring will be initiated.

The nearest medical assistance is:

Lea County Regional Hospital
5419 Lovington Hwy.
Hobbs, NM
(505) 392-6581
Exit facility on Hwy 18. Head north on Hwy 18 for approximately 1.5 miles to hospital

8.1 SAFE WORK PRACTICES FOR SITE ACTIVITIES

Safe work practices are part of assuring a safe and healthy working environment. These practices are standardized for all field activities, and it is the responsibility of Enercon employees to follow safe work practices when on the site. Safe work practices to be employed during the entire duration of field work are as follows:

1. Set up, assemble and check all equipment for integrity and proper function prior to starting work activities.
2. Do not use faulty or suspect equipment.
3. Do not smoke, eat, drink or apply cosmetics while in the site work areas. Take breaks away from hazardous areas.
4. Wash hands, face and arms prior to taking rest breaks, lunch breaks, or leaving the site at the end of the work day.
5. Check in and out with the SSO upon arrival and departure from the site.
6. Notify the SSO immediately if there is an accident that causes an injury or illness.
7. Use the buddy system when working in remote areas of the site.

8. Do not approach or enter an area where oxygen deficiency or toxic or explosive concentrations of airborne contaminants may exist without the proper PPE and appropriate support personnel.
9. Use respirators correctly and as required by the site conditions. Check the fit of the respirator with a negative or positive pressure test. Do not wear respirators with facial hair or other conditions that prevent a face-to-facepiece seal. Do not wear contact lenses when the use of a respirator is required. Cartridge and filter units shall be checked and maintained in accordance with manufacturer instructions, and the face piece shall be washed regularly.

Do not remove protective panels from energized electrical equipment such as transformers, junction boxes, power disconnect switches or lighting fixtures without first securing the power source and then locking out and tagging out the source power. The same principles apply to inspection and access of energized mechanical or hydraulic equipment such as pumps and compressors. Contact Champion personnel to coordinate Lockout/Tagout of energized equipment.

9.0 DECONTAMINATION

A temporary decontamination area will be set up for each activity in each work zone on the site, and decontamination of equipment and personnel will be conducted prior to leaving the site. A decontamination solution of Alconox and water will be used to clean equipment if there are chemically contaminated items. An MSDS for Alconox is available on request. As described under Personal Protective Equipment, an alternative method of decontamination at the site includes bagging and approved laundering of work clothes and boots. Frequent laundering of clothing is advised. Tyvek suits, gloves, and boot covers will be properly disposed of. Handwashing before breaks, lunch, and leaving the site is mandatory.

Street clothes and food items must be stored in a clean area or in clean containers. Workers must wash their hands and face prior to eating. Eating will be permitted only in designated areas. While not indicated by preliminary data, showering immediately after the work shift is advised (weekly at minimum).

The temporary decontamination area should provide sufficient space to wash and rinse boots, gloves, and all sampling equipment prior to placing equipment into the support zone or a vehicle, as well as provide a place to discard used disposable items such as gloves and coveralls.

Depending on the decontamination option chosen, the decontamination station will include: glove/boot wash station, PPE disposal containers, potable water, and rest area.

10.0 EMERGENCY PROCEDURES

In the event of an emergency on-site the SSO will direct the course of action. It may be necessary for the SSO to depend on the other on-site personnel for assistance. The SSO will call for emergency assistance if needed. As soon as practical, the SSO will contact the PM and the HSO. All staff assigned to this project will be briefed on the emergency procedures and their responsibilities for implementation.

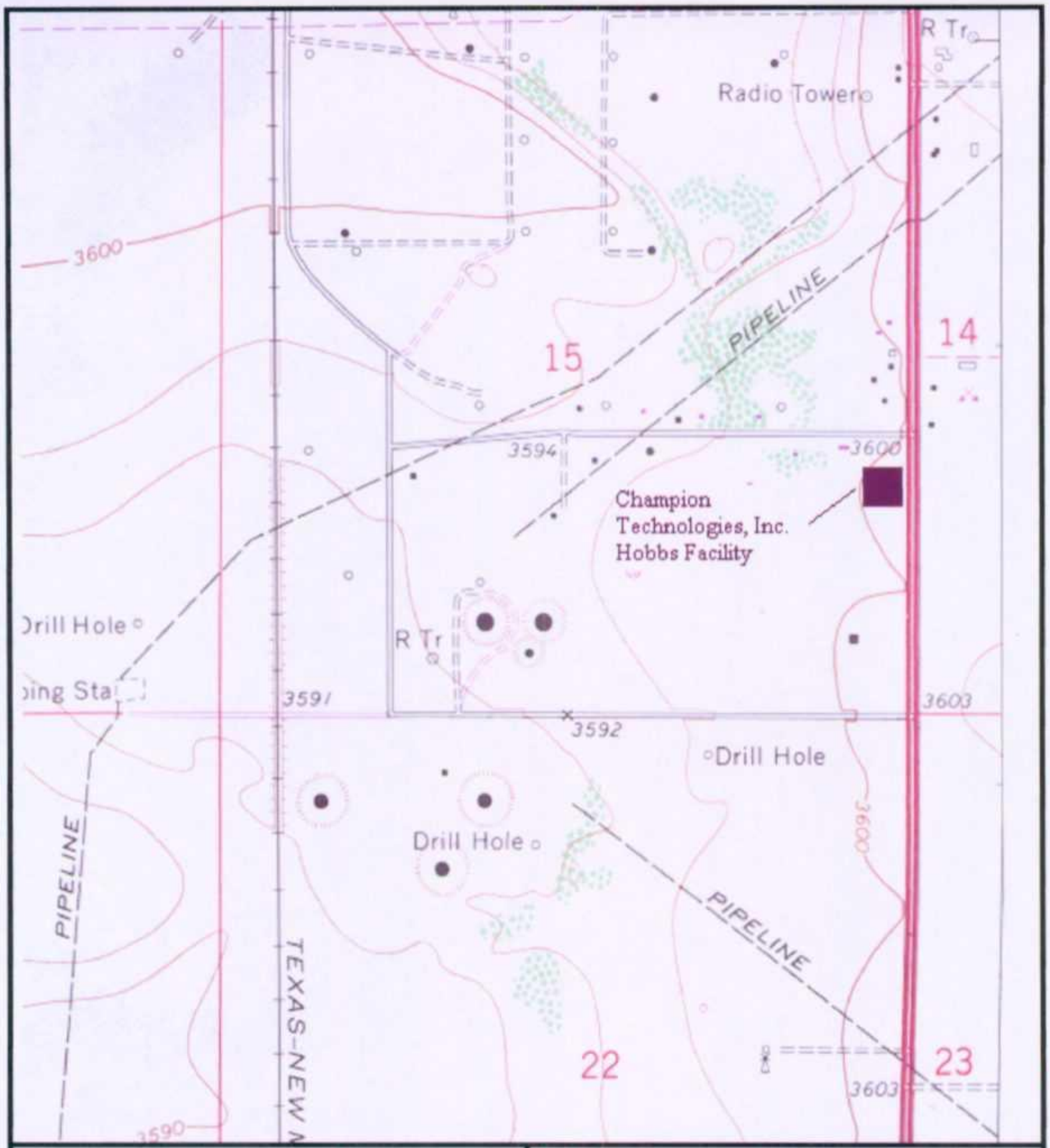
A first aid kit and fire extinguisher will be located in each support vehicle and project trailer. The nearest telephones are located in the support vehicle and the field office. The emergency telephone numbers to be used to call for assistance are listed in the section on Key Personnel and Responsibilities with the reference list of project contacts (Appendix C).

11.0 DOCUMENTATION

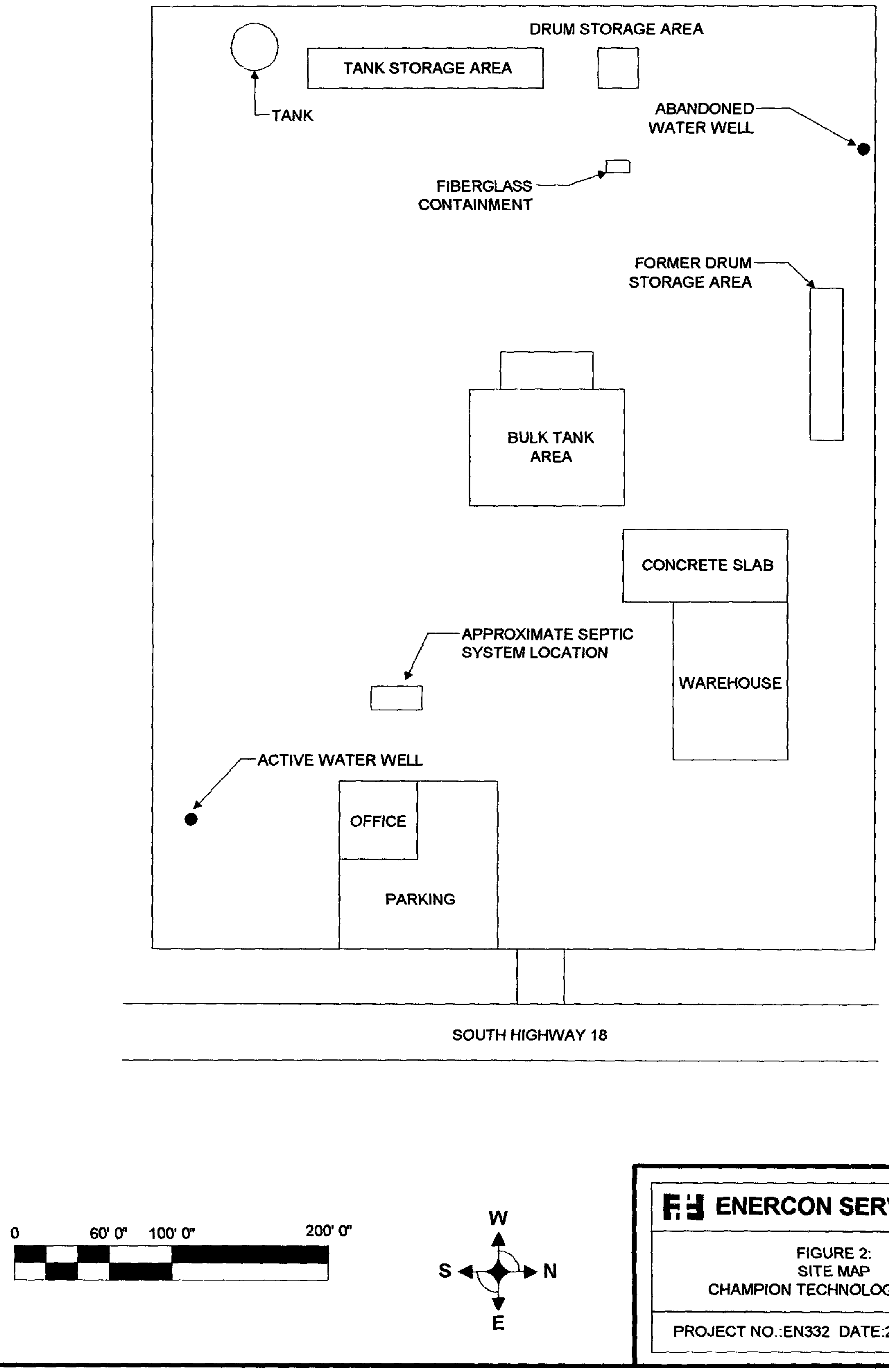
The implementation of the SSHP must be documented to assure employee participation and protection. In addition, the regulatory requirements must be met for record keeping on training, medical surveillance, injuries and illnesses, exposure monitoring, health risk information and respirator fit-tests. Documentation of each employee's activities is maintained by the HSD in Houston, Texas.

Documentation of the implementation of this plan will be accomplished using Attachments A through E. Copies of these forms are included as Appendix B. Attachment A must be completed by each Enercon employee at the initiation of field work for the project. The SSO is responsible for ensuring that each Enercon employee has completed this form, and for submitting copies to the HSO. The SSO is also responsible for completing the other attachments as required for a specific project. Copies should be maintained in the project file.

FIGURES



ENERCON SERVICES, INC. HOUSTON, TEXAS	**Figure 1: Topographic Map Hobbs West, NM Quad (No scale)**
Site Location: Champion Technologies, Inc. 4001 South Hwy. 18 Hobbs, New Mexico	**Prepared for: Champion Technologies, Inc. 3130 FM 521 Fresno. Texas**



ENERCON SERVICES, INC.

FIGURE 2:
SITE MAP
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.:EN332 DATE:2/4/02 BY: APB

APPENDIX A

MATERIAL SAFETY DATA SHEETS

Genium Publishing Corporation
One Genium Plaza
Schenectady, NY 12304-4690 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 318
Xylene *(Mixed Isomers)*

Issued: 11/80 Revision: E, 9/92 Errata: 12

Section 1. Material Identification

R 1
I 2
S 2
K 3

Xylene (Mixed Isomers) (C_8H_{10}) **Description:** The commercial product is a blend of the three isomers [*ortho*-(*o*-), *meta*-(*m*-), *para*-(*p*-)] with the largest proportion being *m*- xylene. Xylene is obtained from coal tar, toluene by transalkylation, and pseudocumene. Used in the manufacture of dyes, resins, paints, varnishes, and other organics; as a general solvent for adhesives, a cleaning agent in microscope technique; as a solvent for Canada balsam microscopy; as a fuel component; in aviation gasoline, protective coatings, sterilizing catgut, hydrogen peroxide, perfumes, insect repellants, pharmaceuticals, and the leather industry; in the production of phthalic anhydride, isophthalic, and terephthalic acids and their dimethyl esters which are used in the manufacture of polyester fibers; and as an indirect food additive as a component of adhesives. Around the home, xylene is found as vehicles in paints, paint removers, degreasing cleaners, lacquers, glues and cements and as solvent/vehicles for pesticides.

Other Designations: CAS No. 1330-20-7 [95-47-6; 108-38-3; 106-42-3 (*o*-, *m*-, *p*-isomers)], dimethylbenzene, methyltoluene, NCI-C55232, Violet 3, xylol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

Cautions: Xylene is an eye, skin, and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

Section 2. Ingredients and Occupational Exposure Limits

Xylene (mixed isomers): the commercial product generally contains ~ 40% *m*-xylene; 20% each of *o*-xylene, *p*-xylene, and ethylbenzene; and quantities of toluene. Unpurified xylene may contain pseudocumene.

1991 OSHA PELs
8-hr TWA: 100 ppm (435 mg/m^3)
15-min STEL: 150 ppm (655 mg/m^3)

1990 IDLH Level
1000 ppm

1990 NIOSH RELs
TWA: 100 ppm (435 mg/m^3)
STEL: 150 ppm (655 mg/m^3)

1992-93 ACGIH TLVs
TWA: 100 ppm (434 mg/m^3)
STEL: 150 ppm (651 mg/m^3)
BEI (Biological Exposure Index): Methylhippuric acids in urine at end of shift: 1.5 g/g creatinine

1990 DFG (Germany) MAK
TWA: 100 ppm (440 mg/m^3)
Category II: Substances with systemic effects
Half-life: < 2 hr
Peak Exposure: 200 ppm, 30 min, average value, 4 peaks per shift

1985-86 Toxicity Data*
Human, inhalation, TC_{Lo}: 200 ppm produced olfaction effects, conjunctiva irritation, and oth changes involving the lungs, thorax, or respira
Man, inhalation, LC_{Lo}: 10000 ppm/6 hr; toxic effects not yet reviewed.
Human, oral, LD_{Lo}: 50 mg/kg; no toxic effect no
Rat, oral, LD_{50}: 4300 mg/kg; toxic effect not yet reviewed.
Rat, inhalation, LC_{50}: 5000 ppm/4 hr; toxic effec not yet reviewed.

* See NIOSH, *RTECS* (XE2100000), for additional toxicity data.

Section 3. Physical Data

Boiling Point Range: 279 to 284 °F (137 to 140 °C)*
Boiling Point: *ortho:* 291 °F (144 °C); *meta:* 281.8 °F (138.8 °C); *para:* 281.3 °F (138.5 °C)
Freezing Point/Melting Point: *ortho:* -13 °F (-25 °C); *meta:* -53.3 °F (- 47.4 °C); *para:* 55 to 57 °F (13 to 14 °C)
Vapor Pressure: 6.72 mm Hg at 70 °F (21 °C)
Saturated Vapor Density (Air = 1.2 kg/m^3): 1.23 kg/m^3, 0.077 lbs/ft^3
Appearance and Odor: Clear, sweet-smelling liquid.

* Materials with wider and narrower boiling ranges are commercially available.

Molecular Weight: 106.16
Specific Gravity: 0.864 at 20 °C/4 °C
Water Solubility: Practically insoluble
Other Solubilities: Miscible with absolute alcohol, ether, a many other organic liquids.
Octanol/Water Partition Coefficient: logKow = 3.12-3.2
Odor Threshold: 1 ppm
Viscosity: <32.6 SUS

Section 4. Fire and Explosion Data

Flash Point: 63 to 77 °F (17 to 25 °C) CC	**Autoignition Temperature:** 982 °F (527 °C) (*m*-)	**LEL:** 1.1 (*m*-, *p*-); 0.9 (*o*-)	**UEL:** 7.0 (*m*-, *p*-);

Extinguishing Media: For small fires, use dry chemical, carbon dioxide (CO_2), water spray or regular foam. For large fires, use water spray, f regular foam. Water may be ineffective. Use water spray to cool fire-exposed containers. **Unusual Fire or Explosion Hazards:** Xylene vapors liquid (which floats on water) may travel to an ignition source and flash back. The heat of fire may cause containers to explode and/or produce irritating or poisonous decomposition products. Xylene may present a vapor explosion hazard indoors, outdoors, or in sewers. Accumulated sta electricity may occur from vapor or liquid flow sufficient to cause ignition. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or posit pressure mode. Structural firefighter's protective clothing will provide limited protection. If feasible and without risk, move containers from fire Otherwise, cool fire-exposed containers until well after fire is extinguished. Stay clear of tank ends. Use unmanned hose holder or monitor noz massive cargo fires. If impossible, withdraw from area and let fire burn. Withdraw immediately in case of any tank discoloration or rising sound venting safety device. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Xylene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Xylene is easily chlorinated, sulfonated, or nitrated. **Chemical Incompatibilities:** Incompatibilities include strong acids and oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Xylene attacks some forms of plastics, rubber, a coatings. **Conditions to Avoid:** Avoid heat and ignition sources and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidat decomposition of xylene can produce carbon dioxide, carbon monoxide, and various hydrocarbon products.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list xylene as a carcinogen. **Summary of Risks:** Xylene is an eye, mucous membrane, and respiratory tract irritant. Irritation starts at 200 ppm; severe breathing difficulties which may be delayed in onset can occur at concentrations. It is a central nervous system (CNS) depressant and at high concentrations can cause coma. Kidney and liver damage can occur w xylene exposure. With prolonged or repeated cutaneous exposure, xylene produces a defatting dermatitis. Chronic toxicity is not well defined. t is less toxic than benzene. Prior to the 1950s, benzene was often found as a contaminant of xylene and the effects attributed to xylene such as b dyscrasias are questionable. Since the late 1950s xylenes have been virtually benzene-free and blood dyscrasias have not been associated with [illegible]

Section 6. Health Hazard Data, *continued*

Menstrual irregularity was reported in association with workplace exposure to xylene perhaps due to effects on liver metabolism. Xylene crosses the human placenta, but does not appear to be teratogenic under conditions tested to date. **Medical Conditions Aggravated by Long-Term Exposure:** CNS, respiratory, eye, skin, gastrointestinal (GI), liver and kidney disorders. **Target Organs:** CNS, eyes, GI tract, liver, kidneys, and skin. **Primary Entry Routes:** Inhalation, skin absorption (slight), eye contact, ingestion. **Acute Effects:** Inhalation of high xylene concentrations may cause dizziness; nausea, vomiting, and abdominal pain; eye, nose, and throat irritation; respiratory tract irritation leading to pulmonary edema (fluid in lung), drowsiness; and unconsciousness. Direct eye contact can result in conjunctivitis and corneal burns. Ingestion may cause a burning sensation in the oropharynx and stomach and transient CNS depression. **Chronic Effects:** Repeated or prolonged skin contact may cause drying and defatting of the skin leading to dermatitis. Repeated eye exposure to high vapor concentrations may cause reversible eye damage, peripheral and central neuropathy, and liver damage. Other symptoms of chronic exposure include headache, fatigue, irritability, chronic bronchitis, and GI disturbances such as nausea, loss of appetite, and gas.

FIRST AID *Emergency personnel should protect against exposure.* **Eyes:** *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. Carefully dispose of contaminated clothing as it may pose a fire hazard. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. Monitor exposed person for respiratory distress. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, *do not induce vomiting!* If spontaneous vomiting should occur, keep exposed person's head below the hips to prevent aspiration (breathing liquid xylene into the lungs). *Aspiration of a few millimeters of xylene can cause chemical pneumonitis, pulmonary edema, and hemorrhage.* **Note to Physicians:** Hippuric acid or the ether glucuronide of *ortho*-toluic acid may be useful in diagnosis of *meta*-, *para*- and *ortho*-xylene exposure, respectively. Consider gastric lavage if a large quantity of xylene was ingested. Proceed gastric lavage with protection of the airway from aspiration; consider endotracheal intubation with inflated cuff.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove all heat and ignition sources, and ventilate spill area. Cleanup personnel should protect against vapor inhalation and skin or eye contact. If feasible and without undue risk, stop leak. Use appropriate foam to blanket release and suppress vapors. Water spray may reduce vapor, but does not prevent ignition in closed spaces. For small spills, absorb on paper and evaporate in appropriate exhaust hood or absorb with sand or some non-combustible absorbent and place in containers for later disposal. For large spills dike far ahead of liquid to contain. Do not allow xylene to enter a confined space such as sewers or drains. On land, dike to contain or divert to impermeable holding area. Apply water spray to control flammable vapor and remove material with pumps or vacuum equipment. On water, contain material with natural barriers, booms, or weirs; apply universal gelling agent; and use suction hoses to remove spilled material. Report any release in excess of 1000 lb. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Transport:** Little bioconcentration is expected. Biological oxygen demand 5 (after 5 days at 20 °C): 0.64 (no stated isomer). **Ecotoxicity values:** LD_{50}, Goldfish, 13 mg/L/24 hr, conditions of bioassay not specified, no specific isomer. **Environmental Degradation:** In the atmosphere, xylenes degrade by reacting with photochemically produced hydroxyl radicals with a half-life ranging from 1-1.7 hr. in the summer to 10-18 hr in winter or a typical loss of 67-86% per day. Xylenes are resistant to hydrolysis. **Soil Absorption/Mobility:** Xylenes have low to moderate adsorption to soil and when spilled on land, will volatilize and leach into groundwater. **Disposal:** As a hydrocarbon, xylene is a good candidate for controlled incineration. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)
Listed as a RCRA Hazardous Waste (40 CFR 261.33): No. U239, F003 (spent solvent)
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg) [* per Clean Water Act, Sec. 311(b)(4); per RCRA, Sec. 3001]

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For concentrations >1000 ppm, use any chemical cartridge respirator with organic vapor cartridges; any powered, air-purifying respirator with organic vapor cartridges; any supplied-air respirator; or any self-contained breathing apparatus. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent all skin contact. With breakthrough times > 8 hr, consider polyvinyl alcohol and fluorocarbon rubber (Viton) as materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes. Launder contaminated work clothing before wearing. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in clearly labelled, tightly closed, containers in a cool, well-ventilated place, away from strong oxidizing materials and heat and ignition sources. During transferring operations, electrically ground and bond metal containers. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Use hermetically sealed equipment, transfer xylene in enclosed systems, avoid processes associated with open evaporating surfaces, and provide sources of gas release with enclosures and local exhaust ventilation. Use Class I, Group D electrical equipment. **Administrative Controls:** Establish air and biological monitoring programs and evaluate regularly. Consider preplacement and periodic medical examinations including a complete blood count, a routine urinalysis, and liver function tests. Consider hematologic studies if there is any significant contamination of the solvent with benzene. If feasible, consider the replacement of xylene by less toxic solvents such as petrol (motor fuel) or white spirit. Before carrying out maintenance and repair work, steam and flush all equipment to remove any xylene residues.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Xylenes
DOT Hazard Class: 3
ID No.: UN1307
DOT Packing Group: II
DOT Label: Flammable Liquid
Special Provisions (172.102): T1

Packaging Authorizations
a) Exceptions: 173.150
b) Nonbulk Packaging : 173.202
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5L
b) Cargo Aircraft Only: 60L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: –

MSDS Collection **References:** 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 139, 140, 148, 149, 153, 159, 163, 164, 167, 171, 174, 176, 180

Prepared by: MJ Wurth, BS; **Industrial Hygiene Review:** PA Roy, MPH, CIH; **Medical Review:** W Silverman, MD

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Material Safety Data Sheets Collec
Sheet No. 317
Toluene
Issued: 8/79 Revision: E, 9/92 Erra

Section 1. Material Identification

Toluene ($C_6H_5CH_3$) Description: Derived from petroleum i.e., dehydrogenation of cycloparaffin fractions followed by the aromatization of saturated aromatic hydrocarbons or by fractional distillation of coal-tar light oil and purified by rectification. Used widely as a solvent (replacing benzene in many cases) for oils, resins, adhesives, natural rubber, coal tar, asphalt, pitch, acetyl celluloses, cellulose paints and varnishes; a diluent for photogravure inks, raw material for organic synthesis (benzoyl & benzilidene chlorides, saccharine, TNT, toluene diisocyanate, and many dyestuffs), in aviation and high octane automobile gasoline, as a nonclinical thermometer liquid and suspension solution for navigational instruments.

Other Designations: CAS No. 108-88-3, Methacide, methylbenzene, methylbenzol, phenylmethane, toluol, Tolu-sol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

Cautions: Toluene is an eye, skin, and respiratory tract irritant becoming narcotic at high centrations. Liver and kidney damage has occurred. Pregnant women chronically exposed to toluene have shown teratogenic effects. Toluene is highly flammable.

R	1
I	3
S	2*
K	3

* Skin absorption

HM
H
F
R
PPI

Section 2. Ingredients and Occupational Exposure Limits

Toluene, < 100%; may contain a small amount of benzene (~ 1%), xylene, and nonaromatic hydrocarbons.

1991 OSHA PELs
8-hr TWA: 100 ppm (375 mg/m³)
15-min STEL: 150 ppm (560 mg/m³)

1990 IDLH Level
2000 ppm

1990 NIOSH RELs
TWA: 100 ppm (375 mg/m³)
STEL: 150 ppm (560 mg/m³)

1992-93 ACGIH TLV (Skin)
TWA: 50 ppm (188 mg/m³)

1990 DFG (Germany) MAK*
TWA: 100 ppm (380 mg/m³)
Half-life: 2 hr to end of shift
Category II: Substances with systemic effects
~~Peak Exposure Limit: 500 ppm, 30 min~~ average value, 2/shift

1985-86 Toxicity Data†
Man, inhalation, TC_{Lo}: 100 ppm caused hallu and changes in motor activity and changes i psychophysiological tests.
Human, oral, LD_{Lo}: 50 mg/kg; toxic effects n yet reviewed
Human, eye: 300 ppm caused irritation.
Rat, oral, LD_{50}: 5000 mg/kg
Rat, liver: 30 µmol/L caused DNA damage.

* Available information suggests damage to the developing fetus is probable.
†See NIOSH, *RTECS* (XS5250000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 232 °F (110.6 °C)
Melting Point: -139 °F (-95 °C)
Molecular Weight: 92.15
Density: 0.866 at 68 °F (20/4 °C)
Surface Tension: 29 dyne/cm at 68 °F (20 °C)
Viscosity: 0.59 cP at 68 °F (20 °C)
Refraction Index: 1.4967 at 20 °C/D
Water Solubility: Very slightly soluble, 0.6 mg/L at 68 °F (20 °C)
Other Solubilities: Soluble in acetone, alcohol, ether, benzene, chloroform, glacial acid, petroleum ether, and carbon disulfide.
Vapor Pressure: 22 mm Hg at 68 °F (20 °C); 36.7 mm Hg at 86 °F (30 °C)
Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.0797 lb/ft³ or 1.275
Odor Threshold (range of all referenced values): 0.021 to 69 ppm

Appearance and Odor: Colorless liquid with a sickly sweet odor.

Section 4. Fire and Explosion Data

Flash Point: 40 °F (4.4 °C) CC	**Autoignition Temperature:** 896 °F (480 °C)	**LEL:** 1.27% v/v	**UEL:** 7.0% v/v

Extinguishing Media: Toluene is a Class 1B flammable liquid. To fight fire, use dry chemical carbon dioxide, or 'alcohol-resistant' foam spray may be ineffective as toluene floats on water and may actually spread fire. **Unusual Fire or Explosion Hazards:** Concentrated vap heavier than air and may travel to an ignition source and flash back. Container may explode in heat of fire. Toluenes' burning rate = 5.7 m and its flame speed = 37 cm/sec. Vapor poses an explosion hazard indoors, outdoors, and in sewers. May accumulate static electricity. Sp **Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (S with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limi protection. Apply cooling water to sides of tanks until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, u monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sou venting safety device or notice any tank discoloration due to fire because a BLEVE (boiling liquid expanding vapor explosion) may be im Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Toluene is stable at room temperature in closed containers under normal storage and handling conditions. Haz polymerization can't occur. **Chemical Incompatibilities:** Strong oxidizers, concentrated nitric acid, nitric acid + sulfuric acid, dinitrogen silver perchlorate, bromine trifluoride, tetranitromethane, and 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione. **Conditions to Avoid:** Con heat, ignition sources, or incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of toluene can produ dioxide, and acrid, irritating smoke.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list toluene as a carcinogen. **Summary of Risks:** Toluene is irritating to nose, and respiratory tract. Inhalation of high concentrations produces a narcotic effect sometimes leading to coma as well as liver and kid damage. 93% of inhaled toluene is retained in the body of which 80% is metabolized to benzoic acid, then to hippuric acid and excreted in The remainder is metabolized to *o*-cresol and excreted or exhaled unchanged. Toluene metabolism is inhibited by alcohol ingestion and is tic with benzene, asphalt fumes, or chlorinated hydrocarbons (i.e. perchloroethylene). Toluene is readily absorbed through the skin at 14 to cm²/hr. Toluene is absorbed quicker during exercise than at rest and appears to be retained longer in obese versus thin victims; presumably lipid solubility. There is inconsistent data on toluene's ability to damage bone marrow; chronic poisoning has resulted in anemia and leuc biopsy showing bone marrow hypo-plasia. These reports are few and some authorities argue that the effects may have been due to benzen nants. Chronic inhalation during pregnancy has been associated with teratogenic effects on the fetus including microcephaly, CNS dysfun attentional deficits, developmental delay + language impairment, growth retardation, and physical defects including a small midface, shor [illegible] with deep-set eyes, low-set ears, flat nasal bridge with a small nose, micrognathia, and blunt fingertips. There is some evidence

ction 6. Health Hazard Data

dical **Conditions Aggravated by Long-Term Exposure:** Alcoholism and CNS, kidney, skin, or liver disease. **Target Organs:** CNS, liver, kidney, skin. **Primary Entry Routes:** Inhalation, skin contact/absorption. **Acute Effects:** Vapor inhalation causes respiratory tract irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, watering eyes, nervousness, insomnia, parasthesis, and vertigo progressing to narcotic coma. ith may result from cardiac arrest due to ventricular fibrillation with catecholamines loss. Liquid splashed in the eye causes conjunctival irritation, isient corneal damage and possible burns. Prolonged skin contact leads to drying and fissured dermatitis. Ingestion causes GI tract irritation and symptoms associated with inhalation. **Chronic Effects:** Symptoms include mucous membrane irritation, headache, vertigo, nausea, appetite loss and alcohol intolerance. Repeated heavy exposure may result in encephalopathies (cerebellar ataxia and cognitive dysfunction), liver enlargement, and ney dystrophy (wasting away). Symptoms usually appear at workdays end, worsen at weeks end and decrease or disappear over the weekend.

RST AID Eyes: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding ounts of water until transported to an emergency medical facility. Consult an ophthalmologist immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. **Inhalation:** Remove exposed person to f sh air and support breathing as needed. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control ter and unless otherwise advised, have that *conscious and alert* person drink 1 to 2 glasses of water to dilute. *Do not* induce vomiting because of iger of aspiration into the lungs. Gastric lavage may be indicated if large amounts are swallowed; potential toxicity needs to be weighed against aspiration risk when deciding for or against gastric lavage. **Note to Physicians:** Monitor cardiac function. If indicated, use epinephrine and other catecholamines carefully, because of the possibility of a lowered myocardial threshold to the arrhythmogenic effects of such substances. Obtain CBC, trolytes, and urinalysis. Monitor arterial blood gases. If toluene has > 0.02% (200 ppm) benzene, evaluate for potential benzene toxicity. BEI: puric acid in urine, sample at shift end (2.5 g/g creatinine); Toluene in venous blood, sample at shift end (1.0 mg/L).

Section 7. Spill, Leak, and Disposal Procedures

ll/Leak: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Cleanup personnel protect against inhalation and skin/eye tact. Use water spray to cool and disperse vapors but it may not prevent ignition in closed spaces. Cellosolve, hycar absorbent materials, and rocarbon water can also be used for vapor suppression/containment. Take up small spill with earth, sand, vermiculite, or other absorbent, noncombustible material. Dike far ahead of large spills for later reclamation or disposal. For water spills, (10 ppm or greater) apply activated carbon at 10X the spilled amount and remove trapped material with suction hoses or use mechanical dredges/lifts to remove immobilized masses of pollutants precipitates. Toluene can undergo fluidized bed incineration at 842 to 1796 °F (450 to 980 °C), rotary kiln incineration at 1508 to 2912 °F (820 to 0 °C), or liquid injection incineration at 1202 to 2912 °F (650 to 1600 °C). Follow applicable OSHA regulations (29 CFR 1910.120). **Ecotoxicity Values:** Blue gill, LC_{50} = 17 mg/L/24 hr; shrimp (*Crangonfracis coron*), LC_{50} = 4.3 ppm/96 hr; fathead minnow (*Pimephales promelas*), LC_{50} = 36.2 ng/L/96 hr. ~~**Environmental Degradation**~~: If ~~released to land, toluene evaporates and undergoes~~ microbial degradation. In ~~water, toluene volatilizes~~ biodegrades with a half-life of days to several weeks. In air, toluene degrades by reaction with photochemically produced hydroxyl radicals. posal: Treat contaminated water by gravity separation of solids, followed by skimming of surface. Pass through dual media filtration and carbon absorption units (carbon ratio 1 kg to 10 kg soluble material). Return waste water from backwash to gravity separator. Contact your supplier or a icensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

A Designations
ed as a RCRA Hazardous Waste (40 CFR 261.33): No. U220
RA Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg)
* per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307 (a)]
ed as a SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

ction 8. Special Protection Data

Goggles: Wear protective eyeglasses with shatter-resistant glass and side-shields or chemical safety goggles, per OSHA eye- and face-protection ılations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional ice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 1000 ppm, use any chemical cartridge respirator with appropriate organic vapor cartridges, any supplied-air respirator SAR), or SCBA. For < 2000 ppm, use any SAR operated in continuous-flow mode, any SAR or SCBA with a full facepiece, or any air-purifying irator with a full facepiece having a chin-style, front or back mounted organic vapor canister. For emergency or nonroutine operations (cleaning ls, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* spirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, eriodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective ves, boots, aprons, and gauntlets to prevent skin contact. Polyvinyl alcohol with a breakthrough time of > 8 hr, Teflon and Viton are recommded as suitable materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its ource.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **ontaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove toluene from your shoes and n PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, king, smoking, using the toilet, or applying cosmetics.

ection 9. Special Precautions and Comments

rage Requirements: Prevent physical damage to containers. Store in a cool, dry, well-ventilated area away from ignition sources and incombles. Outside or detached storage is preferred. If stored inside, use a standard flammable liquids warehouse, room, or cabinet. To prevent static ks, electrically ground and bond all equipment used with toluene. Do not use open lights in toluene areas. Install Class 1, Group D electrical quipment. Check that toluene is free of or contains < 1% benzene before use. **Engineering Controls:** To reduce potential health hazards, use fficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. **Adminisive Controls:** Adopt controls for confined spaces (29 CFR 1910.146) if entering areas of unknown toluene levels (holes, wells, storage tanks). sider preplacement and periodic medical exams of exposed workers that emphasize the CNS, liver, kidney, and skin. Include hemocytometric nd thrombocyte count in cases where benzene is a contaminant of toluene. Monitor air at regular intervals to ensure effective ventilation.

Transportation Data (49 CFR 172.101)

T Shipping Name: Toluene
T Hazard Class: 3
D No.: UN1294
OT Packing Group: II
T Label: Flammable Liquid
ial Provisions (172.102): T1

Packaging Authorizations
a) Exceptions: 150
b) Non-bulk Packaging: 202
c) Bulk Packaging: 242

Quantity Limitations
a) Passenger Aircraft or Railcar: 5L
b) Cargo Aircraft Only: 60L

Vessel Stowage Requirements
Vessel Stowage: B
Other: --

SDS *Collection* **References:** 26, 73, 100, 101, 103, 124, 126, 127, 132, 140, 148, 153, 159, 163, 164, 167, 169, 171, 174, 175, 176, 180.
repared by: M Gannon, BA; **Industrial Hygiene Review:** PA Roy, CIH, MPH; **Medical Review:** AC Darlington, MD, MPH

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Material Safety Data Sheets Collectio

Sheet No. 316
Benzene

Issued: 11/78
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Section 1. Material Identification

Benzene (C_6H_6) Description: Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.

Other Designations: CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phene, phenyl hydride, pyrobenzol.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(73) for a suppliers list.

R	1
I	4
S	2*
K	4

*Skin absorption

Cautions: Benzene is a confirmed *human carcinogen* by the IARC. *Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue.* It is also a dangerous fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Benzene, ca 100%*

1989 OSHA PELs
(29 CFR 1910.1000, Table Z-1-A)
8-hr TWA: 1 ppm, 3 mg/m³
15-min STEL: 5 ppm, 15 mg/m³

(29 CFR 1910.1000, Table Z-2)
8-hr TWA: 10 ppm
Acceptable Ceiling Concentration: 25 ppm
Acceptable Maximum Peak: 50 ppm (10 min)†

1989-90 ACGIH
TLV-TWA: 10 ppm, 32 mg/m³

1988 NIOSH RELs
TWA: 0.1 ppm, 0.3 mg/m³
Ceiling: 1 ppm, 3 mg/m³

1985-86 Toxicity Data‡
Man, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted
Man, inhalation, TC_{Lo}: 150 ppm inhaled intermittently ~~1 yr in a number of discrete, separate doses affects~~ blood (other changes) and nutritional and gross met lism (body temperature increase)
Rabbit, eye: 2 mg administered over 24 hr produces se irritation

* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene except subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke pro oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limi Table Z-2 apply.

† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.

‡ See NIOSH, *RTECS* (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 °F (80 °C)
Melting Point: 42 °F (5.5 °C)
Vapor Pressure: 100 mm Hg at 79 °F (26.1 °C)
Vapor Density (Air = 1): 2.7
Evaporation Rate (Ether = 1): 2.8

Molecular Weight: 78.11
Specific Gravity (15 °C/4 °C): 0.8787
Water Solubility: Slightly (0.180 g/100 g of H_2O at 25 °C)
% Volatile by Volume: 100
Viscosity: 0.6468 mPa at 20 °C

Appearance and Odor: A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is ap mately 5 ppm (unfatigued) in air. Odor *is not* an adequate warning of hazard.

Section 4. Fire and Explosion Data

Flash Point: 12 °F (-11.1 °C), CC	**Autoignition Temperature:** 928 °F (498 °C)	**LEL:** 1.3% v/v	**UEL:** 7.1% v/v

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse be vapor, and protect personnel attempting to stop an unignited benzene leak.

Unusual Fire or Explosion Hazards: Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a poten fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Ex and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, hand stored.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not rele sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazar polymerization cannot occur.

Chemical Incompatibilities: Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium per + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, acid, and arsenic pentafluoride + potassium methoxide (explodes above 30 °C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel [above 410 °F (210 °C)]. Benzene is incompatible with oxidizing materials.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon monoxide

Section 6. Health Hazard Data

Carcinogenicity: The ACGIH, OSHA, and IARC list benzene as, respectively, a supected human carcinogen, a cancer hazard, and, based on sufficient human and animal evidence, a human carcinogen (Group 1).

Summary of Risks: Prolonged skin contact or excessive inhalation of benzene vapor may cause headache, weakness, appetite loss, and fatigue. The most important health hazards are cancer (leukemia) and bone marrow damage with injury to blood-forming tissue from chronic low-level exposure. Higher level exposures may irritate the respiratory tract and cause central nervous system (CNS) depression.

Medical Conditions Aggravated by Long-Term Exposure: Exposure may worsen ailments of the heart, lungs, liver, kidneys, blood, and CNS.

Target Organs: Blood, central nervous system, bone marrow, eyes, upper respiratory tract, and skin.

Primary Entry Routes: Inhalation, skin contact.

Acute Effects: Symptoms of acute overexposure include irritation of the eyes, nose, and respiratory tract, breathlessness, euphoria, nausea, drowsiness, headache, dizziness, and intoxication. Severe exposure may lead to convulsions and unconsciousness. Skin contact may cause a drying rash (dermatitis).

Chronic Effects: Long-term chronic exposure may result in many blood disorders ranging from aplastic anemia (an inability to form blood cells) to leukemia.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: *Quickly* remove contaminated clothing. Immediately rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air. Emergency personnel should protect against inhalation exposure. Provide CPR to support breathing or circulation as necessary. Keep awake and transport to a medical facility.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* since aspiration may be fatal. Call a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Physician's Note: Evaluate chronic exposure with a CBC, peripheral smear, and reticulocyte count for signs of myelotoxicity. Follow up any early indicators of leukemia with a bone marrow biopsy. Urinary phenol conjugates may be used for biological monitoring of recent exposure. Acute management is primarily supportive for CNS depression.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: *Design and practice a benzene spill control and countermeasure plan (SCCP).* Notify safety personnel, evacuate all unnecessary personnel, eliminate all heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against vapor inhalation, eye contact, and skin absorption. Absorb as much benzene as possible with an inert, noncombustible material. For large spills, dike far ahead of spill and contain liquid. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of confined spaces such as sewers, watersheds, and waterways because of explosion danger. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.33), Hazardous Waste No. U019

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1000 lb (454 kg) [* per Clean Water Act, Sec. 307 (a), 311 (b)(4), 112; and per RCRA, Sec. 3001]

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

Listed as SARA Toxic Chemical (40 CFR 372.65)

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Tables Z-1-A and Z-2)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations at least below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.(103)

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all heat and ignition sources and incompatible materials. *Caution! Benzene vapor may form explosive mixtures in air.* To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations in production and storage areas. When opening or closing benzene containers, use nonsparking tools. Keep fire extinguishers readily available.

Engineering Controls: Because OSHA specifically regulates benzene (29 CFR 1910.1028), educate workers about its potential hazards and dangers. Minimize all possible exposures to carcinogens. If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if absolutely essential. Avoid vapor inhalation and skin and eye contact. Use only with adequate ventilation and appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Designate regulated areas of benzene use (see legend in the box below) and label benzene containers with "DANGER, CONTAINS BENZENE, CANCER HAZARD."

Other Precautions: Provide preplacement and periodic medical examinations with emphasis on a history of blood disease or previous exposure.

Transportation Data (49 CFR 172.101, .102)

DOT Shipping Name: Benzene (*benzol*)
DOT Hazard Class: Flammable liquid
ID No.: UN1114
DOT Label: Flammable liquid
DOT Packaging Exceptions: 173.118
DOT Packaging Requirements: 173.119

IMO Shipping Name: Benzene
IMO Hazard Class: 3.2
ID No.: UN1114
IMO Label: Flammable liquid
IMDG Packaging Group: II

DANGER
BENZENE
CANCER HAZARD
FLAMMABLE–NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

MSDS Collection **References:** 1, 2, 12, 26, 73, 84-94, 100, 101, 103, 109, 124, 126, 127, 132, 134, 136, 138, 139, 143

Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Upfal, MD, MPH; **Edited by:** JR Stuart, MS

CHEMISPHERE -- NAPHTHALENE, REFINED FLAKE - INSECTICIDE,NAPHTHALENE
MATERIAL SAFETY DATA SHEET

NSN: 6840005976111
Manufacturer's CAGE: CHEMI
Part No. Indicator: A
Part Number/Trade Name: NAPHTHALENE, REFINED FLAKE

General Information

Item Name: INSECTICIDE,NAPHTHALENE
Company's Name: CHEMISPHERE CORPORATION
Company's P. O. Box: 250
Company's City: BOONTON
Company's State: NJ
Company's Country: US
Company's Zip Code: 07005
Company's Emerg Ph #: 201-335-6972
Company's Info Ph #: 201-335-6972
Distributor/Vendor # 1: EMULTEC INDUSTRIAL PRODUCTS INC.
Distributor/Vendor # 1 Cage: 0WA27
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 003
Status: SM
Date MSDS Prepared: 01AUG92
Safety Data Review Date: 13JUL93
Supply Item Manager: CX
MSDS Serial Number: BRDJR
Specification Number: A-A-1812
Spec Type, Grade, Class: CLASS A
Hazard Characteristic Code: F7
Unit Of Issue: LB
Unit Of Issue Container Qty: UNKNOWN
Type Of Container: 4G BOX
Net Unit Weight: 1 POUND

Ingredients/Identity Information

Proprietary: NO
Ingredient: NAPHTHALENE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: QJ0525000
CAS Number: 91-20-3
OSHA PEL: 10 PPM/15 STEL
ACGIH TLV: 10 PPM/15 STEL; 9293
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CRYSTALLINE SOLID
Boiling Point: 424F,218C
Melting Point: 172F,78C
Vapor Pressure (MM Hg/70 F): 0.032 MM
Vapor Density (Air=1): 4.4
Specific Gravity: 1.16
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: INSOLUBLE
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: 174F,79C

Flash Point Method: OC
Lower Explosive Limit: 0.9
Upper Explosive Limit: 5.9
Extinguishing Media: FOAM, DRY CHEMICAL, CARBON DIOXIDE AND CONTENGENTLY ATOMIZED WATER. ZAVOID WATER IN LIQUID NAPHTHALENE TANK.
Special Fire Fighting Proc: MFR ?. HMIS:WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire And Expl Hazrds: VAPORS & DUSTS CAN FORM EXPLOSIVE MIXTURES IN AIR.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NO INFORMATION GIVEN ON MSDS BY MFR.
Materials To Avoid: NO INFORMATION GIVEN ON MSDS BY MFR.
Hazardous Decomp Products: NO INFORMATION GIVEN ON MSDS BY MFR.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NO INFORMATION GIVEN ON MSDS BY MFR.

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT) IS 178 MG/KGUNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: DUST AND SPATTERINGS AY CAUSE IRTRITATION TO EYES & SKIN. INHALATION MAY CAUSE NAUSEA, HEADACHES OR PERSPIRATION. SWALLOWING MAY CAUSE VOMITING, DIARRHEA AND CRAMPS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THE COMPONENTS OF THIS PRODUCT HAVE NOT SHOWN ANY EVIDENCE OF BEING CARCINOGENIC.
Signs/Symptoms Of Overexp: DUST AND SPATTERINGS AY CAUSE IRTRITATION TO EYES & SKIN. INHALATION MAY CAUSE NAUSEA, HEADACHES OR PERSPIRATION. SWALLOWING MAY CAUSE VOMITING, DIARRHEA AND CRAMPS.
Med Cond Aggravated By Exp: NO INFORMATION GIVEN ON MSDS BY MFR.
Emergency/First Aid Proc: MFR GAVE ONLY SKELETAL INFO FOR EYE/SKIN CONTACT. HMIS: EYE:FLUSH W/WATER 15 MIN, HOLD LIDS OPEN. SKIN:WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE REUSE. DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL CARE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NO INFORMATION GIVEN ON MSDS BY MFR.
Neutralizing Agent: NO INFORMATION GIVEN ON MSDS BY MFR.
Waste Disposal Method: "DISPOSE OF ALL WASTE I/A/W ALL FEDERAL, STATE AND LOCAL REGULATIONS."
Precautions-Handling/Storing: NO INFORMATION GIVEN ON MSDS BY MFR.
Other Precautions: NO INFORMATION GIVEN ON MSDS BY MFR.

Control Measures

Respiratory Protection: NO INFORMATION GIVEN ON MSDS BY MFR.
Ventilation: NO INFORMATION GIVEN ON MSDS BY MFR.
Protective Gloves: NO INFORMATION GIVEN ON MSDS BY MFR.
Eye Protection: NO INFORMATION GIVEN ON MSDS BY MFR.
Other Protective Equipment: NO INFORMATION GIVEN ON MSDS BY MFR.
Work Hygienic Practices: MFR: ? HMIS:USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING.
Suppl. Safety & Health Data: KEY2:KT MANUFACTURER'S MSDS GAVE VERY LITTLE INFORMATION. IT DID NOT MEET THE OSHA HAZARD COMMUNICATION STANDARD.

Transportation Data

Trans Data Review Date: 93194
DOT PSN Code: JZV
DOT Proper Shipping Name: NAPHTHALENE, CRUDE OR NAPHTHALENE, REFINED
DOT Class: 4.1
DOT ID Number: UN1334
DOT Pack Group: III
DOT Label: FLAMMABLE SOLID
IMO PSN Code: KIT
IMO Proper Shipping Name: NAPHTHALENE,CRUDE OR REFINED
IMO Regulations Page Number: 4158
IMO UN Number: 1334
IMO UN Class: 4.1
IMO Subsidiary Risk Label: -
IATA PSN Code: ROK
IATA UN ID Number: 1334
IATA Proper Shipping Name: NAPHTHALENE, REFINED
IATA UN Class: 4.1
IATA Label: FLAMMABLE SOLID
AFI PSN Code: ROD
AFI Prop. Shipping Name: NAPHTHALENE, CRUDE OR REFINED
AFI Class: 4.1
AFI ID Number: UN1334
AFI Pack Group: III
AFI Special Prov: A1
AFI Basic Pac Ref: 8-7

Disposal Data

Label Data

Label Required: NO
Label Status: X
Common Name: LABEL COVERED UNDER EPA REGS - HAZCOM LABEL NOT AUTHORIZED

ALDRICH CHEMICAL -- PYRENE, 99%, 18551-5
MATERIAL SAFETY DATA SHEET
NSN: 685000N014585
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: PYRENE, 99%, 18551-5

General Information

Company's Name: ALDRICH CHEMICAL CO
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 24JAN90
Safety Data Review Date: 25MAR91
MSDS Serial Number: BKPQW
Hazard Characteristic Code: N1

Ingredients/Identity Information

Proprietary: NO
Ingredient: PYRENE (SARA III)
Ingredient Sequence Number: 01
Percent: 99
NIOSH (RTECS) Number: UR2450000
CAS Number: 129-00-0
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: YELLOW CRYSTALS AND POWDER
Boiling Point: 739F,393C
Melting Point: 300F,149C
Vapor Pressure (MM Hg/70 F): VERY LOW
Vapor Density (Air=1): N/A
Specific Gravity: 1.271 (FP N)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE (FP N)
pH: N/A

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY. CO*2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT TO PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO, CO*2
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE SUPP DATA
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED. MAY BE HARMFUL IF INHALED. MAY CAUSE EYE OR SKIN IRRITATION. INHALATION STUDIES IN ANIMALS HAVE CAUSED HEPATIC, PULMONARY & INTRAGASTRIC PATHOLOGIC CHANGES. NEUTROPHIL, LEUKOCYTE & ERYTHROCYTE LEVELS DECREASED. CUTANEOUS APPLICATION CAUSED HYPEREMIA, WEIGHT LOSS AND (SEE EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: N/A
Signs/Symptoms Of Overexp: HLTH HAZ: HEMATOPOIETIC CHANGES AND DERMATITIS. PYRENE IS READILY ABSORBED THROUGH THE SKIN (FP N). CHRONIC: LEUKOCYTOSIS. DERMATITIS (FP N). TARGET ORGANS: LIVER, KIDNEY, LUNG, SKIN AND BLOOD SYSTEM (FP N).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY WASH WITH SOAP AND COPIOUS AMOUNTS OF WATER. INHAL: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL MD. WASH CONTAMINATED CLOTHING BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE I/A/W FEDERAL, STATE AND LOCAL LAWS.
Precautions-Handling/Storing: KEEP TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions: AVOID INHALATION. DO NOT GET IN EYES, ON SKIN OR CLOTHING. AVOID PROLONGED OR REPEATED EXPOSURE. HARMFUL VAPOR.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: RUBBER GLOVES
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N)
Other Protective Equipment: RUBBER BOOTS, SAFETY SHOWER AND EYE BATH
Work Hygienic Practices: WASH HANDS THOROUGHLY AFTER USE AND BEFORE EATING, DRINKING, SMOKING OR USING SANITARY FACILITIES (FP N).
Suppl. Safety & Health Data: LD50-LC50 MIX: LD50: (ORL/RAT)=2700 MG/KG, (ORL/MUS)=800 MG/KG, (IPR/MUS)=514 MG/KG.

Transportation Data

Trans Data Review Date: 91269
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ

AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 25MAR91
Label Status: G
Common Name: PYRENE, 99%
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: MAY BE HARMFUL IF INGESTED OR INHALED. MAY CAUSE EYE & SKIN IRRITATION. AVOID BREATHING DUST. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. FIRE HAZARD NOT DETERMINED. CHRONIC: POSSIBLE CANCER HAZARD BASED ON ANIMAL DATA. TARGET ORGANS: LIVER, KIDNEY, SKIN, LUNGS AND BLOOD SYSTEM.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL CO
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

ALDRICH CHEMICAL -- 1-METHYLNAPHTHALENE, 98% M5680-8
MATERIAL SAFETY DATA SHEET
NSN: 681000N014689
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: 1-METHYLNAPHTHALENE, 98% M5680-8

General Information

Company's Name: ALDRICH CHEMICAL COMPANY
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 03JAN91
Safety Data Review Date: 02APR91
MSDS Serial Number: BKNZM
Hazard Characteristic Code: F8

Ingredients/Identity Information

Proprietary: NO
Ingredient: NAPHTHALENE, 1-METHYL-;(1-METHYLNAPHTHALENE, 98%)
Ingredient Sequence Number: 01
Percent: 98
NIOSH (RTECS) Number: QJ9630000
CAS Number: 90-12-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS TO PALE-YELLOW LIQUID.
Boiling Point: 464F,240C
Melting Point: -8F,-22C
Specific Gravity: 1.001

Fire and Explosion Hazard Data

Flash Point: 180F,82C
Extinguishing Media: WATER SPRAY. CO2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). PREVENT CONTACT WITH SKIN AND EYES. COMBUSTIBLE LIQUID.
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO & CO2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE SPECIFIED BY MANUFACTURER.

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORL,RAT) 1840 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION. VAPOR OR MIST IS IRRITATING TO THE EYES, MUC MEMB & UPPER RESP TRACT. CAUSES SKIN IRRITATION. CAUSES PHOTOSENSITIVITY. EXPOS TO LIGHT CAN RESULT IN ALLERGIC RXN RESULTING IN DERMATOLOGIC LEISONS, WHICH CAN VARY FROM SUNBURNLIKE (SEE EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE.
Signs/Symptoms Of Overexp: HLTH HAZ: RESPONSES TO EDEMATOUS, VESICULATED LESIONS OR BULLAE.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: IN CASE OF CONT, IMMED FLUSH EYES W/COPIOUS AMTS OF WATER FOR AT LEAST 15 MIN. IN CASE OF CONT, IMMED WASH SKIN W/SOAP & COPIOUS AMTS OF WATER. IF INHALED, REMOVE TO FRESH AIR. IF NOT BRTHG GIVE ARTF RESP. IF BRTHG IS DFCLT, GIVE OXYGEN. IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL MD. WASH CONTAM CLTHG BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: THIS COMBUSTIBLE MATERIAL MAY BE BURNED IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.
Precautions-Handling/Storing: DO NOT BREATHE VAPOR. KEEP TIGHTLY CLOSED. KEEP AWAY FROM HEAT AND OPEN FLAME. STORE IN A COOL DRY PLACE.
Other Precautions: DO NOT GET IN EYES, ON SKIN AND CLOTHING. IRRITANT. PHOTOSENSITIZER.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: COMPATIBLE CHEMICAL RESISTANT GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: SAFETY SHOWER AND EYE BATH.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 91273
DOT PSN Code: FST
DOT Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S.
DOT Class: 9
DOT ID Number: UN3082
DOT Pack Group: III
DOT Label: CLASS 9
IMO PSN Code: GMW
IMO Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. o
IMO Regulations Page Number: 9028
IMO UN Number: 3082
IMO UN Class: 9

IMO Subsidiary Risk Label: -
IATA PSN Code: KTV
IATA UN ID Number: 3082
IATA Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *
IATA UN Class: 9
IATA Label: MISCELLANEOUS
AFI PSN Code: KTV
AFI Prop. Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S.
AFI Class: 9
AFI ID Number: UN3082
AFI Pack Group: III
AFI Special Prov: 8
AFI Basic Pac Ref: 13-14

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 10JUN91
Label Date: 10JUN91
Label Status: G
Common Name: 1-METHYLNAPHTHALENE, 98% M5680-8
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: CAUSES EYE, SKIN, MUCOUS MEMBRANE AND UPPER RESPIRATORY TRACT IRRITATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. AVOID BREATHING VAPOR. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. MAY CAUSE ALLERGIC SKIN REACTION. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. COMBUSTIBLE LIQUID AAND VAPOR. KEEP AWAY FROM HEAT AND FLAME.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL COMPANY
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

PREPARERS ST OR P O BOX:
PREPARERS CITY:
PREPARERS STATE:
PREPARERS ZIP CODE:
OTHER MSDS NUMBER:
MSDS SERIAL NUMBER: BHGVQ
SPECIFICATION NUMBER:
SPEC TYPE GRADE CLASS:
HAZARD CHARACTERISTIC CODE:
UNIT OF ISSUE: NK
UNIT OF ISSUE CONTAINER QTY: N/K
TYPE OF CONTAINER: N/K
NET UNIT WEIGHT:
NRC STATE LICENSE NUMBER:
NET EXPLOSIVE WEIGHT:
NET PROPELLANT WEIGHT AMMO:
COAST GUARD AMMUNITION CODE:

Physical & Chemical Characteristics

APPEARANCE AND ODOR: WHITE SOLID
BOILING POINT: 838 F;448 C
MELTING POINT: 489 F;254 C
VAPOR PRESSURE MM HG 70 F: N/A MFR
VAPOR DENSITY AIR 1: N/A MFR
SPECIFIC GRAVITY: N/A
DECOMPOSITION TEMPERATURE: N/K F=N
EVAPORATION RATE AND REF: N/A MFR
SOLUBILITY IN WATER: N/A MFR
PERCENT VOLATILES BY VOLUME: N/AMFR
VISCOSITY:
PH: N/KFPN
RADIOACTIVITY:
FORM RADIOACTIVE MATL:
MAGNETISM MILLIGAUSS: N/P
CORROSION RATE IPY: N/K FPN.
AUTOIGNITION TEMPERATURE:

Fire and Explosion Hazard Data

FLASH POINT: N/K FPN
FLASH POINT METHOD: N/P
LOWER EXPLOSIVE LIMIT: N/KFPN
UPPER EXPLOSIVE LIMIT: N/K FPN
EXTINGUISHING MEDIA: WATER,CO*2,DRY CHEMICAL,ALCOHOL FOAM.
SPECIAL FIRE FIGHTING PROC: WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE(MFR).USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FPN).
UNUSUAL FIRE AND EXPL HAZRDS: N/A(MFR).

Reactivity Data

STABILITY: YES
COND TO AVOID (STABILITY): N/A.

MATERIALS TO AVOID: OXIDIZING AGENTS.
HAZARDOUS DECOMP PRODUCTS: N/A
HAZARDOUS POLY OCCUR: NO
CONDITIONS TO AVOID POLY: WILL NOT OCCUR.

Health Hazard Data

LD50 LC50 MIXTURE: LD50 NA.
ROUTE OF ENTRY INHALATION: YES
ROUTE OF ENTRY SKIN: YES
ROUTE OF ENTRY INGESTION: NO
HEALTH HAZ ACUTE AND CHRONIC: SEE SIGNS & SYMPTOMS OVEREXPOSURE.
CARCINOGENICITY NTP: NO
CARCINOGENICITY IARC: NO
CARCINOGENICITY OSHA: NO
EXPLANATION CARCINOGENICITY: CHRYSENE:ACGIH;SUSPECTED HUMAN CARCINOGEN(FPN).REPORTED ANIMAL CARCINOGEN (MFR).
SIGNS SYMPTOMS OF OVEREXP: REPORTED ANIMAL CARCINOGEN(MFR).
MED COND AGGRAVATED BY EXP: N/K FPN
EMERGENCY FIRST AID PROC: EYES:FLUSH WITH PLENTY OF POTABLE WATER FOR AT LEAST 15 MINUTES,THEN OBTAIN PROMPT MEDICAL ATTENTION (FPN).SKIN:PROMPTLY WASH SKIN WITH MILD SOAP AND LARGE VOLUMES OF WATER .REMOVE CONTAMINATED CLOTHING.INHALATION:IMMEDIATELY MOVE TO FRESH SAIR(MFR).SUPPORT BREATHING (GIVE O*2/ARTIFICAL RESPIRATION) (FPN).INGESTION:N/A(MFR).

Precautions for Safe Handling and Use

STEPS IF MATL RELEASED SPILL: SWEEP UP MATERIAL.FLUSH AREA WITH WATER.
NEUTRALIZING AGENT: N/K FPN.
WASTE DISPOSAL METHOD: COMPLY WITH APPLICABLE FEDERAL,STATE,OR LOCAL REGULATIONS.
PRECAUTIONS HANDLING STORING: STORE SEALED CONTAINER IN COOL,DRY LOCATION.
OTHER PRECAUTIONS: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.AVOID BREATHING VAPORS.

Control Measures

RESPIRATORY PROTECTION: N/A(MFR).NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN(FPN).
VENTILATION: USE ONLY IN EXHAUST HOOD.
PROTECTIVE GLOVES: WEAR RUBBER GLOVES.
EYE PROTECTION: SAFETY GLASSES WITH SIDESHIELDS(FPN)
OTHER PROTECTIVE EQUIPMENT: N/A
WORK HYGIENIC PRACTICES: OBSERVE GOOD WORK HYGIENIC PRACTICES(FPN).
SUPPL SAFETY HEALTH DATA:

Transportation Data

TRANSPORTATION ACTION CODE:
TRANSPORTATION FOCAL POINT: N
TRANS DATA REVIEW DATE: 89101
DOT PSN CODE: LVM

DOT SYMBOL:
DOT PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
DOT CLASS: 6.1
DOT ID NUMBER: UN2811
DOT PACK GROUP: III
DOT LABEL: KEEP AWAY FROM FOOD
DOT DOD EXEMPTION NUMBER: N/R
IMO PSN CODE: LYT
IMO PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
IMO REG PAGE NUMBER: 6236
IMO UN NUMBER: 2811
IMO UN CLASS: 6.1
IMO SUBSID RISK LABEL: -
IATA PSN CODE: UKJ
IATA UN ID NUMBER: 2811
IATA PROPER SHIP NAME: POISONOUS SOLID, N.O.S.
IATA UN CLASS: 6.1
IATA SUBSID RISK CLASS:
IATA LABEL: KEEP AWAY FROM FOOD
AFI PSN CODE: UKJ
AFI SYMBOLS:
AFI PROP SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
AFI CLASS: 6.1
AFI ID NUMBER: UN2811
AFI PACK GROUP: III
AFI LABEL: KEEP AWAY FROM FOOD
AFI SPECIAL PROV:
AFI BASIC PAC REF: 10-13
MMAC CODE:
N O S SHIPPING NAME:
ADDITIONAL TRANS DATA:

Disposal Data

DISPOSAL DATA ACTION CODE:
DISPOSAL DATA FOCAL POINT:
DISPOSAL DATA REVIEW DATE:
RECNUM FOR THIS DISP ENTR:
TOT DISP ENTRIES PER NSN:
LANDFILL BAN ITEM:
DISPOSAL SUPPLEMENTAL DAT:
EPAHAZWST 1ST CODE NEW:
EPAHAZWST 1ST NAME NEW:
EPAHAZWST 1ST CHAR NEW:
EPAACUTEHAZARD 1ST NEW:
EPAHAZWST 2ND CODE NEW:
EPAHAZWST 2ND NAME NEW:
EPAHAZWST 2ND CHAR NEW:
EPAACUTEHAZARD 2ND NEW:
EPAHAZWST 3RD CODE NEW:
EPAHAZWST 3RD NAME NEW:
EPAHAZWST 3RD CHAR NEW:
EPAACUTE 3RD HAZARD NEW:

Label Data

LABEL REQUIRED: YES
TECHNICAL REVIEW DATE:
LABEL DATE:
MFR NUMBER:
LABEL STATUS: F
COMMON NAME:
CHRONIC HAZARD: N/P
SIGNAL WORD:
ACUTE HEALTH HAZARD NONE:
ACUTE HEALTH HAZARD SLIGHT:
ACUTE HEALTH HAZARD MODERATE:
ACUTE HEALTH HAZARD SEVERE:
CONTACT HAZARD NONE:
CONTACT HAZARD SLIGHT:
CONTACT HAZARD MODERATE:
CONTACT HAZARD SEVERE:
FIRE HAZARD NONE:
FIRE HAZARD SLIGHT:
FIRE HAZARD MODERATE:
FIRE HAZARD SEVERE:
REACTIVITY HAZARD NONE:
REACTIVITY HAZARD SLIGHT:
REACTIVITY HAZARD MODERATE:
REACTIVITY HAZARD SEVERE:
SPECIAL HAZARD PRECAUTIONS: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
PROTECT EYE:
PROTECT SKIN:
PROTECT RESPIRATORY:
LABEL NAME: SUPELCO INC
LABEL STREET: SUPELCO PARK
LABEL P O BOX:
LABEL CITY: BELLEFONTE
LABEL STATE: PA
LABEL ZIP CODE: 16823
LABEL COUNTRY: US
LABEL EMERGENCY NUMBER:
YEAR PROCURED:

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SUPELCO -- EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
MATERIAL SAFETY DATA SHEET
NSN: 663000N066603
Manufacturer's CAGE: 54968
Part No. Indicator: A
Part Number/Trade Name: EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
=========================================================================
                          General Information
=========================================================================
Company's Name: SUPELCO INC
Company's Street: SUPELCO PARK
Company's City: BELLEFONTE
Company's State: PA
Company's Country: US
Company's Zip Code: 16823-0048
Company's Emerg Ph #: 814-359-3441
Company's Info Ph #: 814-359-3441
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 13JUL93
Safety Data Review Date: 19DEC95
MSDS Serial Number: BZSBL
=========================================================================
                    Ingredients/Identity Information
=========================================================================
Proprietary: NO
Ingredient: PHENANTHRENE; (PHENANTHRENE-D10) (MFR CAS #1517-22-)
Ingredient Sequence Number: 01
Percent: 0.05
NIOSH (RTECS) Number: SF7175000
CAS Number: 85-01-8
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
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Proprietary: NO
Ingredient: ACENAPHTHYLENE; (ACENAPHTHYLENE-D8, 1,2-DIDEUTERO,
(ACENAPHTHENE D10)) (MFR CAS #15067-26-)
Ingredient Sequence Number: 02
Percent: 0.05
NIOSH (RTECS) Number: AB1000000
CAS Number: 83-32-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
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Proprietary: NO
Ingredient: CHRYSENE; (CHRYSENE D12) (MFR CAS #1719-03-)
Ingredient Sequence Number: 03
Percent: 0.05
NIOSH (RTECS) Number: GC0700000
CAS Number: 218-01-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
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Proprietary: NO
Ingredient: ACETONE (SARA 313) (CERCLA). LD50:(ORAL,RAT) 9750 MG/KG.
Ingredient Sequence Number: 04
Percent: 99-100
NIOSH (RTECS) Number: AL3150000
CAS Number: 67-64-1
OSHA PEL: 1000 PPM
ACGIH TLV: 750 PPM;1000 STEL
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Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID.
Boiling Point: 133F,56C
Melting Point: -139F,-95C
Vapor Pressure (MM Hg/70 F): 181 @ 20C
Vapor Density (Air=1): 2
Specific Gravity: 0.792 (H*2O=1)
Evaporation Rate And Ref: 14.4 (BUTYL ACETATE=1)
Solubility In Water: 100%
Percent Volatiles By Volume: 1

Fire and Explosion Hazard Data

Flash Point: -2F,-19C
Flash Point Method: CC
Lower Explosive Limit: 2.6%
Upper Explosive Limit: 13%
Extinguishing Media: DRY CHEMICAL, ALCOHOL FOAM. WATER MAY BE INEFFECTIVE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: VAPORS FORM EXPLOSIVE MIXTURES W/AIR. CONTAINERS MAY EXPLODE UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE
Materials To Avoid: STRONG ACIDS, STRONG BASES, OXIDIZING AGENTS, AMINES, OXYGEN, ALKANOLAMINES, HALOGENS, ALDEHYDES, AMMONIA & (SUPP DATA)
Hazardous Decomp Products: NOT APPLICABLE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENT 4.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: BURNS EYES. IRRITATES RESPIRATORY TRACT. CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. IRRITATES SKIN. DERMATITIS, HEADACHE, DIZZINESS, GASTROINTESTINAL DISTURBANCES. DEPRESSES CENTRAL NERVOUS SYSTEM. CONVULSIONS, ERYTHEMA, ECZEMA, CONJUNCTIVITIS & CORNEAL EROSION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES:FLUSH W/WATER FOR AT LST 15 MINS. CONT MD. SKIN:PROMPTLY WASH W/MILD SOAP & LG VOLS OF WATER. REMOVE CONTAM CLTHG. INHAL:IMMED MOVE TO FRESH AIR. IF BRTHG STOPS, GIVE ARTF RESP. CONT MD. INGEST:NEVER GIVE ANYTHING BY MOUTH TO UNCON PERS. NEVER TRY TO MAKE UNCON PERS VOMIT. GIVE LG AMTS OF WATER. PRESS FINGERS TO BACK OF TONGUE TO INDUCE VOMIT. IMMED CONTACT MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: TAKE UP W/ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: COMPLY W/ALL APPLICABLE FEDERAL, STATE & LOCAL

REGULATIONS. CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. EMPTIED CONTAINERS RETAIN PRODUCT RESIDUE: HANDLE AS IF THEY WERE FULL.
Precautions-Handling/Storing: REFRIGERATE IN SEALED CONTAINER. KEEP AWAY FROM IGNITION SOURCES. AVOID EYE OR SKIN CONTACT. AVOID BREATHING VAPORS.
Other Precautions: THIS MATL IS INTENDED FOR R&D USE ONLY & MAY NOT BE USED FOR DRUG, HOUSEHOLD/OTHER PURPOSES. IN ADDN, BURDEN OF SAFE USE OF MATL RESTS W/YOU & THEREFORE, IT SHOULD BE HNDLD ONLY BY QUALIFIED PERS TRAINED IN LAB PROCS & GOOD SFTY PRACTICES.

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED SELF CONTAINED BREATHING APPARATUS.
Ventilation: USE ONLY IN EXHAUST HOOD.
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: MATLS TO AVOID:CHLORINATED COMPOUNDS.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 19DEC95
Label Date: 16NOV95
Label Status: G
Common Name: EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE/CHRONIC:BURNS EYES. IRRITATES RESPIRATORY TRACT. CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. IRRITATES SKIN. DERMATITIS, HEADACHE, DIZZINESS, GASTROINTESTINAL DISTURBANCES. DEPRESSES CENTRAL NERVOUS SYSTEM. CONVULSIONS, ERYTHEMA, ECZEMA, CONJUNCTIVITIS AND CORNEAL EROSION.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SUPELCO INC
Label Street: SUPELCO PARK
Label City: BELLEFONTE
Label State: PA
Label Zip Code: 16823-0048
Label Country: US
Label Emergency Number: 814-359-3441

ALDRICH CHEMICAL -- FLUORENE, 98%, 12833-3
MATERIAL SAFETY DATA SHEET
NSN: 681000N014315
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: FLUORENE, 98%, 12833-3

General Information

Company's Name: ALDRICH CHEMICAL COMPANY
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 03JAN90
Safety Data Review Date: 06JUL95
MSDS Serial Number: BKNBR
Hazard Characteristic Code: T3

Ingredients/Identity Information

Proprietary: NO
Ingredient: FLUORENE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: LL5670000
CAS Number: 86-73-7
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: WHITE CRYSTALLINE POWDER.
Boiling Point: 568F,298C
Melting Point: 237F,114C

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY. CO*2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO & CO*2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50: (IPR,MUS) 2 GM/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: ACUTE: MAY BE HARMFUL BY INHALATION OR INGESTION. MAY CAUSE EYE & SKIN IRRITATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: IARC
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH WITH SOAP & COPIOUS AMOUNTS OF WATER. WASH CONTAMINATED CLOTHING BEFORE REUSE. INHAL: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. CALL MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS & HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN A BAG & HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL LAWS.
Precautions-Handling/Storing: DO NOT BREATHE DUST. KEEP TIGHTLY CLOSED. STORE IN A COOL DRY PLACE.
Other Precautions: DO NOT GET IN EYES, ON SKIN OR CLOTHING.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: RUBBER GLOVES.
Eye Protection: CHEMICAL SAFETY GOGGLES.
Other Protective Equipment: SAFETY SHOWER AND EYE BATH.
Work Hygienic Practices: WASH THOROUGHLY AFTER USE AND BEFORE EATING, DRINKING, SMOKING OR USING SANITARY FACILITIES (FP N).
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 91267
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 06JUN91
Label Date: 06JUN91
Label Status: G
Common Name: FLUORENE, 98%, 12833-3
Chronic Hazard: NO

Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: CAUTION: ACUTE: HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE EYE AND SKIN IRRITATION. AVOID BREATHING DUST. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY ATER HANDLING. FIRE HAZARD NOT DETERMINED.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL COMPANY
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

CHEM SERVICE -- BIS(2-ETHYLHEXYL)PHTHALATE, 0-516
MATERIAL SAFETY DATA SHEET
NSN: 681000N077996
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: BIS(2-ETHYLHEXYL)PHTHALATE, 0-516

General Information

Company's Name: CHEM SERVICE INC
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381
Company's Emerg Ph #: 610-692-3026
Company's Info Ph #: 610-692-3026
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 25JAN95
Safety Data Review Date: 23JUL97
MSDS Serial Number: CFHCS

Ingredients/Identity Information

Proprietary: NO
Ingredient: PHTHALIC ACID, BIS(2-ETHYLHEXYL) ESTER; (BIS(2-ETHYLHEXYL) PHTHALATE) (SARA 313) (CERCLA). (ING 2)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: TI0350000
CAS Number: 117-81-7
OSHA PEL: 5 MG/M3
ACGIH TLV: 5 MG/M3

Proprietary: NO
Ingredient: ING 1:LD50:(ORAL,RAT) 31,000 MG/KG.
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SUPP DATA:OBTAINED FROM A POISON CONTROL CENTER.
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID.
Boiling Point: 729F,387C
Melting Point: -51F,-46C
Vapor Pressure (MM Hg/70 F): <0.01 @20C
Specific Gravity: 0.981
Solubility In Water: INSOL (IMMISCIBLE)

Fire and Explosion Hazard Data

Extinguishing Media: CARBON DIOXIDE OR DRY CHEMICAL POWDER. DO NOT USE WATER!
Special Fire Fighting Proc: USE NIOSH APPROVED SCBA & FULL PROTECTIVE

EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NO EXPLOSION LIMITS ARE AVAILABLE FOR THIS COMPOUND.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: INCOMPATIBLE W/STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: DECOMPOSITION LIBERATES TOXIC FUMES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENT 1.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT! MAY BE HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. DUST AND/OR VAPORS CAN CAUSE IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES. CAN CAUSE EYE AND SKIN IRRITATION. PROPOSITION 65 - THIS (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: PHTHALIC ACID, BIS(2-ETHYLHEXYL)ESTER:IARC MONOGRAPHS, SUPP, VOL 7, PG 56, 1989:GRP 2B. NTP 7TH ANNUAL RPT ON (SUPDAT)
Signs/Symptoms Of Overexp: HLTH HAZ:CHEMICAL IS CONSIDERED TO BE A CARCINOGEN BY THE STATE OF CALIFORNIA. THIS COMPOUND IS GENERALLY CONSIDERED TO BE NON-TOXIC.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: INGEST:CALL MD IMMED (FP N). EYES:FLUSH CONTINUOUSLY W/WATER FOR AT LST 15-20 MINS. SKIN:FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED-USE SOAP & WATER TO CLEANSE. DO NOT WEAR SHOES/CLTHG UNTIL ABSOLUTELY FREE OF ALL CHEM ODORS. INHAL:REMOVE PATIENT TO FRESH AIR. ADMIN OXYG IF PATIENT IS HAVING DFCLTY BRTHG. IF PATIENT HAS STOPPED BRTHG ADMIN ARTF RESP. IF PATIENT IS IN CARD (SUPP DATA)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N). BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER.
Precautions-Handling/Storing: AVOID CONTACT W/SKIN, EYES & CLOTHING. DO NOT BREATHE VAPORS. KEEP TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE. STORE ONLY W/COMPATIBLE CHEMICALS.
Other Precautions: PERSONS NOT SPECIFICALLY & PROPERLY TRAINED SHOULD NOT HANDLE THIS CHEM/ITS CNTNR. THIS PROD IS FURNISHED FOR LAB USE ONLY! MFR'S PRODS MAY NOT BE USED AS DRUGS, COSMETICS, AGRICULTURAL/PESTICIDAL PRODS, FOOD ADDTIVES/AS HOUSEHOLD CHEMS.

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). USE APPROPRIATE OSHA APPROVED SAFETY EQUIP.
Work Hygienic Practices: CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY.
Suppl. Safety & Health Data: EXPLAN OF CARCIN:CARCINS, 1994:ANTIC TO BE CARCIN. ANIMAL:LIVER, TESTES. FIRST AID PROC:ARREST ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSISTANCE HAS ARRIVED. NOTE:AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT EFT OF A POIS. IT SHOULD BE ADMIN ONLY BY MD/TRAINED EMER PERS. MED ADVICE CAN BE (ING 3)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 23JUL97
Label Date: 21JUL97
Label Status: G
Common Name: BIS(2-ETHYLHEXYL)PHTHALATE, 0-516
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT! MAY BE HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. DUST AND/OR VAPORS CAN CAUSE IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES. CAN CAUSE EYE AND SKIN IRRITATION. CHRONIC:CANCER HAZARD. CONTAINS BIS(2-ETHYLHEXYL) PHTHALATE, WHICH IS LISTED AS AN ANIMAL LIVER CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEM SERVICE INC
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381
Label Country: US
Label Emergency Number: 610-692-3026

CHEM SERVICE -- F1003 BENZO(E)PYRENE
MATERIAL SAFETY DATA SHEET
NSN: 655000F037550
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: F1003 BENZO(E)PYRENE

General Information

Company's Name: CHEM SERVICE INC
Company's Street: 660 TOWER LN
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381-3108
Company's Emerg Ph #: 215-692-3026/800-452-9994
Company's Info Ph #: 215-692-3026/800-452-9994
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 23OCT92
Safety Data Review Date: 29DEC94
Preparer's Company: CHEM SERVICE INC
Preparer's St Or P. O. Box: 660 TOWER LN
Preparer's City: WEST CHESTER
Preparer's State: PA
Preparer's Zip Code: 19381-3108
MSDS Serial Number: BWJHZ

Ingredients/Identity Information

Proprietary: NO
Ingredient: BENZOPYRENE
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: DJ4200000
CAS Number: 192-97-2

Physical/Chemical Characteristics

Appearance And Odor: WHITE TO YELLOW/GREEN CRYSTALLINE SOLID.
Melting Point: (SEE SUPP)
Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Extinguishing Media: CO2, DRY CHEMICAL POWDER/SPRAY.

Reactivity Data

Stability: YES
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES.
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES: IRRITATION. SKIN: IRRITATION, HARMFUL IF ABSORBED. INGESTION: HARMFUL. INHALATION: HARMFUL, IRRITATION TO RESPIRATORY TRACT & MUCOUS MEMBRANES. POSSIBLE MUTAGEN-MAY CAUSE BIRTH

DEFECTS IN FUTURE GENERATIONS. POSSIBLE TERATOGEN-CAUSES EMBRYO-FETAL DAMAGE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: IRRITATION.
Emergency/First Aid Proc: EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. KEEP WARM & QUIET. INGESTION: DON'T INDUCE VOMITING/GIVE LIQUIDS IF UNCONSCIOUS/ CONVULSIVE. IF VOMITING, WATCH CLOSELY FOR ANY AIRWAY OBSTRUCTION. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL DRY PLACE ONLY W/COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. FOR LABORATORY USE ONLY.
Other Precautions: AVOID CONTACT W/SKIN, EYES & CLOTHING. DON'T BREATH VAPOR. CONTACT LENSES SHOULDN'T BE WORN IN LABORATORY. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. AVOID DIRECT PHYSICAL CONTACT.

Control Measures

Respiratory Protection: WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Eye Protection: EYE SHIELDS
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Suppl. Safety & Health Data: MELTING POINT: 352.4-354.2F.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: F1003 BENZO(E)PYRENE
Special Hazard Precautions: EYES: IRRITATION. SKIN: IRRITATION, HARMFUL IF ABSORBED. INGESTION: HARMFUL. INHALATION: HARMFUL, IRRITATION TO RESPIRATORY TRACT & MUCOUS MEMBRANES. POSSIBLE MUTAGEN-MAY CAUSE BIRTH DEFECTS IN FUTURE GENERATIONS. POSSIBLE TERATOGEN-CAUSES EMBRYO-FETAL DAMAGE. IRRITATION.
Label Name: CHEM SERVICE INC
Label Street: 660 TOWER LN
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381-3108
Label Country: US
Label Emergency Number: 215-692-3026/800-452-9994

CORNELL PDC Material Safety Data Sheets
Planning Design & Construction

DOD Hazardous Material Information
July, 1998
For Cornell University Convenience Only

BENZO(B)FLUORANTHENE 50MG,CATALOG NO,48490

FSC: 6810
NIIN: 00N010747
NSN: 681000N0107475
MANUFACTURERS CAGE: 54968
PART NO INDICATOR: A
PART NUMBER TRADE NAME: BENZO(B)FLUORANTHENE 50MG,CATALOG NO,48490

General Information

ITEM NAME:
MANUFACTURERS NAME: SUPELCO,INC.
MANUFACTURERS STREET: SUPELCO PARK
MANUFACTURERS P O BOX:
MANUFACTURERS CITY: BELLEFONTE
MANUFACTURERS STATE: PA
MANUFACTURERS COUNTRY:
MANUFACTURERS ZIP CODE: 16823-0048
MANUFACTURERS EMERG PH: 814-359-3441
MANUFACTURERS INFO PH: 814-359-3441
DISTRIBUTOR VENDOR 1:
DISTRIBUTOR VENDOR 1 CAGE:
DISTRIBUTOR VENDOR 2:
DISTRIBUTOR VENDOR 2 CAGE:
DISTRIBUTOR VENDOR 3:
DISTRIBUTOR VENDOR 3 CAGE:
DISTRIBUTOR VENDOR 4:
DISTRIBUTOR VENDOR 4 CAGE:
SAFETY DATA ACTION CODE:
SAFETY FOCAL POINT: N
RECORD NO FOR SAFETY ENTRY: 001
TOT SAFETY ENTRIES THIS STK: 001
STATUS: SE
DATE MSDS PREPARED: 10MAR88
SAFETY DATA REVIEW DATE: 01MAR89
SUPPLY ITEM MANAGER:
MSDS PREPARERS NAME:
PREPARERS COMPANY:

PREPARERS ST OR P O BOX:
PREPARERS CITY:
PREPARERS STATE:
PREPARERS ZIP CODE:
OTHER MSDS NUMBER:
MSDS SERIAL NUMBER: BHGVP
SPECIFICATION NUMBER:
SPEC TYPE GRADE CLASS:
HAZARD CHARACTERISTIC CODE:
UNIT OF ISSUE: NK
UNIT OF ISSUE CONTAINER QTY: N/K
TYPE OF CONTAINER: N/K
NET UNIT WEIGHT:
NRC STATE LICENSE NUMBER:
NET EXPLOSIVE WEIGHT:
NET PROPELLANT WEIGHT AMMO:
COAST GUARD AMMUNITION CODE:

Physical & Chemical Characteristics

APPEARANCE AND ODOR: LIGHT YELLOW CRYSTALLINE SOLID.
BOILING POINT: N/A MFR
MELTING POINT: 334 F;168 C
VAPOR PRESSURE MM HG 70 F: N/A MFR
VAPOR DENSITY AIR 1: N/A MFR
SPECIFIC GRAVITY: N/A MFR
DECOMPOSITION TEMPERATURE: N/F FPN
EVAPORATION RATE AND REF: N/A MFR
SOLUBILITY IN WATER: N/A MFR
PERCENT VOLATILES BY VOLUME: N/AMFR
VISCOSITY:
PH: N/KFPN
RADIOACTIVITY:
FORM RADIOACTIVE MATL:
MAGNETISM MILLIGAUSS: N/P
CORROSION RATE IPY: N/K FPN
AUTOIGNITION TEMPERATURE:

Fire and Explosion Hazard Data

FLASH POINT: N/K FPN
FLASH POINT METHOD: N/P
LOWER EXPLOSIVE LIMIT: N/K FPN
UPPER EXPLOSIVE LIMIT: N/K FPN
EXTINGUISHING MEDIA: CO*2,DRY CHEMICAL
SPECIAL FIRE FIGHTING PROC: WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE(MFR).USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FPN).
UNUSUAL FIRE AND EXPL HAZRDS: N/A MFR

Reactivity Data

STABILITY: YES
COND TO AVOID (STABILITY): N/A MFR

MATERIALS TO AVOID: N/A MFR
HAZARDOUS DECOMP PRODUCTS: N/A MFR
HAZARDOUS POLY OCCUR: NO
CONDITIONS TO AVOID POLY: WILL NOT OCCUR.

Health Hazard Data

LD50 LC50 MIXTURE: LD50 N/A MFR
ROUTE OF ENTRY INHALATION: YES
ROUTE OF ENTRY SKIN: NO
ROUTE OF ENTRY INGESTION: YES
HEALTH HAZ ACUTE AND CHRONIC: SEE SIGN & SYMPTOMS OF OVEREXPOSURE.
CARCINOGENICITY NTP: YES
CARCINOGENICITY IARC: YES
CARCINOGENICITY OSHA: NO
EXPLANATION CARCINOGENICITY: BENZO(B)FLUORANTHENE:NTP,MAY REASONABLY BE ANTICIPATED TO BE CARC.IARC,ANIMAL CARCINOGEN(FPN).RPTD ANIMAL (MFR).
SIGNS SYMPTOMS OF OVEREXP: REPORTED ANIMAL CARCINOGEN.
MED COND AGGRAVATED BY EXP: N/K FPN
EMERGENCY FIRST AID PROC: EYES:FLUSH WITH PLENTY OF POTABLE WATER FOR AT LEAST 15 MINUTES,THEN OBTAIN PROMPT MEDICAL ATTENTION (FPN).SKIN: PROMPTLY WASH SKIN WITH MILD SOAP & LARGE VOLUMES OF WATER REMOVE CONTAMINATED CLOTHING.CONTACT PHYSICIAN.INHAL:IMMEDIATELY MOVE TO FRESH AIR.CONTACT PHYSICIAN.INGEST:NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON,NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT.IMMED CONTACT PHYS.

Precautions for Safe Handling and Use

STEPS IF MATL RELEASED SPILL: SWEEP UP MATERIAL.AVOID GENERATING DUST.
NEUTRALIZING AGENT: N/K FPN
WASTE DISPOSAL METHOD: COMPLY WITH ALL APPLICABLE FEDERAL,STATE,OR LOCAL REGULATIONS.
PRECAUTIONS HANDLING STORING: REFRIGERATE IN SEALED CONTAINER.AVOID GENERATING DUST.PROTECT FROM EXPOSURE TO LIGHT.
OTHER PRECAUTIONS: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.

Control Measures

RESPIRATORY PROTECTION: WEAR SELF CONTAINED BREATHING APPARATUS.NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FPN).
VENTILATION: USE ONLY IN EXHAUST HOOD.
PROTECTIVE GLOVES: WEAR GLOVES
EYE PROTECTION: SAFETY GLASSES WITH SIDESHIELDS(FPN)
OTHER PROTECTIVE EQUIPMENT: N/A
WORK HYGIENIC PRACTICES: OBSERVE GOOD WORK HYGIENIC PRACTICES(FPN).
SUPPL SAFETY HEALTH DATA:

Transportation Data

TRANSPORTATION ACTION CODE:
TRANSPORTATION FOCAL POINT: N

TRANS DATA REVIEW DATE: 89101
DOT PSN CODE: LVM
DOT SYMBOL:
DOT PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
DOT CLASS: 6.1
DOT ID NUMBER: UN2811
DOT PACK GROUP: III
DOT LABEL: KEEP AWAY FROM FOOD
DOT DOD EXEMPTION NUMBER: N/R
IMO PSN CODE: LYT
IMO PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
IMO REG PAGE NUMBER: 6236
IMO UN NUMBER: 2811
IMO UN CLASS: 6.1
IMO SUBSID RISK LABEL: -
IATA PSN CODE: UKJ
IATA UN ID NUMBER: 2811
IATA PROPER SHIP NAME: POISONOUS SOLID, N.O.S.
IATA UN CLASS: 6.1
IATA SUBSID RISK CLASS:
IATA LABEL: KEEP AWAY FROM FOOD
AFI PSN CODE: UKJ
AFI SYMBOLS:
AFI PROP SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
AFI CLASS: 6.1
AFI ID NUMBER: UN2811
AFI PACK GROUP: III
AFI LABEL: KEEP AWAY FROM FOOD
AFI SPECIAL PROV:
AFI BASIC PAC REF: 10-13
MMAC CODE:
N O S SHIPPING NAME:
ADDITIONAL TRANS DATA:

Disposal Data

DISPOSAL DATA ACTION CODE:
DISPOSAL DATA FOCAL POINT:
DISPOSAL DATA REVIEW DATE:
RECNUM FOR THIS DISP ENTR:
TOT DISP ENTRIES PER NSN:
LANDFILL BAN ITEM:
DISPOSAL SUPPLEMENTAL DAT:
EPAHAZWST 1ST CODE NEW:
EPAHAZWST 1ST NAME NEW:
EPAHAZWST 1ST CHAR NEW:
EPAACUTEHAZARD 1ST NEW:
EPAHAZWST 2ND CODE NEW:
EPAHAZWST 2ND NAME NEW:
EPAHAZWST 2ND CHAR NEW:
EPAACUTEHAZARD 2ND NEW:
EPAHAZWST 3RD CODE NEW:
EPAHAZWST 3RD NAME NEW:
EPAHAZWST 3RD CHAR NEW:
EPAACUTE 3RD HAZARD NEW:

Label Data

LABEL REQUIRED: YES
TECHNICAL REVIEW DATE:
LABEL DATE:
MFR NUMBER:
LABEL STATUS: F
COMMON NAME:
CHRONIC HAZARD: N/P
SIGNAL WORD:
ACUTE HEALTH HAZARD NONE:
ACUTE HEALTH HAZARD SLIGHT:
ACUTE HEALTH HAZARD MODERATE:
ACUTE HEALTH HAZARD SEVERE:
CONTACT HAZARD NONE:
CONTACT HAZARD SLIGHT:
CONTACT HAZARD MODERATE:
CONTACT HAZARD SEVERE:
FIRE HAZARD NONE:
FIRE HAZARD SLIGHT:
FIRE HAZARD MODERATE:
FIRE HAZARD SEVERE:
REACTIVITY HAZARD NONE:
REACTIVITY HAZARD SLIGHT:
REACTIVITY HAZARD MODERATE:
REACTIVITY HAZARD SEVERE:
SPECIAL HAZARD PRECAUTIONS: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
PROTECT EYE:
PROTECT SKIN:
PROTECT RESPIRATORY:
LABEL NAME: SUPELCO INC
LABEL STREET: SUPELCO PARK
LABEL P O BOX:
LABEL CITY: BELLEFONTE
LABEL STATE: PA
LABEL ZIP CODE: 16823
LABEL COUNTRY: US
LABEL EMERGENCY NUMBER:
YEAR PROCURED:

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ULTRA SCIENTIFIC -- PAH MIXTURE, US-106
MATERIAL SAFETY DATA SHEET
NSN: 685000N041079
Manufacturer's CAGE: 0MU35
Part No. Indicator: A
Part Number/Trade Name: PAH MIXTURE, US-106
=========================================================================
                           General Information
=========================================================================
Company's Name: ULTRA SCIENTIFIC
Company's Street: 250 SMITH ST
Company's City: NO KINGSTOWN
Company's State: RI
Company's Country: US
Company's Zip Code: 02852
Company's Emerg Ph #: 401-294-9400
Company's Info Ph #: 401-294-9400
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 17APR92
Safety Data Review Date: 06APR93
MSDS Serial Number: BSFFX
Hazard Characteristic Code: NK
=========================================================================
                     Ingredients/Identity Information
=========================================================================
Proprietary: NO
2136 MG/KG.
Ingredient Sequence Number: 01
Percent: 48.54
NIOSH (RTECS) Number: PA8050000
CAS Number: 75-09-2
OSHA PEL: 500 PPM;1000 PPM, C
ACGIH TLV: 50 PPM
------------------------------------
Proprietary: NO
Ingredient: BENZENE (SARA III). LD50 (ORAL,RAT): 3320 MG/KG.
Ingredient Sequence Number: 02
Percent: 48.54
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1 PPM;5 STEL
ACGIH TLV: 10 PPM
------------------------------------
Proprietary: NO
Ingredient: ACENAPHTHENE (SARA III)
Ingredient Sequence Number: 03
Percent: 0.182
NIOSH (RTECS) Number: AB1000000
CAS Number: 83-32-9
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
------------------------------------
Proprietary: NO
Ingredient: ACENAPHTHYLENE (SARA III)
Ingredient Sequence Number: 04
Percent: 0.182
NIOSH (RTECS) Number: AB1254000
CAS Number: 208-96-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
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Proprietary: NO
Ingredient: ANTHRACENE (SARA III)
Ingredient Sequence Number: 05
Percent: 0.182
NIOSH (RTECS) Number: CA9350000
CAS Number: 120-12-7
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZ[A]ANTHRACENE (SARA III)
Ingredient Sequence Number: 06
Percent: 0.182
NIOSH (RTECS) Number: CV9275000
CAS Number: 56-55-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZ(E)ACEPHENANTHRYLENE; (BENZO[B]FLUORANTHENE) (SARA III)
Ingredient Sequence Number: 07
Percent: 0.182
NIOSH (RTECS) Number: CU1400000
CAS Number: 205-99-2
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

✓ Proprietary: NO
Ingredient: BENZO(K)FLUORANTHENE (SARA III)
Ingredient Sequence Number: 08
Percent: 0.182
NIOSH (RTECS) Number: DF6350000
CAS Number: 207-08-9
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZO[GHI]PERYLENE (SARA III)
Ingredient Sequence Number: 09
Percent: 0.182
NIOSH (RTECS) Number: DI6200500
CAS Number: 191-24-2
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

✓ Proprietary: NO
Ingredient: BENZO[A]PYRENE (SARA III)
Ingredient Sequence Number: 10
Percent: 0.182
NIOSH (RTECS) Number: DJ3675000
CAS Number: 50-32-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: CHRYSENE (SARA III)
Ingredient Sequence Number: 11
Percent: 0.182
NIOSH (RTECS) Number: GC0700000
CAS Number: 218-01-9
OSHA PEL: 0.2 MG/M3
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: DIBENZ[A,H]ANTHRACENE
Ingredient Sequence Number: 12
Percent: 0.182
NIOSH (RTECS) Number: HN2625000
CAS Number: 53-70-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FLUORANTHENE (SARA III). LD50 (ORAL,RAT): 2000 MG/KG.
Ingredient Sequence Number: 13
Percent: 0.182
NIOSH (RTECS) Number: LL4025000
CAS Number: 206-44-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FLUORENE (SARA III)
Ingredient Sequence Number: 14
Percent: 0.182
NIOSH (RTECS) Number: LL5670000
CAS Number: 86-73-7
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: INDENO[1,2,3-CD]PYRENE (SARA III)
Ingredient Sequence Number: 15
Percent: 0.182
NIOSH (RTECS) Number: NK9300000
CAS Number: 193-39-5
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: NAPHTHALENE (SARA III). LD50 (ORAL,RAT): 1780 MG/KG.
Ingredient Sequence Number: 16
Percent: 0.182
NIOSH (RTECS) Number: QJ0525000
CAS Number: 91-20-3
OSHA PEL: 10 PPM;15 PPM STEL
ACGIH TLV: 10 PPM;15 PPM STEL

Proprietary: NO
Ingredient: PHENANTHRENE (SARA III). LD50 (ORAL,RAT): 700 MG/KG.
Ingredient Sequence Number: 17
Percent: 0.182
NIOSH (RTECS) Number: SF7175000
CAS Number: 85-01-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: PYRENE (SARA III)
Ingredient Sequence Number: 18
Percent: 0.182
NIOSH (RTECS) Number: UR2450000
CAS Number: 129-00-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: SUPDAT: 207-08-9, AND 193-39-5, IARC VOL SUP7, P56, 1987 (FP

N).
Ingredient Sequence Number: 19
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 19:BENZ(A)ANTHRACENE:IARC MONOGRAPHS, SUPPLEMENT, VOL 7, PG 56, 1987:GROUP 2A. NTP 7TH ANNUAL RPT ON (ING 19)
Ingredient Sequence Number: 20
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 20:CARCINS, 1994:ANTIC TO BE CARCIN. BLENO(1,2,3-CO) PYRENE, BENZO(K)FLUORANTHENE, BEN(E)ACEPHENANTHYRYLENE: (ING 22)
Ingredient Sequence Number: 21
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 21:IARC MONO, SUPP, VOL 7, PG56, 1987:GROUP 2B. NTP 7TH ANNUAL RPT ON CARCINS, 1994:ANTIC TO BE CARCIN.
Ingredient Sequence Number: 22
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: LIQUID

Fire and Explosion Hazard Data

Flash Point: NOT APPLICABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER, OR WATER SPRAY.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HCL AND PHOSGENE (FP N).

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZERS.
Hazardous Decomp Products: HCL, PHOSGENE (FP N).
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENTS.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CONTAINS CARCINOGEN(S) OR CANCER SUSPECT AGENT(S). TOXIC; IRRITANT. ALL CHEMS SHOULD BE CONSIDERED HAZARDOUS-DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. CHLOROCARBON MATERIALS HAVE PRODUCED SENSITIZATION OF MYOCARDIUM TO EPINEPHRINE IN LABORATORY ANIMALS AND COULD

HAVE SIMILAR EFFECT IN HUMANS. (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: METHYLENE CHLORIDE: CAS # 56-55-3, 205-99-2, 207-08-9, 50-32-8, 53-70-3, 193-39-5 ANTIC TO BE CARCINOGEN AND (SUPDAT)
Signs/Symptoms Of Overexp: HEALTH HAZARDS: ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY OR CHRONICALLY EXPOSED TO CHLOROCARBONS (FP N).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE: FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT REMOVE TO FRESH AIR. GIVE OXYGEN, IF NECESSARY. CONTACT PHYSICIAN. INGESTION: CALL MD IMMEDIATELY (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DUE TO SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. LEAKING BOTTLE MAY BE PLACED IN PLASTIC BAG AND NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR SAND.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS CONCERNING DISPOSAL.
Precautions-Handling/Storing: KEEP TIGHTLY CLOSED, AND STORE IN A COOL, DRY PLACE.
Other Precautions: MATL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN SAFE HNDLG OF HAZ CHEMS. NO SMOKING IN AREA OF USE. DO NOT USE IN GENERAL VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFS. HEAT &/OR UV RADIA MAY CAUSE FORM OF HCL &/OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: GENERAL VENTILATION SUFFICIENT TO KEEP AIRBORNE CONCENTRATION BELOW CURRENT EXPOSURE LIMITS (FP N).
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APRV CHEM WORK GOG&FULL LGTH FCSHLD
Other Protective Equipment: CHEMICAL RESISTANT CLOTHING SUCH AS LABORATORY COAT AND/OR A RUBBER APRON TO PREVENT CONTACT WITH EYES, SKIN, & CLTHG.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER. CARCIN COMMENTS: SARCOMAGEN (NTP 6TH ANN RPT, 1991); GRP 2B (IARC), BENZENE: KNOWN CARCIN & LEUKEMOGEN (NTP 6TH ANN RPT, 1991); GRP 1 (IARC VOL SUP7, P120, '87), OSHA 29CFR11910.1028, JUL'92), GRP 2A (IARC), CAS #56-55-3, 50-32-8, 53-70-3, GRP 2B, (IARC) CAS #205-99-2, (ING 19)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 06APR93
Label Date: 02APR93
Label Status: G
Common Name: PAH MIXTURE, US-106
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X

Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: KEEP TIGHTLY CLOSED, AND STORE IN A COOL, DRY PLACE. ACUTE: TOXIC; IRRITANT. INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEATS (FP N). ALL CHEMS SHOULD BE CONSIDERED HAZARDOUS-DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. CHRONIC: CANCER HAZARD. METHYLENE CHLORIDE AND BENZENE, CAS #56-55-3, 205-99-2, 50-32-8, 53-70-3, AND 193-39-5, MAY CAUSE LUNG CANCER, SARCOMAS AND OTHER CANCERS (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ULTRA SCIENTIFIC
Label Street: 250 SMITH ST
Label City: NO KINGSTOWN
Label State: RI
Label Zip Code: 02852
Label Country: US
Label Emergency Number: 401-294-9400

CORNELL PDC

Material Safety Data Sheets

Planning Design & Construction

DOD Hazardous Material Information
July, 1998
For Cornell University Convenience Only

CHRYSENE 0.1G CATALOG NO 48565.

FSC: 6810
NIIN: 00N010748
NSN: 681000N0107485
MANUFACTURERS CAGE: 54968
PART NO INDICATOR: A
PART NUMBER TRADE NAME: CHRYSENE 0.1G CATALOG NO 48565.

General Information

ITEM NAME:
MANUFACTURERS NAME: SUPELCO,INC.
MANUFACTURERS STREET: SUPELO PARK
MANUFACTURERS P O BOX:
MANUFACTURERS CITY: BELLEFONTE
MANUFACTURERS STATE: PA
MANUFACTURERS COUNTRY:
MANUFACTURERS ZIP CODE: 16823-0048
MANUFACTURERS EMERG PH: 814-359-3441
MANUFACTURERS INFO PH: 814-359-3441
DISTRIBUTOR VENDOR 1:
DISTRIBUTOR VENDOR 1 CAGE:
DISTRIBUTOR VENDOR 2:
DISTRIBUTOR VENDOR 2 CAGE:
DISTRIBUTOR VENDOR 3:
DISTRIBUTOR VENDOR 3 CAGE:
DISTRIBUTOR VENDOR 4:
DISTRIBUTOR VENDOR 4 CAGE:
SAFETY DATA ACTION CODE:
SAFETY FOCAL POINT: N
RECORD NO FOR SAFETY ENTRY: 001
TOT SAFETY ENTRIES THIS STK: 001
STATUS: SE
DATE MSDS PREPARED: 10MAR88
SAFETY DATA REVIEW DATE: 01MAR89
SUPPLY ITEM MANAGER:
MSDS PREPARERS NAME:
PREPARERS COMPANY:

APPENDIX B

ATTACHMENTS A - E

Attachment A—Site Safety & Health Plan Employee Acknowledgment

Employee Name		
Project Name	Project Location	Project Number

Employee Statement of Acknowledgment

I hereby certify that I have read and that I understand the safety and health guidelines contained in Site Safety and Health Plan for the above-named project.

Employee Signature Date

In the Case of an Emergency, contact::

	Name	Relationship	Phone No.
1.			
2.			

Name of Site Safety Officer Receiving This Form	
Signature of Site Safety Officer	Date

Forward completed form to the Health and Safety Director. Place a copy in project file.

Attachment B—Site Safety & Health Plan
Site Activity and Safety Briefing

Project Name	Project Location	Project Number
Name of Site Safety Officer	Signature of Site Safety Officer	

Who attended the briefing?

Names of BC Employees	Names of Subcontractor(s) employees

What items were discussed?

☐ Site Safety and Health Plan
☐ Specific Accident/Incident
☐ Protective Equipment To Be Used
☐ Emergency Hospital Route
☐ Other ____________________

☐ Hazardous Site Conditions/Activities
☐ Changes/Solutions to Specific Accident(s)
☐ Location of Emergency Telephone Number
☐ Work Schedule

Do any items require assistance from BC Health and Safety Staff? (If yes, describe the item and type of assistance required.)

☐ YES ☐ NO

Forward a copy of this form to Health & Safety Director. Place completed form in project file

Attachment C—Site Safety & Health Plan
Safety Plan Implementation Checklist

Project Name	Project Location (city and state)	Date
Name of Site Safety Officer	Weather Conditions	Project Number

BC Staff Present Name ______________________ Office ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

Indicate the status of each of the following.

1.	Is a copy of the Site Safety and Health Plan (SSHP) on site?	☐ YES	☐ NO	☐ N/A
2.	Is the personal protective equipment required by the SSHP available and being used correctly?	☐ YES	☐ NO	☐ N/A
3.	Have the work zones been delineated?	☐ YES	☐ NO	☐ N/A
4.	Has a decontamination station been set up as required by the SSHP?	☐ YES	☐ NO	☐ N/A
5.	Are the decontamination procedures being followed?	☐ YES	☐ NO	☐ N/A
6.	Is access to the exclusion zone being controlled?	☐ YES	☐ NO	☐ N/A
7.	Has the site activities briefing and tailgate safety meeting been provided?	☐ YES	☐ NO	☐ N/A
8.	Is the list of emergency telephone numbers posted at the support zone?	☐ YES	☐ NO	☐ N/A
9.	Are directions to nearest emergency medical assistance posted at the support zone?	☐ YES	☐ NO	☐ N/A
10.	Is emergency equipment available and functional, as required by the SSHP?	☐ YES	☐ NO	☐ N/A
11.	Has the nearest toilet facility been identified or a portable facility been set up?	☐ YES	☐ NO	☐ N/A
12.	Has an adequate supply of drinking water been provided?	☐ YES	☐ NO	☐ N/A
13.	Has water for decontamination been provided?	☐ YES	☐ NO	☐ N/A
14.	Have the instruments for environmental and exposure monitoring been calibrated and set up as required by the SSHP?	☐ YES	☐ NO	☐ N/A
15.	Are the instruments being used properly and periodically checked during the shift for battery charge status?	☐ YES	☐ NO	☐ N/A
16.	Have trenches and excavations been clearly marked?	☐ YES	☐ NO	☐ N/A
17.	Have trenches and excavations been shored or sloped as required by soil type and work activities?	☐ YES	☐ NO	☐ N/A
18.	Are dust suppression measures being used?	☐ YES	☐ NO	☐ N/A
19.	Is food and tobacco consumption being restricted to the support zone?	☐ YES	☐ NO	☐ N/A
20.	Has a confined space been identified as part of this project?	☐ YES	☐ NO	☐ N/A
21.	Are the confined space entry procedures being correctly implemented?	☐ YES	☐ NO	☐ N/A
22.	Has the work/rest cycle for the shift been established? TIME ON (minutes): ____________ TIME OFF (minutes): ____________	☐ YES	☐ NO	☐ N/A
23.	Has a shaded rest area been set up in the support zone?	☐ YES	☐ NO	☐ N/A

Attachment D
Notice of Unsafe Conditions

Contractor	Date
Project Name	Project Number

THIS NOTICE...

This notice is to advise you, the prime Contractor on the above-named Contract, that this Representative of the Owner of the above-mentioned Project has observed (on the date shown above) an unsafe condition on the Projec

These conditions are listed as follows:

ITEM	CONDITION

By this Notice, the Owner or its Representatives shall not assume any responsibility under the GENERAL CONDITIONS or assume any liability for the existence or correction thereof, for the unsafe conditions, or any others that may have been unnoticed.

These conditions shall be remedied as soon as possible within a safe working period. If these corrections are not made, the Owner will be forced to remove all field staff from the job. No payment shall be made for any work installed after this date without first examination of work in accordance with the GENERAL CONDITIONS.

Signature of Owner's Representative	Title	Date
Received by (Signature of Contractor's Representative)	Title	Date

Place a copy of completed form in project file.

Attachment E—Site Safety & Health Plan
Environmental Monitoring Documentation

Project Name	Project Number
Employee Name	Project Location

Equipment Used (check as appropriate)

	Calibrated	Date	Used	Date(s)
OVA (Organic Vapor Analyzer)/FID	☐	________________	☐	________________
OVM (Organic Vapor Monitor)/PID	☐	________________	☐	________________
HNU	☐	________________	☐	________________
TLV Sniffer	☐	________________	☐	________________
Photovac TIP	☐	________________	☐	________________
Combustible Gas Meter/Explosimeter	☐	________________	☐	________________
Other ________________	☐	________________	☐	________________

Instrument	Date	Time	Readout Value	Area Monitored	Changes in PPE			User's Initial
					YES	NO	Type of PPE	

Place completed form in project file

APPENDIX C

EMERGENCY CONTACT NUMBERS

HOBBS, NEW MEXICO

4001 S. Hwy 18, 88240, District 30
(505) 393-7726

EMERGENCY NUMBER		911
Request for Fire, Sheriff, and Paramedics		
LEPC		
Lea County		(505) 397-9231
300 N. Turner		
Hobbs, NM 88240		
Attn: David Hooten		
FIRE DEPARTMENT:		911
Hobbs Fire Department		
301 E. White Street		(505) 397-7252
Hobbs, NM 88240		
HOSPITAL:		
Lea County Regional Hospital		(505) 392-6581
5419 Lovington Hwy.		
Hobbs, NM 88240		
NATIONAL RESPONSE CENTER		(800) 424-8802
EMERGENCY RESPONSE CENTER		
CHEMTREC		(800) 424-9300
CHEMICAL REFERRAL CENTER		(800) 262-8200
PLANT/DISTRICT CONTACTS:		
Allan Childs		
Robert Middleton		(505) 392-1230
164 Stonecrest Court #50		
Hobbs, NM 88240		
SUGGESTED LOCAL NUMBERS:		
Vacuum Truck:	AA Oilfield Service	(505) 392-2577
	Rowland Truckin	(505) 397-4994
Wrecker:	P&W Wrecker	(505) 393-3715

GW-199

Environmental Technology Group, Inc.
E T
Environmental Consulting & Remediation Services

November 12, 2002

Mr. Wayne Price
Energy, Minerals and Natural Resources Department
Oil Conservation Division (OCD)
2040 South Pacheco
P.O. Box 6429
Santa Fe, New Mexico 87505-5472

RECEIVED
NOV 21 2002
Environmental Bureau
Oil Conservation Division

RE: Request for Backfill of Area 3
Champion Technologies, Inc., Hobbs, New Mexico Facility

Dear Mr. Price:

Environmental Technology Group, Inc. (ETGI) on behalf of Champion Technologies, Inc. (Champion) has completed excavation activities in Area 3 at Champions facility in Hobbs (Lea County), New Mexico. ETGI requests permission (on behalf of Champion) to backfill Area 3 excavations located southwest of the bulk tank and drum storage area (please refer to Figure 1). The excavated materials have been sent to a New Mexico Oil Conservation Division (NMOCD) approved facility (J & L Landfarm, Inc., Hobbs, New Mexico). Upon completion of backfill activities in Area 3, Champion Technologies will begin construction of a new concrete bulk and drum storage containment area on this location (due to site layout and existing infrastructure, Champion has identified this area as the optimal location for the new chemical containment pad). The construction of a new bulk and drum storage area will allow Champion to relocate the existing chemical storage tanks, allowing continuation of remedial activities associated with Area 2.

ETGI collected bottom and sidewall confirmation samples to illustrate the removal of the contaminated material (Figure. 2). These samples were analyzed for Water Quality Control Commission (WQCC) Metals, Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl benzene, Xylenes (BTEX) and General Chemistry parameters. Table 1 lists confirmation samples that were analyzed for WQCC Metals. Table 2 lists confirmation samples that were analyzed for TPH and BTEX constituents and Table 3 lists samples that were analyzed for General Chemistry parameters. Laboratory analytical reports and chain-of-custody documentation is enclosed as Attachment A.

CHROMIUM

To demonstrate that impacted materials have been removed, analytical data collected from Area 3 was compared to background sample data and risk based cleanup action levels. Background soil concentrations for chromium were researched by reviewing existing publications. Published data indicates background chromium concentrations in soil can range from 5-150 milligrams per kilograms (mg/kg), with an average reported at 50 mg/kg. (Risk Assessment Information

Systems from work sponsored by US Department of Energy (DOE) Office of Environmental Management, Attachment B).

Site-specific background soil samples were collected and analyzed for chromium. These samples showed chromium concentrations ranging from 2.1 mg/kg to 20.1 mg/kg (Table 4 – Attachment C).

A search for information on background concentrations, action levels and cleanup goals at chromium contaminated sites listed in the US Environmental Protection Agency (US EPA) Records of Decision Systems (RODS) (http://cfpub.epa.gov/superrods/srchrods.cfm) was as well performed. The search yielded 1,085 relevant records. ETGI screened 150 of these 1,085 records and found 21 records containing data on chromium concentrations in soils for background levels, action levels, screening levels or cleanup levels. These cleanup levels and action levels are based on risk to human health and the environment and undergo extensive regulatory and public screening and review. Chromium background concentrations reported in the reviewed RODS sites illustrated chromium background concentrations ranging from 26.1 mg/kg to 200 mg/kg. Risk based action levels and cleanup goals for chromium concentrations protective of human health and groundwater protection ranged from 92.7 mg/kg to 463 mg/kg. Risk based chromium concentrations protective of human health via dermal contact ranged from 1350 mg/kg to 5,300 mg/kg. A summary of the RODS sites reviewed is enclosed as Attachment D.

This data is similar to the data presented in Table A-1 in Appendix A of the document titled, *New Technical Background Document for Development of Soil Screening Levels prepared by the New Mexico Environmental Department, Hazardous Waste Bureau and Groundwater Quality Bureau, Voluntary Cleanup Program.* Specifically the residential soil screening levels for chromium III is 100,000 mg/kg and for chromium VI is 230 mg/kg.

Based on the data above, ETGI proposes establishing background chromium concentrations as <50 mg/kg chromium at the Champion Hobbs Facility. Utilizing this site specific background concentration, Champion requests approval to backfill Area 3 where the maximum chromium concentrations detected for all sidewall and bottom samples was12.9 mg/kg.

Additional support for this request is seen in the Synthetic Precipitation Leaching Procedure (SPLP) analytical data that illustrates soil concentrations of Chromium at 3.56 mg/kg do not leach chromium at concentrations above the method detection limit of 0.005 mg/kg (Table 5). The complete analytical report is enclosed in Attachment E.

CHLORIDES

Chloride concentrations in soil samples collected from sidewall and bottom samples ranged from 103 mg/kg to 7620 mg/kg. Total chloride analysis of Soil Sample #4, #8, #11 and #27 showed chloride concentrations at 6990 mg/kg, 738 mg/kg, 145 mg/kg and 837 mg/kg respectively (Table 5, Attachment E). SPLP chloride analysis of these same samples showed 520 mg/l, 128 mg/l, 33.6 mg/l and 240 mg/l respectively (Table 5, Attachment E). This data indicates the potential of chlorides to leach out from the soil based on the SPLP analysis. However, a review of the SPLP analytical method states that the solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. This type of condition is not representative of the subsurface conditions where the volume of water below 5 feet is less than 10% of the volume of soil (moisture content is 8.9%, Attachment F).

This moisture content of the soil clearly illustrates the lack of fluid in the subsurface soil to cause leaching. This is further evident when reviewing background chloride concentrations in soil and groundwater. Background soil chloride concentrations range from 92 mg/kg to 3388 mg/kg (SB-55 40', and SB-35 1315-A, Attachment C, Table 4) and background chloride concentrations in groundwater range from 239 mg/l to 408 mg/l (MW-7 and MW-1, Attachment C, Table 4). Samples collected from soil boring SB-35 contained the highest chloride concentrations in soil. This boring was converted into Monitor Well MW-7. The groundwater was then sampled for chlorides, which contained 239 mg/l, the lowest concentration of chlorides among the background monitor wells sampled (Table 4). This data illustrates the chloride concentrations in the soil do not relate to chloride concentrations in the groundwater. Subsequently, chloride concentrations in soil are not considered as a contaminant of concern at this site, as the mechanism for leaching chlorides over fifty feet to groundwater does not exist.

Further review of site-specific conditions demonstrates that topography is nearly flat with a 0-3% slope toward the northwest side of the facility. There are no natural or man-made depressions on the Champion yard that would impound surface water and allow for significant infiltration. The site-specific geology as evidenced by numerous soil borings and monitor well installations is that a hard dry compacted caliche gravel and asphalt surface exists to a depth of approximately 18 inches. The surface yard cover is underlain by a hard, indurated dry caliche and sand to a depth of approximately 8 feet. Below 8 feet are several layers of hard to extremely hard calcic and silicic layers alternating with thin cemented sand zones that do not show significant evidence of fluid transport. This lithology extends to the static water table (approximately 57 feet). The annual rainfall in this area of Lea County, New Mexico averages 12-16 inches with evaporation rates of 45 to 49 inches, yielding compelling evidence that the primary transportation mechanism for moving a constituent through the soil profile is absent.

HYDROCARBONS

TPH detected in the sidewalls and bottom samples of excavated Area 3 ranged from less than the detection limit of 10 mg/kg to 496 mg/kg (Table 2). Review of draft New Mexico Environmental Department (NMED) TPH Cleanup Guidelines (Attachment G) specifies residential direct exposure concentration of 800 mg/kg to 2500 mg/kg for petroleum products ranging from Diesel #2 to waste oil. These TPH cleanup guidelines must be used in conjunction with cleanup levels for target analytes referenced in Table 3 of this NMED guidance document.

Although confirmation samples collected from the sidewalls and bottom of the Area 3 excavation were not analyzed for the analytes listed in Table 3 of the above referenced document, sample SB-41 at 25', collected in Area 2 represents one of the highest concentrations of TPH detected in any Area of concern. Thus, this "worst-case" scenario of hydrocarbon impacted material was analyzed for Semi Volatile Organic Compound (SVOC) and Volatile Organic Compounds (VOC) (Attachment H). Concentrations reported from the SB-41 25' for the specific compounds referenced in Table 3 (of the guideline document) were all below the NMOCD Residential Soil Screening Level. Based on these NMED cleanup standards, the residual TPH concentration in the sidewalls and bottoms of the Area 3 excavation are below NMED cleanup levels.

Based on the data presented above and attached analytical data and researched materials, ETGI requests NMOCD's approval to back fill the excavations associated with Area 3, in order to continue with remedial activities associated with Area 2. Upon receipt of NMOCD's approval, ETGI will backfill the excavation and proceed with construction of the new bulk and drum storage area on this location.

Upon your review of this letter and data enclosed should you have any questions or concerns please feel free to contact us.

Sincerely

for

Todd K Choban

Chan Patel
Senior Project Manager
(281) 484-3595

Todd Choban
Geologist/Senior Project Manager
(915) 522-1139

Cc: Ralph Corry, Champion Technologies, Inc.-Fresno, Texas
Melvin Davis, Champion Technologies, Inc.- Fresno, Texas
Larry Johnson, Oil Conservation Division- Hobbs, New Mexico

ATTACHMENT A

AREA 3 CONFIRMATION SAMPLE ANALYTICAL LABORATORY REPORTS

Table 1

CONCENTRATIONS OF METALS IN WATER/SOIL

Champion Technologies
Hobbs Facility
Hobbs, New Mexico
ETGI Project #CH2100

All soil concentrations are in mg/kg
All water concentrations are in mg/L

SAMPLE DATE	SAMPLE LOCATION	SAMPLE MATRIX	EPA SW846-6010B, 7471A, 6020															
			Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Potassium	Selenium	Silver	Sodium	Zinc
07/25/02	S.S. 1 Wall 5'	Soil	1.61	79.2	0.403	107,000	12.9	1.57	2,450	1.94	2,070	15.7	<0.10	288	<0.320	<0.160	2,220	23.3
07/25/02	S.S. 2 Wall 8'	Soil	1.89	101	0.492	62,000	4.42	2.15	3,240	1.24	4,140	18.2	<0.10	261	<0.320	<0.160	2,450	11.3
07/25/02	S.S. 3 Wall 3'	Soil	4.34	758	0.34	166,000	2.1	1.71	1,240	<0.880	2,020	14.3	<0.10	504	<0.320	<0.160	8,160	10.9
07/25/02	S.S. 4 Wall 3'	Soil	3.42	210	0.329	156,000	1.99	1.9	2,060	1.12	2,300	16.2	<0.10	760	<0.320	<0.160	6,600	10.4
07/25/02	S.S. 5 Wall 3'	Soil	2.12	385	0.54	141,000	3.45	2.5	2,950	1.29	2,300	24.4	<0.10	340	<0.320	<0.160	3,110	10.8
07/25/02	S.S. 6 Wall 4'	Soil	1.2	355	0.325	184,000	2.54	1.77	2,180	1.97	1,630	15.2	<0.10	314	<0.320	<0.160	2,620	14.8
07/25/02	S.S. 7 Wall 4'	Soil	2.65	231	0.458	117,000	2.9	2.5	2,900	1.42	2,220	21.8	<0.10	503	<0.320	<0.160	4,730	11.4
07/25/02	S.S. 8 Wall 4'	Soil	1.8	241	0.257	185,000	2.11	1.63	1,380	1.06	2,350	16.8	<0.10	271	<0.320	<0.160	5,090	6.41
07/25/02	S.S. 9 Wall 4'	Soil	1.55	214	0.421	164,000	2.54	1.31	2,660	1.18	2,100	20	<0.10	363	<0.320	<0.160	3,520	7.3
07/25/02	S.S. 10 Wall 4'	Soil	2.03	219	0.172	214,000	1.81	1.28	1,150	<0.880	1,700	8.76	<0.10	197	<0.320	<0.160	3,120	4.84
07/25/02	S.S. 11 Btm 6'	Soil	1.44	100	0.757	78,300	5.18	1.85	5,060	2.06	2,550	31.9	<0.10	225	<0.320	<0.160	1,110	13.2
07/25/02	S.S. 12 Btm 10'	Soil	1.55	126	0.576	84,600	3.35	1.46	3,420	1.49	1,600	23.8	<0.10	509	<0.320	<0.160	3,080	9.39
07/25/02	S.S. 13 Btm 4'	Soil	1.6	335	0.724	187,000	5.11	3.49	4,570	1.84	2,270	48.8	<0.10	300	<0.320	<0.160	3,320	14.5
07/25/02	S.S. 14 Btm 10'	Soil	<0.640	263	0.379	61,800	2.03	1.64	2,280	0.946	3,490	17.7	<0.10	345	<0.320	<0.160	2,140	6.92
07/25/02	S.S. 15 Btm 10'	Soil	0.999		0.466	59,900	4.28	3.09	3,040	3.74	3,000	34.3	<0.10	278	<0.320	<0.160	1,460	13.2
07/25/02	S.S. 16 Btm 4'	Soil	<0.640	534	0.582	77,200	5.6	3.6	3,560	1.59	3,410	26.1	<0.10	454	<0.320	<0.160	2,570	13.4
07/25/02	S.S. 17 Btm 8'	Soil	1.24	233	0.534	64,000	3.04	1.63	3,300	1.08	2,380	16.1	<0.10	280	<0.320	<0.160	1,790	9.17
07/25/02	S.S. 18 Btm 8'	Soil	<0.640	274	0.681	130,000	10.4	2.61	4,510	2.97	2,860	29.3	<0.10	395	<0.320	<0.160	2,580	21.6
07/25/02	S.S. 19 Wall 4'	Soil	1.82	216	0.344	212,000	2.64	3.28	2,820	1.53	2,750	20.2	<0.10	262	<0.320	<0.160	3,100	13.3
07/25/02	S.S. 20 Wall 4'	Soil	1.51	155	0.296	184,000	1.92	1.9	271	<0.880	5,750	15	<0.10	442	<0.320	<0.160	4,320	7.58
07/25/02	S.S. 21 Wall 4'	Soil	0.992	133	0.293	240,000	1.7	0.573	2,070	1.14	2,200	19.7	<0.10	586	<0.320	<0.160	1,590	6.49
07/25/02	S.S. 22 Wall 4'	Soil	<0.640	120	0.255	149,000	1.59	0.633	1,690	1.34	2,070	14.2	<0.10	364	<0.320	<0.160	1,520	6.08
07/25/02	S.S. 23 Wall 4'	Soil	<0.640	567	0.443	85,100	2.48	1.55	3,290	1.82	2,040	15.4	<0.10	341	<0.320	<0.160	1,750	8.56
07/25/02	S.S. 24 Wall 5'	Soil	<0.640	492	0.537	102,000	4.66	2.73	3,420	2.88	6,330	26.6	<0.10	778	<0.320	<0.160	1,070	15.3
07/25/02	S.S. 25 Btm 5'	Soil	<0.640	358	0.418	168,000	2.71	3.05	2,850	<0.880	4,960	20	<0.10	271	<0.320	<0.160	1,270	8.28
07/25/02	S.S. 26 Btm 5'	Soil	2.29	271	0.5	125,000	2.59	1.88	3,230	0.955	8,600	21.3	<0.10	573	<0.320	<0.160	3,680	9.14
07/25/02	S.S. 27 Btm 5'	Soil	<0.640	143	0.658	90,800	4.29	1.77	4,320	1.65	5,680	24.7	<0.10	586	<0.320	<0.160	5,120	11.4
07/25/02	S.S. 28 Btm 5'	Soil	<0.640	235	0.452	190,000	3.16	1.96	2,820	2.07	3,200	23.4	<0.10	755	<0.320	<0.160	1,220	14.6

Table 2

CONCENTRATIONS OF TPH & BTEX IN SOIL

Champion Technology, Inc.
Hobbs Facility
Hobbs, New Mexico
ETGI Project #CH2100

All concentrations are in mg/kg

SAMPLE DATE	SAMPLE LOCATION	EPA 418.1	Method 8015 Modified			SW 846-8021B, 5030				
		TPH	TPH C_6-C_{10}	TPH >C_{10}-C_{35}	TPH C_6-C_{35}	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	BTEX
07/25/02	SB-41 25'	28000	5140	8220	13360					
07/26/02	SB-41 39'	3900	678	1320	1998					
07/25/02	S.S. 1 Wall 5'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 2 Wall 8'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 3 Wall 3'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 4 Wall 3'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 5 Wall 3'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 6 Wall 4'	**198**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 7 Wall 4'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 8 Wall 4'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 9 Wall 4'	30.6				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 10 Wall 4'	11.6				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 11 Btm 6'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 12 Btm 10'	**496**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 13 Btm 4'	**29.4**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 14 Btm 10'	**35.7**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 15 Btm 10'	**78.4**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 16 Btm 4'	**33.1**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 17 Btm 8'	**26.9**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 18 Btm 8'	**229**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 19 Wall 4'	**19.2**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 20 Wall 4'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 21 Wall 4'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 22 Wall 4'	**10.7**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 23 Wall 4'	<10				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 24 Wall 5'	**197**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 25 Btm 5'	**28.1**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 26 Btm 5'	**11.4**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 27 Btm 5'	**12.7**				<0.025	<0.025	<0.025	<0.025	<0.025
07/25/02	S.S. 28 Btm 5'	**45.9**				<0.025	<0.025	<0.025	<0.025	<0.025

Table 3

GENERAL CHEMISTRY

Champion Technology, Inc.
Hobbs Facility
Hobbs, New Mexico
ETGI Project #CH2100

All soil concentrations are in mg/kg
All water concentrations are in mg/L

ANALYTICAL METHODS			340.1/6020	9253/6020	375.4/6020	353.3/6020	9056/6020	300/6020	310.1	9045C	160.1	1030F
SAMPLE DATE	**SAMPLE LOCATION**	**SAMPLE TYPE**	**FLUORIDE**	**CHLORIDE**	**SULFATE**	**NITRATE-N**	**NITRITE**	**BICARBONATE/CARBONATE**	**HYDROXIDE**	**pH**	**TOTAL DISSOLVED SOLIDS**	**ANION/ CATION BALANCE (%)**
07/25/02	S.S. 1 Wall 5'	Soil	<0.02	3280	56	6	<0.025	124/<0.10	<0.10	7.85		
07/25/02	S.S. 2 Wall 8'	Soil	<0.02	2970	237	15.5	<0.025	78/<0.10	<0.10	7.8		
07/25/02	S.S. 3 Wall 3'	Soil	<0.02	3500	90	3	<0.025	96/<0.10	<0.10	7.87		
07/25/02	S.S. 4 Wall 3'	Soil	<0.02	7620	282	<2.5	<0.025	175/<0.10	<0.10	7.88		
07/25/02	S.S. 5 Wall 3'	Soil	<0.02	2390	220	9.5	<0.025	95/<0.10	<0.10	8.28		
07/25/02	S.S. 6 Wall 4'	Soil	<0.02	2300	578	19	<0.025	100/<0.10	<0.10	8.19		
07/25/02	S.S. 7 Wall 4'	Soil	<0.02	3720	455	9	<0.025	225/20	<0.10	8.44		
07/25/02	S.S. 8 Wall 4'	Soil	<0.02	6910	318	25	<0.025	110/<0.10	<0.10	7.99		
07/25/02	S.S. 9 Wall 4'	Soil	<0.02	2660	374	23	<0.025	370/15	<0.10	8.57		
07/25/02	S.S. 10 Wall 4'	Soil	<0.02	2750	280	9	<0.025	215/<0.10	<0.10	7.98		
07/25/02	S.S. 11 Btm 6'	Soil	<0.02	665	328	10	<0.025	60/<0.10	<0.10	8.16		
07/25/02	S.S. 12 Btm 10'	Soil	<0.02	260	485	27	<0.025	225/<0.10	<0.10	8.02		
07/25/02	S.S. 13 Btm 4'	Soil	<0.02	3630	184	17.5	0.04	370/<0.10	<0.10	7.95		
07/25/02	S.S. 14 Btm 10'	Soil	<0.02	2570	7990	16.4	0.055	45/<0.10	<0.10	7.79		
07/25/02	S.S. 15 Btm 10'	Soil	<0.02	975	801	7	<0.025	110/<0.10	<0.10	8.08		
07/25/02	S.S. 16 Btm 4'	Soil	<0.02	4080	517	23	<0.025	45/<0.10	<0.10	7.7		
07/25/02	S.S. 17 Btm 8'	Soil	<0.02	1370	7840	6	<0.025	47/<0.10	<0.10	7.83		
07/25/02	S.S. 18 Btm 8'	Soil	<0.02	1950	7890	8	<0.025	40/<0.10	<0.10	7.88		
07/25/02	S.S. 19 Wall 4'	Soil	<0.02	1600	350	8	0.025	80/<0.10	<0.10	8.47		
07/25/02	S.S. 20 Wall 4'	Soil	<0.02	3370	525	16.5	<0.025	80/10	<0.10	8.43		
07/25/02	S.S. 21 Wall 4'	Soil	<0.02	443	218	<5.0	<0.20	90/70	<0.10	9.38		
07/25/02	S.S. 22 Wall 4'	Soil	<0.02	103	258	<5.0	<0.20	165/110	<0.10	9.7		
07/25/02	S.S. 23 Wall 4'	Soil	<0.02	133	259	<5.0	<0.20	800/100	<0.10	9.46		
07/25/02	S.S. 24 Wall 5'	Soil	<0.02	106	268	42	<0.20	120/20	<0.10	8.85		
07/25/02	S.S. 25 Btm 5'	Soil	<0.02	399	1050	10.5	<0.025	135/10	<0.10	8.7		
07/25/02	S.S. 26 Btm 5'	Soil	<0.02	3190	516	16.5	<0.025	80/5	<0.10	8.24		
07/25/02	S.S. 27 Btm 5'	Soil	<0.02	5500	184	12.5	<0.025	70/<0.10	<0.10	8.09		
07/25/02	S.S. 28 Btm 5'	Soil	<0.02	133	210	<5.0	<0.20	145/40	<0.10	9.49		
7/25/2002	SB-41 25'	Soil	<0.02	162	162	12.4	0.11	409/<0.1	<0.10	8.13		
7/26/2002	SB-41 39'	Soil	<0.02	421	86	4	0.05	200/<0.1	<0.10	8.07		

Table 4

BACKGROUND ANALYTICAL DATA

Champion Technologies
Hobbs Facility
Hobbs, New Mexico
ETGI Project #CH2100

All soil concentrations are in mg/kg
All water concentrations are in mg/L

			ANALYTICAL PARAMETERS								
SAMPLE DATE	**MATRIX**	**SAMPLE ID**	**CHLORIDE**	**ARSENIC**	**CHROMIUM**	**LEAD**	**BENZENE**	**TOLUENE**	**ETHYL BENZENE**	**XYLENE**	**TPH**
09/16/00	**SOIL**	SB-1 - 0001 - A	151	13.7	20.1	23.2					
09/16/00	**SOIL**	SB-2 - 0001 - A	174	17	8.32	10.2					
05/11/01	**SOIL**	SB-35 - 0305 - A	1339	5.46	<5.0	2.77					
05/11/01	**SOIL**	SB-35 - 1315 - A	3388	<5.0	<5.0	2.02					
05/11/01	**SOIL**	SB-35 - 2325 - A	1579	<5.0	<5.0	2.29					
05/11/01	**SOIL**	SB-35 - 3335 - A	1480	<5.0	<5.0	1.71					
10/02/02	**SOIL**	SB-55 5'	249		3.25						
10/02/02	**SOIL**	SB-55 20'	390		3.57						
10/02/02	**SOIL**	SB-55 40'	92		3.19						
10/02/02	**SOIL**	SB-56 5'	33.3		5.62						
10/02/02	**SOIL**	SB-56 20'	13.9		5.57						
10/02/02	**SOIL**	SB-56 40'	61.9		2.8						
10/02/02	**SOIL**	MW-9 5'	73.9	1.84	2.1	1.51					
09/26/02	**SOIL**	MW-15 5'	46.7		5.73						
09/26/02	**SOIL**	MW-15 25'	37.4		2.46						
09/26/02	**SOIL**	MW-15 40'	137		5.88						
08/02/02	**WATER**	MW-1	408	<0.008	0.038	<0.011					
08/02/02	**WATER**	MW-7	239	<0.008	<0.002	<0.011					
08/02/02	**WATER**	MW-9	346	<0.008	0.023	<0.011					

Table 5

SPLP DATA

CHAMPION TECHNOLOGY
HOBBS FACILITY
HOBBS, NEW MEXICO
ETGI Project #CH2100

Unless otherwise stated, all soil concentrations are in mg/kg.
Unless otherwise stated, all water concentrations are in mg/L.

SAMPLE DATE	SAMPLE LOCATION	SAMPLE TYPE	SW-846 6010B	METHOD E300.0	METHOD 1312/6020	METHOD 1312/E300.0
			Total Chromium	Total Chloride	SPLP Chromium	SPLP Chloride
07/20/02	Soil Sample #1	SOIL	3.56		<0.005	
07/20/02	Soil Sample #4	SOIL		6990		520
07/20/02	Soil Sample #8	SOIL		738		128
07/20/02	Soil Sample #11	SOIL		145		33.6
07/20/02	Soil Sample #27	SOIL		837		240

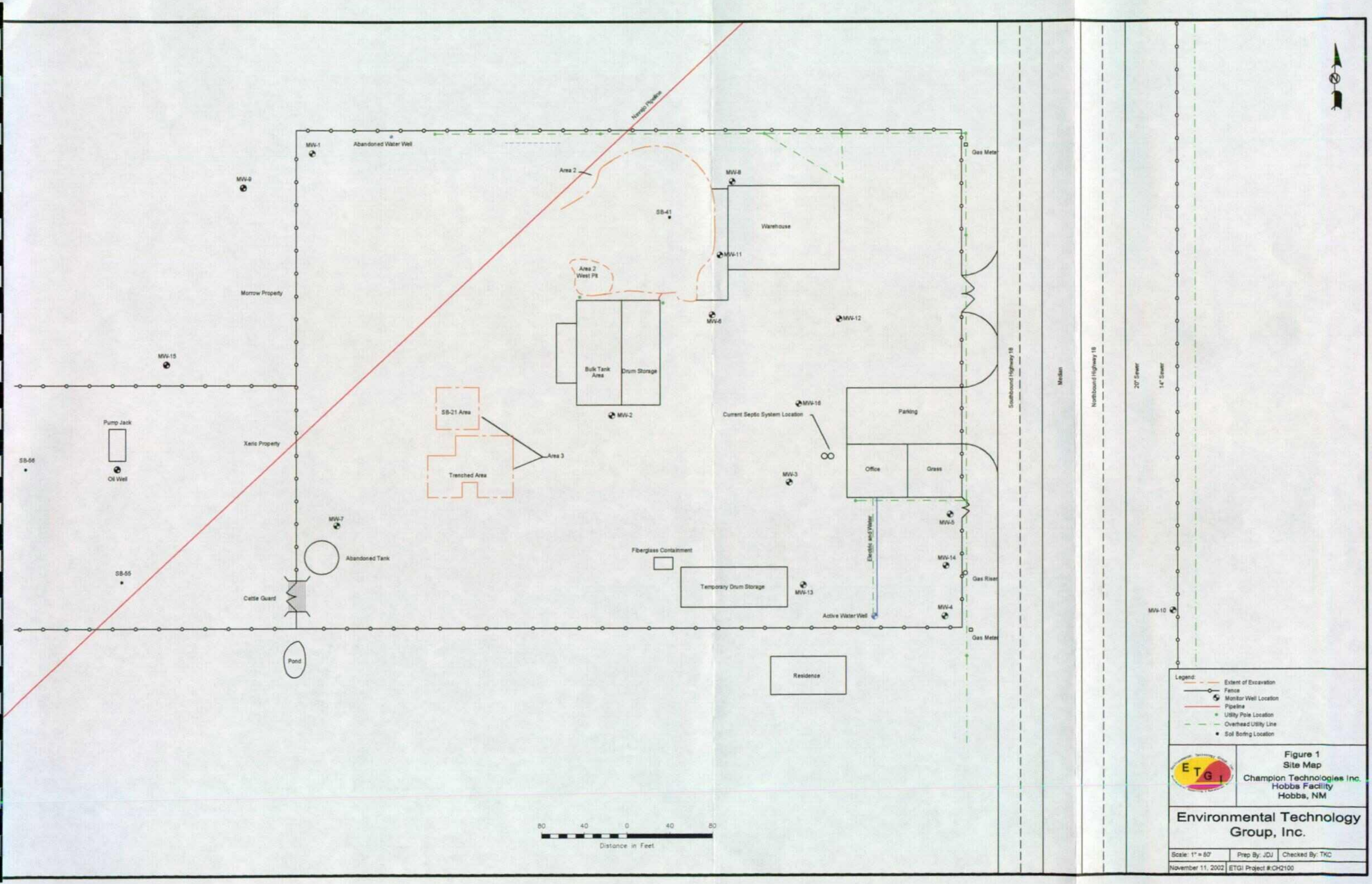
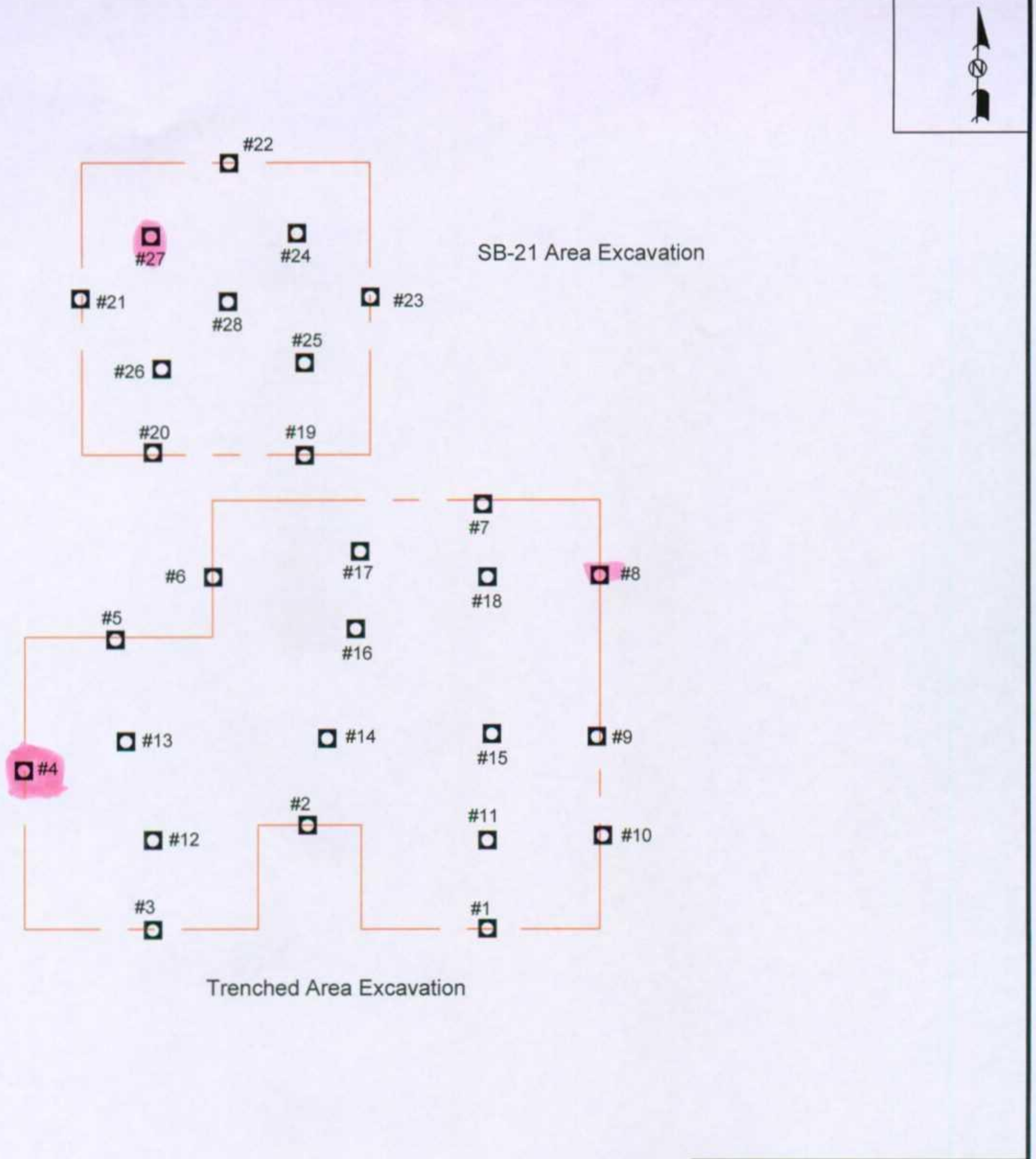


Figure 1
Site Map
Champion Technologies Inc.
Hobbs Facility
Hobbs, NM

Environmental Technology Group, Inc.

Scale: 1" = 80'	Prep By: JDJ	Checked By: TKC
November 11, 2002	ETGI Project #:CH2100	



Legend:

— Extent of Excavation

▣ Soil Sample Location

Figure 2
Area 3 Confirmation
Soil Sample Locations
Champion Technologies Inc.
Hobbs Facility
Hobbs, NM

Environmental Technology Group, Inc.

Scale: 1" = 20'	Prep By: JDJ	Checked By: TKC
November 1, 2002	ETGI Project #:CH2100	

TABLES
&
FIGURES

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-01	South Excavation Stockpile-SS1	SOIL	7/25/02 7:43	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8260B TCLP
8270C Semivolatile Organics - TCLP
METALS RCRA 7 TCLP
RCI
Mercury, TCLP

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-02	South Excavation Stockpile-SS2	SOIL	7/25/02 7:54	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8260B TCLP
8270C Semivolatile Organics - TCLP
METALS RCRA 7 TCLP
RCI
Mercury, TCLP

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-03	S.S. 1 Wall 5'	SOIL	7/25/02 8:45	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.		Order#:	G0204006
P.O. Box 4845		Project:	CH 2100
Midland, TX 79704		Project Name:	Champion Technology Inc.
915-520-4310		Location:	Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative

Selenium
Silver
TPH 418.1 FTIR
Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-04	S.S. 2 Wall 8'	SOIL	7/25/02 8:50	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-05	S.S. 3 Wall 3'	SOIL	7/25/02 9:00	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Cadmium					
	Chromium					
	Copper					
	Fluoride					
	Iron					
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					
	Zinc					
0204006-06	S.S. 4 Wall 3'	SOIL	7/25/02 9:05	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Fluoride
- Iron
- Lead
- Manganese
- Mercury, Total
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- pH
- Selenium

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Silver TPH 418.1 FTIR Zinc					
0204006-07	S.S. 5 Wall 3'	SOIL	7/25/02 9:10	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

0204006-08	S.S. 6 Wall 4'	SOIL	7/25/02 9:15	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Chromium Copper Fluoride Iron Lead Manganese Mercury, Total Nitrogen, Nitrate Nitrogen, Nitrite pH Selenium Silver TPH 418.1 FTIR Zinc					
0204006-09	S.S. 7 Wall 4'	SOIL	7/25/02 9:20	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	TPH 418.1 FTIR Zinc					
0204006-10	S.S. 8 Wall 4'	SOIL	7/25/02 9:25	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Fluoride
- Iron
- Lead
- Manganese
- Mercury, Total
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- pH
- Selenium
- Silver
- TPH 418.1 FTIR
- Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-11	S.S. 9 Wall 4'	SOIL	7/25/02 9:52	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Copper					
	Fluoride					
	Iron					
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					
	Zinc					
0204006-12	S.S. 10 Wall 4'	SOIL	7/25/02 10:02	7/25/02 16:40	4 oz glass	Ice
Lab Testing:		Rejected: No	Temp:	4 C		
	8021B/5030 BTEX					
	Anions					
	Cations					
	Arsenic					
	Barium					
	Cadmium					
	Chromium					
	Copper					
	Fluoride					
	Iron					
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Zinc					
0204006-13	S.S. 11 Btm 6'	SOIL	7/25/02 10:07	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

0204006-14	S.S. 12 Btm 10'	SOIL	7/25/02 10:13	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.		Order#:	G0204006
P.O. Box 4845		Project:	CH 2100
Midland, TX 79704		Project Name:	Champion Technology Inc.
915-520-4310		Location:	Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Fluoride					
	Iron					
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					
	Zinc					
0204006-15	S.S. 13 Btm 4'	SOIL	7/25/02 10:15	7/25/02 16:40	4 oz glass	Ice
	Lab Testing:	Rejected: No	Temp:	4 C		
	8021B/5030 BTEX					
	Anions					
	Cations					
	Arsenic					
	Barium					
	Cadmium					
	Chromium					
	Copper					
	Fluoride					
	Iron					
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					
	Zinc					

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-16	S.S. 14 Btm 10'	SOIL	7/25/02 10:21	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Fluoride
- Iron
- Lead
- Manganese
- Mercury, Total
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- pH
- Selenium
- Silver
- TPH 418.1 FTIR
- Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-17	S.S. 15 Btm 10'	SOIL	7/25/02 10:25	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Fluoride

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Iron					-
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					
	Zinc					
0204006-18	S.S. 16 Btm 4'	SOIL	7/25/02 10:30	7/25/02 16:40	4 oz glass	Ice
	Lab Testing:	Rejected: No	Temp:	4 C		
	8021B/5030 BTEX					
	Anions					
	Cations					
	Arsenic					
	Barium					
	Cadmium					
	Chromium					
	Copper					
	Fluoride					
	Iron					
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					
	Zinc					

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.		Order#:	G0204006
P.O. Box 4845		Project:	CH 2100
Midland, TX 79704		Project Name:	Champion Technology Inc.
915-520-4310		Location:	Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-19	S.S. 17 Btm 8'	SOIL	7/25/02 10:36	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-20	S.S. 18 Btm 8'	SOIL	7/25/02 10:41	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Iron Lead Manganese Mercury, Total Nitrogen, Nitrate Nitrogen, Nitrite pH Selenium Silver TPH 418.1 FTIR Zinc					
0204006-21	S.S. 19 Wall 4'	SOIL	7/25/02 11:55	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.		Order#:	G0204006
P.O. Box 4845		Project:	CH 2100
Midland, TX 79704		Project Name:	Champion Technology Inc.
915-520-4310		Location:	Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-22	S.S. 20 Wall 4'	SOIL	7/25/02 12:04	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Fluoride
- Iron
- Lead
- Manganese
- Mercury, Total
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- pH
- Selenium
- Silver
- TPH 418.1 FTIR
- Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-23	S.S. 21 Wall 4'	SOIL	7/25/02 12:09	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions

Cadmium
Chromium
Copper
Fluoride

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Iron Lead Manganese Mercury, Total Nitrogen, Nitrate Nitrogen, Nitrite pH Selenium Silver TPH 418.1 FTIR Zinc					
0204006-24	S.S. 22 Wall 4'	SOIL	7/25/02 12:15	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-25	S.S. 23 Wall 4'	SOIL	7/25/02 11:50	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Fluoride
- Iron
- Lead
- Manganese
- Mercury, Total
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- pH
- Selenium
- Silver
- TPH 418.1 FTIR
- Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-26	S.S. 24 Btm 5'	SOIL	7/25/02 12:25	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

- 8021B/5030 BTEX
- Anions
- Cations
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Fluoride

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.		Order#:	G0204006
P.O. Box 4845		Project:	CH 2100
Midland, TX 79704		Project Name:	Champion Technology Inc.
915-520-4310		Location:	Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Iron Lead Manganese Mercury, Total Nitrogen, Nitrate Nitrogen, Nitrite pH Selenium Silver TPH 418.1 FTIR Zinc					
0204006-27	S.S. 25 Btm 5'	SOIL	7/25/02 12:37	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.		Order#:	G0204006
P.O. Box 4845		Project:	CH 2100
Midland, TX 79704		Project Name:	Champion Technology Inc.
915-520-4310		Location:	Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-28	S.S. 26 Btm 5'	SOIL	7/25/02 12:41	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204006-29	S.S. 27 Btm 5'	SOIL	7/25/02 12:52	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Iron					
	Lead					
	Manganese					
	Mercury, Total					
	Nitrogen, Nitrate					
	Nitrogen, Nitrite					
	pH					
	Selenium					
	Silver					
	TPH 418.1 FTIR					
	Zinc					
0204006-30	S.S. 28 Btm 5'	SOIL	7/25/02 13:00	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

8021B/5030 BTEX
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

ANALYTICAL REPORT

Prepared for:

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Project: Champion Technology Inc.
Order#: G0204006
Report Date: 07/30/2002

Certificates
US EPA Laboratory Code TX00158

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-03
Sample ID: S.S. 1 Wall 5'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002551-02		7/27/02 3:45	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-04
Sample ID: S.S. 2 Wall 8'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002551-02		7/27/02 4:07	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-05
Sample ID: S.S. 3 Wall 3'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002551-02		7/27/02 4:30	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-06
Sample ID: S.S. 4 Wall 3'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002551-02		7/27/02 4:52	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-07
Sample ID: S.S. 5 Wall 3'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002551-02		7/27/02 5:14	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	<0.025	0.025
Ethylbenzene	<0.025	0.025
Toluene	<0.025	0.025
p/m-Xylene	<0.025	0.025
o-Xylene	<0.025	0.025

Lab ID: 0204006-08
Sample ID: S.S. 6 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002551-02		7/27/02 6:20	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	<0.025	0.025
Ethylbenzene	<0.025	0.025
Toluene	<0.025	0.025
p/m-Xylene	<0.025	0.025
o-Xylene	<0.025	0.025

DL = Diluted N/A = Not RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-09
Sample ID: S.S. 7 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002551-02		7/27/02 7:27	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-10
Sample ID: S.S. 8 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 7:49	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-11
Sample ID: S.S. 9 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 8:11	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-12
Sample ID: S.S. 10 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 8:33	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted   N/A = Not   RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-13
Sample ID: S.S. 11 Btm 6'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 8:55	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-14
Sample ID: S.S. 12 Btm 10'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 9:18	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted   N/A = Not   RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban		Order#:	G0204006
Environmental Technology Group, Inc.		Project:	CH 2100
P.O. Box 4845		Project Name:	Champion Technology Inc.
Midland, TX 79704		Location:	Hobbs, NM

Lab ID: 0204006-15
Sample ID: S.S. 13 Btm 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 9:40	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-16
Sample ID: S.S. 14 Btm 10'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 10:02	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban		Order#:	G0204006
Environmental Technology Group, Inc.		Project:	CH 2100
P.O. Box 4845		Project Name:	Champion Technology Inc.
Midland, TX 79704		Location:	Hobbs, NM

Lab ID: 0204006-17
Sample ID: S.S. 15 Btm 10'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 10:24	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	<0.025	0.025
Ethylbenzene	<0.025	0.025
Toluene	<0.025	0.025
p/m-Xylene	<0.025	0.025
o-Xylene	<0.025	0.025

Lab ID: 0204006-18
Sample ID: S.S. 16 Btm 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 10:46	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	<0.025	0.025
Ethylbenzene	<0.025	0.025
Toluene	<0.025	0.025
p/m-Xylene	<0.025	0.025
o-Xylene	<0.025	0.025

DL = Diluted N/A = Not RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-19
Sample ID: S.S. 17 Btm 8'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 11:08	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-20
Sample ID: S.S. 18 Btm 8'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 11:30	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

Todd Choban
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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-21
Sample ID: S.S. 19 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 11:52	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-22
Sample ID: S.S. 20 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 12:14	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban		Order#:	G0204006
Environmental Technology Group, Inc.		Project:	CH 2100
P.O. Box 4845		Project Name:	Champion Technology Inc.
Midland, TX 79704		Location:	Hobbs, NM

Lab ID: 0204006-23
Sample ID: S.S. 21 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 12:36	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-24
Sample ID: S.S. 22 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 12:58	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

Todd Choban		Order#:	G0204006
Environmental Technology Group, Inc.		Project:	CH 2100
P.O. Box 4845		Project Name:	Champion Technology Inc.
Midland, TX 79704		Location:	Hobbs, NM

Lab ID: 0204006-25
Sample ID: S.S. 23 Wall 4'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 13:20	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-26
Sample ID: S.S. 24 Btm 5'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 13:42	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

Todd Choban		Order#:	G0204006
Environmental Technology Group, Inc.		Project:	CH 2100
P.O. Box 4845		Project Name:	Champion Technology Inc.
Midland, TX 79704		Location:	Hobbs, NM

Lab ID: 0204006-27
Sample ID: S.S. 25 Btm 5'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 14:04	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-28
Sample ID: S.S. 26 Btm 5'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 14:26	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

DL = Diluted N/A = Not RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-29
Sample ID: S.S. 27 Btm 5'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 17:48	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Lab ID: 0204006-30
Sample ID: S.S. 28 Btm 5'

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0002557-02		7/27/02 18:10	1	25	CK	8021B

Parameter	Result mg/kg	RL
Benzene	**<0.025**	0.025
Ethylbenzene	**<0.025**	0.025
Toluene	**<0.025**	0.025
p/m-Xylene	**<0.025**	0.025
o-Xylene	**<0.025**	0.025

Approval:
Raland K. Tuttle, Lab Director, QA Officer Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

DL = Diluted N/A = Not RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-01
Sample ID: South Excavation Stockpile-SS1

METALS RCRA 7 TCLP

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	0.035	mg/L	1	0.008	1311/6010B	07/26/2002	7/29/02	SM
Barium	0.665	mg/L	1	0.001	1311/6010B	07/26/2002	7/29/02	SM
Cadmium	<0.001	mg/L	1	0.001	1311/6010B	07/26/2002	7/29/02	SM
Chromium	<0.002	mg/L	1	0.002	1311/6010B	07/26/2002	7/29/02	SM
Lead	<0.011	mg/L	1	0.011	1311/6010B	07/26/2002	7/29/02	SM
Selenium	0.028	mg/L	1	0.004	1311/6010B	07/26/2002	7/29/02	SM
Silver	<0.002	mg/L	1	0.002	1311/6010B	07/26/2002	7/29/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Mercury, TCLP	<0.002	mg/L	1	0.002	1311/7470	07/26/2002	7/29/02	MB

Lab ID: 0204006-02
Sample ID: South Excavation Stockpile-SS2

METALS RCRA 7 TCLP

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	0.032	mg/L	1	0.008	1311/6010B	07/26/2002	7/29/02	SM
Barium	0.618	mg/L	1	0.001	1311/6010B	07/26/2002	7/29/02	SM
Cadmium	<0.001	mg/L	1	0.001	1311/6010B	07/26/2002	7/29/02	SM
Chromium	0.002	mg/L	1	0.002	1311/6010B	07/26/2002	7/29/02	SM
Lead	<0.011	mg/L	1	0.011	1311/6010B	07/26/2002	7/29/02	SM
Selenium	0.032	mg/L	1	0.004	1311/6010B	07/26/2002	7/29/02	SM
Silver	<0.002	mg/L	1	0.002	1311/6010B	07/26/2002	7/29/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Mercury, TCLP	<0.002	mg/L	1	0.002	1311/7470	07/26/2002	7/29/02	MB

Lab ID: 0204006-03
Sample ID: S.S. 1 Wall 5'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	107000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2070	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	288	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	2220	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Todd Choban
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Midland, TX 79704

Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-03
Sample ID: S.S. 1 Wall 5'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.61	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	79.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.403	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	12.9	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.57	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2450	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.94	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	15.7	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	23.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-04
Sample ID: S.S. 2 Wall 8'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	62000	mg/kg	10000	100	6010B	07/29/2002	7/31/02	SM
Magnesium	4140	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	261	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	2450	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.89	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	101	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.492	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	4.42	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	2.15	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3240	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.24	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	18.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	11.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

N/A = Not Applicable RL = Reporting Limit

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-05
Sample ID: S.S. 3 Wall 3'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	166000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2020	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	504	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	8160	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	4.34	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	758	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.34	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.1	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.71	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	1240	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Lead	< 0.880	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	14.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	10.9	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-06
Sample ID: S.S. 4 Wall 3'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	156000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2300	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	760	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	6600	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	3.42	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	210	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.329	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	1.99	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.9	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2060	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.12	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	16.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-06
Sample ID: S.S. 4 Wall 3'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	10.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-07
Sample ID: S.S. 5 Wall 3'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	141000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2300	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	340	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	3110	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	2.12	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	385	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.54	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	3.45	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	2.5	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2950	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.29	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	24.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	10.8	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-08
Sample ID: S.S. 6 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	184000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	1630	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	314	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	2620	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

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Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-08
Sample ID: S.S. 6 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.2	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	355	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.325	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.54	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.77	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2180	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.97	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	15.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	14.8	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-09
Sample ID: S.S. 7 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	117000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2220	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	503	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	4730	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	2.65	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	231	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.458	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.9	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	2.5	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2900	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.42	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	21.8	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	11.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

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Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-10
Sample ID: S.S. 8 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	185000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2350	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	271	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	5090	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.8	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	241	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.257	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.11	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.63	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	1380	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.06	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	16.8	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	6.41	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-11
Sample ID: S.S. 9 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	164000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2100	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	363	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	3520	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.55	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	214	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.421	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.54	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.31	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2660	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.18	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	20	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB

N/A = Not Applicable   RL = Reporting Limit

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-11
Sample ID: S.S. 9 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	7.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-12
Sample ID: S.S. 10 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	214000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	1700	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	197	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	3120	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	2.03	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	219	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.172	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	1.81	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.28	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	1150	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Lead	< 0.880	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	8.76	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	4.84	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-13
Sample ID: S.S. 11 Btm 6'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	78300	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2550	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	225	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1110	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

N/A = Not Applicable RL = Reporting Limit

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-13
Sample ID: S.S. 11 Btm 6'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.44	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	100	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.757	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	5.18	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.85	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	5060	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	2.06	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	31.9	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	13.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-14
Sample ID: S.S. 12 Btm 10'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	84600	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	1600	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	509	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	3080	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.55	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	126	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.576	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	3.35	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.46	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3420	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.49	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	23.8	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	9.39	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

N/A = Not Applicable RL = Reporting Limit

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-15
Sample ID: S.S. 13 Btm 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	187000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2270	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	300	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	3320	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.6	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	335	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.724	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	5.11	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	3.49	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	4570	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.84	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	48.8	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	14.5	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-16
Sample ID: S.S. 14 Btm 10'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	61800	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	3490	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	345	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	2140	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	263	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.379	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.03	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.64	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2280	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	0.946	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	17.7	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB

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Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-16
Sample ID: S.S. 14 Btm 10'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	6.92	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-17
Sample ID: S.S. 15 Btm 10'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	59900	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	3000	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	278	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1460	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	0.999	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.466	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	4.28	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	3.09	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3040	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	3.74	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	34.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	13.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-18
Sample ID: S.S. 16 Btm 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	77200	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	3410	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	454	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	2570	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-18
Sample ID: S.S. 16 Btm 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	534	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.582	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	5.6	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	3.6	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3560	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.59	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	26.1	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	13.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-19
Sample ID: S.S. 17 Btm 8'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	64000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2380	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	280	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1790	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.24	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	233	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.534	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	3.04	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.63	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3300	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.08	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	16.1	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	9.17	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

N/A = Not Applicable RL = Reporting Limit

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-20
Sample ID: S.S. 18 Btm 8'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	130000	mg/kg	10000	1000	6010B	07/29/2002	7/31/02	SM
Magnesium	2860	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	395	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	2580	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	274	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.681	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	10.4	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	2.61	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	4510	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	2.97	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	29.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/30/2002	7/31/02	SM
Zinc	21.6	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-21
Sample ID: S.S. 19 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	212000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2750	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	262	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	3100	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.82	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	216	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.344	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.64	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	3.28	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2820	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.53	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	20.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB

N/A = Not Applicable RL = Reporting Limit

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-21
Sample ID: S.S. 19 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	13.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-22
Sample ID: S.S. 20 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	184000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	5750	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	442	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	4320	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	1.51	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	155	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.296	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	1.92	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.9	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	271	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Lead	< 0.880	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	15	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	7.58	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-23
Sample ID: S.S. 21 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	240000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2200	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	586	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1590	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

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Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-23
Sample ID: S.S. 21 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	0.992	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	133	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.293	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	1.7	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	0.573	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2070	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.14	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	19.7	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	6.49	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-24
Sample ID: S.S. 22 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	149000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2070	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	364	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1520	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	120	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.255	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	1.59	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	0.633	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	1690	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.34	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	14.2	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	6.08	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

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ANALYTICAL REPORT

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-25
Sample ID: S.S. 23 Wall 4'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	85100	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	2040	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	341	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1750	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	567	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.443	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.48	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.55	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3290	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.82	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	15.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	8.56	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-26
Sample ID: S.S. 24 Btm 5'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	102000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	6330	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	778	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1070	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	492	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.537	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	4.66	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	2.73	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3420	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	2.88	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	26.6	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB

N/A = Not Applicable RL = Reporting Limit

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-26
Sample ID: S.S. 24 Btm 5'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	15.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-27
Sample ID: S.S. 25 Btm 5'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	168000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	4960	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	271	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1270	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	358	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.418	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.71	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	3.05	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2850	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	< 0.880	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	20	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	8.28	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-28
Sample ID: S.S. 26 Btm 5'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	125000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	8600	mg/kg	10000	10.0	6010B	07/29/2002	7/31/02	SM
Potassium	573	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	3680	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-28
Sample ID: S.S. 26 Btm 5'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	2.29	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	271	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.5	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.59	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.88	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	3230	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	0.955	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	21.3	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	9.14	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Lab ID: 0204006-29
Sample ID: S.S. 27 Btm 5'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	90800	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	5680	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	586	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	5120	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	143	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.658	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	4.29	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.77	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	4320	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.65	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	24.7	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	11.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-30
Sample ID: S.S. 28 Btm 5'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	190000	mg/kg	50000	500	6010B	07/29/2002	7/31/02	SM
Magnesium	3200	mg/kg	1000	1.0	6010B	07/29/2002	7/31/02	SM
Potassium	755	mg/kg	100	5.0	6010B	07/29/2002	7/31/02	SM
Sodium	1220	mg/kg	1000	10.0	6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	< 0.640	mg/kg	80	0.640	3051/6010B	07/29/2002	8/1/02	SM
Barium	235	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.452	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	3.16	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Copper	1.96	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	2820	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Lead	2.07	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Manganese	23.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM
Zinc	14.6	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Approval:
Raland K. Tuttle, Lab Director, QA Officer Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-01
Sample ID: South Excavation Stockpile-SS1

RCI

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Ignitability	>100	C	1	NA	1010	7/29/02	SB
pH	7.91	pH Units	1	N/A	9045C	7/26/02	SB
Reactive Cyanide	<0.090	mg/kg	1	0.09	SW846 CH.7	7/27/02	SB
Reactive Sulfide	<5.00	mg/kg	1	5.00	SW846 CH.7	7/27/02	SB

Lab ID: 0204006-02
Sample ID: South Excavation Stockpile-SS2

RCI

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Ignitability	>100	C	1	NA	1010	7/29/02	SB
pH	7.82	pH Units	1	N/A	9045C	7/26/02	SB
Reactive Cyanide	<0.090	mg/kg	1	0.09	SW846 CH.7	7/27/02	SB
Reactive Sulfide	<5.00	mg/kg	1	5.00	SW846 CH.7	7/27/02	SB

Lab ID: 0204006-03
Sample ID: S.S. 1 Wall 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	124	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	3280	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	56.0	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	6.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.85	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-04
Sample ID: S.S. 2 Wall 8'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	78.0	mg/kg	1	2.00	310.1	7/29/02	SB

RL = Reporting Limit N/A = Not Applicable

Todd Choban		**Order#:**	**G0204006**
Environmental Technology Group, Inc.		**Project:**	**CH 2100**
P.O. Box 4845		**Project Name:**	**Champion Technology Inc.**
Midland, TX 79704		**Location:**	**Hobbs, NM**

Lab ID: **0204006-04**
Sample ID: **S.S. 2 Wall 8'**

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	2970	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	237	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	15.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.80	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: **0204006-05**
Sample ID: **S.S. 3 Wall 3'**

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	96.0	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	3500	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	90.0	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	3.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.87	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: **0204006-06**
Sample ID: **S.S. 4 Wall 3'**

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	175	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	7620	mg/kg	1	10	9253	7/30/02	SB

Todd Choban		Order#:	G0204006
Environmental Technology Group, Inc.		Project:	CH 2100
P.O. Box 4845		Project Name:	Champion Technology Inc.
Midland, TX 79704		Location:	Hobbs, NM

Lab ID: 0204006-06
Sample ID: S.S. 4 Wall 3'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	282	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	<2.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.88	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-07
Sample ID: S.S. 5 Wall 3'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	95.0	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	2390	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	220	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	9.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	8.28	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-08
Sample ID: S.S. 6 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	100	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	2300	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	578	mg/kg	1	25	375.4	7/29/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-08
Sample ID: S.S. 6 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	19.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	8.19	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	198	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-09
Sample ID: S.S. 7 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	225	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	20.0	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	3720	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	455	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	9.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	8.44	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-10
Sample ID: S.S. 8 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	110	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	6910	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	318	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	25.0	mg/kg	5	2.5	353.3	7/26/02	RKT

RL = Reporting Limit   N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban		**Order#:**	**G0204006**
Environmental Technology Group, Inc.		**Project:**	**CH 2100**
P.O. Box 4845		**Project Name:**	**Champion Technology Inc.**
Midland, TX 79704		**Location:**	**Hobbs, NM**

Lab ID: 0204006-10
Sample ID: S.S. 8 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.99	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-11
Sample ID: S.S. 9 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	370	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	15.0	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	2660	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	374	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	23.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	8.57	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	30.6	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-12
Sample ID: S.S. 10 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	215	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	2750	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	280	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	9.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.98	pH Units	1	N/A	9045C	7/26/02	MB

RL = Reporting Limit N/A = Not Applicable

Todd Choban
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Midland, TX 79704

Order#:	G0204006
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204006-12
Sample ID: S.S. 10 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
TPH 418.1 FTIR	11.6	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-13
Sample ID: S.S. 11 Btm 6'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	60.0	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	665	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	328	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	10.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	8.16	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-14
Sample ID: S.S. 12 Btm 10'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	225	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	260	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	485	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	27.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	8.02	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	496	mg/kg	1	10.0	418.1	7/29/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
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Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-15
Sample ID: S.S. 13 Btm 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	370	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	3630	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	184	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	17.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	0.040	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.95	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	29.4	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-16
Sample ID: S.S. 14 Btm 10'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	45.0	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	2570	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	7990	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	16.4	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	0.055	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.79	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	35.7	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-17
Sample ID: S.S. 15 Btm 10'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	110	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-17
Sample ID: S.S. 15 Btm 10'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Chloride	975	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	801	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	7.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	8.08	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	78.4	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-18
Sample ID: S.S. 16 Btm 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	45.0	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	4080	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	517	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	23.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.70	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	33.1	mg/kg	1	10.0	418.1	7/29/02	SB

Lab ID: 0204006-19
Sample ID: S.S. 17 Btm 8'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	47.0	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	1370	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

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Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-19
Sample ID: S.S. 17 Btm 8'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
SULFATE, 375.4	7840	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	6.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	RKT
pH	7.83	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	26.9	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-20
Sample ID: S.S. 18 Btm 8'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	40.0	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	1950	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	7890	mg/kg	1	25	375.4	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	8.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	CK
pH	7.88	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	229	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-21
Sample ID: S.S. 19 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	80	mg/kg	1	2.00	310.1	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/29/02	SB
Chloride	1600	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	350	mg/kg	1	25	375.4	7/29/02	SB

RL = Reporting Limit   N/A = Not Applicable

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Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-21
Sample ID: S.S. 19 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	8.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	0.025	mg/kg	5	0.0250	354.1	7/26/02	CK
pH	8.47	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	19.2	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-22
Sample ID: S.S. 20 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	80.0	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	10.0	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	3370	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	525	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	16.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	CK
pH	8.43	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-23
Sample ID: S.S. 21 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	90	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	70.0	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	443	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	218	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	<5.0	mg/kg	10	5.0	353.3	7/26/02	RKT

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
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Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-23
Sample ID: S.S. 21 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Nitrogen, Nitrite	<0.20	mg/kg	10	0.20	354.1	7/26/02	CK
pH	9.38	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-24
Sample ID: S.S. 22 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	165	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	110	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	103	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	258	mg/kg	1	25	375.4	7/31/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	<5.0	mg/kg	10	5.0	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.20	mg/kg	10	0.20	354.1	7/26/02	CK
pH	9.70	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	10.7	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-25
Sample ID: S.S. 23 Wall 4'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	800	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	100	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	133	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	259	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	<5.0	mg/kg	10	5.0	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.20	mg/kg	10	0.20	354.1	7/26/02	CK
pH	9.46	pH Units	1	N/A	9045C	7/26/02	MB

RL = Reporting Limit N/A = Not Applicable

Todd Choban		**Order#:**	**G0204006**
Environmental Technology Group, Inc.		**Project:**	**CH 2100**
P.O. Box 4845		**Project Name:**	**Champion Technology Inc.**
Midland, TX 79704		**Location:**	**Hobbs, NM**

Lab ID: 0204006-25
Sample ID: S.S. 23 Wall 4'

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
TPH 418.1 FTIR	<10.0	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-26
Sample ID: S.S. 24 Btm 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	120	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	20.0	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	106	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	268	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	42.0	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.20	mg/kg	5	0.0250	354.1	7/26/02	CK
pH	8.85	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	197	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-27
Sample ID: S.S. 25 Btm 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	135	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	10.0	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	399	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	1050	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	10.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	CK
pH	8.70	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	28.1	mg/kg	1	10.0	418.1	7/26/02	SB

RL = Reporting Limit N/A = Not Applicable

Todd Choban
Environmental Technology Group, Inc.
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Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-28
Sample ID: S.S. 26 Btm 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	80.0	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	5.0	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	3190	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	516	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	16.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	CK
pH	8.24	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	11.4	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-29
Sample ID: S.S. 27 Btm 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	70.0	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	5500	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	184	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	12.5	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.025	mg/kg	5	0.0250	354.1	7/26/02	CK
pH	8.09	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	12.7	mg/kg	1	10.0	418.1	7/26/02	SB

Lab ID: 0204006-30
Sample ID: S.S. 28 Btm 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	145	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	40.0	mg/kg	1	0.10	310.1	7/28/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204006
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204006-30
Sample ID: S.S. 28 Btm 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Chloride	133	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	210	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	<5.0	mg/kg	10	5.0	353.3	7/26/02	RKT
Nitrogen, Nitrite	<0.20	mg/kg	10	0.20	354.1	7/26/02	CK
pH	9.49	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	45.9	mg/kg	1	10.0	418.1	7/26/02	SB

Approval:
Raland K. Tuttle, Lab Director, QA Officer　　Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

RL = Reporting Limit　　N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8021B/5030 BTEX

Order#: G0204006

BLANK Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Benzene-mg/kg		0002551-02			<0.025			
Benzene-mg/kg		0002557-02			<0.025			
Ethylbenzene-mg/kg		0002551-02			<0.025			
Ethylbenzene-mg/kg		0002557-02			<0.025			
Toluene-mg/kg		0002551-02			<0.025			
Toluene-mg/kg		0002557-02			<0.025			
p/m-Xylene-mg/kg		0002551-02			<0.025			
p/m-Xylene-mg/kg		0002557-02			<0.025			
o-Xylene-mg/kg		0002551-02			<0.025			
o-Xylene-mg/kg		0002557-02			<0.025			

MS Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Benzene-mg/kg		0204001-07	0	0.1	0.092	92.%		
Benzene-mg/kg		0204006-28	0	0.1	0.090	90.%		
Ethylbenzene-mg/kg		0204001-07	0	0.1	0.097	97.%		
Ethylbenzene-mg/kg		0204006-28	0	0.1	0.092	92.%		
Toluene-mg/kg		0204001-07	0	0.1	0.096	96.%		
Toluene-mg/kg		0204006-28	0	0.1	0.092	92.%		
p/m-Xylene-mg/kg		0204001-07	0	0.2	0.204	102.%		
p/m-Xylene-mg/kg		0204006-28	0	0.2	0.194	97.%		
o-Xylene-mg/kg		0204001-07	0	0.1	0.097	97.%		
o-Xylene-mg/kg		0204006-28	0	0.1	0.092	92.%		

MSD Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Benzene-mg/kg		0204001-07	0	0.1	0.084	84.%	9.1%	
Benzene-mg/kg		0204006-28	0	0.1	0.089	89.%	1.1%	
Ethylbenzene-mg/kg		0204001-07	0	0.1	0.088	88.%	9.7%	
Ethylbenzene-mg/kg		0204006-28	0	0.1	0.092	92.%	0.%	
Toluene-mg/kg		0204001-07	0	0.1	0.088	88.%	8.7%	
Toluene-mg/kg		0204006-28	0	0.1	0.092	92.%	0.%	
p/m-Xylene-mg/kg		0204001-07	0	0.2	0.186	93.%	9.2%	
p/m-Xylene-mg/kg		0204006-28	0	0.2	0.195	97.5%	0.5%	
o-Xylene-mg/kg		0204001-07	0	0.1	0.087	87.%	10.9%	
o-Xylene-mg/kg		0204006-28	0	0.1	0.093	93.%	1.1%	

SRM Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Benzene-mg/kg		0002551-05		0.1	0.092	92.%		
Benzene-mg/kg		0002557-05		0.1	0.093	93.%		
Ethylbenzene-mg/kg		0002551-05		0.1	0.094	94.%		
Ethylbenzene-mg/kg		0002557-05		0.1	0.097	97.%		
Toluene-mg/kg		0002551-05		0.1	0.094	94.%		

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

SRM Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Toluene-mg/kg		0002557-05		0.1	0.097	97.%		
p/m-Xylene-mg/kg		0002551-05		0.2	0.197	98.5%		
p/m-Xylene-mg/kg		0002557-05		0.2	0.204	102.%		
o-Xylene-mg/kg		0002551-05		0.1	0.093	93.%		
o-Xylene-mg/kg		0002557-05		0.1	0.098	98.%		

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BLANK Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Bicarbonate Alkalinity-mg/kg		0002564-01			<2.00			
Bicarbonate Alkalinity-mg/kg		0002565-01			<10.0			
Carbonate Alkalinity-mg/kg		0002566-01			<0.10			
Carbonate Alkalinity-mg/kg		0002567-01			<0.10			
Chloride-mg/kg		0002594-01			<5.00			
Chloride-mg/kg		0002608-01			<10.0			
Hydroxide Alkalinity-mg/kg		0002568-01			<0.10			
Hydroxide Alkalinity-mg/kg		0002569-01			<0.10			
SULFATE, 375.4-mg/kg		0002595-01			<0.50			
SULFATE, 375.4-mg/kg		0002609-01			<0.50			

DUPLICATE Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Bicarbonate Alkalinity-mg/kg		0204005-01	409		411		0.5%	
Bicarbonate Alkalinity-mg/kg		0204006-22	80		82.5		3.1%	
Carbonate Alkalinity-mg/kg		0204005-01	0		<0.10		0.%	
Carbonate Alkalinity-mg/kg		0204006-22	10		10		0.%	
Hydroxide Alkalinity-mg/kg		0204005-01	0		<0.10		0.%	
Hydroxide Alkalinity-mg/kg		0204006-22	0		<0.10		0.%	
SULFATE, 375.4-mg/kg		0204005-01	162		165		1.8%	
SULFATE, 375.4-mg/kg		0204006-22	525		520		1.%	

MS Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Chloride-mg/kg		0204005-01	421	1473.75	1640	82.7%		
Chloride-mg/kg		0204006-22	3370	5000	8240	97.4%		

MSD Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Chloride-mg/kg		0204005-01	421	1473.75	1640	82.7%	0.%	
Chloride-mg/kg		0204006-22	3370	5000	8330	99.2%	1.1%	

SRM Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Bicarbonate Alkalinity-mg/kg		0002564-04		0.05	0.0496	99.2%		
Bicarbonate Alkalinity-mg/kg		0002565-04		0.05	0.0496	99.2%		
Carbonate Alkalinity-mg/kg		0002566-04		0.05	0.0496	99.2%		
Carbonate Alkalinity-mg/kg		0002567-04		0.05	0.0496	99.2%		
Chloride-mg/kg		0002594-04		5000	4960	99.2%		
Chloride-mg/kg		0002608-04		5000	4960	99.2%		
Hydroxide Alkalinity-mg/kg		0002568-04		0.05	0.0496	99.2%		
Hydroxide Alkalinity-mg/kg		0002569-04		0.05	0.0496	99.2%		
SULFATE, 375.4-mg/kg		0002595-04		50	49.8	99.6%		
SULFATE, 375.4-mg/kg		0002609-04		50	49.5	99.%		

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BLANK	SOIL	LAB-ID #	Concentr.	Sample	Concentr	Spike	QC Test	Result
Recovery	**Pct (%)**	**RPD**						
	SOIL			.				
Calcium-mg/kg		0002618-02			< 1.0			
Calcium-mg/kg		0002621-02			< 1.0			
Magnesium-mg/kg		0002618-02			< 0.10			
Magnesium-mg/kg		0002621-02			<0.001			
Potassium-mg/kg		0002618-02			< 5.0			
Potassium-mg/kg		0002621-02			< 5.0			
Sodium-mg/kg		0002618-02			< 1.0			
Sodium-mg/kg		0002621-02			< 1.0			

DUPLICATE	SOIL	LAB-ID #	Concentr.	Sample	Concentr	Spike	QC Test	Result
Recovery	**Pct (%)**	**RPD**						
	SOIL			.				
Calcium-mg/kg		0204006-03	107000		106000		0.9%	
Calcium-mg/kg		0204006-23	240000		251000		4.5%	
Magnesium-mg/kg		0204006-03	2070		2120		2.4%	
Magnesium-mg/kg		0204006-23	2200		2210		0.5%	
Potassium-mg/kg		0204006-03	288		281		2.5%	
Potassium-mg/kg		0204006-23	586		600		2.4%	
Sodium-mg/kg		0204006-03	2220		2240		0.9%	
Sodium-mg/kg		0204006-23	1590		1560		1.9%	

SRM	SOIL	LAB-ID #	Concentr.	Sample	Concentr	Spike	QC Test	Result
Recovery	**Pct (%)**	**RPD**						
	SOIL			.				
Calcium-mg/kg		0002618-05		2	2.02	101.%		
Calcium-mg/kg		0002621-05		2	2.29	114.5%		
Magnesium-mg/kg		0002618-05		2	2.12	106.%		
Magnesium-mg/kg		0002621-05		2	2.02	101.%		
Potassium-mg/kg		0002618-05		2	1.88	94.%		
Potassium-mg/kg		0002621-05		2	1.93	96.5%		
Sodium-mg/kg		0002618-05		2	1.90	95.%		
Sodium-mg/kg		0002621-05		2	1.90	95.%		

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BLANK Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/L		0002574-02			<0.008			
Barium-mg/L		0002574-02			<0.001			
Cadmium-mg/L		0002574-02			<0.001			
Chromium-mg/L		0002574-02			<0.002			
Lead-mg/L		0002574-02			<0.011			
Selenium-mg/L		0002574-02			<0.004			
Silver-mg/L		0002574-02			<0.002			

CONTROL Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/L		0002574-03		0.8	0.839	104.9%		
Barium-mg/L		0002574-03		0.2	0.191	95.5%		
Cadmium-mg/L		0002574-03		0.2	0.203	101.5%		
Chromium-mg/L		0002574-03		0.2	0.180	90.%		
Lead-mg/L		0002574-03		1.1	0.980	89.1%		
Selenium-mg/L		0002574-03		0.4	0.446	111.5%		
Silver-mg/L		0002574-03		0.2	0.197	98.5%		

CONTROL DUP Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/L		0002574-04		0.8	0.883	110.4%	5.1%	
Barium-mg/L		0002574-04		0.2	0.190	95.%	0.5%	
Cadmium-mg/L		0002574-04		0.2	0.214	107.%	5.3%	
Chromium-mg/L		0002574-04		0.2	0.191	95.5%	5.9%	
Lead-mg/L		0002574-04		1.1	1.05	95.5%	6.9%	
Selenium-mg/L		0002574-04		0.4	0.435	108.7%	2.5%	
Silver-mg/L		0002574-04		0.2	0.207	103.5%	5.%	

SRM Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/L		0002574-05		1	0.950	95.%		
Barium-mg/L		0002574-05		1	1.05	105.%		
Cadmium-mg/L		0002574-05		1	0.979	97.9%		
Chromium-mg/L		0002574-05		1	0.999	99.9%		
Lead-mg/L		0002574-05		1	0.972	97.2%		
Selenium-mg/L		0002574-05		1	1.02	102.%		
Silver-mg/L		0002574-05		1	0.543	54.3%		

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BLANK Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample .	Concentr	Spike	QC Test	Result
pH-pH Units		0002601-01			7.42			
Reactive Cyanide-mg/kg		0002602-01			<0.090			
Reactive Sulfide-mg/kg		0002603-01			<5.00			

CONTROL Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample .	Concentr	Spike	QC Test	Result
Reactive Cyanide-mg/kg		0002602-02		0.1	0.093	93.%		
Reactive Sulfide-mg/kg		0002603-02		13.6	10.56	77.6%		

DUPLICATE Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample .	Concentr	Spike	QC Test	Result
Ignitability-C		0204006-01	0		>100		0.%	

SRM Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample .	Concentr	Spike	QC Test	Result
pH-pH Units		0002601-04		7	7.05	100.7%		
Reactive Cyanide-mg/kg		0002602-04		1	0.9	90.%		
Reactive Sulfide-mg/kg		0002603-04		680	448	65.9%		

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BLANK Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/kg		0002661-01			<0.64			
Arsenic-mg/kg		0002662-01			< 0.64			
Barium-mg/kg		0002661-01			<0.08			
Barium-mg/kg		0002662-01			<0.08			
Cadmium-mg/kg		0002661-01			<0.08			
Cadmium-mg/kg		0002662-01			<0.08			
Chromium-mg/kg		0002661-01			<0.16			
Chromium-mg/kg		0002662-01			<0.16			
Copper-mg/kg		0002663-01			<0.16			
Copper-mg/kg		0002664-01			<0.16			
Fluoride-mg/kg		0002596-01			<0.10			
Fluoride-mg/kg		0002607-01			<0.02			
Iron-mg/kg		0002663-01			<0.16			
Iron-mg/kg		0002664-01			< 0.16			
Lead-mg/kg		0002661-01			<0.88			
Lead-mg/kg		0002662-01			<0.88			
Manganese-mg/kg		0002663-01			<0.08			
Manganese-mg/kg		0002664-01			<0.08			
Mercury, TCLP-mg/L		0002570-01			<0.002			
Mercury, Total-mg/kg		0002586-01			< 0.0020			
Mercury, Total-mg/kg		0002587-01			< 0.0020			
Nitrogen, Nitrate-mg/kg		0002577-01			<2.5			
Nitrogen, Nitrate-mg/kg		0002578-01			<2.5			
Nitrogen, Nitrite-mg/kg		0002578-01			<0.025			
Nitrogen, Nitrite-mg/kg		0002580-01			<0.025			
pH-pH Units		0002588-01			7.42			
pH-pH Units		0002589-01			7.62			
Selenium-mg/kg		0002661-01			< 0.32			
Selenium-mg/kg		0002662-01			< 0.32			
Silver-mg/kg		0002639-01			< 0.16			
Silver-mg/kg		0002640-01			< 0.16			
TPH 418.1 FTIR-mg/kg		0002541-01			<10.0			
TPH 418.1 FTIR-mg/kg		0002552-01			<10.0			
Zinc-mg/kg		0002663-01			<0.08			
Zinc-mg/kg		0002664-01			<0.08			

CONTROL Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/kg		0002661-02		40	40.9	102.3%		
Arsenic-mg/kg		0002662-02		40	40	100.%		
Barium-mg/kg		0002661-02		40	40	100.%		

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CONTROL Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Barium-mg/kg		0002662-02		40	39	97.5%		
Cadmium-mg/kg		0002661-02		40	43.0	107.5%		
Cadmium-mg/kg		0002662-02		40	42.2	105.5%		
Chromium-mg/kg		0002661-02		40	38	95.%		
Chromium-mg/kg		0002662-02		40	37	92.5%		
Copper-mg/kg		0002663-02		16	16.1	100.6%		
Copper-mg/kg		0002664-02		16	16.2	101.3%		
Iron-mg/kg		0002663-02		16	17.2	107.5%		
Iron-mg/kg		0002664-02		16	17	106.3%		
Lead-mg/kg		0002661-02		40	41.3	103.3%		
Lead-mg/kg		0002662-02		40	41	102.5%		
Manganese-mg/kg		0002663-02		16	15.6	97.5%		
Manganese-mg/kg		0002664-02		16	16.8	105.%		
Mercury, TCLP-mg/L		0002570-02		0.015	.014	93.3%		
Mercury, Total-mg/kg		0002586-02		0.015	0.014	93.3%		
Mercury, Total-mg/kg		0002587-02		0.015	0.015	100.%		
pH-pH Units		0002588-02		7	7.03	100.4%		
pH-pH Units		0002589-02		7	7.05	100.7%		
Selenium-mg/kg		0002661-02		40	42.0	105.%		
Selenium-mg/kg		0002662-02		40	41	102.5%		
Silver-mg/kg		0002639-02		16	13.2	82.5%		
Silver-mg/kg		0002640-02		16	13.2	82.5%		
Zinc-mg/kg		0002663-02		16	18.4	115.%		
Zinc-mg/kg		0002664-02		16	18.6	116.3%		

CONTROL DUP Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/kg		0002661-03		40	40	100.%	2.2%	
Arsenic-mg/kg		0002662-03		40	39.9	99.7%	0.3%	
Barium-mg/kg		0002661-03		40	39.3	98.2%	1.8%	
Barium-mg/kg		0002662-03		40	39.2	98.%	0.5%	
Cadmium-mg/kg		0002661-03		40	42.6	106.5%	0.9%	
Cadmium-mg/kg		0002662-03		40	43.6	109.%	3.3%	
Chromium-mg/kg		0002661-03		40	38.1	95.3%	0.3%	
Chromium-mg/kg		0002662-03		40	38.2	95.5%	3.2%	
Copper-mg/kg		0002663-03		16	15.8	98.8%	1.9%	
Copper-mg/kg		0002664-03		16	15.7	98.1%	3.1%	
Iron-mg/kg		0002663-03		16	17	106.3%	1.2%	
Iron-mg/kg		0002664-03		16	16.2	101.3%	4.8%	
Lead-mg/kg		0002661-03		40	40.0	100.%	3.2%	
Lead-mg/kg		0002662-03		40	41.2	103.%	0.5%	
Manganese-mg/kg		0002663-03		16	15.5	96.9%	0.6%	
Manganese-mg/kg		0002664-03		16	16.5	103.1%	1.8%	

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CONTROL DUP Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Mercury, TCLP-mg/L		0002570-03		0.015	.015	100.%	6.9%	
Mercury, Total-mg/kg		0002586-03		0.015	0.015	100.%	6.9%	
Mercury, Total-mg/kg		0002587-03		0.015	0.014	93.3%	6.9%	
Selenium-mg/kg		0002661-03		40	42.6	106.5%	1.4%	
Selenium-mg/kg		0002662-03		40	41.2	103.%	0.5%	
Silver-mg/kg		0002639-03		16	13.5	84.4%	2.2%	
Silver-mg/kg		0002640-03		16	13.2	82.5%	0.%	
Zinc-mg/kg		0002663-03		16	18.1	113.1%	1.6%	
Zinc-mg/kg		0002664-03		16	17.8	111.3%	4.4%	

DUPLICATE Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Fluoride-mg/kg		0204005-01	0		<0.02		0.%	
Fluoride-mg/kg		0204006-22	0		<0.02		0.%	
Mercury, TCLP-mg/L		0204006-01	0		<0.002		0.%	
Nitrogen, Nitrate-mg/kg		0204005-01	12.4		13.9		11.4%	
Nitrogen, Nitrate-mg/kg		0204006-22	16.5		18.0		8.7%	
Nitrogen, Nitrite-mg/kg		0204005-01	0.11		0.110		0.%	
Nitrogen, Nitrite-mg/kg		0204006-22	0		<0.025		0.%	
pH-pH Units		0204005-01	8.13		8.20		0.9%	
pH-pH Units		0204006-22	8.43		8.42		0.1%	

MS Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
TPH 418.1 FTIR-mg/kg		0204004-01	1730	2500	4180	98.%		
TPH 418.1 FTIR-mg/kg		0204006-19	26.9	2500	2710	107.3%		

MSD Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
TPH 418.1 FTIR-mg/kg		0204004-01	1730	2500	4270	101.6%	2.1%	
TPH 418.1 FTIR-mg/kg		0204006-19	26.9	2500	2770	109.7%	2.2%	

SRM Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Arsenic-mg/kg		0002661-04		1	0.951	95.1%		
Arsenic-mg/kg		0002662-04		1	0.965	96.5%		
Barium-mg/kg		0002661-04		1	0.911	91.1%		
Barium-mg/kg		0002662-04		1	0.913	91.3%		
Cadmium-mg/kg		0002661-04		1	1.04	104.%		
Cadmium-mg/kg		0002662-04		1	1.03	103.%		
Chromium-mg/kg		0002661-04		1	0.93	93.%		
Chromium-mg/kg		0002662-04		1	0.922	92.2%		
Copper-mg/kg		0002663-04		1	1.01	101.%		
Copper-mg/kg		0002664-04		1	0.995	99.5%		
Fluoride-mg/kg		0002596-04		1	0.96	96.%		
Fluoride-mg/kg		0002607-04		1	0.95	95.%		

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SRM Recovery	SOIL Pct (%) SOIL	LAB-ID # RPD	Concentr.	Sample	Concentr	Spike	QC Test	Result
Iron-mg/kg		0002663-04		1	1.01	101.%		
Iron-mg/kg		0002664-04		1	0.993	99.3%		
Lead-mg/kg		0002661-04		1	0.986	98.6%		
Lead-mg/kg		0002662-04		1	0.988	98.8%		
Manganese-mg/kg		0002663-04		1	0.989	98.9%		
Manganese-mg/kg		0002664-04		1	0.979	97.9%		
Mercury, TCLP-mg/L		0002570-04		0.015	0.014	93.3%		
Mercury, Total-mg/kg		0002586-04		0.015	0.015	100.%		
Mercury, Total-mg/kg		0002587-04		0.015	0.014	93.3%		
Nitrogen, Nitrate-mg/kg		0002577-04		1	1.0	100.%		
Nitrogen, Nitrate-mg/kg		0002578-04		1	1.0	100.%		
Nitrogen, Nitrite-mg/kg		0002578-04		0.2	0.166	83.%		
Nitrogen, Nitrite-mg/kg		0002580-04		0.2	0.175	87.5%		
pH-pH Units		0002588-04		7	7.05	100.7%		
pH-pH Units		0002589-04		7	7.04	100.6%		
Selenium-mg/kg		0002661-04		1	0.988	98.8%		
Selenium-mg/kg		0002662-04		1	0.959	95.9%		
Silver-mg/kg		0002639-04		0.5	0.495	99.%		
Silver-mg/kg		0002640-04		0.5	0.486	97.2%		
TPH 418.1 FTIR-mg/kg		0002541-04		5008	4850	96.8%		
TPH 418.1 FTIR-mg/kg		0002552-04		5008	5080	101.4%		
Zinc-mg/kg		0002663-04		1	0.997	99.7%		
Zinc-mg/kg		0002664-04		1	0.993	99.3%		

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COC: 110 1 of 4

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

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Project #: CH2100

Project Loc: Hobbs, N.M.

PO #:

					Preservative							Matrix				Analyze For:																
LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Ice	HNO_3	HCl	NaOH	H_2SO_4	None	Other (Specify)	Water	Sludge	Soil	Other (specify):	TPH (418.1) / (8015M) 1005 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles 8260	Semivolatiles 8270C	BTEX 8021B/5030	RCI	Gen Chemistry	WQCC Metals	PH	Run Aliphatic & Aromatics on highest 8015M sample		RUSH TAT (Pre-Schedule	Standard TAT
																TCLP: / TOTAL:															
	SB-41 25'	7-25-02	1021	4	X									X		X					X	X			X	X	X	X			
	SB-41 35'	↓	1054	3	X									X		[illegible]		HOLD!!													

Special Instructions: 3 day turn around time

Sample Containers Intact? Y N

Temperature Upon Receipt:

Laboratory Comments: 4°C

Relinquished by:	Date	Time	Received by:	Date	Time
Marcelo Campos	7-25-02	1649			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
				7-25-02	16:40

nvironmental Lab of Texas I, Ltd.

00 West I-20 East
essa, Texas 79763

Phone: 915-563-1800
Fax: 915-563-1713

COC: 110 2 of 4

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Todd Choban

Company Name: E.T.G.I.

Company Address: 4600 W. Wall

City/State/Zip: Midland Tx 79703

Telephone No: 915-522-1139

Fax No: 915-520-4310

Sampler Signature: Marcelo Campos

Project Name: Champion Technology Inc

Project #: CH 2100

Project Loc: Hobbs, NM

PO #:

Analyze For: TCLP: / TOTAL:

					Preservative							Matrix				Analyze For:															
B # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Ice	HNO_3	HCl	NaOH	H_2SO_4	None	Other (Specify)	Water	Sludge	Soil	Other (specify):	TPH: [✓ 418.1] 8015M 1005 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles TCLP	Semivolatiles TCLP	BTEX 8021B/~~5030~~	RCI	WQCC Metals	Gen. Chemistry				RUSH TAT (Pre-Schedule)	Standard TAT
	South Excavation Stockpile -SS1	7-25-02	0743	3	X									X						X	X	X		X							X
	" -S.S.2		0754	3																X	X	X		X							
	S.S.1 Wall 5'		0845													X							X		X	X					
	" 2 " 8'		0850																												
	3 " 3'		0900																												
	4 " 3'		0905																												
	5 " 3'		0910																												
	6 " 4'		0915																												
	7 " 4'		0920																												
	8 " 4'	↓	0925	↓	↓									↓		↓							↓		↓	↓					↓

pecial Instructions:

Sample Containers Intact? Y N
Temperature Upon Receipt:
Laboratory Comments:
4°C

elinquished by: Marcelo Campos Jr.	Date 7-25-02	Time 1640	Received by:	Date	Time
elinquished by	Date	Time	Received by ELOT:	Date 7-25-02	Time 16:40

:nvironmental Lab of Texas I, Ltd.

600 West I-20 East
lessa, Texas 79763

Phone: 915-563-1800
Fax: 915-563-1713

COC: 110 3 of 4

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Todd CHOBAN

Company Name E.T.G.I

Company Address: 4600 W. Wall

City/State/Zip: Midland Tx 79703

Telephone No: 915-522-1139

Fax No: 915-520-4310

Sampler Signature: Marcelo Campos

Project Name: Champion Technology Inc

Project #: CH 2100

Project Loc: Hobbs, NM

PO #:

AB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	Preservative: HNO_3	Preservative: HCl	Preservative: NaOH	Preservative: H_2SO_4	Preservative: None	Preservative: Other (Specify)	Matrix: Water	Matrix: Sludge	Matrix: Soil	Matrix: Other (specify):	Analyze For: TPH: 418.1 8015M 1005 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/~~5030~~	RCI	WQCC Metals	Gen. Chemistry				RUSH TAT (Pre-Schedule	Standard TAT
	S.S. 9 Wall 4'	7-25-02	0952	3	X									X		X							X		X	X					X
	" 10 " 4'	↓	1002	↓	↓									↓		↓							↓		↓	↓					↓
	" 11 Btm 6'		1009																												
	" 12 " 10'		1013																												
	" 13 " 4'		1015																												
	" 14 " 10'		1021																												
	" 15 " 10'		1025																												
	" 16 " 4'		1030																												
	" 17 " 8'		1036																												
	" 18 " 8'		1041																												

ipecial Instructions:

Sample Containers Intact? Y N

Temperature Upon Receipt:

Laboratory Comments: 4°C

Relinquished by: Marcelo Campos	Date 7-25-02	Time 1640	Received by:	Date	Time
Relinquished by:	Date	Time	Received by ELOT: Ron B Worthy	Date 7-25-02	Time 16:40

nvironmental Lab of Texas I, Ltd.

600 West I-20 East
essa, Texas 79763

Phone: 915-563-1800
Fax: 915-563-1713

COC: 110 404

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Todd Choban

Company Name: E.T.G.I

Company Address: 4600 W. Wall

City/State/Zip: Midland, Tx 79703

Telephone No: 915-522-1139

Fax No: 915-520-4310

Sampler Signature: Marcelo Campos

Project Name: Champion Chemicals Inc

Project #: CH 2100

Project Loc: Hobbs, N.M.

PO #:

Analyze For:
TCLP:
TOTAL:

AB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO$_3$	HCl	NaOH	H$_2$SO$_4$	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify):	TPH [✓ 418.1] 8015M 1005 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/	RCI	WQCC Metals	Gen. Chemistry				RUSH TAT (Pre-Schedule	Standard TAT
	S.S. 19 Wall -4'	7-25-02	1155	3	X									X		X							X		X	X					X
	" 20 " 4'	↓	1204	↓	↓									↓		↓							↓		↓	↓					↓
	" 21 " 4'	↓	1209	↓	↓									↓		↓							↓		↓	↓					↓
	" 22 " 4'	↓	1215	↓	↓									↓		↓							↓		↓	↓					↓
	" 23 " 4'	↓	1150	↓	↓									↓		↓							↓		↓	↓					↓
	" 24 Btm-5'	↓	1225	↓	↓									↓		↓							↓		↓	↓					↓
	" 25 " 5'	↓	1239	↓	↓									↓		↓							↓		↓	↓					↓
	" 26 " 5'	↓	1241	↓	↓									↓		↓							↓		↓	↓					↓
	" 27 " 5'	↓	1252	↓	↓									↓		↓							↓		↓	↓					↓
	" 28 " 5'	↓	1300	↓	↓									↓		↓							↓		↓	↓					↓

pecial Instructions:

Sample Containers Intact? Y N
Temperature Upon Receipt:
Laboratory Comments: 4°C

elinquished by	Date	Time	Received by:	Date	Time
Marcelo Campos	7-25-02	1640			
elinquished by	Date	Time	Received by ELOT: Ron B Wattly	Date 7-25-02	Time 16:40

ATTACHMENT B

RISK ASSESSMENT INFORMATION SYSTEM

Welcome to the Risk Assessment Information System

The RAIS contains Risk Assessment Tools and Information. The Risk Assessment Tools include: Risk-Based Preliminary Remediation Goal (PRG) calculations, a Toxicity data base, Risk Calculations, and Ecological Benchmarks. The Tools are designed for use at all DOE sites and can be customized for site-specific conditions. The RAIS also includes information, guidance, and risk results applicable to the Oak Ridge Reservation.

Would you like to join a user's list for the Risk Assessment Information System?

Add me to the RAIS User's List
Remove me from the RAIS User's List

This work has been sponsored by the U.S. Department of Energy (DOE), Office of Environmental Management, Oak Ridge Operations (ORO) Office (disclaimer) through a contract with Bechtel Jacobs Company LLC.

These web pages are under configuration management and subject to quality assurance review before being published.

RAIS Home | **PRGs** | Regulatory Limits | **Tox Profiles** | **Tox Values** | **Chemical Factors**
Toxicity Metadata | **HH Risk Models** | **Eco Benchmarks** | **Glossary** | Background

For information or technical assistance, please contact Fred Dolislager.

Generic Soil Background Values

All units are in ppm except where noted

Chemical	Soil Type	Range	Mean
Chromium	Light desert soils	10-200	60
	Sandy and lithosols on sandstone		
	Soils over limestones and calcareous rocks	5-150	50

Reference: Kabata-Pendias, Alina, Henryk Pendias, "Trace Elements in Soils and Plants", 1985, CRC Press Inc.

RAIS Home | PRGs | Regulatory Limits | Tox Profiles | Tox Values | Chemical Factors

Toxicity Metadata | HH Risk Models | Eco Benchmarks | Glossary | Background

For information or technical assistance, please contact Fred Dolislager.

Generic Soil Background Values

All units are in ppm except where noted

Chemical	Soil Type	Range	Mean
Chromium	Alluvial soils	15-100	55
	Chernozems and dark prairie soils	15-150	55
	Clay and clay-loamy soils	20-100	55
	Forest soils	15-150	55
	Lateritic soils		
	Light desert soils	10-200	60
	Light loamy soils	10-100	55
	Loess & soils on silt deposits	10-100	55
	Low Humic Gley soils and humus groundwater podzols		
	Organic light (or rich*) soils	1-100	20
	Sandy and lithosols on sandstone		
	Silty prairie soils	20-100	50
	Soils on glacial till and drift	30-150	80
	Soils on lacustrine deposits		
	Soils over granites and gneisses	10-100	45
	Soils over limestones and calcareous rocks	5-150	50
	Soils over volcanic rocks (or ash*)		

Various soils	7-1500	50
Western Alluvial soils		

Reference: Kabata-Pendias, Alina, Henryk Pendias, "Trace Elements in Soils and Plants", 1985, CRC Press Inc.

RAIS Home | **PRGs** | **Regulatory Limits** | **Tox Profiles** | **Tox Values** | **Chemical Factors**
Toxicity Metadata | **HH Risk Models** | **Eco Benchmarks** | **Glossary** | Background

For information or technical assistance, please contact Fred Dolislager.

ATTACHMENT C

SITE SPECIFIC BACKGROUND SOIL AND GROUNDWATER SAMPLE ANALYTICAL LABORATORY REPORTS AND TABLE

Table 4

BACKGROUND ANALYTICAL DATA

Champion Technologies
Hobbs Facility
Hobbs, New Mexico
ETGI Project #CH2100

All soil concentrations are in mg/kg
All water concentrations are in mg/L

			ANALYTICAL PARAMETERS								
SAMPLE DATE	MATRIX	SAMPLE ID	CHLORIDE	ARSENIC	CHROMIUM	LEAD	BENZENE	TOLUENE	ETHYL BENZENE	XYLENE	TPH
09/16/00	SOIL	SB-1 - 0001 - A	151	13.7	20.1	23.2					
09/16/00	SOIL	SB-2 - 0001 - A	174	17	8.32	10.2					
05/11/01	SOIL	SB-35 - 0305 - A	1339	5.46	<5.0	2.77					
05/11/01	SOIL	SB-35 - 1315 - A	3388	<5.0	<5.0	2.02					
05/11/01	SOIL	SB-35 - 2325 - A	1579	<5.0	<5.0	2.29					
05/11/01	SOIL	SB-35 - 3335 - A	1480	<5.0	<5.0	1.71					
10/02/02	SOIL	SB-55 5'	249		3.25						
10/02/02	SOIL	SB-55 20'	390		3.57						
10/02/02	SOIL	SB-55 40'	92		3.19						
10/02/02	SOIL	SB-56 5'	33.3		5.62						
10/02/02	SOIL	SB-56 20'	13.9		5.57						
10/02/02	SOIL	SB-56 40'	61.9		2.8						
10/02/02	SOIL	MW-9 5'	73.9	1.84	2.1	1.51					
09/26/02	SOIL	MW-15 5'	46.7		5.73						
09/26/02	SOIL	MW-15 25'	37.4		2.46						
09/26/02	SOIL	MW-15 40'	137		5.88						
08/02/02	WATER	MW-1	408	<0.008	0.038	<0.011					
08/02/02	WATER	MW-7	239	<0.008	<0.002	<0.011					
08/02/02	WATER	MW-9	346	<0.008	0.023	<0.011					

TRACEANALYSIS, INC.
6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
155 McCutcheon, Suite H El Paso, Texas 79932 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

CORRECTED CERTIFICATE

Analytical and Quality Control Report

Todd Choban
E.T.G.I.
PO Box 4845
Midland, Tx. 79704

Report Date: November 12, 2002

Order ID Number: A02100420

Project Number: CH2100
Project Name: Champion Tech
Project Location: Hobbs,NM

Enclosed are the Analytical Results and Quality Control Data Reports for the following samples submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
209639	SB-52 5'	Soil	10/2/02	12:40	10/4/02
209641	SB-52 25'	Soil	10/2/02	13:42	10/4/02
209644	SB-52 45'	Soil	10/2/02	14:45	10/4/02
209647	SB-50 10'	Soil	10/1/02	9:54	10/4/02
209648	SB-50 25'	Soil	10/1/02	10:17	10/4/02
209651	SB-61 10'	Soil	10/1/02	13:03	10/4/02
209655	SB-55 5'	Soil	10/2/02	9:55	10/4/02
209656	SB-55 20'	Soil	10/2/02	10:07	10/4/02
209657	SB-55 40'	Soil	10/2/02	10:27	10/4/02
209658	SB-56 5'	Soil	10/2/02	9:37	10/4/02
209659	SB-56 20'	Soil	10/2/02	9:45	10/4/02
209660	SB-56 40'	Soil	10/2/02	9:05	10/4/02
209664	SB-47 5'	Soil	10/1/02	9:28	10/4/02
209665	SB-64	Soil	10/2/02	9:08	10/4/02

Comment: Chloride LCS results have been corrected. Method Blank (Matrix) was added.

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.
Note: the RDL is equal to MQL for all organic analytes including TPH.
The test results contained within this report meet all requirements of LAC 33:I unless otherwise noted.

This report consists of a total of 19 pages and shall not be reproduced except in its entirety including the chain of custody (COC), without written approval of TraceAnalysis, Inc.

Note: Samples will be disposed of 30 days from the report date unless the lab is contacted before the 30 days has past.

Dr. Blair Leftwich, Director

Analytical Report

Sample: 209639 - SB-52 5'
Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC24019 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22434 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		52.7	mg/Kg	5	1

Sample: 209639 - SB-52 5'
Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24071 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22421 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		2.27	mg/Kg	100	0.01

Sample: 209641 - SB-52 25'
Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC24021 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22436 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		43.7	mg/Kg	5	1

Sample: 209641 - SB-52 25'
Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24072 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22421 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		2.27	mg/Kg	100	0.01

Sample: 209644 - SB-52 45'
Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC24021 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22436 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		38.7	mg/Kg	5	1

Sample: 209644 - SB-52 45'
Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24072 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22421 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		2.60	mg/Kg	100	0.01

Sample: 209647 - SB-50 10'

Analysis: BTEX Analytical Method: S 8021B QC Batch: QC23988 Date Analyzed: 10/7/02
Analyst: CG Preparation Method: S 5035 Prep Batch: PB22416 Date Prepared: 10/7/02

Param	Flag	Result	Units	Dilution	RDL
Benzene		<0.010	mg/Kg	10	0.001
Toluene		<0.010	mg/Kg	10	0.001
Ethylbenzene		<0.010	mg/Kg	10	0.001
M,P,O-Xylene		<0.010	mg/Kg	10	0.001
Total BTEX		<0.010	mg/Kg	10	0.001

Surrogate	Flag	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
TFT		0.835	mg/Kg	10	1	83	70 - 130
4-BFB		0.873	mg/Kg	10	1	87	70 - 130

Sample: 209647 - SB-50 10'

Analysis: TPH Analytical Method: E 418.1 QC Batch: QC24013 Date Analyzed: 10/9/02
Analyst: WG Preparation Method: N/A Prep Batch: PB22430 Date Prepared: 10/9/02

Param	Flag	Result	Units	Dilution	RDL
TRPHC		<10.0	mg/Kg	1	10

Sample: 209647 - SB-50 10'

Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24072 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22421 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Total Arsenic		<5.00	mg/Kg	100	0.05
Total Chromium		5.99	mg/Kg	100	0.01
Total Lead		3.17	mg/Kg	100	0.01

Sample: 209648 - SB-50 25'

Analysis: BTEX Analytical Method: S 8021B QC Batch: QC23988 Date Analyzed: 10/7/02
Analyst: CG Preparation Method: S 5035 Prep Batch: PB22416 Date Prepared: 10/7/02

Param	Flag	Result	Units	Dilution	RDL
Benzene		<0.010	mg/Kg	10	0.001
Toluene		<0.010	mg/Kg	10	0.001
Ethylbenzene		<0.010	mg/Kg	10	0.001
M,P,O-Xylene		<0.010	mg/Kg	10	0.001
Total BTEX		<0.010	mg/Kg	10	0.001

Surrogate	Flag	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
TFT		0.890	mg/Kg	10	1	89	70 - 130
4-BFB		0.895	mg/Kg	10	1	89	70 - 130

Sample: 209648 - SB-50 25'

Analysis:	TPH	Analytical Method:	E 418.1	QC Batch:	QC24014	Date Analyzed:	10/9/02
Analyst:	WG	Preparation Method:	N/A	Prep Batch:	PB22430	Date Prepared:	10/9/02

Param	Flag	Result	Units	Dilution	RDL
TRPHC		<10.0	mg/Kg	1	10

Sample: 209648 - SB-50 25'

Analysis:	Total Metals	Analytical Method:	S 6010B	QC Batch:	QC24072	Date Analyzed:	10/10/02
Analyst:	RR	Preparation Method:	S 3050B	Prep Batch:	PB22421	Date Prepared:	10/8/02

Param	Flag	Result	Units	Dilution	RDL
Total Arsenic		<5.00	mg/Kg	100	0.05
Total Chromium		2.01	mg/Kg	100	0.01
Total Lead		<1.00	mg/Kg	100	0.01

Sample: 209651 - SB-61 10'

Analysis:	BTEX	Analytical Method:	S 8021B	QC Batch:	QC23988	Date Analyzed:	10/7/02
Analyst:	CG	Preparation Method:	S 5035	Prep Batch:	PB22416	Date Prepared:	10/7/02

Param	Flag	Result	Units	Dilution	RDL
Benzene		<0.010	mg/Kg	10	0.001
Toluene		<0.010	mg/Kg	10	0.001
Ethylbenzene		<0.010	mg/Kg	10	0.001
M,P,O-Xylene		<0.010	mg/Kg	10	0.001
Total BTEX		<0.010	mg/Kg	10	0.001

Surrogate	Flag	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
TFT		0.807	mg/Kg	10	1	80	70 - 130
4-BFB		0.796	mg/Kg	10	1	79	70 - 130

Sample: 209651 - SB-61 10'

Analysis:	Ion Chromatography (IC)	Analytical Method:	E 300.0	QC Batch:	QC24021	Date Analyzed:	10/8/02
Analyst:	JSW	Preparation Method:	N/A	Prep Batch:	PB22436	Date Prepared:	10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		27.4	mg/Kg	5	1

Sample: 209651 - SB-61 10'

Analysis:	TPH	Analytical Method:	E 418.1	QC Batch:	QC24014	Date Analyzed:	10/9/02
Analyst:	WG	Preparation Method:	N/A	Prep Batch:	PB22430	Date Prepared:	10/9/02

Param	Flag	Result	Units	Dilution	RDL
TRPHC		<10.0	mg/Kg	1	10

Sample: 209651 - SB-61 10'

Analysis:	Total Metals	Analytical Method:	S 6010B	QC Batch:	QC24072	Date Analyzed:	10/10/02
Analyst:	RR	Preparation Method:	S 3050B	Prep Batch:	PB22421	Date Prepared:	10/8/02

Param	Flag	Result	Units	Dilution	RDL
Total Arsenic		<5.00	mg/Kg	100	0.05
Total Chromium		4.22	mg/Kg	100	0.01
Total Lead		2.38	mg/Kg	100	0.01

Sample: 209655 - SB-55 5'

Analysis:	Ion Chromatography (IC)	Analytical Method:	E 300.0	QC Batch:	QC24021	Date Analyzed:	10/8/02
Analyst:	JSW	Preparation Method:	N/A	Prep Batch:	PB22436	Date Prepared:	10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		249	mg/Kg	10	1

Sample: 209655 - SB-55 5'

Analysis:	Total Metals	Analytical Method:	S 6010B	QC Batch:	QC24073	Date Analyzed:	10/10/02
Analyst:	RR	Preparation Method:	S 3050B	Prep Batch:	PB22443	Date Prepared:	10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		3.25	mg/Kg	100	0.01

Sample: 209656 - SB-55 20'

Analysis:	Ion Chromatography (IC)	Analytical Method:	E 300.0	QC Batch:	QC24021	Date Analyzed:	10/8/02
Analyst:	JSW	Preparation Method:	N/A	Prep Batch:	PB22436	Date Prepared:	10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		390	mg/Kg	50	1

Sample: 209656 - SB-55 20'

Analysis:	Total Metals	Analytical Method:	S 6010B	QC Batch:	QC24073	Date Analyzed:	10/10/02
Analyst:	RR	Preparation Method:	S 3050B	Prep Batch:	PB22443	Date Prepared:	10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		3.57	mg/Kg	100	0.01

Sample: 209657 - SB-55 40'

Analysis:	Ion Chromatography (IC)	Analytical Method:	E 300.0	QC Batch:	QC24021	Date Analyzed:	10/8/02
Analyst:	JSW	Preparation Method:	N/A	Prep Batch:	PB22436	Date Prepared:	10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		92.0	mg/Kg	5	1

Sample: 209657 - SB-55 40'

Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24073 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22443 Date Prepared: 10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		3.19	mg/Kg	100	0.01

Sample: 209658 - SB-56 5'

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC24021 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22436 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		33.3	mg/Kg	5	1

Sample: 209658 - SB-56 5'

Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24073 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22443 Date Prepared: 10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		5.62	mg/Kg	100	0.01

Sample: 209659 - SB-56 20'

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC24018 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22437 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		139	mg/Kg	5	1

Sample: 209659 - SB-56 20'

Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24073 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22443 Date Prepared: 10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		5.57	mg/Kg	100	0.01

Sample: 209660 - SB-56 40'

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC24018 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22437 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		61.9	mg/Kg	5	1

Sample: 209660 - SB-56 40'

Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24073 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22443 Date Prepared: 10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		2.80	mg/Kg	100	0.01

Sample: 209664 - SB-47 5'

Analysis: BTEX Analytical Method: S 8021B QC Batch: QC23988 Date Analyzed: 10/7/02
Analyst: CG Preparation Method: S 5035 Prep Batch: PB22416 Date Prepared: 10/7/02

Param	Flag	Result	Units	Dilution	RDL
Benzene		<0.010	mg/Kg	10	0.001
Toluene		<0.010	mg/Kg	10	0.001
Ethylbenzene		<0.010	mg/Kg	10	0.001
M,P,O-Xylene		<0.010	mg/Kg	10	0.001
Total BTEX		<0.010	mg/Kg	10	0.001

Surrogate	Flag	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
TFT		0.898	mg/Kg	10	1	89	70 - 130
4-BFB		0.958	mg/Kg	10	1	95	70 - 130

Sample: 209664 - SB-47 5'

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC24021 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22436 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		2940	mg/Kg	500	1

Sample: 209664 - SB-47 5'

Analysis: TPH Analytical Method: E 418.1 QC Batch: QC24014 Date Analyzed: 10/9/02
Analyst: WG Preparation Method: N/A Prep Batch: PB22430 Date Prepared: 10/9/02

Param	Flag	Result	Units	Dilution	RDL
TRPHC		<10.0	mg/Kg	1	10

Sample: 209664 - SB-47 5'

Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC24073 Date Analyzed: 10/10/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22443 Date Prepared: 10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Arsenic		<5.00	mg/Kg	100	0.05
Total Chromium		2.96	mg/Kg	100	0.01
Total Lead		1.04	mg/Kg	100	0.01

Sample: 209665 - SB-64

Analysis:	BTEX	Analytical Method:	S 8021B	QC Batch:	QC23988	Date Analyzed:	10/7/02
Analyst:	CG	Preparation Method:	S 5035	Prep Batch:	PB22416	Date Prepared:	10/7/02

Param	Flag	Result	Units	Dilution	RDL
Benzene		<0.010	mg/Kg	10	0.001
Toluene		<0.010	mg/Kg	10	0.001
Ethylbenzene		<0.010	mg/Kg	10	0.001
M,P,O-Xylene		<0.010	mg/Kg	10	0.001
Total BTEX		<0.010	mg/Kg	10	0.001

Surrogate	Flag	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
TFT		0.846	mg/Kg	10	1	84	70 - 130
4-BFB		0.903	mg/Kg	10	1	90	70 - 130

Sample: 209665 - SB-64

Analysis:	TPH	Analytical Method:	E 418.1	QC Batch:	QC24014	Date Analyzed:	10/9/02
Analyst:	WG	Preparation Method:	N/A	Prep Batch:	PB22430	Date Prepared:	10/9/02

Param	Flag	Result	Units	Dilution	RDL
TRPHC		<10.0	mg/Kg	1	10

Sample: 209665 - SB-64

Analysis:	Total Metals	Analytical Method:	S 6010B	QC Batch:	QC24073	Date Analyzed:	10/10/02
Analyst:	RR	Preparation Method:	S 3050B	Prep Batch:	PB22443	Date Prepared:	10/9/02

Param	Flag	Result	Units	Dilution	RDL
Total Arsenic		5.66	mg/Kg	100	0.05
Total Chromium		3.03	mg/Kg	100	0.01
Total Lead		<1.00	mg/Kg	100	0.01

Quality Control Report
Method Blank

Method Blank QCBatch: QC23988

Param	Flag	Results	Units	Reporting Limit
Benzene		<0.010	mg/Kg	0.001
Toluene		<0.010	mg/Kg	0.001
Ethylbenzene		<0.010	mg/Kg	0.001
M,P,O-Xylene		<0.010	mg/Kg	0.001
Total BTEX		<0.010	mg/Kg	0.001

Surrogate	Flag	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
TFT		1.03	mg/Kg	10	1	103	70 - 130
4-BFB		0.746	mg/Kg	10	1	75	70 - 130

Method Blank QCBatch: QC24013

Param	Flag	Results	Units	Reporting Limit
TRPHC		<10.0	mg/Kg	10

Method Blank QCBatch: QC24014

Param	Flag	Results	Units	Reporting Limit
TRPHC		<10.0	mg/Kg	10

Method Blank QCBatch: QC24018

Param	Flag	Results	Units	Reporting Limit
Chloride		22.74	mg/Kg	1

Method Blank QCBatch: QC24019

Param	Flag	Results	Units	Reporting Limit
Chloride		14.03	mg/Kg	1

Method Blank QCBatch: QC24021

Param	Flag	Results	Units	Reporting Limit
Chloride	[1]	<1.0	mg/L	1

Method Blank QCBatch: QC24071

Param	Flag	Results	Units	Reporting Limit
Total Chromium		<0.010	mg/Kg	0.01

Method Blank QCBatch: QC24072

Param	Flag	Results	Units	Reporting Limit
Total Arsenic		<0.050	mg/Kg	0.05
Total Chromium		<0.010	mg/Kg	0.01
Total Lead		<0.010	mg/Kg	0.01

Method Blank QCBatch: QC24073

Param	Flag	Results	Units	Reporting Limit
Total Arsenic		<0.050	mg/Kg	0.05
Total Chromium		<0.010	mg/Kg	0.01
Total Lead		<0.010	mg/Kg	0.01

Quality Control Report
Lab Control Spikes and Duplicate Spikes

Laboratory Control Spikes QCBatch: QC23988

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
MTBE	0.940	0.914	mg/Kg	10	1	<0.010	94	2	70 - 130	20
Benzene	0.917	0.845	mg/Kg	10	1	<0.010	91	8	70 - 130	20
Toluene	0.833	0.764	mg/Kg	10	1	<0.010	83	8	70 - 130	20
Ethylbenzene	0.864	0.801	mg/Kg	10	1	<0.010	86	7	70 - 130	20
M,P,O-Xylene	2.75	2.54	mg/Kg	10	3	<0.010	91	7	70 - 130	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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[1] Method Blank (Matrix) 29.57 mg/kg in soil.

Surrogate	LCS Result	LCSD Result	Units	Dilution	Spike Amount	LCS % Rec	LCSD % Rec	Recovery Limits
TFT	0.971	0.892	mg/Kg	10	1	97	89	70 - 130
4-BFB	0.86	0.785	mg/Kg	10	1	86	78	70 - 130

Laboratory Control Spikes QCBatch: QC24013

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
TRPHC	240	242	mg/Kg	1	250	<10.0	96	0	74 - 110	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24014

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
TRPHC	240	242	mg/Kg	1	250	<10.0	96	0	74 - 110	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24018

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	[2] 34.61	[3] 34.68	mg/Kg	1	12.50	22.74	95	0	90 - 110	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24019

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	[4] 25.70	[5] 25.75	mg/Kg	1	12.50	14.03	93	0	90 - 110	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24021

Continued ...

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[2] Blank soil should be subtracted from the sample. %EA = 95 and RPD = 0.

[3] Blank soil should be subtracted from the sample. %EA = 95 and RPD = 0.

[4] Blank soil should be subtracted from the sample. %EA = 93 and RPD = 0.

[5] Blank soil should be subtracted from the sample. %EA = 93 and RPD = 0.

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Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	[6] 40.1	[7] 41.1	mg/Kg	1	12.50	<1.0	91	2	90 - 110	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24071

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Arsenic	44.4	43.5	mg/Kg	100	50	<0.050	88	2	75 - 125	20
Total Chromium	10.4	10.3	mg/Kg	100	10	<0.010	104	0	75 - 125	20
Total Lead	49.3	49.6	mg/Kg	100	50	<0.010	98	0	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24072

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Arsenic	44.4	43.5	mg/Kg	100	50	<0.050	88	2	75 - 125	20
Total Barium	102	102	mg/Kg	100	100	<0.100	102	0	75 - 125	20
Total Cadmium	25.2	25.1	mg/Kg	100	25	<0.005	100	0	75 - 125	20
Total Chromium	10.4	10.3	mg/Kg	100	10	<0.010	104	0	75 - 125	20
Total Lead	49.3	49.6	mg/Kg	100	50	<0.010	98	0	75 - 125	20
Total Selenium	42.0	40.8	mg/Kg	100	50	0.0201	84	2	75 - 125	20
Total Silver	12.4	12.4	mg/Kg	100	12.50	<0.002	99	0	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24073

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Arsenic	42.3	40.8	mg/Kg	100	50	<0.050	84	3	75 - 125	20
Total Barium	103	96.9	mg/Kg	100	100	<0.100	103	6	75 - 125	20
Total Cadmium	25.0	24.0	mg/Kg	100	25	<0.005	100	4	75 - 125	20
Total Chromium	10.5	9.98	mg/Kg	100	10	<0.010	105	5	75 - 125	20
Total Lead	48.6	47.3	mg/Kg	100	50	<0.010	97	2	75 - 125	20
Total Selenium	40.9	39.5	mg/Kg	100	50	0.0153	81	3	75 - 125	20
Total Silver	12.4	11.8	mg/Kg	100	12.50	<0.002	99	4	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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[6] Blank soil should be subtracted from the sample. %IA = 91 and RPD = 0.

[7] Blank soil should be subtracted from the sample. %IA = 91 and RPD = 0.

Quality Control Report
Matrix Spikes and Duplicate Spikes

Matrix Spikes QCBatch: QC23988

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Benzene	0.818	0.85	mg/Kg	10	1	<0.010	81	3	70 - 130	20
Toluene	0.973	1.08	mg/Kg	10	1	<0.010	97	10	70 - 130	20
Ethylbenzene	0.825	0.93	mg/Kg	10	1	<0.010	82	11	70 - 130	20
M,P,O-Xylene	2.42	2.74	mg/Kg	10	3	<0.010	80	12	70 - 130	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Surrogate	MS Result	MSD Result	Units	Dilution	Spike Amount	MS % Rec	MSD % Rec	Recovery Limits
TFT	0.83	0.884	mg/Kg	10	1	83	88	70 - 130
4-BFB	0.919	1	mg/Kg	10	1	91	100	70 - 130

Matrix Spikes QCBatch: QC24013

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
TRPHC	830	842	mg/Kg	1	250	558	108	4	70 - 130	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24014

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
TRPHC	240	223	mg/Kg	1	250	<10.0	96	7	70 - 130	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24018

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	25000	25000	mg/Kg	1	12500	13100	95	0	35 - 144	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24019

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	1130	1130	mg/Kg	1	625	536	95	0	35 - 144	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24021

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	9160	9220	mg/Kg	1	6250	2940	99	0	35 - 144	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24071

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Chromium	21.6	21.0	mg/Kg	100	10	9.56	120	5	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24072

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Arsenic	56.2	54.3	mg/Kg	100	50	9.45	93	4	75 - 125	20
Total Chromium	19.7	19.9	mg/Kg	100	10	8.71	109	1	75 - 125	20
Total Lead	58.9	60.4	mg/Kg	100	50	8.95	99	2	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24073

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Arsenic	46.8	49.0	mg/Kg	100	50	<5.00	93	4	75 - 125	20
Total Chromium	22.0	21.3	mg/Kg	100	10	10.0	119	6	75 - 125	20
Total Lead	62.0	60.3	mg/Kg	100	50	8.68	106	3	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Quality Control Report
Continuing Calibration Verification Standards

CCV (1) QCBatch: QC23988

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
MTBE		mg/L	0.10	0.111	111	85 - 115	10/7/02
Benzene		mg/L	0.10	0.101	101	85 - 115	10/7/02
Toluene		mg/L	0.10	0.098	98	85 - 115	10/7/02
Ethylbenzene		mg/L	0.10	0.099	99	85 - 115	10/7/02
M,P,O-Xylene		mg/L	0.30	0.305	101	85 - 115	10/7/02

ICV (1) QCBatch: QC23988

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
MTBE		mg/L	0.10	0.106	106	85 - 115	10/7/02
Benzene		mg/L	0.10	0.099	99	85 - 115	10/7/02
Toluene		mg/L	0.10	0.096	96	85 - 115	10/7/02
Ethylbenzene		mg/L	0.10	0.098	98	85 - 115	10/7/02
M,P,O-Xylene		mg/L	0.30	0.307	102	85 - 115	10/7/02

CCV (1) QCBatch: QC24013

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
TRPHC		mg/Kg	100	94.3	94	80 - 120	10/9/02

CCV (2) QCBatch: QC24013

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
TRPHC		mg/Kg	100	94.1	94	80 - 120	10/9/02

ICV (1) QCBatch: QC24013

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
TRPHC		mg/Kg	100	94.0	94	80 - 120	10/9/02

CCV (1) QCBatch: QC24014

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
TRPHC		mg/Kg	100	94.6	94	80 - 120	10/9/02

ICV (1) QCBatch: QC24014

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
TRPHC		mg/Kg	100	94.0	94	80 - 120	10/9/02

CCV (1) QCBatch: QC24018

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.84	94	90 - 110	10/8/02

ICV (1) QCBatch: QC24018

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.76	94	90 - 110	10/8/02

CCV (1) QCBatch: QC24019

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.76	94	90 - 110	10/8/02

ICV (1) QCBatch: QC24019

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.82	94	90 - 110	10/8/02

CCV (1) QCBatch: QC24021

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.76	94	90 - 110	10/8/02

ICV (1) QCBatch: QC24021

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.76	94	90 - 110	10/8/02

CCV (1) QCBatch: QC24071

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/L	1	0.983	98	90 - 110	10/10/02
Total Chromium		mg/L	0.20	0.202	101	90 - 110	10/10/02
Total Lead		mg/L	1	0.994	99	90 - 110	10/10/02

ICV (1) QCBatch: QC24071

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/L	1	1.01	101	95 - 105	10/10/02
Total Chromium		mg/L	0.20	0.201	100	95 - 105	10/10/02
Total Lead		mg/L	1	0.988	99	95 - 105	10/10/02

CCV (1) QCBatch: QC24072

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/Kg	1	0.986	99	90 - 110	10/10/02
Total Barium		mg/Kg	2	2.01	100	90 - 110	10/10/02
Total Cadmium		mg/Kg	0.50	0.502	100	90 - 110	10/10/02
Total Chromium		mg/Kg	0.20	0.200	100	90 - 110	10/10/02
Total Lead		mg/Kg	1	0.983	98	90 - 110	10/10/02
Total Selenium		mg/Kg	1	0.954	93	90 - 110	10/10/02
Total Silver		mg/Kg	0.25	0.250	100	90 - 110	10/10/02

ICV (1) QCBatch: QC24072

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/Kg	1	1.01	101	95 - 105	10/10/02
Total Barium		mg/Kg	2	1.98	99	95 - 105	10/10/02
Total Cadmium		mg/Kg	0.50	0.498	100	95 - 105	10/10/02
Total Chromium		mg/Kg	0.20	0.201	100	95 - 105	10/10/02
Total Lead		mg/Kg	1	0.988	99	95 - 105	10/10/02
Total Selenium		mg/Kg	1	0.978	96	95 - 105	10/10/02
Total Silver		mg/Kg	0.25	0.247	99	95 - 105	10/10/02

CCV (1) QCBatch: QC24073

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/Kg	1	0.998	100	90 - 110	10/10/02
Total Barium		mg/Kg	2	1.98	99	90 - 110	10/10/02
Total Cadmium		mg/Kg	0.50	0.497	99	90 - 110	10/10/02
Total Chromium		mg/Kg	0.20	0.202	101	90 - 110	10/10/02
Total Lead		mg/Kg	1	1.00	100	90 - 110	10/10/02
Total Selenium		mg/Kg	1	0.972	96	90 - 110	10/10/02
Total Silver		mg/Kg	0.25	0.246	98	90 - 110	10/10/02

ICV (1) QCBatch: QC24073

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/Kg	1	1.01	101	95 - 105	10/10/02
Total Barium		mg/Kg	2	1.98	99	95 - 105	10/10/02
Total Cadmium		mg/Kg	0.50	0.498	100	95 - 105	10/10/02
Total Chromium		mg/Kg	0.20	0.201	100	95 - 105	10/10/02
Total Lead		mg/Kg	1	0.988	99	95 - 105	10/10/02
Total Selenium		mg/Kg	1	0.978	96	95 - 105	10/10/02
Total Silver		mg/Kg	0.25	0.247	99	95 - 105	10/10/02

109633-65

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Fax (915) 585-4944
1 (888) 588-3443

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID #: A0210042D

ompany Name: ETGI
Phone #: (915)522-1139
ddress: (Street, City, Zip) 4600 W. Wall 79703
Fax #: (915) 528-4310
ontact Person:
voice to: (different from above)
oject #: CH2100
Project Name:
oject Location: Hobbs / Champion Facility
Sampler Signature: Jason

ANALYSIS REQUEST (Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE		PRESERVATIVE METHOD: HCl	HNO₃	H₂SO₄	NaOH	ICE	NONE		SAMPLING: DATE	TIME
633	SB-62 2'	4 jars [illegible]	4oz													10-01	1330
34	SB-62 5'	4														10-01	1337
35	SB-62 15'	8														10-01	1353
36	SB-62 25'	1														10-01	1420
37	SB-62 40'	4														10-01	1512
38	SB-62 10'	4														1001	1345
39	SB-52 5'	4														10-02	1240
40	SB-52 10'	2														10-02	1250
41	SB-52 25'	3														10-02	1342
42	SB-52 35'	1														10-02	1408
43	SB-52 40'	3														10-02	1416

LAB #	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Chromium	Chlorides				Turn Around Time if different from standard	Hold
633																						X
34																						X
35																						X
36																						X
37																						X
38																						X
39																X	X					
40																						X
41																X	X					
42																						X
43																						X

nquished by: Jason Date: 10-03-02 Time: 0800
Received by: Helen Shelton Date: 10/03/02 Time: 0800
inquished by: Helen Shelton Date: 10/03/02 Time: 1830
Received by: Date: Time:
inquished by: Date: Time:
Received at Laboratory by: Date: 10-4-02 Time: 10am

LAB USE ONLY
Intact [✓ Y] / N
Headspace Y / N
Temp 2°
Log-in Review MB

REMARKS: AHF 10/14/02

☐ Check If Special Reporting Limits Are Needed.

bmittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C. 32 samples - HS

Carrier # Greyhound GLI 300 619-685 3

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Page 2 of 3

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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # A0210042-0

ompany Name: ETGI
Phone #: (915)522-1139
ddress: (Street, City, Zip) 4600 W. Wall 79703
Fax #: (915)528-4310
ontact Person: Todd Choban
voice to:
different from above)
oject #: CH2100
Project Name:
oject Location: Hobbs Champion Facility
Sampler Signature:

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX WATER	SOIL	AIR	SLUDGE		PRESERVATIVE METHOD HCl	HNO_3	H_2SO_4	NaOH	ICE	NONE		SAMPLING DATE	TIME	MTBE 8021B/602	[✓ BTEX 8021B/602]	[✓ TPH 418.1] TX1005	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Chlorides	Chromium	Arsenic, Lead			Turn Around Time if different from standard	Hold
09644	SB-52 45'	4	4oz		X								X			10-02	1425																X	X					
45	SB-50 2'	4														10-01	0940																						X
46	SB-56 5'	3														10-01	0947																						X
47	SB-56 10	4														10-01	0954		X	X													X	X	X				
48	SB-50 25'	1														10-01	1017		X	X													X	X	X				
49	SB-61 2'	4														10-01	1245																						X
50	SB-61 5'	2														10-01	1253																						X
51	SB-61 10'	4														10-01	1303		X	X													X	X	X				
52	SB-60 2.5'	4														[illegible]	835																						X
53	SB-60 5'	4															842																						X
54	SB-60 10'	4														10-01	852																						X

inquished by:	Date: 10-03-02	Time: 0800	Received by:	Date: 10-03-02	Time: 0802
inquished by:	Date: 10/03/02	Time: 1435	Received by: Helen Shelton	Date: 10/03/02	Time: 1435
inquished by: Helen Shelton	Date: 10/03/02	Time: 1830	Received at Laboratory by:	Date: 10-4-02	Time: 10a

LAB USE ONLY
Intact [✓ Y] N
Headspace Y / N
Temp 2
Log-in Review MA

REMARKS:

☐ Check If Special Reporting Limits Are Needed

ubmittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C. 38 samples-HS

Carrier # Greyhound GLI 300-619-695-3

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Fax (915) 585-4944
1 (888) 588-3443

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # A02100420

mpany Name: ETGI
Phone #: (915) 522-1139
dress: (Street, City, Zip) 4400 W. Wall 79703
Fax #: (915) 528-4310
ntact Person: Todd Choban
oice to:
different from above)
ject #: CH2100
Project Name:
ject Location: Hobbs/Champion Facility
Sampler Signature: Jason Henry

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE		PRESERVATIVE METHOD: HCl	HNO_3	H_2SO_4	NaOH	ICE	NONE		SAMPLING: DATE	TIME
55	SB-55 5'	2	4 oz													10-02	0955
56	SB-55 20'	2														10-02	1001
57	SB-55 40'	2														10-02	1027
58	SB-56 5'	2														10-02	937
59	SB-56 20'	1														10-02	945
60	SB-56 40'	2														10-02	9:05
61	SB-48 2.5'	4														10-02	1004
62	SB-48 5'	4														10-02	1012
63	SB-47 2.5'	2														10-01	920
64	SB-47 5'	4														10-01	928
65	SB-64	4														10-02	908

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB #	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Chromium	Chlorides	Arsenic, Lead			Turn Around Time if different from standard	Hold
55																X	X					
56																X	X					
57																X	X					
58																X	X					
59																X	X					
60																X	X					
61																						X
62																						X
63																						X
64		X	X													X	X	X				
65		X	X													X	X	X				

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Jason Henry	10-03-02	0800		10-03-02	0800
	10/03/02	1435	Helen Shelton	10/03/02	1435
Helen Shelton	10/03/02	1830	Received at Laboratory by:	10-4-02	10

LAB USE ONLY
Intact [✓ Y] / N
Headspace Y / N
Temp 2°
Log-in Review MM

REMARKS:

☐ Check If Special Reporting Limits Are Needed

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C.

29 samples HS

Carrier # Greyhound GLI 300-619-685-3

TRACEANALYSIS, INC.

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155 McCutcheon, Suite H El Paso, Texas 79932 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

CORRECTED CERTIFICATE

Analytical and Quality Control Report

Todd Choban
E.T.G.I.
PO Box 4845
Midland, Tx. 79704

Report Date: November 11, 2002

Order ID Number: A02093011

Project Number: CH2100
Project Name: Champion Tech
Project Location: Hobbs,NM

Enclosed are the Analytical Results and Quality Control Data Reports for the following samples submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
209245	MW-15 5	Soil	9/26/02	10:55	9/28/02
209249	MW-15 25	Soil	9/26/02	11:31	9/28/02
209252	MW-15 40	Soil	9/26/02	12:07	9/28/02

Comment: LCS had the wrong % recovery needed to be corrected. Matrix Blank was added for chloride.

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.
Note: the RDL is equal to MQL for all organic analytes including TPH.
The test results contained within this report meet all requirements of LAC 33:I unless otherwise noted.

This report consists of a total of 5 pages and shall not be reproduced except in its entirety including the chain of custody (COC), without written approval of TraceAnalysis, Inc.

Note: Samples will be disposed of 30 days from the report date unless the lab is contacted before the 30 days has past.

Dr. Blair Leftwich, Director

Report Date: November 11, 2002
CH2100

Order Number: A02093011
Champion Tech

Hobbs,NM

Analytical Report

Sample: 209245 - MW-15 5
Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC23891 Date Analyzed: 10/1/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22336 Date Prepared: 10/1/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		46.7	mg/Kg	5	1

Sample: 209245 - MW-15 5
Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC23898 Date Analyzed: 10/2/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22328 Date Prepared: 10/1/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		5.73	mg/Kg	100	0.01

Sample: 209249 - MW-15 25
Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC23891 Date Analyzed: 10/1/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22336 Date Prepared: 10/1/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		37.4	mg/Kg	5	1

Sample: 209249 - MW-15 25
Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC23898 Date Analyzed: 10/2/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22328 Date Prepared: 10/1/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		2.46	mg/Kg	100	0.01

Sample: 209252 - MW-15 40
Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC23891 Date Analyzed: 10/1/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22336 Date Prepared: 10/1/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		137	mg/Kg	5	1

Sample: 209252 - MW-15 40
Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC23898 Date Analyzed: 10/2/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22328 Date Prepared: 10/1/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		5.88	mg/Kg	100	0.01

Report Date: November 11, 2002
CH2100

Order Number: A02093011
Champion Tech

Page Number: 3 of 5
Hobbs,NM

Quality Control Report
Method Blank

Method Blank QCBatch: QC23891

Param	Flag	Results	Units	Reporting Limit
Chloride	[1]	<1.0	mg/L	1

Method Blank QCBatch: QC23898

Param	Flag	Results	Units	Reporting Limit
Total Chromium		<0.010	mg/Kg	0.01

Quality Control Report
Lab Control Spikes and Duplicate Spikes

Laboratory Control Spikes QCBatch: QC23891

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	[2] 25.55	[3] 25.22	mg/Kg	1	12.50	<1.0	95	0	90 - 110	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC23898

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Arsenic	52.3	53.2	mg/Kg	100	50	<0.050	104	1	75 - 125	20
Total Chromium	9.65	9.63	mg/Kg	100	10	<0.010	96	0	75 - 125	20
Total Lead	47.8	47.4	mg/Kg	100	50	<0.010	95	0	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Quality Control Report
Matrix Spikes and Duplicate Spikes

Matrix Spikes QCBatch: QC23891

---

[1] Method blank (matrix) QC Batch 23891 in soil 13.42 mg/Kg the other in water.

[2] Soil blank should be subtracted from the blank spikes. %EA = 95 and RPD = 0.

[3] Soil blank should be subtracted from the blank spikes. %EA = 95 and RPD = 0.

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	1150	1160	mg/Kg	1	625	575	92	1	35 - 144	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC23898

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Chromium	13.2	13.5	mg/Kg	100	10	4.28	89	3	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Quality Control Report
Continuing Calibration Verification Standards

CCV (1) QCBatch: QC23891

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.85	94	90 - 110	10/1/02

ICV (1) QCBatch: QC23891

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.88	95	90 - 110	10/1/02

CCV (1) QCBatch: QC23898

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/Kg	1	1.00	100	90 - 110	10/2/02
Total Chromium		mg/Kg	0.20	0.195	98	90 - 110	10/2/02
Total Lead		mg/Kg	1	0.966	97	90 - 110	10/2/02

ICV (1) QCBatch: QC23898

Report Date: November 11, 2002
CH2100

Order Number: A02093011
Champion Tech

Page Number: 5 of 5
Hobbs,NM

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		mg/Kg	1	0.980	98	95 - 105	10/2/02
Total Chromium		mg/Kg	0.20	0.195	98	95 - 105	10/2/02
Total Lead		mg/Kg	1	0.966	97	95 - 105	10/2/02

09245-52

Page 1 of 1

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Fax (915) 585-4944
1 (888) 588-3443

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # A02093011

pany Name: ETGI
Phone #: (915) 522-1139
ess: (Street, City, Zip) 4600 W. Wall Midland 79703
Fax #: (915) 520-4310
act Person: Todd Choban
ce to: (ferent from above)
ct #: CH2100
Project Name: Champion
ct Location: Hobbs / Champion Facility
Sampler Signature:

ANALYSIS REQUEST

(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	MATRIX: SOIL	MATRIX: AIR	MATRIX: SLUDGE	PRESERVATIVE METHOD: HCl	PRESERVATIVE METHOD: HNO_3	PRESERVATIVE METHOD: H_2SO_4	PRESERVATIVE METHOD: NaOH	PRESERVATIVE METHOD: ICE	PRESERVATIVE METHOD: NONE	SAMPLING: DATE	SAMPLING: TIME	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Chlorides	Chromium	Turn Around Time if different from standard	Hold
245	MW-15-5'	3	4oz		X							X		9-26	056																X	X		
46	MW-15-10'	3													1108																			X
47	MW-15-15'	2													1110																			X
48	MW-15-20'	3													1113																			X
49	MW-15-25'	2													1131																X	X		
50	MW-15-30'	3													1149																			X
51	MW-15-35'	1													1155																			X
52	MW-15-40'	3													1207																X	X		

quished by:	Date: 9/27/02	Time: 1500	Received by: Helen Shelton	Date: 9/27/02	Time: 1500
quished by: Helen Shelton	Date: 9/27/02	Time: 1830	Received by:	Date:	Time:
quished by:	Date:	Time:	Received at Laboratory by:	Date:	Time:

LAB USE ONLY
Intact [✓ Y] / N
Headspace Y / N
Temp 6°C
Log-in Review MK

REMARKS: Standard 5 day turn around
1013F
Questions call Todd 238-0061

☐ Check if Special Reporting Limits Are Needed

nittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C. 20 samples-HS

Carrier # Greyhound

MILLENNIUM Laboratories, Inc.

1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Mike Amabisco
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2000090128
Report Date: 10/05/2000

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: ES 705
Received: 09/19/2000

Sampled by: Mike Amabisco

Lab Number	Sample Identification
2000090128-1	17-0810-A
2000090128-2	17-1315-A
2000090128-3	17-1820-A
2000090128-4	17-1820-B
2000090128-5	17-2325-A
2000090128-6	16-0305-A
2000090128-7	16-0810-A
2000090128-8	16-1315-A
2000090128-9	16-1820-A
2000090128-10	16-2325-A
2000090128-11	19-0305-A
2000090128-12	19-0305-B
2000090128-13	19-0810-A
2000090128-14	19-1315-A
2000090128-15	19-1820-A
2000090128-16	6-0002-A
2000090128-17	6-0204-A
2000090128-18	6-0204-B
2000090128-19	8-0002-A
2000090128-20	8-0204-A
2000090128-21	4-0002-A
2000090128-22	4-0204-A
2000090128-23	7-0002-A
2000090128-24	7-0204-A
2000090128-25	5-0002-A
2000090128-26	5-0204-A

REVISED

MILLENNIUM LABORATORIES, Inc.

Amanda Bourgeois
Technical - QA/QC review by :

Gina M. Tatosian

Project Name: Hobbs
Project Number: ES 705
Received: 09/19/2000

Sampled by: Mike Amabisco

Lab Number	Sample Identification
2000090128-27	1-0001-A
2000090128-28	2-0001-A
2000090128-29	3-0001-A
2000090128-30	19-2325-A
2000090128-31	21-0305-A
2000090128-32	21-0305-B
2000090128-33	21-0810-A
2000090128-34	21-1315-A
2000090128-35	18-0305-A
2000090128-36	18-0810-A
2000090128-37	18-1315-A
2000090128-38	18-1820-A

REVISED

MILLENNIUM
LABORATORIES, INC.

October 5, 2000

Enercon
Mike Amabisco
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2000090128
Project Name: Hobbs
Project Number: ES 705

Dear Mr. Amabisco:

Enclosed you find the results of the samples submitted to Millennium Laboratories on 09/19/00 from the site referenced above.

Your sample "6-0204-A" (Millennium ID: 2000090128-17) was randomly chosen for use in Millennium's Quality Control Program for Semi-Volatile Compound analysis by method 8270C. The Matrix Spike and Martix Spike Duplicate recoveries were outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) were analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "17-1315-A" (Millennium ID: 2000090128-2) was randomly chosen for use in Millennium's Quality Control Program for Metals analysis by method 6020. The Matrix Spike recovery was outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "6-0204-B" (Millennium ID: 2000090128-18) was randomly chosen for use in Millennium's Quality Control Program for Metals analysis by method 6020. The Matrix Spike recovery was outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "5-0002-A" (Millennium ID: 2000090128-25) was randomly chosen for use in Millennium's Quality Control Program for Metals analysis by method 6020. The Matrix Spike recovery was outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

MILLENNIUM
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Your sample "18-0305-A" (Millennium ID: 2000090128-35) was randomly chosen for use in Millennium's Quality Control Program for Metals analysis by method 6020. The Matrix Spike recovery was outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "19-0305A" (Millennium ID: 2000090128-11) was randomly chosen for use in Millennium's Quality Control Program for Anions analysis by method 300.0. The Matrix Spike recovery was outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "4-0204-A" (Millennium ID: 2000090128-22) was randomly chosen for use in Millennium's Quality Control Program for Anions analysis by method 300.0. The Matrix Spike recovery was outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "19-2325-A" (Millennium ID: 2000090128-30) was randomly chosen for use in Millennium's Quality Control Program for Anions analysis by method 300.0. The Matrix Spike recovery was outside the quality control limit for several analytes, due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

This report retains its validity and integrity only when reported in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories.

All samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Gina M. Tatosian
Senior Project Manager

Report No.: 2000090128
11/03/2000
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 27 Date Collected: 09/16/2000 Time Collected: 17:00:00 Matrix: Soil
Description: 1-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Mercury	SW-846 7471A	<0.200	mg/Kg	0.2000	09/26/2000	KF
Arsenic	SW-846 3050B/6010B	13.7	mg/Kg	5.0000	09/28/2000	KF
Barium	SW-846 3050B/6010B	540	mg/Kg	5.0000	09/28/2000	KF
Cadmium	SW-846 3050B/6010B	1.42	mg/Kg	0.5000	09/28/2000	KF
Chromium	SW-846 3050B/6010B	20.1	mg/Kg	5.0000	09/28/2000	KF
Lead	SW-846 3050B/6010B	23.2	mg/Kg	1.0000	09/28/2000	KF
Selenium	SW-846 3050B/6010B	<5.00	mg/Kg	5.0000	09/28/2000	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.0000	10/01/2000	KF

Report No.: 2000090128
11/03/2000
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 27 Date Collected: 09/16/2000 Time Collected: 17:00:00 Matrix: Soil
Description: 1-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Fluoride	EPA 300.0	6.02	mg/Kg	0.1000	09/30/2000	KF
Chloride	EPA 300.0	151	mg/Kg	0.1000	09/30/2000	KF
Sulfate	EPA 300.0	182	mg/Kg	1.0000	09/30/2000	KF
Nitrate-N	EPA 300.0	18.5	mg/Kg	0.1000	09/30/2000	KF
Nitrite	EPA 300.0	<0.100	mg/Kg	0.1000	09/30/2000	KF
Bicarbonate/Carbonate	EPA 310.1	88.7/0.39	mg/Kg	1.0000	09/27/2000	TW

Report No.: 2000090128
11/03/2000
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 27 Date Collected: 09/16/2000 Time Collected: 17:00:00 Matrix: Soil
Description: 1-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	29,724	mg/Kg	1.0000	10/01/2000	KF
Potassium	SW-846 3050B/6020	2,282	mg/Kg	1.0000	10/01/2000	KF
Magnesium	SW-846 3050B/6020	2,951	mg/Kg	1.0000	10/01/2000	KF
Sodium	SW-846 3050B/6020	141	mg/Kg	1.0000	10/01/2000	KF
Copper	SW-846 3050B/6010B	12.1	mg/Kg	1.0000	09/28/2000	KF
Iron	SW-846 3050B/6010B	4,832	mg/Kg	1.0000	09/28/2000	KF
Manganese	SW-846 3050B/6020	156	mg/Kg	1.0000	10/01/2000	KF
Zinc	SW-846 3050B/6010B	115	mg/Kg	1.0000	09/28/2000	KF

Report No.: 2000090128
11/03/2000
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 28 Date Collected: 09/16/2000 Time Collected: 17:05:00 Matrix: Soil
Description: 2-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Mercury	SW-846 7471A	<0.200	mg/Kg	0.2000	09/26/2000	KF
Arsenic	SW-846 3050B/6010B	17.0	mg/Kg	5.0000	09/28/2000	KF
Barium	SW-846 3050B/6010B	293	mg/Kg	5.0000	09/28/2000	KF
Cadmium	SW-846 3050B/6010B	1.23	mg/Kg	0.5000	09/28/2000	KF
Chromium	SW-846 3050B/6010B	8.32	mg/Kg	5.0000	09/28/2000	KF
Lead	SW-846 3050B/6010B	10.2	mg/Kg	1.0000	09/28/2000	KF
Selenium	SW-846 3050B/6010B	<5.00	mg/Kg	5.0000	09/28/2000	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.0000	10/01/2000	KF

Report No.: 2000090128
11/03/2000
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 28 Date Collected: 09/16/2000 Time Collected: 17:05:00 Matrix: Soil
Description: 2-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Fluoride	EPA 300.0	4.90	mg/Kg	0.1000	09/30/2000	KF
Chloride	EPA 300.0	174	mg/Kg	0.1000	09/30/2000	KF
Sulfate	EPA 300.0	149	mg/Kg	1.0000	09/30/2000	KF
Nitrate-N	EPA 300.0	211	mg/Kg	0.1000	09/30/2000	KF
Nitrite	EPA 300.0	<0.100	mg/Kg	0.1000	09/30/2000	KF
Bicarbonate/Carbonate	EPA 310.1	50.0/0.23	mg/Kg	1.0000	09/27/2000	TW

Report No.: 2000090128
11/03/2000
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 28 Date Collected: 09/16/2000 Time Collected: 17:05:00 Matrix: Soil
Description: 2-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Calcium	SW-846 3050B/6020	55,323	mg/Kg	1.0000	10/01/2000	KF
Potassium	SW-846 3050B/6020	1,588	mg/Kg	1.0000	10/01/2000	KF
Magnesium	SW-846 3050B/6020	1,573	mg/Kg	1.0000	10/01/2000	KF
Sodium	SW-846 3050B/6020	44.9	mg/Kg	1.0000	10/01/2000	KF
Copper	SW-846 3050B/6010B	4.20	mg/Kg	1.0000	09/28/2000	KF
Iron	SW-846 3050B/6010B	1,072	mg/Kg	1.0000	09/28/2000	KF
Manganese	SW-846 3050B/6020	81.1	mg/Kg	1.0000	10/01/2000	KF
Zinc	SW-846 3050B/6010B	50.5	mg/Kg	1.0000	09/28/2000	KF

Millennium Laboratories, Inc.

QC Batch ID: 100100/RCRA8 9-28

QC SUMMARY REPORT

Metals by EPA Method 6020 and 6010B

Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Calcium	<DL	1.00	0.935	94.0%	75 - 125
Copper	0.016	1.00	0.787	79.0%	75 - 125
Arsenic	0.101	1.00	0.783	78.0%	75 - 125
Barium	0.038	1.00	0.834	83.0%	75 - 125
Zinc	0.010	1.00	0.892	89.0%	75 - 125
Cadmium	0.014	1.00	0.762	76.0%	75 - 125
Chromium	0.027	1.00	0.779	78.0%	75 - 125
Iron	0.080	1.00	0.846	85.0%	75 - 125
Lead	0.039	1.00	0.766	77.0%	75 - 125
Potassium	0.010	50.00	48.202	96.0%	75 - 125
Mercury	0.038	0.10	0.130	105.0%	75 - 125
Magnesium	0.004	1.00	0.995	100.0%	75 - 125
Sodium	0.033	50.00	49.424	99.0%	75 - 125
Selenium	0.035	1.00	0.888	89.0%	75 - 125
Manganese	0.001	0.02	0.016	79.0%	75 - 125
Silver	0.013	0.02	1.044	104.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Copper	2.97	1.00	3.690	72.0%	75 - 125
Arsenic	16.1	1.00	16.803	70.0%	75 - 125
Barium	228	1.00	228.4	43.0%	75 - 125
Zinc	5.72	1.00	6.458	74.0%	75 - 125
Cadmium	1.13	1.00	1.838	71.0%	75 - 125
Chromium	<5.00	1.00	3.828	69.0%	75 - 125
Iron	652	1.00	663.87	1187.0%	75 - 125
Lead	6.79	1.00	7.448	66.0%	75 - 125
Mercury	<0.200	0.25	0.222	89.0%	75 - 125
Selenium	<5.00	1.00	2.415	81.0%	75 - 125
Silver	<5.00	1.00	0.025	2.0%	75 - 125

Sequence Date(s): 10/1/00 & 9/28/00 Batch Extraction/Prep Date: 9/27/00

Sample ID - MS/MSD: 2000090128-25 &
2000090128-32 (Hg)

Data Qualifiers: NONE - associated with this batch of samples.

Millennium Laboratories, Inc.

QC Batch ID: 93000

QC SUMMARY REPORT

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	<DL	10.00	10.174	102.0%	75 - 125
Chloride	<DL	50.00	49.630	99.0%	75 - 125
Nitrite	<DL	15.00	14.208	95.0%	75 - 125
Nitrate	<DL	10.00	12.080	121.0%	75 - 125
Sulfate	<DL	50.00	50.490	101.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	16.0	10.00	22.657	67.0%	75 - 125
Chloride	986	10.00	991.225	52.0%	75 - 125
Nitrite	<0.100	10.00	10.710	107.0%	75 - 125
Nitrate	47.4	10.00	53.895	65.0%	75 - 125
Sulfate	529	10.00	538.193	92.0%	75 - 125

Sequence Date(s): 9/30/00

Batch Extraction/Prep Date: 9/29/00

Sample ID - MS/MSD: 2000090128-11

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2000090128

Millennium Laboratories, Inc.

QC SUMMARY REPORT

Anions by EPA Method 300.0

QC Batch ID: 93000

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	<DL	10.00	10.174	102.0%	75 - 125
Chloride	<DL	50.00	49.630	99.0%	75 - 125
Nitrite	<DL	15.00	14.208	95.0%	75 - 125
Nitrate	<DL	10.00	12.080	121.0%	75 - 125
Sulfate	<DL	50.00	50.490	101.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	16.0	10.00	22.695	67.0%	75 - 125
Chloride	837	10.00	845.077	81.0%	75 - 125
Nitrite	<0.100	10.00	11.113	111.0%	75 - 125
Nitrate	8.16	10.00	14.859	67.0%	75 - 125
Sulfate	311	10.00	324.361	134.0%	75 - 125

Sequence Date(s): 9/30/00 Batch Extraction/Prep Date: 9/29/00

Sample ID - MS/MSD: 2000090128-22

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) in Batch: 2000090128

Millennium Laboratories, Inc.

QC SUMMARY REPORT

Anions by EPA Method 300.0

QC Batch ID: 93000

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	<DL	10.00	10.174	102.0%	75 - 125
Chloride	<DL	50.00	49.630	99.0%	75 - 125
Nitrite	<DL	15.00	14.208	95.0%	75 - 125
Nitrate	<DL	10.00	12.080	121.0%	75 - 125
Sulfate	<DL	50.00	50.490	101.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	14.6	10.00	23.301	87.0%	75 - 125
Chloride	676	10.00	676.0	0.0%	75 - 125
Nitrite	<0.100	10.00	10.884	109.0%	75 - 125
Nitrate	2.47	10.00	9.015	65.0%	75 - 125
Sulfate	732	10.00	732.0	0.0%	75 - 125

Sequence Date(s): 9/30/00 Batch Extraction/Prep Date: 9/29/00

Sample ID - MS/MSD: 2000090128-30

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2000090128

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 92100

Alkalinity - Bicarbonate/Carbonate by EPA Method 310.1

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS*		*QC Acceptance Criteria*
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Alkalinity	1.00	79.42	78.00	98.0%	80 - 120

Sample/Sample Duplicate

CONSTITUENT	Sample Result (ppm)	Sample Dup (ppm)	Dup Recovery (%)	QC Acceptance Criteria % Recovery (Low - High Limit)
Alkalinity	158.00	162.00	101.0%	75 - 125

Sequence Date(s): 9/21/00 Batch Extraction/Prep Date: 9/21/00

Sample ID - Sample/Dup 2000090128-2

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2000090128

QC SUMMARY REPORT

QC Batch ID: 92100

Alkalinity - Bicarbonate/Carbonate by EPA Method 310.1

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Alkalinity	1.00	79.42	76.00	96.0%	80 - 120

Sample/Sample Duplicate

CONSTITUENT	Sample Result (ppm)	Sample Dup (ppm)	Dup Recovery (%)	QC Acceptance Criteria % Recovery (Low - High Limit)
Alkalinity	68.00	72.00	103.0%	75 - 125

Sequence Date(s): 9/21/00

Batch Extraction/Prep Date: 9/21/00

Sample ID - Sample/Dup 2000090128-17

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2000090128

QC SUMMARY REPORT

QC Batch ID: 92700

Alkalinity - Bicarbonate/Carbonate by EPA Method 310.1

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Alkalinity	1.00	79.42	78.00	98.0%	80 - 120

Sample/Sample Duplicate

CONSTITUENT	Sample Result (ppm)	Sample Dup (ppm)	Dup Recovery (%)	QC Acceptance Criteria % Recovery (Low - High Limit)
Alkalinity	50.00	50.00	100.0%	75 - 125

Sequence Date(s): 9/27/00 Batch Extraction/Prep Date: 9/27/00

Sample ID - Sample/Dup 2000090128-30

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2000090128

Laboratory Order Variance & Documentation Tracking Form
MILLENNIUM Laboratories, Inc.

Sample Log-In Check List

JH

☑ No problems were detected during the log-in for the sampling event received.

☑ Please see the item(s) checked below.

Problem(s) related to Shipping and Handling of Coolers & Documentation

☐ Shipping/Cooler Custody Seal was damaged

☐ Sample(s) received without refrigeration/cool (> 4 °C)

☐ Sample(s) were damaged during shipping (see note below)

☐ Documentation incomplete or missing (see note below)

Problem(s) related to specific sections of the Chain of Custody

☐ Report To:

☐ Billing information:

☐ Project information:

☐ Collection Date/Time:

☐ Sample Matrix

☐ Analytical Requested:

☑ Broken/Missing Sample(s): 1 jar for each

Corrective Action Taken: 19-2325-A & 4-0204-A broken upon arrival at lab

Sample Control Coordinator: JH Date: 5-19-00 Approved by:

MILLENNIUM Labs - Project Number

2000- 050128

Date Rec'd 5-19

Date Due: 10-3 Rush ☐

Client	Energy
Project No:	ES 725
Site:	Hobbs
Project Mgr:	Mike Amaliso
Phone:	

Report Tracking

Report Type	ML Staff Initials	Date completed
[✓ Faxed Rpt.]		☐ No Fax Required
Case Narrative Completed		
Final Rpt. Mailed		

Quality Assurance Tracking

Add'l Item(s) client has for this sampling event	Quality Assurance Req'd	QA/QC Filed Initials/Date	Variance Filed Initials/Date
TPH 418	☐ BTEX or BTEX/MtBE		
Gen Chem.	☐ TPH (TX1005)		
	☐ Nitrate/Sulfate		
	☑ Metals		
	☐ VOCs by GC-MS		
	☐ SVOC by GC-MS		
	☐ PAH		
	☐ Pesticides		
	☐ Herbicides		
	☐ PCBs		
	☐ ______		

Analytical Parameters Added:

☐ PAH	Analyzed Sample #______		
☐ ______	Analyzed Sample #______		
☐ ______	Analyzed Sample #______		
☐ ______	Analyzed Sample #______		

Sub-contracted Analyses

GEOTECHS ML#______ Sent:______ Rec'd:______ Lab______

INVOICE Tracking

☐ FUNDED Project (verify billing address)

☐ CASH Project

☐ Other:______

RUSH FEES ☐ Yes ☐ No

Date Invoice Printed	
Invoice Number	
Invoice Amount	

Invoice Created By:______

☐ Mailed with Report to Project Manager

☐ Other:

Notes:

Revised 04-03-00 TS

[redacted] S[redacted]est Me[redacted]hone N[redacted] Shipp[redacted]nation. [redacted] Page[redacted]

REPORT TO:

Company: Enercon
Mailing Address:
City: ST: Zip:
Phone: - -
Fax Phone: - -
Report Attn: M. AMABISCO

BILLING INFORMATION

PO No.:
☐ Invoice per Fee Schedule Established for our firm:
☒ Special Project: Invoice as per project quote: *Please attach quotation*
☐ Direct Billing-Third Party: *Attach sheet or use Remarks section for details*
☐ Priority Project - Lab is Authorized to Invoice for RUSH FEES
Send Invoice To: ☐ Project Manager ☐ See Remarks

PROJECT INFORMATION

Project Number: LS 785
Site Name (limited to 20 characters): Nebbs

Sampled by: Print Name(s) Below
1. M. AMABISCO
2.

LAB USE ONLY

2000 - ______

Page Number: Each Chain PER PROJECT ONLY

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm; ☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm; Analyze one sample with the highest C_{10}-C_{28} concentration
☐ TDS: Analyze the cleanest sampling point based on TPH-total; if TPH is non-detect; select sample with lowest aromatic content (total BTEX)
☐ TCLP-Metals: Based on Total Metals results; run TCLP Extraction on samples with parameters which exceed 20 times the TCLP Limits
☐ TCLP-Volatiles: Based on VOC results; run TCLP Extraction on samples with compounds which exceed: (attach sheet or use remarks section)

Remarks:

Turnaround Time
☐ 5 Working Days
☐ Other: ______ days

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Total Lead 6010B	BTEX/MTBE 8021	TPH 1005 418.1 80	(8) RCRA Metals	Volatile Organics 826	Semi-Volatiles 8270	PAH 8310 8100 82	Pesticides 8081	Herbicides 8151	Additional Parameters: [illegible] (WT)	Additional Parameters: [illegible] Chem				Comments (Please use space below or attach additional sheet(s))	Preserved	Total Number of Bottles per Location
1	17-0810-A	9/16/00	0750		X		X			X	X												Strong odor		2
2	17-1315-A	9/16/00	0800		X		X			X	X							X	X				"		3
3	17-1820-A	9/16/00	0815		X		X			X	X												"		2
4	17-1820-B	9/16/00	0815		X		X			X	X												"		2
5	17-2325-A	9/16/00	0830		X		X			~~X~~	X			X				X	X				"		3
6	16-0305-A	9/16/00	0905		X		X			X	X							X	X				"		3
7	16-0810-A	9/16/00	0915		X		X				X														1
8	16-1315-A	9/16/00	0930		X		X				X							X	X						2
9	16-1820-A	9/16/00	0945		X		X				X														1
10	16-2325-A	9/16/00	1000		X		X				X							X	X						2
11	19-0305-A	9/16/00	1040		X		X				X							X	X						2
12	19-0305-B	9/16/00	1040		X		X				X							X	X						2
13	19-0810-A	9/16/00	1050		X		X				X														1
14	19-1315-A	9/16/00	1105		X		X				X							X	X						1
15	19-1820-A	9/16/00	1120		X		X				X														1

Relinquished by M. Amabisco	Date: 9/16/00	Time: 1630	Received by:	Date:	Time:	**Condition of Sample(s) Rec'd At Lab**
Relinquished by	Date:	Time:	Received by:	Date:	Time:	Custody Seal Intact ☐ Yes ☐ No
Relinquished by	Date:	Time:	**Received At Millennium Labs by:**	**Date:**	**Time:**	Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
				[illegible]	[illegible]	☐ Temperature of Sample(s): 4.1

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express ☒ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

REPORT TO: | **BILLING INFORMATION** | **PROJECT INFORMATION** | [redacted] B U[redacted]NLY [redacted]

Company: Enviro-N
Mailing Address:
City: ST: Zip:
Phone: - -
Fax Phone: - -
Report Attn: M. Ambrosio

PO No.:
☐ Invoice per Fee Schedule Established for our firm:
☐ **Special Project:** Invoice as per project quote: *Please attach quotation*
☐ **Direct Billing-Third Party:** *Attach sheet or use Remarks section for details*
☐ **Priority Project** - Lab is **Authorized** to invoice for **RUSH FEES**
Send Invoice To: ☒ Project Manager ☐ See Remarks

Project Number: 03 105
Site Name (limited to 20 characters): Hobbs
Sampled by: Print Name(s) Below
1. M. Ambrosio
2.

2000 - ___ ___ ___ ___
Page Number Each Chain PER PROJECT ONLY

☐ **PAH-Soil:** If, C_8-C_{28} total > 100 ppm;
☐ **PAH-Water:** If, C_8-C_{28} total > 5.0 ppm;
Analyze one sample with the highest C_{10}-C_{28} concentration
☐ **TDS:** Analyze the cleanest sampling point based on TPH-total; If TPH is non-detect; select sample with lowest aromatic content [total BTEX]
☐ **TCLP-Metals:** Based on Total Metals results; run TCLP Extraction on samples with parameters which exceed 20 times the TCLP Limits
☐ **TCLP-Volatiles:** Based on VOC results; run TCLP Extraction on samples with compounds which exceed: [attach sheet or use remarks section]

Remarks:

Turnaround Time
☐ 5 Working Days
☐ Other: ______ days

Comments
Please use space below or attach additional sheet(s)

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Total Lead 6010B	BTEX/MTBE 8021	TPH 1005 418.1 80	(8) RCRA Metals	Volatile Organics 826	Semi-Volatiles 8270	PAH 8310 8100 82	Pesticides 8081	Herbicides 8151	WQCC MTL	Chloride	Sulfates	Gen. Chem		Comments	Preserved	Total Number of Bottles per Location
16	6-0002-A	9/16/00	1535		X		X											X	X	X					-
17	6-0204-A	9/16/00	1540		X		X				X			X				X	X	X					3
18	6-0204-B	9/16/00	1540		X		X				X			X				X	X	X					3
19	8-0002-A	9/16/00	1550		X		X											X	X	X					2
20	8-0204-A	9/16/00	1555		X		X				X			X				X	X	X					3
21	4-0002-A	9/16/00	1600		X		X											X	X	X					2
22	4-0204-A	9/16/00	1610		X		X				X			X				X	X	X					3
23	7-0002-A	9/16/00	1620		X		X											X	X	X					2
24	7-0204-A	9/16/00	1630		X		X				X			X				X	X	X					3
25	5-0002-A	9/16/00	1640		X		X											X	X	X					2
26	5-0204-A	9/16/00	1650		X		X				X			X				X	X	X					3
27	1-0001-A	9/16/00	1700		X		X											X			X				2
28	2-0001-A	9/16/00	1705		X		X											X			X				2
29	3-0001-A	9/16/00	1710		X		X											X			X				2

Relinquished by M. Ambrosio	Date: 9/18/00	Time: 1630	Received by:	Date:	Time:	**Condition of Sample(s) Rec'd At Lab**
Relinquished by	Date:	Time:	Received by:	Date:	Time:	Custody Seal Intact ☐ Yes ☐ No
Relinquished by	Date:	Time:	**Received At Millennium Labs by:**	**Date:**	**Time:**	Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
Method of Shipment: [see back copy for shipping address & instructions] ☐ Greyhound Express ☒ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client				9/19/00	10:00	☐ Temperature of Sample(s): 4°C

[redacted] Test M [redacted] Phone N [redacted] & Ship [redacted] mation [redacted]
Chain of Custody Record [redacted]
Millennium Labs Project Number [redacted]
Page [redacted] of [redacted]

REPORT TO: [redacted]

Company: Envirotech
Mailing Address:
City: ST: Zip:
Phone: - -
Fax Phone: - -
Report Attn: M. AMABISCO

BILLING INFORMATION [redacted]

PO No.:
☐ Invoice per Fee Schedule Established for our firm:
☑ Special Project: Invoice as per project quote: *Please attach quotation*
☐ Direct Billing-Third Party: *Attach sheet or use Remarks section for details*
☐ Priority Project - Lab is Authorized to Invoice for RUSH FEES
Send Invoice To: ☒ Project Manager ☐ See Remarks

PROJECT INFORMATION [redacted]

Project Number: 1532T
Site Name (limited to 20 characters): Hobbs
Sampled by: Print Name(s) Below
1. M. AMABISCO
2.

LAB USE ONLY [redacted]

2000 - ______

Page Number Each Chain PER PROJECT ONLY

☐ PAH-Soil: If, C_6-C_{28} total > 100 ppm; Analyze one sample with the highest C_{10}-C_{28} concentration
☐ PAH-Water: If, C_6-C_{28} total > 6.0 ppm;
☐ TDS: Analyze the cleanest sampling point based on TPH-total; if TPH is non-detect; select sample with lowest aromatic content (total BTEX)
☐ TCLP-Metals: Based on Total Metals results; run TCLP Extraction on samples with parameters which exceed 20 times the TCLP Limits
☐ TCLP-Volatiles: Based on VOC results; run TCLP Extraction on samples with compounds which exceed: (attach sheet or use remarks section)

Remarks:

Turnaround Time
☐ 5 Working Days
☐ Other: ______ days

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Total Lead 6010B	BTEX/MTBE 8021	TPH 1005 418.1 80	(8) RCRA Metals	Volatile Organics 826	Semi-Volatiles 8270	PAH 8310 8100 82	Pesticides 8081	Herbicides 8151	Additional Parameters: [illegible] MTL	Chem				Comments (Please use space below or attach additional sheet(s))	Preserved	Total Number of Bottles per Location
30	19-2325-A	9/16/00	1135		X		X				X							X	X						2
31	21-0305-A	9/16/00	1250		X		X			X	X			X				X	X						4
32	21-0305-B	9/16/00	1250		X		X			~~X~~	X			~~X~~				X	X						3
33	21-0810-A	9/16/00	1300		X		X				X														1
34	21-1315-A	9/16/00	1317		X		X				X							X	X						2
35	18-0305-A	9/16/00	1420		X		X				X							X	X						2
36	18-0810-A	9/16/00	1430		X		X				X														1
37	18-1315-A	9/16/00	1440		X		X				X							X	X						2
38	18-1820-A	9/16/00	1450		X		X				X														1

Relinquished by M. [illegible]	Date: 9/16/00	Time: 1630	Received by:	Date:	Time:
Relinquished by	Date:	Time:	Received by:	Date:	Time:
Relinquished by	Date:	Time:	Received At Millennium Labs by:	Date: [illegible]	Time: [illegible]

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☐ Yes ☐ No
☐ Temperature of Sample(s): [illegible]

Method of Shipment: (see back copy for shipping address & instructions)
☐ Greyhound Express ☑ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client

MILLENNIUM
LABORATORIES, INC.

June 13, 2001

Paul Brodin
Enercon
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2001050118
Project Name: Hobbs
Project Number: PH334

Dear Mr. Brodin:

Enclosed you will find the results of the samples submitted to Millennium Laboratories on 05/15/01 from the site referenced above.

As per your request, the detection limits have been lowered for Chromium on your samples "MW-4 and MW-6" (Millennium ID: 2001050118-17 and 18).

Your samples "35-0305-A and MW-6" (Millennium ID: 2001050118-1 and 18) were randomly chosen for use in Millennium's Quality Control Program for Metals Analysis by method 6020. The Matrix Spike (MS) recovery was outside the quality control limit for several analytes, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "MW-6" (Millennium ID: 2001050118-17) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride and Sulfate, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "36-1315-A" (Millennium ID: 2001050118-7) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

MILLENNIUM
LABORATORIES, INC.

This report retains its validity and integrity only when reproduced in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories. All

samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Amanda Bourgeois

Amanda Bourgeois
Project Manager

REVISED

MILLENNIUM Laboratories, Inc.

1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Paul Brodin
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2001050118
Report Date: 06/13/2001

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: PH334
Received: 05/15/2001

Sampled by: Paul Brodin

Lab Number	Sample Identification
2001050118-1	35-0305-A
2001050118-2	35-1315-A
2001050118-3	35-2325-A
2001050118-4	35-3335-A
2001050118-5	35-4345-A
2001050118-6	36-0305-A
2001050118-7	36-1315-A
2001050118-8	36-2325-A
2001050118-9	36-3335-A
2001050118-10	36-4345-A
2001050118-11	37-0001-A
2001050118-12	38-0001-A
2001050118-13	39-0001-A
2001050118-14	40-0001-A
2001050118-15	MW-4
2001050118-16	MW-6
2001050118-17	MW-6
2001050118-18	MW-6

REVISED

MILLENNIUM LABORATORIES, Inc.

Technical - QA/QC review by :
Matt Sicero/Theresa Sorrells

Amanda Bourgeois
Amanda Bourgeois/Daniel Duplechien
Project Manager

Report No.: 2001050118
06/13/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 1   Date Collected: 05/11/2001   Time Collected: 07:50:00   Matrix: Soil
Description: 35-0305-A   Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,339	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	120,727	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,806	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	12,858	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	4,376	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	3.20	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	3,278	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.8	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	15.5	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	5.46	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	380	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.77	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 2   Date Collected: 05/11/2001   Time Collected: 07:55:00   Matrix: Soil
Description: 35-1315-A   Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,388	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	105,792	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,066	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	11,280	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	3,488	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	1.01	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	2,241	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.3	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	8.09	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	191	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.02	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 3 Date Collected: 05/11/2001 Time Collected: 08:30:00 Matrix: Soil
Description: 35-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,579	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	157,033	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	293	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	16,344	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,222	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	2.88	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,356	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	37.5	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	28.1	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	212	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.29	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 4 Date Collected: 05/11/2001 Time Collected: 08:35:00 Matrix: Soil
Description: 35-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,480	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	108,689	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	272	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	5,759	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,065	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,410	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	65.4	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	6.20	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	162	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	1.71	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Report No.: 2001050118
06/13/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 5 Date Collected: 05/11/2001 Time Collected: 08:50:00 Matrix: Soil
Description: 35-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,405	mg/Kg	0.100	05/31/2001	KF

Sample No.: 6 Date Collected: 05/11/2001 Time Collected: 12:10:00 Matrix: Soil
Description: 36-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,582	mg/Kg	0.100	05/31/2001	KF

Sample No.: 7 Date Collected: 05/11/2001 Time Collected: 12:15:00 Matrix: Soil
Description: 36-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,195	mg/Kg	0.100	05/31/2001	KF

Sample No.: 8 Date Collected: 05/11/2001 Time Collected: 12:30:00 Matrix: Soil
Description: 36-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	197	mg/Kg	0.100	05/31/2001	KF

Sample No.: 9 Date Collected: 05/11/2001 Time Collected: 12:35:00 Matrix: Soil
Description: 36-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	68.5	mg/Kg	0.100	05/31/2001	KF

Sample No.: 10 Date Collected: 05/11/2001 Time Collected: 12:45:00 Matrix: Soil
Description: 36-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	57.2	mg/Kg	0.100	05/31/2001	KF

Sample No.: 11 Date Collected: 05/11/2001 Time Collected: 15:00:00 Matrix: Soil
Description: 37-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,076	mg/Kg	0.100	05/31/2001	KF

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 51701

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS) Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	<DL	0.05	0.049	98.0%	75 - 125
Barium	<DL	0.05	0.048	97.0%	75 - 125
Cadmium	<DL	0.05	0.048	96.0%	75 - 125
Chromium	<DL	0.05	0.047	95.0%	75 - 125
Lead	<DL	0.05	0.043	86.0%	75 - 125
Mercury	0.035J	0.10	0.150	115.0%	75 - 125
Selenium	<DL	0.05	0.049	98.0%	75 - 125
Silver	<DL	0.05	0.048	97.0%	75 - 125
Sodium	<DL	0.50	0.496	99.0%	75 - 125
Magnesium	<DL	0.50	0.476	95.0%	75 - 125
Potassium	<DL	0.50	0.493	99.0%	75 - 125
Calcium	0.005J	0.50	0.518	104.0%	75 - 125
Iron	0.018J	0.50	0.481	96.0%	75 - 125
Manganese	<DL	0.05	0.041	82.0%	75 - 125
Copper	<DL	0.05	0.049	98.0%	75 - 125
Zinc	<DL	0.05	0.051	101.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Arsenic	5.46	1.00	6.520	106.0%	75 - 125
Barium	380	1.00	380.590	59.0%	75 - 125
Cadmium	<0.500	1.00	1.071	107.0%	75 - 125
Chromium	<5.00	1.00	5.944	108.0%	75 - 125
Lead	2.77	1.00	3.660	89.0%	75 - 125
Mercury	<0.200	0.25	0.275	106.0%	75 - 125
Selenium	<5.00	1.00	1.559	110.0%	75 - 125
Silver	<5.00	1.00	0.841	71.0%	75 - 125
Sodium	4,376	1.00	<4,376	0.0%	75 - 125
Magnesium	12,858	1.00	<12,858	0.0%	75 - 125
Potassium	1,806	1.00	<1,806	0.0%	75 - 125
Calcium	120,727	1.00	246,727	12600.0%	75 - 125
Iron	3,278	1.00	<3,278	0.0%	75 - 125
Manganese	30.8	1.00	31.680	88.0%	75 - 125
Copper	3.20	1.00	4.200	100.0%	75 - 125
Zinc	15.5	1.00	16.540	104.0%	75 - 125

Sequence Date(s):	5/17/01	**Batch Extraction/Prep Date:**	5/17/01
Sample ID - MS/MSD:	2001050118-1 2001050118-4 (Hg only)		
Data Qualifiers:	"J" denotes analyte recovery above the MDL but below the reporting limit. No contamination is associated with this value.		

Project(s) In Batch: 2001050118

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,251	1,157	10.00	1,258.30	73.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050123-1

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

MILLENNIUM Laboratories, Inc.
1544 SAWDUST ROAD * SUITE 402 * THE WOODLANDS, TEXAS 77380 * 281-362-8490

CLIENT: Paul Brodin
Enercon
8866 Gulf Freeway,Suite 380
Houston, TX 77017

Report No.: 2001050118
Report Date: 05/31/2001

Phone: 713-941-0401

Fax: 713-941-0402

Project Name: Hobbs
Project Number: PH334
Received: 05/15/2001

Sampled by: Paul Brodin

Lab Number	Sample Identification
2001050118-1	35-0305-A
2001050118-2	35-1315-A
2001050118-3	35-2325-A
2001050118-4	35-3335-A
2001050118-5	35-4345-A
2001050118-6	36-0305-A
2001050118-7	36-1315-A
2001050118-8	36-2325-A
2001050118-9	36-3335-A
2001050118-10	36-4345-A
2001050118-11	37-0001-A
2001050118-12	38-0001-A
2001050118-13	39-0001-A
2001050118-14	40-0001-A
2001050118-15	MW-4
2001050118-16	MW-6
2001050118-17	MW-6
2001050118-18	MW-6

Technical - QA/QC review by :
Matt Steere/Theresa Sorrells

MILLENNIUM LABORATORIES, Inc.
Amanda Bourgeois
Amanda Bourgeois/Daniel Duplechien
Project Manager

MILLENNIUM
LABORATORIES, INC.

June 5, 2001

Paul Brodin
Enercon
8866 Gulf Freeway, Suite 380
Houston, TX 77017

Millennium Labs Order Number: 2001050118
Project Name: Hobbs
Project Number: PH334

Dear Mr. Brodin:

Enclosed you will find the results of the samples submitted to Millennium Laboratories on 05/15/01 from the site referenced above.

Your samples "35-0305-A and MW-6" (Millennium ID: 2001050118-1 and 18) were randomly chosen for use in Millennium's Quality Control Program for Metals Analysis by method 6020. The Matrix Spike (MS) recovery was outside the quality control limit for several analytes, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "MW-6" (Millennium ID: 2001050118-17) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride and Sulfate, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

Your sample "36-1315-A" (Millennium ID: 2001050118-7) was randomly chosen for use in Millennium's Quality Control Program for Anion Analysis by method 300.0. The Matrix Spike (MS) recovery was outside the quality control limit for Chloride, due to the high amount of analyte present in the original unspiked sample. A Laboratory Control Sample (LCS) was analyzed as part of the analytical batch and all recoveries were within acceptable limits.

All procedures and analyses have been reviewed and meet the Quality Control limits established at Millennium Laboratories.

This report retains its validity and integrity only when reproduced in full and accompanied by this letter. Any other use of this report must be granted, in writing, by Millennium Laboratories. All samples pertaining to this Order Number will be disposed of 60 days after the date of receipt, unless otherwise arranged in writing.

Please do not hesitate to contact us if you have any questions or comments concerning this report. Please reference the above Work Order Number.

Sincerely,

Amanda Bourgeois

Amanda Bourgeois, Project Manager

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 1 Date Collected: 05/11/2001 Time Collected: 07:50:00 Matrix: Soil
Description: 35-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,339	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	120,727	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,806	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	12,858	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	4,376	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	3.20	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	3,278	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.8	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	15.5	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	5.46	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	380	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.77	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 2 Date Collected: 05/11/2001 Time Collected: 07:55:00 Matrix: Soil
Description: 35-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,388	mg/Kg	0.100	05/30/2001	KF
Calcium	SW-846 3050B/6020	105,792	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	1,066	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	11,280	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	3,488	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	1.01	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	2,241	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	30.3	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	8.09	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	191	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.02	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

TEST RESULTS BY SAMPLE

Sample No.: 3 Date Collected: 05/11/2001 Time Collected: 08:30:00 Matrix: Soil
Description: 35-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,579	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	157,033	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	293	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	16,344	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,222	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	2.88	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,356	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	37.5	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	28.1	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	212	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	2.29	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Sample No.: 4 Date Collected: 05/11/2001 Time Collected: 08:35:00 Matrix: Soil
Description: 35-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,480	mg/Kg	0.100	05/31/2001	KF
Calcium	SW-846 3050B/6020	108,689	mg/Kg	1.000	05/17/2001	KF
Potassium	SW-846 3050B/6020	272	mg/Kg	1.000	05/17/2001	KF
Magnesium	SW-846 3050B/6020	5,759	mg/Kg	1.000	05/17/2001	KF
Sodium	SW-846 3050B/6020	1,065	mg/Kg	1.000	05/17/2001	KF
Copper	SW-846 3050B/6020	<1.00	mg/Kg	1.000	05/17/2001	KF
Iron	SW-846 3050B/6020	1,410	mg/Kg	1.000	05/17/2001	KF
Manganese	SW-846 3050B/6020	65.4	mg/Kg	1.000	05/17/2001	KF
Zinc	SW-846 3050B/6020	6.20	mg/Kg	1.000	05/17/2001	KF
Mercury	SW-846 7471A	<0.200	mg/Kg	0.200	05/18/2001	GN
Arsenic	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Barium	SW-846 3050B/6020	162	mg/Kg	5.000	05/17/2001	KF
Cadmium	SW-846 3050B/6020	<0.500	mg/Kg	0.500	05/17/2001	KF
Chromium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Lead	SW-846 3050B/6020	1.71	mg/Kg	1.000	05/17/2001	KF
Selenium	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF
Silver	SW-846 3050B/6020	<5.00	mg/Kg	5.000	05/17/2001	KF

Report No.: 2001050118
05/31/2001
Client: Enercon

TEST RESULTS BY SAMPLE

Sample No.: 5 Date Collected: 05/11/2001 Time Collected: 08:50:00 Matrix: Soil
Description: 35-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,405	mg/Kg	0.100	05/31/2001	KF

Sample No.: 6 Date Collected: 05/11/2001 Time Collected: 12:10:00 Matrix: Soil
Description: 36-0305-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	3,582	mg/Kg	0.100	05/31/2001	KF

Sample No.: 7 Date Collected: 05/11/2001 Time Collected: 12:15:00 Matrix: Soil
Description: 36-1315-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	1,195	mg/Kg	0.100	05/31/2001	KF

Sample No.: 8 Date Collected: 05/11/2001 Time Collected: 12:30:00 Matrix: Soil
Description: 36-2325-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	197	mg/Kg	0.100	05/31/2001	KF

Sample No.: 9 Date Collected: 05/11/2001 Time Collected: 12:35:00 Matrix: Soil
Description: 36-3335-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	68.5	mg/Kg	0.100	05/31/2001	KF

Sample No.: 10 Date Collected: 05/11/2001 Time Collected: 12:45:00 Matrix: Soil
Description: 36-4345-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	57.2	mg/Kg	0.100	05/31/2001	KF

Sample No.: 11 Date Collected: 05/11/2001 Time Collected: 15:00:00 Matrix: Soil
Description: 37-0001-A Project Name: Hobbs

Test	Method	Results	Units	Detection Limit	Date Analyzed	Analyst
Chloride	EPA 300.0	2,076	mg/Kg	0.100	05/31/2001	KF

QC SUMMARY REPORT

QC Batch ID: 51701

Metals by EPA Method 6020
Mercury by Method 7471A

Laboratory Control Sample (LCS)
Method Blank Results

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS*		*QC Acceptance Criteria*
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	<DL	0.05	0.049	98.0%	75 - 125
Barium	<DL	0.05	0.048	97.0%	75 - 125
Cadmium	<DL	0.05	0.048	96.0%	75 - 125
Chromium	<DL	0.05	0.047	95.0%	75 - 125
Lead	<DL	0.05	0.043	86.0%	75 - 125
Mercury	0.035J	0.10	0.150	115.0%	75 - 125
Selenium	<DL	0.05	0.049	98.0%	75 - 125
Silver	<DL	0.05	0.048	97.0%	75 - 125
Sodium	<DL	0.50	0.496	99.0%	75 - 125
Magnesium	<DL	0.50	0.476	95.0%	75 - 125
Potassium	<DL	0.50	0.493	99.0%	75 - 125
Calcium	0.005J	0.50	0.518	104.0%	75 - 125
Iron	0.018J	0.50	0.481	96.0%	75 - 125
Manganese	<DL	0.05	0.041	82.0%	75 - 125
Copper	<DL	0.05	0.049	98.0%	75 - 125
Zinc	<DL	0.05	0.051	101.0%	75 - 125

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Spike Added* (ppm)	*MS*		*QC Acceptance Criteria*
			Result (ppm)	Recovery (%)	Spike % Recovery (Low - High Limit)
Arsenic	5.46	1.00	6.520	106.0%	75 - 125
Barium	380	1.00	380.590	59.0%	75 - 125
Cadmium	<0.500	1.00	1.071	107.0%	75 - 125
Chromium	<5.00	1.00	5.944	108.0%	75 - 125
Lead	2.77	1.00	3.660	89.0%	75 - 125
Mercury	<0.200	0.25	0.275	106.0%	75 - 125
Selenium	<5.00	1.00	1.559	110.0%	75 - 125
Silver	<5.00	1.00	0.841	71.0%	75 - 125
Sodium	4,376	1.00	<4,376	0.0%	75 - 125
Magnesium	12,858	1.00	<12,858	0.0%	75 - 125
Potassium	1,806	1.00	<1,806	0.0%	75 - 125
Calcium	120,727	1.00	246,727	12600.0%	75 - 125
Iron	3,278	1.00	<3,278	0.0%	75 - 125
Manganese	30.8	1.00	31.680	88.0%	75 - 125
Copper	3.20	1.00	4.200	100.0%	75 - 125
Zinc	15.5	1.00	16.540	104.0%	75 - 125

Sequence Date(s):	5/17/01	**Batch Extraction/Prep Date:**	5/17/01
Sample ID - MS/MSD:	2001050118-1 2001050118-4 (Hg only)		
Data Qualifiers:	"J" denotes analyte recovery above the MDL but below the reporting limit.		
	No contamination is associated with this value.		

Project(s) In Batch: 2001050118

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 051501/051701

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	Spike Added (ppm)	*LCS* Result (ppm)	*LCS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	<DL	10.00	9.458	95.0%	90 - 110
Chloride	<DL	50.00	45.581	91.0%	90 - 110
Nitrite	<DL	15.00	14.058	94.0%	90 - 110
Nitrate	<DL	10.00	10.933	109.0%	90 - 110
Sulfate	<DL	50.00	45.757	92.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	Sample Result (ppm)	Sample Dup Result (ppm)	Spike Added (ppm)	*MS* Result (ppm)	*MS* Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Fluoride	2.15	2.34	10.00	11.865	97.0%	80 -120
Chloride	421	420	10.00	<421	0.0%	80 -120
Nitrite	<0.100	<0.100	10.00	9.087	91.0%	80 -120
Nitrate	14.1	14.3	10.00	22.477	84.0%	80 -120
Sulfate	163	167	10.00	<163	0.0%	80 -120

Sequence Date(s): 5/15/01 & 5/17/01 **Batch Extraction/Prep Date:** 5/15/2001

Sample ID - MS/DUP: 2001050118-17

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch: 2001050118

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,195	1,022	10.00	1202.6	76.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050118-7

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

Millennium Laboratories, Inc.

QC SUMMARY REPORT

QC Batch ID: 52901

Anions by EPA Method 300.0

Laboratory Control Sample (LCS)

CONSTITUENT	*Method Blank* (ppm)	*Spike Added* (ppm)	*LCS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	<DL	50.00	46.577	93.0%	90 - 110

Sample Matrix Spikes (MS)

CONSTITUENT	*Sample Result* (ppm)	*Sample Dup Result* (ppm)	*Spike Added* (ppm)	*MS* Result (ppm)	Recovery (%)	*QC Acceptance Criteria* Spike % Recovery (Low - High Limit)
Chloride	1,251	1,157	10.00	1,258.30	73.0%	80 -120

Sequence Date(s): 5/29/01 **Batch Extraction/Prep Date:** 5/29/01

Sample ID - MS/DUP: 2001050123-1

Data Qualifiers: NONE - associated with this batch of samples.

Project(s) In Batch:

2001050118
2001050123
2001050124

MILLENNIUM LABORATORIES
CHAIN OF CUSTODY RECORD

1544 Sawdust [illegible], Suite 402
The Woodlands, Texas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number

LAB USE ONLY
200 1 - 0 5 0 118

age 1
of 2

Number each chain per project

REPORT TO:	**INVOICING INFORMATION**	**PROJECT INFORMATION**
Company Enercon Services	Company Same	Project Number PH334
Mailing Address 8866 Gulf Frwy #380	Address:	Site Name Hobbs
City Houston ST TX Zip 77017	City ST Zip	
Phone # 713-941-0401	Phone #:	**Sampled by:** Print Name(s) Below
Fax # 713-941-0402	Fax #:	Paul Brodin
Report Attn: Paul Brodin	Invoice Attn:	

☐ PAH-Soil: If, C_6-C_{28} total >100 ppm
☐ PAH-Water: If, C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ Level III ____ TRPP ____

Remarks:

P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ________

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	Chlorides	WQCC Metals					Comments	Preserved	Total Number of Sample Containers
1	35-0305-A	5/11/01	0750												X	X						ice	1
2	35-1315-A		0755												X	X							1
3	35-2325-A		0830												X	X							1
4	35-3335-A		0835												X	X							1
5	35-4345-A		0850												X								1
6	36-0305-A		1210												X								1
7	36-1315-A		1215												X								1
8	36-2325-A		1230												X								1
9	36-3335-A		1235												X								1
10	36-4345-A		1245												X								1

Relinquished by:	Date: 5/14/00	Time: 1700	Received by:	Date:	Time:	**Condition of Sample(s) Rec'd At Lab**
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Custody Seal Intact ☐ Yes ☐ No
Method of Shipment: [see back copy for shipping address & instructions]			**Received by Millennium Labs:**	**Date:**	**Time:**	Sample(s) Rec'd Iced/Cool ☑ Yes ☐ No
☐ Greyhound Express ☐ Next-day Air FedEx-UPS ☐ Contract Courier ☐ Laboratory Personnel ☐ OTC-Delivery From Client						☑ Temperature of Sample(s):

MILLENI JM LABORATORIES
CHAIN OF CUSTODY RECORD

1544 Sawdust I d, Suite 402
The Woodlands, exas 77380
(281) 362-8490 Phone (281) 362-8491 Fax

Millennium Labs - Project Number
LAB USE ONLY
200 1-050118

age 2
of 2

Number each chain per project

REPORT TO:	**INVOICING INFORMATION**	**PROJECT INFORMATION**
Company	Company	Project Number PH 334
Mailing Address	Address:	Site Name Hobbs
City ST Zip	City ST Zip	
Phone #	Phone #:	**Sampled by:** Print Name(s) Below
Fax #	Fax #:	Paul Brodin
Report Attn:	Invoice Attn:	

☐ PAH-Soil: If. C_6-C_{28} total >100 ppm
☐ PAH-Water: If. C_6-C_{28} total >5.0 ppm
Analyze one sample with the highest C_{10}-C_{28} concentration

SPECIAL REPORTING REQUIREMENTS:
Fax Results: Yes ____ No ____
Level II ____ Level III ____ TRPP____

Remarks:
P.O. #:

Turnaround Time
☒ 10 Working Days
☐ 5 Working Days
☐ Other: ________

Lab No.	Sample Identification	Collected Date	Collected Time	Matrix W	Matrix S	Matrix X	Method G	Method C	Volatile Organics 8260	Semi-Volatiles 8270	Metals (8) 6010 / 6020	BTEX 8260/8021B+MTBE	TPH 418.1/1005/1006	PAH 8310 / 8270	Chlorides	Chromium	General Chem	WQCC Metals			Comments	Preserved	Total Number of Sample Containers
11	37-0001-A	5/11/01	1500		↓			↓							X							ice	1
12	38-0001-A	↓	1505		↓			↓							X							↓	1
13	39-0001-A	↓	1510		↓			↓							X							↓	1
14	40-0001-A	↓	1515		↓			↓							X							↓	1
15	MW-4	5/12/01	1450	X			X									X						HNO_3	1
16	MW-6	5/14/01	1530	↓			↓		X													HCl	3
17	MW-6	↓	1530	↓			↓										X					ice	1
18	MW-6	↓	1530	↓			↓											X				HNO_3	1

Relinquished by:	Date: 5/14/01	Time: 1700	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
			Received by Millennium Labs:	**Date:** [illegible]	**Time:** [illegible]

Condition of Sample(s) Rec'd At Lab
Custody Seal Intact ☐ Yes ☐ No
Sample(s) Rec'd Iced/Cool ☑ Yes ☐ No
☐ Temperature of Sample(s): 4°C

Method of Shipment: [see back copy for shipping address & instructions]
☐ Greyhound Express
☐ Next-day Air FedEx-UPS
☐ Contract Courier
☐ Laboratory Personnel
☐ OTC-Delivery From Client

ANALYTICAL REPORT

Prepared for:

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Project:	Champion Technology-Hobbs
PO#:	
Order#:	G0204041
Report Date:	08/01/2002

Certificates
US EPA Laboratory Code TX00158

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704
915-520-4310

Order#: G0204041
Project: CH2100
Project Name: Champion Technology-Hobbs
Location: Hobbs (Lea Co.), NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204041-01	SB-41 @ 39'	SOIL	7/26/02 11:17	7/27/02 12:01	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 8.0 C

- 8015M
- Anions
- Cations
- METALS RCRA 7 Total
- Copper
- Fluoride
- Iron
- Manganese
- Mercury, Total
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- pH
- TPH 418.1 FTIR
- Zinc

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204041-02	MW-9 @ 5'	SOIL	7/26/02 7:49	7/27/02 12:01	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 8.0 C

- Anions
- Cations
- METALS RCRA 7 Total
- Copper
- Fluoride
- Iron
- Manganese
- Mercury, Total
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- pH
- Zinc

Barium	75.4	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Cadmium	0.251	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM
Chromium	2.10	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Lead	1.51	mg/kg	80	0.880	3051/6010B	07/29/2002	8/1/02	SM
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	8/1/02	SM

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban		**Order#:**	**G0204041**
Environmental Technology Group, Inc.		**Project:**	**CH2100**
P.O. Box 4845		**Project Name:**	**Champion Technology-Hobbs**
Midland, TX 79704		**Location:**	**Hobbs (Lea Co.), NM**

Lab ID: 0204041-02

Sample ID: MW-9 @ 5'

METALS RCRA 7 Total

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/31/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Copper	0.619	mg/kg	80	0.160	3051/6010B	07/29/2002	8/1/02	SM
Iron	1860	mg/kg	800	1.6	3051/6010B	07/29/2002	8/1/02	SM
Manganese	19.1	mg/kg	80	0.080	3051/6010B		8/1/02	SM
Mercury, Total	< 0.10	mg/kg	50	0.10	7471	07/29/2002	7/29/02	SM
Zinc	5.56	mg/kg	80	0.080	3051/6010B	07/29/2002	8/1/02	SM

Approval: Raland K Tuttle 8-01-02

Raland K. Tuttle, Lab Director, QA Officer Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS
ANALYTICAL REPORT

Todd Choban		**Order#:**	G0204041
Environmental Technology Group, Inc.		**Project:**	CH2100
P.O. Box 4845		**Project Name:**	Champion Technology-Hobbs
Midland, TX 79704		**Location:**	Hobbs (Lea Co.), NM

Lab ID: 0204041-01
Sample ID: SB-41 @ 39'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	200	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	421	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	86.0	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	4.0	mg/kg	5	2.5	353.3	7/27/02	RKT
Nitrogen, Nitrite	0.050	mg/kg	5	0.0250	9056	7/27/02	RKT
pH	8.07	pH Units	1	N/A	9045C	7/28/02	SB
TPH 418.1 FTIR	3900	mg/kg	1	10.0	418.1	7/28/02	SB

Lab ID: 0204041-02
Sample ID: MW-9 @ 5'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	265	mg/kg	1	2.00	310.1	7/28/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	310.1	7/28/02	SB
Chloride	73.9	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/28/02	SB
SULFATE, 375.4	98.0	mg/kg	1	25	375.4	7/30/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	<12.5	mg/kg	25	12.5	353.3	7/27/02	RKT
Nitrogen, Nitrite	<0.250	mg/kg	50	0.250	9056	7/27/02	RKT
pH	8.54	pH Units	1	N/A	9045C	7/28/02	SB

Approval: ______________________ 8-01-02
Raland K. Tuttle, Lab Director, QA Officer Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

RL = Reporting Limit N/A = Not Applicable

Page 1 of 1

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8015M

Order#: G0204041

BLANK SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TOTAL, C6-C35-mg/kg	0002642-02			<10.0		

CONTROL SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TOTAL, C6-C35-mg/kg	0002642-03		909	1160	127.6%	

CONTROL DUP SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TOTAL, C6-C35-mg/kg	0002642-04		909	1120	123.2%	3.5%

SRM SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TOTAL, C6-C35-mg/kg	0002642-05		1000	1100	110.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Anions

Order#: G0204041

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Bicarbonate Alkalinity-mg/kg	0002565-01			<10.0		
Carbonate Alkalinity-mg/kg	0002567-01			<0.10		
Chloride-mg/kg	0002608-01			<10.0		
Hydroxide Alkalinity-mg/kg	0002569-01			<0.10		
SULFATE, 375.4-mg/kg	0002609-01			<0.50		
DUPLICATE SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Bicarbonate Alkalinity-mg/kg	0204006-22	80		82.5		3.1%
Carbonate Alkalinity-mg/kg	0204006-22	10		10		0.%
Hydroxide Alkalinity-mg/kg	0204006-22	0		<0.10		0.%
SULFATE, 375.4-mg/kg	0204006-22	525		520		1.%
MS SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Chloride-mg/kg	0204006-22	3370	5000	8240	97.4%	
MSD SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Chloride-mg/kg	0204006-22	3370	5000	8330	99.2%	1.1%
SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Bicarbonate Alkalinity-mg/kg	0002565-04		0.05	0.0496	99.2%	
Carbonate Alkalinity-mg/kg	0002567-04		0.05	0.0496	99.2%	
Chloride-mg/kg	0002608-04		5000	4960	99.2%	
Hydroxide Alkalinity-mg/kg	0002569-04		0.05	0.0496	99.2%	
SULFATE, 375.4-mg/kg	0002609-04		50	49.5	99.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Cations

Order#: G0204041

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/kg	0002621-02			< 1.0		
Magnesium-mg/kg	0002621-02			<0.001		
Potassium-mg/kg	0002621-02			< 5.0		
Sodium-mg/kg	0002621-02			< 1.0		

DUPLICATE SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/kg	0204006-23	240000		251000		4.5%
Magnesium-mg/kg	0204006-23	2200		2210		0.5%
Potassium-mg/kg	0204006-23	586		600		2.4%
Sodium-mg/kg	0204006-23	1590		1560		1.9%

SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/kg	0002621-05		2	2.29	114.5%	
Magnesium-mg/kg	0002621-05		2	2.02	101.%	
Potassium-mg/kg	0002621-05		2	1.93	96.5%	
Sodium-mg/kg	0002621-05		2	1.90	95.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

METALS RCRA 7 Total

Order#: G0204041

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002644-01			< 0.64		
Barium-mg/kg	0002644-01			< 0.080		
Cadmium-mg/kg	0002644-01			< 0.080		
Chromium-mg/kg	0002644-01			< 0.16		
Lead-mg/kg	0002644-01			< 0.88		
Selenium-mg/kg	0002644-01			< 0.32		
Silver-mg/kg	0002639-01			< 0.16		

CONTROL SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002644-02		40	40.9	102.3%	
Barium-mg/kg	0002644-02		40	39.9	99.7%	
Cadmium-mg/kg	0002644-02		40	42.6	106.5%	
Chromium-mg/kg	0002644-02		40	38.2	95.5%	
Lead-mg/kg	0002644-02		40	40.0	100.%	
Selenium-mg/kg	0002644-02		40	42.3	105.7%	
Silver-mg/kg	0002639-02		16	13.2	82.5%	

CONTROL DUP SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002644-03		40	40.0	100.%	2.2%
Barium-mg/kg	0002644-03		40	39.3	98.2%	1.5%
Cadmium-mg/kg	0002644-03		40	42.6	106.5%	0.%
Chromium-mg/kg	0002644-03		40	38.1	95.3%	0.3%
Lead-mg/kg	0002644-03		40	41.3	103.3%	3.2%
Selenium-mg/kg	0002644-03		40	42.6	106.5%	0.7%
Silver-mg/kg	0002639-03		16	13.5	84.4%	2.2%

SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002644-04		1	1.00	100.%	
Barium-mg/kg	0002644-04		1	0.913	91.3%	
Cadmium-mg/kg	0002644-04		1	1.06	106.%	
Chromium-mg/kg	0002644-04		1	0.929	92.9%	
Lead-mg/kg	0002644-04		1	1.01	101.%	
Selenium-mg/kg	0002644-04		1	1.02	102.%	
Silver-mg/kg	0002639-04		0.5	0.495	99.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Test Parameters

Order#: G0204041

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Copper-mg/kg	0002643-01			< 0.16		
Fluoride-mg/kg	0002607-01			<0.02		
Iron-mg/kg	0002643-01			< 0.16		
Manganese-mg/kg	0002643-01			< 0.080		
Mercury, Total-mg/kg	0002648-01			< 0.10		
Nitrogen, Nitrate-mg/kg	0002576-01			<2.5		
Nitrogen, Nitrite-mg/kg	0002579-01			<0.025		
pH-pH Units	0002561-01			6.34		
TPH 418.1 FTIR-mg/kg	0002556-01			< 10		
Zinc-mg/kg	0002643-01			< 0.080		
CONTROL SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Copper-mg/kg	0002643-02		16	16.1	100.6%	
Iron-mg/kg	0002643-02		16	17.2	107.5%	
Manganese-mg/kg	0002643-02		16	15.6	97.5%	
Mercury, Total-mg/kg	0002648-02		0.75	0.710	94.7%	
Nitrogen, Nitrate-mg/kg	0002576-02		2.5	2.5	100.%	
Nitrogen, Nitrite-mg/kg	0002579-02		0.2	0.181	90.5%	
Zinc-mg/kg	0002643-02		16	18.4	115.%	
CONTROL DUP SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Copper-mg/kg	0002643-03		16	15.8	98.8%	1.9%
Iron-mg/kg	0002643-03		16	17.1	106.9%	0.6%
Manganese-mg/kg	0002643-03		16	15.5	96.9%	0.6%
Mercury, Total-mg/kg	0002648-03		0.75	0.765	102.%	7.5%
Nitrogen, Nitrate-mg/kg	0002576-03		2.5	2.4	96.%	4.1%
Nitrogen, Nitrite-mg/kg	0002579-03		0.2	0.186	93.%	2.7%
Zinc-mg/kg	0002643-03		16	18.1	113.1%	1.6%
DUPLICATE SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Fluoride-mg/kg	0204006-22	0		<0.02		0.%
pH-pH Units	0204041-01	8.07		8.13		0.7%
MS SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TPH 418.1 FTIR-mg/kg	0204032-61	13.4	2640	2780	104.8%	
MSD SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TPH 418.1 FTIR-mg/kg	0204032-61	13.4	2640	2790	105.2%	0.4%
SRM SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Copper-mg/kg	0002643-04		1	1.03	103.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Fluoride-mg/kg	0002607-04		1	0.95	95.%	
Iron-mg/kg	0002643-04		1	1.02	102.%	
Manganese-mg/kg	0002643-04		1	1.01	101.%	
Mercury, Total-mg/kg	0002648-04		0.015	0.015	100.%	
Nitrogen, Nitrate-mg/kg	0002576-04		2.5	2.5	100.%	
Nitrogen, Nitrite-mg/kg	0002579-04		0.2	0.178	89.%	
pH-pH Units	0002561-04		10	10.01	100.1%	
TPH 418.1 FTIR-mg/kg	0002556-04		5288	5440	102.9%	
Zinc-mg/kg	0002643-04		1	1.01	101.%	

Page of

Environmental Technology Group, Inc.
Environmental Consulting & Remediation Services

4600 West Wall
Midland, TX 79703
Tel (915) 522-1139
Fax(915) 520-4310

1765 Woodstead Court, Ste. 117
The Woodlands, TX 77380
Tel (281) 362-8571
Fax (281) 362-8932

2540 West Marland
Hobbs, NM 88242
Tel (505) 397-4882
Fax (505) 397-4701

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Project Manager: TODD CHOBAN

Project Name: Champion Technologies - Hobbs

Project Number: CH2100

Project Location: Hobbs (Lea Co), NM

Sampler Signature: Todd Chob

LAB # (Lab Use Only) 0204041	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE		PRESERVATION METHOD: HCL	HNO_3	$NaHSO_4$	ICE	NONE		SAMPLING: DATE	TIME
01	SB-41 @ 39'	4			X							X			7/25/02	11:17
02	MW-9 @ 5'	3			X							X			7/24/02	7:49

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB #	BTEX 8021B/BTEX 8260B	TPH [✓ 418.1]/TX 1005 Ext/TX 1006	TPH 8015M GRO/DRO	PAH 8270C (8100 New Mexico only)	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/7470	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	Volatiles 8260B	Semi Volatiles 8270C	TDS 160.1	Cations/Anions 375.4/325.3	RCI	WQCC Metals	General Chemistry		RUSH TAT	STANDARD TAT
01		X	X						Hold	Hold				X	X			X
02														X	X			X

Relinquished by: Todd Chob **Date:** 7/27/02 **Time:** 1201

Received by: **Date:** **Time:**

Relinquished by: **Date:** **Time:**

Received at Lab by: **Date:** 7-27-02 **Time:** 1201

REMARKS:
Hold for VOCs, SVOCs Rec 8.0°C
plz call w/ Verbals 915 238 0061

ATTACHMENT D

LIST OF RECORD OF DECISION SYSTEM SITE SCREENED FOR CHROMIUM BACKGOUND COCNETRATIONS AND ACTION LEVELS

ATTACHMENT D

LIST OF RECORD OF DECISION SYSTEM SITE SCREENED FOR CHORMIUM BACKGROUND CONCENTRATIONS AND ACTION LEVELS

ROD ID R04-1990/077
EPA ID FLD980709356
Site Name Cabot/Koppers

Chemical specific cleanup goal based on groundwater protection
Arsenic 27 mg/kg and Chromium 92.7 mg/kg
GW cleanup MCL's for arsenic and chromium are 50 mg/L

ROD ID R00-1592000
EPA ID ILD010236230
Site Name Byron Salvage Yard

Ingestion of household water residential
Chromium = 0.110

ROD ID R02-1992/182
EPA ID NYD980768683
Site Name Biochemical Laboratories, Inc.

Background sand soils = 200 mg/kg of chromium

ROD ID R10-1993/059
EPA ID ORD009051442
Site Name Allied Plating, Inc.

Action level Arsenic 150 mg/kg

ROD ID R02-1995/254
EPA ID NYD001485226
Site Name Anchor Chemicals

No risk to human health and environment
Chromium soils concentrations ranging from 101 to 463 mg/kg

ATTACHMENT D

LIST OF RECORD OF DECISION SYSTEM SITE SCREENED FOR CHORMIUM BACKGROUND CONCENTRATIONS AND ACTION LEVELS

ROD ID 541-R97-144-1997
EPA ID MOD980860522
Site Name Bee Cee Manufacturing, Inc.

Action level for soil for a removal action
2000 mg/kg Total Chromium
180 mg/kg Hexavalent Chromium
Risk Based Total Chromium = 3500 ppb
Hexavalent Chromium = 18 ppb
Background Chromium in GW = <0.005
Background Total Chromium in GW = 0.024 to 0.0407

ROD ID 541-R99-030 1999
EPA ID KSD046746731
Site Name Ace Services

Cleanup Levels in soil
Chromium 1500 mg/kg Lead 500 mg/kg
Chromium in GW 100 mg/kg

ROD ID R05-1993/230
EPA ID MID006522791
Site Name Adams Plating

Background Levels
Chromium 26.1 mg/L Arsenic 6.7 mg/kg

ROD ID R04-R94-2041 1994
EPA ID FLD004145140
Site Name Airco Plating Co.

Protection of contact with soil
Chromium 1350 mg/kg

ATTACHMENT D

LIST OF RECORD OF DECISION SYSTEM SITE SCREENED FOR CHORMIUM BACKGROUND CONCENTRATIONS AND ACTION LEVELS

ROD ID R09-R94-120 1994
EPA ID ARD008399263
Site Name Apache Powder Co.

Cleanup levels for Chromium 9.78 mg/L

ROD ID R05-1992/220
EPA ID MID980678627
Site Name Cannelton Industries, Inc.

Cleanup standards: 54 mg/kg for hexavalent chromium & 5,300 mg/kg for trivalent chromium

ROD ID R02-1995/245
EPA ID NYD010968014
Site Name Carroll & Dubies Sewage Disposal

Background soil samples
Arsenic 7.0 ppm & Chromium 61.9 ppm

ROD ID R04-1993/129
EPA ID GAD095840674
Site Name Cedartown Industries, Inc.

Chemical-specific soil cleanup goals
Arsenic 80 mg/kg & Lead 500 mg/kg

ROD ID R08-1991/055
EPA ID COD980717557
Site Name Central City, Clear Creek

Drinking water ingestion reported in ug/L
Risk Based Target Concentrations = Chromium 175 ug/L

ATTACHMENT D

LIST OF RECORD OF DECISION SYSTEM SITE SCREENED FOR CHORMIUM BACKGROUND CONCENTRATIONS AND ACTION LEVELS

ROD ID R05-R96-310 1996
EPA ID IND001213503
Site Name Continental Steel Superfund Site

Screening values for chromium 390 mg/kg

ROD ID R02-1992/187
EPA ID NJD000565531
Site Name Cosden Chemical Coatings Corp.

Risk-based cleanup goals
Chromium 390 to 78,000 mg/kg
Lead 500 mg/kg

ROD ID R09-1989/038
EPA ID CAD063015887
Site Name Coast Wood Preserving

Action Level
Areas containing greater than 100 mg/kg of total Chromium

ROD ID R07-1994/073
EPA ID IAD005279039
Site Name Electro-Coatings Inc.

Action level
Total Chromium in excess of 1,500 mg/kg

ROD ID R04-1993/142
EPA ID SCD980839542
Site Name Elmore Waste Disposal

Chemical-specific subsurface soil cleanup levels:
Arsenic 300 mg/kg and Chromium 800 mg/kg

ATTACHMENT D

LIST OF RECORD OF DECISION SYSTEM SITE SCREENED FOR CHORMIUM BACKGROUND CONCENTRATIONS AND ACTION LEVELS

ROD ID 541-R98-005 1998
EPA ID NYD981560923
Site Name Forest Glen Mobile Home Subdivision

Soil Cleanup Objectives
Chromium 50 ppm or site background

ROD ID R10-1988/014
EPA ID WAD053614988
Site Name Frontier Hard Chrome, Inc.

Control the drilling of new wells in the plume of chromium contamination
Greatest Contamination = Levels of Chromium greater than 50 ppm

ATTACHMENT E

SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) SOIL SAMPLE ANALYTICAL LABORATORY REPORT AND TABLE

Table 5

SPLP DATA

CHAMPION TECHNOLOGY
HOBBS FACILITY
HOBBS, NEW MEXICO
ETGI Project #CH2100

Unless otherwise stated, all soil concentrations are in mg/kg.
Unless otherwise stated, all water concentrations are in mg/L.

SAMPLE DATE	SAMPLE LOCATION	SAMPLE TYPE	SW-846 6010B	METHOD E300.0	METHOD 1312/6020	METHOD 1312/E300.0
			Total Chromium	Total Chloride	SPLP Chromium	SPLP Chloride
07/20/02	Soil Sample #1	SOIL	3.56		<0.005	
07/20/02	Soil Sample #4	SOIL		6990		520
07/20/02	Soil Sample #8	SOIL		738		128
07/20/02	Soil Sample #11	SOIL		145		33.6
07/20/02	Soil Sample #27	SOIL		837		240

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
155 McCutcheon, Suite H El Paso, Texas 79932 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

CORRECTED CERTIFICATE

Analytical and Quality Control Report

Todd Choban
E.T.G.I.
PO Box 4845
Midland, Tx. 79704

Report Date: November 11, 2002

Order ID Number: A02092418

Project Number: CH2100
Project Name: Champion Tech
Project Location: Hobbs,NM

Enclosed are the Analytical Results and Quality Control Data Reports for the following samples submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
208671	Soil Sample #1	Soil	9/24/02	9:40	9/24/02
208672	Soil Sample #4	Soil	9/20/02	9:20	9/24/02
208673	Soil Sample #8	Soil	9/20/02	9:05	9/24/02
208674	Soil Sample #11	Soil	9/20/02	9:30	9/24/02
208675	Soil Sample #27	Soil	9/20/02	8:45	9/24/02

Comment: LCS & MS % recoveries had wrong values and were corrected.

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.
Note: the RDL is equal to MQL for all organic analytes including TPH.
The test results contained within this report meet all requirements of LAC 33:I unless otherwise noted.

This report consists of a total of 7 pages and shall not be reproduced except in its entirety including the chain of custody (COC), without written approval of TraceAnalysis, Inc.

Note: Samples will be disposed of 30 days from the report date unless the lab is contacted before the 30 days has past.

Dr. Blair Leftwich, Director

Analytical Report

Sample: 208671 - Soil Sample #1

Analysis: SPLP Metals Analytical Method: S 6010B QC Batch: QC23808 Date Analyzed: 9/27/02
Analyst: RR Preparation Method: SPLP 1312 Prep Batch: PB22216 Date Prepared: 9/25/02

Param	Flag	Result	Units	Dilution	RDL
SPLP Chromium		<0.005	mg/L	1	0.005

Sample: 208671 - Soil Sample #1

Analysis: Total Metals Analytical Method: S 6010B QC Batch: QC23775 Date Analyzed: 9/25/02
Analyst: RR Preparation Method: S 3050B Prep Batch: PB22201 Date Prepared: 9/24/02

Param	Flag	Result	Units	Dilution	RDL
Total Chromium		3.56	mg/Kg	100	0.01

Sample: 208672 - Soil Sample #4

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC23887 Date Analyzed: 9/30/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22331 Date Prepared: 9/30/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		6990	mg/Kg	500	1

Sample: 208672 - Soil Sample #4

Analysis: SPLP Chloride Analytical Method: E 300.0 QC Batch: QC24020 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: 1312 Prep Batch: PB22435 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
SPLP Chloride		520	mg/L	1	4

Sample: 208673 - Soil Sample #8

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC23887 Date Analyzed: 9/30/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22331 Date Prepared: 9/30/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		738	mg/Kg	50	1

Sample: 208673 - Soil Sample #8

Analysis: SPLP Chloride Analytical Method: E 300.0 QC Batch: QC24020 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: 1312 Prep Batch: PB22435 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
SPLP Chloride		128	mg/L	1	4

Sample: 208674 - Soil Sample #11

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC23887 Date Analyzed: 9/30/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22331 Date Prepared: 9/30/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		145	mg/Kg	5	1

Sample: 208674 - Soil Sample #11

Analysis: SPLP Chloride Analytical Method: E 300.0 QC Batch: QC24020 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: 1312 Prep Batch: PB22435 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
SPLP Chloride		33.6	mg/L	1	4

Sample: 208675 - Soil Sample #27

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC23887 Date Analyzed: 9/30/02
Analyst: JSW Preparation Method: N/A Prep Batch: PB22331 Date Prepared: 9/30/02

Param	Flag	Result	Units	Dilution	RDL
Chloride		837	mg/Kg	50	1

Sample: 208675 - Soil Sample #27

Analysis: SPLP Chloride Analytical Method: E 300.0 QC Batch: QC24020 Date Analyzed: 10/8/02
Analyst: JSW Preparation Method: 1312 Prep Batch: PB22435 Date Prepared: 10/8/02

Param	Flag	Result	Units	Dilution	RDL
SPLP Chloride		240	mg/L	1	4

Quality Control Report
Method Blank

Method Blank QCBatch: QC23775

Param	Flag	Results	Units	Reporting Limit
Total Chromium		<0.010	mg/Kg	0.01

Method Blank QCBatch: QC23808

Param	Flag	Results	Units	Reporting Limit
SPLP Chromium		<0.005	mg/L	0.005

Method Blank QCBatch: QC23887

Param	Flag	Results	Units	Reporting Limit
Chloride		17.49	mg/Kg	1

Method Blank QCBatch: QC24020

Param	Flag	Results	Units	Reporting Limit
SPLP Chloride		14.03	mg/L	4

Quality Control Report
Lab Control Spikes and Duplicate Spikes

Laboratory Control Spikes QCBatch: QC23775

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Chromium	10.6	10.5	mg/Kg	100	10	<0.010	106	0	75 - 125	20
Total Iron	254	140	mg/Kg	100	50	0.801	5	58	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC23808

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
SPLP Chromium	0.103	0.103	mg/L	1	0.10	<0.005	103	0	80 - 120	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC23887

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	[1] 29.66	[2] 29.38	mg/Kg	1	12.50	17.49	97	0	90 - 110	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spikes QCBatch: QC24020

Param	LCS Result	LCSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
SPLP Chloride	[3] 25.70	[4] 25.75	mg/L	1	12.50	14.03	93	0	85 - 115	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Quality Control Report
Matrix Spikes and Duplicate Spikes

Matrix Spikes QCBatch: QC23775

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Total Chromium	12.5	12.7	mg/Kg	100	10	3.56	89	2	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC23808

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
SPLP Chromium	0.107	0.106	mg/L	1	0.10	<0.005	107	0	75 - 125	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

---

[1] Soil blank should be subtracted from the blank spikes. %EA = 97 and RPD = 1.

[2] Soil blank should be subtracted from the blank spikes. %EA = 97 and RPD = 1.

[3] Blank soil should be subtracted from the sample. %EA = 93 and RPD = 0.

[4] Blank soil should be subtracted from the sample. %EA = 93 and RPD = 0.

Matrix Spikes QCBatch: QC23887

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
Chloride	12810	12870	mg/Kg	1	6250	6990	93	1	35 - 144	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spikes QCBatch: QC24020

Param	MS Result	MSD Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec	RPD	% Rec Limit	RPD Limit
SPLP Chloride	801	812	mg/L	1	312	520	94	1	85 - 115	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Quality Control Report
Continuing Calibration Verification Standards

CCV (1) QCBatch: QC23775

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Chromium		mg/Kg	0.20	0.197	98	90 - 110	9/25/02
Total Iron		mg/Kg	1	0.974	97	90 - 110	9/25/02

ICV (1) QCBatch: QC23775

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Chromium		mg/Kg	0.20	0.197	98	95 - 105	9/25/02
Total Iron		mg/Kg	1	0.984	98	95 - 105	9/25/02

CCV (1) QCBatch: QC23808

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
SPLP Chromium		mg/L	0.20	0.198	99	90 - 110	9/27/02

ICV (1) QCBatch: QC23808

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
SPLP Chromium		mg/L	0.20	0.199	99	90 - 110	9/27/02

CCV (1) QCBatch: QC23887

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.72	93	90 - 110	9/30/02

ICV (1) QCBatch: QC23887

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		mg/L	12.50	11.73	93	90 - 110	9/30/02

CCV (1) QCBatch: QC24020

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
SPLP Chloride		mg/L	12.50	11.76	94	85 - 115	10/8/02

ICV (1) QCBatch: QC24020

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
SPLP Chloride		mg/L	12.50	11.82	94	85 - 115	10/8/02

98L 71-75

COC: 162

Page 1 of 1

01 Aberdeen Avenue, Ste. 9
Lubbock, Texas 79424
Tel (806) 794-1296
Fax (806) 794-1298
1 (800) 378-1296

TraceAnalysis, Inc.

155 McCutcheon, Suite H
El Paso, Texas 79932
Tel (915) 585-3443
Fax (915) 585-4944
1 (888) 588-3443

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # A0209418

pany Name: E.T.G.I. Phone #: 916-522-1139

ess: (Street, City, Zip) 4600 W. Wall, Midland, Tx 79703 Fax #: 915-520-4310

act Person: Todd Choban

ce to: (ferent from above)

ct #: CH2100 Project Name: Champion Technologies

ct Location: Hobbs, N.M. Sampler Signature: Marcelo Campos

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	MATRIX: SOIL	MATRIX: AIR	MATRIX: SLUDGE	MATRIX:	PRESERVATIVE METHOD: HCl	PRESERVATIVE METHOD: HNO_3	PRESERVATIVE METHOD: H_2SO_4	PRESERVATIVE METHOD: NaOH	PRESERVATIVE METHOD: ICE	PRESERVATIVE METHOD: NONE	PRESERVATIVE METHOD:	SAMPLING: DATE	SAMPLING: TIME
8471	Soil Sample #1	2	4oz		X								X			9/20	0940
72	Soil Sample #4	2															0920
73	Soil Sample #8	2															0905
74	Soil Sample #11	2														↓	0930
75	Soil Sample #27	2	↓		↓								↓			9/20	0845

ANALYSIS REQUEST

(Circle or Specify Method No.)

LAB #	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Total Chromium	Total Chlorides	SPLP Chromium	SPLP Chlorides		Turn Around Time if different from [✓ standard]	Hold
8471																X		X			X	
72																	X		X			
73																	X		X			
74																	X		X			
75																	X		X		↓	

quished by: Marcelo Campos	Date: 9-23-02	Time: 0800	Received by:	Date:	Time:
quished by:	Date:	Time:	Received by:	Date:	Time:
quished by:	Date:	Time:	Received at Laboratory by:	Date: 9-24-02	Time:

LAB USE ONLY

Intact [✓ Y] / N

Headspace Y / N

Temp

Log-in Review MK

REMARKS:

P+F
10/17/02

☐ Check If Special Reporting Limits Are Needed

Carrier # FedEx 819228917579

...ing agreement to Terms and Conditions listed on reverse side of C.O.C.

ATTACHMENT F

GEOTECHNICAL SOIL SAMPLE ANALYTICAL LABORATORY REPORT

STORK®
SwL
SOUTHWESTERN LABORATORIES
222 Cavalcade Street, 77009-3213
P.O. Box 8768, Houston, Texas 77249-8768
Tel (713) 692-9151 Fax (713) 696-6307

November 11, 2002

Environmental Technology Group
Midland, Texas

Attention: Mr. Todd Choban

Ref: Geotechnical Laboratory Testing

Dear Mr. Choban:

Southwestern Laboratories has completed the laboratory testing on one sample you had delivered to our office on August 9, 2002. We are pleased to submit the attached graphs and Summary of Laboratory Test Data to reflect the laboratory test results.

It has been a pleasure working with you and we hope you will keep Southwestern Laboratories in mind for future projects. If you have any questions concerning these results or if Southwestern Laboratories may be of further assistance, please contact us.

Respectfully submitted,

Southwestern Laboratories, Inc.

Manohar Medi, E.I.T.
Laboratory Manager

STORK® SwL

SOUTHWESTERN LABORATORIES

222 Cavalcade Street, 77009-3213
P.O. Box 8768, Houston, Texas 77249-8768
Tel (713) 692-9151 Fax (713) 696-6307

HYDRAULIC CONDUCTIVITY (ASTM D 5084), ORGANIC CONTENT (ASTM D2974) BULK DENSITY(ASTM D2937), MOISTURE CONTENT (ASTM D2216)

Project Name:	Environmental Technoloy Group	Proj. No.:	
Sample ID:	42-45 ft	Lab No.:	51409
Description of Soil:	Pale Brown Caliche Cemented Sand		
Porosity	31.0 %	Fraction Organic Corban = 0.3 %	

Back Pressure Saturation Conditions:		B Coefficient	> or =	0.95
Consolidation and Permeation Conditions:		Effective Stress, psi:	=	30.0
Pipet Length, Lp (cm)	11.237 in 28.542 cn	Pipet Area, a (25.000 cm^3/Lp)	=	0.876 cm^2
		Specific Gravity of Water, G_W	=	1.003

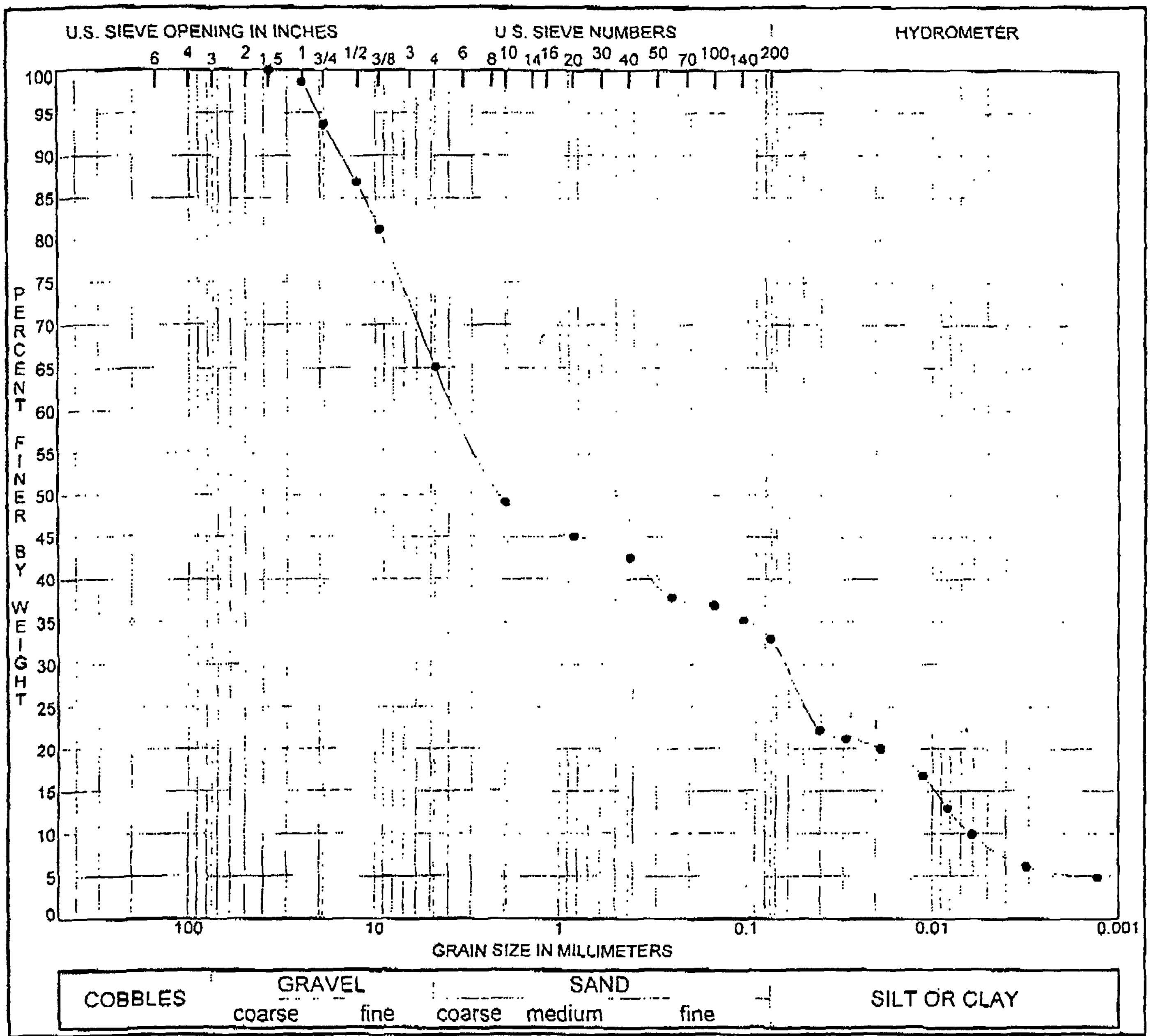
SPECIMEN DIMENSIONS AND PROPERTIES

Item	Initial			Final		
	Input Data	Cor. Factor	Output Data	Input Data	Cor. Factor	Output Data
Sample Diameter	2.825 in	2.54	7.18 cm	2.820 in	2.54	7.16 cm
Sample Area	6.27 in		40.44 cm^2	6.25		40.30 cm^2
Sample Length	3.65 in	2.54	9.27 cm	3.64 in	2.54	9.25 cm
Tare Number	6			100		
Tare Weight (gm)	144.86			130.26		
Wet Soil + Tare (gm)	786.60			608.20		
Dry Soil + Tare (gm)	734.00			542.10		
Water Weight (gm)			52.60			66.10
Dry Soil Weight (gm)			589.14			411.84
Moisture Content (%)			8.9			16.0
Wet Soil Weight (gm)	760.60			798.20		
Wet Bulk Density (pcf)			**126.7**			133.7
Dry Bulk Density (pcf)			**116.3**			115.3
Saturation (%)			53.7			95.0
Specific Gravity	2.700		TESTED ☐		ASSUMED ☒	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

Confining Pressure (psi)			82	Influent Pressure (psi)		52	Effluent Press. (psi)		50.5
Reset?	Meas. Time		ha_{out}	ha_{in}	Temperature	Gradient		k	k_{20}
1=Yes	Date	Time	(cm)	(cm)	(°C)	Min.	Max.	(cm/s)	(cm/s)
1	08/13	16:12:00	24.00	1.00	22.5	10	34		
	08/13	16:23:00	20.65	4.30	22.5	13		9.0E-06	8.5E-06
	08/13	16:36:00	16.85	7.10	22.5	13		8.1E-06	7.6E-06
	08/13	16:45:00	14.40	9.65	22.5	12		9.3E-06	8.7E-06
AVERAGE VALUES						13		8.8E-06	8.3E-06

Calculated by: M. Medi, E.I.T. Date: 08-14-2002



Boring No.	Depth, ft	Sample Description	MC%	LL	PL	PI	Cc	Cu
● 42-45 ft	45.0	Pale Brown Caliche Cemented Sand w/Aggregates					0.18	626.8

Boring No.	Depth, ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 42-45 ft	45.0	37.50	3.87	0.065	0.0062	34.9	32.1	27.7	5.3

PROJECT: Evironmental Technology Group
Midland, Texas

PROJECT NReport No.51409
DATE: 8/15/02

Southwestern Laboratories, Inc. **GRADATION CURVES**

ATTACHMENT G

NEW MEXICO ENVIRONMENT DEPARTMENT TPH CLEANUP GUIDELINES

DRAFT

NEW MEXICO ENVIRONMENT DEPARTMENT
TPH CLEANUP GUIDELINES

Some facilities with areas of soil contamination resulting from releases of petroleum products such as jet fuel and diesel wish to use total petroleum hydrocarbon (TPH) sampling results to delineate the extent of petroleum-related contamination at these sites and ascertain if the level of cleanup is adequate. TPH results represent a complex mixture of compounds, some of which are RCRA regulated constituents and some compounds that are not regulated under RCRA. In addition, the amount and types of the constituent compounds in TPH differ widely depending on which petroleum product was spilled and how the spill has weathered. This variability makes it difficult to determine the toxicity of weathered petroleum products in soil solely from TPH results. Therefore, corrective action at SWMUs cannot be based solely on results of TPH sampling; these TPH guidelines must be used in conjunction with the cleanup guidelines for individual target analytes and other RCRA-regulated contaminants.

The cleanup levels for each petroleum carbon range from the Massachusetts Department of Environmental Protection (MADEP) Volatile Petroleum Hydrocarbons/Extractable Petroleum Hydrocarbons (VPH/EPH) approach and the percent composition table below were used to generate cleanup levels corresponding to total TPH. Except for waste oil, the information in the compositional assumptions table was obtained from Table 5-1 of the Massachusetts Department of Environmental Protection guidance document *Implementation of the MADEP VPH/EPH Approach Final Draft June 2001.* TPH toxicity was based only on the weighted sum of the toxicity of the hydrocarbon fractions listed in Table 1.

Table 1: TPH Compositional Assumptions in Soil

Petroleum Product	C11-C22 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics
Diesel #2/ new crankcase oil	60%	40%	0%
#3 and #6 Fuel Oil	70%	30%	0%
Kerosene and jet fuel	30%	70%	0%
Mineral oil dielectric fluid	20%	40%	40%
Unknown oil [a]	100%	0%	0%
Waste Oil[b]	0%	0%	100%

[a] Sites with oil from unknown sources must be tested for VOCs, SVOCs, metals, and PCBs to determine if other potentially toxic constituents are present. The TPH guidelines in Table 2 are not designed to be protective of exposure to these constituents therefore they must be tested for, and compared to, their individual NMED soil screening guidelines.

[b] Compositional assumption for waste oil developed by NMED is based on review of chromatographs of several types of waste oil. Sites with waste oil must be tested for VOCs, SVOCs, metals, and PCBs to determine if other potentially toxic constituents are present. The TPH guidelines in Table 2 are not designed to be protective of exposure to these constituents therefore they must be tested for, and compared to, their individual NMED soil screening guidelines.

Table 3. Target Analyte cleanup guidelines

Target Analyte	Values for Direct Exposure to Soil		NMED DAF 20 GW protection (mg/kg in soil)	NMED DAF 1[f] GW protection (mg/kg in soil)
	NMED residential SSL (mg/kg)	NMED Indus. SSL (mg/kg)		
Benzene		5.6	0.06	0.003
Toluene	180	180	5	0.2
Ethyl benzene	68	68	8	0.4
Xylene	63	63	100	5
Naphthalene	53	43	0.2	0.01
2-methyl naphthalene	1000[e]	2500[e]	---[e]	---[e]
Benzo(a)anthracene	6.2	26	40	2
Benzo(b)fluoranthene	6.2	26	20	0.8
Benzo(k)fluoranthene	62	260	200	8
Benzo(a)pyrene	0.62	2.6	100	6
Chrysene	610	2500	1000	50
Dibenz(a,h) anthracene	0.62	2.6	9	0.5
Indeno(1,2,3-c,d) pyrene	6.2	26	40	2

[e] no NMED value available, value taken from MADEP paper

[f] for contaminated soil in contact with ground water

References

Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup and Office of Research and Standards. 1994. "Background Documentation for the Development of the MCP Numerical Standards."

Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup and Office of Research and Standards. 2001. "Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach Final Draft June 2001."

New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program. 2000. "Technical Background Document for Development of Soil Screening Levels." Document # NMED-00-008.

ATTACHMENT H

VOLATILE ORGANIC COMPOUND (VOC) AND SEMI-VOLATILE ORGANIC COMPOUND (SVOC) SOIL SAMPLE ANALYTICAL LABORATORY REPORT

ANALYTICAL REPORT

Prepared for:

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Project:	Champion Technology Inc.
Order#:	G0204005
Report Date:	07/30/2002

Certificates
US EPA Laboratory Code TX00158

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

Environmental Technology Group, Inc.		Order#:	G0204005
P.O. Box 4845		Project:	CH 2100
Midland, TX 79704		Project Name:	Champion Technology Inc.
915-520-4310		Location:	Hobbs, NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204005-01	SB-41 25'	SOIL	7/25/00 10:21	7/25/02 16:40	4 oz glass	Ice

Lab Testing: Rejected: No Temp: 4 C

1006 TNRCC, Aliphatics
1006 TNRCC, Aromatics
8015M
8260B Volatiles List
8270C - BNA
Anions
Cations
Arsenic
Barium
Cadmium
Chromium
Copper
Fluoride
Iron
Lead
Manganese
Mercury, Total
Nitrogen, Nitrate
Nitrogen, Nitrite
pH
Selenium
Silver
TPH 418.1 FTIR
Zinc

ENVIRONMENTAL LAB OF I, LTD.

"Don't Treat Your Soil Like Dirt!"

ENVIRONMENTAL TECHNOLOGY GROUP, INC.
ATTN: TODD CHOBAN
P.O. BOX 4845
MIDLAND, TEXAS 79704
FAX: 520-4310

SampleType: Soil
Sample Condition: Intact/ Iced/ 4 deg. C
Project Name: Champion Technology Inc.
Project #: CH 2100
Project Location: Hobbs, NM

Sampling Date: 07/25/02
Receiving Date: 07/25/02
Analysis Date: 07/29/02

ELT#	FIELD CODE	GRO C6-C10 mg/kg	DRO >C10-C35 mg/kg	TPH C6-C35 mg/kg
0204005-01	SB-41 25'	5140	8220	13360

% IA	91.3
% EA	118
BLANK	<10

METHODS: Modified 8015 C6-C35

Raland K. Tuttle

7-30-02
Date

ENVIRONMENTAL TECHNOLOGY GROUP, INC.
ATTN: TODD CHOBAN
P.O. BOX 4845
MIDLAND, TEXAS 79704
FAX: 520-4310

SampleType: Soil
Sample Condition: Intact/ Iced/ 4 deg. C
Project Name: Champion Technology Inc.
Project #: CH 2100
Project Location: Hobbs, NM

Sampling Date: 07/25/02
Receiving Date: 07/25/02
Analysis Date: 07/29/02

				AROMATICS			
ELT#	FIELD CODE	C6-C8 mg/kg	>C8-C10 mg/kg	>C10-C12 mg/kg	>C12-C16 mg/kg	>C16-C21 mg/kg	>C21-C35 mg/kg
0204005-01	SB-41 25'	43.6	3.74	19.8	70.3	102	123

% IA
Blank

METHODS: Modified 8015 C6-C35

Raland K. Tuttle

7-30-02
Date

ENVIRONMENTAL TECHNOLOGY GROUP, INC.
ATTN: TODD CHOBAN
P.O. BOX 4845
MIDLAND, TEXAS 79704
FAX: 520-4310

SampleType: Soil
Sample Condition: Intact/ Iced/ 4 deg. C
Project Name: Champion Technology Inc.
Project #: CH 2100
Project Location: Hobbs, NM

Sampling Date: 07/25/02
Receiving Date: 07/25/02
Analysis Date: 07/29/02

				ALIPHATICS			
ELT#	FIELD CODE	C6-C8 mg/kg	>C8-C10 mg/kg	>C10-C12 mg/kg	>C12-C16 mg/kg	>C16-C21 mg/kg	>C21-C35 mg/kg
0204005-01	SB-41 25'	291	528	2087	2860	1674	1486

METHODS: Modified 8015 C6-C35

Raland K. Tuttle
Raland K. Tuttle

7-30-02
Date

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#:	G0204005
Project:	CH 2100
Project Name:	Champion Technology Inc.
Location:	Hobbs, NM

Lab ID: 0204005-01
Sample ID: SB-41 25'

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
	7/26/02	7/26/02	1	10	CK	8015M

Parameter	Result mg/kg	RL
GRO, C6-C12	5140	100
DRO, >C12-C35	8220	100
TOTAL, C6-C35	13360	100

Approval: Raland K Tuttle 7-29-02
Raland K. Tuttle, Lab Director, QA Officer Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

Page 1 of 2

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204005
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab-ID: 0204005-01
Sample-ID: SB-41 25'

Date Collected	Date Received	Date Prepared	Date Analyzed	Matrix	Sample Amount	Dilution Factor	Analyst	Method	Method Blank
7/25/00 10:21	7/25/02 16:40	7/29/02	7/30/02 14:37	SOIL	5	200	CK	8260B	0002583-01

8260B Volatiles List

Parameter	Result µg/kg	RL	Parameter	Result µg/kg	RL
Dichlorodifluoromethane	<200	200	Chlorobenzene	<200	200
Chloromethane	<200	200	1,1,1,2-Tetrachloroethane	<200	200
Vinyl chloride	<200	200	EthylBenzene	14600	200
Bromomethane	<200	200	m,p-Xylene	18800	200
Chloroethane	<200	200	o-Xylene	7490	200
Trichlorofluoromethane	<200	200	Styrene	<200	200
1,1-Dichloroethene	<200	200	Bromoform	<200	200
Acetone	<200	200	trans-1,4-Dichloro-2-butene	<200	200
Iodomethane	<200	200	Isopropylbenzene	4920	200
Carbon disulfide	<200	200	1,2,3-Trichloropropane	<200	200
Methylene chloride	<200	200	1,1,2,2-Tetrachloroethane	<200	200
MTBE	<200	200	Bromobenzene	<200	200
trans-1,2-dichloroethylene	<200	200	n-Propylbenzene	7490	200
Acrylonitrile	<200	200	2-Chlorotoluene	<200	200
1,1-Dichloroethane	<200	200	1,3,5-Trimethylbenzene	6300	200
Vinyl acetate	<200	200	4-Chlorotoluene	<200	200
cis-1,2-Dichloroethene	<200	200	tert-Butylbenzene	<200	200
2-Butanone (MEK)	<200	200	1,2,4-Trimethylbenzene	19000	200
Bromochloromethane	<200	200	sec-Butylbenzene	3560	200
Chloroform	<200	200	1,3-Dichlorobenzene	<200	200
1,1,1-Trichloroethane	<200	200	p-Isopropyltoluene	2440	200
2,2-Dichloropropane	<200	200	1,4-Dichlorobenzene	<200	200
Carbon tetrachloride	<200	200	n-Butylbenzene	<200	200
1,1-Dichloropropene	<200	200	1,2-Dichlorobenzene	<200	200
1,2-Dichloroethane	<200	200	1,2-Dibromo-3-chloropropane	<200	200
Benzene	1300	200	1,2,4-Trichlorobenzene	<200	200
Trichloroethene	<200	200	Hexachlorobutadiene	<200	200
1,2-Dichloropropane	<200	200	Naphthalene	10300	200
Dibromomethane	<200	200	1,2,3-Trichlorobenzene	<200	200
Bromodichloromethane	<200	200			
2-Chloroethyl vinyl ether	<200	200			
cis-1,3-Dichloropropene	<200	200			
4-Methyl-2-pentanone	<200	200			
Toluene	4310	200			
trans-1,3-Dichloropropene	<200	200			
1,1,2-Trichloroethane	<200	200			
2-Hexanone	<200	200			
Tetrachloroethene	<200	200			
1,3-Dichloropropane	<200	200			
Dibromochloromethane	<200	200			
1,2-Dibromoethane	<200	200			

Surrogates	% Recovered	QC Limits (%)	
Dibromofluoromethane	123%	53	144
1,2-dichloroethane-d4	96%	57	147
Toluene-d8	100%	64	128
4-Bromofluorobenzene	119%	47	158

RL = Reporting Limit

Approval: 7-30-02
Raland K. Tuttle, Lab Director, QA Officer
Celey D. Keene, Org. Tech. Director
Date

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204005
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab-ID: 0204005-01
Sample-ID: SB-41 25'

Date Collected	Date Received	Date Prepared	Date Analyzed	Matrix	Sample Amount	Dilution Factor	Analyst	Method	Method Blank
7/25/00 10:21	7/25/02 16:40	7/26/02	7/30/02 13:15	SOIL	1	187	RKT	8270C	0002582-01

8270C - BNA

Parameter	Result µg/kg	RL	Parameter	Result µg/kg	RL
Pyridine	<1000	1000	2,3,4,6-Tetrachlorophenol	<1000	1000
N-Nitrosodimethylamine	<1000	1000	2,4-Dinitrotoluene	<1000	1000
Aniline	<1000	1000	Diethylphthalate	<1000	1000
Phenol	<1000	1000	Fluorene	2780	1000
bis(2-Chloroethyl) Ether	<1000	1000	4-Chlorophenyl-phenylether	<1000	1000
2-Chlorophenol	<1000	1000	4-Nitroaniline	<1000	1000
1,3-Dichlorobenzene	<1000	1000	Azobenzene	<1000	1000
1,4-Dichlorobenzene	<1000	1000	4,6-Dinitro-2-methylphenol	<1000	1000
1,2-Dichlorobenzene	<1000	1000	N-Nitrosodiphenylamine	<1000	1000
Benzyl Alcohol	<1000	1000	4-Bromophenyl-phenylether	<1000	1000
Bis(2-chloroisopropyl) ether	<1000	1000	Hexachlorobenzene	<1000	1000
2-Methylphenol	<1000	1000	Pentachlorophenol	<1000	1000
N-Nitroso-di-n-propylamine	<1000	1000	Phenanthrene	6460	1000
4-Methylphenol	<1000	1000	Anthracene	<1000	1000
Hexachloroethane	<1000	1000	Carbozole	<1000	1000
Nitrobenzene	<1000	1000	Di-n-Butylphthalate	<1000	1000
Isophorone	<1000	1000	Fluoranthene	<1000	1000
2-Nitrophenol	<1000	1000	Benzidine	<1000	1000
2,4-Dimethylphenol	<1000	1000	Pyrene	<1000	1000
bis(2-Chloroethoxy) methane	<1000	1000	Butylbenzylphthalate	<1000	1000
2,4-Dichlorophenol	<1000	1000	Benzo(a)anthracene	<1000	1000
Benzoic Acid	<1000	1000	Chrysene	<1000	1000
1,2,4-Trichlorobenzene	<1000	1000	bis-(2-Ethylhexyl) phthalate	<1000	1000
Naphthalene	8250	1000	Di-n-octylphthalate	<1000	1000
4-Chloroaniline	<1000	1000	Benzo(b)fluoranthene	<1000	1000
Hexachlorobutadiene	<1000	1000	Benzo(k)fluoranthene	<1000	1000
4-Chloro-3-methylphenol	<1000	1000	Benzo(a)pyrene	<1000	1000
2-Methylnaphthalene	18600	1000	Indeno(1,2,3-cd)Pyrene	<1000	1000
Hexachlorocyclopentadiene	<1000	1000	Dibenzo(a,h)Anthracene	<1000	1000
2,4,5-Trichlorophenol	<1000	1000	Benzo(g,h,i)Perylene	<1000	1000
2,4,6-Trichlorophenol	<1000	1000	3,3 Dichlorobenzidine	<1000	1000
2-Chloronaphthalene	<1000	1000			
2-Nitroaniline	<1000	1000			
Dimethylphthalate	<1000	1000			
2,6-Dinitrotoluene	<1000	1000			
3-Nitroaniline	<1000	1000			
Acenaphthylene	<1000	1000			
Acenaphthene	<1000	1000			
2,4-Dinitrophenol	<1000	1000			
4-Nitrophenol	<1000	1000			
Dibenzofuran	3080	1000			

Surrogates	% Recovered	QC Limits (%)	
2-Fluorophenol	68%	21	110
Phenol-d5	65%	10	110
Nitrobenzene-d5	90%	35	114
2-Fluorobiphenyl	104%	43	116
2,4,6-Tribromophenol	95%	10	123
p-Terphenyl-d14	90%	33	141

RL = Reporting Limit

Approval: Raland K Tuttle 7-30-02
Raland K. Tuttle, Lab Director, QA Officer Date
Celey D. Keene, Org. Tech. Director

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban		**Order#:**	G0204005
Environmental Technology Group, Inc.		**Project:**	CH 2100
P.O. Box 4845		**Project Name:**	Champion Technology Inc.
Midland, TX 79704		**Location:**	Hobbs, NM

Lab ID: 0204005-01

Sample ID: SB-41 25'

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	409	mg/kg	1	2.00	300	7/29/02	SB
Carbonate Alkalinity	<0.10	mg/kg	1	0.10	300	7/29/02	SB
Chloride	421	mg/kg	1	10	9253	7/30/02	SB
Hydroxide Alkalinity	<0.10	mg/kg	1	2	310.1	7/30/02	SB
SULFATE, 375.4	162	mg/kg	1	25	300	7/29/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	<0.02	mg/kg	1	0.02	340.1	7/29/02	SB
Nitrogen, Nitrate	12.4	mg/kg	5	2.5	353.3	7/26/02	RKT
Nitrogen, Nitrite	0.110	mg/kg	5	0.0250	9056	7/26/02	RKT
pH	8.13	pH Units	1	N/A	9045C	7/26/02	MB
TPH 418.1 FTIR	28000	mg/kg	5	50.0	418.1	7/29/02	SB

Approval: Raland K 7-30-02

Raland K. Tuttle, Lab Director, QA Officer Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

Todd Choban
Environmental Technology Group, Inc.
P.O. Box 4845
Midland, TX 79704

Order#: G0204005
Project: CH 2100
Project Name: Champion Technology Inc.
Location: Hobbs, NM

Lab ID: 0204005-01
Sample ID: SB-41 25'

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	179000	mg/kg	50000	500	6010B	07/29/2002	7/30/02	SM
Magnesium	4220	mg/kg	1000	1.00	6010B	07/29/2002	7/30/02	SM
Potassium	713	mg/kg	100	5.00	6010B	07/29/2002	7/30/02	SM
Sodium	1730	mg/kg	1000	10.0	6010B	07/29/2002	7/30/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Arsenic	2.77	mg/kg	80	0.640	3051/6010B	07/29/2002	7/30/02	MB
Barium	266	mg/kg	80	0.080	3051/6010B	07/29/2002	7/30/02	MB
Cadmium	< 0.080	mg/kg	80	0.080	3051/6010B	07/29/2002	7/30/02	MB
Chromium	13.4	mg/kg	80	0.160	3051/6010B	07/29/2002	7/30/02	MB
Copper	7.64	mg/kg	80	0.160	3051/6010B	07/29/2002	7/30/02	MB
Iron	4500	mg/kg	800	1.6	3051/6010B	07/29/2002	7/30/02	MB
Lead	14.8	mg/kg	80	0.880	3051/6010B	07/29/2002	7/30/02	MB
Manganese	35.6	mg/kg	80	0.080	3051/6010B	07/29/2002	7/30/02	MB
Mercury, Total	<0.100	mg/kg	50	0.10	7470	07/29/2002	7/29/02	MB
Selenium	< 0.320	mg/kg	80	0.320	3051/6010B	07/29/2002	7/30/02	MB
Silver	< 0.160	mg/kg	80	0.160	3051/6010B	07/29/2002	7/30/02	MB
Zinc	59.3	mg/kg	80	0.080	3051/6010B	07/29/2002	7/30/02	MB

Approval: 7-30-02
Raland K. Tuttle, Lab Director, QA Officer　　Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

N/A = Not Applicable　　RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8015M

Order#: G0204005

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TOTAL, C6-C35-mg/kg	0002549-02			<10.0		
MS SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TOTAL, C6-C35-mg/kg	0204008-04	152	909	1140	108.7%	
MSD SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TOTAL, C6-C35-mg/kg	0204008-04	152	909	1120	106.5%	1.8%
SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TOTAL, C6-C35-mg/kg	0002549-05		1000	913	91.3%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8260B Volatiles List

Order#: G0204005

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Dichlorodifluoromethane-µg/L	0002583-01			<25		
Chloromethane-µg/L	0002583-01			<25		
Vinyl chloride-µg/L	0002583-01			<25		
Bromomethane-µg/L	0002583-01			<25		
Chloroethane-µg/L	0002583-01			<25		
Trichlorofluoromethane-µg/L	0002583-01			<25		
1,1-Dichloroethene-µg/L	0002583-01			<25		
Acetone-µg/L	0002583-01			<25		
Iodomethane-µg/L	0002583-01			<25		
Carbon disulfide-µg/L	0002583-01			<25		
Methylene chloride-µg/L	0002583-01			<25		
MTBE-µg/L	0002583-01			<25		
trans-1,2-dichloroethylene-µg/L	0002583-01			<25		
Acrylonitrile-µg/L	0002583-01			<25		
1,1-Dichloroethane-µg/L	0002583-01			<25		
Vinyl acetate-µg/L	0002583-01			<25		
cis-1,2-Dichloroethene-µg/L	0002583-01			<25		
2-Butanone (MEK)-µg/L	0002583-01			<25		
Bromochloromethane-µg/L	0002583-01			<25		
Chloroform-µg/L	0002583-01			<25		
1,1,1-Trichloroethane-µg/L	0002583-01			<25		
2,2-Dichloropropane-µg/L	0002583-01			<25		
Carbon tetrachloride-µg/L	0002583-01			<25		
1,1-Dichloropropene-µg/L	0002583-01			<25		
1,2-Dichloroethane-µg/L	0002583-01			<25		
Benzene-µg/L	0002583-01			<25		
Trichloroethene-µg/L	0002583-01			<25		
1,2-Dichloropropane-µg/L	0002583-01			<25		
Dibromomethane-µg/L	0002583-01			<25		
Bromodichloromethane-µg/L	0002583-01			<25		
2-Chloroethyl vinyl ether-µg/L	0002583-01			<25		
cis-1,3-Dichloropropene-µg/L	0002583-01			<25		
4-Methyl-2-pentanone-µg/L	0002583-01			<25		
Toluene-µg/L	0002583-01			<25		
trans-1,3-Dichloropropene-µg/L	0002583-01			<25		
1,1,2-Trichloroethane-µg/L	0002583-01			<25		
2-Hexanone-µg/L	0002583-01			<25		
Tetrachloroethene-µg/L	0002583-01			<25		
1,3-Dichloropropane-µg/L	0002583-01			<25		
Dibromochloromethane-µg/L	0002583-01			<25		

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
1,2-Dibromoethane-µg/L	0002583-01			<25		
Chlorobenzene-µg/L	0002583-01			<25		
1,1,1,2-Tetrachloroethane-µg/L	0002583-01			<25		
EthylBenzene-µg/L	0002583-01			<25		
m,p-Xylene-µg/L	0002583-01			<25		
o-Xylene-µg/L	0002583-01			<25		
Styrene-µg/L	0002583-01			<25		
Bromoform-µg/L	0002583-01			<25		
trans-1,4-Dichloro-2-butene-µg/L	0002583-01			<25		
Isopropylbenzene-µg/L	0002583-01			<25		
1,2,3-Trichloropropane-µg/L	0002583-01			<25		
1,1,2,2-Tetrachloroethane-µg/L	0002583-01			<25		
Bromobenzene-µg/L	0002583-01			<25		
n-Propylbenzene-µg/L	0002583-01			<25		
2-Chlorotoluene-µg/L	0002583-01			<25		
1,3,5-Trimethylbenzene-µg/L	0002583-01			<25		
4-Chlorotoluene-µg/L	0002583-01			<25		
tert-Butylbenzene-µg/L	0002583-01			<25		
1,2,4-Trimethylbenzene-µg/L	0002583-01			<25		
sec-Butylbenzene-µg/L	0002583-01			<25		
p-Isopropyltoluene-µg/L	0002583-01			<25		
n-Butylbenzene-µg/L	0002583-01			<25		
1,2-Dibromo-3-chloropropane-µg/L	0002583-01			<25		
1,2,3-Trichlorobenzene-µg/L	0002583-01			<25		

CONTROL SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Vinyl chloride-µg/L	0002583-02		50	47.8	95.6%	
1,1-Dichloroethene-µg/L	0002583-02		50	61.9	123.8%	
2-Butanone (MEK)-µg/L	0002583-02		100	96.2	96.2%	
Chloroform-µg/L	0002583-02		50	57.2	114.4%	
Carbon tetrachloride-µg/L	0002583-02		50	62.2	124.4%	
1,2-Dichloroethane-µg/L	0002583-02		50	45.4	90.8%	
Benzene-µg/L	0002583-02		50	57.7	115.4%	
Trichloroethene-µg/L	0002583-02		50	40.4	80.8%	
Tetrachloroethene-µg/L	0002583-02		50	43.4	86.8%	
Chlorobenzene-µg/L	0002583-02		50	57.2	114.4%	

CONTROL DUP SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Vinyl chloride-µg/L	0002583-03		50	44.2	88.4%	7.8%
1,1-Dichloroethene-µg/L	0002583-03		50	57	114.%	8.2%
2-Butanone (MEK)-µg/L	0002583-03		100	89.4	89.4%	7.3%
Chloroform-µg/L	0002583-03		50	56.4	112.8%	1.4%

ENVIRONMENTAL LAB OF TEXAS
12600 West Interstate 20 East
Odessa, Texas 79765
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FAX TRANSMITTAL

Date: 7-30-02

To: Chan Patel

FROM:

SUBJECT:

NUMBER OF PAGES: (including this sheet) 20

COMMENTS:

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

CONTROL DUP SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Carbon tetrachloride-µg/L	0002583-03		50	62.9	125.8%	1.1%
1,2-Dichloroethane-µg/L	0002583-03		50	45.7	91.4%	0.7%
Benzene-µg/L	0002583-03		50	57.6	115.2%	0.2%
Trichloroethene-µg/L	0002583-03		50	39.8	79.6%	1.5%
Tetrachloroethene-µg/L	0002583-03		50	41.8	83.6%	3.8%
Chlorobenzene-µg/L	0002583-03		50	57.5	115.%	0.5%

SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Vinyl chloride-µg/L	0002583-04		20	21.7	108.5%	
1,1-Dichloroethane-µg/L	0002583-04		20	24	120.%	
Chloroform-µg/L	0002583-04		20	23.9	119.5%	
1,2-Dichloropropane-µg/L	0002583-04		20	22.3	111.5%	
Toluene-µg/L	0002583-04		20	24.2	121.%	
EthylBenzene-µg/L	0002583-04		20	23	115.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8270C - BNA

Order#: G0204005

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Pyridine-µg/L	0002582-01			<200		
N-Nitrosodimethylamine-µg/L	0002582-01			<200		
Aniline-µg/L	0002582-01			<200		
Phenol-µg/L	0002582-01			<200		
bis(2-Chloroethyl) Ether-µg/L	0002582-01			<200		
2-Chlorophenol-µg/L	0002582-01			<200		
1,3-Dichlorobenzene-µg/L	0002582-01			<200		
1,4-Dichlorobenzene-µg/L	0002582-01			<200		
1,2-Dichlorobenzene-µg/L	0002582-01			<200		
Benzyl Alcohol-µg/L	0002582-01			<200		
Bis(2-chloroisopropyl) ether-µg/L	0002582-01			<200		
2-Methylphenol-µg/L	0002582-01			<200		
N-Nitroso-di-n-propylamine-µg/L	0002582-01			<200		
4-Methylphenol-µg/L	0002582-01			<200		
Hexachloroethane-µg/L	0002582-01			<200		
Nitrobenzene-µg/L	0002582-01			<200		
Isophorone-µg/L	0002582-01			<200		
2-Nitrophenol-µg/L	0002582-01			<200		
2,4-Dimethylphenol-µg/L	0002582-01			<200		
bis(2-Chloroethoxy) methane-µg/L	0002582-01			<200		
2,4-Dichlorophenol-µg/L	0002582-01			<200		
Benzoic Acid-µg/L	0002582-01			<200		
1,2,4-Trichlorobenzene-µg/L	0002582-01			<200		
Naphthalene-µg/L	0002582-01			<200		
4-Chloroaniline-µg/L	0002582-01			<200		
Hexachlorobutadiene-µg/L	0002582-01			<200		
4-Chloro-3-methylphenol-µg/L	0002582-01			<200		
2-Methylnaphthalene-µg/L	0002582-01			<200		
Hexachlorocyclopentadiene-µg/L	0002582-01			<200		
2,4,5-Trichlorophenol-µg/L	0002582-01			<200		
2,4,6-Trichlorophenol-µg/L	0002582-01			<200		
2-Chloronaphthalene-µg/L	0002582-01			<200		
2-Nitroaniline-µg/L	0002582-01			<200		
Dimethylphthalate-µg/L	0002582-01			<200		
2,6-Dinitrotoluene-µg/L	0002582-01			<200		
3-Nitroaniline-µg/L	0002582-01			<200		
Acenaphthylene-µg/L	0002582-01			<200		
Acenaphthene-µg/L	0002582-01			<200		
2,4-Dinitrophenol-µg/L	0002582-01			<200		
4-Nitrophenol-µg/L	0002582-01			<200		

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Dibenzofuran-µg/L	0002582-01			<200		
2,3,4,6-Tetrachlorophenol-µg/L	0002582-01			<200		
2,4-Dinitrotoluene-µg/L	0002582-01			<200		
Diethylphthalate-µg/L	0002582-01			<200		
Fluorene-µg/L	0002582-01			<200		
4-Chlorophenyl-phenylether-µg/L	0002582-01			<200		
4-Nitroaniline-µg/L	0002582-01			<200		
Azobenzene-µg/L	0002582-01			<200		
4,6-Dinitro-2-methylphenol-µg/L	0002582-01			<200		
N-Nitrosodiphenylamine-µg/L	0002582-01			<200		
4-Bromophenyl-phenylether-µg/L	0002582-01			<200		
Hexachlorobenzene-µg/L	0002582-01			<200		
Pentachlorophenol-µg/L	0002582-01			<200		
Phenanthrene-µg/L	0002582-01			<200		
Anthracene-µg/L	0002582-01			<200		
Carbozole-µg/L	0002582-01			<200		
Di-n-Butylphthalate-µg/L	0002582-01			<200		
Fluoranthene-µg/L	0002582-01			<200		
Benzidine-µg/L	0002582-01			<200		
Pyrene-µg/L	0002582-01			<200		
Butylbenzylphthalate-µg/L	0002582-01			<200		
Benzo(a)anthracene-µg/L	0002582-01			<200		
Chrysene-µg/L	0002582-01			<200		
bis-(2-Ethylhexyl) phthalate-µg/L	0002582-01			<200		
Di-n-octylphthalate-µg/L	0002582-01			<200		
Benzo(b)fluoranthene-µg/L	0002582-01			<200		
Benzo(k)fluoranthene-µg/L	0002582-01			<200		
Benzo(a)pyrene-µg/L	0002582-01			<200		
Indeno(1,2,3-cd)Pyrene-µg/L	0002582-01			<200		
Dibenzo(a,h)Anthracene-µg/L	0002582-01			<200		
Benzo(g,h,i)Perylene-µg/L	0002582-01			<200		
3,3 Dichlorobenzidine-µg/L	0002582-01			<200		

CONTROL SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Phenol-µg/L	0002582-02		200	62.2	31.1%	
2-Chlorophenol-µg/L	0002582-02		200	91.5	45.8%	
1,4-Dichlorobenzene-µg/L	0002582-02		100	49.6	49.6%	
N-Nitroso-di-n-propylamine-µg/L	0002582-02		100	70.8	70.8%	
1,2,4-Trichlorobenzene-µg/L	0002582-02		100	63.5	63.5%	
4-Chloro-3-methylphenol-µg/L	0002582-02		200	77.1	38.5%	
Acenaphthene-µg/L	0002582-02		100	67.7	67.7%	
4-Nitrophenol-µg/L	0002582-02		200	104	52.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

CONTROL SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
2,4-Dinitrotoluene-µg/L	0002582-02		100	57.3	57.3%	
Pentachlorophenol-µg/L	0002582-02		200	152	76.%	
Pyrene-µg/L	0002582-02		100	107	107.%	
CONTROL DUP SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Phenol-µg/L	0002582-03		200	71.2	35.6%	13.5%
2-Chlorophenol-µg/L	0002582-03		200	111	55.5%	19.3%
1,4-Dichlorobenzene-µg/L	0002582-03		100	61.1	61.1%	20.8%
N-Nitroso-di-n-propylamine-µg/L	0002582-03		100	75	75.%	5.8%
1,2,4-Trichlorobenzene-µg/L	0002582-03		100	75.8	75.8%	17.7%
4-Chloro-3-methylphenol-µg/L	0002582-03		200	80	40.%	3.7%
Acenaphthene-µg/L	0002582-03		100	72.9	72.9%	7.4%
4-Nitrophenol-µg/L	0002582-03		200	113	56.5%	8.3%
2,4-Dinitrotoluene-µg/L	0002582-03		100	61	61.%	6.3%
Pentachlorophenol-µg/L	0002582-03		200	168	84.%	10.%
Pyrene-µg/L	0002582-03		100	102	102.%	4.8%
SRM SOIL	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Phenol-µg/L	0002582-04		50	34.4	68.8%	
1,4-Dichlorobenzene-µg/L	0002582-04		50	56.7	113.4%	
2-Nitrophenol-µg/L	0002582-04		50	50.2	100.4%	
2,4-Dichlorophenol-µg/L	0002582-04		50	50.5	101.%	
Hexachlorobutadiene-µg/L	0002582-04		50	52.5	105.%	
4-Chloro-3-methylphenol-µg/L	0002582-04		50	31.2	62.4%	
2,4,6-Trichlorophenol-µg/L	0002582-04		50	46.9	93.8%	
Acenaphthene-µg/L	0002582-04		50	55.9	111.8%	
N-Nitrosodiphenylamine-µg/L	0002582-04		50	62.2	124.4%	
Pentachlorophenol-µg/L	0002582-04		50	40.2	80.4%	
Fluoranthene-µg/L	0002582-04		50	45.4	90.8%	
Di-n-octylphthalate-µg/L	0002582-04		50	70.6	141.2%	
Benzo(a)pyrene-µg/L	0002582-04		50	55.6	111.2%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Cations

Order#: G0204005

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/kg	0002593-02			< 1.0		
Magnesium-mg/kg	0002593-02			< 0.10		
Potassium-mg/kg	0002593-02			< 5.0		
Sodium-mg/kg	0002593-02			< 1.0		

DUPLICATE SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/kg	0204005-01	179000		183000		2.2%
Magnesium-mg/kg	0204005-01	4220		4260		0.9%
Potassium-mg/kg	0204005-01	713		698		2.1%
Sodium-mg/kg	0204005-01	1730		1730		0.%

SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/kg	0002593-05		2	1.76	88.%	
Magnesium-mg/kg	0002593-05		2	2.17	108.5%	
Potassium-mg/kg	0002593-05		2	1.76	88.%	
Sodium-mg/kg	0002593-05		2	1.87	93.5%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Test Parameters

Order#: G0204005

BLANK SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002590-01			< 0.640		
Barium-mg/kg	0002590-01			< 0.080		
Cadmium-mg/kg	0002590-01			< 0.080		
Chromium-mg/kg	0002590-01			< 0.160		
Copper-mg/kg	0002592-01			< 0.160		
Fluoride-mg/kg	0002596-01			<0.02		
Iron-mg/kg	0002592-01			< 0.160		
Lead-mg/kg	0002590-01			< 0.880		
Manganese-mg/kg	0002592-01			< 0.080		
Mercury, Total-mg/kg	0002584-01			<0.100		
Nitrogen, Nitrate-mg/kg	0002578-01			<2.5		
Nitrogen, Nitrite-mg/kg	0002578-01			<0.025		
pH-pH Units	0002588-01			7.42		
Selenium-mg/kg	0002590-01			< 0.320		
Silver-mg/kg	0002590-01			< 0.160		
TPH 418.1 FTIR-mg/kg	0002541-01			<10.0		
Zinc-mg/kg	0002592-01			< 0.080		

CONTROL SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002590-02		64	53.2	83.1%	
Barium-mg/kg	0002590-02		16	18	112.5%	
Cadmium-mg/kg	0002590-02		16	15.58	97.4%	
Chromium-mg/kg	0002590-02		16	15.9	99.4%	
Copper-mg/kg	0002592-02		16	16.9	105.6%	
Iron-mg/kg	0002592-02		16	15.8	98.8%	
Lead-mg/kg	0002590-02		88	79.4	90.2%	
Manganese-mg/kg	0002592-02		16	16.5	103.1%	
Mercury, Total-mg/kg	0002584-02		0.015	0.014	93.3%	
pH-pH Units	0002588-02		7	7.03	100.4%	
Selenium-mg/kg	0002590-02		32	22.8	71.3%	
Silver-mg/kg	0002590-02		16	12.6	78.7%	
Zinc-mg/kg	0002592-02		16	18.3	114.4%	

CONTROL DUP SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002590-03		64	52.3	81.7%	1.7%
Barium-mg/kg	0002590-03		16	18	112.5%	0.%
Cadmium-mg/kg	0002590-03		16	15.75	98.4%	1.1%
Chromium-mg/kg	0002590-03		16	16.0	100.%	0.6%
Copper-mg/kg	0002592-03		16	16.9	105.6%	0.%
Iron-mg/kg	0002592-03		16	15.9	99.4%	0.6%

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

CONTROL DUP SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Lead-mg/kg	0002590-03		88	79.4	90.2%	0.%
Manganese-mg/kg	0002592-03		16	16.5	103.1%	0.%
Mercury, Total-mg/kg	0002584-03		0.015	0.015	100.%	6.9%
Selenium-mg/kg	0002590-03		32	21.6	67.5%	5.4%
Silver-mg/kg	0002590-03		16	12.1	75.6%	4.%
Zinc-mg/kg	0002592-03		16	18.4	115.%	0.5%

DUPLICATE SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Fluoride-mg/kg	0204005-01	0		<0.02		0.%
Nitrogen, Nitrate-mg/kg	0204005-01	12.4		13.9		11.4%
Nitrogen, Nitrite-mg/kg	0204005-01	0.11		0.110		0.%
pH-pH Units	0204005-01	8.13		8.20		0.9%

MS SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TPH 418.1 FTIR-mg/kg	0204004-01	1730	2500	4180	98.%	

MSD SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TPH 418.1 FTIR-mg/kg	0204004-01	1730	2500	4270	101.6%	2.1%

SRM SOIL	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Arsenic-mg/kg	0002590-04		1	1.06	106.%	
Barium-mg/kg	0002590-04		1	0.946	94.6%	
Cadmium-mg/kg	0002590-04		1	1.05	105.%	
Chromium-mg/kg	0002590-04		1	1.01	101.%	
Copper-mg/kg	0002592-04		1	1.02	102.%	
Fluoride-mg/kg	0002596-04		1	0.96	96.%	
Iron-mg/kg	0002592-04		1	1.01	101.%	
Lead-mg/kg	0002590-04		1	1.08	108.%	
Manganese-mg/kg	0002592-04		1	0.972	97.2%	
Mercury, Total-mg/kg	0002584-04		0.015	0.015	100.%	
Nitrogen, Nitrate-mg/kg	0002578-04		1	1.0	100.%	
Nitrogen, Nitrite-mg/kg	0002578-04		0.2	0.166	83.%	
pH-pH Units	0002588-04		7	7.05	100.7%	
Selenium-mg/kg	0002590-04		1	1.03	103.%	
Silver-mg/kg	0002590-04		0.5	0.50	100.%	
TPH 418.1 FTIR-mg/kg	0002541-04		5008	4850	96.8%	
Zinc-mg/kg	0002592-04		1	0.984	98.4%	

Environmental Lab of Texas I, Ltd.

12600 West I-20 East
Odessa, Texas 79763

Phone: 915-563-1800
Fax: 915-563-1713

COC: 110 1 of 4

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Todd Choban ~~(438-2228~~ 238-0061
Company Name: E.T.G.I
Company Address: 4600 W. Wall
City/State/Zip: Midland, Tx 79703
Telephone No: 915-522-1139
Fax No: 915-520-4310
Sampler Signature: Todd Choban

Project Name: Champion Technology Inc
Project #: CH 2100
Project Loc: Hobbs, N.M.
PO #:

LAB # (lab use only) 0204005	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO$_3$	HCl	NaOH	H$_2$SO$_4$	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify):	Analyze For: TPH (418.1) (8015M) 1005 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles 8260	Semivolatiles 8270C	BTEX 8021B/5030	RCI	Gen Chemistry	WQCC Metals Total	PH	Run Aliphatic + Aromatics	on Highest 8015M sample	RUSH TAT (Pre-Schedule)	Standard TAT
01	SB-41 25'	7-25-02	1021	4	X									X		X					X	X			X	X	X	X	X		
02	SB-41 35'	↓	1054	3	X									X		X	HOLD!!														

TCLP:
TOTAL:

Special Instructions: 3 day turn around time

Sample Containers Intact? Y N
Temperature Upon Receipt:
Laboratory Comments: 4°C

Relinquished by:	Date	Time	Received by:	Date	Time
Marcelo Campos	7-25-02	1640			
Relinquished by:	Date	Time	Received by ELOT: Roy B Wattly	7-25-02	16:40

Jul 31 02 12:41P

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

REVISED ABATEMENT PLAN PROPOSAL

March 27, 2000

RECEIVED
MAR 27 2000
Environmental Bureau
Oil Conservation Division

Submitted to:
Champion Technologies, Inc.
3130 FM 521
Fresno, Texas 77545

Prepared by:
Enercon Services, Inc.
8866 Gulf Freeway, Suite 380
Houston, TX 77017

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

REVISED ABATEMENT PLAN PROPOSAL

March 27, 2000

Submitted to: Champion Technologies, Inc.
3130 FM 521
Fresno, Texas 77545

Prepared by: Enercon Services, Inc.
8866 Gulf Freeway, Suite 380
Houston, TX 77017

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1.0 OBJECTIVES

Enercon Services, Inc. (Enercon) has been retained to prepare an Abatement Plan Proposal (APP) for the Champion Technologies, Inc. (Champion) facility located at 4001 South Hwy. 18 in Hobbs, New Mexico. This APP is prepared pursuant to the Notice of Violation issued by the New Mexico Oil Conservation Division (NMOCD) on April 26, 1999.

This APP will focus on determining the nature and extent of potentially hazardous waste contamination in the soil on site, and evaluating the potential of groundwater impact on site.

The APP describes the procedures that will be used to evaluate the potential impact at the site. The APP contains the following:

1. A detailed description of the site;

2. A site and project background;

3. A detailed sampling plan;

4. A schedule for implementation of the APP and submittal of a Site Investigation Report (SIR) that will be an addendum to the APP; and

5. A description of the contents of the SIR.

The objectives of the site investigation are to evaluate the nature, extent and degree of potentially hazardous waste impacts to the site, if any. This objective will be accomplished through the following activities:

1. Reviewing relevant documents to the site and vicinity; and

2. Developing and executing a soil-sampling program in the area near the warehouse to identify any potential impact to the site.

3. Installing monitoring wells, collect and analyze groundwater samples to identify any potential impact to the groundwater.

4. Investigate potential former pond and pit area on southwest portion of the site.

The data obtained from the site investigationwill be used to present recommendations, if warranted, for future investigations and remedial actions at the site. A work plan for any further investigations that may be deemed necessary, based on the results of the site assessment, will be prepared as an addendum to this APP.

Project Contacts

The following is a reference list of project contacts:

Client:	Champion Technologies, Inc. Mr. Melvin Davis (281) 431-2561
Champion Technologies Project Manager:	Mr. Ralph Corry (281) 431-2561
Enercon Services, Inc. Project Manager:	Mr. Michael Amabisco (713) 941-0401

2.0 SITE DESRIPTION AND BACKGROUND

2.1 Site Location and Description

The Champion facility's physical address is 4001 South Highway 18 in Hobbs, New Mexico. The location of the property is NE/4 of SE/4, Section 15, Township 19 South, Range 38 East, West Hobbs Quadrangle (Appendix A, Figure 1.)

The Champion facility stores and distributes chemicals for the petroleum industry. The property is rectangular in shape, approximately 500 feet by 640 feet, or an estimated 7 acres. The facility consists of an office building, manufacturing, and storage areas, as well as parking and undeveloped areas (Appendix A, Figure 2.). The site is enclosed by a fence, with a gate along South Highway 18. The facility uses a septic system for sanitary purposes and water is supplied by an on site domestic well. The site is generally flat with a slight gradient in the westerly direction. There are no bodies of surface water on the site.

The facility is bordered by the highway on the east side, residential and undeveloped property to the south, undeveloped land on the west side, and an oil field service company to the north.

2.1.1 Regional Geologic Setting

The geology of the Southern High Plains of Texas and New Mexico consists of the Tertiary Ogallala Formation which is overlain by Quaternary eolian, fluvial, and lacustrine sediments. The Quaternary deposits range in age from 1.4 million years old to recent, and extend to a maximum depth of 80 feet below ground surface regionally. The Tertiary Ogallala Formation contains coarse fluvial conglomerates, sandstone, and fine-grained eolian siltstone and clay. The depositional environment of the Ogallala Formation and overlying Quaternary deposits produce overlapping alluvial fans. Exposed along dry riverbeds in the region, the Quaternary alluvium deposits consist of sands, silts, and gravels. Locally, a resistant calcitic layer known as caprock overlies the Ogallala Formation. The caprock is exposed along the northwestern portion of Lea County.

2.1.2 Regional Hydrogeology

The Ogallala aquifer is the primary drinking water and irrigation source for the Southern High Plains of Texas and Eastern New Mexico. The Ogallala aquifer occurs within the Tertiary Ogallala Formation which is composed of terrigenous sediments such as sands, gravels, and finer sediments. The aquifer is covered by Quaternary deposits and unconformably overlies Cretaceous, Triassic, and Permian rocks. Water table elevations approximately parallel the regional land surface, which dips southeasterly. The general hydraulic conductivity (K) for the aquifer is approximately 200 gal/day/ft^2 with a porosity of 43% and a specific yield of 23% for fined grained sands. However, at the time of this abatement plan proposal, the local hydraulic conductivity, storativity, and transmissivity have not been determined at the site.

2.2 SITE BACKGROUND

2.2.1 Site History and Usage

Champion Technologies, Inc. has occupied the 4001 South Highway location for approximately 30 years. In that time, the site has been used for the distribution of chemicals used in the petroleum industry.

Previous soil sampling was performed 1996 in connection with modification to the septic system. Soil sampling was also performed in April 1998 in regards to removal of contaminated soils near drum storage areas and product tanks. All actions were addressed and approved by the New Mexico Environmental Department (Appendix G).

In 1995 a new water well was constructed at the site. Water quality samples were collected and analyzed. Analytical results from the sampling are included in Appendix B. Results showed elevated concentrations of chloride and total dissolved solids.

On December 8, 1998, the NMOCD conducted an inspection at the Hobbs facility. During the inspection, department personnel collected a soil sample from a "yellow stained" area and a water sample from a faucet inside one of the buildings. Analytical results from these samples showed concentrations of lead, chromium, manganese, nickel, chloride, and soluble sulfates that exceeded groundwater standards. The soil sample analytical results also showed detected concentrations of polyaromatic hydrocarbon compounds.

In a letter dated December 29, 1999 from the NMOCD, several areas of alleged buried waste were identified. Each of these areas is addressed below. Areas are shown in Appendix A, Figure 3.

1. <u>Old UST Area</u>. The UST in this area was removed prior to 1985, and prior to RCRA UST regulations. No documentation pertaining to this removal exists.

2. <u>Old Pit Area on South Side of Warehouse</u>. Champion has no knowledge of a pit area in this location. No known past waste activities are known to have taken place in this area. To further investigate the possibility of potential buried waste in this area, Champion proposes to use electromagnetic geophysical methods to evaluate the presence of metallic buried waste. ALL FOR COMPLETE SITE!

3. <u>Old Pit Area on West Side of the Warehouse</u>. Further investigation of this area (Area 2) is proposed and detailed in Section 3.1.

4. <u>Areas Around the Bulk Tank Area</u>. These two areas have been remediated in the past. Champion is currently reviewing archived files to retrieve documentation of the cleanup to be submitted to NMOCD. If the files cannot be found, the area will be investigated and a plan will be submitted to NMOCD.

5. <u>Lab Septic System</u>. The septic system has been identified and is shown in Figures 2, 3, and 4. Previous samplings from the septic system area are discussed in Section 2.2.5. The proposed plan to evaluate potential impact to groundwater from the septic system is included in Section 5.0

6. <u>Old Pit Area with Buried Drums</u>. To further evaluate this area (Area 3) a soil boring to 25 feet bgs will be advanced. Investigation details for Area 3 are in Section 3.4.

2.2.2 Chemical List

Chemicals of primary concern in regards to the APP are stored on the site. A list of stored chemicals is included in Appendix A, Table 1.

2.2.3 Summary of Soil Sample Analytical Results

On December 8, 1998 the NMOCD collected a soil sample from a yellow stained area. A summary of detected concentrations is presented in Appendix A, Table 2. The location of the sample collection was reportedly 105 feet west of the concrete pad adjacent to the warehouse and 71 feet south of the north fence line.

2.2.4 Summary of Groundwater Sample Analytical Results

On December 8, 1998 the NMOCD collected a water sample from a faucet in the break room in the office building. A summary of detected concentrations is presented in Appendix A, Table 3.

2.2.5 Past Investigations and Incidences

Three investigations have been conducted on the Hobbs site. Two of the investigations pertained to the septic system, with the third pertaining to the cleanup of minor releases on site. Previous sample locations are shown in Appendix A, Figure 4.

Both soil and groundwater samples were collected for the septic area. Analytical results showed detectable concentrations of total petroleum hydrocarbons, arsenic, barium, chromium, and lead. Analytical results are included in Appendix G.

The third investigation involved the excavation and removal of soil from four separate areas on site. The areas were sampled for volatile and semi-volatile organic compounds after the excavation. All areas were below analytical detection limits. The removal report is included in Appendix G.

A review of available aerial photographs of the Hobbs area was conducted. Available aerial photographs of the area were not extensive. Photographs from 1949, 1954, and 1967 were found and reviewed. The 1967 photograph showed a possible pond in the southwest portion of the site (Area 3), and a pit near a structure (Area 2). More recent photographs were not available. Aerial photographs are included in Appendix G.

3.0 SOIL SAMPLE LOCATIONS AND RATIONALE

3.1 Background Samples

Three background samples will be collected. These samples will be collected from areas on the site that have not have been impacted by any facility operation activities. These samples will be collected from the ground surface to 1-foot bgs. Analyses for each sample location are summarized in Appendix A, Table 4. These sample locations will be backfilled with native material. Proposed soil sample locations are shown in Appendix A, Figure 5.

3.2 Area 1

One set of soil samples will be collected in the yellow stained area (Area 1), which is approximately 100 feet west of the concrete pad associated with the warehouse building. Five locations will be sampled in the yellow stained and surrounding area. Sample locations will be placed to delineate the lateral extent of potential soil impact. Soil samples will be collected at 0 to 1 foot below ground surface (bgs) and 2 to 3 feet bgs. The soils on the site are characterized by sands, silts, and caliche. The caliche and silt materials are likely to impede the migration of any potential surface impact, so samples will be collected at a maximum depth of 3-foot bgs. Proposed soil locations are shown in Appendix A, Figure 5.

3.3 Area 2

Soil samples will also be collected in the area adjacent to the warehouse concrete slab (Area 2). A total of nine (9) locations will be sampled in this area. Six (6) locations will be sampled in the alleged "old pit area", and three (3) locations approximately 10 feet outside the alleged pit area. Samples will be collected at 5-foot intervals from the ground surface to a maximum 25 feet bgs. Analyses for each sample location are summarized in Appendix A, Table 4. These sample locations will be backfilled with bentonite. Proposed soil sample locations are shown in Appendix A, Figure 5.

3.4 Area 3

One boring will be placed in this area. Samples will be collected at 5-feet bgs and 25 feet bgs. Analyses for each sample location are summarized in Appendix A, Table 4. These sample locations will be backfilled with bentonite. Proposed soil sample locations are shown in Appendix A, Figure 5.

4.0 SOIL SAMPLING PROCEDURES AND EQUIPMENT

4.1 Sample Collection Technique

Background samples will be collected using a decontaminated trowel.

Soil samples in Areas 1, 2, and 3 will be collected using a hollow-stem auger drill rig and a decontaminated split-spoon sampler. Samples will be collected from 0 to 3 feet bgs in Area 1 and 0 to 25 feet bgs in Areas 2 and 3. These depths are optimal depths for each zone and may not be attainable due to bedrock, cobbles, gravels, or other obstructions preventing the sampler from reaching the target depth. All depth intervals sampled will be recorded on the Field Data Form (Appendix E). Samples will be collected in accordance with ASTM Standard D 4700-91: *Standard Guide for Sampling From the Vadose Zone* (Appendix D), as well as the procedures described below.

- In Area 1 the sampling device will be advanced to a maximum depth of 3 feet bgs. The split-spoon sampler will be removed and opened. An organic vapor meter (OVM) will be used to screen the sample.
- In Areas 2 and 3, the sampler will be advanced to a maximum depth of 25 feet bgs. A continuous core sampler will be used and advanced in 5-foot intervals. The split-spoon sampler will be removed and opened. An oragnic vapor meter (OVM) will be used to screen the sample.
- Soil samples will be placed in 8-oz. glass jars, sealed, labeled, and placed in a cooler prior to laboratory delivery.

- A Field Data Form (Appendix E) will be utilized at each sample location, and completed during sample preparation.
- Three duplicate samples will be collected.

4.2 Soil Sample Identifier

All soil samples will be assigned a unique sample identifier. Each identifier will be comprised of a numeric sample location, a four number depth descriptor, and an alpha character sample type descriptor. The components of the sample designations are described below.

- *Sample Location.* This component consists of a single number unique to each sample location. These numbers will start at 1, and increase sequentially at each sample location.
- *Sample Depth Zone.* The sample depth descriptor consists of four numbers. The first two numbers signify the top of the sample zone (feet bgs), and the last two numbers signify the bottom of the sample zone (feet bgs).
- *Sample Type.* The letter designation and its associated sample type are as follows:

  -A unique

  -B duplicate/replicate

  -C equipment blank

For example, the designation of a unique sample collected at Location No. 9 from 14 to 15 feet bgs would be 9-1415-A.

4.3 Equipment Decontamination

All field sampling equipment and sample preparation equipment will be decontaminated between samples using a non-phosphatic detergent wash, tap water rinse, and a deionized water rinse and the guidance given in ASTM Standard D 5088-90: *Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites* (Appendix E).

5.0 MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

5.1 Monitoring Well Installation

To evaluate the potential impact to ground water, three monitoring wells will be installed on the site (Appendix A, Figure 5). One monitoring well will be place up-gradient of the septic system, and two down-gradient. The following describes the monitoring well installation procedures and specifications:

- Wells will be drilled using an air-rotary drilling method. Wells will be drilled to a maximum depth of 140 feet bgs.
- Approximately 10 feet of screen will be installed in the well. Screen placement will be determined in the field by the field geologist. Screening zones will be based on field observations and logging data.
- The well will be constructed with Schedule 40 PVC casing and screen.
- Screened zones will have appropriate filter pack placed in a matter to avoid any bridging. Wells will be properly sealed with bentonite and cement grout.
- The wells will have surface completions that will protect the well from any damage or unauthorized access.

5.2 Monitoring Well Purging

Monitoring well activities will include the following:

- A measuring point will be established on the well casing as a consistent measuring point. Each well will be sounded three times for depth to water.
- Wells will be purged with a decontaminated submersible pump.
- A minimal volume of water will be purged, taking into consideration the stabilization of pH. electrical conductance (EC), and oxidation reduction potential (ORP) over at least two to three casing volumes.
- Purge pumping may possibly draw the water down to a level that the pump will shut off due to lack of water. If this occurs, the well will be allowed to recover to 80% of the original static water level, or for 24 hours before samples will be collected.
- The rate of purging will be calculated and recorded.
- Purge water will be containerized and stored until analytical results are evaluated.

5.3 Groundwater Sampling Techniques

In order to ensure that proper groundwater samples are collected, the following procedures will be followed:

- Groundwater samples will be collected with disposable bailers and nylon cord. The bailer and cord will be disposed of after the sample has been collected.
- Samples will be placed in laboratory supplied, clean containers. Each container will be marked with the sample designation, date and time, sampler's initials, and required analysis.
- Samples will be placed in a cooler after collection and kept chilled until delivered to the laboratory.

5.4 Groundwater Sample Identifiers

Groundwater samples will have the following sample identifiers:

- Monitoring Well 1 - MW1
- Monitoring Well 2 - MW2
- Monitoring Well 3 - MW3

5.5 Groundwater Sampling Frequency

The initial groundwater samples will be collected approximately two weeks after the monitoring well installation. The need for further sampling or sampling frequency will be determined after review and evaluation of the initial results.

6.0 SAMPLE ANALYSIS AND HANDLING

6.1 Soil Sample Analytical Methods

Background soil samples collected on the site will be analyzed for the constituents listed below:

- Lead, chromium, manganese, nickel (Metals Suite 1)
- Chlorides and soluble sulfates.

Analytical methods used for soil samples will be in accordance with USEPA SW-846 prescribed or comparable methodologies. The constituents to be analyzed and the appropriate analytical methods to be used are summarized in Appendix A, Table 4, and analytical protocols are included in Appendix D.

Soil samples collected in Area 1 will be analyzed for the constituents listed below.

- Lead, chromium, manganese, nickel (Metals Suite 1)
- Chlorides and soluble sulfates.

Additionally, soil samples collected at 3 feet bgs will be analyzed using EPA Method 8270 (Semivolatile Organic Compounds).

Soil samples collected in Areas 2 and 3 will be analyzed for the constituents listed below.

- Barium, chromium, and lead (Metals Suite 2), SW-846 EPA Method 6010
- Total petroleum hydrocarbons (TPH), using EPA Method 418.1

Additionally, samples collected at 25 feet bgs will be analyzed for Metals Suite 2 using SW-846 EPA Method 1312/6010 (Synthetic Precipitation Leaching Procedure). Also the two samples with the highest OVM readings will be analyzed for BTEX constituents using SW-846 EPA Method 8021B.

The analytical work for this project will be conducted by Hall Environmental Analysis Laboratory. Their address is as follows:

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite C
Albuquerque, NM 87109
Phone: (505) 345-3975
Fax: (505) 345-4107

The laboratory project manager (LPM) will be responsible for analytical results, sample tracking, sample container order, courier requests, turnaround time requests, and explanation of reports. The LPM will also be responsible for tracking the analytical work of the project throughout the laboratory and ensuring the efficient transition of samples through sample control.

6.2 Groundwater Sample Analytical Methods

Groundwater samples collected from the monitoring wells will be analyzed for chromium, chloride, and total dissolved solids (TDS) (Table 5). Analytical work will be performed by Hall Environmental Analysis Laboratory.

6.3 Sample Containers, Preservatives and Shipping

The laboratory will provide sample containers and preservatives. All container preparation by the laboratory will be done in a designated area. Containers will be labeled to indicate the added preservative. Sample containers, preservatives, and holding times are summarized in Appendix A, Table 4. Preparation is accomplished using the following Standard Operating Procedures (SOPs) for bottle preservation:

- The laboratory will provide bottles for analyses. These will be purchased from suppliers who certify the containers to have been cleaned by protocols as prescribed by the EPA.
- The laboratory will also provide coolers and applicable Chain-of-Custody forms.
- All sample containers will be delivered at least 1 day before sample collection.
- After a sample is collected and labeled, it will be stored in a plastic ice chest.
- All samples will be wrapped in plastic packing when necessary to avoid breakage, and will be clearly labeled and sealed to prevent tampering.
- All samples will have a label containing (at a minimum) the following information.
    - sample designation;
    - project name and number;
    - date and time of collection; and
    - Comments - These may include parameters to be analyzed.

6.4 Chain of Custody

Chain-of-custody procedures will include:

- Samples collected by field personnel will be accompanied by a Chain-of-Custody Record Form (Appendix E), which will include date and time of collection, container type, preservatives used, number of samples, sample descriptions, and others.
- Sample identification labels and Chain-of-Custody Records will be completed with waterproof ink, and placed in a waterproof bag for shipment.
- Chain-of-Custody documentation will be completed at each sample location prior to sampling at the next site.

- The integrity of the samples will be examined, and the final signature on the Chain-of-Custody Form will be completed by a receiving agent of the selected laboratory.

6.5 Quality Assurance/Quality Control (QA/QC)

Analytical methods and Standard Operating Procedures, in accordance with EPA will be consistently maintained by the laboratory to satisfy the required level of QA/QC protocol. One solid sample will be subjected to duplicate or replicate analysis. One equipment blank from soil sampling equipment will be submitted for analysis.

All of the samples will be analyzed under a QC package which includes a case narrative, field identification/laboratory sample number cross-reference summary, analytical results, method blank results, laboratory control sample recoveries, matrix spike/spike duplicate recoveries, and Chain-of-Custody Record.

6.6 Data Management

Field and laboratory data management, data review, protocols, and procedures are provided to create a centralized working system and to maintain data quality. The following includes a discussion of field and laboratory data management and data review.

Field Data Management. Field data and completed Chain-of-Custody Forms will be completed in the field for each sampling location. These records will be produced, copied, and filed under the appropriate site location nomenclature for each selected site location. The Field Manager will forward these forms to the Project Manager at the conclusion of each sampling round.

The following field documentation will be completed.

- Completed field data forms, and Chain-of-Custody forms (Appendix F); and
- Samples will be described in the field according to procedures established in this document.

Laboratory Data Management. Analytical results and QC data relating to analytical precision and accuracy will be obtained from the laboratory. Laboratory data forms will specify sampling location and method of analysis. Chain-of-Custody Forms will be filed with the laboratory reports.

Data Review. Field data will be reviewed for measurements collected during sampling, order of sample collection, and the observations and notes recorded during the course of the sampling day. Laboratory data forms will be reviewed for the completion of required measurements, including parameter results, limits of detection, and dilution factors. Validity of both the field and laboratory data will be determined by evaluating the completeness of the data for the required parameters as documented on the Chain-of-Custody Form. The following data will also be reviewed.

- use of EPA or SW methods with detection limits below aquifer standards, where applicable;
- chemical data of control matrix blanks, control matrix spikes, standards, control matrix duplicates; and
- confirmation of sample analyses within specific holding times.

7.0 SITE SAFETY HEALTH PLAN

Enercon personnel will review the Site Safety Health Plan (SSHP) prior to initiation of the sampling events. The SSHP for conducting this APP is on file at the Enercon office in Houston and is attached here as Appendix F. A copy of this plan will be maintained on site during sampling activities.

8.0 SCHEDULE

Enercon anticipates that the NMOCD will require approximately 3 weeks to review and approve the APP. A schedule for the implementation of the site investigation is included in Appendix A, Table 6. The NMOCD will be notified at least 5 days in advance of any investigative work that will be performed at the site.

9.0 REPORTING

A SIR outlining the results of the soil and groundwater sampling, as well as the findings from the water well inventory survey will be submitted to the NMOCD as per the schedule presented in Section 7.0. The SIR will include the following:

1. Discussion of review of regulatory files related to the site and vicinity;
2. Field methods and procedures;
3. Soil and groundwater analytical results, QA/QC results;
4. Copies of Chain-of-Custody records;
5. Site plan showing the final locations of the soil and groundwater sampling locations;
6. Findings and recommendations for remedial/closure activities at the site.

10.0 REFERENCES

University of Texas Bulletin #3232, Geology of Texas, Austin, TX 1932

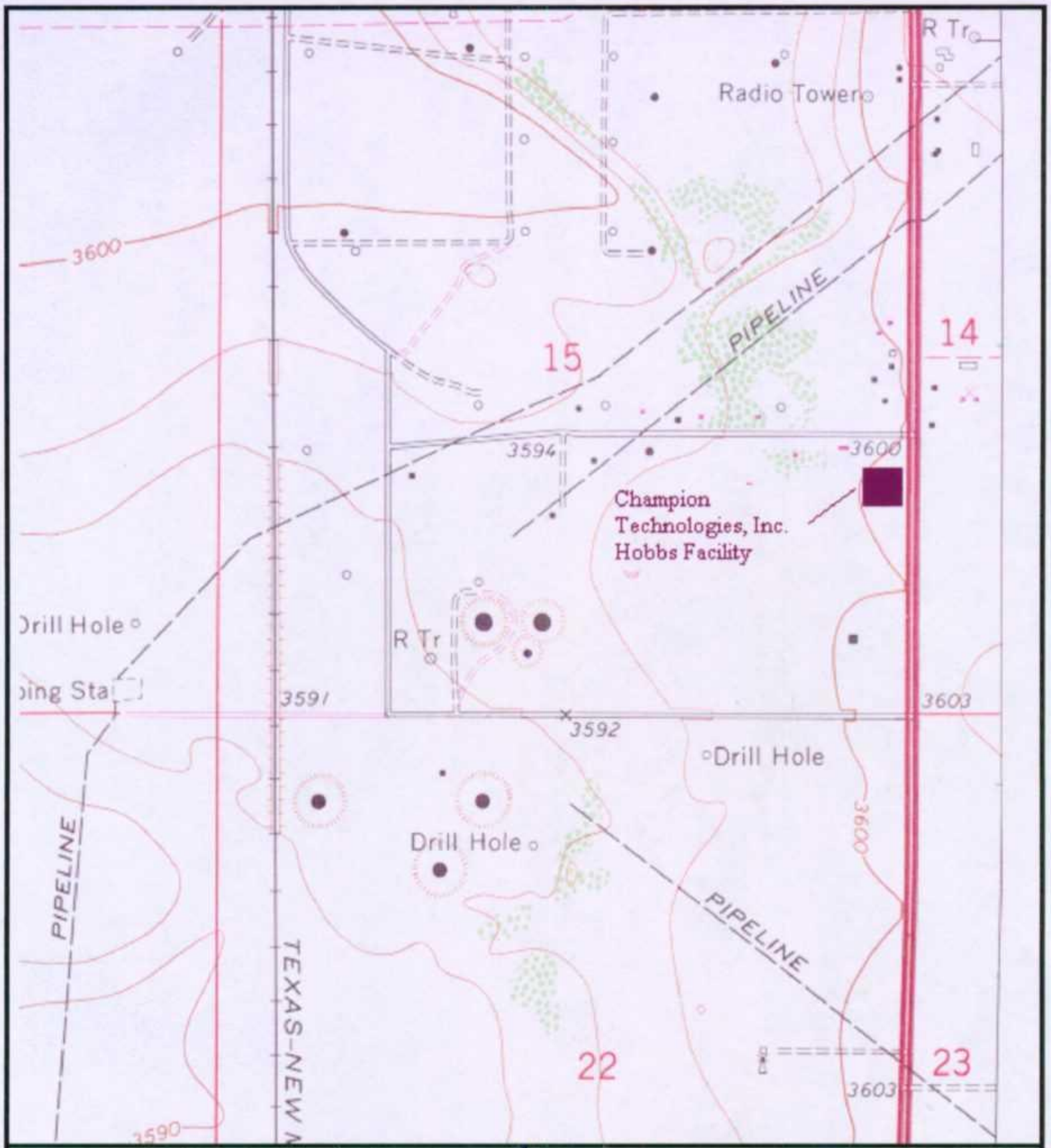
USEPA. *Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies.* Office of Research and Development, Washington, D.C. 1992. EPA/600/R-92/128.

USEPA. *Soil Screening Guidance. User's Guide.* Office of Emergency and Remedial Response. Washington, D.C. 1996. EPA/540/R-96/018.

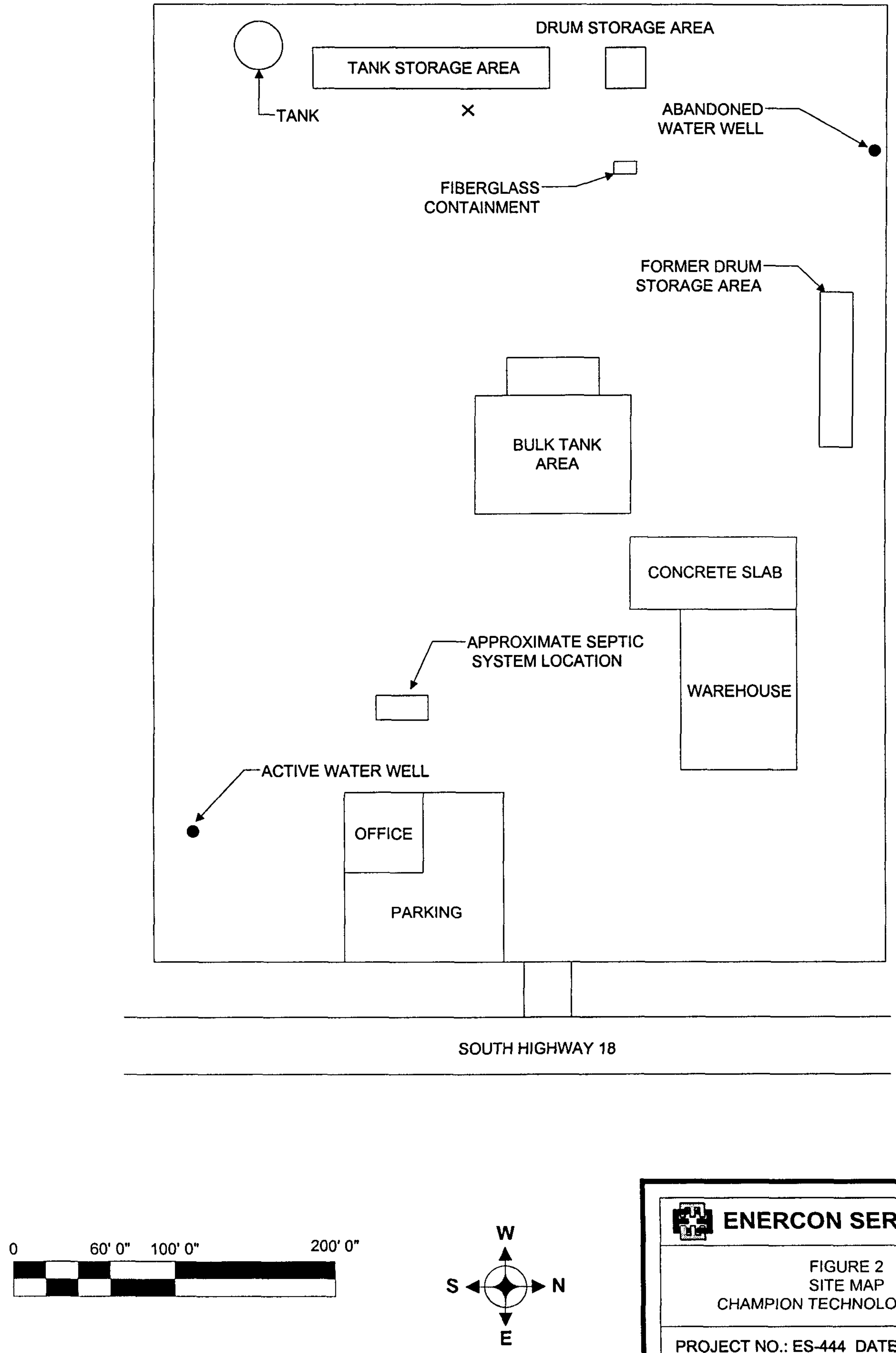
USEPA. *Test Methods for Evaluating Solids Waste, Physical/Chemical Methods.* Publication SW-846, 1996

APPENDIX A

FIGURES AND TABLES



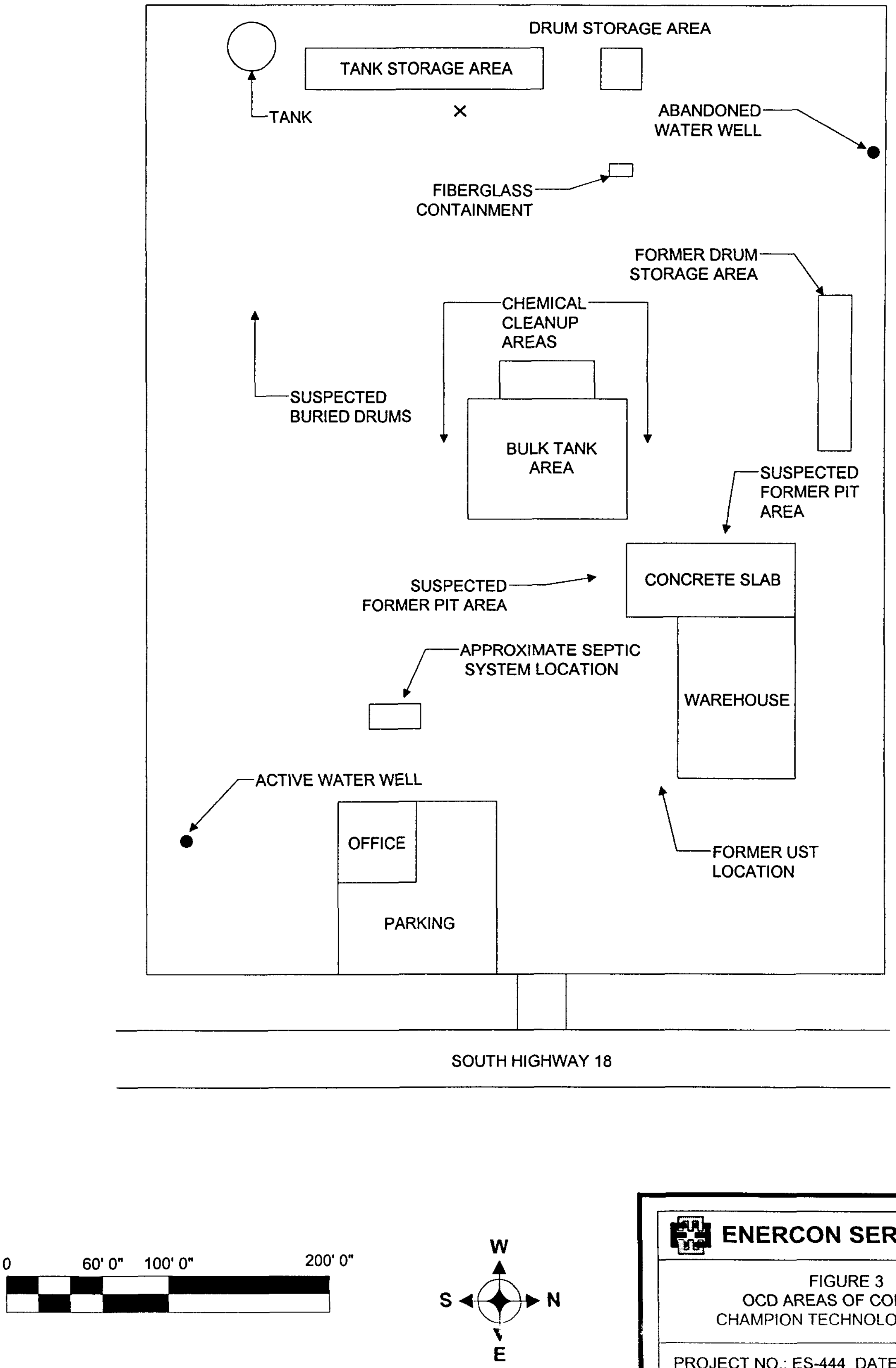
ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 1** **Topographic Map** **Hobbs West, NM Quad** **(No scale)**
Subject Property **4001 South Hwy. 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc.**



ENERCON SERVICES, INC.

FIGURE 2
SITE MAP
CHAMPION TECHNOLOGIES, INC.

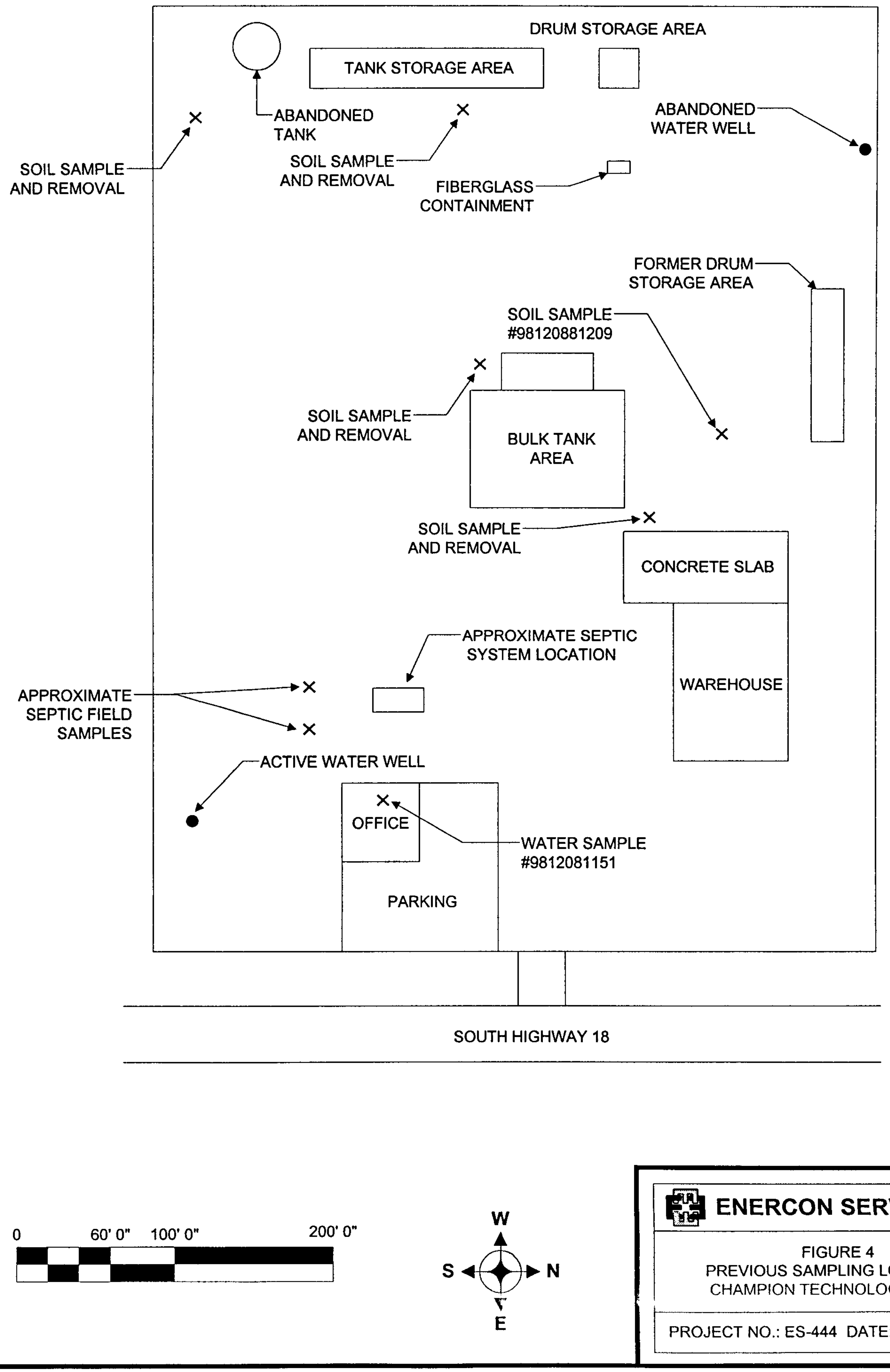
PROJECT NO.: ES-444 DATE:3/23/00 BY:JLP



ENERCON SERVICES, INC.

FIGURE 3
OCD AREAS OF CONCERN
CHAMPION TECHNOLOGIES, INC.

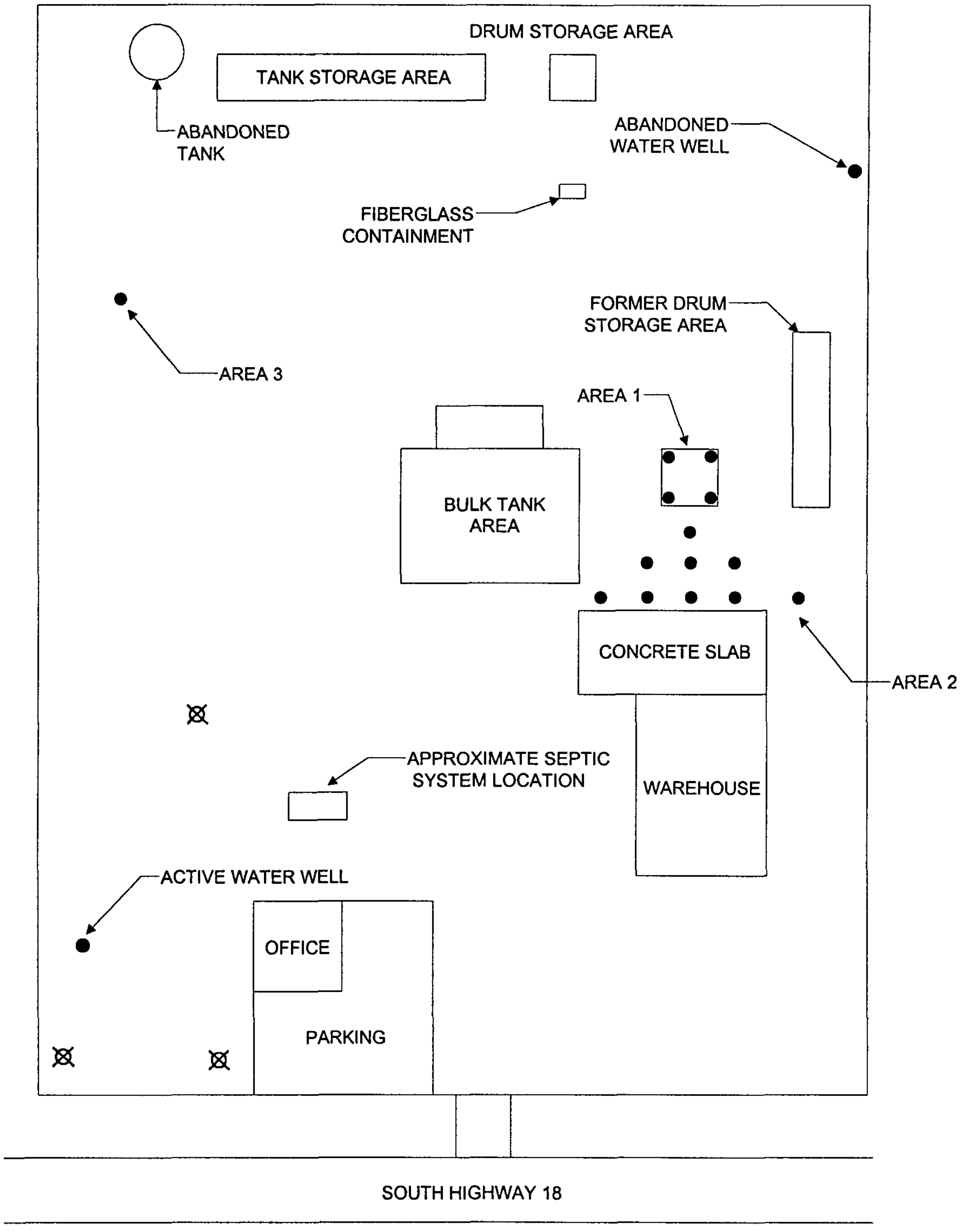
PROJECT NO.: ES-444 DATE:3/23/00 BY:JLP



ENERCON SERVICES, INC.

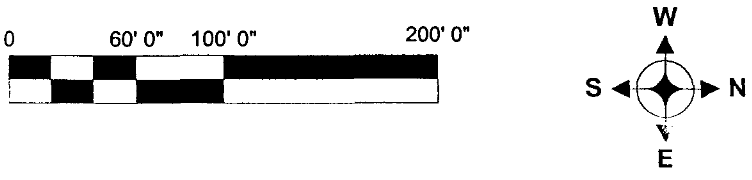
FIGURE 4
PREVIOUS SAMPLING LOCATIONS
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.: ES-444 DATE:3/23/00 BY:JLP



● = SOIL SAMPLE LOCATIONS

☒ = MONITORING WELL LOCATIONS



ENERCON SERVICES, INC.

FIGURE 5
PROPOSED SOIL SAMPLE AND
MONITORING WELL LOCATIONS
CHAMPION TECHNOLOGIES, INC.

PROJECT NO.: ES-444 DATE:3/23/00 BY:JLP

Table 1. Production Chemicals Stored at the Facility
Champion Technologies, Inc. Hobbs, New Mexico

Description of Chemicals

Name	Description
Cortrons	Corrosion inhibitors for the oilfield that normally consists of Imadazolines, amines, fatty acids, and various organic solvents. Sometimes the solvent is water. The organic solvents are usually mixed alcohols or heavy aromatic naphthas.
Scortrons	Combination scale and corrosion inhibitors that normally consist of the same things found in corrosion with the addition of phosphonates, amides, and bisulfites.
Gyptrons	Scale treating compounds for the oilfield that are used either to prevent scale from forming or removing it. This line normally consiss of products based on water soluble phosphonates either in the neutralized or unneutralized form.
Emulsotrons	Chemicals for treating oilfield oil and water emulsions will normally consist of surfactants in an organic solvent such as heavy aromatic naphtha.
Flexoils	Paraffin treating compounds for the oilfield. Normally consists of high molecular weight polymers in an organic solvent such as xylene, toluene, or heavy aromatic naphtha.
Flotrons	Paraffin treating compounds for the oilfield that generally consist of surfactants in either aqueous or organic solvent. Solvents for organic blends are heavy aromatic naphtha or xylene, etc. Aqueous blends consist of water, methanol, or isporopanol as the solvent system.
Gas Treat	Amine based chemicals for treating sour gas
Foamatrons	Blends much like Surfatrons chemistry
Defoamers	Organic solvent based chemicals for preventing or removing foam problems in the oilfield
Bactrons	Bacteriocides for treating oilfield corrosion problems. These normally consist of aldehyde or quaternary amine chemistry.
Cleartrons	Used for water clarification in the oilfield to remove residual amounts of oil from water. These chemicals normally consist of polymers in an aqueous solvent system.
Xylene & Han	Oil base hydrocarbons used as solvents in oilfield chemical treatment mixtures
Methanol & IPA	Alcohol used as solvents in oilfield treatment mixtures

Table 2. Summary of Detected Concentrations, Soil – December 8, 1998
Champion Technologies, Inc. Hobbs, New Mexico

Sample No.	Constituent	Test Method	Result
9812081209	Benzo (a) pyrene	EPA 8310	63 ug/Kg
	Benzo (b) fluoranthene		54 ug/Kg
	Benzo (k) fluoranthene		100 ug/Kg
	Chrysene		61 ug/Kg
	Dibenzo (a,h) anthracene		20 ug/Kg
	Fluorene		32 ug/Kg
	Naphthalene		22 ug/Kg
	Pyrene		22 ug/Kg
	1-Methylnaphthalene		73 ug/Kg
	Bis (2-ethylhexyl) phthalate	EPA 8270C	630 ug/Kg
	Aluminum	EPA 6010	5,500 mg/Kg
	Arsenic		3.2 mg/Kg
	Barium		600 mg/Kg
	Calcium		120,000 mg/kg
	Chromium		1,600 mg/Kg
	Cobalt		2.7 mg/Kg
	Copper		4.9 mg/Kg
	Iron		5,500 mg/Kg
	Lead		8.4 mg/Kg
	Magnesium		2,400 mg/Kg
	Manganese		120 mg/Kg
	Nickel		5.0 mg/Kg
	Potassium		2,000 mg/Kg
	Sodium		2,600 mg/Kg
	Vanadium		7.5 mg/Kg
	Zinc		61 mg/Kg
	Chloride	EPA 325.3	600 mg/Kg
	Nitrate	SM 4500-NO	4.3 mg/Kg
	Nitrite		0.64 mg/Kg
	Silica	EPA 370.1	12 mg/Kg
	Sulfate, soluble	EPA 375.4	800 mg/Kg
	Barium	TCLP	0.36 mg/L
	Chromium	TCLP	33 mg/L

Table 3. Summary of Detected Concentrations, Groundwater – December 8, 1998
Champion Technologies, Inc. Hobbs, New Mexico

Sample No.	Constituent	Test Method	Result
9812081151	Alkalinity, bicarb	SM 2320B	225 mg/L
	Alkalinity, total	EPA 310.1	225 mg/L
	Bromide	SM 4500-Br	1.7 mg/L
	Chloride	EPA 300.0	400 mg/L
	Conductivity	EPA 120.1	1,800 umho
	Fluoride, total	EPA 340.2	1.5 mg/L
	Nitrate	EPA 353.1	2.2 mg/L
	Silica	EPA 370.1	26 mg/L
	Total dissolved solids	EPA 160.1	1,300 mg/L
	Calcium	EPA 200.7	160 mg/L
	Magnesium		30 mg/L
	Potassium		7.5 mg/L
	Sodium		140 mg/L

Table 4. Summary of Soil Sample Identifiers and Analysis[1]
Champion Technologies, Inc., Hobbs, New Mexico

Sample ID	Constituents	Test Method	Container	Preservative	Hold Time
Background Samples					
1-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
2-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
3-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
Area 1 Samples					
4-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
4-0203-A	SVOC Metals Suite 1 Soluble Sulfates Chloride	EPA 8270 EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	14 days 180 days 28 days 28 days
5-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
5-0203-A	SVOC Metals Suite 1 Soluble Sulfates Chloride	EPA 8270 EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	14 days 180 days 28 days 28 days
6-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
6-0203-A	SVOC Metals Suite 1 Soluble Sulfates Chloride	EPA 8270 EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	14 days 180 days 28 days 28 days
7-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
7-0203-A	SVOC Metals Suite 1 Soluble Sulfates Chloride	EPA 8270 EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	14 days 180 days 28 days 28 days
8-0001-A	Metals Suite 1 Soluble Sulfates Chloride	EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	180 days 28 days 28 days
8-0203-A	SVOC Metals Suite 1 Soluble Sulfates Chloride	EPA 8270 EPA 6010/7000 EPA 300.0 EPA 300.0	8-oz glass	Ice	14 days 180 days 28 days 28 days
Area 2 Samples[2]					
9-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
9-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days

Sample ID	Constituents	Test Method	Container	Preservative	Hold Time
Area 2 Samples[2]					
9-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
9-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
9-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
10-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
10-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
10-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
10-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
10-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
11-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
11-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
11-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
11-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
11-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
12-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
12-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
12-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
12-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
12-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
13-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
13-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
13-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
13-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
13-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days

Sample ID	Constituents	Test Method	Container	Preservative	Hold Time
Area 2 Samples[2]					
14-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
14-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
14-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
14-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
14-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
15-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
15-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
15-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
15-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
15-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
16-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
16-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
16-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
16-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
16-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
17-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
17-0910-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
17-1415-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
17-1920-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
17-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days
Area 3 Samples[2]					
18-0405-A	Metals Suite 2 TPH	EPA 6010/7000 418.1	8-oz glass	Ice	180 days 14 days
18-2425-A	Metals Suite 2 SPLP TPH	EPA 6010/7000 EPA 1312 418.1	8-oz glass	Ice	180 days 14 days

Notes:

1 Three duplicate samples will be collected.
2 Two samples with highest OVM readings will be analyzed for BTEX using EPA 8021B.

**Table 5. Summary of Groundwater Sample Identifiers and Analysis
Champion Technologies, Inc., Hobbs, New Mexico**

Sample ID	Constituents	Test Method	Container	Preservative	Hold Time
MW-1	Chromium	6010/7000	1-L plastic	Ice	180 days
MW-2	Chloride	EPA 300.0	1-L plastic	Ice	28 days
MW-3	TDS[1]	EPA 160.1	1-L plastic	Ice	7 days

Notes:

[1] Total dissolved solids

Table 6. Anticipated Schedule, Implementation of Site Investigation Champion Technologies, Inc. Hobbs, New Mexico		
Item	**Description**	**Schedule**
1	Submittal of Revised Abatement Plan Proposal to New Mexico Energy, Minerals, & Natural Resources Department	March 27, 2000
2	Approval of Revised Abatement Plan Proposal by New Mexico Energy, Minerals, & Natural Resources Department	April 21, 2000
3	Conduct Soil Sampling and Monitoring Well Installation, Hobbs, New Mexico	May 22, 2000
4	Groundwater Sampling, Hobbs, New Mexico	June 8, 2000
5	Submit SIR to New Mexico Energy, Minerals, & Natural Resources Department	July 7, 2000

APPENDIX B

WATER WELL ANALYTICAL RESULT

P. O. BOX 1468
MONAHANS, TEXAS 79756
PH. 943-3234 OR 563-1040

Martin Water Laboratories, Inc.

709 W. INDIANA
MIDLAND, TEXAS 79701
PHONE 683-4521

RESULT OF WATER ANALYSES

LABORATORY NO. 495145
SAMPLE RECEIVED 4-24-95
RESULTS REPORTED 4-26-95

TO: Mr. Robert Middleton
P. O. Box 2187, Hobbs, NM 88240

COMPANY Champion Technologies, Inc.
LEASE
FIELD OR POOL
SECTION ____ BLOCK ____ SURVEY ____ COUNTY Lea STATE NM

SOURCE OF SAMPLE AND DATE TAKEN:
NO. 1 Drinking water - taken @ Hobbs laboratory.
NO. 2
NO. 3
NO. 4

REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0025			
pH When Sampled				
pH When Received	7.00			
Bicarbonate as HCO_3	244			
Supersaturation as $CaCO_3$				
Undersaturation as $CaCO_3$				
Total Hardness as $CaCO_3$	520			
Calcium as Ca	168			
Magnesium as Mg	24			
Sodium and/or Potassium	138			
Sulfate as SO_4	86			
Chloride as Cl	376			
Iron as Fe	0.04			
Barium as Ba				
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	1,036			
Temperature °F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen,				
Hydrogen Sulfide	0.0			
Resistivity, ohms/m at 77° F.	6.11			
Suspended Oil				
Filtrable Solids as mg/l				
Volume Filtered, ml				
Nitrate, as N	1.4			

Results Reported As Milligrams Per Liter

Additional Determinations And Remarks The undersigned certifies the above to be true and correct to the best of his knowledge and belief.

Form No. 3

By
Waylan C. Martin, M.A.

APPENDIX C

ANALYTICAL METHODS

METHOD 8270C

SEMIVOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

1.0 SCOPE AND APPLICATION

1.1 Method 8270 is used to determine the concentration of semivolatile organic compounds in extracts prepared from many types of solid waste matrices, soils, air sampling media and water samples. Direct injection of a sample may be used in limited applications. The following compounds can be determined by this method:

		Appropriate Preparation Techniques[b]				
Compounds	CAS No[a]	3510	3520	3540/ 3541	3550	3580
Acenaphthene	83-32-9	X	X	X	X	X
Acenaphthene-d_{10} (IS)		X	X	X	X	X
Acenaphthylene	208-96-8	X	X	X	X	X
Acetophenone	98-86-2	X	ND	ND	ND	X
2-Acetylaminofluorene	53-96-3	X	ND	ND	ND	X
1-Acetyl-2-thiourea	591-08-2	LR	ND	ND	ND	LR
Aldrin	309-00-2	X	X	X	X	X
2-Aminoanthraquinone	117-79-3	X	ND	ND	ND	X
Aminoazobenzene	60-09-3	X	ND	ND	ND	X
4-Aminobiphenyl	92-67-1	X	ND	ND	ND	X
3-Amino-9-ethylcarbazole	132-32-1	X	X	ND	ND	ND
Anilazine	101-05-3	X	ND	ND	ND	X
Aniline	62-53-3	X	X	ND	X	X
o-Anisidine	90-04-0	X	ND	ND	ND	X
Anthracene	120-12-7	X	X	X	X	X
Aramite	140-57-8	HS(43)	ND	ND	ND	X
Aroclor 1016	12674-11-2	X	X	X	X	X
Aroclor 1221	11104-28-2	X	X	X	X	X
Aroclor 1232	11141-16-5	X	X	X	X	X
Aroclor 1242	53469-21-9	X	X	X	X	X
Aroclor 1248	12672-29-6	X	X	X	X	X
Aroclor 1254	11097-69-1	X	X	X	X	X
Aroclor 1260	11096-82-5	X	X	X	X	X
Azinphos-methyl	86-50-0	HS(62)	ND	ND	ND	X
Barban	101-27-9	LR	ND	ND	ND	LR
Benzidine	92-87-5	CP	CP	CP	CP	CP
Benzoic acid	65-85-0	X	X	ND	X	X
Benz(a)anthracene	56-55-3	X	X	X	X	X
Benzo(b)fluoranthene	205-99-2	X	X	X	X	X
Benzo(k)fluoranthene	207-08-9	X	X	X	X	X
Benzo(g,h,i)perylene	191-24-2	X	X	X	X	X
Benzo(a)pyrene	50-32-8	X	X	X	X	X

Compounds	CAS No[a]	Appropriate Preparation Techniques[b]				
		3510	3520	3540/ 3541	3550	3580
p-Benzoquinone	106-51-4	OE	ND	ND	ND	X
Benzyl alcohol	100-51-6	X	X	ND	X	X
α-BHC	319-84-6	X	X	X	X	X
β-BHC	319-85-7	X	X	X	X	X
δ-BHC	319-86-8	X	X	X	X	X
γ-BHC (Lindane)	58-89-9	X	X	X	X	X
Bis(2-chloroethoxy)methane	111-91-1	X	X	X	X	X
Bis(2-chloroethyl) ether	111-44-4	X	X	X	X	X
Bis(2-chloroisopropyl) ether	108-60-1	X	X	X	X	X
Bis(2-ethylhexyl) phthalate	117-81-7	X	X	X	X	X
4-Bromophenyl phenyl ether	101-55-3	X	X	X	X	X
Bromoxynil	1689-84-5	X	ND	ND	ND	X
Butyl benzyl phthalate	85-68-7	X	X	X	X	X
Captafol	2425-06-1	HS(55)	ND	ND	ND	X
Captan	133-06-2	HS(40)	ND	ND	ND	X
Carbaryl	63-25-2	X	ND	ND	ND	X
Carbofuran	1563-66-2	X	ND	ND	ND	X
Carbophenothion	786-19-6	X	ND	ND	ND	X
Chlordane (NOS)	57-74-9	X	X	X	X	X
Chlorfenvinphos	470-90-6	X	ND	ND	ND	X
4-Chloroaniline	106-47-8	X	ND	ND	ND	X
Chlorobenzilate	510-15-6	X	ND	ND	ND	X
5-Chloro-2-methylaniline	95-79-4	X	ND	ND	ND	X
4-Chloro-3-methylphenol	59-50-7	X	X	X	X	X
3-(Chloromethyl)pyridine hydrochloride	6959-48-4	X	ND	ND	ND	X
1-Chloronaphthalene	90-13-1	X	X	X	X	X
2-Chloronaphthalene	91-58-7	X	X	X	X	X
2-Chlorophenol	95-57-8	X	X	X	X	X
4-Chloro-1,2-phenylenediamine	95-83-0	X	X	ND	ND	ND
4-Chloro-1,3-phenylenediamine	5131-60-2	X	X	ND	ND	ND
4-Chlorophenyl phenyl ether	7005-72-3	X	X	X	X	X
Chrysene	218-01-9	X	X	X	X	X
Chrysene-d_{12} (IS)		X	X	X	X	X
Coumaphos	56-72-4	X	ND	ND	ND	X
p-Cresidine	120-71-8	X	ND	ND	ND	X
Crotoxyphos	7700-17-6	X	ND	ND	ND	X
2-Cyclohexyl-4,6-dinitro-phenol	131-89-5	X	ND	ND	ND	LR
4,4'-DDD	72-54-8	X	X	X	X	X
4,4'-DDE	72-55-9	X	X	X	X	X
4,4'-DDT	50-29-3	X	X	X	X	X
Demeton-O	298-03-3	HS(68)	ND	ND	ND	X
Demeton-S	126-75-0	X	ND	ND	ND	X
Diallate (cis or trans)	2303-16-4	X	ND	ND	ND	X

		Appropriate Preparation Techniques[b]				
Compounds	CAS No[a]	3510	3520	3540/ 3541	3550	3580
2,4-Diaminotoluene	95-80-7	DC,0E(42)	ND	ND	ND	X
Dibenz(a,j)acridine	224-42-0	X	ND	ND	ND	X
Dibenz(a,h)anthracene	53-70-3	X	X	X	X	X
Dibenzofuran	132-64-9	X	X	ND	X	X
Dibenzo(a,e)pyrene	192-65-4	ND	ND	ND	ND	X
1,2-Dibromo-3-chloropropane	96-12-8	X	X	ND	ND	ND
Di-n-butyl phthalate	84-74-2	X	X	X	X	X
Dichlone	117-80-6	OE	ND	ND	ND	X
1,2-Dichlorobenzene	95-50-1	X	X	X	X	X
1,3-Dichlorobenzene	541-73-1	X	X	X	X	X
1,4-Dichlorobenzene	106-46-7	X	X	X	X	X
1,4-Dichlorobenzene-d_4 (IS)		X	X	X	X	X
3,3'-Dichlorobenzidine	91-94-1	X	X	X	X	X
2,4-Dichlorophenol	120-83-2	X	X	X	X	X
2,6-Dichlorophenol	87-65-0	X	ND	ND	ND	X
Dichlorovos	62-73-7	X	ND	ND	ND	X
Dicrotophos	141-66-2	X	ND	ND	ND	X
Dieldrin	60-57-1	X	X	X	X	X
Diethyl phthalate	84-66-2	X	X	X	X	X
Diethylstilbestrol	56-53-1	AW,0S(67)	ND	ND	ND	X
Diethyl sulfate	64-67-5	LR	ND	ND	ND	LR
Dihydrosaffrole	56312-13-1	ND	ND	ND	ND	ND
Dimethoate	60-51-5	HE,HS(31)	ND	ND	ND	X
3,3'-Dimethoxybenzidine	119-90-4	X	ND	ND	ND	LR
Dimethylaminoazobenzene	60-11-7	X	ND	ND	ND	X
7,12-Dimethylbenz(a)-anthracene	57-97-6	CP(45)	ND	ND	ND	CP
3,3'-Dimethylbenzidine	119-93-7	X	ND	ND	ND	X
α,α-Dimethylphenethylamine	122-09-8	ND	ND	ND	ND	X
2,4-Dimethylphenol	105-67-9	X	X	X	X	X
Dimethyl phthalate	131-11-3	X	X	X	X	X
1,2-Dinitrobenzene	528-29-0	X	ND	ND	ND	X
1,3-Dinitrobenzene	99-65-0	X	ND	ND	ND	X
1,4-Dinitrobenzene	100-25-4	HE(14)	ND	ND	ND	X
4,6-Dinitro-2-methylphenol	534-52-1	X	X	X	X	X
2,4-Dinitrophenol	51-28-5	X	X	X	X	X
2,4-Dinitrotoluene	121-14-2	X	X	X	X	X
2,6-Dinitrotoluene	606-20-2	X	X	X	X	X
Dinocap	39300-45-3	CP,HS(28)	ND	ND	ND	CP
Dinoseb	88-85-7	X	ND	ND	ND	X
Dioxathion	78-34-2	ND	ND	ND	ND	ND
Diphenylamine	122-39-4	X	X	X	X	X
5,5-Diphenylhydantoin	57-41-0	X	ND	ND	ND	X
1,2-Diphenylhydrazine	122-66-7	X	X	X	X	X

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
Di-n-octyl phthalate	117-84-0	X	X	X	X	X
Disulfoton	298-04-4	X	ND	ND	ND	X
Endosulfan I	959-98-8	X	X	X	X	X
Endosulfan II	33213-65-9	X	X	X	X	X
Endosulfan sulfate	1031-07-8	X	X	X	X	X
Endrin	72-20-8	X	X	X	X	X
Endrin aldehyde	7421-93-4	X	X	X	X	X
Endrin ketone	53494-70-5	X	X	ND	X	X
EPN	2104-64-5	X	ND	ND	ND	X
Ethion	563-12-2	X	ND	ND	ND	X
Ethyl carbamate	51-79-6	DC(28)	ND	ND	ND	X
Ethyl methanesulfonate	62-50-0	X	ND	ND	ND	X
Famphur	52-85-7	X	ND	ND	ND	X
Fensulfothion	115-90-2	X	ND	ND	ND	X
Fenthion	55-38-9	X	ND	ND	ND	X
Fluchloralin	33245-39-5	X	ND	ND	ND	X
Fluoranthene	206-44-0	X	X	X	X	X
Fluorene	86-73-7	X	X	X	X	X
2-Fluorobiphenyl (surr)	321-60-8	X	X	X	X	X
2-Fluorophenol (surr)	367-12-4	X	X	X	X	X
Heptachlor	76-44-8	X	X	X	X	X
Heptachlor epoxide	1024-57-3	X	X	X	X	X
Hexachlorobenzene	118-74-1	X	X	X	X	X
Hexachlorobutadiene	87-68-3	X	X	X	X	X
Hexachlorocyclopentadiene	77-47-4	X	X	X	X	X
Hexachloroethane	67-72-1	X	X	X	X	X
Hexachlorophene	70-30-4	AW,CP(62)	ND	ND	ND	CP
Hexachloropropene	1888-71-7	X	ND	ND	ND	X
Hexamethylphosphoramide	680-31-9	X	ND	ND	ND	X
Hydroquinone	123-31-9	ND	ND	ND	ND	X
Indeno(1,2,3-cd)pyrene	193-39-5	X	X	X	X	X
Isodrin	465-73-6	X	ND	ND	ND	X
Isophorone	78-59-1	X	X	X	X	X
Isosafrole	120-58-1	DC(46)	ND	ND	ND	X
Kepone	143-50-0	X	ND	ND	ND	X
Leptophos	21609-90-5	X	ND	ND	ND	X
Malathion	121-75-5	HS(5)	ND	ND	ND	X
Maleic anhydride	108-31-6	HE	ND	ND	ND	X
Mestranol	72-33-3	X	ND	ND	ND	X
Methapyrilene	91-80-5	X	ND	ND	ND	X
Methoxychlor	72-43-5	X	ND	ND	ND	X
3-Methylcholanthrene	56-49-5	X	ND	ND	ND	X
4,4'-Methylenebis (2-chloroaniline)	101-14-4	OE,OS(0)	ND	ND	ND	LR

		Appropriate Preparation Techniques[b]				
Compounds	CAS No[a]	3510	3520	3540/ 3541	3550	3580
4,4'-Methylenebis (N,N-dimethylaniline)	101-61-1	X	X	ND	ND	ND
Methyl methanesulfonate	66-27-3	X	ND	ND	ND	X
2-Methylnaphthalene	91-57-6	X	X	ND	X	X
Methyl parathion	298-00-0	X	ND	ND	ND	X
2-Methylphenol	95-48-7	X	ND	ND	ND	X
3-Methylphenol	108-39-4	X	ND	ND	ND	X
4-Methylphenol	106-44-5	X	ND	ND	ND	X
Mevinphos	7786-34-7	X	ND	ND	ND	X
Mexacarbate	315-18-4	HE,HS(68)	ND	ND	ND	X
Mirex	2385-85-5	X	ND	ND	ND	X
Monocrotophos	6923-22-4	HE	ND	ND	ND	X
Naled	300-76-5	X	ND	ND	ND	X
Naphthalene	91-20-3	X	X	X	X	X
Naphthalene-d_8 (IS)		X	X	X	X	X
1,4-Naphthoquinone	130-15-4	X	ND	ND	ND	X
1-Naphthylamine	134-32-7	OS(44)	ND	ND	ND	X
2-Naphthylamine	91-59-8	X	ND	ND	ND	X
Nicotine	54-11-5	DE(67)	ND	ND	ND	X
5-Nitroacenaphthene	602-87-9	X	ND	ND	ND	X
2-Nitroaniline	88-74-4	X	X	ND	X	X
3-Nitroaniline	99-09-2	X	X	ND	X	X
4-Nitroaniline	100-01-6	X	X	ND	X	X
5-Nitro-o-anisidine	99-59-2	X	ND	ND	ND	X
Nitrobenzene	98-95-3	X	X	X	X	X
Nitrobenzene-d_5 (surr)		X	X	X	X	X
4-Nitrobiphenyl	92-93-3	X	ND	ND	ND	X
Nitrofen	1836-75-5	X	ND	ND	ND	X
2-Nitrophenol	88-75-5	X	X	X	X	X
4-Nitrophenol	100-02-7	X	X	X	X	X
5-Nitro-o-toluidine	99-55-8	X	X	ND	ND	X
Nitroquinoline-1-oxide	56-57-5	X	ND	ND	ND	X
N-Nitrosodi-n-butylamine	924-16-3	X	ND	ND	ND	X
N-Nitrosodiethylamine	55-18-5	X	ND	ND	ND	X
N-Nitrosodimethylamine	62-75-9	X	X	X	X	X
N-Nitrosomethylethylamine	10595-95-6	X	ND	ND	ND	X
N-Nitrosodiphenylamine	86-30-6	X	X	X	X	X
N-Nitrosodi-n-propylamine	621-64-7	X	X	X	X	X
N-Nitrosomorpholine	59-89-2	ND	ND	ND	ND	X
N-Nitrosopiperidine	100-75-4	X	ND	ND	ND	X
N-Nitrosopyrrolidine	930-55-2	X	ND	ND	ND	X
Octamethyl pyrophosphoramide	152-16-9	LR	ND	ND	ND	LR
4,4'-Oxydianiline	101-80-4	X	ND	ND	ND	X

		Appropriate Preparation Techniques[b]				
Compounds	CAS No[a]	3510	3520	3540/ 3541	3550	3580
Parathion	56-38-2	X	X	ND	ND	X
Pentachlorobenzene	608-93-5	X	ND	ND	ND	X
Pentachloronitrobenzene	82-68-8	X	ND	ND	ND	X
Pentachlorophenol	87-86-5	X	X	X	X	X
Perylene-d_{12} (IS)		X	X	X	X	X
Phenacetin	62-44-2	X	ND	ND	ND	X
Phenanthrene	85-01-8	X	X	X	X	X
Phenanthrene-d_{10} (IS)		X	X	X	X	X
Phenobarbital	50-06-6	X	ND	ND	ND	X
Phenol	108-95-2	DC(28)	X	X	X	X
Phenol-d_6 (surr)		DC(28)	X	X	X	X
1,4-Phenylenediamine	106-50-3	X	ND	ND	ND	X
Phorate	298-02-2	X	ND	ND	ND	X
Phosalone	2310-17-0	HS(65)	ND	ND	ND	X
Phosmet	732-11-6	HS(15)	ND	ND	ND	X
Phosphamidon	13171-21-6	HE(63)	ND	ND	ND	X
Phthalic anhydride	85-44-9	CP,HE(1)	ND	ND	ND	CP
2-Picoline (2-Methylpyridine)	109-06-8	X	X	ND	ND	ND
Piperonyl sulfoxide	120-62-7	X	ND	ND	ND	X
Pronamide	23950-58-5	X	ND	ND	ND	X
Propylthiouracil	51-52-5	LR	ND	ND	ND	LR
Pyrene	129-00-0	X	X	X	X	X
Pyridine	110-86-1	ND	ND	ND	ND	ND
Resorcinol	108-46-3	DC,OE(10)	ND	ND	ND	X
Safrole	94-59-7	X	ND	ND	ND	X
Strychnine	57-24-9	AW,0S(55)	ND	ND	ND	X
Sulfallate	95-06-7	X	ND	ND	ND	X
Terbufos	13071-79-9	X	ND	ND	ND	X
Terphenyl-d_{14}(surr)	1718-51-0	X	X	ND	X	X
1,2,4,5-Tetrachlorobenzene	95-94-3	X	ND	ND	ND	X
2,3,4,6-Tetrachlorophenol	58-90-2	X	ND	ND	ND	X
Tetrachlorvinphos	961-11-5	X	ND	ND	ND	X
Tetraethyl dithiopyrophosphate	3689-24-5	X	X	ND	ND	ND
Tetraethyl pyrophosphate	107-49-3	X	ND	ND	ND	X
Thionazine	297-97-2	X	ND	ND	ND	X
Thiophenol (Benzenethiol)	108-98-5	X	ND	ND	ND	X
Toluene diisocyanate	584-84-9	HE(6)	ND	ND	ND	X
o-Toluidine	95-53-4	X	ND	ND	ND	X
Toxaphene	8001-35-2	X	X	X	X	X
2,4,6-Tribromophenol (surr)	118-79-6	X	X	X	X	X
1,2,4-Trichlorobenzene	120-82-1	X	X	X	X	X
2,4,5-Trichlorophenol	95-95-4	X	X	ND	X	X
2,4,6-Trichlorophenol	88-06-2	X	X	X	X	X
Trifluralin	1582-09-8	X	ND	ND	ND	X

		Appropriate Preparation Techniques[b]				
Compounds	CAS No[a]	3510	3520	3540/ 3541	3550	3580
2,4,5-Trimethylaniline	137-17-7	X	ND	ND	ND	X
Trimethyl phosphate	512-56-1	HE(60)	ND	ND	ND	X
1,3,5-Trinitrobenzene	99-35-4	X	ND	ND	ND	X
Tris(2,3-dibromopropyl) phosphate	126-72-7	X	ND	ND	ND	LR
Tri-p-tolyl phosphate	78-32-0	X	ND	ND	ND	X
O,O,O-Triethyl phosphorothioate	126-68-1	X	ND	ND	ND	X

[a] Chemical Abstract Service Registry Number
[b] See Sec. 1.2 for other acceptable preparation methods.

KEY TO ANALYTE LIST

IS = This compound may be used as an internal standard.
surr = This compound may be used as a surrogate.
AW = Adsorption to walls of glassware during extraction and storage.
CP = Nonreproducible chromatographic performance.
DC = Unfavorable distribution coefficient (number in parenthesis is percent recovery).
HE = Hydrolysis during extraction accelerated by acidic or basic conditions (number in parenthesis is percent recovery).
HS = Hydrolysis during storage (number in parenthesis is percent stability).
LR = Low response.
ND = Not determined.
OE = Oxidation during extraction accelerated by basic conditions (number in parenthesis is percent recovery).
OS = Oxidation during storage (number in parenthesis is percent stability).
X = Greater than 70 percent recovery by this technique.

1.2 In addition to the sample preparation methods listed in the above analyte list, Method 3542 describes sample preparation for semivolatile organic compounds in air sampled by Method 0010 (Table 11 contains surrogate performance data), Method 3545 describes an automated solvent extraction device for semivolatiles in solids (Table 12 contains performance data), and Method 3561 describes a supercritical fluid extraction of solids for PAHs (see Tables 13, 14, and 15 for performance data).

1.3 Method 8270 can be used to quantitate most neutral, acidic, and basic organic compounds that are soluble in methylene chloride and capable of being eluted, without derivatization, as sharp peaks from a gas chromatographic fused-silica capillary column coated with a slightly polar silicone. Such compounds include polynuclear aromatic hydrocarbons, chlorinated hydrocarbons and pesticides, phthalate esters, organophosphate esters, nitrosamines, haloethers, aldehydes, ethers, ketones, anilines, pyridines, quinolines, aromatic nitro compounds, and phenols, including nitrophenols. See Table 1 for a list of compounds and their characteristic ions that have been evaluated.

In most cases, Method 8270 is not appropriate for the quantitation of multicomponent analytes, e.g., Aroclors, Toxaphene, Chlordane, etc., because of limited sensitivity for those analytes. When these analytes have been identified by another technique, Method 8270 is appropriate for confirmation of the presence of these analytes when concentration in the extract permits. Refer to Sec. 7.0 of Methods 8081 and 8082 for guidance on calibration and quantitation of multicomponent analytes such as the Aroclors, Toxaphene, and Chlordane.

1.4 The following compounds may require special treatment when being determined by this method:

1.4.1 Benzidine may be subject to oxidative losses during solvent concentration and its chromatographic behavior is poor.

1.4.2 Under the alkaline conditions of the extraction step from aqueous matrices, α-BHC, γ-BHC, Endosulfan I and II, and Endrin are subject to decomposition. Neutral extraction should be performed if these compounds are expected.

1.4.3 Hexachlorocyclopentadiene is subject to thermal decomposition in the inlet of the gas chromatograph, chemical reaction in acetone solution, and photochemical decomposition.

1.4.4 N-nitrosodimethylamine is difficult to separate from the solvent under the chromatographic conditions described.

1.4.5 N-nitrosodiphenylamine decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine.

1.4.6 Pentachlorophenol, 2,4-dinitrophenol, 4-nitrophenol, benzoic acid, 4,6-dinitro-2-methylphenol, 4-chloro-3-methylphenol, 2-nitroaniline, 3-nitroaniline, 4-chloroaniline, and benzyl alcohol are subject to erratic chromatographic behavior, especially if the GC system is contaminated with high boiling material.

1.4.7 Pyridine may perform poorly at the GC injection port temperatures listed in the method. Lowering the injection port temperature may reduce the amount of degradation. The analyst needs to use caution if modifying the injection port temperature as the performance of other analytes may be adversely affected.

1.4.8 Toluene diisocyanate rapidly hydrolyses in water (half-life of less then 30 min.). Therefore, recoveries of this compound from aqueous matrices should not be expected. In addition, in solid matrices, toluene diisocyanate often reacts with alcohols and amines to produce urethane and ureas and consequently cannot usually coexist in a solution containing these materials.

1.4.9 In addition, analytes in the list provided above are flagged when there are limitations caused by sample preparation and/or chromatographic problems.

1.5 The estimated quantitation limit (EQL) of Method 8270 for determining an individual compound is approximately 660 µg/kg (wet weight) for soil/sediment samples, 1-200 mg/kg for wastes (dependent on matrix and method of preparation), and 10 µg/L for ground water samples (see Table 2). EQLs will be proportionately higher for sample extracts that require dilution to avoid saturation of the detector.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of gas chromatograph/mass spectrometers and skilled in the interpretation of mass spectra. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 The samples are prepared for analysis by gas chromatography/mass spectrometry (GC/MS) using the appropriate sample preparation (refer to Method 3500) and, if necessary, sample cleanup procedures (refer to Method 3600).

2.2 The semivolatile compounds are introduced into the GC/MS by injecting the sample extract into a gas chromatograph (GC) with a narrow-bore fused-silica capillary column. The GC column is temperature-programmed to separate the analytes, which are then detected with a mass spectrometer (MS) connected to the gas chromatograph.

2.3 Analytes eluted from the capillary column are introduced into the mass spectrometer via a jet separator or a direct connection. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact (or electron impact-like) spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve.

2.4 The method includes specific calibration and quality control steps that supersede the general requirements provided in Method 8000.

3.0 INTERFERENCES

3.1 Raw GC/MS data from all blanks, samples, and spikes must be evaluated for interferences. Determine if the source of interference is in the preparation and/or cleanup of the samples and take corrective action to eliminate the problem.

3.2 Contamination by carryover can occur whenever high-concentration and low-concentration samples are sequentially analyzed. To reduce carryover, the sample syringe must be rinsed with solvent between sample injections. Whenever an unusually concentrated sample is encountered, it should be followed by the analysis of solvent to check for cross-contamination.

4.0 APPARATUS AND MATERIALS

4.1 Gas chromatograph/mass spectrometer system

4.1.1 Gas chromatograph - An analytical system complete with a temperature-programmable gas chromatograph suitable for splitless injection and all required accessories, including syringes, analytical columns, and gases. The capillary column should be directly coupled to the source.

4.1.2 Column - 30 m x 0.25 mm ID (or 0.32 mm ID) 1 µm film thickness silicone-coated fused-silica capillary column (J&W Scientific DB-5 or equivalent).

4.1.3 Mass spectrometer

4.1.3.1 Capable of scanning from 35 to 500 amu every 1 sec or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer must be capable of producing a mass spectrum for decafluorotriphenylphosphine (DFTPP) which meets the criteria in Table 3 when 1 µL of the GC/MS tuning standard is injected through the GC (50 ng of DFTPP).

4.1.3.2 An ion trap mass spectrometer may be used if it is capable of axial modulation to reduce ion-molecule reactions and can produce electron impact-like spectra that match those in the EPA/NIST Library. The mass spectrometer must be capable of producing a mass spectrum for DFTPP which meets the criteria in Table 3 when 5 or 50 ng are introduced.

4.1.4 GC/MS interface - Any GC-to-MS interface may be used that gives acceptable calibration points at 50 ng per injection for each compound of interest and achieves acceptable tuning performance criteria. For a narrow-bore capillary column, the interface is usually capillary-direct into the mass spectrometer source.

4.1.5 Data system - A computer system should be interfaced to the mass spectrometer. The system must allow the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer should have software that can search any GC/MS data file for ions of a specific mass and that can plot such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software should also be available that allows integrating the abundances in any EICP between specified time or scan-number limits. The most recent version of the EPA/NIST Mass Spectral Library should also be available.

4.1.6 Guard column (optional) - (J&W Deactivated Fused Silica, 0.25 mm ID x 6 m, or equivalent) between the injection port and the analytical column joined with column joiners (Hewlett-Packard Catalog No. 5062-3556, or equivalent).

4.2 Syringe - 10-µL.

4.3 Volumetric flasks, Class A - Appropriate sizes with ground-glass stoppers.

4.4 Balance - Analytical, capable of weighing 0.0001 g.

4.5 Bottles - glass with polytetrafluoroethylene (PTFE)-lined screw caps or crimp tops.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Stock standard solutions (1000 mg/L) - Standard solutions can be prepared from pure standard materials or purchased as certified solutions.

5.3.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in pesticide quality acetone or other suitable solvent and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially-prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.3.2 Transfer the stock standard solutions into bottles with PTFE-lined screw-caps. Store, protected from light, at -10°C or less or as recommended by the standard manufacturer. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.3.3 Stock standard solutions must be replaced after 1 year or sooner if comparison with quality control check samples indicates a problem.

5.3.4 It is recommended that nitrosamine compounds be placed together in a separate calibration mix and not combined with other calibration mixes. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.3.5 Mixes with hydrochloride salts may contain hydrochloric acid, which can cause analytical difficulties. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.4 Internal standard solutions - The internal standards recommended are 1,4-dichlorobenzene-d_4, naphthalene-d_8, acenaphthene-d_{10}, phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12} (see Table 5). Other compounds may be used as internal standards as long as the requirements given in Sec. 7.3.2 are met.

5.4.1 Dissolve 0.200 g of each compound with a small volume of carbon disulfide. Transfer to a 50 mL volumetric flask and dilute to volume with methylene chloride so that the final solvent is approximately 20% carbon disulfide. Most of the compounds are also soluble in small volumes of methanol, acetone, or toluene, except for perylene-d_{12}. The resulting solution will contain each standard at a concentration of 4,000 ng/µL. Each 1 mL sample extract undergoing analysis should be spiked with 10 µL of the internal standard solution, resulting in a concentration of 40 ng/µL of each internal standard. Store at -10°C or less when not in use. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.4.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute internal standard solution may be required. Area counts of the internal standard peaks should be between 50-200% of the area of the target analytes in the mid-point calibration analysis.

5.5 GC/MS tuning standard - A methylene chloride solution containing 50 ng/µL of decafluorotriphenylphosphine (DFTPP) should be prepared. The standard should also contain 50 ng/µL each of 4,4'-DDT, pentachlorophenol, and benzidine to verify injection port inertness and GC column performance. Store at -10°C or less when not in use. If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute tuning solution may be necessary. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.6 Calibration standards - A minimum of five calibration standards should be prepared at five different concentrations. At least one of the calibration standards should correspond to a sample concentration at or below that necessary to meet the data quality objectives of the project. The remaining standards should correspond to the range of concentrations found in actual samples but should not exceed the working range of the GC/MS system. Each standard should contain each analyte for detection by this method.

5.6.1 It is the intent of EPA that all target analytes for a particular analysis be included in the calibration standard(s). These target analytes may not include the entire list of analytes (Sec. 1.1) for which the method has been demonstrated. However, the laboratory shall not report a quantitative result for a target analyte that was not included in the calibration standard(s).

5.6.2 Each 1-mL aliquot of calibration standard should be spiked with 10 µL of the internal standard solution prior to analysis. All standards should be stored at -10°C or less, and should be freshly prepared once a year, or sooner if check standards indicate a problem. The calibration verification standard should be prepared weekly and stored at 4°C. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.7 Surrogate standards - The recommended surrogates are phenol-d_6, 2-fluorophenol, 2,4,6-tribromophenol, nitrobenzene-d_5, 2-fluorobiphenyl, and p-terphenyl-d_{14}. See Method 3500 for instructions on preparing the surrogate solutions.

5.7.1 Surrogate Standard Check: Determine what the appropriate concentration should be for the blank extracts after all extraction, cleanup, and concentration steps. Inject this concentration into the GC/MS to determine recovery of surrogate standards. It is recommended that this check be done whenever a new surrogate spiking solution is prepared.

NOTE: Method 3561 (SFE Extraction of PAHs) recommends the use of bromobenzene and p-quaterphenyl to better cover the range of PAHs listed in the method.

5.7.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute surrogate solution may be necessary.

5.8 Matrix spike and laboratory control standards - See Method 3500 for instructions on preparing the matrix spike standard. The same standard may be used as the laboratory control standard (LCS).

5.8.1 Matrix Spike Check: Determine what concentration should be in the blank extracts after all extraction, cleanup, and concentration steps. Inject this concentration into the GC/MS to determine recovery. It is recommended that this check be done whenever a new matrix spiking solution is prepared.

5.8.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute matrix and LCS spiking solution may be necessary.

5.8.3 Some projects may require the spiking of the specific compounds of interest, since the spiking compounds listed in Method 3500 would not be representative of the compounds of interest required for the project. When this occurs, the matrix and LCS spiking standards should be prepared in methanol, with each compound present at a concentration appropriate for the project.

5.9 Acetone, hexane, methylene chloride, isooctane, carbon disulfide, toluene, and other appropriate solvents - All solvents should be pesticide quality or equivalent.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

6.2 Store the sample extracts at -10°C, protected from light, in sealed vials (e.g., screw-cap vials or crimp-capped vials) equipped with unpierced PTFE-lined septa.

7.0 PROCEDURE

7.1 Sample preparation

7.1.1 Samples are normally prepared by one of the following methods prior to GC/MS analysis.

Matrix	Methods
Air	3542
Water	3510, 3520, 3535
Soil/sediment	3540, 3541, 3545, 3550, 3560, 3561
Waste	3540, 3541, 3545, 3550, 3560, 3561, 3580

7.1.2 In very limited applications, direct injection of the sample into the GC/MS system with a 10-µL syringe may be appropriate. The detection limit is very high (approximately 10,000 µg/L). Therefore, it is only permitted where concentrations in excess of 10,000 µg/L are expected.

7.2 Extract cleanup - Extracts may be cleaned up by any of the following methods prior to GC/MS analysis.

Analytes of interest	Methods
Aniline & aniline derivatives	3620
Phenols	3630, 3640, 8041[a]
Phthalate esters	3610, 3620, 3640
Nitrosamines	3610, 3620, 3640
Organochlorine pesticides & PCBs	3610, 3620, 3630, 3660, 3665
Nitroaromatics and cyclic ketones	3620, 3640
Polynuclear aromatic hydrocarbons	3611, 3630, 3640
Haloethers	3620, 3640
Chlorinated hydrocarbons	3620, 3640
Organophosphorus pesticides	3620

Analytes of interest	Methods
Petroleum waste	3611, 3650
All base, neutral, and acid priority pollutants	3640

[a] Method 8041 includes a derivatization technique followed by GC/ECD analysis, if interferences are encountered on GC/FID.

7.3 Initial calibration

Establish the GC/MS operating conditions, using the following recommendations as guidance.

Mass range:	35-500 amu
Scan time:	1 sec/scan
Initial temperature:	40°C, hold for 4 minutes
Temperature program:	40-270°C at 10°C/min
Final temperature:	270°C, hold until benzo[g,h,i]perylene elutes
Injector temperature:	250-300°C
Transfer line temperature:	250-300°C
Source temperature:	According to manufacturer's specifications
Injector:	Grob-type, splitless
Injection volume:	1-2 µL
Carrier gas:	Hydrogen at 50 cm/sec or helium at 30 cm/sec
Ion trap only:	Set axial modulation, manifold temperature, and emission current to manufacturer's recommendations

Split injection is allowed if the sensitivity of the mass spectrometer is sufficient.

7.3.1 The GC/MS system must be hardware-tuned using a 50 ng injection of DFTPP. Analyses must not begin until the tuning criteria are met.

7.3.1.1 In the absence of specific recommendations on how to acquire the mass spectrum of DFTPP from the instrument manufacturer, the following approach has been shown to be useful: Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and must be accomplished using a single scan acquired no more than 20 scans prior to the elution of DFTPP. The background subtraction should be designed only to eliminate column bleed or instrument background ions. Do not subtract part of the DFTPP peak.

7.3.1.2 Use the DFTPP mass intensity criteria in Table 3 as tuning acceptance criteria. Alternatively, other documented tuning criteria may be used (e.g. CLP, Method 525, or manufacturer's instructions), provided that method performance is not adversely affected.

NOTE: All subsequent standards, samples, MS/MSDs, and blanks associated with a DFTPP analysis must use the identical mass spectrometer instrument conditions.

7.3.1.3 The GC/MS tuning standard solution should also be used to assess GC column performance and injection port inertness. Degradation of DDT to DDE and DDD should not exceed 20%. (See Sec. 8.0 of Method 8081 for the percent breakdown calculation). Benzidine and pentachlorophenol should be present at their normal responses, and no peak tailing should be visible.

7.3.1.4 If degradation is excessive and/or poor chromatography is noted, the injection port may require cleaning. It may also be necessary to break off the first 6-12 in. of the capillary column. The use of a guard column (Sec. 4.1.6) between the injection port and the analytical column may help prolong analytical column performance.

7.3.2 The internal standards selected in Sec. 5.4 should permit most of the components of interest in a chromatogram to have retention times of 0.80-1.20 relative to one of the internal standards. Use the base peak ion from the specific internal standard as the primary ion for quantitation (see Table 1). If interferences are noted, use the next most intense ion as the quantitation ion (i.e. for 1,4-dichlorobenzene-d_4, use 152 m/z for quantitation).

7.3.3 Analyze 1-2 µL of each calibration standard (containing internal standards) and tabulate the area of the primary characteristic ion against concentration for each target analyte (as indicated in Table 1). A set of at least five calibration standards is necessary (see Sec. 5.6 and Method 8000). The injection volume must be the same for all standards and sample extracts. Figure 1 shows a chromatogram of a calibration standard containing base/neutral and acid analytes.

Calculate response factors (RFs) for each target analyte relative to one of the internal standards as follows:

$$RF = \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

where:

A_s = Peak area (or height) of the analyte or surrogate.
A_{is} = Peak area (or height) of the internal standard.
C_s = Concentration of the analyte or surrogate, in µg/L.
C_{is} = Concentration of the internal standard, in µg/L.

7.3.4 System performance check compounds (SPCCs)

7.3.4.1 A system performance check must be performed to ensure that minimum average RFs are met before the calibration curve is used. For semivolatiles, the System Performance Check Compounds (SPCCs) are: N-nitroso-di-n-propylamine; hexachlorocyclopentadiene; 2,4-dinitrophenol; and 4-nitrophenol.

7.3.4.2 The minimum acceptable average RF for these compounds is 0.050. These SPCCs typically have very low RFs (0.1-0.2) and tend to decrease in response as the chromatographic system begins to deteriorate or the standard material begins to deteriorate. They are usually the first to show poor performance. Therefore, they must meet the minimum requirement when the system is calibrated.

7.3.4.3 If the minimum response factors are not met, the system must be evaluated, and corrective action must be taken before sample analysis begins. Possible problems include standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, and active sites in the column or chromatographic system. This check must be met before sample analysis begins.

7.3.5 Calibration check compounds (CCCs)

7.3.5.1 The purpose of the CCCs are to evaluate the calibration from the standpoint of the integrity of the system. High variability for these compounds may be indicative of system leaks or reactive sites on the column. Meeting the CCC criteria is not a substitute for successful calibration of the target analytes using one of the approaches described in Section 7.0 of Method 8000.

7.3.5.2 Calculate the mean response factor and the relative standard deviation (RSD) of the response factors for each target analyte. The RSD should be less than or equal to 15% for each target analyte. However, the RSD for each individual CCC (see Table 4) must be less than or equal to 30%.

$$\text{mean RF} = \overline{RF} = \frac{\sum_{i=1}^{n} RF_i}{n} \qquad SD = \sqrt{\frac{\sum_{i=1}^{n} (RF_i - \overline{RF})^2}{n-1}}$$

$$RSD = \frac{SD}{\overline{RF}} \times 100$$

7.3.5.3 If the RSD of any CCC is greater than 30%, then the chromatographic system is too reactive for analysis to begin. Clean or replace the injector liner and/or capillary column, then repeat the calibration procedure beginning with Sec. 7.3.

7.3.5.4 If the CCCs are not included in the list of analytes for a project, and therefore not included in the calibration standards, refer to Sec. 7.0 of Method 8000.

7.3.6 Evaluation of retention times - The relative retention time (RRT) of each target analyte in each calibration standard should agree within 0.06 RRT units. Late-eluting target analytes usually have much better agreement.

7.3.7 Linearity of target analytes - If the RSD of any target analytes is 15% or less, then the relative response factor is assumed to be constant over the calibration range, and the average relative response factor may be used for quantitation (Sec. 7.6.2).

7.3.7.1 If the RSD of any target analyte is greater than 15%, refer to Sec. 7.0 in Method 8000 for additional calibration options. One of the options must be applied to GC/MS calibration in this situation, or a new initial calibration must be performed.

NOTE: Method 8000 designates a linearity criterion of 20% RSD. That criterion pertains to GC and HPLC methods other than GC/MS. Method 8270 requires 15% RSD as evidence of sufficient linearity to employ an average response factor.

7.3.7.2 When the RSD exceeds 15%, the plotting and visual inspection of a calibration curve can be a useful diagnostic tool. The inspection may indicate analytical problems, including errors in standard preparation, the presence of active sites in the chromatographic system, analytes that exhibit poor chromatographic behavior, etc.

7.4 GC/MS calibration verification - Calibration verification consists of three steps that are performed at the beginning of each 12-hour analytical shift.

7.4.1 Prior to the analysis of samples or calibration standards, inject 50 ng of the DFTPP standard into the GC/MS system. The resultant mass spectrum for DFTPP must meet the criteria given in Table 3 before sample analysis begins. These criteria must be demonstrated each 12-hour shift during which samples are analyzed.

7.4.2 The initial calibration (Sec. 7.3) for each compound of interest should be verified once every 12 hours prior to sample analysis, using the introduction technique and conditions used for samples. This is accomplished by analyzing a calibration standard at a concentration near the midpoint concentration for the calibrating range of the GC/MS. The results from the calibration standard analysis should meet the verification acceptance criteria provided in Secs. 7.4.4 through 7.4.7.

NOTE: The DFTPP and calibration verification standard may be combined into a single standard as long as both tuning and calibration verification acceptance criteria for the project can be met without interferences.

7.4.3 A method blank should be analyzed after the calibration standard, or at any other time during the analytical shift, to ensure that the total system (introduction device, transfer lines and GC/MS system) is free of contaminants. If the method blank indicates contamination, then it may be appropriate to analyze a solvent blank to demonstrate that the contamination is not a result of carryover from standards or samples. See Sec. 8.0 of Method 8000B for method blank performance criteria.

7.4.4 System performance check compounds (SPCCs)

7.4.4.1 A system performance check must be made during every 12-hour analytical shift. Each SPCC in the calibration verification standard must meet a minimum response factor of 0.050. This is the same check that is applied during the initial calibration.

7.4.4.2 If the minimum response factors are not met, the system must be evaluated, and corrective action must be taken before sample analysis begins. Possible problems include standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, and active sites in the column or chromatographic system. This check must be met before sample analysis begins.

7.4.5 Calibration check compounds (CCCs)

7.4.5.1 After the system performance check is met, the CCCs listed in Table 4 are used to check the validity of the initial calibration. Use percent difference when performing the average response factor model calibration. Use percent drift when calibrating using a regression fit model. Refer to Sec. 7.0 of Method 8000 for guidance on calculating percent difference and drift.

7.4.5.2 If the percent difference for each CCC is less than or equal to 20%, then the initial calibration is assumed to be valid. If the criterion is not met (i.e., greater than 20% difference or drift) for any one CCC, then corrective action must be taken prior to the analysis of samples. If the CCCs are not included in the list of analytes for a project, and therefore not included in the calibration standards, then all analytes must meet the 20% difference or drift criterion.

7.4.5.3 Problems similar to those listed under SPCCs could affect the CCCs. If the problem cannot be corrected by other measures, a new initial calibration must be generated. The CCC criteria must be met before sample analysis begins.

7.4.6 *Internal standard retention time* - The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 30 seconds from that in the mid-point standard level of the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and corrections must be made, as required. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

7.4.7 Internal standard response - If the EICP area for any of the internal standards in the calibration verification standard changes by a factor of two (-50% to +100%) from that in the mid-point standard level of the most recent initial calibration sequence, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

7.5 GC/MS analysis of samples

7.5.1 It is highly recommended that sample extracts be screened on a GC/FID or GC/PID using the same type of capillary column used in the GC/MS system. This will minimize contamination of the GC/MS system from unexpectedly high concentrations of organic compounds.

7.5.2 Allow the sample extract to warm to room temperature. Just prior to analysis, add 10 µL of the internal standard solution to the 1-mL concentrated sample extract obtained from sample preparation.

7.5.3 Inject a 1-2 µL aliquot of the sample extract into the GC/MS system, using the same operating conditions that were used for the calibration (Sec. 7.3). The volume to be injected should contain 100 ng of base/neutral and 200 ng of acid surrogates (assuming 100% recovery), unless a more sensitive GC/MS system is being used and the surrogate solution is less concentrated then that listed in Sec. 5.7. The injection volume must be the same volume used for the calibration standards.

7.5.4 If the response for any quantitation ion exceeds the initial calibration range of the GC/MS system, the sample extract must be diluted and reanalyzed. Additional internal standard must be added to the diluted extract to maintain the same concentration as in the calibration standards (40 ng/µL, unless a more sensitive GC/MS system is being used).

NOTE: It may be a useful diagnostic tool to monitor internal standard retention times and responses (area counts) in all samples, spikes, blanks, and standards to effectively check drifting method performance, poor injection execution, and anticipate the need for system inspection and/or maintenance.

7.5.5 The use of selected ion monitoring (SIM) is acceptable for applications requiring detection limits below the normal range of electron impact mass spectrometry. However, SIM may provide a lesser degree of confidence in the compound identification unless multiple ions are monitored for each compound.

7.6 Qualitative analysis

7.6.1 The qualitative identification of compounds determined by this method is based on retention time and on comparison of the sample mass spectrum, after background correction, with characteristic ions in a reference mass spectrum. The reference mass spectrum must be generated by the laboratory using the conditions of this method. The characteristic ions from the reference mass spectrum are defined as the three ions of greatest relative intensity, or any ions over 30% relative intensity, if less than three such ions occur in the reference spectrum. Compounds are identified when the following criteria are met.

7.6.1.1 The intensities of the characteristic ions of a compound must maximize in the same scan or within one scan of each other. Selection of a peak by a data system target compound search routine where the search is based on the presence of a target chromatographic peak containing ions specific for the target compound at a compound-specific retention time will be accepted as meeting this criterion.

7.6.1.2 The RRT of the sample component is within ± 0.06 RRT units of the RRT of the standard component.

7.6.1.3 The relative intensities of the characteristic ions agree within 30% of the relative intensities of these ions in the reference spectrum. (Example: For an ion with an abundance of 50% in the reference spectrum, the corresponding abundance in a sample spectrum can range between 20% and 80%.)

7.6.1.4 Structural isomers that produce very similar mass spectra should be identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs. Diastereomeric pairs (e.g., Aramite and Isosafrol) that may be separable by the GC should be identified, quantitated and reported as the sum of both compounds by the GC.

7.6.1.5 Identification is hampered when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analyte. When gas chromatographic peaks obviously represent more than one sample component (i.e., a broadened peak with shoulder(s) or a valley between two or more maxima), appropriate selection of analyte spectra and background spectra is important.

7.6.1.6 Examination of extracted ion current profiles of appropriate ions can aid in the selection of spectra and in qualitative identification of compounds. When analytes coelute (i.e., only one chromatographic peak is apparent), the identification criteria may be met, but each analyte spectrum will contain extraneous ions contributed by the coeluting compound.

7.6.2 For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the analyses being conducted. Data system library search routines should not use normalization routines that would misrepresent the library or unknown spectra when compared to each other.

For example, the RCRA permit or waste delisting requirements may require the reporting of non-target analytes. Only after visual comparison of sample spectra with the nearest library searches may the analyst assign a tentative identification. Guidelines for tentative identification are:

(1) Relative intensities of major ions in the reference spectrum (ions > 10% of the most abundant ion) should be present in the sample spectrum.

(2) The relative intensities of the major ions should agree within ± 20%. (Example: For an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30 and 70%.)

(3) Molecular ions present in the reference spectrum should be present in the sample spectrum.

(4) Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.

(5) Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks. Data system library reduction programs can sometimes create these discrepancies.

7.7 Quantitative analysis

7.7.1 Once a compound has been identified, the quantitation of that compound will be based on the integrated abundance of the primary characteristic ion from the EICP.

7.7.2 If the RSD of a compound's response factor is 15% or less, then the concentration in the extract may be determined using the average response factor ($\overline{RF}$) from initial calibration data (Sec. 7.3.5). See Method 8000, Sec. 7.0, for the equations describing internal standard calibration and either linear or non-linear calibrations.

7.7.3 Where applicable, the concentration of any non-target analytes identified in the sample (Sec. 7.6.2) should be estimated. The same formulae should be used with the following modifications: The areas A_x and A_{is} should be from the total ion chromatograms, and the RF for the compound should be assumed to be 1.

7.7.4 The resulting concentration should be reported indicating: (1) that the value is an estimate, and (2) which internal standard was used to determine concentration. Use the nearest internal standard free of interferences.

7.7.5 Quantitation of multicomponent compounds (e.g., Toxaphene, Aroclors, etc.) is beyond the scope of Method 8270. Normally, quantitation is performed using a GC/ECD, by Methods 8081 or 8082. However, Method 8270 may be used to confirm the identification of these compounds, when the concentrations are at least 10 ng/µL in the concentrated sample extract.

7.7.6 Structural isomers that produce very similar mass spectra should be quantitated as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are quantitated as isomeric pairs. Diastereomeric pairs (e.g., Aramite and Isosafrol) that may be separable by the GC should be summed and reported as the sum of both compounds.

8.0 QUALITY CONTROL

8.1 Refer to Chapter One and Method 8000 for specific quality control (QC) procedures. Quality control procedures to ensure the proper operation of the various sample preparation and/or sample introduction techniques can be found in Method 3500. Each laboratory should maintain a formal quality assurance program. The laboratory should also maintain records to document the quality of the data generated.

8.2 Quality control procedures necessary to evaluate the GC system operation are found in Sec. 7.0 of Method 8000 and include calibration verification and chromatographic analysis of samples. In addition, instrument QC requirements may be found in the following sections of Method 8270:

8.2.1 The GC/MS system must be tuned to meet the DFTPP criteria listed in Secs. 7.3.1 and 7.4.1.

8.2.2 There must be an initial calibration of the GC/MS system as described in Sec. 7.3.

8.2.3 The GC/MS system must meet the calibration verification acceptance criteria in Sec. 7.4, each 12 hours.

8.2.4 The RRT of the sample component must fall within the RRT window of the standard component provided in Sec. 7.6.1.

8.3 Initial Demonstration of Proficiency - Each laboratory must demonstrate initial proficiency with each sample preparation and determinative method combination it utilizes, by generating data of acceptable accuracy and precision for target analytes in a clean matrix. The laboratory must also repeat the following operations whenever new staff are trained or significant changes in instrumentation are made. See Method 8000, Sec. 8.0 for information on how to accomplish this demonstration.

8.4 Sample Quality Control for Preparation and Analysis - The laboratory must also have procedures for documenting the effect of the matrix on method performance (precision, accuracy, and detection limit). At a minimum, this includes the analysis of QC samples including a method blank, matrix spike, a duplicate, and a laboratory control sample (LCS) in each analytical batch and the addition of surrogates to each field sample and QC sample.

8.4.1 Before processing any samples, the analyst should demonstrate, through the analysis of a method blank, that interferences from the analytical system, glassware, and reagents are under control. Each time a set of samples is analyzed or there is a change in reagents, a method blank should be analyzed as a safeguard against chronic laboratory contamination. The blanks should be carried through all stages of sample preparation and measurement.

8.4.2 Documenting the effect of the matrix should include the analysis of at least one matrix spike and one duplicate unspiked sample or one matrix spike/matrix spike duplicate pair. The decision on whether to prepare and analyze duplicate samples or a matrix spike/matrix spike duplicate must be based on a knowledge of the samples in the sample batch. If samples are expected to contain target analytes, then laboratories may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratories should use a matrix spike and matrix spike duplicate pair.

8.4.3 A Laboratory Control Sample (LCS) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike. When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

8.4.4 See Method 8000, Sec. 8.0 for the details on carrying out sample quality control procedures for preparation and analysis.

8.5 Surrogate recoveries - The laboratory must evaluate surrogate recovery data from individual samples versus the surrogate control limits developed by the laboratory. See Method 8000, Sec. 8.0 for information on evaluating surrogate data and developing and updating surrogate limits.

8.6 The experience of the analyst performing GC/MS analyses is invaluable to the success of the methods. Each day that analysis is performed, the calibration verification standard should be evaluated to determine if the chromatographic system is operating properly. Questions that should be asked are: Do the peaks look normal? Is the response obtained comparable to the response from previous calibrations? Careful examination of the standard chromatogram can indicate whether the column is still performing acceptably, the injector is leaking, the injector septum needs replacing, etc. If any changes are made to the system (e.g., the column changed, a septum is changed), see the guidance in Sec 8.2 of Method 8000 regarding whether recalibration of the system must take place.

8.7 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9.0 METHOD PERFORMANCE

9.1 Method 8250 (the packed column version of Method 8270) was tested by 15 laboratories using organic-free reagent water, drinking water, surface water, and industrial wastewaters spiked at six concentrations ranging from 5 to 1,300 µg/L. Single operator accuracy and precision, and method accuracy were found to be directly related to the concentration of the analyte and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 7. These values are presented as guidance only and are not intended as absolute acceptance criteria. Laboratories should generate their own acceptance criteria for capillary column method performance. (See Method 8000.)

9.2 Chromatograms from calibration standards analyzed with Day 0 and Day 7 samples were compared to detect possible deterioration of GC performance. These recoveries (using Method 3510 extraction) are presented in Table 8.

9.3 Method performance data (using Method 3541 Automated Soxhlet extraction) are presented in Table 9. Single laboratory accuracy and precision data were obtained for semivolatile organics in a clay soil by spiking at a concentration of 6 mg/kg for each compound. The spiking solution was mixed into the soil during addition and then allowed to equilibrate for approximately 1 hour prior to extraction. The spiked samples were then extracted by Method 3541 (Automated Soxhlet). Three determinations were performed and each extract was analyzed by gas chromatography/ mass spectrometry following Method 8270. The low recovery of the more volatile compounds is probably due to volatilization losses during equilibration. These data are listed in Table 10 and were taken from Reference 7.

9.4 Surrogate precision and accuracy data are presented in Table 11 from a field dynamic spiking study based on air sampling by Method 0010. The trapping media were prepared for analysis by Method 3542 and subsequently analyzed by Method 8270.

9.5 Single laboratory precision and bias data (using Method 3545 Accelerated Solvent Extraction) for semivolatile organic compounds are presented in Table 12. The samples were conditioned spiked samples prepared and certified by a commercial supplier that contained 57 semivolatile organics at three concentrations (250, 2500, and 12,500 µg/kg) on three types of soil (clay, loam and sand). Spiked samples were extracted both by the Dionex Accelerated Solvent Extraction system and by Perstorp Environmental Soxtec™ (automated Soxhlet). The data presented in Table 12 represents seven replicate extractions and analyses for each individual sample and were taken from reference 9. The average recoveries from the three matrices for all analytes and all replicates relative to the automated Soxhlet data are as follows: clay 96.8%, loam 98.7% and sand 102.1%. The average recoveries from the three concentrations also relative to the automated Soxhlet data are as follows: low-101.2%, mid-97.2% and high-99.2%.

9.6 Single laboratory precision and bias data (using Method 3561 SFE Extraction of PAHs with a variable restrictor and solid trapping material) were obtained for the method analytes by the extraction of two certified reference materials (one, EC-1, a lake sediment from Environment Canada and the other, HS-3, a marine sediment from the National Science and Engineering Research Council of Canada, both naturally-contaminated with PAHs). The SFE instrument used for these extractions was a Hewlett-Packard Model 7680. Analysis was by GC/MS. Average recoveries from six replicate extractions range from 85 to 148% (overall average of 100%) based on the certified value (or a Soxhlet value if a certified value was unavailable for a specific analyte) for the lake sediment. Average recoveries from three replicate extractions range from 73 to 133% (overall average of 92%) based on the certified value for the marine sediment. The data are found in Tables 13 and 14 and were taken from Reference 10.

9.7 Single laboratory precision and accuracy data (using Method 3561 SFE Extraction of PAHs with a fixed restrictor and liquid trapping) were obtained for twelve of the method analytes by the extraction of a certified reference material (a soil naturally contaminated with PAHs). The SFE instrument used for these extractions was a Dionex Model 703-M. Analysis was by GC/MS. Average recoveries from four replicate extractions range from 60 to 122% (overall average of 89%) based on the certified value. Following are the instrument conditions that were utilized to extract a 3.4 g sample: Pressure - 300 atm; Time - 60 min.; Extraction fluid - CO_2; Modifier - 10% 1:1 (v/v) methanol/methylene chloride; Oven temperature - 80°C; Restrictor temperature - 120°C; and, Trapping fluid - chloroform (methylene chloride has also been used). The data are found in Table 15 and were taken from Reference 11.

10.0 REFERENCES

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TABLE 1

CHARACTERISTIC IONS FOR SEMIVOLATILE COMPOUNDS

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
2-Picoline	3.75[a]	93	66,92
Aniline	5.68	93	66,65
Phenol	5.77	94	65,66
Bis(2-chloroethyl) ether	5.82	93	63,95
2-Chlorophenol	5.97	128	64,130
1,3-Dichlorobenzene	6.27	146	148,111
1,4-Dichlorobenzene-d_4 (IS)	6.35	152	150,115
1,4-Dichlorobenzene	6.40	146	148,111
Benzyl alcohol	6.78	108	79,77
1,2-Dichlorobenzene	6.85	146	148,111
N-Nitrosomethylethylamine	6.97	88	42,43,56
Bis(2-chloroisopropyl) ether	7.22	45	77,121
Ethyl carbamate	7.27	62	44,45,74
Thiophenol (Benzenethiol)	7.42	110	66,109,84
Methyl methanesulfonate	7.48	80	79,65,95
N-Nitrosodi-n-propylamine	7.55	70	42,101,130
Hexachloroethane	7.65	117	201,199
Maleic anhydride	7.65	54	98,53,44
Nitrobenzene	7.87	77	123,65
Isophorone	8.53	82	95,138
N-Nitrosodiethylamine	8.70	102	42,57,44,56
2-Nitrophenol	8.75	139	109,65
2,4-Dimethylphenol	9.03	122	107,121
p-Benzoquinone	9.13	108	54,82,80
Bis(2-chloroethoxy)methane	9.23	93	95,123
Benzoic acid	9.38	122	105,77
2,4-Dichlorophenol	9.48	162	164,98
Trimethyl phosphate	9.53	110	79,95,109,140
Ethyl methanesulfonate	9.62	79	109,97,45,65
1,2,4-Trichlorobenzene	9.67	180	182,145
Naphthalene-d_8 (IS)	9.75	136	68
Naphthalene	9.82	128	129,127
Hexachlorobutadiene	10.43	225	223,227
Tetraethyl pyrophosphate	11.07	99	155,127,81,109
Diethyl sulfate	11.37	139	45,59,99,111,125
4-Chloro-3-methylphenol	11.68	107	144,142
2-Methylnaphthalene	11.87	142	141
2-Methylphenol	12.40	107	108,77,79,90
Hexachloropropene	12.45	213	211,215,117,106,141
Hexachlorocyclopentadiene	12.60	237	235,272

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
N-Nitrosopyrrolidine	12.65	100	41,42,68,69
Acetophenone	12.67	105	71,51,120
4-Methylphenol	12.82	107	108,77,79,90
2,4,6-Trichlorophenol	12.85	196	198,200
o-Toluidine	12.87	106	107,77,51,79
3-Methylphenol	12.93	107	108,77,79,90
2-Chloronaphthalene	13.30	162	127,164
N-Nitrosopiperidine	13.55	114	42,55,56,41
1,4-Phenylenediamine	13.62	108	80,53,54,52
1-Chloronaphthalene	13.65[a]	162	127,164
2-Nitroaniline	13.75	65	92,138
5-Chloro-2-methylaniline	14.28	106	141,140,77,89
Dimethyl phthalate	14.48	163	194,164
Acenaphthylene	14.57	152	151,153
2,6-Dinitrotoluene	14.62	165	63,89
Phthalic anhydride	14.62	104	76,50,148
o-Anisidine	15.00	108	80,123,52
3-Nitroaniline	15.02	138	108,92
Acenaphthene-d$_{10}$ (IS)	15.05	164	162,160
Acenaphthene	15.13	154	153,152
2,4-Dinitrophenol	15.35	184	63,154
2,6-Dinitrophenol	15.47	162	164,126,98,63
4-Chloroaniline	15.50	127	129,65,92
Isosafrole	15.60	162	131,104,77,51
Dibenzofuran	15.63	168	139
2,4-Diaminotoluene	15.78	121	122,94,77,104
2,4-Dinitrotoluene	15.80	165	63,89
4-Nitrophenol	15.80	139	109,65
2-Naphthylamine	16.00[a]	143	115,116
1,4-Naphthoquinone	16.23	158	104,102,76,50,130
p-Cresidine	16.45	122	94,137,77,93
Dichlorovos	16.48	109	185,79,145
Diethyl phthalate	16.70	149	177,150
Fluorene	16.70	166	165,167
2,4,5-Trimethylaniline	16.70	120	135,134,91,77
N-Nitrosodi-n-butylamine	16.73	84	57,41,116,158
4-Chlorophenyl phenyl ether	16.78	204	206,141
Hydroquinone	16.93	110	81,53,55
4,6-Dinitro-2-methylphenol	17.05	198	51,105
Resorcinol	17.13	110	81,82,53,69
N-Nitrosodiphenylamine	17.17	169	168,167
Safrole	17.23	162	104,77,103,135

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Hexamethyl phosphoramide	17.33	135	44,179,92,42
3-(Chloromethyl)pyridine hydrochloride	17.50	92	127,129,65,39
Diphenylamine	17.54[a]	169	168,167
1,2,4,5-Tetrachlorobenzene	17.97	216	214,179,108,143,218
1-Naphthylamine	18.20	143	115,89,63
1-Acetyl-2-thiourea	18.22	118	43,42,76
4-Bromophenyl phenyl ether	18.27	248	250,141
Toluene diisocyanate	18.42	174	145,173,146,132,91
2,4,5-Trichlorophenol	18.47	196	198,97,132,99
Hexachlorobenzene	18.65	284	142,249
Nicotine	18.70	84	133,161,162
Pentachlorophenol	19.25	266	264,268
5-Nitro-o-toluidine	19.27	152	77,79,106,94
Thionazine	19.35	107	96,97,143,79,68
4-Nitroaniline	19.37	138	65,108,92,80,39
Phenanthrene-d_{10} (IS)	19.55	188	94,80
Phenanthrene	19.62	178	179,176
Anthracene	19.77	178	176,179
1,4-Dinitrobenzene	19.83	168	75,50,76,92,122
Mevinphos	19.90	127	192,109,67,164
Naled	20.03	109	145,147,301,79,189
1,3-Dinitrobenzene	20.18	168	76,50,75,92,122
Diallate (cis or trans)	20.57	86	234,43,70
1,2-Dinitrobenzene	20.58	168	50,63,74
Diallate (trans or cis)	20.78	86	234,43,70
Pentachlorobenzene	21.35	250	252,108,248,215,254
5-Nitro-o-anisidine	21.50	168	79,52,138,153,77
Pentachloronitrobenzene	21.72	237	142,214,249,295,265
4-Nitroquinoline-1-oxide	21.73	174	101,128,75,116
Di-n-butyl phthalate	21.78	149	150,104
2,3,4,6-Tetrachlorophenol	21.88	232	131,230,166,234,168
Dihydrosaffrole	22.42	135	64,77
Demeton-O	22.72	88	89,60,61,115,171
Fluoranthene	23.33	202	101,203
1,3,5-Trinitrobenzene	23.68	75	74,213,120,91,63
Dicrotophos	23.82	127	67,72,109,193,237
Benzidine	23.87	184	92,185
Trifluralin	23.88	306	43,264,41,290
Bromoxynil	23.90	277	279,88,275,168
Pyrene	24.02	202	200,203
Monocrotophos	24.08	127	192,67,97,109
Phorate	24.10	75	121,97,93,260

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Sulfallate	24.23	188	88,72,60,44
Demeton-S	24.30	88	60,81,89,114,115
Phenacetin	24.33	108	180,179,109,137,80
Dimethoate	24.70	87	93,125,143,229
Phenobarbital	24.70	204	117,232,146,161
Carbofuran	24.90	164	149,131,122
Octamethyl pyrophosphoramide	24.95	135	44,199,286,153,243
4-Aminobiphenyl	25.08	169	168,170,115
Dioxathion	25.25	97	125,270,153
Terbufos	25.35	231	57,97,153,103
α,α-Dimethylphenylamine	25.43	58	91,65,134,42
Pronamide	25.48	173	175,145,109,147
Aminoazobenzene	25.72	197	92,120,65,77
Dichlone	25.77	191	163,226,228,135,193
Dinoseb	25.83	211	163,147,117,240
Disulfoton	25.83	88	97,89,142,186
Fluchloralin	25.88	306	63,326,328,264,65
Mexacarbate	26.02	165	150,134,164,222
4,4'-Oxydianiline	26.08	200	108,171,80,65
Butyl benzyl phthalate	26.43	149	91,206
4-Nitrobiphenyl	26.55	199	152,141,169,151
Phosphamidon	26.85	127	264,72,109,138
2-Cyclohexyl-4,6-Dinitrophenol	26.87	231	185,41,193,266
Methyl parathion	27.03	109	125,263,79,93
Carbaryl	27.17	144	115,116,201
Dimethylaminoazobenzene	27.50	225	120,77,105,148,42
Propylthiouracil	27.68	170	142,114,83
Benz(a)anthracene	27.83	228	229,226
Chrysene-d_{12} (IS)	27.88	240	120,236
3,3'-Dichlorobenzidine	27.88	252	254,126
Chrysene	27.97	228	226,229
Malathion	28.08	173	125,127,93,158
Kepone	28.18	272	274,237,178,143,270
Fenthion	28.37	278	125,109,169,153
Parathion	28.40	109	97,291,139,155
Anilazine	28.47	239	241,143,178,89
Bis(2-ethylhexyl) phthalate	28.47	149	167,279
3,3'-Dimethylbenzidine	28.55	212	106,196,180
Carbophenothion	28.58	157	97,121,342,159,199
5-Nitroacenaphthene	28.73	199	152,169,141,115
Methapyrilene	28.77	97	50,191,71
Isodrin	28.95	193	66,195,263,265,147

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Captan	29.47	79	149,77,119,117
Chlorfenvinphos	29.53	267	269,323,325,295
Crotoxyphos	29.73	127	105,193,166
Phosmet	30.03	160	77,93,317,76
EPN	30.11	157	169,185,141,323
Tetrachlorvinphos	30.27	329	109,331,79,333
Di-n-octyl phthalate	30.48	149	167,43
2-Aminoanthraquinone	30.63	223	167,195
Barban	30.83	222	51,87,224,257,153
Aramite	30.92	185	191,319,334,197,321
Benzo(b)fluoranthene	31.45	252	253,125
Nitrofen	31.48	283	285,202,139,253
Benzo(k)fluoranthene	31.55	252	253,125
Chlorobenzilate	31.77	251	139,253,111,141
Fensulfothion	31.87	293	97,308,125,292
Ethion	32.08	231	97,153,125,121
Diethylstilbestrol	32.15	268	145,107,239,121,159
Famphur	32.67	218	125,93,109,217
Tri-p-tolyl phosphate[b]	32.75	368	367,107,165,198
Benzo(a)pyrene	32.80	252	253,125
Perylene-d_{12} (IS)	33.05	264	260,265
7,12-Dimethylbenz(a)anthracene	33.25	256	241,239,120
5,5-Diphenylhydantoin	33.40	180	104,252,223,209
Captafol	33.47	79	77,80,107
Dinocap	33.47	69	41,39
Methoxychlor	33.55	227	228,152,114,274,212
2-Acetylaminofluorene	33.58	181	180,223,152
4,4'-Methylenebis(2-chloroaniline)	34.38	231	266,268,140,195
3,3'-Dimethoxybenzidine	34.47	244	201,229
3-Methylcholanthrene	35.07	268	252,253,126,134,113
Phosalone	35.23	182	184,367,121,379
Azinphos-methyl	35.25	160	132,93,104,105
Leptophos	35.28	171	377,375,77,155,379
Mirex	35.43	272	237,274,270,239,235
Tris(2,3-dibromopropyl) phosphate	35.68	201	137,119,217,219,199
Dibenz(a,j)acridine	36.40	279	280,277,250
Mestranol	36.48	277	310,174,147,242
Coumaphos	37.08	362	226,210,364,97,109
Indeno(1,2,3-cd)pyrene	39.52	276	138,227
Dibenz(a,h)anthracene	39.82	278	139,279
Benzo(g,h,i)perylene	41.43	276	138,277
1,2:4,5-Dibenzopyrene	41.60	302	151,150,300

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Strychnine	45.15	334	334,335,333
Piperonyl sulfoxide	46.43	162	135,105,77
Hexachlorophene	47.98	196	198,209,211,406,408
Aldrin	--	66	263,220
Aroclor 1016	--	222	260,292
Aroclor 1221	--	190	224,260
Aroclor 1232	--	190	224,260
Aroclor 1242	--	222	256,292
Aroclor 1248	--	292	362,326
Aroclor 1254	--	292	362,326
Aroclor 1260	--	360	362,394
α-BHC	--	183	181,109
β-BHC	--	181	183,109
δ-BHC	--	183	181,109
γ-BHC (Lindane)	--	183	181,109
4,4'-DDD	--	235	237,165
4,4'-DDE	--	246	248,176
4,4'-DDT	--	235	237,165
Dieldrin	--	79	263,279
1,2-Diphenylhydrazine	--	77	105,182
Endosulfan I	--	195	339,341
Endosulfan II	--	337	339,341
Endosulfan sulfate	--	272	387,422
Endrin	--	263	82,81
Endrin aldehyde	--	67	345,250
Endrin ketone	--	317	67,319
2-Fluorobiphenyl (surr)	--	172	171
2-Fluorophenol (surr)	--	112	64
Heptachlor	--	100	272,274
Heptachlor epoxide	--	353	355,351
Nitrobenzene-d_5 (surr)	--	82	128,54
N-Nitrosodimethylamine	--	42	74,44
Phenol-d_6 (surr)	--	99	42,71
Terphenyl-d_{14} (surr)	--	244	122,212
2,4,6-Tribromophenol (surr)	--	330	332,141
Toxaphene	--	159	231,233

IS = internal standard
surr = surrogate
[a] Estimated retention times
[b] Substitute for the non-specific mixture, tricresyl phosphate

TABLE 2

ESTIMATED QUANTITATION LIMITS (EQLs) FOR SEMIVOLATILE ORGANICS

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Estimated Quantitation Limits[a] Low Soil/Sediment[b] µg/kg
Acenaphthene	10	660
Acenaphthylene	10	660
Acetophenone	10	ND
2-Acetylaminofluorene	20	ND
1-Acetyl-2-thiourea	1000	ND
2-Aminoanthraquinone	20	ND
Aminoazobenzene	10	ND
4-Aminobiphenyl	20	ND
Anilazine	100	ND
o-Anisidine	10	ND
Anthracene	10	660
Aramite	20	ND
Azinphos-methyl	100	ND
Barban	200	ND
Benz(a)anthracene	10	660
Benzo(b)fluoranthene	10	660
Benzo(k)fluoranthene	10	660
Benzoic acid	50	3300
Benzo(g,h,i)perylene	10	660
Benzo(a)pyrene	10	660
p-Benzoquinone	10	ND
Benzyl alcohol	20	1300
Bis(2-chloroethoxy)methane	10	660
Bis(2-chloroethyl) ether	10	660
Bis(2-chloroisopropyl) ether	10	660
4-Bromophenyl phenyl ether	10	660
Bromoxynil	10	ND
Butyl benzyl phthalate	10	660
Captafol	20	ND
Captan	50	ND
Carbaryl	10	ND
Carbofuran	10	ND
Carbophenothion	10	ND
Chlorfenvinphos	20	ND
4-Chloroaniline	20	1300
Chlorobenzilate	10	ND
5-Chloro-2-methylaniline	10	ND
4-Chloro-3-methylphenol	20	1300
3-(Chloromethyl)pyridine hydrochloride	100	ND
2-Chloronaphthalene	10	660

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Estimated Quantitation Limits[a] Low Soil/Sediment[b] µg/kg
2-Chlorophenol	10	660
4-Chlorophenyl phenyl ether	10	660
Chrysene	10	660
Coumaphos	40	ND
p-Cresidine	10	ND
Crotoxyphos	20	ND
2-Cyclohexyl-4,6-dinitrophenol	100	ND
Demeton-O	10	ND
Demeton-S	10	ND
Diallate (cis or trans)	10	ND
Diallate (trans or cis)	10	ND
2,4-Diaminotoluene	20	ND
Dibenz(a,j)acridine	10	ND
Dibenz(a,h)anthracene	10	660
Dibenzofuran	10	660
Dibenzo(a,e)pyrene	10	ND
Di-n-butyl phthalate	10	ND
Dichlone	NA	ND
1,2-Dichlorobenzene	10	660
1,3-Dichlorobenzene	10	660
1,4-Dichlorobenzene	10	660
3,3'-Dichlorobenzidine	20	1300
2,4-Dichlorophenol	10	660
2,6-Dichlorophenol	10	ND
Dichlorovos	10	ND
Dicrotophos	10	ND
Diethyl phthalate	10	660
Diethylstilbestrol	20	ND
Diethyl sulfate	100	ND
Dimethoate	20	ND
3,3'-Dimethoxybenzidine	100	ND
Dimethylaminoazobenzene	10	ND
7,12-Dimethylbenz(a)anthracene	10	ND
3,3'-Dimethylbenzidine	10	ND
a,a-Dimethylphenethylamine	ND	ND
2,4-Dimethylphenol	10	660
Dimethyl phthalate	10	660
1,2-Dinitrobenzene	40	ND
1,3-Dinitrobenzene	20	ND
1,4-Dinitrobenzene	40	ND
4,6-Dinitro-2-methylphenol	50	3300
2,4-Dinitrophenol	50	3300

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	 Low Soil/Sediment[b] µg/kg
2,4-Dinitrotoluene	10	660
2,6-Dinitrotoluene	10	660
Dinocap	100	ND
Dinoseb	20	ND
5,5-Diphenylhydantoin	20	ND
Di-n-octyl phthalate	10	660
Disulfoton	10	ND
EPN	10	ND
Ethion	10	ND
Ethyl carbamate	50	ND
Bis(2-ethylhexyl) phthalate	10	660
Ethyl methanesulfonate	20	ND
Famphur	20	ND
Fensulfothion	40	ND
Fenthion	10	ND
Fluchloralin	20	ND
Fluoranthene	10	660
Fluorene	10	660
Hexachlorobenzene	10	660
Hexachlorobutadiene	10	660
Hexachlorocyclopentadiene	10	660
Hexachloroethane	10	660
Hexachlorophene	50	ND
Hexachloropropene	10	ND
Hexamethylphosphoramide	20	ND
Hydroquinone	ND	ND
Indeno(1,2,3-cd)pyrene	10	660
Isodrin	20	ND
Isophorone	10	660
Isosafrole	10	ND
Kepone	20	ND
Leptophos	10	ND
Malathion	50	ND
Maleic anhydride	NA	ND
Mestranol	20	ND
Methapyrilene	100	ND
Methoxychlor	10	ND
3-Methylcholanthrene	10	ND
4,4'-Methylenebis(2-chloroaniline)	NA	ND
Methyl methanesulfonate	10	ND
2-Methylnaphthalene	10	660
Methyl parathion	10	ND
2-Methylphenol	10	660
3-Methylphenol	10	ND

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	 Low Soil/Sediment[b] µg/kg
4-Methylphenol	10	660
Mevinphos	10	ND
Mexacarbate	20	ND
Mirex	10	ND
Monocrotophos	40	ND
Naled	20	ND
Naphthalene	10	660
1,4-Naphthoquinone	10	ND
1-Naphthylamine	10	ND
2-Naphthylamine	10	ND
Nicotine	20	ND
5-Nitroacenaphthene	10	ND
2-Nitroaniline	50	3300
3-Nitroaniline	50	3300
4-Nitroaniline	20	ND
5-Nitro-o-anisidine	10	ND
Nitrobenzene	10	660
4-Nitrobiphenyl	10	ND
Nitrofen	20	ND
2-Nitrophenol	10	660
4-Nitrophenol	50	3300
5-Nitro-o-toluidine	10	ND
4-Nitroquinoline-1-oxide	40	ND
N-Nitrosodi-n-butylamine	10	ND
N-Nitrosodiethylamine	20	ND
N-Nitrosodiphenylamine	10	660
N-Nitroso-di-n-propylamine	10	660
N-Nitrosopiperidine	20	ND
N-Nitrosopyrrolidine	40	ND
Octamethyl pyrophosphoramide	200	ND
4,4'-Oxydianiline	20	ND
Parathion	10	ND
Pentachlorobenzene	10	ND
Pentachloronitrobenzene	20	ND
Pentachlorophenol	50	3300
Phenacetin	20	ND
Phenanthrene	10	660
Phenobarbital	10	ND
Phenol	10	660
1,4-Phenylenediamine	10	ND
Phorate	10	ND
Phosalone	100	ND
Phosmet	40	ND
Phosphamidon	100	ND

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Low Soil/Sediment[b] µg/kg
Phthalic anhydride	100	ND
2-Picoline	ND	ND
Piperonyl sulfoxide	100	ND
Pronamide	10	ND
Propylthiouracil	100	ND
Pyrene	10	660
Pyridine	ND	ND
Resorcinol	100	ND
Safrole	10	ND
Strychnine	40	ND
Sulfallate	10	ND
Terbufos	20	ND
1,2,4,5-Tetrachlorobenzene	10	ND
2,3,4,6-Tetrachlorophenol	10	ND
Tetrachlorvinphos	20	ND
Tetraethyl pyrophosphate	40	ND
Thionazine	20	ND
Thiophenol (Benzenethiol)	20	ND
o-Toluidine	10	ND
1,2,4-Trichlorobenzene	10	660
2,4,5-Trichlorophenol	10	660
2,4,6-Trichlorophenol	10	660
Trifluralin	10	ND
2,4,5-Trimethylaniline	10	ND
Trimethyl phosphate	10	ND
1,3,5-Trinitrobenzene	10	ND
Tris(2,3-dibromopropyl) phosphate	200	ND
Tri-p-tolyl phosphate(h)	10	ND
O,O,O-Triethyl phosphorothioate	NT	ND

[a] Sample EQLs are highly matrix-dependent. The EQLs listed here are provided for guidance and may not always be achievable.

[b] EQLs listed for soil/sediment are based on wet weight. Normally, data are reported on a dry weight basis, therefore, EQLs will be higher based on the % dry weight of each sample. These EQLs are based on a 30-g sample and gel permeation chromatography cleanup.

ND = Not Determined
NA = Not Applicable
NT = Not Tested

Other Matrices	Factor[c]
High-concentration soil and sludges by ultrasonic extractor	7.5
Non-water miscible waste	75

[c] EQL = (EQL for Low Soil/Sediment given above in Table 2) x (Factor)

TABLE 3

DFTPP KEY IONS AND ION ABUNDANCE CRITERIA[a,b]

Mass	Ion Abundance Criteria
51	30-60% of mass 198
68	< 2% of mass 69
70	< 2% of mass 69
127	40-60% of mass 198
197	< 1% of mass 198
198	Base peak, 100% relative abundance
199	5-9% of mass 198
275	10-30% of mass 198
365	> 1% of mass 198
441	Present but less than mass 443
442	> 40% of mass 198
443	17-23% of mass 442

[a] Data taken from Reference 3.

[b] Alternate tuning criteria may be used, (e.g., CLP, Method 525, or manufacturers' instructions), provided that method performance is not adversely affected.

TABLE 4

CALIBRATION CHECK COMPOUNDS (CCC)

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol
Benzo(a)pyrene	

TABLE 5

SEMIVOLATILE INTERNAL STANDARDS WITH CORRESPONDING ANALYTES ASSIGNED FOR QUANTITATION

1,4-Dichlorobenzene-d_4	Naphthalene-d_8	Acenaphthene-d_{10}
Aniline	Acetophenone	Acenaphthene
Benzyl alcohol	Benzoic acid	Acenaphthylene
Bis(2-chloroethyl) ether	Bis(2-chloroethoxy)methane	1-Chloronaphthalene
Bis(2-chloroisopropyl) ether	4-Chloroaniline	2-Chloronaphthalene
2-Chlorophenol	4-Chloro-3-methylphenol	4-Chlorophenyl phenyl ether
1,3-Dichlorobenzene	2,4-Dichlorophenol	Dibenzofuran
1,4-Dichlorobenzene	2,6-Dichlorophenol	Diethyl phthalate
1,2-Dichlorobenzene	α,α-Dimethylphenethylamine	Dimethyl phthalate
Ethyl methanesulfonate	2,4-Dimethylphenol	2,4-Dinitrophenol
2-Fluorophenol (surr)	Hexachlorobutadiene	2,4-Dinitrotoluene
Hexachloroethane	Isophorone	2,6-Dinitrotoluene
Methyl methanesulfonate	2-Methylnaphthalene	Fluorene
2-Methylphenol	Naphthalene	2-Fluorobiphenyl (surr)
4-Methylphenol	Nitrobenzene	Hexachlorocyclopentadiene
N-Nitrosodimethylamine	Nitrobenzene-d_8 (surr)	1-Naphthylamine
N-Nitroso-di-n-propylamine	2-Nitrophenol	2-Naphthylamine
Phenol	N-Nitrosodi-n-butylamine	2-Nitroaniline
Phenol-d_6 (surr)	N-Nitrosopiperidine	3-Nitroaniline
2-Picoline	1,2,4-Trichlorobenzene	4-Nitroaniline
		4-Nitrophenol
		Pentachlorobenzene
		1,2,4,5-Tetrachlorobenzene
		2,3,4,6-Tetrachlorophenol
		2,4,6-Tribromophenol (surr)
		2,4,6-Trichlorophenol
		2,4,5-Trichlorophenol

(surr) = surrogate

TABLE 5
(continued)

Phenanthrene-d_{10}	Chrysene-d_{12}	Perylene-d_{12}
4-Aminobiphenyl	Benzidine	Benzo(b)fluoranthene
Anthracene	Benzo(a)anthracene	Benzo(k)fluoranthene
4-Bromophenyl phenyl ether	Bis(2-ethylhexyl) phthalate	Benzo(g,h,i)perylene
Di-n-butyl phthalate	Butyl benzyl phthalate	Benzo(a)pyrene
4,6-Dinitro-2-methylphenol	Chrysene	Dibenz(a,j)acridine
Diphenylamine	3,3'-Dichlorobenzidine	Dibenz(a,h)anthracene
Fluoranthene	p-Dimethylaminoazobenzene	
Hexachlorobenzene	Pyrene	
N-Nitrosodiphenylamine	Terphenyl-d_{14} (surr)	
Pentachlorophenol	7,12-Dimethylbenz(a)anthracene	
Pentachloronitrobenzene	Di-n-octyl phthalate	
Phenacetin	Indeno(1,2,3-cd)pyrene	
Phenanthrene	3-Methylcholanthrene	
Pronamide		

(surr) = surrogate

TABLE 6

MULTILABORATORY PERFORMANCE DATA[a]

Compound	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{x}$ (µg/L)	Range p, p_s (%)
Acenaphthene	100	27.6	60.1-132.3	47-145
Acenaphthylene	100	40.2	53.5-126.0	33-145
Aldrin	100	39.0	7.2-152.2	D-166
Anthracene	100	32.0	43.4-118.0	27-133
Benz(a)anthracene	100	27.6	41.8-133.0	33-143
Benzo(b)fluoranthene	100	38.8	42.0-140.4	24-159
Benzo(k)fluoranthene	100	32.3	25.2-145.7	11-162
Benzo(a)pyrene	100	39.0	31.7-148.0	17-163
Benzo(g,h,i)perylene	100	58.9	D-195.0	D-219
Benzyl butyl phthalate	100	23.4	D-139.9	D-152
β-BHC	100	31.5	41.5-130.6	24-149
δ-BHC	100	21.6	D-100.0	D-110
Bis(2-chloroethyl) ether	100	55.0	42.9-126.0	12-158
Bis(2-chloroethoxy)methane	100	34.5	49.2-164.7	33-184
Bis(2-chloroisopropyl) ether	100	46.3	62.8-138.6	36-166
Bis(2-ethylhexyl) phthalate	100	41.1	28.9-136.8	8-158
4-Bromophenyl phenyl ether	100	23.0	64.9-114.4	53-127
2-Chloronaphthalene	100	13.0	64.5-113.5	60-118
4-Chlorophenyl phenyl ether	100	33.4	38.4-144.7	25-158
Chrysene	100	48.3	44.1-139.9	17-168
4,4'-DDD	100	31.0	D-134.5	D-145
4,4'-DDE	100	32.0	19.2-119.7	4-136
4,4'-DDT	100	61.6	D-170.6	D-203
Dibenzo(a,h)anthracene	100	70.0	D-199.7	D-227
Di-n-butyl phthalate	100	16.7	8.4-111.0	1-118
1,2-Dichlorobenzene	100	30.9	48.6-112.0	32-129
1,3-Dichlorobenzene	100	41.7	16.7-153.9	D-172
1,4-Dichlorobenzene	100	32.1	37.3-105.7	20-124
3,3'-Dichlorobenzidine	100	71.4	8.2-212.5	D-262
Dieldrin	100	30.7	44.3-119.3	29-136
Diethyl phthalate	100	26.5	D-100.0	D-114
Dimethyl phthalate	100	23.2	D-100.0	D-112
2,4-Dinitrotoluene	100	21.8	47.5-126.9	39-139
2,6-Dinitrotoluene	100	29.6	68.1-136.7	50-158
Di-n-octyl phthalate	100	31.4	18.6-131.8	4-146
Endosulfan sulfate	100	16.7	D-103.5	D-107
Endrin aldehyde	100	32.5	D-188.8	D-209
Fluoranthene	100	32.8	42.9-121.3	26-137
Fluorene	100	20.7	71.6-108.4	59-121
Heptachlor	100	37.2	D-172.2	D-192

TABLE 6
(continued)

Compound	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{x}$ (µg/L)	Range p, p_s (%)
Heptachlor epoxide	100	54.7	70.9-109.4	26.155
Hexachlorobenzene	100	24.9	7.8-141.5	D-152
Hexachlorobutadiene	100	26.3	37.8-102.2	24-116
Hexachloroethane	100	24.5	55.2-100.0	40-113
Indeno(1,2,3-cd)pyrene	100	44.6	D-150.9	D-171
Isophorone	100	63.3	46.6-180.2	21-196
Naphthalene	100	30.1	35.6-119.6	21-133
Nitrobenzene	100	39.3	54.3-157.6	35-180
N-Nitrosodi-n-propylamine	100	55.4	13.6-197.9	D-230
Aroclor 1260	100	54.2	19.3-121.0	D-164
Phenanthrene	100	20.6	65.2-108.7	54-120
Pyrene	100	25.2	69.6-100.0	52-115
1,2,4-Trichlorobenzene	100	28.1	57.3-129.2	44-142
4-Chloro-3-methylphenol	100	37.2	40.8-127.9	22-147
2-Chlorophenol	100	28.7	36.2-120.4	23-134
2,4-Chlorophenol	100	26.4	52.5-121.7	39-135
2,4-Dimethylphenol	100	26.1	41.8-109.0	32-119
2,4-Dinitrophenol	100	49.8	D-172.9	D-191
2-Methyl-4,6-dinitrophenol	100	93.2	53.0-100.0	D-181
2-Nitrophenol	100	35.2	45.0-166.7	29-182
4-Nitrophenol	100	47.2	13.0-106.5	D-132
Pentachlorophenol	100	48.9	38.1-151.8	14-176
Phenol	100	22.6	16.6-100.0	5-112
2,4,6-Trichlorophenol	100	31.7	52.4-129.2	37-144

s = Standard deviation of four recovery measurements, in µg/L

$\bar{x}$ = Average recovery for four recovery measurements, in µg/L

p, p_s = Measured percent recovery

D = Detected; result must be greater than zero

[a] Criteria from 40 CFR Part 136 for Method 625, using a packed GC column. These criteria are based directly on the method performance data in Table 7. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 7. These values are for guidance only. Appropriate derivation of acceptance criteria for capillary columns should result in much narrower ranges. See Method 8000 for information on developing and updating acceptance criteria for method performance.

TABLE 7

METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION[a]

Compound	Accuracy, as recovery, x' (µg/L)	Single analyst precision, s_r' (µg/L)	Overall precision, S' (µg/L)
Acenaphthene	0.96C+0.19	$0.15\bar{x}-0.12$	$0.21\bar{x}-0.67$
Acenaphthylene	0.89C+0.74	$0.24\bar{x}-1.06$	$0.26\bar{x}-0.54$
Aldrin	0.78C+1.66	$0.27\bar{x}-1.28$	$0.43\bar{x}+1.13$
Anthracene	0.80C+0.68	$0.21\bar{x}-0.32$	$0.27\bar{x}-0.64$
Benz(a)anthracene	0.88C-0.60	$0.15\bar{x}+0.93$	$0.26\bar{x}-0.21$
Benzo(b)fluoranthene	0.93C-1.80	$0.22\bar{x}+0.43$	$0.29\bar{x}+0.96$
Benzo(k)fluoranthene	0.87C-1.56	$0.19\bar{x}+1.03$	$0.35\bar{x}+0.40$
Benzo(a)pyrene	0.90C-0.13	$0.22\bar{x}+0.48$	$0.32\bar{x}+1.35$
Benzo(g,h,i)perylene	0.98C-0.86	$0.29\bar{x}+2.40$	$0.51\bar{x}-0.44$
Benzyl butyl phthalate	0.66C-1.68	$0.18\bar{x}+0.94$	$0.53\bar{x}+0.92$
β-BHC	0.87C-0.94	$0.20\bar{x}-0.58$	$0.30\bar{x}+1.94$
δ-BHC	0.29C-1.09	$0.34\bar{x}+0.86$	$0.93\bar{x}-0.17$
Bis(2-chloroethyl) ether	0.86C-1.54	$0.35\bar{x}-0.99$	$0.35\bar{x}+0.10$
Bis(2-chloroethoxy)methane	1.12C-5.04	$0.16\bar{x}+1.34$	$0.26\bar{x}+2.01$
Bis(2-chloroisopropyl) ether	1.03C-2.31	$0.24\bar{x}+0.28$	$0.25\bar{x}+1.04$
Bis(2-ethylhexyl) phthalate	0.84C-1.18	$0.26\bar{x}+0.73$	$0.36\bar{x}+0.67$
4-Bromophenyl phenyl ether	0.91C-1.34	$0.13\bar{x}+0.66$	$0.16\bar{x}+0.66$
2-Chloronaphthalene	0.89C+0.01	$0.07\bar{x}+0.52$	$0.13\bar{x}+0.34$
4-Chlorophenyl phenyl ether	0.91C+0.53	$0.20\bar{x}-0.94$	$0.30\bar{x}-0.46$
Chrysene	0.93C-1.00	$0.28\bar{x}+0.13$	$0.33\bar{x}-0.09$
4,4'-DDD	0.56C-0.40	$0.29\bar{x}-0.32$	$0.66\bar{x}-0.96$
4,4'-DDE	0.70C-0.54	$0.26\bar{x}-1.17$	$0.39\bar{x}-1.04$
4,4'-DDT	0.79C-3.28	$0.42\bar{x}+0.19$	$0.65\bar{x}-0.58$
Dibenzo(a,h)anthracene	0.88C+4.72	$0.30\bar{x}+8.51$	$0.59\bar{x}+0.25$
Di-n-butyl phthalate	0.59C+0.71	$0.13\bar{x}+1.16$	$0.39\bar{x}+0.60$
1,2-Dichlorobenzene	0.80C+0.28	$0.20\bar{x}+0.47$	$0.24\bar{x}+0.39$
1,3-Dichlorobenzene	0.86C-0.70	$0.25\bar{x}+0.68$	$0.41\bar{x}+0.11$
1,4-Dichlorobenzene	0.73C-1.47	$0.24\bar{x}+0.23$	$0.29\bar{x}+0.36$
3,3'-Dichlorobenzidine	1.23C-12.65	$0.28\bar{x}+7.33$	$0.47\bar{x}+3.45$
Dieldrin	0.82C-0.16	$0.20\bar{x}-0.16$	$0.26\bar{x}-0.07$
Diethyl phthalate	0.43C+1.00	$0.28\bar{x}+1.44$	$0.52\bar{x}+0.22$
Dimethyl phthalate	0.20C+1.03	$0.54\bar{x}+0.19$	$1.05\bar{x}-0.92$
2,4-Dinitrotoluene	0.92C-4.81	$0.12\bar{x}+1.06$	$0.21\bar{x}+1.50$
2,6-Dinitrotoluene	1.06C-3.60	$0.14\bar{x}+1.26$	$0.19\bar{x}+0.35$
Di-n-octyl phthalate	0.76C-0.79	$0.21\bar{x}+1.19$	$0.37\bar{x}+1.19$
Endosulfan sulfate	0.39C+0.41	$0.12\bar{x}+2.47$	$0.63\bar{x}-1.03$
Endrin aldehyde	0.76C-3.86	$0.18\bar{x}+3.91$	$0.73\bar{x}-0.62$
Fluoranthene	0.81C+1.10	$0.22\bar{x}-0.73$	$0.28\bar{x}-0.60$
Fluorene	0.90C-0.00	$0.12\bar{x}+0.26$	$0.13\bar{x}+0.61$
Heptachlor	0.87C-2.97	$0.24\bar{x}-0.56$	$0.50\bar{x}-0.23$
Heptachlor epoxide	0.92C-1.87	$0.33\bar{x}-0.46$	$0.28\bar{x}+0.64$

TABLE 7
(continued)

Compound	Accuracy, as recovery, x' (μg/L)	Single analyst precision, s_r' (μg/L)	Overall precision, S' (μg/L)
Hexachlorobenzene	0.74C+0.66	$0.18\bar{x}-0.10$	$0.43\bar{x}-0.52$
Hexachlorobutadiene	0.71C-1.01	$0.19\bar{x}+0.92$	$0.26\bar{x}+0.49$
Hexachloroethane	0.73C-0.83	$0.17\bar{x}+0.67$	$0.17\bar{x}+0.80$
Indeno(1,2,3-cd)pyrene	0.78C-3.10	$0.29\bar{x}+1.46$	$0.50\bar{x}-0.44$
Isophorone	1.12C+1.41	$0.27\bar{x}+0.77$	$0.33\bar{x}+0.26$
Naphthalene	0.76C+1.58	$0.21\bar{x}-0.41$	$0.30\bar{x}-0.68$
Nitrobenzene	1.09C-3.05	$0.19\bar{x}+0.92$	$0.27\bar{x}+0.21$
N-Nitrosodi-n-propylamine	1.12C-6.22	$0.27\bar{x}+0.68$	$0.44\bar{x}+0.47$
Aroclor 1260	0.81C-10.86	$0.35\bar{x}+3.61$	$0.43\bar{x}+1.82$
Phenanthrene	0.87C+0.06	$0.12\bar{x}+0.57$	$0.15\bar{x}+0.25$
Pyrene	0.84C-0.16	$0.16\bar{x}+0.06$	$0.15\bar{x}+0.31$
1,2,4-Trichlorobenzene	0.94C-0.79	$0.15\bar{x}+0.85$	$0.21\bar{x}+0.39$
4-Chloro-3-methylphenol	0.84C+0.35	$0.23\bar{x}+0.75$	$0.29\bar{x}+1.31$
2-Chlorophenol	0.78C+0.29	$0.18\bar{x}+1.46$	$0.28\bar{x}+0.97$
2,4-Dichlorophenol	0.87C-0.13	$0.15\bar{x}+1.25$	$0.21\bar{x}+1.28$
2,4-Dimethylphenol	0.71C+4.41	$0.16\bar{x}+1.21$	$0.22\bar{x}+1.31$
2,4-Dinitrophenol	0.81C-18.04	$0.38\bar{x}+2.36$	$0.42\bar{x}+26.29$
2-Methyl-4,6-dinitrophenol	1.04C-28.04	$0.10\bar{x}+42.29$	$0.26\bar{x}+23.10$
2-Nitrophenol	0.07C-1.15	$0.16\bar{x}+1.94$	$0.27\bar{x}+2.60$
4-Nitrophenol	0.61C-1.22	$0.38\bar{x}+2.57$	$0.44\bar{x}+3.24$
Pentachlorophenol	0.93C+1.99	$0.24\bar{x}+3.03$	$0.30\bar{x}+4.33$
Phenol	0.43C+1.26	$0.26\bar{x}+0.73$	$0.35\bar{x}+0.58$
2,4,6-Trichlorophenol	0.91C-0.18	$0.16\bar{x}+2.22$	$0.22\bar{x}+1.81$

x' = Expected recovery for one or more measurements of a sample containing a concentration of C, in μg/L.

s_r' = Expected single analyst standard deviation of measurements at an average concentration of $\bar{x}$, in μg/L.

S' = Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{x}$, in μg/L.

C = True value for the concentration, in μg/L.

$\bar{x}$ = Average recovery found for measurements of samples containing a concentration of C, in μg/L.

[a] Criteria from 40 CFR Part 136 for Method 625, using a packed GC column. These criteria are based directly on the method performance data in Table 7. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 7. These values are for guidance only. Appropriate derivation of acceptance criteria for capillary columns should result in much narrower ranges. See Method 8000 for information on developing and updating acceptance criteria for method performance.

TABLE 8

EXTRACTION EFFICIENCY AND AQUEOUS STABILITY RESULTS

Compound	Percent Recovery on Day 0		Percent Recovery on Day 7	
	Mean	RSD	Mean	RSD
3-Amino-9-ethylcarbazole	80	8	73	3
4-Chloro-1,2-phenylenediamine	91	1	108	4
4-Chloro-1,3-phenylenediamine	84	3	70	3
1,2-Dibromo-3-chloropropane	97	2	98	5
Dinoseb	99	3	97	6
Parathion	100	2	103	4
4,4'-Methylenebis(N,N-dimethylaniline)	108	4	90	4
5-Nitro-o-toluidine	99	10	93	4
2-Picoline	80	4	83	4
Tetraethyl dithiopyrophosphate	92	7	70	1

Data taken from Reference 6.

TABLE 9

MEAN PERCENT RECOVERIES AND PERCENT RSD VALUES FOR SEMIVOLATILE ORGANICS FROM SPIKED CLAY SOIL AND TOPSOIL BY AUTOMATED SOXHLET EXTRACTION (METHOD 3541) WITH HEXANE-ACETONE (1:1)[a]

Compound	Clay Soil Mean Recovery	Clay Soil RSD	Topsoil Mean Recovery	Topsoil RSD
1,3-Dichlorobenzene	0	--	0	--
1,2-Dichlorobenzene	0	--	0	--
Nitrobenzene	0	--	0	--
Benzal chloride	0	--	0	--
Benzotrichloride	0	--	0	--
4-Chloro-2-nitrotoluene	0	--	0	--
Hexachlorocyclopentadiene	4.1	15	7.8	23
2,4-Dichloronitrobenzene	35.2	7.6	21.2	15
3,4-Dichloronitrobenzene	34.9	15	20.4	11
Pentachlorobenzene	13.7	7.3	14.8	13
2,3,4,5-Tetrachloronitrobenzene	55.9	6.7	50.4	6.0
Benefin	62.6	4.8	62.7	2.9
alpha-BHC	58.2	7.3	54.8	4.8
Hexachlorobenzene	26.9	13	25.1	5.7
delta-BHC	95.8	4.6	99.2	1.3
Heptachlor	46.9	9.2	49.1	6.3
Aldrin	97.7	12	102	7.4
Isopropalin	102	4.3	105	2.3
Heptachlor epoxide	90.4	4.4	93.6	2.4
trans-Chlordane	90.1	4.5	95.0	2.3
Endosulfan I	96.3	4.4	101	2.2
Dieldrin	129	4.7	104	1.9
2,5-Dichlorophenyl-4-nitrophenyl ether	110	4.1	112	2.1
Endrin	102	4.5	106	3.7
Endosulfan II	104	4.1	105	0.4
p,p'-DDT	134	2.1	111	2.0
2,3,6-Trichlorophenyl-4'-nitrophenyl ether	110	4.8	110	2.8
2,3,4-Trichlorophenyl-4'-nitrophenyl ether	112	4.4	112	3.3
Mirex	104	5.3	108	2.2

[a] The operating conditions for the Soxtec apparatus were as follows: immersion time 45 min; extraction time 45 min; the sample size was 10 g; the spiking concentration was 500 ng/g, except for the surrogate compounds at 1000 ng/g, 2,5-Dichlorophenyl-4-nitrophenyl ether, 2,3,6-Trichlorophenyl-4-nitrophenyl ether, and 2,3,4-Trichlorophenyl-4-nitrophenyl ether at 1500 ng/g, Nitrobenzene at 2000 ng/g, and 1,3-Dichlorobenzene and 1,2-Dichlorobenzene at 5000 ng/g.

TABLE 10

SINGLE LABORATORY ACCURACY AND PRECISION DATA FOR THE EXTRACTION OF SEMIVOLATILE ORGANICS FROM SPIKED CLAY BY AUTOMATED SOXHLET (METHOD 3541)[a]

Compound	Mean Recovery	RSD
Phenol	47.8	5.6
Bis(2-chloroethyl)ether	25.4	13
2-Chlorophenol	42.7	4.3
Benzyl alcohol	55.9	7.2
2-Methylphenol	17.6	6.6
Bis(2-chloroisopropyl)ether	15.0	15
4-Methylphenol	23.4	6.7
N-Nitroso-di-n-propylamine	41.4	6.2
Nitrobenzene	28.2	7.7
Isophorone	56.1	4.2
2-Nitrophenol	36.0	6.5
2,4-Dimethylphenol	50.1	5.7
Benzoic acid	40.6	7.7
Bis(2-chloroethoxy)methane	44.1	3.0
2,4-Dichlorophenol	55.6	4.6
1,2,4-Trichlorobenzene	18.1	31
Naphthalene	26.2	15
4-Chloroaniline	55.7	12
4-Chloro-3-methylphenol	65.1	5.1
2-Methylnaphthalene	47.0	8.6
Hexachlorocyclopentadiene	19.3	19
2,4,6-Trichlorophenol	70.2	6.3
2,4,5-Trichlorophenol	26.8	2.9
2-Chloronaphthalene	61.2	6.0
2-Nitroaniline	73.8	6.0
Dimethyl phthalate	74.6	5.2
Acenaphthylene	71.6	5.7
3-Nitroaniline	77.6	5.3
Acenaphthene	79.2	4.0
2,4-Dinitrophenol	91.9	8.9
4-Nitrophenol	62.9	16
Dibenzofuran	82.1	5.9
2,4-Dinitrotoluene	84.2	5.4
2,6-Dinitrotoluene	68.3	5.8
Diethyl phthalate	74.9	5.4
4-Chlorophenyl-phenyl ether	67.2	3.2
Fluorene	82.1	3.4
4-Nitroaniline	79.0	7.9

TABLE 10
(continued)

Compound	Mean Recovery	RSD
4,6-Dinitro-2-methylphenol	63.4	6.8
N-Nitrosodiphenylamine	77.0	3.4
4-Bromophenyl-phenyl ether	62.4	3.0
Hexachlorobenzene	72.6	3.7
Pentachlorophenol	62.7	6.1
Phenanthrene	83.9	5.4
Anthracene	96.3	3.9
Di-n-butyl phthalate	78.3	40
Fluoranthene	87.7	6.9
Pyrene	102	0.8
Butyl benzyl phthalate	66.3	5.2
3,3'-Dichlorobenzidine	25.2	11
Benzo(a)anthracene	73.4	3.8
Bis(2-ethylhexyl) phthalate	77.2	4.8
Chrysene	76.2	4.4
Di-n-octyl phthalate	83.1	4.8
Benzo(b)fluoranthene	82.7	5.0
Benzo(k)fluoranthene	71.7	4.1
Benzo(a)pyrene	71.7	4.1
Indeno(1,2,3-cd)pyrene	72.2	4.3
Dibenzo(a,h)anthracene	66.7	6.3
Benzo(g,h,i)perylene	63.9	8.0
1,2-Dichlorobenzene	0	--
1,3-Dichlorobenzene	0	--
1,4-Dichlorobenzene	0	--
Hexachloroethane	0	--
Hexachlorobutadiene	0	--

[a] Number of determinations was three. The operating conditions for the Soxtec apparatus were as follows: immersion time 45 min; extraction time 45 min; the sample size was 10 g clay soil; the spike concentration was 6 mg/kg per compound. The sample was allowed to equilibrate 1 hour after spiking.

Data taken from Reference 7.

TABLE 11

PRECISION AND BIAS VALUES FOR METHOD 3542[1]

Compound	Mean Recovery	Standard Deviation	Relative Standard Deviation Percent
2-Fluorophenol	74.6	28.6	38.3
Phenol-d_5	77.8	27.7	35.6
Nitrobenzene-d_5	65.6	32.5	49.6
2-Fluorobiphenyl	75.9	30.3	39.9
2,4,6-Tribromophenol	67.0	34.0	50.7
Terphenyl-d_{14}	78.6	32.4	41.3

[1] The surrogate values shown in Table 11 represent mean recoveries for surrogates in all Method 0010 matrices in a field dynamic spiking study.

TABLE 12

ACCELERATED SOLVENT EXTRACTION (METHOD 3545) RECOVERY VALUES AS PERCENT OF SOXTEC™

COMPOUND	CLAY			LOAM			SAND			AVE
	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH	
Phenol	93.3	78.7	135.9	73.9	82.8	124.6	108.8	130.6	89.7	**102.0**
Bis(2-chloroethyl) ether	102.1	85.1	109.1	96.0	88.0	103.6	122.3	119.9	90.8	**101.9**
2-Chlorophenol	100.8	82.6	115.0	93.8	88.9	111.1	115.0	115.3	91.9	**101.6**
1,3-Dichlorobenzene	127.7	129.7	110.0	*364.2	129.9	119.0	*241.3	*163.7	107.1	**120.6**
1,4-Dichlorobenzene	127.9	127.0	110.5	*365.9	127.8	116.4	*309.6	*164.1	105.8	**119.2**
1,2-Dichlorobenzene	116.8	115.8	101.3	*159.2	113.4	105.5	*189.3	134.0	100.4	**112.5**
2-Methylphenol	98.9	82.1	119.7	87.6	89.4	111.0	133.2	128.0	92.1	**104.7**
Bis(2-chloroisopropyl)ether	109.4	71.5	108.0	81.8	81.0	88.6	118.1	148.3	94.8	**100.2**
o-Toluidine	100.0	89.7	117.2	100.0	*152.5	120.3	100.0	*199.5	102.7	**110.3**
N-Nitroso-di-n-propylamine	103.0	79.1	107.7	83.9	88.1	96.2	109.9	123.3	91.4	**98.1**
Hexachloroethane	97.1	125.1	111.0	*245.4	117.1	128.1	*566.7	147.9	103.7	**118.6**
Nitrobenzene	104.8	82.4	106.6	86.8	84.6	101.7	119.7	122.1	93.3	**100.2**
Isophorone	100.0	86.4	98.2	87.1	87.5	109.7	135.5	118.4	92.7	**101.7**
2,4-Dimethylphenol	100.0	104.5	140.0	100.0	114.4	123.1	100.0	*180.6	96.3	**109.8**
2-Nitrophenol	80.7	80.5	107.9	91.4	86.7	103.2	122.1	107.1	87.0	**96.3**
Bis(chloroethoxy)methane	94.4	80.6	94.7	86.5	84.4	99.6	130.6	110.7	93.2	**97.2**
2,4-Dichlorophenol	88.9	87.8	111.4	85.9	87.6	103.5	123.3	107.0	92.1	**98.6**
1,2,4-Trichlorobenzene	98.0	97.8	98.8	123.0	93.7	94.5	137.0	99.4	95.3	**104.2**
Naphthalene	101.7	97.2	123.6	113.2	102.9	129.5	*174.5	114.0	89.8	**106.1**
4-Chloroaniline	100.0	*150.2	*162.4	100.0	125.5	*263.6	100.0	*250.8	114.9	**108.1**
Hexachlorobutadiene	101.1	98.7	102.2	124.1	90.3	98.0	134.9	96.1	96.8	**104.7**
4-Chloro-3-methylphenol	90.4	80.2	114.7	79.0	85.2	109.8	131.6	116.2	90.1	**99.7**
2-Methylnaphthalene	93.2	89.9	94.6	104.1	92.2	105.9	146.2	99.1	93.3	**102.1**
Hexachlorocyclopentadiene	100.0	100.0	0.0	100.0	100.0	6.8	100.0	100.0	*238.3	**75.8**
2,4,6-Trichlorophenol	94.6	90.0	112.0	84.2	91.2	103.6	101.6	95.9	89.8	**95.9**
2,4,5-Trichlorophenol	84.4	91.9	109.6	96.1	80.7	103.6	108.9	83.9	87.9	**94.1**
2-Chloronaphthalene	100.0	91.3	93.6	97.6	93.4	98.3	106.8	93.0	92.0	**96.2**
2-Nitroaniline	90.0	83.4	97.4	71.3	88.4	89.9	112.1	113.3	87.7	**92.6**
2,6-Dinitrotoluene	83.1	90.6	91.6	86.4	90.6	90.3	104.3	84.7	90.9	**90.3**
Acenaphthylene	104.9	95.9	100.5	99.0	97.9	108.8	118.5	97.8	92.0	**101.7**
3-Nitroaniline	*224.0	115.6	97.6	100.0	111.8	107.8	0.0	111.7	99.0	**92.9**
Acenaphthene	102.1	92.6	97.6	97.2	96.9	104.4	114.2	92.0	89.0	**98.4**
4-Nitrophenol	0.0	93.2	121.5	18.1	87.1	116.6	69.1	90.5	84.5	**75.6**
2,4-Dinitrotoluene	73.9	91.9	100.2	84.7	93.8	98.9	100.9	84.3	87.3	**90.7**

TABLE 12 (cont.)

ACCELERATED SOLVENT EXTRACTION (METHOD 3545) RECOVERY VALUES AS PERCENT OF SOXTEC™

COMPOUND	CLAY			LOAM			SAND			AVE
	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH	
Dibenzofuran	89.5	91.7	109.3	98.5	92.2	111.4	113.8	92.7	90.4	**98.8**
4-Chlorophenyl phenyl ether	83.0	94.5	98.7	95.7	94.3	94.2	111.4	87.7	90.3	**94.4**
Fluorene	85.2	94.9	89.2	102.0	95.5	93.8	121.3	85.7	90.9	**95.4**
4-Nitroaniline	77.8	114.8	94.5	129.6	103.6	95.4	*154.1	89.3	87.5	**99.1**
N-Nitrosodiphenylamine	82.6	96.7	93.8	92.9	93.4	116.4	97.5	110.9	86.7	**96.8**
4-Bromophenyl phenyl ether	85.6	92.9	92.8	91.1	107.6	89.4	118.0	97.5	87.1	**95.8**
Hexachlorobenzene	95.4	91.7	92.3	95.4	93.6	83.7	106.8	94.3	90.0	**93.7**
Pentachlorophenol	68.2	85.9	107.7	53.2	89.8	88.1	96.6	59.8	81.3	**81.2**
Phenanthrene	92.1	93.7	93.3	100.0	97.8	113.3	124.4	101.0	89.9	**100.6**
Anthracene	101.6	95.0	93.5	92.5	101.8	118.4	123.0	94.5	90.6	**101.2**
Carbazole	94.4	99.3	96.6	105.5	96.7	111.4	115.7	83.2	88.9	**99.1**
Fluoranthene	109.9	101.4	94.3	111.6	96.6	109.6	123.2	85.4	92.7	**102.7**
Pyrene	106.5	105.8	107.6	116.7	90.7	127.5	103.4	95.5	93.2	**105.2**
3,3'-Dichlorobenzidine	100.0	*492.3	131.4	100.0	*217.6	*167.6	100.0	*748.8	100.0	**116.5**
Benzo(a)anthracene	98.1	107.0	98.4	119.3	98.6	104.0	105.0	93.4	89.3	**101.5**
Chrysene	100.0	108.5	100.2	116.8	93.0	117.0	106.7	93.6	90.2	**102.9**
Benzo(b)fluoranthene	106.6	109.9	75.6	121.7	100.7	93.9	106.9	81.9	93.6	**99.0**
Benzo(k)fluoranthene	102.4	105.2	88.4	125.5	99.4	95.1	144.7	89.2	78.1	**103.1**
Benzo(a)pyrene	107.9	105.5	80.8	122.3	97.7	104.6	101.7	86.2	92.0	**99.9**
Indeno(1,2,3-cd)pyrene	95.1	105.7	93.8	126.0	105.2	90.4	133.6	82.6	91.9	**102.7**
Dibenz(a,h)anthracene	85.0	102.6	82.0	118.8	100.7	91.9	142.3	71.0	93.1	**98.6**
Benzo(g,h,i)perylene	98.0	0.0	81.2	0.0	33.6	78.6	128.7	83.0	94.2	**66.4**
Average	**95.1**	**94.3**	**101.0**	**95.5**	**96.5**	**104.1**	**113.0**	**100.9**	**92.5**	

* Values greater than 150% were not used to determine the averages, but the 0% values were used.

TABLE 13

SINGLE LABORATORY ACCURACY AND PRECISION FOR THE EXTRACTION OF PAHs FROM A CERTIFIED REFERENCE SEDIMENT EC-1, USING METHOD 3561 (SFE - SOLID TRAP)

Compound	Certified Value (mg/kg)	SFE Value[a] (mg/kg)	Percent of Certified Value	SFE RSD
Naphthalene	(27.9)[b]	41.3 ± 3.6	(148)	8.7
Acenaphthylene	(0.8)	0.9 ± 0.1	(112)	11.1
Acenaphthene	(0.2)	0.2 ± 0.01	(100)	0.05
Fluorene	(15.3)	15.6 ± 1.8	(102)	11.5
Phenanthrene	15.8 ± 1.2	16.1 ± 1.8	102	11.2
Anthracene	(1.3)	1.1 ± 0.2	(88)	18.2
Fluoranthene	23.2 ± 2.0	24.1 ± 2.1	104	8.7
Pyrene	16.7 ± 2.0	17.2 ± 1.9	103	11.0
Benz(a)anthracene	8.7 ± 0.8	8.8 ± 1.0	101	11.4
Chrysene	(9.2)	7.9 ± 0.9	(86)	11.4
Benzo(b)fluoranthene	7.9 ± 0.9	8.5 ± 1.1	108	12.9
Benzo(k)fluoranthene	4.4 ± 0.5	4.1 ± 0.5	91	12.2
Benzo(a)pyrene	5.3 ± 0.7	5.1 ± 0.6	96	11.8
Indeno(1,2,3-cd)pyrene	5.7 ± 0.6	5.2 ± 0.6	91	11.5
Benzo(g,h,i)perylene	4.9 ± 0.7	4.3 ± 0.5	88	11.6
Dibenz(a,h)anthracene	(1.3)	1.1 ± 0.2	(85)	18.2

[a] Relative standard deviations for the SFE values are based on six replicate extractions.

[b] Values in parentheses were obtained from, or compared to, Soxhlet extraction results which were not certified.

Data are taken from Reference 10.

TABLE 14

SINGLE LABORATORY ACCURACY AND PRECISION FOR THE EXTRACTION OF PAHs FROM A CERTIFIED REFERENCE SEDIMENT HS-3, USING METHOD 3561 (SFE - SOLID TRAP)

Compound	Certified Value (mg/kg)	SFE Value[a] (mg/kg)	Percent of Certified Value	SFE RSD
Naphthalene	9.0 ± 0.7	7.4 ± 0.6	82	8.1
Acenaphthylene	0.3 ± 0.1	0.4 ± 0.1	133	25.0
Acenaphthene	4.5 ± 1.5	3.3 ± 0.3	73	9.0
Fluorene	13.6 ± 3.1	10.4 ± 1.3	77	12.5
Phenanthrene	85.0 ± 20.0	86.2 ± 9.5	101	11.0
Anthracene	13.4 ± 0.5	12.1 ± 1.5	90	12.4
Fluoranthene	60.0 ± 9.0	54.0 ± 6.1	90	11.3
Pyrene	39.0 ± 9.0	32.7 ± 3.7	84	11.3
Benz(a)anthracene	14.6 ± 2.0	12.1 ± 1.3	83	10.7
Chrysene	14.1 ± 2.0	12.0 ± 1.3	85	10.8
Benzo(b)fluoranthene	7.7 ± 1.2	8.4 ± 0.9	109	10.7
Benzo(k)fluoranthene	2.8 ± 2.0	3.2 ± 0.5	114	15.6
Benzo(a)pyrene	7.4 ± 3.6	6.6 ± 0.8	89	12.1
Indeno(1,2,3-cd)pyrene	5.0 ± 2.0	4.5 ± 0.6	90	13.3
Benzo(g,h,i)perylene	5.4 ± 1.3	4.4 ± 0.6	82	13.6
Dibenz(a,h)anthracene	1.3 ± 0.5	1.1 ± 0.3	85	27.3

[a] Relative standard deviations for the SFE values are based on three replicate extractions.

Data are taken from Reference 10.

TABLE 15

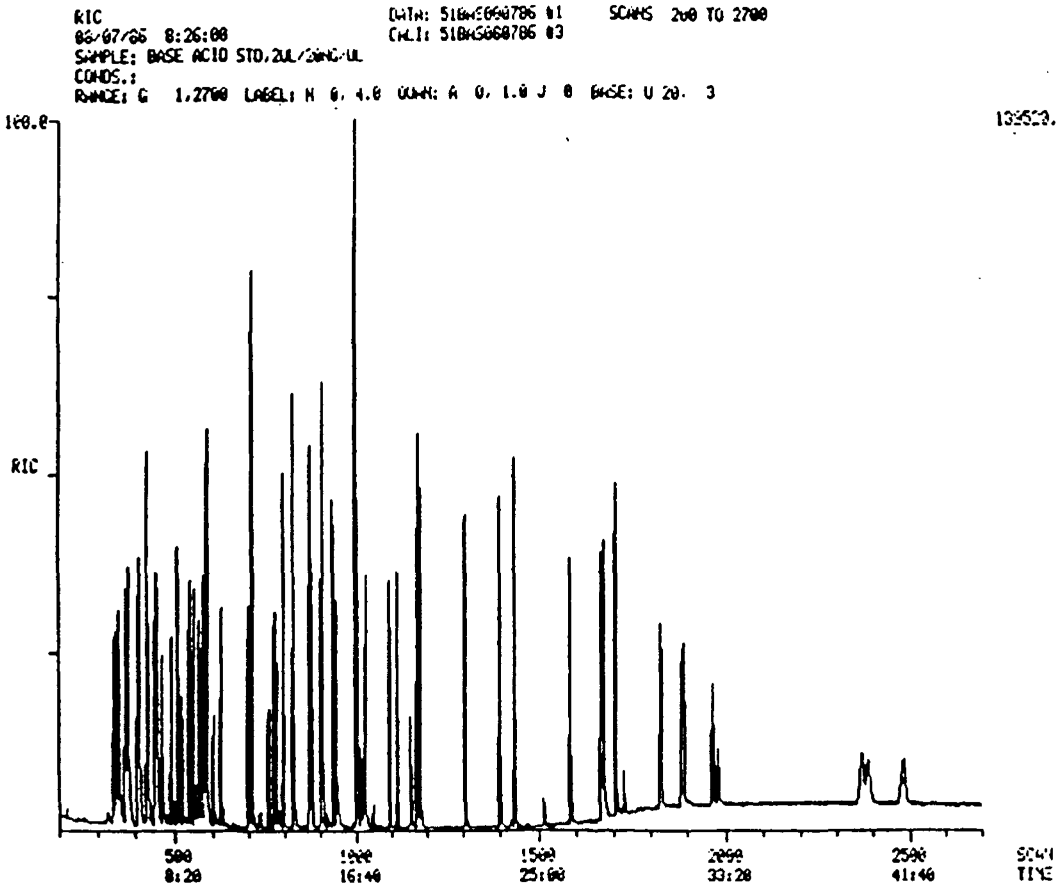
SINGLE LABORATORY ACCURACY AND PRECISION FOR THE EXTRACTION OF PAHs FROM A CERTIFIED REFERENCE SOIL SRS103-100, USING METHOD 3561 (SFE - LIQUID TRAP)

Compound	Certified Value (mg/kg)			SFE Value[a] (mg/kg)	Percent of Certified Value	SFE RSD
Naphthalene	32.4	±	8.2	29.55	91	10.5
2-Methylnaphthalene	62.1	±	11.5	76.13	122	2.0
Acenaphthene	632	±	105	577.28	91	2.9
Dibenzofuran	307	±	49	302.25	98	4.1
Fluorene	492	±	78	427.15	87	3.0
Phenanthrene	1618	±	340	1278.03	79	3.4
Anthracene	422	±	49	400.80	95	2.6
Fluoranthene	1280	±	220	1019.13	80	4.5
Pyrene	1033	±	285	911.82	88	3.1
Benz(a)anthracene	252	±	38	225.50	89	4.8
Chrysene	297	±	26	283.00	95	3.8
Benzo(b)fluoranthene + Benzo(k)fluoranthene	153	±	22	130.88	86	10.7
Benzo(a)pyrene	97.2	±	17.1	58.28	60	6.5

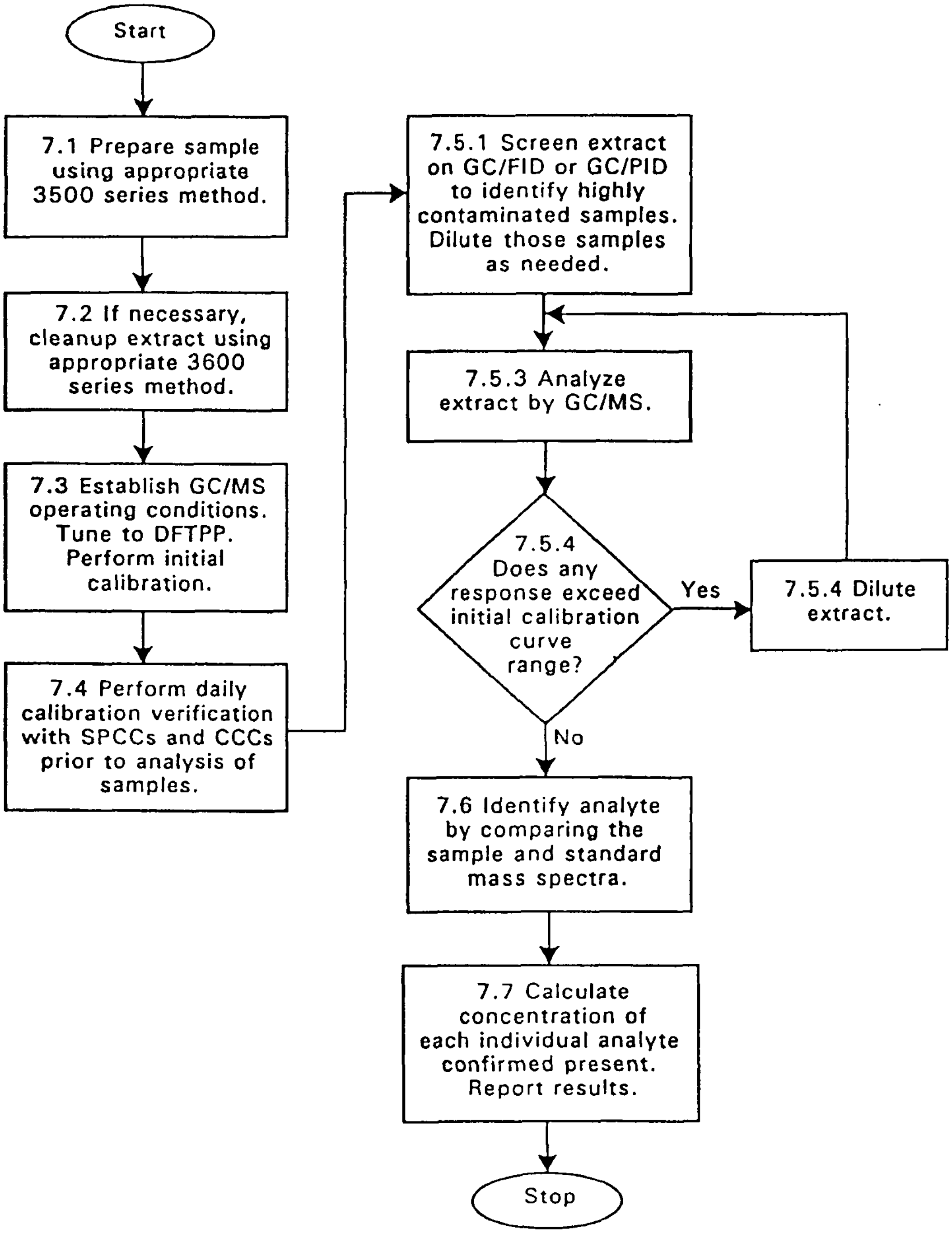
[a] Relative standard deviations for the SFE values are based on four replicate extractions.

Data are taken from Reference 11.

FIGURE 1
GAS CHROMATOGRAM OF BASE/NEUTRAL AND ACID CALIBRATION STANDARD



METHOD 8270C
SEMIVOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)



METHOD 7000A

ATOMIC ABSORPTION METHODS

1.0 SCOPE AND APPLICATION

1.1 Metals in solution may be readily determined by atomic absorption spectroscopy. The method is simple, rapid, and applicable to a large number of metals in drinking, surface, and saline waters and domestic and industrial wastes. While drinking water free of particulate matter may be analyzed directly, ground water, other aqueous samples, EP extracts, industrial wastes, soils, sludges, sediments, and other solid wastes require digestion prior to analysis for both total and acid leachable metals. Analysis for dissolved elements does not require digestion if the sample has been filtered and acidified.

1.2 Detection limits, sensitivity, and optimum ranges of the metals will vary with the matrices and models of atomic absorption spectrophotometers. The data shown in Table 1 provide some indication of the detection limits obtainable by direct aspiration and by furnace techniques. For clean aqueous samples, the detection limits shown in the table by direct aspiration may be extended downward with scale expansion and upward by using a less sensitive wavelength or by rotating the burner head. Detection limits by direct aspiration may also be extended through concentration of the sample and/or through solvent extraction techniques. For certain samples, lower concentrations may also be determined using the furnace techniques. The detection limits given in Table 1 are somewhat dependent on equipment (such as the type of spectrophotometer and furnace accessory, the energy source, the degree of electrical expansion of the output signal), and are greatly dependent on sample matrix. Detection limits should be established, empirically, for each matrix type analyzed. When using furnace techniques, however, the analyst should be cautioned as to possible chemical reactions occurring at elevated temperatures which may result in either suppression or enhancement of the analysis element. To ensure valid data with furnace techniques, the analyst must examine each matrix for interference effects (see Step 3.2.1) and, if detected, treat them accordingly, using either successive dilution, matrix modification, or method of standard additions (see Step 8.7).

1.3 Where direct-aspiration atomic absorption techniques do not provide adequate sensitivity, reference is made to specialized procedures (in addition to the furnace procedure) such as the gaseous-hydride method for arsenic and selenium and the cold-vapor technique for mercury.

2.0 SUMMARY OF METHOD

2.1 Although methods have been reported for the analysis of solids by atomic absorption spectroscopy, the technique generally is limited to metals in solution or solubilized through some form of sample processing.

2.2 Preliminary treatment of waste water, ground water, EP extracts, and industrial waste is always necessary because of the complexity and variability of sample matrix. Solids, slurries, and suspended material must be subjected to a solubilization process before analysis. This process may vary because of the metals to be determined and the nature of the sample being analyzed. Solubilization and digestion procedures are presented in Step 3.2 (Sample Preparation Methods).

2.3 In direct-aspiration atomic absorption spectroscopy, a sample is aspirated and atomized in a flame. A light beam from a hollow cathode lamp or an electrodeless discharge lamp is directed through the flame into a monochromator, and onto a detector that measures the amount of absorbed light. Absorption depends upon the presence of free unexcited ground-state atoms in the flame. Because the wavelength of the light beam is characteristic of only the metal being determined, the light energy absorbed by the flame is a measure of the concentration of that metal in the sample. This principle is the basis of atomic absorption spectroscopy.

2.4 When using the furnace technique in conjunction with an atomic absorption spectrophotometer, a representative aliquot of a sample is placed in the graphite tube in the furnace, evaporated to dryness, charred, and atomized. As a greater percentage of available analyte atoms is vaporized and dissociated for absorption in the tube rather than the flame, the use of smaller sample volumes or detection of lower concentrations of elements is possible. The principle is essentially the same as with direct aspiration atomic absorption, except that a furnace, rather than a flame, is used to atomize the sample. Radiation from a given excited element is passed through the vapor containing ground-state atoms of that element. The intensity of the transmitted radiation decreases in proportion to the amount of the ground-state element in the vapor. The metal atoms to be measured are placed in the beam of radiation by increasing the temperature of the furnace, thereby causing the injected specimen to be volatilized. A monochromator isolates the characteristic radiation from the hollow cathode lamp or electrodeless discharge lamp, and a photosensitive device measures the attenuated transmitted radiation.

3.0 INTERFERENCES

3.1 Direct aspiration

3.1.1 The most troublesome type of interference in atomic absorption spectrophotometry is usually termed "chemical" and is caused by lack of absorption of atoms bound in molecular combination in the flame. This phenomenon can occur when the flame is not sufficiently hot to dissociate the molecule, as in the case of phosphate interference with magnesium, or when the dissociated atom is immediately oxidized to a compound that will not dissociate further at the temperature of the flame. The addition of lanthanum will overcome phosphate interference in magnesium, calcium, and barium determinations. Similarly, silica interference in the determination of manganese can be eliminated by the addition of calcium.

3.1.2 Chemical interferences may also be eliminated by separating the metal from the interfering material. Although complexing agents are employed primarily to increase the sensitivity of the analysis, they may also be used to eliminate or reduce interferences.

3.1.3 The presence of high dissolved solids in the sample may result in an interference from nonatomic absorbance such as light scattering. If background correction is not available, a nonabsorbing wavelength should be checked. Preferably, samples containing high solids should be extracted.

3.1.4 Ionization interferences occur when the flame temperature is sufficiently high to generate the removal of an electron from a neutral atom, giving a positively charged ion. This type of interference can generally be controlled by the addition, to both standard and sample solutions, of a large excess (1,000 mg/L) of an easily ionized element such as K, Na, Li or Cs.

3.1.5 Spectral interference can occur when an absorbing wavelength of an element present in the sample but not being determined falls within the width of the absorption line of the element of interest. The results of the determination will then be erroneously high, due to the contribution of the interfering element to the atomic absorption signal. Interference can also occur when resonant energy from another element in a multielement lamp, or from a metal impurity in the lamp cathode, falls within the bandpass of the slit setting when that other metal is present in the sample. This type of interference may sometimes be reduced by narrowing the slit width.

3.1.6 Samples and standards should be monitored for viscosity differences that may alter the aspiration rate.

3.1.7 All metals are not equally stable in the digestate, especially if it contains only nitric acid, not nitric acid and hydrochloric acid. The digestate should be analyzed as soon as possible, with preference given to Sn, Sb, Mo, Ba, and Ag.

3.2 Furnace procedure

3.2.1 Although the problem of oxide formation is greatly reduced with furnace procedures because atomization occurs in an inert atmosphere, the technique is still subject to chemical interferences. The composition of the sample matrix can have a major effect on the analysis. It is those effects which must be determined and taken into consideration in the analysis of each different matrix encountered. To help verify the absence of matrix or chemical interference, the serial dilution technique (see Step 8.6) may be used. Those samples which indicate the presence of interference should be treated in one or more of the following ways:

1. Successively dilute and reanalyze the samples to eliminate interferences.

2. Modify the sample matrix either to remove interferences or to stabilize the analyte. Examples are the addition of ammonium nitrate to remove alkali chlorides and the addition of ammonium phosphate to retain cadmium. The mixing of hydrogen with the inert purge gas has also been used to suppress chemical interference. The hydrogen acts as a reducing agent and aids in molecular dissociation.

3. Analyze the sample by method of standard additions while noticing the precautions and limitations of its use (see Step 8.7.2).

3.2.2 Gases generated in the furnace during atomization may have molecular absorption bands encompassing the analytical wavelength. When this occurs, use either background correction or choose an alternate wavelength. Background correction may also compensate for nonspecific broad-band absorption interference.

3.2.3 Continuum background correction cannot correct for all types of background interference. When the background interference cannot be compensated for, chemically remove the analyte or use an alternate form of background correction, e.g., Zeeman background correction.

3.2.4 Interference from a smoke-producing sample matrix can sometimes be reduced by extending the charring time at a higher temperature or utilizing an ashing cycle in the presence of air. Care must be taken, however, to prevent loss of the analyte.

3.2.5 Samples containing large amounts of organic materials should be oxidized by conventional acid digestion before being placed in the furnace. In this way, broad-band absorption will be minimized.

3.2.6 Anion interference studies in the graphite furnace indicate that, under conditions other than isothermal, the nitrate anion is preferred. Therefore, nitric acid is preferable for any digestion or solubilization step. If another acid in addition to nitric acid is required, a minimum amount should be used. This applies particularly to hydrochloric and, to a lesser extent, to sulfuric and phosphoric acids.

3.2.7 Carbide formation resulting from the chemical environment of the furnace has been observed. Molybdenum may be cited as an example. When carbides form, the metal is released very slowly from the resulting metal carbide as atomization continues. Molybdenum may require 30 seconds or more atomization time before the signal returns to baseline levels. Carbide formation is greatly reduced and the sensitivity increased with the use of pyrolytically coated graphite. Elements that readily form carbides are noted with the symbol (p) in Table 1.

3.2.8 For comments on spectral interference, see Step 3.1.5.

3.2.9 Cross-contamination and contamination of the sample can be major sources of error because of the extreme sensitivities achieved with the furnace. The sample preparation work area should be kept scrupulously clean. All glassware should be cleaned as directed in Step 4.8. Pipet tips are a frequent source of contamination. If suspected, they should be acid soaked with 1:5 nitric acid and rinsed thoroughly with tap and reagent water. The use of a better grade of pipet tip can greatly reduce this problem. Special attention should be given to reagent blanks in both analysis and in the correction of analytical results. Lastly, pyrolytic graphite, because of the production process and handling, can become contaminated. As many as five to ten high-temperature burns may be required to clean the tube before use.

4.0 APPARATUS AND MATERIALS

4.1 Atomic absorption spectrophotometer - Single- or dual-channel, single- or double-beam instrument having a grating monochromator, photomultiplier detector, adjustable slits, a wavelength range of 190 to 800 nm, and provisions for interfacing with a graphical display.

4.2 Burner - The burner recommended by the particular instrument manufacturer should be used. For certain elements the nitrous oxide burner is required.

4.3 Hollow cathode lamps - Single-element lamps are preferred but multielement lamps may be used. Electrodeless discharge lamps may also be used when available. Other types of lamps meeting the performance criteria of this method may be used.

4.4 Graphite furnace - Any furnace device capable of reaching the specified temperatures is satisfactory.

4.5 Graphical display and recorder - A recorder is recommended for furnace work so that there will be a permanent record and that any problems with the analysis such as drift, incomplete atomization, losses during charring, changes in sensitivity, peak shape, etc., can be easily recognized.

4.6 Pipets - Microliter, with disposable tips. Sizes can range from 5 to 100 uL as required. Pipet tips should be checked as a possible source of contamination prior to their use. The accuracy of automatic pipets must be verified daily. Class A pipets can be used for the measurement of volumes larger than 1 mL.

4.7 Pressure-reducing valves - The supplies of fuel and oxidant should be maintained at pressures somewhat higher than the controlled operating pressure of the instrument by suitable valves.

4.8 Glassware - All glassware, polypropylene, or Teflon containers, including sample bottles, flasks and pipets, should be washed in the following sequence: detergent, tap water, 1:1 nitric acid, tap water, 1:1 hydrochloric acid, tap water, and reagent water. (Chromic acid should not be used as a cleaning agent for glassware if chromium is to be included in the analytical scheme.) If it can be documented through an active analytical quality control program using spiked samples and reagent blanks that certain steps in the cleaning procedure are not required for routine samples, those steps may be eliminated from the procedure.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination. All reagents should be analyzed to provide proof that all constituents are below the MDLs.

5.2 Reagent water. All references to water in this method refer to reagent water unless otherwise specified. Reagent grade water will be of at least 16 Mega Ohm quality.

5.3 Nitric acid (concentrated), HNO_3. Use a spectrograde acid certified for AA use. Prepare a 1:1 dilution with water by adding the concentrated acid to an equal volume of water. If the reagent blank is less than the IDL, the acid may be used.

5.4 Hydrochloric acid (1:1), HCl. Use a spectrograde acid certified for AA use. Prepare a 1:1 dilution with water by adding the concentrated acid to an equal volume of water. If the reagent blank is less than the IDL, the acid may be used.

5.5 Fuel and oxidant - High purity acetylene is generally acceptable. Air may be supplied from a compressed air line, a laboratory compressor, or a cylinder of compressed air and should be clean and dry. Nitrous oxide is also required for certain determinations. Standard, commercially available argon and nitrogen are required for furnace work.

5.6 Stock standard metal solutions - Stock standard solutions are prepared from high purity metals, oxides, or nonhygroscopic salts using water and redistilled nitric or hydrochloric acids. (See individual methods for specific instructions.) Sulfuric or phosphoric acids should be avoided as they produce an adverse effect on many elements. The stock solutions are prepared at concentrations of 1,000 mg of the metal per liter. Commercially available standard solutions may also be used. Where the sample viscosity, surface tension, and components cannot be accurately matched with standards, the method of standard addition (MSA) may be used (see Step 8.7).

5.7 Calibration standards - For those instruments which do not read out directly in concentration, a calibration curve is prepared to cover the appropriate concentration range. Usually, this means the preparation of standards which produce an absorbance of 0.0 to 0.7. Calibration standards are prepared by diluting the stock metal solutions at the time of analysis. For best results, calibration standards should be prepared fresh each time a batch of samples is analyzed. Prepare a blank and at least three calibration standards in graduated amounts in the appropriate range of the linear part of the curve. The calibration standards should be prepared using the same type of acid or combination of acids and at the same concentration as will result in the samples following processing. Beginning with the blank and working toward the highest standard, aspirate the solutions and record the readings. Repeat the operation with both the calibration standards and the samples a sufficient number of times to secure a reliable average reading for each solution. Calibration standards for furnace procedures should be prepared as described on the individual sheets for that metal. Calibration curves are always required.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material in Chapter Three, Metallic Analytes.

7.0 PROCEDURE

7.1 Preliminary treatment of waste water, ground water, EP extracts, and industrial waste is always necessary because of the complexity and variability of sample matrices. Solids, slurries, and suspended material must be subjected to a solubilization process before analysis. This process may vary because of the metals to be determined and the nature of the sample being analyzed. Solubilization and digestion procedures are presented in Chapter Three, Step 3.2, Sample Preparation Methods. Samples which are to be analyzed for dissolved constituents need not be digested if they have been filtered and acidified.

7.2 Direct aspiration (flame) procedure

7.2.1 Differences between the various makes and models of satisfactory atomic absorption spectrophotometers prevent the formulation of detailed instructions applicable to every instrument. The analyst should follow the manufacturer's operating instructions for a particular instrument. In general, after choosing the proper lamp for the analysis, allow the lamp to warm up for a minimum of 15 minutes, unless operated in a double-beam mode. During this period, align the instrument, position the monochromator at the correct wavelength, select the proper monochromator slit width, and adjust the current according to the manufacturer's recommendation. Subsequently, light the flame and regulate the flow of fuel and oxidant. Adjust the burner and nebulizer flow rate for maximum percent absorption and stability. Balance the photometer. Run a series of standards of the element under analysis. Construct a calibration curve by plotting the concentrations of the standards against absorbances. Set the curve corrector of a direct reading instrument to read out the proper concentration. Aspirate the samples and determine the concentrations either directly or from the calibration curve. Standards must be run each time a sample or series of samples is run.

7.3 Furnace procedure

7.3.1 Furnace devices (flameless atomization) are a most useful means of extending detection limits. Because of differences between various makes and models of satisfactory instruments, no detailed operating instructions can be given for each instrument. Instead, the analyst should follow the instructions provided by the manufacturer of a particular instrument.

7.3.2 Background correction is important when using flameless atomization, especially below 350 nm. Certain samples, when atomized, may absorb or scatter light from the lamp. This can be caused by the presence of gaseous molecular species, salt particles, or smoke in the sample beam. If no correction is made, sample absorbance will be greater than it should be, and the analytical result will be erroneously high. Zeeman background correction is effective in overcoming composition or structured background interferences. It is particularly useful when analyzing for As in the presence of Al and when analyzing for Se in the presence of Fe.

7.3.3 Memory effects occur when the analyte is not totally volatilized during atomization. This condition depends on several factors: volatility of the element and its chemical form, whether pyrolytic graphite is used, the rate of atomization, and furnace design. This situation is detected through blank burns. The tube should be cleaned by operating the furnace at full power for the required time period, as needed, at regular intervals during the series of determinations.

7.3.4 Inject a measured microliter aliquot of sample into the furnace and atomize. If the concentration found is greater than the highest standard, the sample should be diluted in the same acid matrix and reanalyzed. The use of multiple injections can improve accuracy and help detect furnace pipetting errors.

7.3.5 To verify the absence of interference, follow the serial dilution procedure given in Step 8.6.

7.3.6 A check standard should be run after approximately every 10 sample injections. Standards are run in part to monitor the life and performance of the graphite tube. Lack of reproducibility or significant change in the signal for the standard indicates that the tube should be replaced. Tube life depends on sample matrix and atomization temperature. A conservative estimate would be that a tube will last at least 50 firings. A pyrolytic coating will extend that estimated life by a factor of three.

7.4 Calculation

7.4.1 For determination of metal concentration by direct aspiration and furnace: Read the metal value from the calibration curve or directly from the read-out system of the instrument.

7.4.2 If dilution of sample was required:

$$\text{ug/L metal in sample} = A\left(\frac{C + B}{C}\right)$$

where:

A = ug/L of metal in diluted aliquot from calibration curve.
B = Acid blank matrix used for dilution, mL.
C = Sample aliquot, mL.

7.4.3 For solid samples, report all concentrations in consistent units based on wet weight. Hence:

$$\text{ug metal/kg sample} = \frac{A \times V}{W}$$

where:

A = ug/L of metal in processed sample from calibration curve.
V = Final volume of the processed sample, mL.
W = Weight of sample, grams.

7.4.4 Different injection volumes must not be used for samples and standards. Instead, the sample should be diluted and the same size injection volume be used for both samples and standards. If dilution of the sample was required:

$$\text{ug/L of metal in sample} = Z \left(\frac{C + B}{C} \right)$$

where:

Z = ug/L of metal read from calibration curve or read-out system.
B = Acid blank matrix used for dilution mL.
C = Sample aliquot, mL.

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection.

8.2 A calibration curve must be prepared each day with a minimum of a calibration blank and three standards. After calibration, the calibration curve must be verified by use of at least a calibration blank and a calibration check standard (made from a reference material or other independent standard material) at or near the mid-range. The calibration reference standard must be measured within 10 % of it's true value for the curve to be considered valid.

8.3 If more than 10 samples per day are analyzed, the working standard curve must be verified by measuring satisfactorily a mid-range standard or reference standard after every 10 samples. This sample value must be within 20% of the true value, or the previous ten samples need to be reanalyzed.

8.4 At least one matrix spike and one matrix spike duplicate sample shall be included in each analytical batch. A laboratory control sample shall also be processed with each sample batch. Refer to Chapter One for more information.

8.5 Where the sample matrix is so complex that viscosity, surface tension, and components cannot be accurately matched with standards, the method of standard addition (MSA) is recommended (see Section 8.7 below). Section 8.6 provides tests to evaluate the need for using the MSA.

8.6 Interference tests

8.6.1 Dilution test - For each analytical batch select one typical sample for serial dilution to determine whether interferences are present. The concentration of the analyte should be at least 25 times the estimated detection limit. Determine the apparent concentration in the undiluted sample. Dilute the sample by a minimum of five fold (1+4) and reanalyze. If all of the samples in the batch are below 10 times the detection limits, perform the spike recovery analysis described below. Agreement within 10% between the concentration for the undiluted sample and five times the concentration for the diluted sample indicates the absence of interferences, and such samples may be analyzed without using the method of standard additions.

8.6.2 Recovery test - If results from the dilution test do not agree, a matrix interference may be suspected and a spiked sample should be analyzed to help confirm the finding from the dilution test. Withdraw another aliquot of the test sample and add a known amount of analyte to bring the concentration of the analyte to 2 to 5 times the original concentration. If all of the samples in the batch have analyte concentrations below the detection limit, spike the selected sample at 20 times the detection limit. Analyze the spiked sample and calculate the spike recovery. If the recovery is less than 85% or greater than 115%, the method of standard additions shall be used for all samples in the batch.

8.7 Method of standard additions - The standard addition technique involves adding known amounts of standard to one or more aliquots of the processed sample solution. This technique compensates for a sample constituent that enhances or depresses the analyte signal, thus producing a different slope from that of the calibration standards. It will not correct for additive interferences which cause a baseline shift. The method of standard additions shall be used for analysis of all EP extracts, on all analyses submitted as part of a delisting petition, and whenever a new sample matrix is being analyzed.

8.7.1 The simplest version of this technique is the single-addition method, in which two identical aliquots of the sample solution, each of volume V_x, are taken. To the first (labeled A) is added a known volume V_S of a standard analyte solution of concentration C_S. To the second aliquot (labeled B) is added the same volume V_S of the solvent. The analytical signals of A and B are measured and corrected for nonanalyte signals. The unknown sample concentration C_x is calculated:

$$C_x = \frac{S_B V_S C_S}{(S_A - S_B) V_x}$$

where S_A and S_B are the analytical signals (corrected for the blank) of solutions A and B, respectively. V_s and C_s should be chosen so that S_A is roughly twice S_B on the average, avoiding excess dilution of the sample. If a separation or concentration step is used, the additions are best made first and carried through the entire procedure.

8.7.2 Improved results can be obtained by employing a series of standard additions. To equal volumes of the sample are added a series of standard solutions containing different known quantities of the analyte, and all solutions are diluted to the same final volume. For example, addition 1 should be prepared so that the resulting concentration is approximately 50 percent of the expected absorbance from the endogenous analyte in the sample. Additions 2 and 3 should be prepared so that the concentrations are approximately 100 and 150 percent of the expected endogenous sample absorbance. The absorbance of each solution is determined and then plotted on the vertical axis of a graph, with the concentrations of the known standards plotted on the horizontal axis. When the resulting line is extrapolated to zero absorbance, the point of interception of the abscissa is the endogenous concentration of the analyte in the sample. The abscissa on the left of the ordinate is scaled

the same as on the right side, but in the opposite direction from the ordinate. An example of a plot so obtained is shown in Figure 1. A linear regression program may be used to obtain the intercept concentration.

8.7.3 For the results of this MSA technique to be valid, the following limitations must be taken into consideration:

1. The apparent concentrations from the calibration curve must be linear over the concentration range of concern. For the best results, the slope of the MSA plot should be nearly the same as the slope of the standard curve. If the slope is significantly different (greater than 20%), caution should be exercised.

2. The effect of the interference should not vary as the ratio of analyte concentration to sample matrix changes, and the standard addition should respond in a similar manner as the analyte.

3. The determination must be free of spectral interference and corrected for nonspecific background interference.

8.8 All quality control measures described in Chapter One should be followed.

9.0 METHOD PERFORMANCE

9.1 See individual methods.

10.0 REFERENCES

1. Methods for Chemical Analysis of Water and Wastes; U.S. Environmental Protection Agency. Office of Research and Development. Environmental Monitoring and Support Laboratory. ORD Publication Offices of Center for Environmental Research Information: Cincinnati, OH, 1983; EPA-600/4-79-020.

2. Rohrbough, W.G.; et al. Reagent Chemicals, American Chemical Society Specifications, 7th ed.; American Chemical Society: Washington, DC, 1986.

3. 1985 Annual Book of ASTM Standards, Vol. 11.01; "Standard Specification for Reagent Water"; ASTM: Philadelphia, PA, 1985; D1193-77.

TABLE 1.
ATOMIC ABSORPTION CONCENTRATION RANGES

Metal	Direct Aspiration		Furnace Procedure[a,c] Detection Limit (ug/L)
	Detection Limit (mg/L)	Sensitivity (mg/L)	
Aluminum	0.1	1	--
Antimony	0.2	0.5	3
Arsenic[b]	0.002	--	1
Barium	0.1	0.4	2
Beryllium	0.005	0.025	0.2
Cadmium	0.005	0.025	0.1
Calcium	0.01	0.08	--
Chromium	0.05	0.25	1
Cobalt	0.05	0.2	1
Copper	0.02	0.1	1
Iron	0.03	0.12	1
Lead	0.1	0.5	1
Lithium	0.002	0.04	--
Magnesium	0.001	0.007	--
Manganese	0.01	0.05	0.2
Mercury[d]	0.0002	--	--
Molybdenum(p)	0.1	0.4	1
Nickel	0.04	0.15	--
Osmium	0.03	1	--
Potassium	0.01	0.04	--
Selenium[b]	0.002	--	2
Silver	0.01	0.06	0.2
Sodium	0.002	0.015	--
Strontium	0.03	0.15	--
Thallium	0.1	0.5	1
Tin	0.8	4	--
Vanadium(p)	0.2	0.8	4
Zinc	0.005	0.02	0.05

<u>NOTE</u>: The symbol (p) indicates the use of pyrolytic graphite with the furnace procedure.

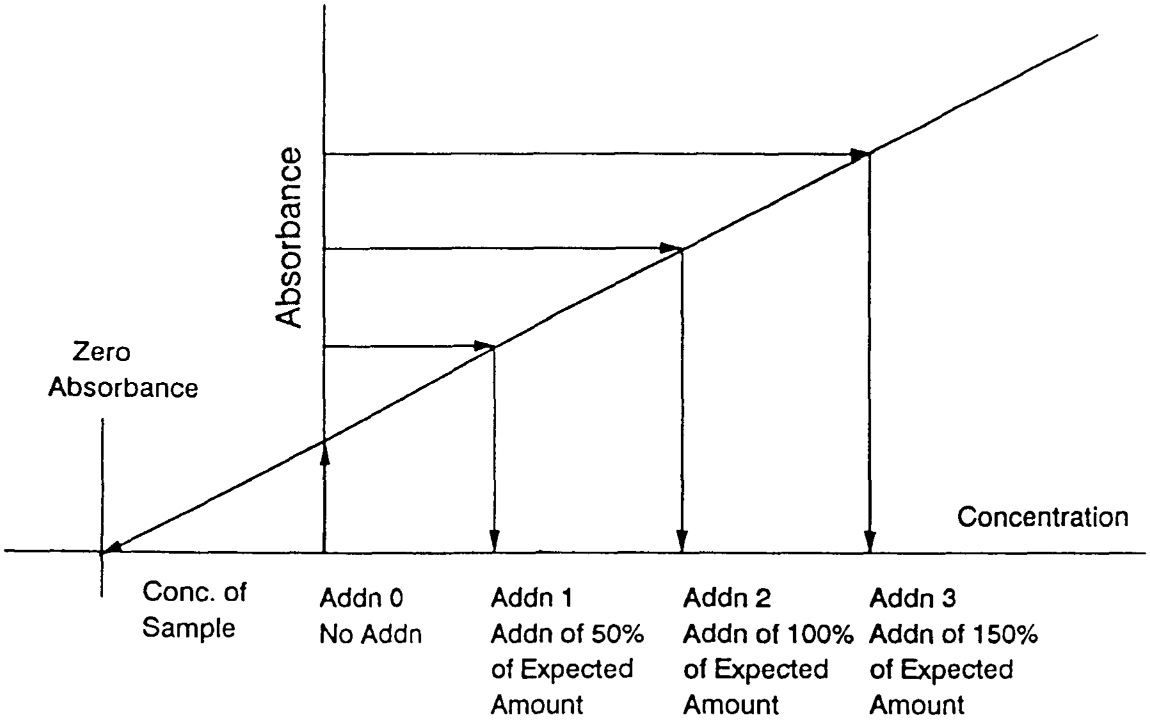
[a] For furnace sensitivity values, consult instrument operating manual.

[b] Gaseous hydride method.

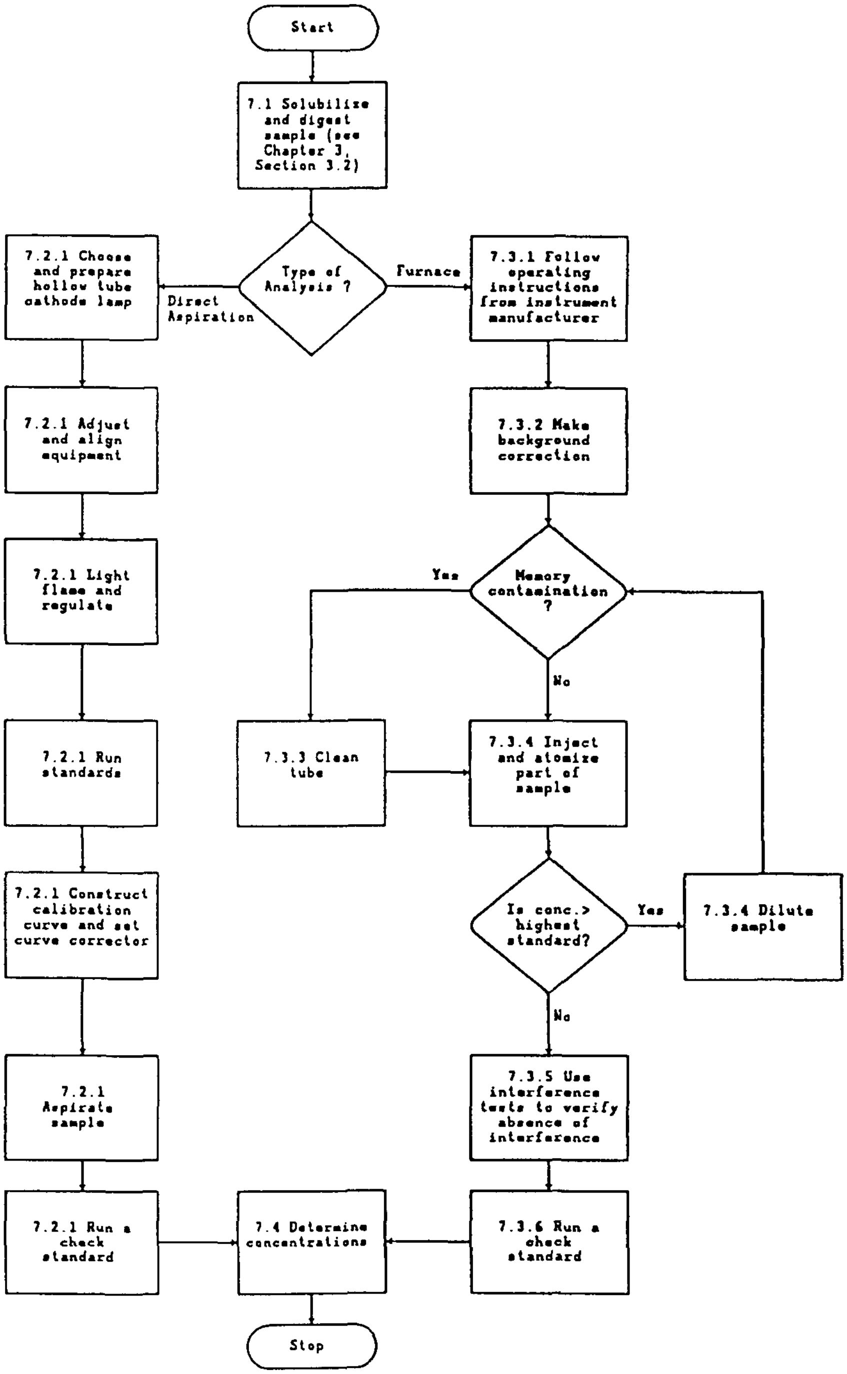
[c] The listed furnace values are those expected when using a 20-uL injection and normal gas flow, except in the cases of arsenic and selenium, where gas interrupt is used.

[d] Cold vapor technique.

FIGURE 1.
STANDARD ADDITION PLOT



METHOD 7000A
ATOMIC ABSORPTION METHODS



METHOD 8270C

SEMIVOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

1.0 SCOPE AND APPLICATION

1.1 Method 8270 is used to determine the concentration of semivolatile organic compounds in extracts prepared from many types of solid waste matrices, soils, air sampling media and water samples. Direct injection of a sample may be used in limited applications. The following compounds can be determined by this method:

		Appropriate Preparation Techniques[b]				
Compounds	CAS No[a]	3510	3520	3540/ 3541	3550	3580
Acenaphthene	83-32-9	X	X	X	X	X
Acenaphthene-d_{10} (IS)		X	X	X	X	X
Acenaphthylene	208-96-8	X	X	X	X	X
Acetophenone	98-86-2	X	ND	ND	ND	X
2-Acetylaminofluorene	53-96-3	X	ND	ND	ND	X
1-Acetyl-2-thiourea	591-08-2	LR	ND	ND	ND	LR
Aldrin	309-00-2	X	X	X	X	X
2-Aminoanthraquinone	117-79-3	X	ND	ND	ND	X
Aminoazobenzene	60-09-3	X	ND	ND	ND	X
4-Aminobiphenyl	92-67-1	X	ND	ND	ND	X
3-Amino-9-ethylcarbazole	132-32-1	X	X	ND	ND	ND
Anilazine	101-05-3	X	ND	ND	ND	X
Aniline	62-53-3	X	X	ND	X	X
o-Anisidine	90-04-0	X	ND	ND	ND	X
Anthracene	120-12-7	X	X	X	X	X
Aramite	140-57-8	HS(43)	ND	ND	ND	X
Aroclor 1016	12674-11-2	X	X	X	X	X
Aroclor 1221	11104-28-2	X	X	X	X	X
Aroclor 1232	11141-16-5	X	X	X	X	X
Aroclor 1242	53469-21-9	X	X	X	X	X
Aroclor 1248	12672-29-6	X	X	X	X	X
Aroclor 1254	11097-69-1	X	X	X	X	X
Aroclor 1260	11096-82-5	X	X	X	X	X
Azinphos-methyl	86-50-0	HS(62)	ND	ND	ND	X
Barban	101-27-9	LR	ND	ND	ND	LR
Benzidine	92-87-5	CP	CP	CP	CP	CP
Benzoic acid	65-85-0	X	X	ND	X	X
Benz(a)anthracene	56-55-3	X	X	X	X	X
Benzo(b)fluoranthene	205-99-2	X	X	X	X	X
Benzo(k)fluoranthene	207-08-9	X	X	X	X	X
Benzo(g,h,i)perylene	191-24-2	X	X	X	X	X
Benzo(a)pyrene	50-32-8	X	X	X	X	X

5.3.17 Mercury solution, stock, 1 mL = 1000 µg Hg: Do not dry, highly toxic element. Dissolve 1.354 g $HgCl_2$ (Hg fraction = 0.7388) in reagent water. Add 50.0 mL concentrated HNO_3 and dilute to volume in 1-L volumetric flask with reagent water.

5.3.18 Molybdenum solution, stock, 1 mL = 1000 µg Mo: Dissolve 1.7325 g $(NH_4)_6Mo_7O_{24}.4H_2O$ (element fraction Mo = 0.5772), weighed accurately to at least four significant figures, in water and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.19 Nickel solution, stock, 1 mL = 1000 µg Ni: Dissolve 1.00 g of nickel metal, weighed accurately to at least four significant figures, in 10.0 mL hot concentrated HNO_3, cool, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.20 Phosphate solution, stock, 1 mL = 1000 µg P: Dissolve 4.3937 g anhydrous KH_2PO_4 (element fraction P = 0.2276), weighed accurately to at least four significant figures, in water. Dilute to volume in a 1,000 mL volumetric flask with water.

5.3.21 Potassium solution, stock, 1 mL = 1000 µg K: Dissolve 1.9069 g KCl (element fraction K = 0.5244) dried at 110°C, weighed accurately to at least four significant figures, in water, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.22 Selenium solution, stock, 1 mL = 1000 µg Se: Do not dry. Dissolve 1.6332 g H_2SeO_3 (element fraction Se = 0.6123), weighed accurately to at least four significant figures, in water and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.23 Silica solution, stock, 1 mL = 1000 µg SiO_2: Do not dry. Dissolve 2.964 g NH_4SiF_6, weighed accurately to at least four significant figures, in 200 mL (1:20) HCl with heating at 85°C to effect dissolution. Let solution cool and dilute to volume in a 1-L volumetric flask with reagent water.

5.3.24 Silver solution, stock, 1 mL = 1000 µg Ag: Dissolve 1.5748 g $AgNO_3$ (element fraction Ag = 0.6350), weighed accurately to at least four significant figures, in water and 10 mL concentrated HNO_3. Dilute to volume in a 1,000 mL volumetric flask with water.

5.3.25 Sodium solution, stock, 1 mL = 1000 µg Na: Dissolve 2.5419 g NaCl (element fraction Na = 0.3934), weighed accurately to at least four significant figures, in water. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.26 Strontium solution, stock, 1 mL = 1000 µg Sr: Dissolve 2.4154 g of strontium nitrate ($Sr(NO_3)_2$) (element fraction Sr = 0.4140), weighed accurately to at least four significant figures, in a 1-liter flask containing 10 mL of concentrated HCl and 700 mL of water. Dilute to volume in a 1,000 mL volumetric flask with water.

5.3.27 Thallium solution, stock, 1 mL = 1000 µg Tl: Dissolve 1.3034 g $TlNO_3$ (element fraction Tl = 0.7672), weighed accurately to at least four significant figures, in water. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.28 Tin solution, stock, 1 mL = 1000 µg Sn: Dissolve 1.000 g Sn shot, weighed accurately to at least 4 significant figures, in 200 mL (1:1) HCl with heating to effect dissolution. Let solution cool and dilute with (1:1) HCl in a 1-L volumetric flask.

5.3.29 Vanadium solution, stock, 1 mL = 1000 µg V: Dissolve 2.2957 g NH_4VO_3 (element fraction V = 0.4356), weighed accurately to at least four significant figures, in a minimum amount of concentrated HNO_3. Heat to increase rate of dissolution. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.30 Zinc solution, stock, 1 mL = 1000 µg Zn: Dissolve 1.2447 g ZnO (element fraction Zn = 0.8034), weighed accurately to at least four significant figures, in a minimum amount of dilute HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.4 Mixed calibration standard solutions - Prepare mixed calibration standard solutions by combining appropriate volumes of the stock solutions in volumetric flasks (see Table 3). Add the appropriate types and volumes of acids so that the standards are matrix matched with the sample digestates. Prior to preparing the mixed standards, each stock solution should be analyzed separately to determine possible spectral interference or the presence of impurities. Care should be taken when preparing the mixed standards to ensure that the elements are compatible and stable together. Transfer the mixed standard solutions to FEP fluorocarbon or previously unused polyethylene or polypropylene bottles for storage. Fresh mixed standards should be prepared, as needed, with the realization that concentration can change on aging. Some typical calibration standard combinations are listed in Table 3.

NOTE: If the addition of silver to the recommended acid combination results in an initial precipitation, add 15 mL of water and warm the flask until the solution clears. Cool and dilute to 100 mL with water. For this acid combination, the silver concentration should be limited to 2 mg/L. Silver under these conditions is stable in a tap-water matrix for 30 days. Higher concentrations of silver require additional HCl.

5.5 Two types of blanks are required for the analysis for samples prepared by any method other than 3040. The calibration blank is used in establishing the analytical curve, and the method blank is used to identify possible contamination resulting from varying amounts of the acids used in the sample processing.

5.5.1 The calibration blank is prepared by acidifying reagent water to the same concentrations of the acids found in the standards and samples. Prepare a sufficient quantity to flush the system between standards and samples. The calibration blank will also be used for all initial and continuing calibration blank determinations (see Sections 7.3 and 7.4).

5.5.2 The method blank must contain all of the reagents in the same volumes as used in the processing of the samples. The method blank must be carried through the complete procedure and contain the same acid concentration in the final solution as the sample solution used for analysis.

5.6 The Initial Calibration Verification (ICV) is prepared by the analyst by combining compatible elements from a standard source different than that of the calibration standard and at concentrations within the linear working range of the instrument (see Section 8.6.1 for use).

5.7 The Continuing Calibration Verification (CCV)) should be prepared in the same acid matrix using the same standards used for calibration at a concentration near the mid-point of the calibration curve (see Section 8.6.1 for use).

5.8 The interference check solution is prepared to contain known concentrations of interfering elements that will provide an adequate test of the correction factors. Spike the sample with the elements of interest, particularly those with known interferences at 0.5 to 1 mg/L. In the absence of measurable analyte, overcorrection could go undetected because a negative value could be reported as zero. If the particular instrument will display overcorrection as a negative number, this spiking procedure will not be necessary.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material in Chapter Three, Inorganic Analytes, Sections 3.1 through 3.3.

7.0 PROCEDURE

7.1 Preliminary treatment of most matrices is necessary because of the complexity and variability of sample matrices. Groundwater samples which have been prefiltered and acidified will not need acid digestion. Samples which are not digested must either use an internal standard or be matrix matched with the standards. Solubilization and digestion procedures are presented in Sample Preparation Methods (Chapter Three, Inorganic Analytes).

7.2 Set up the instrument with proper operating parameters established as detailed below. The instrument must be allowed to become thermally stable before beginning (usually requiring at least 30 minutes of operation prior to calibration). Operating conditions - The analyst should follow the instructions provided by the instrument manufacturer.

7.2.1 Before using this procedure to analyze samples, there must be data available documenting initial demonstration of performance. The required data document the selection criteria of background correction points; analytical dynamic ranges, the applicable equations, and the upper limits of those ranges; the method and instrument detection limits; and the determination and verification of interelement correction equations or other routines for correcting spectral interferences. This data must be generated using the same instrument, operating conditions and calibration routine to be used for sample analysis. These documented data must be kept on file and be available for review by the data user or auditor.

7.2.2 Specific wavelengths are listed in Table 1. Other wavelengths may be substituted if they can provide the needed sensitivity and are corrected for spectral interference. Because of differences among various makes and models of spectrometers, specific instrument operating conditions cannot be provided. The instrument and operating conditions utilized for determination must be capable of providing data of acceptable quality to the program and data user. The analyst should follow the instructions provided by the instrument manufacturer unless other conditions provide similar or better performance for a task. Operating conditions for aqueous solutions usually vary from 1100 to 1200 watts forward power, 14 to 18 mm viewing height, 15 to 19 liters/min argon coolant flow, 0.6 to 1.5 L/min argon nebulizer flow, 1 to 1.8 mL/min sample pumping rate with a 1 minute preflush time and measurement time near 1 second per wavelength peak for sequential instruments and 10 seconds per sample for simultaneous instruments. For an axial plasma, the conditions will usually vary from 1100-1500 watts forward power, 15-19 liters/min argon coolant flow, 0.6-1.5 L/min argon nebulizer flow, 1-1.8 mL/min sample pumping rate with a 1 minute preflush time and measurement time near 1 second per wavelength peak for sequential instruments and 10 seconds per sample for simultaneous instruments. Reproduction of the Cu/Mn intensity ratio at 324.754 nm and 257.610 nm respectively, by adjusting the argon aerosol flow has been recommended as a way to achieve repeatable interference correction factors.

7.2.3 The plasma operating conditions need to be optimized prior to use of the instrument. This routine is not required on a daily basis, but only when first setting up a new instrument or following a change in operating conditions. The following procedure is recommended or follow manufacturer's recommendations. The purpose of plasma optimization is to provide a maximum signal to background ratio for some of the least sensitive elements in the analytical array. The use of a mass flow controller to regulate the nebulizer gas flow or source optimization software greatly facilitates the procedure.

7.2.3.1 Ignite the radial plasma and select an appropriate incident RF power. Allow the instrument to become thermally stable before beginning, about 30 to 60 minutes of operation. While aspirating a 1000 ug/L solution of yttrium, follow the instrument manufacturer's instructions and adjust the aerosol carrier gas flow rate through the nebulizer so a definitive blue emission region of the plasma extends approximately from 5 to 20 mm above the top of the load coil. Record the nebulizer gas flow rate or pressure setting for future reference. The yttrium solution can also be used for coarse optical alignment of the torch by observing the overlay of the blue light over the entrance slit to the optical system.

7.2.3.2 After establishing the nebulizer gas flow rate, determine the solution uptake rate of the nebulizer in mL/min by aspirating a known volume of calibration blank for a period of at least three minutes. Divide the volume aspirated by the time in minutes and record the uptake rate; set the peristaltic pump to deliver the rate in a steady even flow.

7.2.3.3 Profile the instrument to align it optically as it will be used during analysis. The following procedure can be used for both horizontal and vertical optimization in the radial mode, but is written for vertical. Aspirate a solution containing 10 ug/L of several selected elements. These elements can be As, Se, Tl or Pb as the least sensitive of the elements and most needing to be optimize or others representing analytical judgement (V, Cr, Cu, Li and Mn are also used with success). Collect intensity data at the wavelength peak for each analyte at 1 mm intervals from 14 to 18 mm above the load coil. (This region of the plasma is referred to as the analytical zone.) Repeat the process using the calibration blank. Determine the net signal to blank intensity ratio for each analyte for each viewing height setting. Choose the height for viewing the plasma that provides the best net intensity ratios for the elements analyzed or the highest intensity ratio for the least sensitive element. For optimization in the axial mode, follow the instrument manufacturer's instructions.

7.2.3.4 The instrument operating condition finally selected as being optimum should provide the lowest reliable instrument detection limits and method detection limits.

7.2.3.5 If either the instrument operating conditions, such as incident power or nebulizer gas flow rate are changed, or a new torch injector tube with a different orifice internal diameter is installed, the plasma and viewing height should be re-optimized.

7.2.3.6 After completing the initial optimization of operating conditions, but before analyzing samples, the laboratory must establish and initially verify an interelement spectral interference correction routine to be used during sample analysis. A general description concerning spectral interference and the analytical requirements for background correction in particular are discussed in the section on interferences. Criteria for determining an interelement spectral interference is an apparent positive or negative concentration for the analyte that falls within ± one reporting limit from zero. The upper control limit is the analyte instrument detection limit. Once established the entire routine must be periodically verified every six months. Only a portion of the correction routine must be verified more frequently or on a daily basis. Initial and periodic verification of the routine should be kept on file. Special cases where continual verification is required are described elsewhere.

7.2.3.7 Before daily calibration and after the instrument warmup period, the nebulizer gas flow rate must be reset to the determined optimized flow. If a mass flow controller is being used, it should be set to the recorded optimized flow rate, In order to maintain valid spectral interelement correction routines the nebulizer gas flow rate should be the same (< 2% change) from day to day.

7.2.4 For operation with organic solvents, use of the auxiliary argon inlet is recommended, as are solvent-resistant tubing, increased plasma (coolant) argon flow, decreased nebulizer flow, and increased RF power to obtain stable operation and precise measurements.

7.2.5 Sensitivity, instrumental detection limit, precision, linear dynamic range, and interference effects must be established for each individual analyte line on each particular instrument. All measurements must be within the instrument linear range where the correction equations are valid.

7.2.5.1 Method detection limits must be established for all wavelengths utilized for each type of matrix commonly analyzed. The matrix used for the MDL calculation must contain analytes of known concentrations within 3-5 times the anticipated detection limit. Refer to Chapter One for additional guidance on the performance of MDL studies.

7.2.5.2 Determination of limits using reagent water represent a best case situation and do not represent possible matrix effects of real world samples.

7.2.5.3 If additional confirmation is desired, reanalyze the seven replicate aliquots on two more non consecutive days and again calculate the method detection limit values for each day. An average of the three values for each analyte may provide for a more appropriate estimate. Successful analysis of samples with added analytes or using method of standard additions can give confidence in the method detection limit values determined in reagent water.

7.2.5.4 The upper limit of the linear dynamic range must be established for each wavelength utilized by determining the signal responses from a minimum for three, preferably five, different concentration standards across the range. One of these should be near the upper limit of the range. The ranges which may be used for the analysis of samples should be judged by the analyst from the resulting data. The data, calculations and rationale for the choice of range made should be documented and kept on file. The upper range limit should be an observed signal no more than 10% below the level extrapolated from lower standards. Determined analyte concentrations that are above the upper range limit must be diluted and reanalyzed. The analyst should also be aware that if an interelement correction from an analyte above the linear range exists, a second analyte where the interelement correction has been applied may be inaccurately reported. New dynamic ranges should be determined whenever there is a significant change in instrument response. For those analytes that periodically approach the upper limit, the range should be checked every six months. For those analytes that are known interferences, and are present at above the linear range, the analyst should ensure that the interelement correction has not been inaccurately applied.

<u>NOTE</u>: Many of the alkali and alkaline earth metals have non-linear response curves due to ionization and self absorption effects. These curves may be used if the instrument allows; however the effective range must be checked and the second order curve fit should have a correlation coefficient of 0.995 or better. Third order fits are not acceptable. These non-linear response curves should be revalidated and recalculated every six months. These curves are much more sensitive to changes in operating conditions than the linear lines and should be checked whenever there have been moderate equipment changes.

7.2.6 The analyst must (1) verify that the instrument configuration and operating conditions satisfy the analytical requirements and (2) maintain quality control data confirming instrument performance and analytical results.

7.3 Profile and calibrate the instrument according to the instrument manufacturer's recommended procedures, using the typical mixed calibration standard solutions described in Section 5.4. Flush the system with the calibration blank (Section 5.5.1) between each standard or as the manufacturer recommends. (Use the average intensity of multiple exposures for both standardization and sample analysis to reduce random error.) The calibration curve must consist of a minimum of a blank and a standard.

7.4 For all analytes and determinations, the laboratory must analyze an ICV (Section 5.6), a calibration blank (Section 5.5.1), and a continuing calibration verification (CCV) (Section 5.7) immediately following daily calibration. A calibration blank and either a calibration verification (CCV) or an ICV must be analyzed after every tenth sample and at the end of the sample run. Analysis of the check standard and calibration verification must verify that the instrument is within ± 10% of calibration with relative standard deviation < 5% from replicate (minimum of two) integrations. If the calibration cannot be verified within the specified limits, the sample analysis must be discontinued, the cause determined and the instrument recalibrated. All samples following the last acceptable ICV, CCV or check standard must be reanalyzed. The analysis data of the calibration blank, check standard, and ICV or CCV must be kept on file with the sample analysis data.

7.5 Rinse the system with the calibration blank solution (Section 5.5.1) before the analysis of each sample. The rinse time will be one minute. Each laboratory may establish a reduction in this rinse time through a suitable demonstration.

7.6 Calculations: If dilutions were performed, the appropriate factors must be applied to sample values. All results should be reported with up to three significant figures.

7.7 The MSA should be used if an interference is suspected or a new matrix is encountered. When the method of standard additions is used, standards are added at one or more levels to portions of a prepared sample. This technique compensates for enhancement or depression of an analyte signal by a matrix. It will not correct for additive interferences, such as contamination, interelement interferences, or baseline shifts. This technique is valid in the linear range when the interference effect is constant over the range, the added analyte responds the same as the endogenous analyte, and the signal is corrected for additive interferences. The simplest version of this technique is the single addition method. This procedure calls for two identical aliquots of the sample solution to be taken. To the first aliquot, a small volume of standard is added; while to the second aliquot, a volume of acid blank is added equal to the standard addition. The sample concentration is calculated by: multiplying the intensity value for the unfortified aliquot by the volume (Liters) and concentration (mg/L or mg/kg) of the standard addition to make the numerator; the difference in intensities for the fortified sample and unfortified sample is multiplied by the volume (Liters) of the sample aliquot for the denominator. The quotient is the sample concentration.

For more than one fortified portion of the prepared sample, linear regression analysis can be applied using a computer or calculator program to obtain the concentration of the sample solution.

NOTE: Refer to Method 7000 for a more detailed discussion of the MSA.

7.8 An alternative to using the method of standard additions is the internal standard technique. Add one or more elements not in the samples and verified not to cause an interelement spectral interference to the samples, standards and blanks; yttrium or scandium are often used. The concentration should be sufficient for optimum precision but not so high as to alter the salt concentration of the matrix. The element intensity is used by the instrument as an internal standard to ratio the analyte intensity signals for both calibration and quantitation. This technique is very useful in overcoming matrix interferences especially in high solids matrices.

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection. All quality control measures described in Chapter One should be followed.

8.2 Dilute and reanalyze samples that exceed the linear calibration range or use an alternate, less sensitive line for which quality control data is already established.

8.3 Employ a minimum of one method blank per sample batch to determine if contamination or any memory effects are occurring. A method blank is a volume of reagent water carried through the same preparation process as a sample (refer to Chapter One).

8.4 Analyze matrix spiked duplicate samples at a frequency of one per matrix batch. A matrix duplicate sample is a sample brought through the entire sample preparation and analytical process in duplicate.

8.4.1.1 The relative percent difference between spiked matrix duplicate determinations is to be calculated as follows:

$$RPD=\frac{|D_1-D_2|}{(|D_1+D_2|)/2}\times 100$$

where:

RPD = relative percent difference.
D_1 = first sample value.
D_2 = second sample value (replicate).

(A control limit of ± 20% RPD or within the documented historical acceptance limits for each matrix shall be used for sample values greater than ten times the instrument detection limit.)

8.4.1.2 The spiked sample or spiked duplicate sample recovery is to be within ± 25% of the actual value or within the documented historical acceptance limits for each matrix.

8.5 It is recommended that whenever a new or unusual sample matrix is encountered, a series of tests be performed prior to reporting concentration data for analyte elements. These tests, as outlined in Sections 8.5.1 and 8.5.2, will ensure that neither positive nor negative interferences are operating on any of the analyte elements to distort the accuracy of the reported values.

8.5.1 Dilution Test: If the analyte concentration is sufficiently high (minimally, a factor of 10 above the instrumental detection limit after dilution), an analysis of a 1:5 dilution should agree within ± 10% of the original determination. If not, a chemical or physical interference effect should be suspected.

8.5.2 Post Digestion Spike Addition: An analyte spike added to a portion of a prepared sample, or its dilution, should be recovered to within 75% to 125% of the known value. The spike addition should produce a minimum level of 10 times and a maximum of 100 times the instrumental detection limit. If the spike is not recovered within the specified limits, a matrix effect should be suspected.

CAUTION: If spectral overlap is suspected, use of computerized compensation, an alternate wavelength, or comparison with an alternate method is recommended.

8.6 Check the instrument standardization by analyzing appropriate QC samples as follows.

8.6.1 Verify calibration with the Continuing Calibration Verification (CCV) Standard immediately following daily calibration, after every ten samples, and at the end of an analytical run. Check calibration with an ICV following the initial calibration (Section 5.6). At the laboratory's discretion, an ICV may be used in lieu of the continuing calibration verifications. If used in this manner, the ICV should be at a concentration near the mid-point of the calibration curve. Use a calibration blank (Section 5.5.1) immediately following daily calibration, after every 10 samples and at the end of the analytical run.

8.6.1.1 The results of the ICV and CCVs are to agree within 10% of the expected value; if not, terminate the analysis, correct the problem, and recalibrate the instrument.

8.6.1.2 The results of the check standard are to agree within 10% of the expected value; if not, terminate the analysis, correct the problem, and recalibrate the instrument.

8.6.1.3 The results of the calibration blank are to agree within three times the IDL. If not, repeat the analysis two more times and average the results. If the average is not within three standard deviations of the background mean, terminate the analysis, correct the problem, recalibrate, and reanalyze the previous 10 samples. If the blank is less than 1/10 the concentration of the action level of interest, and no sample is within ten percent of the action limit, analyses need not be rerun and recalibration need not be performed before continuation of the run.

8.6.2 Verify the interelement and background correction factors at the beginning of each analytical run. Do this by analyzing the interference check sample (Section 5.8). Results should be within ± 20% of the true value.

9.0 METHOD PERFORMANCE

9.1 In an EPA round-robin Phase 1 study, seven laboratories applied the ICP technique to acid-distilled water matrices that had been spiked with various metal concentrates. Table 4 lists the true values, the mean reported values, and the mean percent relative standard deviations.

9.2 Performance data for aqueous solutions and solid samples from a multilaboratory study (9) are provided in Tables 5 and 6.

10.0 REFERENCES

1. Boumans, P.W.J.M. Line Coincidence Tables for Inductively Coupled Plasma Atomic Emission Spectrometry, 2nd Edition. Pergamon Press, Oxford, United Kingdom, 1984.

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4. 1985 Annual Book of ASTM Standards, Vol. 11.01; "Standard Specification for Reagent Water"; ASTM: Philadelphia, PA, 1985; D1193-77.

5. Jones, C.L. et al. An Interlaboratory Study of Inductively Coupled Plasma Atomic Emission Spectroscopy Method 6010 and Digestion Method 3050. EPA-600/4-87-032, U.S. Environmental Protection Agency, Las Vegas, Nevada, 1987.

TABLE 1
RECOMMENDED WAVELENGTHS AND ESTIMATED INSTRUMENTAL DETECTION LIMITS

Detection Element	Wavelength[a] (nm)	Estimated IDL[b] (µg/L)
Aluminum	308.215	30
Antimony	206.833	21
Arsenic	193.696	35
Barium	455.403	0.87
Beryllium	313.042	0.18
Boron	249.678x2	3.8
Cadmium	226.502	2.3
Calcium	317.933	6.7
Chromium	267.716	4.7
Cobalt	228.616	4.7
Copper	324.754	3.6
Iron	259.940	4.1
Lead	220.353	28
Lithium	670.784	2.8
Magnesium	279.079	20
Manganese	257.610	0.93
Mercury	194.227x2	17
Molybdenum	202.030	5.3
Nickel	231.604x2	10
Phosphorus	213.618	51
Potassium	766.491	See note c
Selenium	196.026	50
Silica (SiO_2)	251.611	17
Silver	328.068	4.7
Sodium	588.995	19
Strontium	407.771	0.28
Thallium	190.864	27
Tin	189.980x2	17
Titanium	334.941	5.0
Vanadium	292.402	5.0
Zinc	213.856x2	1.2

[a] The wavelengths listed (where x2 indicates second order) are recommended because of their sensitivity and overall acceptance. Other wavelengths may be substituted (e.g., in the case of an interference) if they can provide the needed sensitivity and are treated with the same corrective techniques for spectral interference (see Section 3.1). In time, other elements may be added as more information becomes available and as required.

[b] The estimated instrumental detection limits shown are provided as a guide for an instrumental limit. The actual method detection limits are sample dependent and may vary as the sample matrix varies.

[c] Highly dependent on operating conditions and plasma position.

TABLE 2
POTENTIAL INTERFERENCES
ANALYTE CONCENTRATION EQUIVALENTS ARISING FROM INTERFERENCE AT THE 100-mg/L LEVEL[c]

Analyte	Wavelength (nm)	Interferant[a,b]									
		Al	Ca	Cr	Cu	Fe	Mg	Mn	Ni	Ti	V
Aluminum	308.215	--	--	--	--	--	--	0.21	--	--	1.4
Antimony	206.833	0.47	--	2.9	--	0.08	--	--	--	0.25	0.45
Arsenic	193.696	1.3	--	0.44	--	--	--	--	--	--	1.1
Barium	455.403	--	--	--	--	--	--	--	--	--	--
Beryllium	313.042	--	--	--	--	--	--	--	--	0.04	0.05
Cadmium	226.502	--	--	--	--	0.03	--	--	0.02	--	--
Calcium	317.933	--	--	0.08	--	0.01	0.01	0.04	--	0.03	0.03
Chromium	267.716	--	--	--	--	0.003	--	0.04	--	--	0.04
Cobalt	228.616	--	--	0.03	--	0.005	--	--	0.03	0.15	--
Copper	324.754	--	--	--	--	0.003	--	--	--	0.05	0.02
Iron	259.940	--	--	--	--	--	--	0.12	--	--	--
Lead	220.353	0.17	--	--	--	--	--	--	--	--	--
Magnesium	279.079	--	0.02	0.11	--	0.13	--	0.25	--	0.07	0.12
Manganese	257.610	0.005	--	0.01	--	0.002	0.002	--	--	--	--
Molybdenum	202.030	0.05	--	--	--	0.03	--	--	--	--	--
Nickel	231.604	--	--	--	--	--	--	--	--	--	--
Selenium	196.026	0.23	--	--	--	0.09	--	--	--	--	--
Sodium	588.995	--	--	--	--	--	--	--	--	0.08	--
Thallium	190.864	0.30	--	--	--	--	--	--	--	--	--
Vanadium	292.402	--	--	0.05	--	0.005	--	--	--	0.02	--
Zinc	213.856	--	--	--	0.14	--	--	--	0.29	--	--

[a] Dashes indicate that no interference was observed even when interferents were introduced at the following levels:

Al - 1000 mg/L
Ca - 1000 mg/L
Cr - 200 mg/L
Cu - 200 mg/L
Fe - 1000 mg/L
Mg - 1000 mg/L
Mn - 200 mg/L
Tl - 200 mg/L
V - 200 mg/L

[b] The figures recorded as analyte concentrations are not the actual observed concentrations; to obtain those figures, add the listed concentration to the interferant figure.

[c] Interferences will be affected by background choice and other interferences may be present.

TABLE 3
MIXED STANDARD SOLUTIONS

Solution	Elements
I	Be, Cd, Mn, Pb, Se and Zn
II	Ba, Co, Cu, Fe, and V
III	As, Mo
IV	Al, Ca, Cr, K, Na, Ni,Li, and Sr
V	Ag (see "NOTE" to Section 5.4), Mg, Sb, and Tl
VI	P

TABLE 4. ICP PRECISION AND ACCURACY DATA[a]

E ent	Sample No. 1				Sample No. 2				Sample No. 3			
	True Conc. (ug/L)	Mean Conc. (ug/L)	RSD[b] (%)	Accuracy[d] (%)	True Conc. (ug/L)	Mean Conc. (ug/L)	RSD[b]	Accuracy[d] (%)	True Conc. (ug/L)	Mean Conc. (ug/L)	RSD[b] (%)	Accuracy[d] (%)
B	750	733	6.2	98	20	20	9.8	100	180	176	5.2	98
M	350	345	2.7	99	15	15	6.7	100	100	99	3.3	99
V	750	749	1.8	100	70	69	2.9	99	170	169	1.1	99
A	200	208	7.5	104	22	19	23	86	60	63	17	105
C	150	149	3.8	99	10	10	18	100	50	50	3.3	100
C	250	235	5.1	94	11	11	40	100	70	67	7.9	96
F	600	594	3.0	99	20	19	15	95	180	178	6.0	99
A	700	696	5.6	99	60	62	33	103	160	161	13	101
C	50	48	12	96	2.5	2.9	16	116	14	13	16	93
C	700	512	10	73	20	20	4.1	100	120	108	21	90
N	250	245	5.8	98	30	28	11	93	60	55	14	92
P	250	236	16	94	24	30	32	125	80	80	14	100
Z	200	201	5.6	100	16	19	45	119	80	82	9.4	102
S	40	32	21.9	80	6	8.5	42	142	10	8.5	8.3	85

[a] Nc all elements were analyzed by all laboratories.
[b] RS) = relative standard deviation.
[c] Re ults for Se are from two laboratories.
[d] Ac iracy is expressed as the mean concentration divided by the true concentration times 100.

TABLE 5

ICP-AES PRECISION AND ACCURACY FOR AQUEOUS SOLUTIONS[a]

Element	Mean Conc. (mg/L)	N[b]	RSD[b] (%)	Accuracy[c] (%)
Al	14.8	8	6.3	100
Sb	15.1	8	7.7	102
As	14.7	7	6.4	99
Ba	3.66	7	3.1	99
Be	3.78	8	5.8	102
Cd	3.61	8	7.0	97
Ca	15.0	8	7.4	101
Cr	3.75	8	8.2	101
Co	3.52	8	5.9	95
Cu	3.58	8	5.6	97
Fe	14.8	8	5.9	100
Pb	14.4	7	5.9	97
Mg	14.1	8	6.5	96
Mn	3.70	8	4.3	100
Mo	3.70	8	6.9	100
Ni	3.70	7	5.7	100
K	14.1	8	6.6	95
Se	15.3	8	7.5	104
Ag	3.69	6	9.1	100
Na	14.0	8	4.2	95
Tl	15.1	7	8.5	102
V	3.51	8	6.6	95
Zn	3.57	8	8.3	96

[a] these performance values are independent of sample preparation because the labs analyzed portions of the same solutions

[b] N = Number of measurements for mean and relative standard deviation (RSD).

[c] Accuracy is expressed as a percentage of the nominal value for each analyte in acidified, multi-element solutions.

TABLE 6

ICP-AES PRECISION AND BIAS FOR SOLID WASTE DIGESTS[a]

	Spiked Coal Fly Ash (NIST-SRM 1633a)				Spiked Electroplating Sludge			
Element	Mean Conc. (mg/L)	N[b]	RSD[b] (%)	Bias[c] (%AAS)	Mean Conc. (mg/L)	N[b]	RSD[b] (%)	Bias[c] (%AAS)
Al	330	8	16	104	127	8	13	110
Sb	3.4	6	73	96	5.3	7	24	120
As	21	8	83	270	5.2	7	8.6	87
Ba	133	8	8.7	101	1.6	8	20	58
Be	4.0	8	57	460	0.9	7	9.9	110
Cd	0.97	6	5.7	101	2.9	7	9.9	90
Ca	87	6	5.6	208	954	7	7.0	97
Cr	2.1	7	36	106	154	7	7.8	93
Co	1.2	6	21	94	1.0	7	11	85
Cu	1.9	6	9.7	118	156	8	7.8	97
Fe	602	8	8.8	102	603	7	5.6	98
Pb	4.6	7	22	94	25	7	5.6	98
Mg	15	8	15	110	35	8	20	84
Mn	1.8	7	14	104	5.9	7	9.6	95
Mo	891	8	19	105	1.4	7	36	110
Ni	1.6	6	8.1	91	9.5	7	9.6	90
K	46	8	4.2	98	51	8	5.8	82
Se	6.4	5	16	73	8.7	7	13	101
Ag	1.4	3	17	140	0.75	7	19	270
Na	20	8	49	130	1380	8	9.8	95
Tl	6.7	4	22	260	5.0	7	20	180
V	1010	5	7.5	100	1.2	6	11	80
Zn	2.2	6	7.6	93	266	7	2.5	101

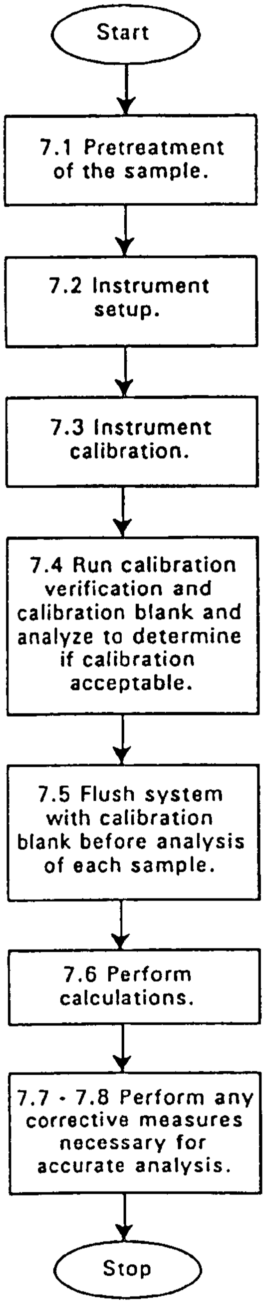
[a] These performance values are independent of sample preparation because the labs analyzed portions of the same digests.

[b] N = Number of measurements for mean and relative standard deviation (RSD).

[c] Bias for the ICP-AES data is expressed as a percentage of atomic absorption spectroscopy (AA) data for the same digests.

METHOD 6010B

INDUCTIVELY COUPLED PLASMA-ATOMIC EMISSION SPECTROMETRY



APPENDIX C

ANALYTICAL METHODS

METHOD 6010B

INDUCTIVELY COUPLED PLASMA-ATOMIC EMISSION SPECTROMETRY

1.0 SCOPE AND APPLICATION

1.1 Inductively coupled plasma-atomic emission spectrometry (ICP-AES) determines trace elements, including metals, in solution. The method is applicable to all of the elements listed in Table 1. All matrices, excluding filtered groundwater samples but including ground water, aqueous samples, TCLP and EP extracts, industrial and organic wastes, soils, sludges, sediments, and other solid wastes, require digestion prior to analysis. Groundwater samples that have been prefiltered and acidified will not need acid digestion. Samples which are not digested must either use an internal standard or be matrix matched with the standards. Refer to Chapter Three for the appropriate digestion procedures.

1.2 Table 1 lists the elements for which this method is applicable. Detection limits, sensitivity, and the optimum and linear concentration ranges of the elements can vary with the wavelength, spectrometer, matrix and operating conditions. Table 1 lists the recommended analytical wavelengths and estimated instrumental detection limits for the elements in clean aqueous matrices. The instrument detection limit data may be used to estimate instrument and method performance for other sample matrices. Elements and matrices other than those listed in Table 1 may be analyzed by this method if performance at the concentration levels of interest (see Section 8.0) is demonstrated.

1.3 Users of the method should state the data quality objectives prior to analysis and must document and have on file the required initial demonstration performance data described in the following sections prior to using the method for analysis.

1.4 Use of this method is restricted to spectroscopists who are knowledgeable in the correction of spectral, chemical, and physical interferences described in this method.

2.0 SUMMARY OF METHOD

2.1 Prior to analysis, samples must be solubilized or digested using appropriate Sample Preparation Methods (e.g. Chapter Three). When analyzing groundwater samples for dissolved constituents, acid digestion is not necessary if the samples are filtered and acid preserved prior to analysis.

2.2 This method describes multielemental determinations by ICP-AES using sequential or simultaneous optical systems and axial or radial viewing of the plasma. The instrument measures characteristic emission spectra by optical spectrometry. Samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific emission spectra are produced by a radio-frequency inductively coupled plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the emission lines are monitored by photosensitive devices. Background correction is required for trace element determination. Background must be measured adjacent to analyte lines on samples during analysis. The position selected for the background-intensity measurement, on either or both sides of the analytical line, will be determined by the complexity of the spectrum adjacent to the analyte line. In one mode of analysis the position used should be as free as possible from spectral interference and should reflect the same change in background intensity as occurs at the analyte wavelength measured. Background correction is not required in cases of line broadening where a background correction measurement would actually degrade the analytical result. The possibility of additional interferences named in Section 3.0 should also be recognized and appropriate corrections made; tests for their presence are described in Section 8.5. Alternatively, users may choose multivariate calibration methods. In this case, point selections for background correction are superfluous since whole spectral regions are processed.

3.0 INTERFERENCES

3.1 Spectral interferences are caused by background emission from continuous or recombination phenomena, stray light from the line emission of high concentration elements, overlap of a spectral line from another element, or unresolved overlap of molecular band spectra.

3.1.1 Background emission and stray light can usually be compensated for by subtracting the background emission determined by measurements adjacent to the analyte wavelength peak. Spectral scans of samples or single element solutions in the analyte regions may indicate when alternate wavelengths are desirable because of severe spectral interference. These scans will also show whether the most appropriate estimate of the background emission is provided by an interpolation from measurements on both sides of the wavelength peak or by measured emission on only one side. The locations selected for the measurement of background intensity will be determined by the complexity of the spectrum adjacent to the wavelength peak. The locations used for routine measurement must be free of off-line spectral interference (interelement or molecular) or adequately corrected to reflect the same change in background intensity as occurs at the wavelength peak. For multivariate methods using whole spectral regions, background scans should be included in the correction algorithm. Off-line spectral interferences are handled by including spectra on interfering species in the algorithm.

3.1.2 To determine the appropriate location for off-line background correction, the user must scan the area on either side adjacent to the wavelength and record the apparent emission intensity from all other method analytes. This spectral information must be documented and kept on file. The location selected for background correction must be either free of off-line interelement spectral interference or a computer routine must be used for automatic correction on all determinations. If a wavelength other than the recommended wavelength is used, the analyst must determine and document both the overlapping and nearby spectral interference effects from all method analytes and common elements and provide for their automatic correction on all analyses. Tests to determine spectral interference must be done using analyte concentrations that will adequately describe the interference. Normally, 100 mg/L single element solutions are sufficient; however, for analytes such as iron that may be found at high concentration, a more appropriate test would be to use a concentration near the upper analytical range limit.

3.1.3 Spectral overlaps may be avoided by using an alternate wavelength or can be compensated by equations that correct for interelement contributions. Instruments that use equations for interelement correction **require** the interfering elements be analyzed at the same time as the element of interest. When operative and uncorrected, interferences will produce false positive determinations and be reported as analyte concentrations. More extensive information on interferant effects at various wavelengths and resolutions is available in reference wavelength tables and books. Users may apply interelement correction equations determined on their instruments with tested concentration ranges to compensate (off line or on line) for the effects of interfering elements. Some potential spectral interferences observed for the recommended wavelengths are given in Table 2. For multivariate methods using whole spectral regions, spectral interferences are handled by including spectra of the interfering elements in the algorithm. The interferences listed are only those that occur between method analytes. Only interferences of a direct overlap nature are listed. These overlaps were observed with a single instrument having a working resolution of 0.035 nm.

3.1.4 When using interelement correction equations, the interference may be expressed as analyte concentration equivalents (i.e. false analyte concentrations) arising from 100 mg/L of the interference element. For example, assume that As is to be determined (at 193.696 nm) in a sample containing approximately 10 mg/L of Al. According to Table 2, 100 mg/L of Al would yield a false signal for As equivalent to approximately 1.3 mg/L. Therefore, the presence of 10 mg/L of Al would result in a false signal for As equivalent to approximately 0.13 mg/L. The user is cautioned that other instruments may exhibit somewhat different levels of interference than those shown in Table 2. The interference effects must be evaluated for each individual instrument since the intensities will vary.

3.1.5 Interelement corrections will vary for the same emission line among instruments because of differences in resolution, as determined by the grating, the entrance and exit slit widths, and by the order of dispersion. Interelement corrections will also vary depending upon the choice of background correction points. Selecting a background correction point where an interfering emission line may appear should be avoided when practical. Interelement corrections that constitute a major portion of an emission signal may not yield accurate data. Users should not forget that some samples may contain uncommon elements that could contribute spectral interferences.

3.1.6 The interference effects must be evaluated for each individual instrument whether configured as a sequential or simultaneous instrument. For each instrument, intensities will vary not only with optical resolution but also with operating conditions (such as power, viewing height and argon flow rate). When using the recommended wavelengths, the analyst is required to determine and document for each wavelength the effect from referenced interferences (Table 2) as well as any other suspected interferences that may be specific to the instrument or matrix. The analyst is encouraged to utilize a computer routine for automatic correction on all analyses.

3.1.7 Users of sequential instruments must verify the absence of spectral interference by scanning over a range of 0.5 nm centered on the wavelength of interest for several samples. The range for lead, for example, would be from 220.6 to 220.1 nm. This procedure must be repeated whenever a new matrix is to be analyzed and when a new calibration curve using different instrumental conditions is to be prepared. Samples that show an elevated background emission across the range may be background corrected by applying a correction factor equal to the emission adjacent to the line or at two points on either side of the line and interpolating between them. An alternate wavelength that does not exhibit a background shift or spectral overlap may also be used.

3.1.8 If the correction routine is operating properly, the determined apparent analyte(s) concentration from analysis of each interference solution should fall within a specific concentration range around the calibration blank. The concentration range is calculated by multiplying the concentration of the interfering element by the value of the correction factor being tested and divided by 10. If after the subtraction of the calibration blank the apparent analyte concentration falls outside of this range in either a positive or negative direction, a change in the correction factor of more than 10% should be suspected. The cause of the change should be determined and corrected and the correction factor updated. The interference check solutions should be analyzed more than once to confirm a change has occurred. Adequate rinse time between solutions and before analysis of the calibration blank will assist in the confirmation.

3.1.9 When interelement corrections are applied, their accuracy should be verified, daily, by analyzing spectral interference check solutions. If the correction factors or multivariate correction matrices tested on a daily basis are found to be within the 20% criteria for 5 consecutive days, the required verification frequency of those factors in compliance may be extended to a weekly basis. Also, if the nature of the samples analyzed is such they do not contain concentrations of the interfering elements at ± one reporting limit from zero, daily verification is not required. All interelement spectral correction factors or multivariate correction matrices must be verified and updated every six months or when an instrumentation change, such as in the torch, nebulizer, injector, or plasma conditions occurs. Standard solution should be inspected to ensure that there is no contamination that may be perceived as a spectral interference.

3.1.10 When interelement corrections are <u>not</u> used, verification of absence of interferences is required.

3.1.10.1 One method is to use a computer software routine for comparing the determinative data to limits files for notifying the analyst when an interfering element is detected in the sample at a concentration that will produce either an apparent false positive concentration, (i.e., greater than) the analyte instrument detection limit, or false negative analyte concentration, (i.e., less than the lower control limit of the calibration blank defined for a 99% confidence interval).

3.1.10.2 Another method is to analyze an Interference Check Solution(s) which contains similar concentrations of the major components of the samples (>10 mg/L) on a continuing basis to verify the absence of effects at the wavelengths selected. These data must be kept on file with the sample analysis data. If the check solution confirms an operative interference that is $\geq$ 20% of the analyte concentration, the analyte must be determined using (1) analytical and background correction wavelengths (or spectral regions) free of the interference, (2) by an alternative wavelength, or (3) by another documented test procedure.

3.2 Physical interferences are effects associated with the sample nebulization and transport processes. Changes in viscosity and surface tension can cause significant inaccuracies, especially in samples containing high dissolved solids or high acid concentrations. If physical interferences are present, they must be reduced by diluting the sample or by using a peristaltic pump, by using an internal standard or by using a high solids nebulizer. Another problem that can occur with high dissolved solids is salt buildup at the tip of the nebulizer, affecting aerosol flow rate and causing instrumental drift. The problem can be controlled by wetting the argon prior to nebulization, using a tip washer, using a high solids nebulizer or diluting the sample. Also, it has been reported that better control of the argon flow rate, especially to the nebulizer, improves instrument performance: this may be accomplished with the use of mass flow controllers. The test described in Section 8.5.1 will help determine if a physical interference is present.

3.3 Chemical interferences include molecular compound formation, ionization effects, and solute vaporization effects. Normally, these effects are not significant with the ICP technique, but if observed, can be minimized by careful selection of operating conditions (incident power, observation position, and so forth), by buffering of the sample, by matrix matching, and by standard addition procedures. Chemical interferences are highly dependent on matrix type and the specific analyte element.

3.4 Memory interferences result when analytes in a previous sample contribute to the signals measured in a new sample. Memory effects can result from sample deposition on the uptake tubing to the nebulizer and from the build up of sample material in the plasma torch and spray chamber. The site where these effects occur is dependent on the element and can be minimized by flushing the system with a rinse blank between samples. The possibility of memory interferences should be recognized within an analytical run and suitable rinse times should be used to reduce them. The rinse times necessary for a particular element must be estimated prior to analysis. This may be achieved by aspirating a standard containing elements at a concentration ten times the usual amount or at the top of the linear dynamic range. The aspiration time for this sample should be the same as a normal sample analysis period, followed by analysis of the rinse blank at designated intervals. The length of time required to reduce analyte signals to within a factor of two of the method detection limit should be noted. Until the required rinse time is established, this method suggests a rinse period of at least 60 seconds between samples and standards. If a memory interference is suspected, the sample must be reanalyzed after a rinse period of sufficient length. Alternate rinse times may be established by the analyst based upon their DQOs.

3.5 Users are advised that high salt concentrations can cause analyte signal suppressions and confuse interference tests. If the instrument does not display negative values, fortify the interference check solution with the elements of interest at 0.5 to 1 mg/L and measure the added standard concentration accordingly. Concentrations should be within 20% of the true spiked concentration or dilution of the samples will be necessary. In the absence of measurable analyte, overcorrection could go undetected if a negative value is reported as zero.

3.6 The dashes in Table 2 indicate that no measurable interferences were observed even at higher interferant concentrations. Generally, interferences were discernible if they produced peaks, or background shifts, corresponding to 2 to 5% of the peaks generated by the analyte concentrations.

4.0 APPARATUS AND MATERIALS

4.1 Inductively coupled argon plasma emission spectrometer:

4.1.1 Computer-controlled emission spectrometer with background correction.

4.1.2 Radio-frequency generator compliant with FCC regulations.

4.1.3 Optional mass flow controller for argon nebulizer gas supply.

4.1.4 Optional peristaltic pump.

4.1.5 Optional Autosampler.

4.1.6 Argon gas supply - high purity.

4.2 Volumetric flasks of suitable precision and accuracy.

4.3 Volumetric pipets of suitable precision and accuracy.

5.0 REAGENTS

5.1 Reagent or trace metals grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination. If the purity of a reagent is in question analyze for contamination. If the concentration of the contamination is less than the MDL then the reagent is acceptable.

5.1.1 Hydrochloric acid (conc), HCl.

5.1.2 Hydrochloric acid (1:1), HCl. Add 500 mL concentrated HCl to 400 mL water and dilute to 1 liter in an appropriately sized beaker.

5.1.3 Nitric acid (conc), HNO_3.

5.1.4 Nitric acid (1:1), HNO_3. Add 500 mL concentrated HNO_3 to 400 mL water and dilute to 1 liter in an appropriately sized beaker.

5.2 Reagent Water. All references to water in the method refer to reagent water unless otherwise specified. Reagent water will be interference free. Refer to Chapter One for a definition of reagent water.

5.3 Standard stock solutions may be purchased or prepared from ultra- high purity grade chemicals or metals (99.99% pure or greater). All salts must be dried for 1 hour at 105°C, unless otherwise specified.

Note: This section does not apply when analyzing samples that have been prepared by Method 3040.

CAUTION: Many metal salts are extremely toxic if inhaled or swallowed. Wash hands thoroughly after handling.

Typical stock solution preparation procedures follow. Concentrations are calculated based upon the weight of pure metal added, or with the use of the element fraction and the weight of the metal salt added.

For metals:

$$\text{Concentration (ppm)} = \frac{\text{weight (mg)}}{\text{volume (L)}}$$

For metal salts:

$$\text{Concentration (ppm)} = \frac{\text{weight (mg) x mole fraction}}{\text{volume (L)}}$$

5.3.1 Aluminum solution, stock, 1 mL = 1000 µg Al: Dissolve 1.000 g of aluminum metal, weighed accurately to at least four significant figures, in an acid mixture of 4.0 mL of (1:1) HCl and 1.0 mL of concentrated HNO_3 in a beaker. Warm beaker slowly to effect solution. When dissolution is complete, transfer solution quantitatively to a 1-liter flask, add an additional 10.0 mL of (1:1) HCl and dilute to volume with reagent water.

NOTE: Weight of analyte is expressed to four significant figures for consistency with the weights below because rounding to two decimal places can contribute up to 4 % error for some of the compounds.

5.3.2 Antimony solution, stock, 1 mL = 1000 µg Sb: Dissolve 2.6673 g $K(SbO)C_4H_4O_6$ (element fraction Sb = 0.3749), weighed accurately to at least four significant figures, in water, add 10 mL (1:1) HCl, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.3 Arsenic solution, stock, 1 mL = 1000 µg As: Dissolve 1.3203 g of As_2O_3 (element fraction As = 0.7574), weighed accurately to at least four significant figures, in 100 mL of water containing 0.4 g NaOH. Acidify the solution with 2 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.4 Barium solution, stock, 1 mL = 1000 µg Ba: Dissolve 1.5163 g $BaCl_2$ (element fraction Ba = 0.6595), dried at 250°C for 2 hours, weighed accurately to at least four significant figures, in 10 mL water with 1 mL (1:1) HCl. Add 10.0 mL (1:1) HCl and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.5 Beryllium solution, stock, 1 mL = 1000 µg Be: Do not dry. Dissolve 19.6463 g $BeSO_4 \cdot 4H_2O$ (element fraction Be = 0.0509), weighed accurately to at least four significant figures, in water, add 10.0 mL concentrated HNO_3, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.6 Boron solution, stock, 1 mL = 1000 µg B: Do not dry. Dissolve 5.716 g anhydrous H_3BO_3 (B fraction = 0.1749), weighed accurately to at least four significant figures, in reagent water and dilute in a 1-L volumetric flask with reagent water. Transfer immediately after mixing in a clean polytetrafluoroethylene (PTFE) bottle to minimize any leaching of boron from the glass volumetric container. Use of a non-glass volumetric flask is recommended to avoid boron contamination from glassware.

5.3.7 Cadmium solution, stock, 1 mL = 1000 µg Cd: Dissolve 1.1423 g CdO (element fraction Cd = 0.8754), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Heat to increase rate of dissolution. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.8 Calcium solution, stock, 1 mL = 1000 µg Ca: Suspend 2.4969 g $CaCO_3$ (element Ca fraction = 0.4005), dried at 180°C for 1 hour before weighing, weighed accurately to at least four significant figures, in water and dissolve cautiously with a minimum amount of (1:1) HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.9 Chromium solution, stock, 1 mL = 1000 µg Cr: Dissolve 1.9231 g CrO_3 (element fraction Cr = 0.5200), weighed accurately to at least four significant figures, in water. When solution is complete, acidify with 10 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.10 Cobalt solution, stock, 1 mL = 1000 µg Co: Dissolve 1.00 g of cobalt metal, weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10.0 mL (1:1) HCl and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.11 Copper solution, stock, 1 mL = 1000 µg Cu: Dissolve 1.2564 g CuO (element fraction Cu = 0.7989), weighed accurately to at least four significant figures), in a minimum amount of (1:1) HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.12 Iron solution, stock, 1 mL = 1000 µg Fe: Dissolve 1.4298 g Fe_2O_3 (element fraction Fe = 0.6994), weighed accurately to at least four significant figures, in a warm mixture of 20 mL (1:1) HCl and 2 mL of concentrated HNO_3. Cool, add an additional 5.0 mL of concentrated HNO_3, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.13 Lead solution, stock, 1 mL = 1000 µg Pb: Dissolve 1.5985 g $Pb(NO_3)_2$ (element fraction Pb = 0.6256), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10 mL (1:1) HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.14 Lithium solution, stock, 1 mL = 1000 µg Li: Dissolve 5.3248 g lithium carbonate (element fraction Li = 0.1878), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HCl and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.15 Magnesium solution, stock, 1 mL = 1000 µg Mg: Dissolve 1.6584 g MgO (element fraction Mg = 0.6030), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10.0 mL (1:1) concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.16 Manganese solution, stock, 1 mL = 1000 µg Mn: Dissolve 1.00 g of manganese metal, weighed accurately to at least four significant figures, in acid mixture (10 mL concentrated HCl and 1 mL concentrated HNO_3) and dilute to volume in a 1,000 mL volumetric flask with water.

APPENDIX D

SOIL SAMPLING AND DECONTAMINATION PROCEDURES

Designation: D 5088 - 90

Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites[1]

This standard is issued under the fixed designation D 5088; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the decontamination of field equipment used in the sampling of soils, soil gas, sludges, surface water, and ground water at waste sites which are to undergo both physical and chemical analyses.

1.2 This practice is applicable only at sites where chemical (organic and inorganic) wastes are a concern and is not intended for use at radioactive or mixed (chemical and radioactive) waste sites.

1.3 Procedures are included for the decontamination of equipment which comes into contact with the sample matrix (sample contacting equipment) and for ancillary equipment that has not contacted the portion of sample to be analyzed (non-sample contacting equipment).

1.4 This practice is based on recognized methods by which equipment may be decontaminated. When collecting environmental matrix samples, one should become familiar with the site specific conditions. Based on these conditions and the purpose of the sampling effort, the most suitable method of decontamination can be selected to maximize the integrity of analytical and physical testing results.

1.5 This practice is applicable to most conventional sampling equipment constructed of metallic and synthetic materials. The manufacturer of a specific sampling apparatus should be contacted if there is concern regarding the reactivity of a decontamination rinsing agent with the equipment.

1.6 *This standard does not purport to address the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Document

2.1 *ASTM Standard:*

D 653 Terminology Relating to Soil, Rock, and Contained Fluids[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *contaminant*—an undesirable substance not normally present or an unusually high concentration of a naturally occurring substance in water or soil.

3.1.2 *control rinse water*—water used for equipment washing and rinsing having a known chemistry.

3.1.3 *decontamination*—the process of removing or reducing to a known level undesirable physical or chemical constituents, or both, from a sampling apparatus to maximize the representativeness of physical or chemical analyses proposed for a given sample.

3.1.4 *non-sample contacting equipment*—related equipment associated with the sampling effort, but that does not directly contact the sample (for example, augers, drilling rods, excavations machinery).

3.1.5 *quality assurance/quality control (QA/QC)*—the efforts completed to evaluate the accuracy and precision of a sampling or testing procedure, or both.

3.1.6 *sample contacting equipment*—equipment that comes in direct contact with the sample or portion of sample that will undergo chemical analyses or physical testing (for example, ground water well bailer, split-spoon sampler, soil gas sampling probe).

3.1.7 For definitions of other terms used in this practice, see Terminology D 653.

4. Summary of Practice

4.1 Two different procedures are presented for the decontamination of sample-contacting and non-sample contacting equipment. The procedures have been developed based on a review of current state and federal guidelines, as well as a summary of commonly employed procedures. In general, sample contacting equipment should be washed with a detergent solution followed by a series of control water, desorbing agents and deionized water rinses. Nonsample contacting equipment should be washed with a detergent solution and rinsed with control water. Although such techniques may be difficult to perform in the field, they may be necessary to most accurately evaluate low concentrations of the chemical constituent(s) of interest.

4.2 Prior to initiating a field program that will involve equipment decontamination, a site specific equipment decontamination protocol should be prepared for distribution to the individuals involved with the particular sampling program. Information to be presented in the protocol should include:

4.2.1 Site location and description,

4.2.2 Statement of the sampling program objective and desired precision and accuracy, that is, is sampling effort for gross qualitative evaluation or for trace concentration, parameter specific evaluations,

4.2.3 Summary of available information regarding soil type, hydrogeology, and anticipated chemistry of the materials to be sampled,

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[1] This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.14 on Geotechnics of Waste Management.

[2] *Annual Book of ASTM Standards*, Vol 04.08.

4.2.4 Listing of equipment to be used for sampling and materials needed for decontamination,

4.2.5 Detailed step by step procedure for equipment decontamination for each piece or type of equipment to be utilized and procedures for rinse fluids containment and disposal as appropriate,

4.2.6 Summary of QA/QC procedures and QA/QC samples to be collected to document decontamination completeness including specific type of chemical analyses and their associated detection limit, and

4.2.7 Outline of equipment decontamination verification report.

5. Significance and Use

5.1 An appropriately developed, executed and documented equipment decontamination procedure is an integral and essential part of waste site investigations. The benefits of its use include:

5.1.1 Minimizing the spread of contaminants within a study area and from site to site,

5.1.2 Reducing the potential for worker exposure by means of contact with contaminated sampling equipment, and

5.1.3 Improved data quality and reliability.

5.2 This practice is not a substitute for a well-documented Quality Assurance/Quality Control (QA/QC) program. Because the ultimate test of a decontamination procedure is its ability to minimize erroneous data, a reasonable QA/QC program must be implemented.

5.3 This practice may not be applicable to all waste sites. When a sampling effort is completed to determine only the general range of chemical concentrations of interest less rigorous decontamination procedures can be adequate. Investigators should have the flexibility to modify the decontamination procedures with due consideration for the sampling objective or if QA/QC documentation supports alternative decontamination methods.

5.4 At sites where the reactivity of sampling equipment to decontamination washes creates concern for the generation of undesirable chemical by-products, the use of dedicated sampling equipment should be considered.

5.5 This practice, where applicable, should be used before, between, and after the completion of sampling events.

6. Reagents

6.1 *Detergent*, non-phosphate detergent solution.[3]

6.2 *Acid rinse (inorganic desorbing agent)*, 10 % nitric or hydrochloric acid solution-made from reagent grade nitric or hydrochloric acid and deionized water (1 % is to be applied to low-carbon steel equipment).

6.3 *Solvent rinse (organic desorbing agent)*, isopropanol, acetone, or methanol; pesticide grade.

6.4 *Control rinse water*, preferably from a water system of known chemical composition.

6.5 *Deionized water*, organic-free reagent grade.

7. Procedure for Sample Contacting Equipment

7.1 At a minimum, sample contacting equipment should be washed with a detergent solution and rinsed with con water.

7.2 For programs requiring more rigorous decontam tion to meet the sampling or QA/QC objectives, the lowing procedures are indicated:

7.2.1 Wash with detergent solution, using a brush mad inert material to remove any particles or surface film.

7.2.1.1 For equipment that, because of internal mec nism or tubing cannot be adequately cleaned with a bru the decontamination solutions should be circulated thro the equipment.

7.2.2 Rinse thoroughly with control water.

7.2.3 Rinse with an inorganic desorbing agent (ma deleted if samples will not undergo inorganic chemi analysis).

7.2.4 Rinse with control water.

7.2.5 Rinse with organic desorbing agent (may be dele if samples will not undergo organic chemical analyses).

7.2.6 Rinse with deionized water.

7.2.7 Allow equipment to air dry prior to next use.

7.2.8 Wrap equipment for transport with inert mate (aluminum foil or plastic wrap) to direct contact w potentially contaminated material.

7.3 *Nonsample Contact Equipment:*

7.3.1 Clean the equipment with portable power washer steam cleaning machine. Alternatively, hand wash wi brush using detergent solution.

7.3.2 Rinse with control water.

7.3.3 The more rigorous decontamination procedur may be employed if necessary to meet sampling or QA/Q objectives.

7.4 Depending on site conditions, it may be appropria to contain spent decontamination rinse fluids. If this is th case the appropriate vessel[4] for fluid containment should used depending on the ultimate disposition of the materia.

7.5 Depending on site conditions, it may be desirable perform all equipment decontamination at a centraliz location as opposed to the location where the equipment w used. If this is the case, care must be taken to transport th equipment to the decontamination area such that the spre of contaminants is minimized.

8. Quality Assurance/Quality Control

8.1 It is important to document the effectiveness of th decontamination procedure. To that end the projects Q QC program should include provisions for the collection samples to evaluate the completeness of a specific decontam ination procedure. This could include:

8.1.1 Collection of rinse or wipe samples before the initi equipment decontamination prior to its use for sampling establish a base line level of contaminants residing on or the equipment,

8.1.2 Collection of final rinse or wipe samples afte equipment decontamination following its use, and

8.1.3 The frequency of sampling to demonstrate th completeness of equipment decontamination is depender upon objectives of the project as they relate to QA/QC A

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[3] [illegible] similar solution has been found suitable for this [illegible]

[4] A drum approved by the Department of Transportation or similar conta has been found suitable for this purpose.

minimum it is recommended after every ten decontamination washings.

9. Report

9.1 The activities completed for each equipment decontamination should be documented in writing. Included in this report should be the following information:

9.1.1 Site location, date, time, and weather,

9.1.2 Sample location where equipment was employed,

9.1.3 Location where decontamination was performed,

9.1.4 Individuals performing the decontamination,

9.1.5 Decontamination procedures,

9.1.6 Source of materials (solutions) used for decontamination,

9.1.7 Handling of rinse fluids and accumulates solids, if any, and

9.1.8 QA/QC sampling performed and analytical results of QA/QC samples whether completed in the field or laboratory subsequent to sampling event.

10. Keywords

10.1 contaminant; decontamination; sampling; waste

Designation: D 4700 - 91

Standard Guide for Soil Sampling from the Vadose Zone[1]

cope

1 This guide addresses procedures that may be used for taining soil samples from the vadose zone (unsaturated e). Samples can be collected for a variety of reasons uding the following:

1.1.1 Stratigraphic description,

1.1.2 Hydraulic conductivity testing,

1.3 Moisture content measurement,

1.4 Moisture release curve construction,

1.1.5 Geotechnical testing,

1.1.6 Soil gas analyses,

1.7 Microorganism extraction, or

1.8 Pore liquid and soils chemical analyses.

1.2 This guide focuses on methods that provide soil ples for chemical analyses of the soil or contained liquids ontaminants. However, comments on how methods may nodified for other objectives are included.

1.3 This guide does not describe sampling methods for fied deposits and rocks (for example, sandstone, shale, granite).

1.4 In general, it is prudent to perform all field work with least two people present. This increases safety and itates efficient data collection.

.5 The values stated in inch-pound units are to be arded as the standard. The SI units given in parentheses for information only.

6 *This standard does not purport to address all of the ety problems, if any, associated with its use. It is the ponsibility of the user of this standard to establish appro-te safety and health practices and determine the applica-y of regulatory limitations prior to use.*

eferenced Documents

.1 *ASTM Standards:*

420 Practice for Investigating and Sampling Soil and Rock for Engineering Purposes[2]

653 Terminology Relating to Soil, Rock, and Contained Fluids[2]

1452 Practice for Soil Investigation and Sampling by Auger Borings[2]

D 1586 Method for Penetration Test and Split-Barrel Sampling of Soils[2]

D 1587 Method for Thin-Walled Tube Sampling of Soils[2]

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)[2]

D 2607 Classification of Peats, Mosses, Humus, and Related Products[2]

D 3550 Method for Ring-Lined Barrel Sampling of Soils[2]

D 4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)[2]

D 4220 Practice for Preserving and Transporting Soil Samples[2]

3. Terminology

3.1 *Definitions:*

3.1.1 Except where noted, all terms and symbols in this guide are in accordance with the following publications. In order of consideration they are:

3.1.1.1 Terminology D 653.

3.1.1.2 *Compilation of ASTM Standard Terminology,*[3] and

3.1.1.3 *Webster's New Collegiate Dictionary.*[4]

3.1.2 For definitions and classifications of soil related terms used, refer to Practice D 2488 and Terminology D 653. Additional terms that require clarification are defined in 3.2.

3.2 *Descriptions of Terms Specific to This Standard:*

3.2.1 *cascading water*—perched ground water that enters a well casing via cracks or uncovered perforations, trickling, or pouring down the inside of the casing.

3.2.2 *sludge*—a water charged sedimentary deposit.

3.2.2.1 *Discussion*—The water-formed sedimentary deposit may include all suspended solids carried by the water and trace elements that were in solution in the water. Sludge usually does not cohere sufficiently to retain its physical shape when mechanical means are used to remove it from the surface on which it deposits, but it may be baked in place and be adherent.

4. Summary of Guide

4.1 Sampling vadose zone soil involves inserting into the ground a device that retains and recovers a sample. Devices and systems for vadose zone sampling are divided into two general groups, namely the following: samplers used in conjunction with hand operated devices; and samplers used

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his guide is under the jurisdiction of ASTM Committee D-18 on Soil and and is the direct responsibility of Subcommittee D18.21 on Ground Water Vadose Zone Investigations.

Annual Book of ASTM Standards, Vol 04.08.

[3] *Compilation of ASTM Standard Terminology,* Sixth edition, ASTM, 1916.

[4] *Webster's New Collegiate Dictionary,* Fifth edition, 1977.

Type of Sampler	Obtains Core Sample		Most Suitable Core Types		Operation in Stoney Soils		Most Suitable Soil Moisture Conditions			Access to Sample Sites During Poor Soil Conditions		Relative Sample Size		Labor Req'mts	
	Yes	No	Coh	Cohless	Fav	Unfav	Wet	Dry	Inter	Yes	No	Sm	Lg	Sngl	2/More
A. Drill Rig Samplers															
1 Multipurpose Drill Rig	◆		◆	◆	◆		◆	◆	◆	◆		◆	◆		
2 Split Barrel Drive Sampler	◆		◆		◆			◆			◆		◆		◆
3 Thin Walled Tube Sampler	◆		◆			◆			◆	◆			◆		◆
4 Piston Sampler	◆		◆			◆	◆			◆			◆		◆
5 Continuous Sample Tube system	◆		◆		◆		◆	◆	◆	◆		◆	◆		◆
6 Hand Held Power Auger		◆			◆					◆			◆		◆
B. Hand Operated Samplers															
1 Screw Type Auger		◆				◆	◆			◆		◆		◆	
2 Barrel Auger															
a Post Hole Auger		◆	◆		◆		◆			◆			◆	◆	
b Dutch Auger		◆	◆		◆		◆								
c Regular Barrel Auger		◆	◆		◆				◆	◆		◆		◆	
d Sand Auger		◆		◆	◆				◆	◆			◆	◆	
e Mud Auger		◆	◆		◆		◆			◆			◆	◆	
3. Tube-Type Sampler															
a Soil Sampling Tube															
(1) Wet Tip	◆					◆	◆			◆				◆	
(2) Dry Tip	◆					◆	◆			◆		◆		◆	
b Veihmeyer Tube	◆								◆			◆		◆	

FIG. 1 Criteria for Selecting Soil Sampling Equipment

in conjunction with multipurpose or auger drill rigs. This guide discusses these groups and their associated practices.

4.2 The discussion of each device is organized into three sections, describing the device, describing sampling methods, and limitations and advantages of its use.

4.3 This guide identifies and describes a number of sampling methods and samplers. It is advisable to consult available site-specific geological and hydrological data to assist in determining the sampling method and sampler best suited for a specific project. It is also advisable to contact a local firm providing the services required as not all sampling and drilling methods described in this guide are available nationwide.

5. Significance and Use

5.1 Chemical analyses of liquids, solids, and gases from the vadose zone can provide information on the presence, possible source, migration route, and physical-chemical behavior of contaminants. Remedial or mitigating measures can be formulated based on this information. This guide describes devices and procedures that can be used to obtain vadose zone soil samples.

5.2 Soil sampling is useful for the reasons presented in Section 1. However, it should be recognized that the general method is destructive, and that resampling at an exact location is not possible. Therefore, if a long term monitoring program is being designed, other methods for obtaining samples should be considered.

6. Criteria for Selecting Soil Samplers

6.1 Important criteria to consider when selecting devices for vadose zone soil sampling include the following:

6.1.1 Type of sample: An encased core sample, an uncased core sample, a depth-specific representative sample, or a sample according to requirements of the analyses,

6.1.2 Sample size requirements,

6.1.3 Suitability for sampling various soil types,

6.1.4 Maximum sampling depth,

6.1.5 Suitability for sampling soils under various moist conditions,

6.1.6 Ability to minimize cross contamination,

6.1.7 Accessibility to the sampling site, and

6.1.8 Personnel requirements.

6.2 The sampling devices described in this guide h been evaluated for these criteria. The results are summari in Fig. 1.

7. Sampling with Hand Operated Devices

7.1 These devices, that have mostly been developed agricultural purposes, include:

7.1.1 Screw-type augers,

7.1.2 Barrel augers,

7.1.3 Tube-type samplers,

7.1.4 Hand held power augers, and

7.1.5 Trench sampling with shovels in conjunction w machine excavations.

7.2 The advantages of using hand operated devices o drill rigs are the ease of equipment transport to locati with poor vehicle access, and the lower costs of setup a decontamination. However, a major disadvantage is th these devices are limited to shallower depths than drill rig

7.3 *Screw-Type Augers:*

7.3.1 *Description*—The screw or ship auger is essentiall small diameter (for example, 1.5 in. (3.81 cm)) wood au from which the cutting side flanges and tip have be removed (**1**)[5] (see Fig. 2(*a*)). According to the Soil Surv Staff (**1**), the spiral part of the auger should be about 7 in. (cm) long, with the distances between flights about the sa as the diameter (for example, 1.5 in.) of the auger. Th facilitates measuring the depth of penetration of the to Variations on this design include the closed spiral auger a the Jamaica open spiral auger (**2**) (see Fig. 2(*b*) and 1(*c*)). T

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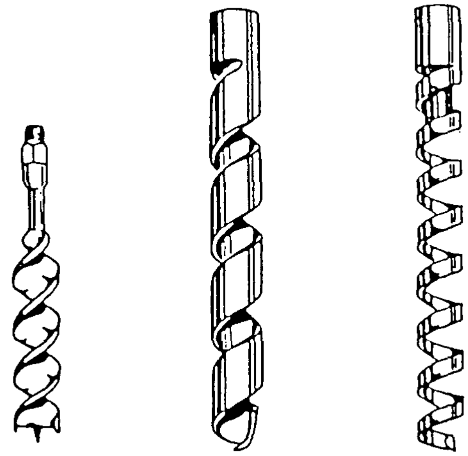
[5] The boldface numbers in parentheses refer to the list of references at the of the text.



(a) Ship Auger (b) Closed Auger (c) Jamaica Open Spiral Auger

FIG. 2 Screw Type Augers

auger is welded onto a length of solid or tubular rod. The upper end of this rod is threaded, to accept a handle or extension rods. As many extensions are used as are required to reach the target sampling depth. The rod and the extensions are marked in even increments (for example, in 6-in. (15.24-cm) increments) above the base of the auger to aid in determining drilling depth. A wooden or metal handle fits into a tee-type coupling, screwed into the uppermost extension rod.

7.3.2 *Sampling Method*—For drilling, the auger is rotated manually. The operator may have to apply downward pressure to start and embed the auger; afterwards, the auger screws itself into the soil. The auger is advanced to its full length, and then pulled up and removed. Soil from the deepest interval penetrated by the auger is retained on the auger flights. A sample can be collected from the flights using a spatula. A foot pump operated hydraulic system has been developed to advance augers up to 4.5 in. (11.43 cm) in diameter. This larger diameter allows insertion of other sampling devices into the drill hole, once the auger is removed, if desired (3).[6]

7.3.3 *Comments*—Samples obtained with screw-type samplers are disturbed and are not truly core samples. Therefore, the samples are not suitable for tests requiring undisturbed samples, such as hydraulic conductivity tests. In addition, soil structures are disrupted and small scale lithologic features cannot be examined. Nevertheless, screw-type samplers are still suitable for use in collecting sampl for the purpose of detecting contaminants. However, it i difficult to avoid transporting shallow soils downward whe reentering a drill hole. When representative samples ar desired from a discrete interval, the borehole must be mad large enough to insert a sampler and extend it to the botto of the borehole without touching the sides of the borehole. I is suggested that a larger diameter auger be used to advanc and clear the borehole, then a smaller diameter aug sampler be used to obtain the sample. Screw-type auger work better in wet, cohesive soils than in dry, loose soil Sampling in very dry (for example, powdery) soils may n be possible with these augers as soils will not be retained o the auger flights. Also, if the soil contains gravel or roc fragments larger than about one tenth of the hole diamete drilling may not be possible (4).

7.4 *Barrel Augers:*

7.4.1 *Description*—The barrel auger consists of a bit wit cutting edges welded to a short tube or barrel within whic the soil sample is retained, welded in turn to shanks. Th shanks are welded to a threaded rod at the other en Extension rods are attached as required to reach the targ sampling depth. Extensions are marked in increments abo the base of the tool. The uppermost extension rod contains tee-type coupling for a handle. The auger is available i carbon steel and stainless steel with hardened steel cutti edges (5, 6).

7.4.2 *Sampling Method*—The auger is rotated to advanc the barrel into the ground. The operator may have to appl downward pressure to keep the auger advancing. When th barrel is filled, the unit is withdrawn from the soil cavity an a sample may be collected from the barrel.

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[6] This reference is manufacturer's literature, and it has not been subjected to technical review.

7.4.3 *Comments*—Barrel augers generally provide larger samples than screw-type augers. The augers can penetrate shallow clays, silts, and fine grained sands (7).[6] The augers do not work well in gravelly soils, caliche, or semi-lithified deposits. Samples obtained with barrel augers are disturbed and are not core samples. Therefore, the samples are not suitable for tests requiring undisturbed samples, such as hydraulic conductivity tests. Nevertheless, the samplers are still suitable for use in collecting samples for the purpose of detecting contaminants. Because the sample is retained inside the barrel, there is less of a chance of mixing it with soil from a shallower interval during insertion or withdrawal of the sampler. The following are five common barrel augers:

7.4.3.1 Post-hole augers (also called Iwan-type augers),
7.4.3.2 Dutch-type augers,
7.4.3.3 Regular or general purpose barrel augers,
7.4.3.4 Sand augers, and
7.4.3.5 Mud augers.

7.4.4 *Post-Hole Augers*—The most readily available barrel auger is the post-hole auger (also called the Iwan-type auger) (8). As shown in Fig. 3, the barrel consists of two-part cylindrical leaves rather than a complete cylinder and is slightly tapered toward the cutting bit. The taper and the cupped bit help to retain soils within the barrel. The barrel is available with a 3 to 12-in. (7.62 to 30.48-cm) diameter. There are two types of drilling systems, one has a single rod and handle, and the other has two handles. In stable, cohesive soils, the auger can be advanced up to 25 ft (7.62 m) (8).

7.4.5 *Dutch-Type Augers*—The Dutch-type auger (commercially developed by Eijkelkamp) is a smaller variation of the post-hole auger design. As shown in Fig. 4, the pointed bit is continuous with two, narrow part-cylindrical barrel segments, welded onto the shanks. The barrel generally has a 3 in. (7.62 cm) outside diameter. This tool is best suited for sampling wet, clayey soils.

7.4.6 *Regular or General Purpose Barrel Augers*—A sion of the barrel auger commonly used by soil scientists county agricultural agents is depicted in Fig. 5(*a*) and (*b* shown, the barrel is a complete cylinder. As with post-hole auger, the cutting blades are cupped so that so loosened and forced into the barrel as the unit is rotated pushed into the ground. Each filling of the barrel co sponds to a depth of penetration of 3 to 5 in. (7.62 to 1 cm) (1). The most popular barrel diameter is 3.5 in. (cm), but sizes ranging from 1.5 to 7 in. (3.81 to 17.78 cm) available (6).[6] Plastic, stainless steel, PTFE (polyte fluoroethylene) or aluminum liners can also be used (6 Extension rods are available in 4 ft (1.22 m) lengths. rods can be made from standard black pipe, from lightwe conduit or from seamless steel tubing. The extensions h evenly spaced marks to facilitate determining sample dep The regular barrel auger is suitable for use in loam type so

7.4.7 *Sand Augers*—For dry, sandy soils it may be ne sary to use a variation of the regular barrel auger t includes a specially-formed bit to retain the sample in barrel (see Fig. 5(*c*)). Sand augers with 2, 3, or 4-in. (5 7.62, or 10.16-cm) diameters are available (5).[6]

7.4.8 *Mud Augers*—Another variation on the regu barrel auger design is available for sampling wet, clayey so As shown in Fig. 5(*d*), the barrel is designed with open si to facilitate extraction of samples. The bits are the same those used on the regular barrel auger (6).[6] Mud augers w 2, 3, or 4-in. (5.08, 7.62, or 10.16-cm) diameters are availa (5).[6]

7.5 *Tube-Type Samplers:*

7.5.1 Tube-type samplers generally have proportion smaller diameters and greater body lengths than those barrel augers.

7.5.2 For sampling, these units are perched into the causing the tube to fill with material from the inter penetrated. The assembly is then pulled to the surface an sample can be collected from the tube. Since the device is

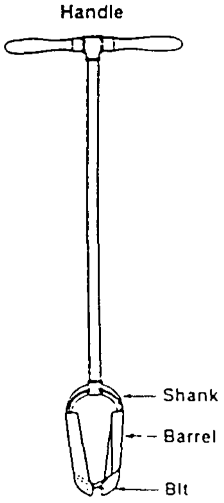


FIG. 3 Post-Hole Type Barrel Auger

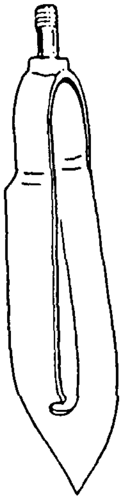
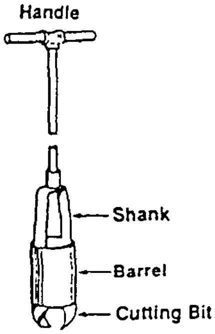
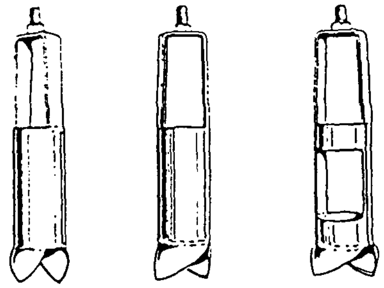


FIG. 4 Dutch Type Auger



(a) Regular Barrel Auger



(b) Regular Barrel Auger (c) Sand Auger (d) Mud Auger

FIG. 5 Barrel Auger Variations and Soil Moisture

rotated, a nearly undisturbed sample can be obtained. Commercial units are available with foot lever attachments, a hydraulic apparatus, or drop-hammers to aid in driving the sampler into the ground (5)[6]. Vibratory heads have also been developed to advance tube-type samplers (9).[6]

7.5.3 These units are not as suitable for sampling in compacted, gravelly soils as are the barrel augers. They are preferred if an undisturbed sample is required. Commonly used varieties of the tube type samplers include:

7.5.3.1 Soil sampling tubes (also called Lord samplers),

7.5.3.2 Veihmeyer tubes (also called King tubes),

7.5.3.3 Thin-walled tube samplers (also called Shelby tubes),

7.5.3.4 Ring-lined barrel samplers, and

7.5.3.5 Piston samplers.

7.5.4 *Soil Sampling Tubes:*

7.5.4.1 *Description*—As depicted in Fig. 6, the soil sampling tube consists of a hardened cutting tip, a cut-away barrel, and an uppermost threaded segment. The cut-away barrel allows textural examination and easy removal of soil samples. Generally, the tube is constructed from high strength alloy steel (**10**).[6] The samplers are available with 6, 12, 15, 18, and 24-in. (15.24, 30.48, 38.10, 45.72, 60.96-cm) lengths (5, 6). The tubes are available with 1.13 or 0.88-in. (2.87 or 2.23-cm) [illegible] diameter. [illegible] modified [illegible] of the tip are available, for sampling in wet or dry soils. The

7.5.6.3 *Comments*—Shelby tubes are best used in clays, silts, and fine-grained sands. If the soils are cohesionless, they may not be retained in the tube. If firm to very hard soils are encountered, driving (hammering) the sampler may be required. However, this should be avoided as the tube may buckle under the drive stress.

7.5.7 *Ring-Lined Barrel Samplers:*

7.5.7.1 *Description*—As described in Practice D 3550, the ring-lined barrel sampler consists of a one piece barrel or two split barrel halves, a drive shoe, rings, and a sampler head (see Fig. 9). The rings, that are usually brass, fit snugly inside the barrel and are designed to be directly inserted into geotechnical testing apparatuses when removed from the barrel. Most samplers are designed to hold at least two rings. The barrel is commonly 3.5 in. (8.89 cm) inside diameter and 3.94 to 5.91 in. (10 to 15 cm) long (5).[6] With these lengths, the barrel can be fitted with a variety of liners ranging in length from 1 to 2.36 in. (2.54 to 6 cm).

7.5.7.2 *Sampling Method*—The ring-lined barrel sampler can be driven or pushed into soil. Once retrieved, the sampler is disassembled, and the sample-filled rings are removed. The rings are usually removed as one unit and placed into a capped container. Alternately, the individual soil-filled rings can be capped with plastic or PTFE and then sealed with wax or adhesive tape (refer to Practice D 4220).

7.5.7.3 *Comments*—Because barrel samplers are more rigid than thin-walled tubes, they can be driven into hard soils and soils containing sands and gravels that might damage thin-walled tubes. The sampler provides samples i rings which can be handled without further disturbance the soil. Because of this, these devices are most often use when geotechnical or chemical analyses are to be performed.

7.5.8 *Piston Samplers:*

7.5.8.1 *Description*—Locally saturated (for example, b perched ground water), or cohesionless soils, and very so soils or sludges may not be retained in most samplers, even when fitted with retainer baskets or flap valves. Piston samplers can be used in these situations. The sampler consists of a sampling tube, extension pipe attached to the tube, an internal piston, and rods connected to the piston and running through the extension pipe (see Fig. 10). These samplers are often built, as needed, out of common PVC (for use in sludge) or steel pipe fittings. The sampling tube commonly has a 0.75 to 3-in. (1.91 to 7.62-cm) inside diameter and is 8 in. to 9 ft (20.32 cm to 2.74 m) long (13). A variation designed for sampling peat has a cone shaped piston (8).

7.5.8.2 *Sampling Method*—The sampler can be pushed into the ground with the handle or driven into the ground with a drop hammer (13). As the tube is advanced, the piston is held stationary or pulled upward with the attached rods. Once the tube has been advanced through the sampling interval, it is rotated to break suction that might have developed between the soil and the outside wall of the tube. The sampler is then pulled to the surface keeping the piston rod fixed with respect to the extension pipe. The sample is retained because of suction that develops between the piston and the sample. Upon retrieval, the sample is extruded by

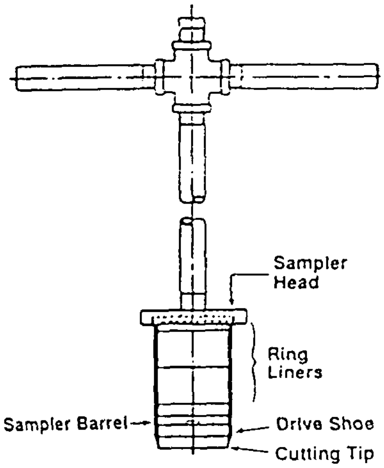


FIG. 9 Hand Operated Ring-Lined Barrel Sampler

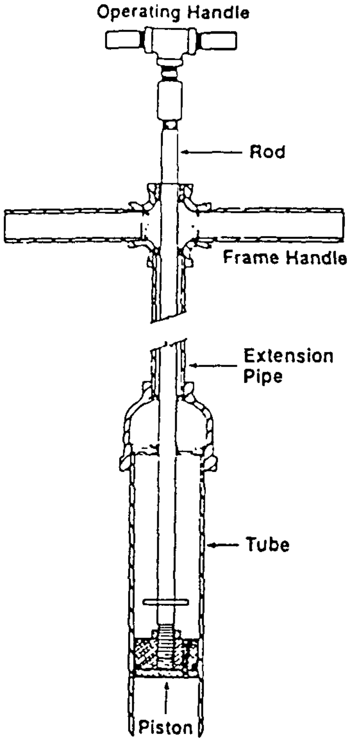


FIG. 10 Hand Operated Piston Sampler

using the piston to force the sample out of the tube. Sharma and De Dalta (**14**) described a cylindrical sampler for use in puddled soils that would flow back out of most samplers. The design includes a basal shutter that retains the sample while the sampler is withdrawn from the soil.

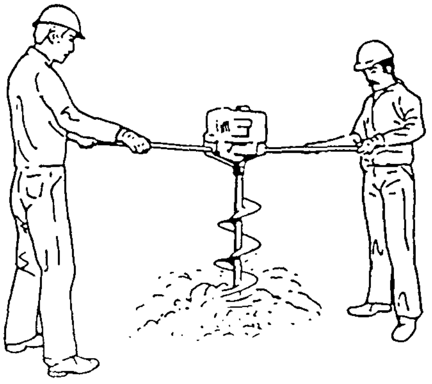
7.5.8.3 *Comments*—Because the sampler depends on development of suction between the sample and the piston, it may not work in unsaturated, coarse-grained sands and gravels. This is due to the high air permeability of such material that prevents the creation of high suction.

7.6 *Hand Held Power Augers:*

7.6.1 *Description*—A very simple, commercially available auger consists of a solid flight auger attached to and driven by a small air-cooled engine (see Fig. 11). Two handles on the head assembly allow two operators to guide the auger into the soil. Throttle and clutch controls are integrated into grips on the handles. Augers are available with diameters ranging from 2 to 16 in. (5.08 to 40.64 cm). The auger sections are commonly 3 ft (0.91 m) long.

7.6.2 *Sampling Method*—As the auger rotates into soil, cuttings advance up the flights and are discharged at the surface. Soil samples can be collected from the surface discharge, or from the auger flights after pulling the auger out of the ground. Alternatively, samples can be collected with other samplers (for example, a thin-walled tube) after auger removal.

7.6.3 *Comments*—As discussed in 7.3, if samples are collected from surface discharge or from the flights, they are disturbed and are not suitable for some uses. In addition, if samples are collected from surface discharge, it is difficult to



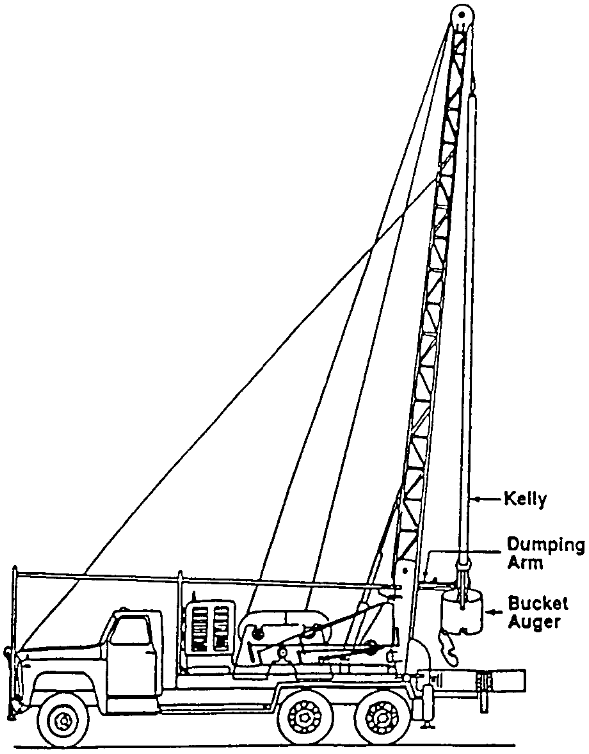


FIG. 13 Bucket Auger and Drilling Rig

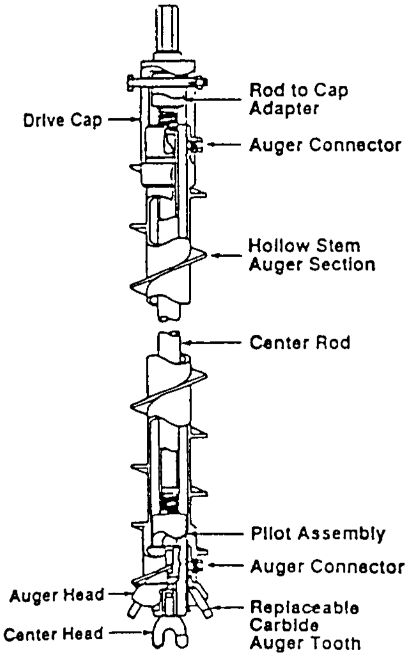


FIG. 14 Hollow-Stem Auger Components

column rotation. The cutting diameter is somewhat greater than the flighting diameter because of the protruding teeth. Auger sections are typically 5 ft (1.52 m) long and are interchangeable for assembly in an articulated but continuously flighted column. Drilling [illegible] shorter increments and sampling can be accomplished at any depth within that increment. Upon advancement of a 5 (1.52 m) increment, another 5 ft (1.52 m) section hollow-stem auger and center rod is added. Hollow-ste augers are readily available with 2.25, 2.75, 3.25, 3.75, 4.2 [illegible] 20.96-cm) inside diameters.

9.3.2 *Sampling Method*—The auger column and pilot assembly are advanced to the top of the desired sampling interval. Sampling is accomplished by removing the pilot assembly and center rod, if they are used, and inserting the sampler through the hollow stem of the auger column (see Fig. 15). The sampler may be lowered to the sampling depth by attaching it to center rods or by using a wireline assembly (**12**). When the sampler is attached to center rods, a sample is collected by pushing or driving the sampler into undisturbed soil with the rig hydraulic system or with a drop hammer. When a wireline is used, the sampler is locked into place ahead of the lower-most auger and advanced into the sampling interval by rotating the auger column (**18**).[6] Hollow stem augers with a 6.25-in. (15.88-cm) inside diameter allow the use of 5-in. (12.70-cm) outside diameter Shelby tubes and 4.5-in. (11.43-cm) outside diameter split barrel samplers (see 9.4).

9.3.3 *Comments*—The purpose of the center head (pilot) assembly is to prevent soils from entering the auger column as it is advanced (**19**). Driscoll (**17**) suggests that the assembly may be omitted when drilling through hard, silty and clayey soils as these materials will usually form a 2 to 4 in. (5.08 to 10.16 cm) long plug at the auger opening. However, Hackett (**19**) recommends that the pilot assembly be used when detailed samples are required. When perched water is encountered, "heaving sands" that move up into the auger column upon pilot assembly removal during sampling, may be a concern. Various one-way plugs that allow sampling, but that prevent sand from moving into the auger column, are described in Hackett (**19**). The important capability of being able to obtain samples that do not contain mixed material from shallow sources in the hole is enhanced by using the hollow-stem auger method. However, because the sections are hollow, decontamination of the auger interiors between holes to prevent cross contamination is difficult. High pressure steam cleaners are usually necessary to remove caked-on soils and contaminants. Hollow stem augers may advance rapidly through unconsolidated materials.

9.4 *Sampling Devices:*

9.4.1 Sampling devices used in conjunction with hollow stem augers and occasionally in holes advanced by solid stem augers include:

9.4.1.1 Thin-walled tube samplers (also called Shelby tubes),

9.4.1.2 Split-barrel drive samplers (also called Split spoons),

9.4.1.3 Ring-lined barrel samplers,

9.4.1.4 Continuous sample tube systems, and

9.4.1.5 Piston samplers.

9.4.2 These samplers are either pushed or driven in sequence with an increment of drilling or advanced simultaneously with the advance of a hollow stem auger column.

9.4.3 *Thin-Walled Tube Samplers:*

9.4.3.1 *Description*—The thin-walled tube sampler consists of a tube connected to a head with screws. The head is threaded to connect with standard drill rods. The head contains a ball check valve. Thin-walled tube (Shelby tube) samplers are readily available with 2, 3, and 5-in. (5.08, 7.62, and 12.70-cm) outside diameter and are commonly 30 in. (76.20 cm) long. The 3 by 30 in. (7.62 by 76.20 cm) outside diameter long sampler is most common. The advancing end of the sampler is constructed with an inward lip, machined to a cutting edge, that has a smaller diameter than the tube inside diameter. The cutting edge inside diameter reduction, defined as a "clearance ratio," is usually in the range of 0.0050 to 0.0150 or 0.50 to 1.50 % (refer to Practice D 1587). PTFE or plastic sealing caps and other sealing devices for use after sampling are readily available for the 2, 3, and 5-in. (5.08, 7.62 and 12.70-cm) diameter tubes (refer to Practice D 4220). Shelby tubes are commonly available in carbon steel but can be manufactured from other metal (see Fig. 8).

9.4.3.2 *Sampling Methods*—When a Shelby tube is pushed into soil, the length of the sample recovered is often less than the distance pushed, that is, the recovery ratio is less than 1.0 (see 7.5.6.2). In addition, a portion of the sample frequently remains in the borehole after retrieval of the sampler. This is due to suction that develops at the sampler-soil interface. This suction may be broken by twisting the

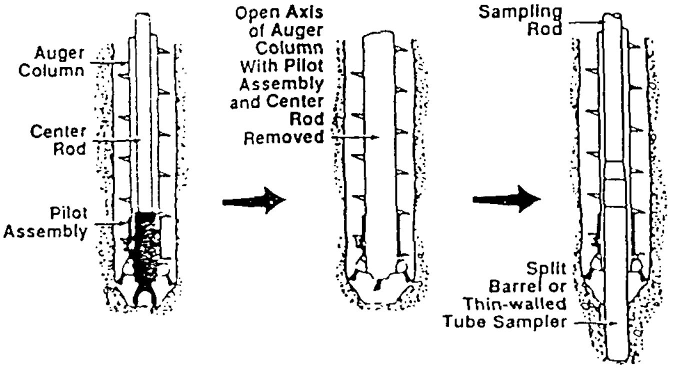


FIG. 15 Hollow-Stem Auger Sampling

sampler prior to retrieval or by advancing the auger column below the base of the sampler before retrieval (20). Samples are extruded from the Shelby tube with a hydraulic ram. As with all sampling devices, the portion of the sample in contact with the tube is considered disturbed and unrepresentative. Wilson et al. (12) developed a paring device to remove this outer layer of the core during extrusion.

9.4.3.3 *Comments*—The ball check valve was originally intended to provide a vent for drilling fluids when pushing the tube into soil, and also to prevent the column of fluid within the drill stem from forcing the sample out of the tube during retrieval. Since drilling fluids are not used when sampling in the vadose zone, these considerations are not important. However, the valve does provide a vent for air displaced as the sampler is pushed into soil. Shelby tubes are best used in clays, silts, and fine grained sands. They can be pushed with the hydraulic system of most drill rigs in fine grained sands that are loose to moderately consolidated or in clays and silts that are soft to firm. If the soils are cohesionless, they may not be retained in the tube. If consolidated or hard soils are encountered, driving the sampler may be required. However, some tubes may buckle under the drive stress. A spring-loaded barrel has been developed to protect the Shelby tube from buckling when sampling these soils (21).[6]

9.4.4 *Split-Barrel Drive Samplers:*

9.4.4.1 *Description*—The split-barrel drive sampler consists of two split-barrel halves, a drive shoe, and a sample head containing a ball check valve, all of which are threaded together (see Fig. 15). The most common size has a 2-in. (5.08-cm) outside diameter and a 1.5-in. (3.81-cm) inside diameter split barrel with a 1.375-in. (3.49-cm) inside diameter drive shoe. This sampler is used extensively in geotechnical exploration (Refer to Method D 1586). When fitted with a 16 gage liner for encased cores, the sampler has a 1.375-in. (3.49-cm) inside diameter throughout. A 3-in. (7.62-cm) outside diameter by 2.5-in. (6.35-cm) inside diameter split-barrel sampler with a 2.375-in. (6.03-cm) inside diameter drive shoe is also available (22).[6] Other split-barrel samplers in the size range of 2.5-in. (6.35-cm) to 4.5-in. (11.43-cm) outside diameter are manufactured but are less common. A plastic or metal retainer basket, or a flap valve is often fitted into the drive shoe to prevent samples from falling out during retrieval.

9.4.4.2 *Sampling Method*—As described in Method D 1586 the sampler is threaded onto drilling rods and is lowered to the bottom of the boring. The sampler is then driven into the soil with blows from a drop hammer attached to the drill rig. The hammer usually weighs 140 lb and is operated by the driller. The sampler is extracted from the soil in a manner that will ensure maximum sample recovery. A

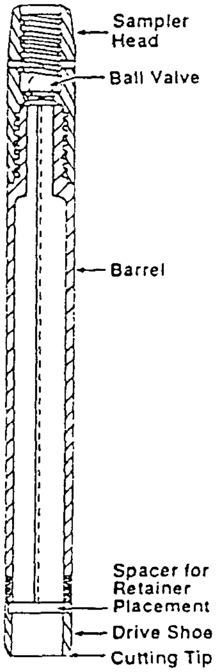


FIG. 16 Split-Barrel Drive Sampler

sample is obtained by disassembling the drive shoe and head, and splitting the barrel to expose the core of soil. Material disturbed by contact with the barrel can be scraped away, or a less disturbed interior portion collected with a spatula.

9.4.4.3 *Comments*—Split barrel drive samplers can be used in all soil types if the larger grain sizes can enter through the opening of the drive shoe. Because the sampler can be fitted with a retainer basket, it is typically used in place of thin-walled tubes when cohesionless soils are to be sampled.

9.4.5 *Ring-Lined Barrel Samplers:*

9.4.5.1 *Description*—As described in Practice D 3550, the ring-lined barrel sampler consists of a one piece barrel or two split-barrel halves, a drive shoe, rings, a waste barrel and a sampler head containing a ball check valve (see Fig. 17). The rings fit snugly inside the barrel and are designed to be directly inserted into geotechnical testing apparatus when removed from the barrel. Most samplers are designed to hold at least six rings. The waste barrel provides a space above the rings into which disturbed soil, originally at the bottom of the hole, can move. The samplers are commonly available with 2, 3, and 4-in. (5.08, 7.62, and 10.16-cm) outside diameter.

9.4.5.2 *Sampling Method*—The ring-lined barrel sampler can be driven or pushed into soil. It is important to insert the sampler deep enough to allow all disturbed soil to move through the rings and into the waste barrel. Once retrieved, the sampler is disassembled, and the sample filled rings are carefully removed. The rings are usually removed as one unit and placed into a capped container. Alternately, the individual soil filled rings can be capped with plastic or PTFE and even sealed with wax or adhesive tape (refer to Practice D 4220).

9.4.5.3 *Comments*—Because ring-lined barrel samplers are more rigid than thin-walled tubes, they can be driven into soils containing sands and gravels that might damage thin-walled tubes. The sampler provides samples in rings that can be handled without further disturbance of the soil. Because of this, these devices are most often used when geotechnical or chemical analyses are to be performed.

9.4.6 *Continuous Sample Tube System:*

9.4.6.1 *Description*—Continuous sample tube systems that fit within a hollow-stem auger column are readily available in North America. The barrel is typically 5 ft (1.52 m) long, and fits within the lead auger of the hollow auger column. The sampler is prevented from rotating as the auger column is turned (20). For many conditions the sampler provides continuous, 5-ft (1.52-m) samples (see Fig. 18). The assembly can be split- or solid-barrel and can be used with or without liners of various metallic and nonmetallic materials (20). Two clear, plastic, 30 in. (76.20 cm) long liners are often used. The sampler may also be fitted with a plastic or metal retainer basket, or a falp valve to prevent cohesionless soils from falling out of the sampler during retrieval (20).

9.4.6.2 *Sampling Method*—The sampler is locked in place inside the auger column with its open end protruding a short distance beyond the end of the column. While advancing the column, soil enters the non-rotating sampling barrel. After a 5-ft (1.52-m) advance, the sampler is withdrawn, and the liner (if used) is removed and capped.

9.4.6.3 *Comments*—The continuous sample tube system replaces the pilot head assembly in the hollow-stem auger column. Because of this, sampling speed is greatly increased since the pilot assembly does not have to be removed before taking a sample. The continuous sample tube system is best used in clays, silts, and in fine grained sands. It can be used to sample soils that are much more consolidated or harder than can be sampled with Shelby tubes.

9.4.7 *Piston Samplers:*

9.4.7.1 *Description*—Locally saturated (for example, perched ground water), or cohesionless soils, and very soft soils or sludges may not be retained in most samplers, even when they have been fitted with retainer baskets or flap valves. Piston samplers are often used under these conditions. The sampler consists of a sampling tube, an internal piston, and a drive head. The piston fits snugly inside the tube. The piston is attached to a rod assembly or a cable that leads to the surface. Tubes made of steel are available in 5.5 and 30-in. (13.97 and 76.20-cm) and 5-ft (1.5-m) lengths with 0.75, 2, 3, 4, and 5-in. (1.91, 5.08, 7.62, 10.16, and 12.70-cm) inside diameter (22, 23). When equipped with a hardened steel drive shoe, the tube can be fitted with a liner made of aluminum clear PVC, or another material (see Fig. 19) (24). A version of the sampler designed for peat sampling has a cone shaped piston (8).

9.4.7.2 *Sampling Method*—Prior to sampling, the piston is placed at the base (advancing end) of the tube. The sampler is then attached to drill rods and lowered down the borehole or hollow-stem auger column to the bottom of the hole (top of the sampling interval). The sampler is then pushed or driven into the sampling interval. As the tube

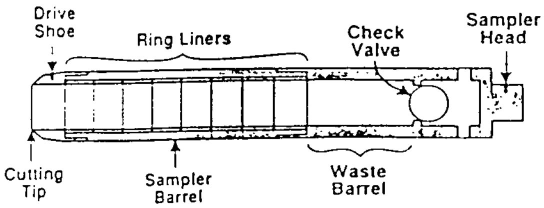


FIG. 17 Ring-Lined Barrel Sampler

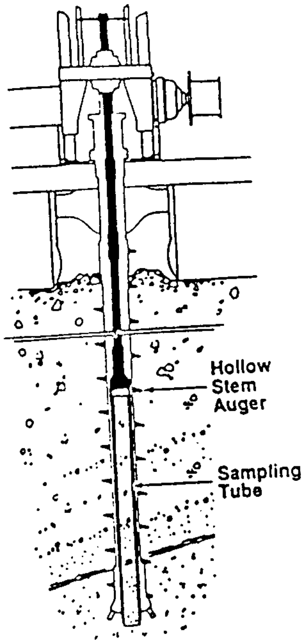


FIG. 18 Continuous Sample Tube System

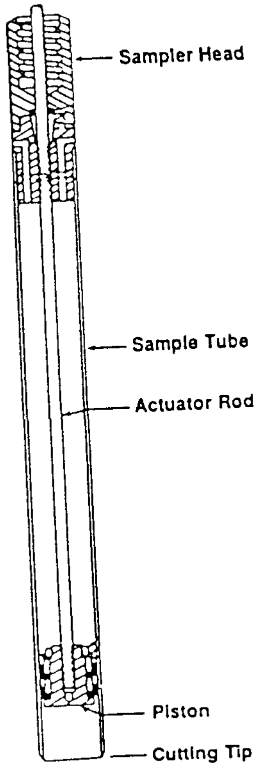


FIG. 19 Piston Sampler

moves downward, the piston remains stationary and in contact with the [illegible] of the soil sample. When the sampler is withdrawn, soil is retained because of suction that [illegible] between the piston and the soil core within the sampler. This suction is stronger than the suction at the bottom of the [illegible] soil from the sampler

and ensure that the sample will not be pulled sampler.

6.1.7.3 *Comments*—Average recovery ratios 0.9 can be attained with this [illegible] However, because the sampler depends on de suction between the sample and the piston, it [illegible] saturated, coarse grained sands and gra creation of suction with the sampler. Samples collected with piston samplers are relatively undisturbed. Zapico et al. (24) described techniques for extracting fluid samples directly from liners, and for converting liners into permeameters.

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APPENDIX E

FIELD DATA AND CHAIN-OF-CUSTODY FORMS

FIELD DATA FORM

Sample location:

Sample Location Sketch

Sample Designation:

Sample Date/Time:

Sampler(s):

Sample Depths:

Sample Collection Technique:

Field Preparation /Date

Sample Preservation:

Analysis:

Sample Location Description:

Soil Description/Classification:

APPENDIX F

SITE SAFETY HEALTH PLAN

ENERCON SERVICES, INC.
SITE SAFETY AND HEALTH PLAN

For

CHAMPION TECHNOLOGIES, INC.
SITE INVESTIGATION PROJECT
HOBBS, NEW MEXICO

PROJECT NO. ES 444

Prepared by: Michael Amabisco Date: March 24, 2000

Reviewed/Approved by: Michael Amabisco Date: 3/24/00

Mr. Michael Amabisco
Project Manager

EFFECTIVE DATES: March 27, 2000 through September 1, 2000

ENERCON SERVICES, INC.
SITE SAFETY AND HEALTH PLAN

This site safety and health plan (SSHP) was prepared by Enercon Services, Inc. (Enercon) to address health and safety issues for Enercon work conducted for Champion Technologies, Inc. (Champion) facility in Hobbs, New Mexico. The majority of this work is associated with site investigation fieldwork. Environmental testing and investigation will be accomplished in accordance with applicable laws and regulations. Changes and amendments to this SSHP will be added in attached addenda. Field safety meetings should include review of changing conditions and addenda to the plan

1.0 SITE HISTORY

Champion Technologies, Inc. has occupied the 4001 South Highway location for approximately 10 years. In that time, the site has been used for the manufacturing, production, and distribution of chemicals used in the petroleum industry.

1.2 SITE DESCRIPTION

The Champion facility's physical address is 4001 South Highway 18 in Hobbs, New Mexico. The location of the property is NE/4 of SE/4, Section 15, Township 19 South, Range 38 East, West Hobbs Quadrangle (Figure 1.)

The Champion facility produces and manufactures chemicals for the petroleum industry. The property is rectangular in shape, approximately 500 feet by 640 feet, or an estimated 7 acres. The facility consists of an office building, manufacturing, and storage areas, as well as parking and undeveloped areas (Figure 2.). The site is enclosed by a fence, with a gate along South Highway 18. The facility uses a septic system for sanitary purposes and water is supplied by an on site domestic well. The site is generally flat with a slight gradient in the westerly direction. There are no bodies of surface water on the site.

The facility is bordered by the highway on the east side, residential and undeveloped property to the south, undeveloped land on the west side, and an oil field service company to the north.

1.3 PROJECT OBJECTIVES

Enercon's general field objective is to provide the services listed below.

1. Further environmental investigation to identify potential environmental problems to determine site need for remediation actions.

2. Sample collection to identify and assess chemical constituents potentially released into the subsurface during historic activities.

2.0 KEY PERSONNEL AND RESPONSIBILITIES

Mr. Mike Amabisco is project manager (PM) for the project. Mr. Paul Brodin is the Field Coordinator for the investigation portion of the project. Mr. Douglas Hagemeier is the Health and Safety Officer (HSO). Mr. Amabisco will also function as the site safety officer (SSO). All project field staff have completed 40 hours of comprehensive health and safety training which meets the requirements of 29 CFR 1910.120. A site safety officer (SSO) having completed the 1910.120 Supervisor Course and with the appropriate experience for the project will have the authority to monitor and correct health and safety problems as noticed on site will be appointed to each project. The SSO has the authority to monitor and correct health and safety problems as noticed on site.

2.1 PM RESPONSIBILITIES

The PM is responsible for generating, organizing, and compiling the SSHP which describes all planned field activities and potential hazards that may be encountered at the site. The PM is also responsible for assuring that adequate training and site safety briefing(s) are provided to the project field team. The PM has provided a copy of this SSHP to each member of the project field team and each subcontractor prior to field activities.

2.2 HSO RESPONSIBILITIES

For specific projects, the HSD is responsible for reviewing and approving the SSHP for accuracy and incorporating new information or guidelines which aid the PM and SSO in further definition and control of the potential health and safety hazards associated with the project.

2.3 SSO RESPONSIBILITIES

The SSO has on-site responsibility for ensuring that all team members comply with the SSHP. It is the SSO's responsibility to inform the subcontractor(s) and other field personnel of chemical and physical hazards as he/she becomes aware of them. Additional SSO responsibilities include:

1. Providing safety briefing and coordinating a site safety orientation meeting for team members.
2. Updating equipment or procedures to be used on site based on new information gathered during the site investigation.
3. Inspecting all personal protective equipment (PPE) prior to on-site use.
4. Assisting the PM in documenting compliance with the safety plan by completing the standard Enercon and OSHA forms.
5. Assisting in and evaluating the effectiveness of decontamination procedures for personnel, protective equipment, sampling equipment and containers, and heavy equipment and vehicles.

6. Enforcing the "buddy system" as appropriate for site activities.
7. Posting location and route to the nearest medical facility; arranging for emergency transportation to the nearest medical facility.
8. Posting the telephone numbers of local public emergency services; i.e., emergency personnel, police, and fire.
9. Stopping operations that threaten the health and safety of the field team or surrounding populace.
10. Entering the exclusion area in emergencies after he/she has notified emergency services.
11. Observing field team members for signs of exposure, stress, or other conditions related to pre-existing physical conditions or site work activities.

2.4 PROJECT FIELD STAFF RESPONSIBILITIES

The project field staff is responsible for ensuring that all data acquisition is performed in accordance with the work plan and SSHP, and that any deviations from the plans are based upon field conditions encountered and are well documented in the field notes. The project field staff's health and safety responsibilities include:

1. Following the SSHP.
2. Reporting to the SSO any unsafe conditions or practices.
3. Reporting to the SSO all facts pertaining to incidents which result in injury or exposure to toxic materials.
4. Reporting to the SSO equipment malfunctions or deficiencies.

2.5 PROJECT CONTACTS

The following is a reference list of project contacts:

Client:	Champion Technologies, Inc. Mr. Ralph Corry (281) 431-2561
Enercon PM:	Mike Amabisco (713) 941-0401
Field Manager:	Paul Brodin (713) 941-0401
Enercon HSO:	Douglas Hagemeier (713) 941-0401
Enercon SSO:	Mike Amabisco

(713) 941-0401

2.6 EMERGENCY TELEPHONE NUMBERS

The following emergency telephone numbers will be used to call for assistance:

Fire/Ambulance:	911
Hospital:	Lea County Regional Hospital 5419 Lovington Hwy. Hobbs, NM **(505) 392-6581** Exit facility on Hwy 18. Head north on Hwy 18 for approximately 1.5 miles to hospital

A comprehensive listing of all of the emergency numbers for this project are listed in Appendix C.

2.7 SUBCONTRACTOR RESPONSIBILITIES

All subcontractors are responsible for their own health and safety program and the health and safety of their own employees. This requirement is based on OSHA regulations, which recognize the employer-to-employee responsibility for health and safety. A copy of their written program must be submitted for review to Enercon, if requested. In an effort to assist the subcontractors, and to comply with hazard communication requirements, Enercon will provide a copy of the SSHP for this project to each subcontractor for implementation by the subcontractor's employees.

3.0 HAZARD ANALYSIS

The potential hazards to personnel working at the subject site have been identified as chemical hazards and as physical hazards of uneven terrain, snakes, gila monsters, insects, cacti, severe thunder storms, and heat stress. Each potential chemical and physical hazard relative to the potential for exposure is described below.

3.1 CHEMICAL HAZARDS

Health hazards associated with potential chemical exposures at the sites include flammability and toxicity. Toxicity may occur following inhalation of chemical from dust or from vapors that could potentially be released from soil, and direct contact with soil that could potentially contain hazardous materials. Tables 1 through 3 present summaries of the chemical exposure limits and characteristics associated with fuels and related compounds, metals and metal ions, and oxygenated and halocarbon solvents. Material safety data sheets have been provided for additional information (Appendix A).

In order to understand the potential chemical hazards associated with this project, it is necessary to review what chemicals were used, and which, if any, chemicals may exist and pose a threat to workers. During its operation, a number of chemicals may have been used, transported, and stored at the site.

Based on the site history, past operational use, recent environmental assessments of similar properties, site visits and project briefings, a preliminary list of potential chemical hazards for this project are: fuels and related compounds such as gasoline, benzene, toluene, ethylbenzene, xylenes, and total petroleum hydrocarbon. The primary chemicals of concern are metals and metal ions such as manganese, lead, chromium, and nickel. Additional chemicals of concerns are: Bis (2-ethylhexyl) phthalate, benzo(a)pyrene, benzo(b)fluorathane, benzo(k)fluorathathane, chrysene, dibezo(a,h)anthracene, fluorene, naphthalene, pyrene, and 1-methylnaphthalene.

3.2 FUELS AND RELATED COMPOUNDS

3.2.1 Benzene, Toluene, Ethylbenzene and Xylenes (BTEX)

Benzene is regulated by OSHA as an occupational carcinogen and has been associated with leukemia. Acute health effects include irritation to the eyes, nose and respiratory system, headache, giddiness, nausea, and anorexia. Benzene exposure can also lead to disturbances in gait, dermatitis, and bone marrow depression.

The other BTEX compounds (toluene, ethylbenzene, and xylenes) may cause irritation to the eyes, nose and respiratory system, and dermatitis. Acute exposure can lead to central nervous system effects including headache, dizziness, confusion, and irritability. Exposure to toluene may also result in pupil dilatation, nervousness, insomnia and reproductive toxicity. Elevated concentrations of xylene isomers may lead to corneal damage, and gastrointestinal symptoms including abdominal pain, nausea and vomiting.

3.2.2 Gasoline Vapors (50 - 100 Octane)

Gasoline vapors (50-100 Octane) are moderately to highly toxic via inhalation. Inhalation of gasoline vapors can cause central nervous system (CNS) depression, pneumonitis, fatal pulmonary edema, and some addiction. The vapors are considered moderately toxic and may cause eye disturbances. The current Threshold Limit Value (TLV) for gasoline vapor in air is 300 ppm. OSHA has not established a PEL. Gasoline contains benzene.

Oils are not considered flammable, only combustible. Because of their low vapor pressure, they do not typically constitute an inhalation hazard unless working conditions include extremely hot temperatures or create excessive airborne oil-contaminated dust. These conditions are not anticipated.

3.2.3 Total Petroleum Hydrocarbons (TPH)

TPH refers to heavy hydrocarbons which may present a fire hazard in extreme circumstances, such as the presence of flame, excessive heat or strong oxidizers. An exposure limit for TPH has not been established due to the varied chemical composition. Presently, there are no known chronic health hazards associated with TPH.

Table 1. Chemical Exposure Limits and Characteristics for Fuels and Related Compounds

Chemical	IP[1]	OVA[2] Relative Response Percent	TLV-TWA[3] (ppm)	IDLH[4] Level (ppm)	Flammable Range Percent	Odor Threshold (ppm)	Note[5]
Benzene	9.24	150	1[6]	Ca	1.2 - 7.8	4.68	C, F
Toluene	8.82	110	50	500	1.1 - 7.1	0.17 - 40	T, F
Ethylbenzene	8.76	100	100	800	0.8 - 6.7	0.25 - 200	T, F
Xylenes	8.56	111	100	900	0.9 - 7 .0	0.05 - 200	T, F
Gasoline	?	?	300	Ca	1.4 - 7.6	low ppm	F, T

[1] Ionization potential in electron-volts (eV).

[2] Century Organic Vapor Analyzer relative response to the compound in percent.

[3] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[4] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[5] C-Carcinogen; F-Flammable; T-Toxic.

[6] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the NIOSH Pocket Guide to Chemical Hazards, 1994 edition.

3.3 METALS AND METAL IONS

Metal and metal ions present no volatility or flammability problems. They can present acute or chronic effects if the host material is inhaled in the form of a dust or fume. Metals such as chromium and cadmium and their ions can cause irritation of mucous membranes and lung tissues. To minimize inhalation of metals, host dusts should be minimized as much as possible. In addition, protective equipment and safe work practices will be used to limit exposure.

3.3.1 Manganese

Arsenic has toxic health effects which include irritation to eyes, nose, and throat, central nervous system disorder, mottling of lungs, and benign pneumoconiossis. The current PEL for manganese is 10 mg/m^3 as an 8-hour time-weighted average (TWA) airborne dust concentration. The regulatory action level is 0.2 mg/m^3 TWA dust concentration.

3.3.2 Nickel

Nickel has toxic health effects which include headaches, vertigo, nausea, vomiting, epigatric pain, cough, weakness, delerium, and convulsions. Nickel is a suspected carcinogen. The current PEL for nickel is 0.01 mg/m^3 as an 8-hour TWA airborne dust concentration.

3.3.3 Chromium

Chromium has toxic health effects which can range from allergic skin reactions to mild, and eventually severe, respiratory system irritation. Chromium may exist in one of three valence states in compounds (+2, +3, or +6). Toxic health effects are primarily associated with Cr+6 (hexavalent chromium) exposure. It is a suspected carcinogen as Cr+6. Symptoms of acute exposure include coughing, wheezing, painful deep inspiration, and fever. Pulmonary edema may persist after other symptoms subside. Other effects include dermatitis, ulceration of the skin, conjunctivitis and asthma. Chronic exposure may be associated with lung cancer. The current TLV for chromium as water-soluble Cr+6 is 0.05 mg/m^3 as an 8-hour TWA airborne dust concentration.

3.3.4 Lead

Lead in its elemental form is a heavy, ductile, soft gray metal. The PEL for lead is 0.05 mg/m^3 in air based on an 8-hour TWA. The regulatory action level is 0.005 mg/m^3 in air. Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, neuropathy, encephalopathy, gingival lead line, hypotension, anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, reproductive tissue, gingival tissue, and the gastrointestinal tract.

Table 2. Chemical Exposure Limits and Characteristics for Metals and Metal Ions

Chemical	OSHA PEL[1] (mg/m^3)	TLV TWA[2] (mg/m^3)	IDLH[3] Level (mg/m^3)	Physical Description	Note[4]
Manganese	1	0.2	None	metallic gray material	T
Nickel	1	1	None	Silver gay material	C
Chromium (VI)	0.1	0.05	15, Ca	appearance and odor vary depending upon the specific compound	C
Lead	0.05	0.05	100	heavy, ductile, soft, gray solid	T

[1] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the NIOSH Pocket Guide to Chemical Hazards, 1994 edition.

[2] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[3] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[4] C-Carcinogen; F-Flammable; T-Toxic.

3.4 SEMIVOLATILE ORGANIC COMPOUNDS

3.4.1 Bis (2-ethylhexyl) phthalate

Acute health effects include irritation to the eyes, nose, skin, and respiratory system.

3.4.2 Benzo (a) pyrene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) pyrene is recognized as a possible mutagen.

3.4.3 Benzo(b)fluorathene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) fluoranthene is recognized as an animal carcinogen.

3.4.4 Benzo(k)fluorathene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) fluoranthene is recognized as an animal carcinogen.

3.4.5 Chrysene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Crysene is recognized as an animal carcinogen.

3.4.6 Fluorene

Acute health effects include irritation to the eyes, nose, skin and respiratory system.

3.4.7 Naphthalene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Also includes nausea, headaches, diarrhea, and cramps.

3.4.8 Pyrene

Acute health effects include, hematopoietic changes, dermatitis, damage to skin and blood sysytems.

3.4.9 1-Methylnaphthalene

Acute health effects include irritation to the eyes, nose, skin and respiratory system.

Table 3. Chemical Exposure Limits and Characteristics for Semivolatile Organic Compounds

Chemical	TLV TWA[3] (ppm)	PEL[4] Level (ppm)	Flammable Range Percent	Note[5]
2-ethylhexyl) phthalate	5	5	N/A	N/A
o (a) pyrene	N/A	N/A	N/A	T
o (b) fluoranthene	N/A	N/A	N/A	C
o (k) fluoranthene	N/A	N/A	N/A	C
sene	N/A	0.2	N/A	C
nzo (a,h) anthracene	N/A	N/A	N/A	T
rene	N/A	N/A	N/A	T
thalene	10	10	N/A	T
ne	N/A	N/A	N/A	T
thylnaphthalene	N/A	N/A	N/A	T

[1] Ionization potential in electron-volts (eV).

[2] Century Organic Vapor Analyzer relative response to the compound in percent.

[3] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[4] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[5] C-Carcinogen; F-Flammable; T-Toxic.

[6] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the Federal Register, January 1997.

3.5 PHYSICAL HAZARDS

Accidents involving physical hazards can directly injure field personnel and can create additional hazards such as increased exposure to chemicals due to damaged protective equipment. Working at heights or in limited access areas, and around open excavations and heavy equipment present physical hazards. Field personnel should maintain awareness for potential safety hazards, and should immediately inform the SSO of any new hazards so that corrective measures can be taken.

3.5.1 Excavation/Trenching

Excavation and trenching work can present several significant physical hazards (e.g., trip/fall hazards, collapse of trench excavation walls, pinching or crushing from heavy equipment and tools, tipping hazards, oxygen deficiency). For this reason, all such work must be performed in compliance with the regulations on excavations, trenches and earthwork, 29 CFR 1926, Subpart P - Trenching and Excavation. Excavation/trenches are not expect during the initial site work. Permits are required for construction of trenches and excavations four feet or deeper into which a person is required to descend. The contractor performing the excavation must assure that the OSHA district office nearest the job site is notified prior to work commencement. An on-site "competent person" will be provided by Enercon and should be capable of identifying existing and predictable hazards in the surroundings or working conditions and have authorization to take prompt corrective measures to eliminate identified hazards. Be aware that the possibility of an oxygen-deficient or hazardous atmosphere could exist or occur in excavations, especially when excavating in previously-existing industrial areas. A trench could be a confined space where gases heavier than air can collect. It is not anticipated that the work conducted under this plan will require significant trenching or excavation and therefore monitoring will not be warranted.

The following general rules must be observed when working in trenches or excavation areas:

- no one should enter a trench or excavation without proper access, such as with ladders, ramps or stairs;
- there should be no more than 25 feet lateral distance in the trench/excavation between the worker and the nearest means of egress;
- a means of protection from collapse of trench/excavation walls must be provided for all workers either by sloping, benching, shoring, sheeting or by some other type of support system if excavation or trench is four feet or greater in depth;
- employees should not work in excavations where water has accumulated or is accumulating; adequate precautions (e.g., installation of special supports or shields, water removal equipment) must be taken to protect employees from the hazards of groundwater infiltration;
- employees should never enter a trench/excavation when parts or materials (e.g., pipes, valves) are being lifted/moved in the vicinity by heavy machinery; and

- daily inspections of the excavation area and protective systems should be performed by a competent person who can identify existing or potential unsanitary or hazardous conditions, and who has the authority to take prompt corrective measure to eliminate such conditions.

3.5.2 Limited Access Areas

Limited access areas can interfere with planned field operations and enhance the potential of physical hazards to personnel working in the field. Limited access areas include interior building spaces, sensitive manufacturing operations, access restrictions, and obstructions to digging or drilling such as subsurface and overhead interference's (utilities). These interference's must be clearly identified and marked prior to any digging or drilling operations.

3.5.3 Heavy Equipment

The SSO will be present on a regular during all drilling and excavation operations involving the use of heavy equipment to ensure that appropriate level of protection and safety procedures are utilized. Hard hats, steel-toed boots, ear and eye protection will be required at all times when working around heavy equipment. The proximity of chemical, water, sewer, and electrical lines will be identified before any digging or drilling is attempted. Additionally, hazards associated with working around heavy equipment can be effectively managed by the employee if a constant awareness of these hazards is maintained. These hazards include the risk of becoming physically entangled in the equipment or being run over, slipping and falling, impact injury to eyes, head and body, and injury from machinery operations. Constant visual or verbal contact with the equipment operator will facilitate such awareness.

3.5.4 Noise

Noise is a potential hazard in areas where heavy equipment including backhoes, power tools, pumps or generators are operated. Heavy equipment operation may produce noise levels that reach or exceed 85 decibels (dBA), the action level established by the OSHA. Elevated noise levels will be evaluated by the SSO when equipment is operated. Exposure to elevated noise levels can lead to temporary or permanent hearing loss. The SSO will ensure hearing protection is utilized when noise levels are elevated, e.g. when the excavator is in operation.

3.5.5 Sunburn

Working outdoors or on roofs on sunny days for extended periods of time can cause sunburn to the skin. Excessive exposure to sunlight is associated with the development of skin cancer. Field staff should take precautions to prevent sunburn by using sun-screen lotion and/or wearing hats and long-sleeved garments.

3.5.6 Heat Stress

The potential for heat stress is a concern when field activities are performed on warm, sunny days, and is accentuated when chemical protective clothing is worn. Heat stress prevention measures and monitoring will be implemented if ambient temperatures are above 70 degrees Fahrenheit (F).

General Precautions. Precautions to prevent heat stress will include: work/rest cycles so that rest periods are taken before excessive fatigue occurs; regular intake of water to replace that lost from sweating. Work/rest cycles will be based on monitoring the heart rate (pulse) of each individual worker. Rest breaks will be long enough to reduce the heart rate (HR) below levels calculated according to the following method:

1. Workers will initially determine their resting HR prior to starting work activities.

2. At the start of the first rest period, workers will determine their initial HR. This initial HR should not exceed the individual's age-adjusted maximum HR, which equals [(0.7)(220 - age in years)]. At 1 minute into the rest period, the recovery HR will be determined. The recovery HR should not exceed 110 beats per minute.

3. If the initial HR exceeds the age-adjusted maximum HR, or the 1-minute recovery HR is greater than 110 beats per minute, then the next work period will be decreased by 10 minutes.

An initial work/rest cycle of 1 hour work and 15 minutes rest is recommended for protection of staff when the heat stress hazard is high. The recommended cycle will be adjusted up or down based upon worker monitoring, environmental conditions, and the judgment of the SSO. At any time, field team members recognize the signs or symptoms of heat stress prior to a scheduled rest period, they will notify the SSO immediately in order that a rest period can be called.

Heat stress due to water loss can be prevented. To prevent dehydration, water intake must approximate sweat loss. Water intake guidelines are as follows:

1. The sense of thirst is not an adequate indicator of water replacement needs during heat exposure. Therefore, water must be replaced at prescribed intervals.

    a. Before work begins, drink two 8-ounce glasses of water.
    b. During each rest period, drink at least two 8-ounce glasses of water.

2. Plain water, served cool, is excellent. An adequate supply of drinking water (at least one gallon per person per day) and clean cups will be readily available (i.e., at the support vehicle) to provide water during rest periods.

3. Adding salt to water is not recommended. However, other fluids, in addition to water, could include fruit juices and diluted electrolyte replacement drinks (diluted 3:1 with water). **Do not use salt tablets!**

Heat stress, if not prevented, results in heat stress illnesses. Two critical illnesses, if not recognized and treated immediately, can become life-threatening. These are heat exhaustion and heat stroke. Heat exhaustion will result if the prevention measures described above are not implemented. Ignoring the signs and symptoms of heat exhaustion will lead to the development of heat stroke. Heat stroke is an immediate, life-threatening condition that results because the body's heat regulating mechanisms shut down, and the body cannot cool itself sufficiently. As heat is excessively stored in the body, brain damage can result causing permanent disability or death.

Heat Exhaustion. The signs and symptoms of heat exhaustion are headache; dizziness; nausea; weakness; fainting; profuse sweating; loss of appetite; approximately normal body temperature; dilated pupils; weak and rapid pulse; shallow and rapid breathing; possible cramps in abdomen and extremities; possible vomiting; difficulty walking; and **skin that is cool and sweaty to the touch with pale to ashen-gray coloring.**

First aid for heat exhaustion is as follows:

1. Immediately remove victim to the support area; if you are the victim, go to the support area.
2. Decontaminate, if practical, before entering support area.
3. Start cooling, but be careful not to cause a chill (i.e., rest in shade and apply wet towel to forehead; open up and/or remove clothing as much as practical, especially chemical-resistant clothing).
4. Drink cool water slowly, but only if conscious and not in shock.
5. If vomiting, and/or the signs and symptoms are not lessening within an hour, call for emergency help and/or transport the victim to emergency room.
6. It is likely that a heat exhaustion victim will be unable to work for the remainder of the day.

Heat Stroke (aka sun stroke). The signs and symptoms of heat stroke **are hot, dry skin to the touch with reddish coloring**; body temperature >105 degrees F; no sweating; mental confusion; deep, rapid breathing that sounds like snoring progressing to shallow, weak breathing; headache; dizziness; nausea; vomiting; weakness; dry mouth; convulsions; muscular twitching; sudden collapse; possible unconsciousness.

First aid for heat stroke is as follows:

1. Immediately remove the victim to the support area; prior to entering the support area, remove and dispose the victim's chemical-resistant clothing.

2. Cool the victim rapidly using whatever means are available, such as shade, opening up and/or removing clothing, soaking clothing/skin with water and fanning, placing victim in vehicle using air conditioning on maximum.
3. Do not give drinking water to victim.
4. Treat for shock, if needed.
5. **Transport** the victim **to the emergency room** or call for emergency help; **no exceptions** for heat stroke victim.

3.5.7 Lightning - Severe Storm Conditions

In the event of an electrical storm in which lightning is in and around the facility, all personnel should make the appropriate provisions to minimize and/or eliminate the potential for shock from a nearby or direct lightning strike. Personnel should proceed to:

- Turn off all electrical powered equipment and tools;
- Move to a safe location until the storm passes;
- Do not seek refuge under trees;
- Do not stand in an open area;
- Do not hold any type of metal tools in hands; and
- Do not go near electrical transformer, switch gear, or distribution boxes.

3.5.8 Slips, Trips, and Falls

Site activities pose a variety of slip, trip, and fall hazards due to the uneven and potentially slippery surfaces on which personnel will walk. Personnel should be cognizant at all times of their position and work activities in relation to other site activities. During activities that require personnel to walk on slippery or uneven surfaces, personnel need to be careful and should always wear a shoe with a non-slip bottom and good tread.

3.5.9 Ergonomic Hazards

Ergonomic injuries to muscles, joints, backs, tendons, etc., occur during lifting, moving heavy objects, maintaining static body positions or performing repetitive motions. Ergonomic injuries can be prevented by evaluating job activities before the start of work and assuming that adequate tools and equipment are available for the job. Particular attention should be paid to jobs requiring bending, squatting or kneeling positions, transporting heavy loads, exerting heavy forces or maintaining static positions. For further job analysis, contact the HSO.

3.5.10 Fires

There is a concern for possible entrapment by large brush fires which could sweep the entire area. Consideration needs to be given to a number of issues:

- The potential for excessive wild fire over the area;
- The amount of advance warning one could anticipate of a fire advancing;
- A place of refuge, safe from the advancing fire; and
- An alternative evacuation/escape route, if needed.

3.5.11 Animal/Insect/Reptile Bites

Since the potential exists for possible serious insect/reptile bites from rattlesnakes, scorpions, and gila monsters, care and preparation should be taken to handle the potential for injury to our employees. Also certain protection equipment should be on hand, such as individual snakebite kits for each person on site.

Snakes

The most common types of poisonous snakes in New Mexico are the rattlesnakes (pit vipers) and coral snakes. Any snake that inflicts a bite should be precisely identified if possible. Many people are injured by unnecessary treatment for bites of nonpoisonous snakes. More significantly, a bite by a Mojave rattlesnake may produce very little reaction in the hours immediately after it occurs, when treatment is most effective. Only if the species of snake is known can optimal therapy be started without delay. Preferably the snake should be killed and brought to a medical center with the person who was bitten so that the exact species can be determined.

Snake bites are best avoided, not treated

Pit Vipers

Pit vipers are so named because they have a small pit located between the eye and the nostril, a feature found only in these poisonous species. The pit is an infrared sensing organ instrumental in detecting the small, warm-blooded animals these snakes eat. They have a characteristic triangle head and heavy body. Rattlesnakes in New Mexico belong to the pit viper species. If fangs are present the snake is undoubtedly poisonous, however, searching for fangs is hazardous. If they have rattles they are obviously rattlesnakes and poisonous. However, the lack of rattles is not a good identifier since they can get broken off or even shed with the skin.

The reaction following the bite of a pit viper is one of the best indications that the snake was poisonous and is the only indication that envenomation has occurred and treatment may be needed. This reaction begins within minutes after the bite, but is usually less marked after other pit viper bites. The reaction severity also varies depending on the species of snake. The earliest symptom is pain or burning at the site of the bite, although some people experience relatively little pain. Shortly afterward the area begins to swell as fluid pours into the tissues. Bleeding usually produces a purple or green discoloration, but this change may take several hours to appear.

Following moderate envenomation, the swelling and discoloration extend further from the site of the bite, large blisters that contain clear or bloody fluid appear, and the regional lymph nodes, particularly in the armpit or the inguinal crease, become enlarged and tender. Severe envenomation is heralded by the development of a systemic reaction. The subject becomes weak and dizzy and develops signs of shock, particularly cold, clammy skin and a weak pulse.

When a subject can be hospitalized within two hours time, the only treatment needed is limiting the spread of the venom and immobilizing the extremity. No other measures, particularly incision and suction, should be attempted. Tourniquets are not recommended to help reduce the spread of the venom because they are rarely applied correctly and commonly do more harm than good. The immobilized extremity should be kept at the same level as the heart, and the person should be transported to a hospital with as little effort on his part as possible. No other treatment should be attempted. Wrapping of the wound should not be applied unless envenomation is known to be moderate or severe.

Coral Snakes

Coral snakes are small, thin, brightly colored snakes with small heads. They can be identified by the adjacent red and yellow bands. The nonpoisonous king snakes and other harmless species with similar coloration have adjacent red and black bands. A helpful reminder is: "Red and Yellow--kill a fellow. Red and black--venom lack".

Coral snakes tend to bite and hang on, sometimes chewing for as long as a minute. The bites are rarely associated with the local reaction--severe pain and swelling--typical of pit viper bites. Some pain may be present and may radiate up the limb. Often the first sign of envenomation is painful enlargement of the regional lymph nodes. Severe envenomation may include numbness and weakness of the limb within one to two hours, or less. Antivenom is the only effective therapy for coral snake bites. The limb should be wrapped to immobilize the venom and should be splinted. The individual should be rapidly transported to a hospital with as little effort on his/her part as possible. Incision and suction or other forms of non-hospital treatment are of no value.

Spiders and Other Insects

Almost all spiders produce toxic venoms, but their fangs are too small and weak to penetrate the skin, the venom is too weak, or the volume of venom is too small to pose a significant threat to humans. The black widow is the only spider found in the US that is capable of routinely producing serious illness by its bite. The "tarantula" native to the US Southwest bites only after extreme provocation. Its weak and ineffective fangs can only penetrate thin skin, such as that on the sides of the fingers; the effects of the bite are no worse than an insect sting.

The female black widow typically is coal black and has a prominent, spherical abdomen that may be as large as one-half inch in diameter. A red or orange marking resembling an hourglass shape is present on the underside of the abdomen. The black widow weaves a coarse, crudely constructed web in dark corners, both indoors and out. They exist in secluded areas beneath objects, under toilet seats, in dark corners of buildings, window sills, etc.

The black widow bite may feel like a pin prick, may produce a mild burning, or may not be noticed at all. Small puncture wounds, slight redness, or no visible marks may be found at the site of the bite. Within about 15 minutes painful muscle cramps develop at the point of the bite and rapidly spread to involve the entire body. Weakness and tremors may also be present.

Treatment for black widows consists of efforts to relieve the painful muscle spasms and antivenom for small children. No treatment at all should be directed to the site of the bite, with the possible exception of applying an ice cube to relieve pain. Incision and suction is damaging and useless, and should not be performed. Essentially, nothing can be done outside a hospital. This applies to other types of spider bites too.

Scorpion Stings

Scorpions are found throughout the US but the species lethal for man are limited to Arizona, New Mexico, Texas, southern California, and northern Mexico. The problems with scorpions are related to their tendency to live in the vicinity of human habitation where children are frequently playing. Stings can be avoided by exercising care when picking up stones, logs, or similar objects. Shoes and clothing should be shaken vigorously before dressing in the morning. Scorpions are nocturnal creatures.

The lethal species are typically yellow to greenish yellow color and can be distinguished from other species by a small, knob like projection at the base of their stingers. Adults measure about 3 inches in length and 3/8 inch in width. One subspecies has two irregular dark stripes down its back. Lethal scorpion bites are usually painful, but fatalities are generally limited to small children.

Symptoms of a scorpion sting include a pricking sensation initially, pain follows in 5 to 60 minutes and may be severe. The sting is sensitive to the touch. Tapping the site produces a painful tingling or burning sensation that travels up the extremity toward the body. Sensitivity may persist for up to 10 days.

Only a medical facility has the equipment and supplies necessary to monitor and deal with any complications that may arise. An ice cube may be applied to the site to help reduce pain, but no other therapy is possible outside a hospital.

3.5.12 Animal Droppings

Due to the fact that many buildings have been vacant and that some have become a haven for animals or birds, there may be a significant amount of droppings in some areas. In areas where there is evidence of particularly bird droppings, those persons entering should be equipped with and required to use dust type respirator or a PPE device. Unless the individual is not crawling or doing excessive hands-on touching in the area, there should not be a need for other protective clothing. If, however, there is excessive time, touching, sampling, or movement in the immediate area of the droppings, then gloves and coveralls should be used.

3.5.13 Hanta Virus

Enercon personnel and subcontractors working at the site where there is evidence of a rodent population, particularly the deer mouse, must be made aware of an increased level of concern regarding the transmission of "Hanta Virus" associated diseases. The Hanta Virus is believed to be associated with rodents, especially the deer mouse, which serves as a primary reservoir host, and can result in fatalities. The Hanta Virus is responsible for an increasing number of deaths in the Southwestern U.S.

The Hanta Virus can be spread by the saliva, urine, and feces of infected rodents. Human infection may occur when infected wastes are inhaled as aerosols produced directly from the animals, or as dried materials introduced into broken skin or onto mucous membranes. Known infections of humans occur mostly in adults and are associated with activities that provide contact with infected rodents in rural/semi-rural areas. Activities to be avoided are sweeping, dusting and other cleaning activities unless precautions are taken. Areas should be sprayed with a 5% solution of bleach and water, allowed to sit for a minimum of 15 minutes and then the debris may be swept up and thrown away. High hazard areas will be decontaminated by approved vendors prior to the entry of Enercon personnel.

Illness caused by the Hanta Virus begins with one or more flu-like symptoms (i.e., fever, muscle aches, headache and/or cough), and progresses rapidly to severe lung disease and may cause death. Early diagnosis and treatment are vital.

Field Precautions to Avoid Hanta Virus: Personnel entering areas where rodents and the presence of the Hanta Virus is known or suspected need to take proactive measures and notify the PM or HSD. If simply precautionary measures are needed, field personnel will wear respirators with P-100 filters, eye protection, chemical resistant coveralls, chemical resistant gloves and disposable boot covers if there is any potential for direct contact with rodents or their wastes. Strict decontamination requirements must be followed. When working in rural/semi-rural areas, the following risk reduction strategies should be implemented:

1. Eliminate rodents and reduce availability of food sources and nesting sites used by rodents.

2. Store trash/garbage in rodent-proof metal or thick plastic containers with tight lids.
3. Cut tall grass/underbrush in close proximity to buildings.
4. Prevent rodents from entering buildings.

3.5.14 Bloodborne Pathogens

While it is policy to provide first aid and CPR training to field workers, no employee is designated as a first aid provider. Emergency services will be summoned. Employees have the option to render aid until help arrives. First aid kits should include latex gloves, alcohol wipes, and CPR isolation devices. These devices should be used when rendering aid.

Should an employee provide first aid or CPR to an individual during the course of his/her duties, the incident must be reported immediately after the incident occurred. All such personnel will be offered the Hepatitis B vaccination and medical follow-up without cost. Recent medical developments may allow for intervention following contamination with the HIV virus that reduces the possibility of infection if received within hours of the incident.

4.0 TRAINING REQUIREMENTS

All Enercon staff working on site must have completed training in hazard recognition and basic health and safety issues as required by the occupational safety and health regulations contained in 29 CFR 1910.120 (e). This training is accomplished through an initial 40-hour classroom program, which includes hazard communication training, and 24-hour on-the-job training. The 8-hour refresher training is conducted annually. In addition, Enercon field personnel will be familiar with the requirements of this SSHP, and will participate in site activity and safety briefings provided by the project SSO, particularly on site-specific conditions and potential contaminants. The SSO and project manager have completed the required 8 hours of additional supervisory training for this project assignment.

Personnel performing oversight of asbestos abatement activities will also be required to have competent person training (EPA approved contractor/supervisor) and must remain on site during all removal activities.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Based on the hazard analysis for this project, the following PPE will be required and used. Changes to these specified items of PPE will not be made without the approval of the SSO.

Level D is the minimum protection required for this job. Level D consists of hard hat, steel-toed work boots, long pants and shirt with sleeves. Safety glasses must be worn when chemical and/or eye hazards are present and must be American National Standards institute (ANSI) approved. Ear plugs will be worn if, at any time, verbal communication is difficult to comprehend within a radius of three feet. All respirator fit tests will be current within one year. Fit tests for asbestos will be accomplished on a semi-annual basis.

During any sampling activities involving site soils with excessive fugitive dust emissions, the sampling area will be misted with a spray bottle to preclude fugitive dust emissions and unnecessary exposures to site soils. Gloves will be utilized during all sampling activities. All re-usable work clothes and footwear will be bagged at the end of each work shift to avoid potential for secondary exposures or cross-contamination. The clothes will then be either decontaminated (by approved laundering) or sampled to verify that no contamination exists.

If field conditions indicate potential exposure to amounts of dust not suppressed by the above-referenced methods, PPE will be upgraded to Level C. Level C consists of Level D and the following items of PPE:

- Air Purifying Respirator (APR) half-masks with P100 particulate filters will be used. Additional filters that may be used in applicable situations will include acid/organic vapor cartridges. When using these devices, care shall be taken to follow device instructions carefully. In all cases, the equipment must be of the type approved by the National Institute of Occupational Safety and Health (NIOSH).

- Disposable Tyvek coveralls taped at the wrist and ankles, boot covers, and disposable latex examination gloves.

Field Precautions to Avoid Hanta Virus: Personnel entering areas where rodents and the presence of the Hanta Virus is known or suspected need to take personal proactive measures. Field personnel must contact the PM and HSD to determine the level of hazard involved and if a specialist should be contracted to clean the area prior to starting work. Personal protective equipment will include respirators with P100 particulate filters, eye protection, coveralls, latex gloves, and disposable boot covers .

6.0 ENVIRONMENTAL MONITORING PLAN

The potential hazards identified in the Hazard Analysis portion of this SSHP determined the need for initial and/or ongoing monitoring for assessment of exposure to the hazards as follows.

A no dust policy will be implemented for all activities being accomplished at the site, to include sampling demolition and excavation to ensure that potential exposure to contaminants identified in site soils is being controlled. If activities indicate elevated levels of dust, a real time dust monitor will be utilized to keep track of employee dust exposure.

If at any time during the sampling, it is suspected that a hazardous condition exists, or if sampling data, odors, symptoms or visual observations (i.e., staining) indicate the potential for exposure, or if visible dust is evident, and weather conditions do not allow for the suppression of dust during sampling, work will be stopped and monitoring efforts and personal protective equipment choices will be re-evaluated. Action levels and changes to this health and safety protocol for this site will be documented in addenda to this plan.

Heat stress and noise will be monitored as described in the Hazard Analysis portion of this SSHP.

7.0 MEDICAL SURVEILLANCE REQUIREMENTS

Medical surveillance is conducted as a routine program for Enercon field staff that meets the requirements of HAZWOPER regulation - 29 CFR 1910.120 (f) and Respiratory Protection regulations - 29 CFR 1910.134. Any additional test or examinations and Tetanus shots required for staff involved in this project will be performed on an as needed basis.

All subcontractor personnel directly involved with the field work must also meet the medical surveillance requirements of 29 CFR 1910.120.

8.0 SITE CONTROL MEASURES

This section describes the general facilities and site-specific control measures for this project. The potential chemical and physical hazards have been identified in this SSHP; however, should unexpected conditions arise, the SSO will stop all work at the site and notify the PM and HSO. Work will not resume until the SSHP and working conditions have been reevaluated and the SSHP revised accordingly.

Communication between field team members will consist of verbal communications, hand signals, and portable radios.

It is not anticipated that the PEL for any of the potential contaminants in this plan will be exceeded on site. However, if this does occur, a regulated area must be established and posted with warning signs, the language of which, is regulation specific. A no dust policy will be enforced during all site activities. If activities indicate the generation of dust, wetting procedures and real time dust monitoring will be initiated.

The nearest medical assistance is:

Lea County Regional Hospital
5419 Lovington Hwy.
Hobbs, NM
(505) 392-6581
Exit facility on Hwy 18. Head north on Hwy 18 for approximately 1.5 miles to hospital

8.1 SAFE WORK PRACTICES SITE ACTIVITIES

Safe work practices are part of assuring a safe and healthful working environment. These practices are standardized for all field activities, and it is the responsibility of Enercon employees to follow safe work practices when conducting field activities. Safe work practices to be employed during the entire progress of field work are as follows:

1. Set up, assemble, and check out all equipment for integrity and proper function prior to starting work activities.
2. Do not use faulty or suspect equipment.
3. Do not smoke, eat, drink or apply cosmetics while in the site work areas. Take breaks away from hazardous areas.
4. Wash hands, face, and arms prior to taking rest breaks, lunch break, and leaving the site at the end of the work day.
5. Check in and out with the SSO upon arrival and departure from the site.
6. Notify the SSO immediately if there is an accident that causes an injury or illness.
7. Use the buddy system when working in remote areas of the site.

8. Do not approach or enter an area where oxygen deficiency or toxic or explosive concentrations of airborne contaminants may exist without the proper personal protective equipment and appropriate support personnel.

9. Use respirators correctly and as required by the site; check the fit of the respirator with a negative or positive pressure test; do not wear respirator with facial hair or other conditions that prevent a face-to-facepiece seal; do not wear contact lenses when the use of a respirator is required; cartridge and filter units shall be checked and maintained in accordance with manufacturer instructions; the face piece shall be washed regularly.

Do not remove protective panels from energized electrical equipment such as transformers, junction boxes, power disconnect switches, or lighting fixtures without first securing the power source and then locking out and tagging out the source power. The same principles apply to inspection and access of energized mechanical or hydraulic equipment such as pumps and compressors. Contact Champion personnel to coordinate Lockout/Tagout of energized equipment.

9.0 DECONTAMINATION

A temporary decontamination line will be set up for each activity at each work zone at the site and decontamination of equipment and personnel will be conducted prior to leaving the site. A decontamination solution of Alconox and water will be used to clean if there are chemically contaminated items. A MSDS for Alconox is available on request. As described under Personal Protective Equipment, an alternative method of decontamination at the site includes bagging and approved laundering of work clothes and boots. Frequent laundering of clothing is advised. Tyuek suits, gloves, and boot covers will be properly disposed of. Handwashing before breaks, lunch, and leaving the site is mandatory.

Street clothes and food items must be stored in a clean area or in clean containers. Workers must wash their hands and face prior to eating. Eating will be permitted only in designated areas. While not indicated by preliminary data, showering immediately after the work shift is advised (weekly at minimum).

The temporary decontamination line should provide sufficient space to wash and rinse boots, gloves, and all sampling equipment prior to placing equipment into the support zone or a vehicle, as well as a place to discard used disposable items such as gloves and coveralls.

Depending on the decontamination option chosen, the decontamination station will include: glove/boot wash station, PPE disposal containers, potable water, and rest area.

10.0 EMERGENCY PROCEDURES

In the event of an emergency on site, the SSO will direct the course of action. It may be necessary for the SSO to depend on the other on-site personnel for assistance. The SSO will call for emergency assistance if needed. As soon as practical, the SSO will contact the PM and the HSO. All staff assigned to this project will be briefed on the emergency procedures and their responsibilities for implementation. A map showing the location and route to the hospital is included as Figure 1.

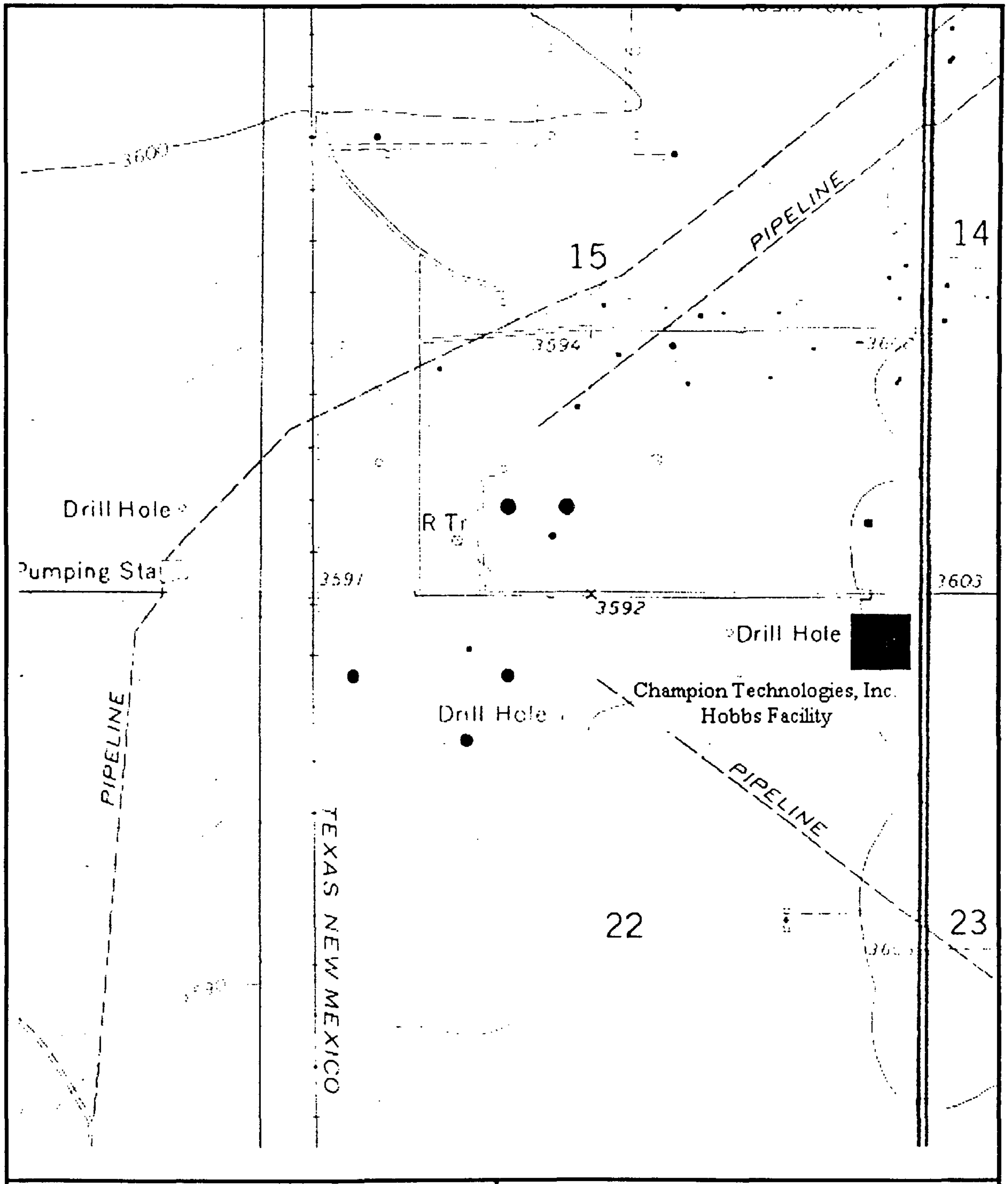
A first aid kit and fire extinguisher will be located in each support vehicle and project trailer. The nearest telephone is located in the support vehicle and the field office. The emergency telephone numbers to be used to call for assistance are listed in the section on Key Personnel and Responsibilities with the reference list of project contacts.

11.0 DOCUMENTATION

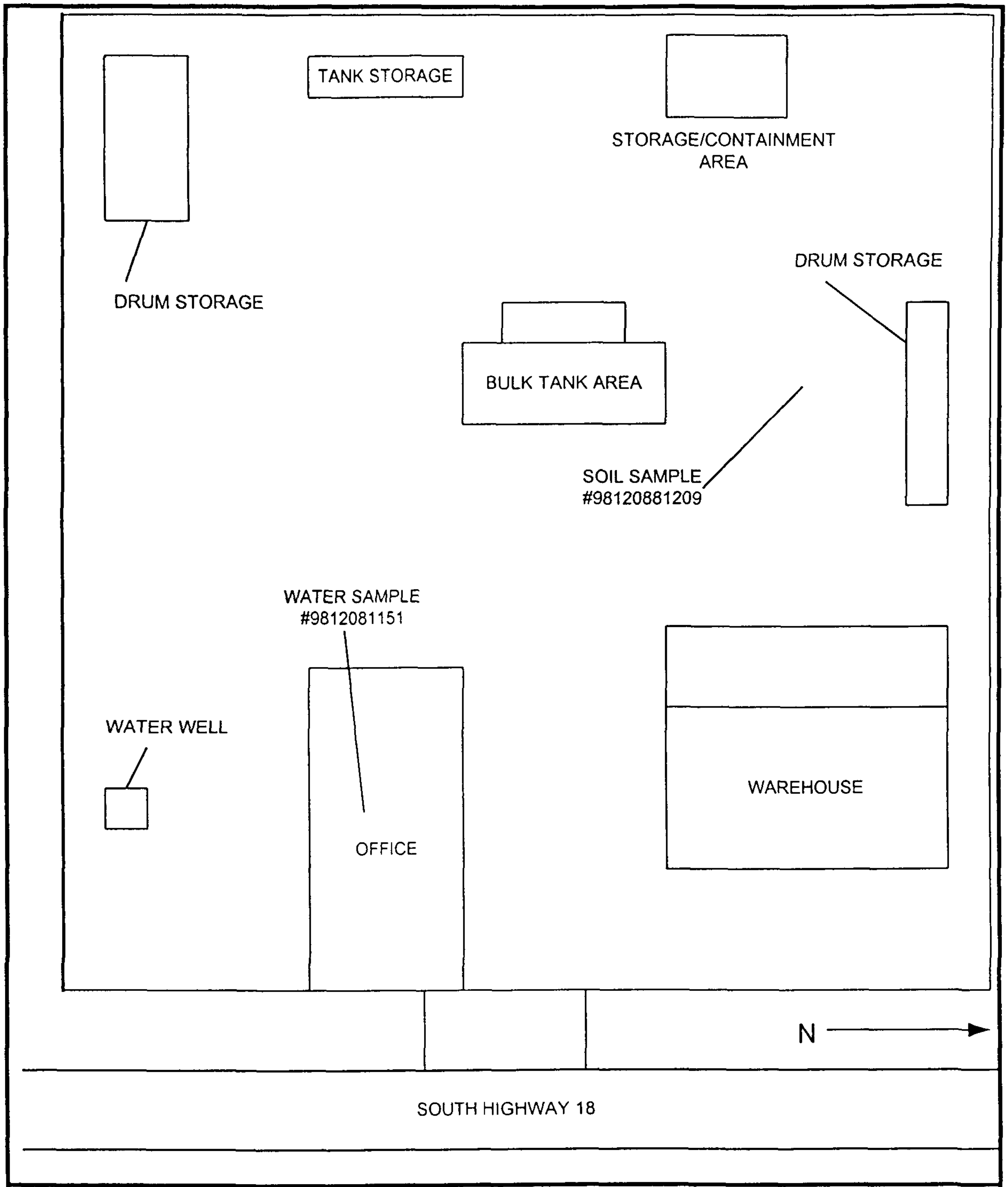
The implementation of the SSHP must be documented to assure employee participation and protection. In addition, the regulatory requirements must be met for record keeping on training, medical surveillance, injuries and illnesses, exposure monitoring, health risk information, and respirator fit-tests. Documentation of each employee's activities is maintained by the HSD in Pleasant Hill, California.

Documentation of the implementation of this plan will be accomplished using Attachments A through E. Copies of these forms are included as Appendix B. Attachment A must be completed by each Enercon employee at the initiation of field work for the project. The SSO is responsible for ensuring that each Enercon employee has completed this form, and for submitting copies to the HSO. The SSO is also responsible for completing the other attachments as required for a specific project. Copies should be maintained in the project file.

FIGURES



ENERCON SERVICES, INC. HOUSTON, TEXAS	Figure 1 Topographic Map
Subject Property 4001 South Hwy. 18 Hobbs, New Mexico	Prepared for: Champion Technologies, Inc.



ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 2** **Site Diagram**
Subject Property **4001 S. Hwy 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc**

APPENDIX A

MATERIAL SAFETY DATA SHEETS

Genium Publishing Corporation
One Genium Plaza
Schenectady, NY 12304-4690 USA
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Material Safety Data Sheets Collection:

Sheet No. 318
Xylene *(Mixed Isomers)*

Issued: 11/80 Revision: E, 9/92 Errata: 12/

Section 1. Material Identification

Xylene (Mixed Isomers) (C_8H_{10}) Description: The commercial product is a blend of the three isomers [*ortho*-(*o*-), *meta*-(*m*-), *para*-(*p*-)] with the largest proportion being *m*- xylene. Xylene is obtained from coal tar, toluene by transalkylation, and pseudocumene. Used in the manufacture of dyes, resins, paints, varnishes, and other organics; as a general solvent for adhesives, a cleaning agent in microscope technique; as a solvent for Canada balsam microscopy; as a fuel component; in aviation gasoline, protective coatings, sterilizing catgut, hydrogen peroxide, perfumes, insect repellants, pharmaceuticals, and the leather industry; in the production of phthalic anhydride, isophthalic, and terephthalic acids and their dimethyl esters which are used in the manufacture of polyester fibers; and as an indirect food additive as a component of adhesives. Around the home, xylene is found as vehicles in paints, paint removers, degreasing cleaners, lacquers, glues and cements and as solvent/vehicles for pesticides.

Other Designations: CAS No. 1330-20-7 [95-47-6; 108-38-3; 106-42-3 (*o*-, *m*-, *p*-isomers)], dimethylbenzene, methyltoluene, NCI-C55232, Violet 3, xylol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

Cautions: Xylene is an eye, skin, and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

R	1
I	2
S	2
K	3

NF
2

H
H
F
R
PP
† C
E
‡ S

Section 2. Ingredients and Occupational Exposure Limits

Xylene (mixed isomers): the commercial product generally contains ~ 40% *m*-xylene; 20% each of *o*-xylene, *p*-xylene, and ethylbenzene; and quantities of toluene. Unpurified xylene may contain pseudocumene.

1991 OSHA PELs
8-hr TWA: 100 ppm (435 mg/m^3)
15-min STEL: 150 ppm (655 mg/m^3)

1990 IDLH Level
1000 ppm

1990 NIOSH RELs
TWA: 100 ppm (435 mg/m^3)
STEL: 150 ppm (655 mg/m^3)

1992-93 ACGIH TLVs
TWA: 100 ppm (434 mg/m^3)
STEL: 150 ppm (651 mg/m^3)
BEI (Biological Exposure Index): Methylhippuric acids in urine at end of shift: 1.5 g/g creatinine

1990 DFG (Germany) MAK
TWA: 100 ppm (440 mg/m^3)
Category II: Substances with systemic effects
Half-life: < 2 hr
Peak Exposure: 200 ppm, 30 min, average value, 4 peaks per shift

1985-86 Toxicity Data*
Human, inhalation, TC_{Lo}: 200 ppm produced olfaction effects, conjunctiva irritation, and othe changes involving the lungs, thorax, or respirat
Man, inhalation, LC_{Lo}: 10000 ppm/6 hr; toxic effects not yet reviewed.
Human, oral, LD_{Lo}: 50 mg/kg; no toxic effect no
Rat, oral, LD_{50}: 4300 mg/kg; toxic effect not yet reviewed.
Rat, inhalation, LC_{50}: 5000 ppm/4 hr; toxic effec not yet reviewed.

* See NIOSH, *RTECS* (XE2100000), for additional toxicity data.

Section 3. Physical Data

Boiling Point Range: 279 to 284 °F (137 to 140 °C)*
Boiling Point: *ortho:* 291 °F (144 °C); *meta:* 281.8 °F (138.8 °C); *para:* 281.3 °F (138.5 °C)
Freezing Point/Melting Point: *ortho:* -13 °F (-25 °C); *meta:* -53.3 °F (- 47.4 °C); *para:* 55 to 57 °F (13 to 14 °C)
Vapor Pressure: 6.72 mm Hg at 70 °F (21 °C)
Saturated Vapor Density (Air = 1.2 kg/m^3): 1.23 kg/m^3, 0.077 lbs/ft^3
Appearance and Odor: Clear, sweet-smelling liquid.

* Materials with wider and narrower boiling ranges are commercially available.

Molecular Weight: 106.16
Specific Gravity: 0.864 at 20 °C/4 °C
Water Solubility: Practically insoluble
Other Solubilities: Miscible with absolute alcohol, ether, ar many other organic liquids.
Octanol/Water Partition Coefficient: logKow = 3.12-3.2
Odor Threshold: 1 ppm
Viscosity: <32.6 SUS

Section 4. Fire and Explosion Data

Flash Point: 63 to 77 °F (17 to 25 °C) CC	**Autoignition Temperature:** 982 °F (527 °C) (*m*-)	**LEL:** 1.1 (*m*-, *p*-); 0.9 (*o*-)	**UEL:** 7.0 (*m*-, *p*-); 6

Extinguishing Media: For small fires, use dry chemical, carbon dioxide (CO_2), water spray or regular foam. For large fires, use water spray, fo regular foam. Water may be ineffective. Use water spray to cool fire-exposed containers. **Unusual Fire or Explosion Hazards:** Xylene vapors c liquid (which floats on water) may travel to an ignition source and flash back. The heat of fire may cause containers to explode and/or produce irritating or poisonous decomposition products. Xylene may present a vapor explosion hazard indoors, outdoors, or in sewers. Accumulated stat electricity may occur from vapor or liquid flow sufficient to cause ignition. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positi pressure mode. Structural firefighter's protective clothing will provide limited protection. If feasible and without risk, move containers from fire Otherwise, cool fire-exposed containers until well after fire is extinguished. Stay clear of tank ends. Use unmanned hose holder or monitor nozz massive cargo fires. If impossible, withdraw from area and let fire burn. Withdraw immediately in case of any tank discoloration or rising sound venting safety device. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Xylene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Xylene is easily chlorinated, sulfonated, or nitrated. **Chemical Incompatibilities:** Incompatibilities include strong acids and oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Xylene attacks some forms of plastics, rubber, an coatings. **Conditions to Avoid:** Avoid heat and ignition sources and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidati decomposition of xylene can produce carbon dioxide, carbon monoxide, and various hydrocarbon products.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list xylene as a carcinogen. **Summary of Risks:** Xylene is an eye, mucous membrane, and respiratory tract irritant. [illegible] 200 ppm; severe breathing difficulties which may be delayed in onset can occur at hi concentrations. It is a central nervous system (CNS) depressant and at high concentrations can cause coma. Kidney and liver damage can occur xylene exposure. With prolonged or repeated cutaneous exposure, xylene produces a defatting dermatitis. Chronic toxicity is not well defined, b is less toxic than benzene. Prior to the 1950s, benzene was often found as a contaminant of xylene and the effects attributed to xylene such as bl dyscrasias are questionable. Since the late 1950s, xylenes have been virtually benzene-free and blood dyscrasias have not been associated with [illegible]

Section 6. Health Hazard Data, *continued*

Menstrual irregularity was reported in association with workplace exposure to xylene perhaps due to effects on liver metabolism. Xylene crosses the human placenta, but does not appear to be teratogenic under conditions tested to date. **Medical Conditions Aggravated by Long-Term Exposure:** CNS, respiratory, eye, skin, gastrointestinal (GI), liver and kidney disorders. **Target Organs:** CNS, eyes, GI tract, liver, kidneys, and skin. **Primary Entry Routes:** Inhalation, skin absorption (slight), eye contact, ingestion. **Acute Effects:** Inhalation of high xylene concentrations may cause dizziness; nausea, vomiting, and abdominal pain; eye, nose, and throat irritation; respiratory tract irritation leading to pulmonary edema (fluid in lung), drowsiness; and unconsciousness. Direct eye contact can result in conjunctivitis and corneal burns. Ingestion may cause a burning sensation in the oropharynx and stomach and transient CNS depression. **Chronic Effects:** Repeated or prolonged skin contact may cause drying and defatting of the skin leading to dermatitis. Repeated eye exposure to high vapor concentrations may cause reversible eye damage, peripheral and central neuropathy, and liver damage. Other symptoms of chronic exposure include headache, fatigue, irritability, chronic bronchitis, and GI disturbances such as nausea, loss of appetite, and gas.

FIRST AID *Emergency personnel should protect against exposure.* **Eyes:** *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. Carefully dispose of contaminated clothing as it may pose a fire hazard. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. Monitor exposed person for respiratory distress. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, *do not induce vomiting!* If spontaneous vomiting should occur, keep exposed person's head below the hips to prevent aspiration (breathing liquid xylene into the lungs). *Aspiration of a few millimeters of xylene can cause chemical pneumonitis, pulmonary edema, and hemorrhage.* **Note to Physicians:** Hippuric acid or the ether glucuronide of *ortho*-toluic acid may be useful in diagnosis of *meta-*, *para-* and *ortho*-xylene exposure, respectively. Consider gastric lavage if a large quantity of xylene was ingested. Proceed gastric lavage with protection of the airway from aspiration; consider endotracheal intubation with inflated cuff.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove all heat and ignition sources, and ventilate spill area. Cleanup personnel should protect against vapor inhalation and skin or eye contact. If feasible and without undue risk, stop leak. Use appropriate foam to blanket release and suppress vapors. Water spray may reduce vapor, but does not prevent ignition in closed spaces. For small spills, absorb on paper and evaporate in appropriate exhaust hood or absorb with sand or some non-combustible absorbent and place in containers for later disposal. For large spills dike far ahead of liquid to contain. Do not allow xylene to enter a confined space such as sewers or drains. On land, dike to contain or divert to impermeable holding area. Apply water spray to control flammable vapor and remove material with pumps or vacuum equipment. On water, contain material with natural barriers, booms, or weirs; apply universal gelling agent; and use suction hoses to remove spilled material. Report any release in excess of 1000 lb. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Transport:** Little bioconcentration is expected. Biological oxygen demand 5 (after 5 days at 20 °C): 0.64 (no stated isomer). **Ecotoxicity values:** LD$_{50}$, Goldfish, 13 mg/L/24 hr, conditions of bioassay not specified, no specific isomer. **Environmental Degradation:** In the atmosphere, xylenes degrade by reacting with photochemically produced hydroxyl radicals with a half-life ranging from 1-1.7 hr. in the summer to 10-18 hr in winter or a typical loss of 67-86% per day. Xylenes are resistant to hydrolysis. **Soil Absorption/Mobility:** Xylenes have low to moderate adsorption to soil and when spilled on land, will volatilize and leach into groundwater. **Disposal:** As a hydrocarbon, xylene is a good candidate for controlled incineration. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)
Listed as a RCRA Hazardous Waste (40 CFR 261.33): No. U239, F003 (spent solvent)
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg) [* per Clean Water Act, Sec. 311(b)(4); per RCRA, Sec. 3001]

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For concentrations >1000 ppm, use any chemical cartridge respirator with organic vapor cartridges; any powered, air-purifying respirator with organic vapor cartridges; any supplied-air respirator; or any self-contained breathing apparatus. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent all skin contact. With breakthrough times > 8 hr, consider polyvinyl alcohol and fluorocarbon rubber (Viton) as materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes. Launder contaminated work clothing before wearing. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in clearly labelled, tightly closed, containers in a cool, well-ventilated place, away from strong oxidizing materials and heat and ignition sources. During transferring operations, electrically ground and bond metal containers. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Use hermetically sealed equipment, transfer xylene in enclosed systems, avoid processes associated with open evaporating surfaces, and provide sources of gas release with enclosures and local exhaust ventilation. Use Class I, Group D electrical equipment. **Administrative Controls:** Establish air and biological monitoring programs and evaluate regularly. Consider preplacement and periodic medical examinations including a complete blood count, a routine urinalysis, and liver function tests. Consider hematologic studies if there is any significant contamination of the solvent with benzene. If feasible, consider the replacement of xylene by less toxic solvents such as petrol (motor fuel) or white spirit. Before carrying out maintenance and repair work, steam and flush all equipment to remove any xylene residues.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Xylenes	Packaging Authorizations	Quantity Limitations	Vessel Stowage Requirements
DOT Hazard Class: 3	a) Exceptions: 173.150	a) Passenger, Aircraft, or Railcar: 5L	a) Vessel Stowage: B
ID No.: UN1307	b) Nonbulk Packaging : 173.202	b) Cargo Aircraft Only: 60L	b) Other: –
DOT Packing Group: II	c) Bulk Packaging: 173.242		
DOT Label: Flammable Liquid			
Special Provisions (172.102): T1			

MSDS Collection References: 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 139, 140, 148, 149, 153, 159, 163, 164, 167, 171, 174, 176, 180
Prepared by: MJ Wurth, BS, **Industrial Hygiene Review:** PA Roy, MPH, CIH; **Medical Review:** W Silverman, MD

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Material Safety Data Sheets Collect

Sheet No. 317
Toluene
Issued: 8/79 Revision: E, 9/92 Errat

Section 1. Material Identification

Toluene ($C_6H_5CH_3$) Description: Derived from petroleum i.e., dehydrogenation of cycloparaffin fractions followed by the aromatization of saturated aromatic hydrocarbons or by fractional distillation of coal-tar light oil and purified by rectification. Used widely as a solvent (replacing benzene in many cases) for oils, resins, adhesives, natural rubber, coal tar, asphalt, pitch, acetyl celluloses, cellulose paints and varnishes; a diluent for photogravure inks, raw material for organic synthesis (benzoyl & benzilidene chlorides, saccharine, TNT, toluene diisocyanate, and many dyestuffs), in aviation and high octane automobile gasoline, as a nonclinical thermometer liquid and suspension solution for navigational instruments.
Other Designations: CAS No. 108-88-3, Methacide, methylbenzene, methylbenzol, phenylmethane, toluol, Tolu-sol.
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

Cautions: Toluene is an eye, skin, and respiratory tract irritant becoming narcotic at high centrations. Liver and kidney damage has occurred. Pregnant women chronically exposed to toluene have shown teratogenic effects. Toluene is highly flammable.

R 1
I 3
S 2*
K 3
* Skin absorption

HM
H
F
R
PPE

Section 2. Ingredients and Occupational Exposure Limits

Toluene, < 100%; may contain a small amount of benzene (~ 1%), xylene, and nonaromatic hydrocarbons.

1991 OSHA PELs
8-hr TWA: 100 ppm (375 mg/m³)
15-min STEL: 150 ppm (560 mg/m³)

1990 IDLH Level
2000 ppm

1990 NIOSH RELs
TWA: 100 ppm (375 mg/m³)
STEL: 150 ppm (560 mg/m³)

1992-93 ACGIH TLV (Skin)
TWA: 50 ppm (188 mg/m³)

1990 DFG (Germany) MAK*
TWA: 100 ppm (380 mg/m³)
Half-life: 2 hr to end of shift
Category II: Substances with systemic effects
~~Peak Exposure Limit: 500 ppm, 30 min~~ average value, 2/shift

1985-86 Toxicity Data†
Man, inhalation, TC_{Lo}: 100 ppm caused halluc and changes in motor activity and changes in psychophysiological tests.
Human, oral, LD_{Lo}: 50 mg/kg; toxic effects no yet reviewed
Human, eye: 300 ppm caused irritation.
Rat, oral, LD_{50}: 5000 mg/kg
Rat, liver: 30 µmol/L caused DNA damage.

* Available information suggests damage to the developing fetus is probable.
†See NIOSH, *RTECS* (XS5250000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 232 °F (110.6 °C)
Melting Point: -139 °F (-95 °C)
Molecular Weight: 92.15
Density: 0.866 at 68 °F (20/4 °C)
Surface Tension: 29 dyne/cm at 68 °F (20 °C)
Viscosity: 0.59 cP at 68 °F (20 °C)
Refraction Index: 1.4967 at 20 °C/D
Water Solubility: Very slightly soluble, 0.6 mg/L at 68 °F (20 °C)
Other Solubilities: Soluble in acetone, alcohol, ether, benzene, chloroform, glacial a acid, petroleum ether, and carbon disulfide.
Vapor Pressure: 22 mm Hg at 68 °F (20 °C); 36.7 mm Hg at 86 °F (30 °C)
Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.0797 lb/ft³ or 1.2755
Odor Threshold (range of all referenced values): 0.021 to 69 ppm

Appearance and Odor: Colorless liquid with a sickly sweet odor.

Section 4. Fire and Explosion Data

Flash Point: 40 °F (4.4 °C) CC	**Autoignition Temperature:** 896 °F (480 °C)	**LEL:** 1.27% v/v	**UEL:** 7.0% v/v

Extinguishing Media: Toluene is a Class 1B flammable liquid. To fight fire, use dry chemical carbon dioxide, or 'alcohol-resistant' foam. spray may be ineffective as toluene floats on water and may actually spread fire. **Unusual Fire or Explosion Hazards:** Concentrated vapo heavier than air and may travel to an ignition source and flash back. Container may explode in heat of fire. Toluenes' burning rate = 5.7 mm and its flame speed = 37 cm/sec. Vapor poses an explosion hazard indoors, outdoors, and in sewers. May accumulate static electricity. **Spe Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SC with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limit protection. Apply cooling water to sides of tanks until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, us monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sour venting safety device or notice any tank discoloration due to fire because a BLEVE (boiling liquid expanding vapor explosion) may be imr Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Toluene is stable at room temperature in closed containers under normal storage and handling conditions. Hazar polymerization can't occur. **Chemical Incompatibilities:** Strong oxidizers, concentrated nitric acid, nitric acid + sulfuric acid, dinitrogen t silver perchlorate, bromine trifluoride, tetranitromethane, and 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione. **Conditions to Avoid:** Conta heat, ignition sources, or incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of toluene can produce dioxide, and acrid, irritating smoke.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list toluene as a carcinogen. **Summary of Risks:** Toluene is irritating to t nose, and respiratory tract. Inhalation of high concentrations produces a narcotic effect sometimes leading to coma as well as liver and kidn damage. 93% of inhaled toluene is retained in the body of which 80% is metabolized to benzoic acid, then to hippuric acid and excreted in The remainder is metabolized to *o*-cresol and excreted or exhaled unchanged. Toluene metabolism is inhibited by alcohol ingestion and is s tic with benzene, asphalt fumes, or chlorinated hydrocarbons (i.e. perchloroethylene). Toluene is readily absorbed through the skin at 14 to cm²/hr. Toluene is absorbed quicker during exercise than at rest and appears to be retained longer in obese versus thin victims; presumably [illegible] There is inconsistent data on toluene's ability to damage bone marrow; chronic poisoning has resulted in anemia and leuco biopsy showing bone marrow hypo-plasia. These reports are few and some authorities argue that the effects may have been due to benzene nants. Chronic inhalation during pregnancy has been associated with teratogenic effects on the fetus including microcephaly, CNS dysfunc attentional deficits, developmental delay + language impairment, growth retardation, and physical defects including a small midface, short fissures with deep-set eyes, low-set ears, flat nasal bridge with a small nose, micrognathia, and blunt fingertips. There is some evidence th

ction 6. Health Hazard Data

dical Conditions Aggravated by Long-Term Exposure: Alcoholism and CNS, kidney, skin, or liver disease. **Target Organs:** CNS, liver, idney, skin. **Primary Entry Routes:** Inhalation, skin contact/absorption. **Acute Effects:** Vapor inhalation causes respiratory tract irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, watering eyes, nervousness, insomnia, parasthesis, and vertigo progressing to narcotic coma. ath may result from cardiac arrest due to ventricular fibrillation with catecholamines loss. Liquid splashed in the eye causes conjunctival irritation, nsient corneal damage and possible burns. Prolonged skin contact leads to drying and fissured dermatitis. Ingestion causes GI tract irritation and symptoms associated with inhalation. **Chronic Effects:** Symptoms include mucous membrane irritation, headache, vertigo, nausea, appetite loss and alcohol intolerance. Repeated heavy exposure may result in encephalopathies (cerebellar ataxia and cognitive dysfunction), liver enlargement, and ney dystrophy (wasting away). Symptoms usually appear at workdays end, worsen at weeks end and decrease or disappear over the weekend.

RST AID Eyes: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding ounts of water until transported to an emergency medical facility. Consult an ophthalmologist immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. **Inhalation:** Remove exposed person to sh air and support breathing as needed. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control ter and unless otherwise advised, have that *conscious and alert* person drink 1 to 2 glasses of water to dilute. *Do not* induce vomiting because of iger of aspiration into the lungs. Gastric lavage may be indicated if large amounts are swallowed; potential toxicity needs to be weighed against aspiration risk when deciding for or against gastric lavage. **Note to Physicians:** Monitor cardiac function. If indicated, use epinephrine and other catecholamines carefully, because of the possibility of a lowered myocardial threshold to the arrhythmogenic effects of such substances. Obtain CBC, ctrolytes, and urinalysis. Monitor arterial blood gases. If toluene has > 0.02% (200 ppm) benzene, evaluate for potential benzene toxicity. BEI: puric acid in urine, sample at shift end (2.5 g/g creatinine); Toluene in venous blood, sample at shift end (1.0 mg/L).

Section 7. Spill, Leak, and Disposal Procedures

ll/Leak: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Cleanup personnel protect against inhalation and skin/eye tact. Use water spray to cool and disperse vapors but it may not prevent ignition in closed spaces. Cellosolve, hycar absorbent materials, and rocarbon water can also be used for vapor suppression/containment. Take up small spill with earth, sand, vermiculite, or other absorbent, noncombustible material. Dike far ahead of large spills for later reclamation or disposal. For water spills, (10 ppm or greater) apply activated carbon at 10X the spilled amount and remove trapped material with suction hoses or use mechanical dredges/lifts to remove immobilized masses of pollutants precipitates. Toluene can undergo fluidized bed incineration at 842 to 1796 °F (450 to 980 °C), rotary kiln incineration at 1508 to 2912 °F (820 to 0 °C), or liquid injection incineration at 1202 to 2912 °F (650 to 1600 °C). Follow applicable OSHA regulations (29 CFR 1910.120). **Ecotoxicity Values:** Blue gill, LC_{50} = 17 mg/L/24 hr; shrimp (*Crangonfracis coron*), LC_{50} = 4.3 ppm/96 hr; fathead minnow (*Pimephales promelas*), LC_{50} = 36.2 ng/L/96 hr. ~~**Environmental Degradation:** If released to land, toluene evaporates and undergoes microbial degradation. **In water,** toluene volatilizes~~ biodegrades with a half-life of days to several weeks. In air, toluene degrades by reaction with photochemically produced hydroxyl radicals. posal: Treat contaminated water by gravity separation of solids, followed by skimming of surface. Pass through dual media filtration and carbon absorption units (carbon ratio 1 kg to 10 kg soluble material). Return waste water from backwash to gravity separator. Contact your supplier or a icensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

A Designations
ed as a RCRA Hazardous Waste (40 CFR 261.33): No. U220
RA Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg)
* per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307 (a)]
ed as a SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

ction 8. Special Protection Data

Goggles: Wear protective eyeglasses with shatter-resistant glass and side-shields or chemical safety goggles, per OSHA eye- and face-protection ulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional ice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 1000 ppm, use any chemical cartridge respirator with appropriate organic vapor cartridges, any supplied-air respirator SAR), or SCBA. For < 2000 ppm, use any SAR operated in continuous-flow mode, any SAR or SCBA with a full facepiece, or any air-purifying pirator with a full facepiece having a chin-style, front or back mounted organic vapor canister. For emergency or nonroutine operations (cleaning ls, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* spirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective ves, boots, aprons, and gauntlets to prevent skin contact. Polyvinyl alcohol with a breakthrough time of > 8 hr, Teflon and Viton are recommended as suitable materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its ource.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **ontaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove toluene from your shoes and n PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, king, smoking, using the toilet, or applying cosmetics.

ection 9. Special Precautions and Comments

rage Requirements: Prevent physical damage to containers. Store in a cool, dry, well-ventilated area away from ignition sources and incombles. Outside or detached storage is preferred. If stored inside, use a standard flammable liquids warehouse, room, or cabinet. To prevent static ks, electrically ground and bond all equipment used with toluene. Do not use open lights in toluene areas. Install Class 1, Group D electrical quipment. Check that toluene is free of or contains < 1% benzene before use. **Engineering Controls:** To reduce potential health hazards, use fficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. **Administ**lve Controls: Adopt controls for confined spaces (29 CFR 1910.146) if entering areas of unknown toluene levels (holes, wells, storage tanks). sider preplacement and periodic medical exams of exposed workers that emphasize the CNS, liver, kidney, and skin. Include hemocytometric nd thrombocyte count in cases where benzene is a contaminant of toluene. Monitor air at regular intervals to ensure effective ventilation.

Transportation Data (49 CFR 172.101)

T Shipping Name: Toluene	**Packaging Authorizations**	**Quantity Limitations**	**Vessel Stowage Requirements**
T Hazard Class: 3	a) Exceptions: 150	a) Passenger Aircraft or Railcar: 5L	Vessel Stowage: B
D No.: UN1294	b) Non-bulk Packaging: 202	b) Cargo Aircraft Only: 60L	Other: --
OT Packing Group: II	c) Bulk Packaging: 242		
T Label: Flammable Liquid			
al Provisions (172.102): T1			

SDS Collection References: 26, 73, 100, 101, 103, 124, 126, 127, 132, 140, 148, 153, 159, 163, 164, 167, 169, 171, 174, 175, 176, 180.
repared by: M Gannon, BA; Industrial Hygiene Review: PA Roy, CIH, MPH; Medical Review: AC Darlington, MD, MPH

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Material Safety Data Sheets Collectio

Sheet No. 316
Benzene

Issued: 11/78 Revision: E, 8/90

Section 1. Material Identification

Benzene (C_6H_6) Description: Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.

R 1
I 4
S 2*
K 4
*Skin absorption

Other Designations: CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phene, phenyl hydride, pyrobenzol.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(73) for a suppliers list.

Cautions: Benzene is a confirmed *human carcinogen* by the IARC. *Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue.* It is also a dangerous fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Benzene, ca 100%*

1989 OSHA PELs	**1989-90 ACGIH**	**1985-86 Toxicity Data‡**
(29 CFR 1910.1000, Table Z-1-A) 8-hr TWA: 1 ppm, 3 mg/m³ 15-min STEL: 5 ppm, 15 mg/m³	TLV-TWA: 10 ppm, 32 mg/m³	Man, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted Man, inhalation, TC_{Lo}: 150 ppm inhaled intermittentl ~~1 yr in a number of discrete, separate doses affects~~ blood (other changes) and nutritional and gross me lism (body temperature increase) Rabbit, eye: 2 mg administered over 24 hr produces s irritation
(29 CFR 1910.1000, Table Z-2) 8-hr TWA: 10 ppm Acceptable Ceiling Concentration: 25 ppm Acceptable Maximum Peak: 50 ppm (10 min)†	**1988 NIOSH RELs** TWA: 0.1 ppm, 0.3 mg/m³ Ceiling: 1 ppm, 3 mg/m³	

* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene excep subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke pro oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limi Table Z-2 apply.

† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.

‡ See NIOSH, *RTECS* (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 °F (80 °C)
Melting Point: 42 °F (5.5 °C)
Vapor Pressure: 100 mm Hg at 79 °F (26.1 °C)
Vapor Density (Air = 1): 2.7
Evaporation Rate (Ether = 1): 2.8

Molecular Weight: 78.11
Specific Gravity (15 °C/4 °C): 0.8787
Water Solubility: Slightly (0.180 g/100 g of H_2O at 25 °C)
% Volatile by Volume: 100
Viscosity: 0.6468 mPa at 20 °C

Appearance and Odor: A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is ap mately 5 ppm (unfatigued) in air. Odor *is not* an adequate warning of hazard.

Section 4. Fire and Explosion Data

Flash Point: 12 °F (-11.1 °C), CC	**Autoignition Temperature:** 928 °F (498 °C)	**LEL:** 1.3% v/v	**UEL:** 7.1% v/v

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse ben vapor, and protect personnel attempting to stop an unignited benzene leak.

Unusual Fire or Explosion Hazards: Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a poten fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Exp and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, handl stored.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not rele sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazard polymerization cannot occur.

Chemical Incompatibilities: Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, a peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium pe + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, [illegible] pentafluoride + potassium methoxide (explodes above 30 °C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel [above 410 °F (210 °C)]. Benzene is incompatible with oxidizing materials.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon [illegible]

Section 6. Health Hazard Data

Carcinogenicity: The ACGIH, OSHA, and IARC list benzene as, respectively, a supected human carcinogen, a cancer hazard, and, based on sufficient human and animal evidence, a human carcinogen (Group 1).

Summary of Risks: Prolonged skin contact or excessive inhalation of benzene vapor may cause headache, weakness, appetite loss, and fatigue. The most important health hazards are cancer (leukemia) and bone marrow damage with injury to blood-forming tissue from chronic low-level exposure. Higher level exposures may irritate the respiratory tract and cause central nervous system (CNS) depression.

Medical Conditions Aggravated by Long-Term Exposure: Exposure may worsen ailments of the heart, lungs, liver, kidneys, blood, and CNS.

Target Organs: Blood, central nervous system, bone marrow, eyes, upper respiratory tract, and skin.

Primary Entry Routes: Inhalation, skin contact.

Acute Effects: Symptoms of acute overexposure include irritation of the eyes, nose, and respiratory tract, breathlessness, euphoria, nausea, drowsiness, headache, dizziness, and intoxication. Severe exposure may lead to convulsions and unconsciousness. Skin contact may cause a drying rash (dermatitis).

Chronic Effects: Long-term chronic exposure may result in many blood disorders ranging from aplastic anemia (an inability to form blood cells) to leukemia.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: *Quickly* remove contaminated clothing. Immediately rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air. Emergency personnel should protect against inhalation exposure. Provide CPR to support breathing or circulation as necessary. Keep awake and transport to a medical facility.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* since aspiration may be fatal. Call a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Physician's Note: Evaluate chronic exposure with a CBC, peripheral smear, and reticulocyte count for signs of myelotoxicity. Follow up any early indicators of leukemia with a bone marrow biopsy. Urinary phenol conjugates may be used for biological monitoring of recent exposure. Acute management is primarily supportive for CNS depression.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: *Design and practice a benzene spill control and countermeasure plan (SCCP).* Notify safety personnel, evacuate all unnecessary personnel, eliminate all heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against vapor inhalation, eye contact, and skin absorption. Absorb as much benzene as possible with an inert, noncombustible material. For large spills, dike far ahead of spill and contain liquid. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of confined spaces such as sewers, watersheds, and waterways because of explosion danger. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.33), Hazardous Waste No. U019

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1000 lb (454 kg) [* per Clean Water Act, Sec. 307 (a), 311 (b)(4), 112; and per RCRA, Sec. 3001]

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

Listed as SARA Toxic Chemical (40 CFR 372.65)

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Tables Z-1-A and Z-2)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations at least below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.(103)

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all heat and ignition sources and incompatible materials. *Caution! Benzene vapor may form explosive mixtures in air.* To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations in production and storage areas. When opening or closing benzene containers, use nonsparking tools. Keep fire extinguishers readily available.

Engineering Controls: Because OSHA specifically regulates benzene (29 CFR 1910.1028), educate workers about its potential hazards and dangers. Minimize all possible exposures to carcinogens. If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if absolutely essential. Avoid vapor inhalation and skin and eye contact. Use only with adequate ventilation and appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Designate regulated areas of benzene use (see legend in the box below) and label benzene containers with "DANGER, CONTAINS BENZENE, CANCER HAZARD."

Other Precautions: Provide preplacement and periodic medical examinations with emphasis on a history of blood disease or previous exposure.

Transportation Data (49 CFR 172.101, .102)

DOT Shipping Name: Benzene (*benzol*)
DOT Hazard Class: Flammable liquid
ID No.: UN1114
DOT Label: Flammable liquid
DOT Packaging Exceptions: 173.118
DOT Packaging Requirements: 173.119

IMO Shipping Name: Benzene
IMO Hazard Class: 3.2
ID No.: UN1114
IMO Label: Flammable liquid
IMDG Packaging Group: II

DANGER
BENZENE
CANCER HAZARD
FLAMMABLE–NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

MSDS Collection **References:** 1, 2, 12, 26, 73, 84-94, 100, 101, 103, 109, 124, 126, 127, 132, 134, 136, 138, 139, 143

Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Upfal, MD, MPH; **Edited by:** JR Stuart, MS

CHEMISPHERE -- NAPHTHALENE, REFINED FLAKE - INSECTICIDE,NAPHTHALENE
MATERIAL SAFETY DATA SHEET
NSN: 6840005976111
Manufacturer's CAGE: CHEMI
Part No. Indicator: A
Part Number/Trade Name: NAPHTHALENE, REFINED FLAKE

General Information

Item Name: INSECTICIDE,NAPHTHALENE
Company's Name: CHEMISPHERE CORPORATION
Company's P. O. Box: 250
Company's City: BOONTON
Company's State: NJ
Company's Country: US
Company's Zip Code: 07005
Company's Emerg Ph #: 201-335-6972
Company's Info Ph #: 201-335-6972
Distributor/Vendor # 1: EMULTEC INDUSTRIAL PRODUCTS INC.
Distributor/Vendor # 1 Cage: 0WA27
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 003
Status: SM
Date MSDS Prepared: 01AUG92
Safety Data Review Date: 13JUL93
Supply Item Manager: CX
MSDS Serial Number: BRDJR
Specification Number: A-A-1812
Spec Type, Grade, Class: CLASS A
Hazard Characteristic Code: F7
Unit Of Issue: LB
Unit Of Issue Container Qty: UNKNOWN
Type Of Container: 4G BOX
Net Unit Weight: 1 POUND

Ingredients/Identity Information

Proprietary: NO
Ingredient: NAPHTHALENE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: QJ0525000
CAS Number: 91-20-3
OSHA PEL: 10 PPM/15 STEL
ACGIH TLV: 10 PPM/15 STEL; 9293
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CRYSTALLINE SOLID
Boiling Point: 424F,218C
Melting Point: 172F,78C
Vapor Pressure (MM Hg/70 F): 0.032 MM
Vapor Density (Air=1): 4.4
Specific Gravity: 1.16
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: INSOLUBLE
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: 174F,79C

Flash Point Method: OC
Lower Explosive Limit: 0.9
Upper Explosive Limit: 5.9
Extinguishing Media: FOAM, DRY CHEMICAL, CARBON DIOXIDE AND CONTENGENTLY ATOMIZED WATER. ZAVOID WATER IN LIQUID NAPHTHALENE TANK.
Special Fire Fighting Proc: MFR ?. HMIS:WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire And Expl Hazrds: VAPORS & DUSTS CAN FORM EXPLOSIVE MIXTURES IN AIR.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NO INFORMATION GIVEN ON MSDS BY MFR.
Materials To Avoid: NO INFORMATION GIVEN ON MSDS BY MFR.
Hazardous Decomp Products: NO INFORMATION GIVEN ON MSDS BY MFR.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NO INFORMATION GIVEN ON MSDS BY MFR.

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT) IS 178 MG/KGUNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: DUST AND SPATTERINGS AY CAUSE IRTRITATION TO EYES & SKIN. INHALATION MAY CAUSE NAUSEA, HEADACHES OR PERSPIRATION. SWALLOWING MAY CAUSE VOMITING, DIARRHEA AND CRAMPS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THE COMPONENTS OF THIS PRODUCT HAVE NOT SHOWN ANY EVIDENCE OF BEING CARCINOGENIC.
Signs/Symptoms Of Overexp: DUST AND SPATTERINGS AY CAUSE IRTRITATION TO EYES & SKIN. INHALATION MAY CAUSE NAUSEA, HEADACHES OR PERSPIRATION. SWALLOWING MAY CAUSE VOMITING, DIARRHEA AND CRAMPS.
Med Cond Aggravated By Exp: NO INFORMATION GIVEN ON MSDS BY MFR.
Emergency/First Aid Proc: MFR GAVE ONLY SKELETAL INFO FOR EYE/SKIN CONTACT. HMIS: EYE:FLUSH W/WATER 15 MIN, HOLD LIDS OPEN. SKIN:WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE REUSE. DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL CARE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NO INFORMATION GIVEN ON MSDS BY MFR.
Neutralizing Agent: NO INFORMATION GIVEN ON MSDS BY MFR.
Waste Disposal Method: "DISPOSE OF ALL WASTE I/A/W ALL FEDERAL, STATE AND LOCAL REGULATIONS."
Precautions-Handling/Storing: NO INFORMATION GIVEN ON MSDS BY MFR.
Other Precautions: NO INFORMATION GIVEN ON MSDS BY MFR.

Control Measures

Respiratory Protection: NO INFORMATION GIVEN ON MSDS BY MFR.
Ventilation: NO INFORMATION GIVEN ON MSDS BY MFR.
Protective Gloves: NO INFORMATION GIVEN ON MSDS BY MFR.
Eye Protection: NO INFORMATION GIVEN ON MSDS BY MFR.
Other Protective Equipment: NO INFORMATION GIVEN ON MSDS BY MFR.
Work Hygienic Practices: MFR: ? HMIS:USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING.
Suppl. Safety & Health Data: KEY2:KT MANUFACTURER'S MSDS GAVE VERY LITTLE INFORMATION. IT DID NOT MEET THE OSHA HAZARD COMMUNICATION STANDARD.

Transportation Data

```
========================================================================
Trans Data Review Date:   93194
DOT PSN Code: JZV
DOT Proper Shipping Name: NAPHTHALENE, CRUDE OR NAPHTHALENE, REFINED
DOT Class: 4.1
DOT ID Number: UN1334
DOT Pack Group: III
DOT Label: FLAMMABLE SOLID
IMO PSN Code: KIT
IMO Proper Shipping Name: NAPHTHALENE,CRUDE OR REFINED
IMO Regulations Page Number: 4158
IMO UN Number: 1334
IMO UN Class: 4.1
IMO Subsidiary Risk Label: -
IATA PSN Code: ROK
IATA UN ID Number: 1334
IATA Proper Shipping Name: NAPHTHALENE, REFINED
IATA UN Class: 4.1
IATA Label: FLAMMABLE SOLID
AFI PSN Code: ROD
AFI Prop. Shipping Name: NAPHTHALENE, CRUDE OR REFINED
AFI Class: 4.1
AFI ID Number: UN1334
AFI Pack Group: III
AFI Special Prov: A1
AFI Basic Pac Ref: 8-7
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Disposal Data

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========================================================================
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Label Data

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========================================================================
Label Required: NO
Label Status: X
Common Name: LABEL COVERED UNDER EPA REGS - HAZCOM LABEL NOT
AUTHORIZED
```

ALDRICH CHEMICAL -- PYRENE, 99%, 18551-5
MATERIAL SAFETY DATA SHEET
NSN: 685000N014585
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: PYRENE, 99%, 18551-5

General Information

Company's Name: ALDRICH CHEMICAL CO
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 24JAN90
Safety Data Review Date: 25MAR91
MSDS Serial Number: BKPQW
Hazard Characteristic Code: N1

Ingredients/Identity Information

Proprietary: NO
Ingredient: PYRENE (SARA III)
Ingredient Sequence Number: 01
Percent: 99
NIOSH (RTECS) Number: UR2450000
CAS Number: 129-00-0
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: YELLOW CRYSTALS AND POWDER
Boiling Point: 739F,393C
Melting Point: 300F,149C
Vapor Pressure (MM Hg/70 F): VERY LOW
Vapor Density (Air=1): N/A
Specific Gravity: 1.271 (FP N)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE (FP N)
pH: N/A

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY. CO*2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT TO PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO, CO*2
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE SUPP DATA
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED. MAY BE HARMFUL IF INHALED. MAY CAUSE EYE OR SKIN IRRITATION. INHALATION STUDIES IN ANIMALS HAVE CAUSED HEPATIC, PULMONARY & INTRAGASTRIC PATHOLOGIC CHANGES. NEUTROPHIL, LEUKOCYTE & ERYTHROCYTE LEVELS DECREASED. CUTANEOUS APPLICATION CAUSED HYPEREMIA, WEIGHT LOSS AND (SEE EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: N/A
Signs/Symptoms Of Overexp: HLTH HAZ: HEMATOPOIETIC CHANGES AND DERMATITIS. PYRENE IS READILY ABSORBED THROUGH THE SKIN (FP N). CHRONIC: LEUKOCYTOSIS. DERMATITIS (FP N). TARGET ORGANS: LIVER, KIDNEY, LUNG, SKIN AND BLOOD SYSTEM (FP N).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY WASH WITH SOAP AND COPIOUS AMOUNTS OF WATER. INHAL: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL MD. WASH CONTAMINATED CLOTHING BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE I/A/W FEDERAL, STATE AND LOCAL LAWS.
Precautions-Handling/Storing: KEEP TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions: AVOID INHALATION. DO NOT GET IN EYES, ON SKIN OR CLOTHING. AVOID PROLONGED OR REPEATED EXPOSURE. HARMFUL VAPOR.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: RUBBER GLOVES
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N)
Other Protective Equipment: RUBBER BOOTS, SAFETY SHOWER AND EYE BATH
Work Hygienic Practices: WASH HANDS THOROUGHLY AFTER USE AND BEFORE EATING, DRINKING, SMOKING OR USING SANITARY FACILITIES (FP N).
Suppl. Safety & Health Data: LD50-LC50 MIX: LD50: (ORL/RAT)=2700 MG/KG, (ORL/MUS)=800 MG/KG, (IPR/MUS)=514 MG/KG.

Transportation Data

Trans Data Review Date: 91269
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ

AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 25MAR91
Label Status: G
Common Name: PYRENE, 99%
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: MAY BE HARMFUL IF INGESTED OR INHALED. MAY CAUSE EYE & SKIN IRRITATION. AVOID BREATHING DUST. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. FIRE HAZARD NOT DETERMINED. CHRONIC: POSSIBLE CANCER HAZARD BASED ON ANIMAL DATA. TARGET ORGANS: LIVER, KIDNEY, SKIN, LUNGS AND BLOOD SYSTEM.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL CO
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

ALDRICH CHEMICAL -- 1-METHYLNAPHTHALENE, 98% M5680-8
MATERIAL SAFETY DATA SHEET
NSN: 681000N014689
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: 1-METHYLNAPHTHALENE, 98% M5680-8

General Information

Company's Name: ALDRICH CHEMICAL COMPANY
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 03JAN91
Safety Data Review Date: 02APR91
MSDS Serial Number: BKNZM
Hazard Characteristic Code: F8

Ingredients/Identity Information

Proprietary: NO
Ingredient: NAPHTHALENE, 1-METHYL-;(1-METHYLNAPHTHALENE, 98%)
Ingredient Sequence Number: 01
Percent: 98
NIOSH (RTECS) Number: QJ9630000
CAS Number: 90-12-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS TO PALE-YELLOW LIQUID.
Boiling Point: 464F,240C
Melting Point: -8F,-22C
Specific Gravity: 1.001

Fire and Explosion Hazard Data

Flash Point: 180F,82C
Extinguishing Media: WATER SPRAY. CO2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). PREVENT CONTACT WITH SKIN AND EYES. COMBUSTIBLE LIQUID.
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO & CO2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE SPECIFIED BY MANUFACTURER.

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORL,RAT) 1840 MG/KG.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION. VAPOR OR MIST IS IRRITATING TO THE EYES, MUC MEMB & UPPER RESP TRACT. CAUSES SKIN IRRITATION. CAUSES PHOTOSENSITIVITY. EXPOS TO LIGHT CAN RESULT IN ALLERGIC RXN RESULTING IN DERMATOLOGIC LEISONS, WHICH CAN VARY FROM SUNBURNLIKE (SEE EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NONE.

Signs/Symptoms Of Overexp: HLTH HAZ: RESPONSES TO EDEMATOUS, VESICULATED LESIONS OR BULLAE.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: IN CASE OF CONT, IMMED FLUSH EYES W/COPIOUS AMTS OF WATER FOR AT LEAST 15 MIN. IN CASE OF CONT, IMMED WASH SKIN W/SOAP & COPIOUS AMTS OF WATER. IF INHALED, REMOVE TO FRESH AIR. IF NOT BRTHG GIVE ARTF RESP. IF BRTHG IS DFCLT, GIVE OXYGEN. IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL MD. WASH CONTAM CLTHG BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: THIS COMBUSTIBLE MATERIAL MAY BE BURNED IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

Precautions-Handling/Storing: DO NOT BREATHE VAPOR. KEEP TIGHTLY CLOSED. KEEP AWAY FROM HEAT AND OPEN FLAME. STORE IN A COOL DRY PLACE.

Other Precautions: DO NOT GET IN EYES, ON SKIN AND CLOTHING. IRRITANT. PHOTOSENSITIZER.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.

Ventilation: MECHANICAL EXHAUST REQUIRED.

Protective Gloves: COMPATIBLE CHEMICAL RESISTANT GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: SAFETY SHOWER AND EYE BATH.

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 91273

DOT PSN Code: FST

DOT Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S.

DOT Class: 9

DOT ID Number: UN3082

DOT Pack Group: III

DOT Label: CLASS 9

IMO PSN Code: GMW

IMO Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. o

IMO Regulations Page Number: 9028

IMO UN Number: 3082

IMO UN Class: 9

IMO Subsidiary Risk Label: -
IATA PSN Code: KTV
IATA UN ID Number: 3082
IATA Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *
IATA UN Class: 9
IATA Label: MISCELLANEOUS
AFI PSN Code: KTV
AFI Prop. Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S.
AFI Class: 9
AFI ID Number: UN3082
AFI Pack Group: III
AFI Special Prov: 8
AFI Basic Pac Ref: 13-14

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 10JUN91
Label Date: 10JUN91
Label Status: G
Common Name: 1-METHYLNAPHTHALENE, 98% M5680-8
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: CAUSES EYE, SKIN, MUCOUS MEMBRANE AND UPPER RESPIRATORY TRACT IRRITATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. AVOID BREATHING VAPOR. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. MAY CAUSE ALLERGIC SKIN REACTION. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. COMBUSTIBLE LIQUID AAND VAPOR. KEEP AWAY FROM HEAT AND FLAME.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL COMPANY
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

PREPARERS ST OR P O BOX:
PREPARERS CITY:
PREPARERS STATE:
PREPARERS ZIP CODE:
OTHER MSDS NUMBER:
MSDS SERIAL NUMBER: BHGVQ
SPECIFICATION NUMBER:
SPEC TYPE GRADE CLASS:
HAZARD CHARACTERISTIC CODE:
UNIT OF ISSUE: NK
UNIT OF ISSUE CONTAINER QTY: N/K
TYPE OF CONTAINER: N/K
NET UNIT WEIGHT:
NRC STATE LICENSE NUMBER:
NET EXPLOSIVE WEIGHT:
NET PROPELLANT WEIGHT AMMO:
COAST GUARD AMMUNITION CODE:

Physical & Chemical Characteristics

APPEARANCE AND ODOR: WHITE SOLID
BOILING POINT: 838 F;448 C
MELTING POINT: 489 F;254 C
VAPOR PRESSURE MM HG 70 F: N/A MFR
VAPOR DENSITY AIR 1: N/A MFR
SPECIFIC GRAVITY: N/A
DECOMPOSITION TEMPERATURE: N/K F=N
EVAPORATION RATE AND REF: N/A MFR
SOLUBILITY IN WATER: N/A MFR
PERCENT VOLATILES BY VOLUME: N/AMFR
VISCOSITY:
PH: N/KFPN
RADIOACTIVITY:
FORM RADIOACTIVE MATL:
MAGNETISM MILLIGAUSS: N/P
CORROSION RATE IPY: N/K FPN.
AUTOIGNITION TEMPERATURE:

Fire and Explosion Hazard Data

FLASH POINT: N/K FPN
FLASH POINT METHOD: N/P
LOWER EXPLOSIVE LIMIT: N/KFPN
UPPER EXPLOSIVE LIMIT: N/K FPN
EXTINGUISHING MEDIA: WATER,CO*2,DRY CHEMICAL,ALCOHOL FOAM.
SPECIAL FIRE FIGHTING PROC: WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE(MFR).USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FPN).
UNUSUAL FIRE AND EXPL HAZRDS: N/A(MFR).

Reactivity Data

STABILITY: YES
COND TO AVOID (STABILITY): N/A.

MATERIALS TO AVOID: OXIDIZING AGENTS.
HAZARDOUS DECOMP PRODUCTS: N/A
HAZARDOUS POLY OCCUR: NO
CONDITIONS TO AVOID POLY: WILL NOT OCCUR.

Health Hazard Data

LD50 LC50 MIXTURE: LD50 NA.
ROUTE OF ENTRY INHALATION: YES
ROUTE OF ENTRY SKIN: YES
ROUTE OF ENTRY INGESTION: NO
HEALTH HAZ ACUTE AND CHRONIC: SEE SIGNS & SYMPTOMS OVEREXPOSURE.
CARCINOGENICITY NTP: NO
CARCINOGENICITY IARC: NO
CARCINOGENICITY OSHA: NO
EXPLANATION CARCINOGENICITY: CHRYSENE:ACGIH;SUSPECTED HUMAN CARCINOGEN(FPN).REPORTED ANIMAL CARCINOGEN (MFR).
SIGNS SYMPTOMS OF OVEREXP: REPORTED ANIMAL CARCINOGEN(MFR).
MED COND AGGRAVATED BY EXP: N/K FPN
EMERGENCY FIRST AID PROC: EYES:FLUSH WITH PLENTY OF POTABLE WATER FOR AT LEAST 15 MINUTES,THEN OBTAIN PROMPT MEDICAL ATTENTION (FPN).SKIN:PROMPTLY WASH SKIN WITH MILD SOAP AND LARGE VOLUMES OF WATER .REMOVE CONTAMINATED CLOTHING.INHALATION:IMMEDIATELY MOVE TO FRESH SAIR(MFR).SUPPORT BREATHING (GIVE O*2/ARTIFICAL RESPIRATION) (FPN).INGESTION:N/A(MFR).

Precautions for Safe Handling and Use

STEPS IF MATL RELEASED SPILL: SWEEP UP MATERIAL.FLUSH AREA WITH WATER.
NEUTRALIZING AGENT: N/K FPN.
WASTE DISPOSAL METHOD: COMPLY WITH APPLICABLE FEDERAL,STATE,OR LOCAL REGULATIONS.
PRECAUTIONS HANDLING STORING: STORE SEALED CONTAINER IN COOL,DRY LOCATION.
OTHER PRECAUTIONS: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.AVOID BREATHING VAPORS.

Control Measures

RESPIRATORY PROTECTION: N/A(MFR).NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN(FPN).
VENTILATION: USE ONLY IN EXHAUST HOOD.
PROTECTIVE GLOVES: WEAR RUBBER GLOVES.
EYE PROTECTION: SAFETY GLASSES WITH SIDESHIELDS(FPN)
OTHER PROTECTIVE EQUIPMENT: N/A
WORK HYGIENIC PRACTICES: OBSERVE GOOD WORK HYGIENIC PRACTICES(FPN).
SUPPL SAFETY HEALTH DATA:

Transportation Data

TRANSPORTATION ACTION CODE:
TRANSPORTATION FOCAL POINT: N
TRANS DATA REVIEW DATE: 89101
DOT PSN CODE: LVM

DOT SYMBOL:
DOT PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
DOT CLASS: 6.1
DOT ID NUMBER: UN2811
DOT PACK GROUP: III
DOT LABEL: KEEP AWAY FROM FOOD
DOT DOD EXEMPTION NUMBER: N/R
IMO PSN CODE: LYT
IMO PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
IMO REG PAGE NUMBER: 6236
IMO UN NUMBER: 2811
IMO UN CLASS: 6.1
IMO SUBSID RISK LABEL: -
IATA PSN CODE: UKJ
IATA UN ID NUMBER: 2811
IATA PROPER SHIP NAME: POISONOUS SOLID, N.O.S.
IATA UN CLASS: 6.1
IATA SUBSID RISK CLASS:
IATA LABEL: KEEP AWAY FROM FOOD
AFI PSN CODE: UKJ
AFI SYMBOLS:
AFI PROP SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
AFI CLASS: 6.1
AFI ID NUMBER: UN2811
AFI PACK GROUP: III
AFI LABEL: KEEP AWAY FROM FOOD
AFI SPECIAL PROV:
AFI BASIC PAC REF: 10-13
MMAC CODE:
N O S SHIPPING NAME:
ADDITIONAL TRANS DATA:

Disposal Data

DISPOSAL DATA ACTION CODE:
DISPOSAL DATA FOCAL POINT:
DISPOSAL DATA REVIEW DATE:
RECNUM FOR THIS DISP ENTR:
TOT DISP ENTRIES PER NSN:
LANDFILL BAN ITEM:
DISPOSAL SUPPLEMENTAL DAT:
EPAHAZWST 1ST CODE NEW:
EPAHAZWST 1ST NAME NEW:
EPAHAZWST 1ST CHAR NEW:
EPAACUTEHAZARD 1ST NEW:
EPAHAZWST 2ND CODE NEW:
EPAHAZWST 2ND NAME NEW:
EPAHAZWST 2ND CHAR NEW:
EPAACUTEHAZARD 2ND NEW:
EPAHAZWST 3RD CODE NEW:
EPAHAZWST 3RD NAME NEW:
EPAHAZWST 3RD CHAR NEW:
EPAACUTE 3RD HAZARD NEW:

Label Data

LABEL REQUIRED: YES
TECHNICAL REVIEW DATE:
LABEL DATE:
MFR NUMBER:
LABEL STATUS: F
COMMON NAME:
CHRONIC HAZARD: N/P
SIGNAL WORD:
ACUTE HEALTH HAZARD NONE:
ACUTE HEALTH HAZARD SLIGHT:
ACUTE HEALTH HAZARD MODERATE:
ACUTE HEALTH HAZARD SEVERE:
CONTACT HAZARD NONE:
CONTACT HAZARD SLIGHT:
CONTACT HAZARD MODERATE:
CONTACT HAZARD SEVERE:
FIRE HAZARD NONE:
FIRE HAZARD SLIGHT:
FIRE HAZARD MODERATE:
FIRE HAZARD SEVERE:
REACTIVITY HAZARD NONE:
REACTIVITY HAZARD SLIGHT:
REACTIVITY HAZARD MODERATE:
REACTIVITY HAZARD SEVERE:
SPECIAL HAZARD PRECAUTIONS: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
PROTECT EYE:
PROTECT SKIN:
PROTECT RESPIRATORY:
LABEL NAME: SUPELCO INC
LABEL STREET: SUPELCO PARK
LABEL P O BOX:
LABEL CITY: BELLEFONTE
LABEL STATE: PA
LABEL ZIP CODE: 16823
LABEL COUNTRY: US
LABEL EMERGENCY NUMBER:
YEAR PROCURED:

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SUPELCO -- EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
MATERIAL SAFETY DATA SHEET
NSN: 663000N066603
Manufacturer's CAGE: 54968
Part No. Indicator: A
Part Number/Trade Name: EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
=============================================================================
                           General Information
=============================================================================
Company's Name: SUPELCO INC
Company's Street: SUPELCO PARK
Company's City: BELLEFONTE
Company's State: PA
Company's Country: US
Company's Zip Code: 16823-0048
Company's Emerg Ph #: 814-359-3441
Company's Info Ph #: 814-359-3441
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 13JUL93
Safety Data Review Date: 19DEC95
MSDS Serial Number: BZSBL
=============================================================================
                      Ingredients/Identity Information
=============================================================================
Proprietary: NO
Ingredient: PHENANTHRENE; (PHENANTHRENE-D10) (MFR CAS #1517-22-)
Ingredient Sequence Number: 01
Percent: 0.05
NIOSH (RTECS) Number: SF7175000
CAS Number: 85-01-8
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
--------------------------------------
Proprietary: NO
Ingredient: ACENAPHTHYLENE; (ACENAPHTHYLENE-D8, 1,2-DIDEUTERO,
(ACENAPHTHENE D10)) (MFR CAS #15067-26-)
Ingredient Sequence Number: 02
Percent: 0.05
NIOSH (RTECS) Number: AB1000000
CAS Number: 83-32-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
--------------------------------------
Proprietary: NO
Ingredient: CHRYSENE; (CHRYSENE D12) (MFR CAS #1719-03-)
Ingredient Sequence Number: 03
Percent: 0.05
NIOSH (RTECS) Number: GC0700000
CAS Number: 218-01-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
--------------------------------------
Proprietary: NO
Ingredient: ACETONE (SARA 313) (CERCLA). LD50:(ORAL,RAT) 9750 MG/KG.
Ingredient Sequence Number: 04
Percent: 99-100
NIOSH (RTECS) Number: AL3150000
CAS Number: 67-64-1
OSHA PEL: 1000 PPM
ACGIH TLV: 750 PPM;1000 STEL
=============================================================================
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Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID.

Boiling Point: 133F,56C

Melting Point: -139F,-95C

Vapor Pressure (MM Hg/70 F): 181 @ 20C

Vapor Density (Air=1): 2

Specific Gravity: 0.792 (H*2O=1)

Evaporation Rate And Ref: 14.4 (BUTYL ACETATE=1)

Solubility In Water: 100%

Percent Volatiles By Volume: 1

Fire and Explosion Hazard Data

Flash Point: -2F,-19C

Flash Point Method: CC

Lower Explosive Limit: 2.6%

Upper Explosive Limit: 13%

Extinguishing Media: DRY CHEMICAL, ALCOHOL FOAM. WATER MAY BE INEFFECTIVE.

Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire And Expl Hazrds: VAPORS FORM EXPLOSIVE MIXTURES W/AIR. CONTAINERS MAY EXPLODE UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES

Cond To Avoid (Stability): NOT APPLICABLE

Materials To Avoid: STRONG ACIDS, STRONG BASES, OXIDIZING AGENTS, AMINES, OXYGEN, ALKANOLAMINES, HALOGENS, ALDEHYDES, AMMONIA & (SUPP DATA)

Hazardous Decomp Products: NOT APPLICABLE

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENT 4.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: BURNS EYES. IRRITATES RESPIRATORY TRACT. CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. IRRITATES SKIN. DERMATITIS, HEADACHE, DIZZINESS, GASTROINTESTINAL DISTURBANCES. DEPRESSES CENTRAL NERVOUS SYSTEM. CONVULSIONS, ERYTHEMA, ECZEMA, CONJUNCTIVITIS & CORNEAL EROSION.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT

Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYES:FLUSH W/WATER FOR AT LST 15 MINS. CONT MD. SKIN:PROMPTLY WASH W/MILD SOAP & LG VOLS OF WATER. REMOVE CONTAM CLTHG. INHAL:IMMED MOVE TO FRESH AIR. IF BRTHG STOPS, GIVE ARTF RESP. CONT MD. INGEST:NEVER GIVE ANYTHING BY MOUTH TO UNCON PERS. NEVER TRY TO MAKE UNCON PERS VOMIT. GIVE LG AMTS OF WATER. PRESS FINGERS TO BACK OF TONGUE TO INDUCE VOMIT. IMMED CONTACT MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: TAKE UP W/ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: COMPLY W/ALL APPLICABLE FEDERAL, STATE & LOCAL

REGULATIONS. CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. EMPTIED CONTAINERS RETAIN PRODUCT RESIDUE: HANDLE AS IF THEY WERE FULL.
Precautions-Handling/Storing: REFRIGERATE IN SEALED CONTAINER. KEEP AWAY FROM IGNITION SOURCES. AVOID EYE OR SKIN CONTACT. AVOID BREATHING VAPORS.
Other Precautions: THIS MATL IS INTENDED FOR R&D USE ONLY & MAY NOT BE USED FOR DRUG, HOUSEHOLD/OTHER PURPOSES. IN ADDN, BURDEN OF SAFE USE OF MATL RESTS W/YOU & THEREFORE, IT SHOULD BE HNDLD ONLY BY QUALIFIED PERS TRAINED IN LAB PROCS & GOOD SFTY PRACTICES.

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED SELF CONTAINED BREATHING APPARATUS.
Ventilation: USE ONLY IN EXHAUST HOOD.
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: MATLS TO AVOID:CHLORINATED COMPOUNDS.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 19DEC95
Label Date: 16NOV95
Label Status: G
Common Name: EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE/CHRONIC:BURNS EYES. IRRITATES RESPIRATORY TRACT. CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. IRRITATES SKIN. DERMATITIS, HEADACHE, DIZZINESS, GASTROINTESTINAL DISTURBANCES. DEPRESSES CENTRAL NERVOUS SYSTEM. CONVULSIONS, ERYTHEMA, ECZEMA, CONJUNCTIVITIS AND CORNEAL EROSION.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SUPELCO INC
Label Street: SUPELCO PARK
Label City: BELLEFONTE
Label State: PA
Label Zip Code: 16823-0048
Label Country: US
Label Emergency Number: 814-359-3441

ALDRICH CHEMICAL -- FLUORENE, 98%, 12833-3
MATERIAL SAFETY DATA SHEET
NSN: 681000N014315
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: FLUORENE, 98%, 12833-3

General Information

Company's Name: ALDRICH CHEMICAL COMPANY
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 03JAN90
Safety Data Review Date: 06JUL95
MSDS Serial Number: BKNBR
Hazard Characteristic Code: T3

Ingredients/Identity Information

Proprietary: NO
Ingredient: FLUORENE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: LL5670000
CAS Number: 86-73-7
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: WHITE CRYSTALLINE POWDER.
Boiling Point: 568F,298C
Melting Point: 237F,114C

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY. CO*2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO & CO*2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50: (IPR,MUS) 2 GM/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: ACUTE: MAY BE HARMFUL BY INHALATION OR INGESTION. MAY CAUSE EYE & SKIN IRRITATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: IARC
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH WITH SOAP & COPIOUS AMOUNTS OF WATER. WASH CONTAMINATED CLOTHING BEFORE REUSE. INHAL: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. CALL MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS & HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN A BAG & HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL LAWS.
Precautions-Handling/Storing: DO NOT BREATHE DUST. KEEP TIGHTLY CLOSED. STORE IN A COOL DRY PLACE.
Other Precautions: DO NOT GET IN EYES, ON SKIN OR CLOTHING.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: RUBBER GLOVES.
Eye Protection: CHEMICAL SAFETY GOGGLES.
Other Protective Equipment: SAFETY SHOWER AND EYE BATH.
Work Hygienic Practices: WASH THOROUGHLY AFTER USE AND BEFORE EATING, DRINKING, SMOKING OR USING SANITARY FACILITIES (FP N).
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 91267
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 06JUN91
Label Date: 06JUN91
Label Status: G
Common Name: FLUORENE, 98%, 12833-3
Chronic Hazard: NO

Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: CAUTION: ACUTE: HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE EYE AND SKIN IRRITATION. AVOID BREATHING DUST. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY ATER HANDLING. FIRE HAZARD NOT DETERMINED.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL COMPANY
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

CHEM SERVICE -- BIS(2-ETHYLHEXYL)PHTHALATE, 0-516
MATERIAL SAFETY DATA SHEET
NSN: 681000N077996
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: BIS(2-ETHYLHEXYL)PHTHALATE, 0-516

General Information

Company's Name: CHEM SERVICE INC
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381
Company's Emerg Ph #: 610-692-3026
Company's Info Ph #: 610-692-3026
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 25JAN95
Safety Data Review Date: 23JUL97
MSDS Serial Number: CFHCS

Ingredients/Identity Information

Proprietary: NO
Ingredient: PHTHALIC ACID, BIS(2-ETHYLHEXYL) ESTER; (BIS(2-ETHYLHEXYL) PHTHALATE) (SARA 313) (CERCLA). (ING 2)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: TI0350000
CAS Number: 117-81-7
OSHA PEL: 5 MG/M3
ACGIH TLV: 5 MG/M3

Proprietary: NO
Ingredient: ING 1:LD50:(ORAL,RAT) 31,000 MG/KG.
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SUPP DATA:OBTAINED FROM A POISON CONTROL CENTER.
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID.
Boiling Point: 729F,387C
Melting Point: -51F,-46C
Vapor Pressure (MM Hg/70 F): <0.01 @20C
Specific Gravity: 0.981
Solubility In Water: INSOL (IMMISCIBLE)

Fire and Explosion Hazard Data

Extinguishing Media: CARBON DIOXIDE OR DRY CHEMICAL POWDER. DO NOT USE WATER!
Special Fire Fighting Proc: USE NIOSH APPROVED SCBA & FULL PROTECTIVE

EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NO EXPLOSION LIMITS ARE AVAILABLE FOR THIS COMPOUND.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: INCOMPATIBLE W/STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: DECOMPOSITION LIBERATES TOXIC FUMES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENT 1.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT! MAY BE HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. DUST AND/OR VAPORS CAN CAUSE IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES. CAN CAUSE EYE AND SKIN IRRITATION. PROPOSITION 65 - THIS (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: PHTHALIC ACID, BIS(2-ETHYLHEXYL)ESTER:IARC MONOGRAPHS, SUPP, VOL 7, PG 56, 1989:GRP 2B. NTP 7TH ANNUAL RPT ON (SUPDAT)
Signs/Symptoms Of Overexp: HLTH HAZ:CHEMICAL IS CONSIDERED TO BE A CARCINOGEN BY THE STATE OF CALIFORNIA. THIS COMPOUND IS GENERALLY CONSIDERED TO BE NON-TOXIC.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: INGEST:CALL MD IMMED (FP N). EYES:FLUSH CONTINUOUSLY W/WATER FOR AT LST 15-20 MINS. SKIN:FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED-USE SOAP & WATER TO CLEANSE. DO NOT WEAR SHOES/CLTHG UNTIL ABSOLUTELY FREE OF ALL CHEM ODORS. INHAL:REMOVE PATIENT TO FRESH AIR. ADMIN OXYG IF PATIENT IS HAVING DFCLTY BRTHG. IF PATIENT HAS STOPPED BRTHG ADMIN ARTF RESP. IF PATIENT IS IN CARD (SUPP DATA)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N). BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER.
Precautions-Handling/Storing: AVOID CONTACT W/SKIN, EYES & CLOTHING. DO NOT BREATHE VAPORS. KEEP TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE. STORE ONLY W/COMPATIBLE CHEMICALS.
Other Precautions: PERSONS NOT SPECIFICALLY & PROPERLY TRAINED SHOULD NOT HANDLE THIS CHEM/ITS CNTNR. THIS PROD IS FURNISHED FOR LAB USE ONLY! MFR'S PRODS MAY NOT BE USED AS DRUGS, COSMETICS, AGRICULTURAL/PESTICIDAL PRODS, FOOD ADDTIVES/AS HOUSEHOLD CHEMS.

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). USE APPROPRIATE OSHA APPROVED SAFETY EQUIP.
Work Hygienic Practices: CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY.
Suppl. Safety & Health Data: EXPLAN OF CARCIN:CARCINS, 1994:ANTIC TO BE CARCIN. ANIMAL:LIVER, TESTES. FIRST AID PROC:ARREST ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSISTANCE HAS ARRIVED. NOTE:AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT EFT OF A POIS. IT SHOULD BE ADMIN ONLY BY MD/TRAINED EMER PERS. MED ADVICE CAN BE (ING 3)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 23JUL97
Label Date: 21JUL97
Label Status: G
Common Name: BIS(2-ETHYLHEXYL)PHTHALATE, 0-516
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT! MAY BE HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. DUST AND/OR VAPORS CAN CAUSE IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES. CAN CAUSE EYE AND SKIN IRRITATION. CHRONIC:CANCER HAZARD. CONTAINS BIS(2-ETHYLHEXYL) PHTHALATE, WHICH IS LISTED AS AN ANIMAL LIVER CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEM SERVICE INC
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381
Label Country: US
Label Emergency Number: 610-692-3026

CHEM SERVICE -- F1003 BENZO(E)PYRENE
MATERIAL SAFETY DATA SHEET
NSN: 655000F037550
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: F1003 BENZO(E)PYRENE

General Information

Company's Name: CHEM SERVICE INC
Company's Street: 660 TOWER LN
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381-3108
Company's Emerg Ph #: 215-692-3026/800-452-9994
Company's Info Ph #: 215-692-3026/800-452-9994
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 23OCT92
Safety Data Review Date: 29DEC94
Preparer's Company: CHEM SERVICE INC
Preparer's St Or P. O. Box: 660 TOWER LN
Preparer's City: WEST CHESTER
Preparer's State: PA
Preparer's Zip Code: 19381-3108
MSDS Serial Number: BWJHZ

Ingredients/Identity Information

Proprietary: NO
Ingredient: BENZOPYRENE
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: DJ4200000
CAS Number: 192-97-2

Physical/Chemical Characteristics

Appearance And Odor: WHITE TO YELLOW/GREEN CRYSTALLINE SOLID.
Melting Point: (SEE SUPP)
Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Extinguishing Media: CO2, DRY CHEMICAL POWDER/SPRAY.

Reactivity Data

Stability: YES
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES.
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES: IRRITATION. SKIN: IRRITATION, HARMFUL IF ABSORBED. INGESTION. HARMFUL. INHALATION: HARMFUL, IRRITATION TO RESPIRATORY TRACT & MUCOUS MEMBRANES. POSSIBLE MUTAGEN-MAY CAUSE BIRTH

DEFECTS IN FUTURE GENERATIONS. POSSIBLE TERATOGEN-CAUSES EMBRYO-FETAL DAMAGE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: IRRITATION.
Emergency/First Aid Proc: EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. KEEP WARM & QUIET. INGESTION: DON'T INDUCE VOMITING/GIVE LIQUIDS IF UNCONSCIOUS/ CONVULSIVE. IF VOMITING, WATCH CLOSELY FOR ANY AIRWAY OBSTRUCTION. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL DRY PLACE ONLY W/COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. FOR LABORATORY USE ONLY.
Other Precautions: AVOID CONTACT W/SKIN, EYES & CLOTHING. DON'T BREATH VAPOR. CONTACT LENSES SHOULDN'T BE WORN IN LABORATORY. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. AVOID DIRECT PHYSICAL CONTACT.

Control Measures

Respiratory Protection: WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Eye Protection: EYE SHIELDS
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Suppl. Safety & Health Data: MELTING POINT: 352.4-354.2F.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: F1003 BENZO(E)PYRENE
Special Hazard Precautions: EYES: IRRITATION. SKIN: IRRITATION, HARMFUL IF ABSORBED. INGESTION: HARMFUL. INHALATION: HARMFUL, IRRITATION TO RESPIRATORY TRACT & MUCOUS MEMBRANES. POSSIBLE MUTAGEN-MAY CAUSE BIRTH DEFECTS IN FUTURE GENERATIONS. POSSIBLE TERATOGEN-CAUSES EMBRYO-FETAL DAMAGE. IRRITATION.
Label Name: CHEM SERVICE INC
Label Street: 660 TOWER LN
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381-3108
Label Country: US
Label Emergency Number: 215-692-3026/800-452-9994

CORNELL PDC

Material Safety Data Sheets

Planning Design & Construction

DOD Hazardous Material Information
July, 1998
For Cornell University Convenience Only

BENZO(B)FLUORANTHENE 50MG,CATALOG NO,48490

FSC: 6810
NIIN: 00N010747
NSN: 681000N0107475
MANUFACTURERS CAGE: 54968
PART NO INDICATOR: A
PART NUMBER TRADE NAME: BENZO(B)FLUORANTHENE 50MG,CATALOG NO,48490

General Information

ITEM NAME:
MANUFACTURERS NAME: SUPELCO,INC.
MANUFACTURERS STREET: SUPELCO PARK
MANUFACTURERS P O BOX:
MANUFACTURERS CITY: BELLEFONTE
MANUFACTURERS STATE: PA
MANUFACTURERS COUNTRY:
MANUFACTURERS ZIP CODE: 16823-0048
MANUFACTURERS EMERG PH: 814-359-3441
MANUFACTURERS INFO PH: 814-359-3441
DISTRIBUTOR VENDOR 1:
DISTRIBUTOR VENDOR 1 CAGE:
DISTRIBUTOR VENDOR 2:
DISTRIBUTOR VENDOR 2 CAGE:
DISTRIBUTOR VENDOR 3:
DISTRIBUTOR VENDOR 3 CAGE:
DISTRIBUTOR VENDOR 4:
DISTRIBUTOR VENDOR 4 CAGE:
SAFETY DATA ACTION CODE:
SAFETY FOCAL POINT: N
RECORD NO FOR SAFETY ENTRY: 001
TOT SAFETY ENTRIES THIS STK: 001
STATUS: SE
DATE MSDS PREPARED: 10MAR88
SAFETY DATA REVIEW DATE: 01MAR89
SUPPLY ITEM MANAGER:
MSDS PREPARERS NAME:
PREPARERS COMPANY:

PREPARERS ST OR P O BOX:
PREPARERS CITY:
PREPARERS STATE:
PREPARERS ZIP CODE:
OTHER MSDS NUMBER:
MSDS SERIAL NUMBER: BHGVP
SPECIFICATION NUMBER:
SPEC TYPE GRADE CLASS:
HAZARD CHARACTERISTIC CODE:
UNIT OF ISSUE: NK
UNIT OF ISSUE CONTAINER QTY: N/K
TYPE OF CONTAINER: N/K
NET UNIT WEIGHT:
NRC STATE LICENSE NUMBER:
NET EXPLOSIVE WEIGHT:
NET PROPELLANT WEIGHT AMMO:
COAST GUARD AMMUNITION CODE:

Physical & Chemical Characteristics

APPEARANCE AND ODOR: LIGHT YELLOW CRYSTALLINE SOLID.
BOILING POINT: N/A MFR
MELTING POINT: 334 F;168 C
VAPOR PRESSURE MM HG 70 F: N/A MFR
VAPOR DENSITY AIR 1: N/A MFR
SPECIFIC GRAVITY: N/A MFR
DECOMPOSITION TEMPERATURE: N/F FPN
EVAPORATION RATE AND REF: N/A MFR
SOLUBILITY IN WATER: N/A MFR
PERCENT VOLATILES BY VOLUME: N/AMFR
VISCOSITY:
PH: N/KFPN
RADIOACTIVITY:
FORM RADIOACTIVE MATL:
MAGNETISM MILLIGAUSS: N/P
CORROSION RATE IPY: N/K FPN
AUTOIGNITION TEMPERATURE:

Fire and Explosion Hazard Data

FLASH POINT: N/K FPN
FLASH POINT METHOD: N/P
LOWER EXPLOSIVE LIMIT: N/K FPN
UPPER EXPLOSIVE LIMIT: N/K FPN
EXTINGUISHING MEDIA: CO*2,DRY CHEMICAL
SPECIAL FIRE FIGHTING PROC: WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE(MFR).USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FPN).
UNUSUAL FIRE AND EXPL HAZRDS: N/A MFR

Reactivity Data

STABILITY: YES
COND TO AVOID (STABILITY): N/A MFR

MATERIALS TO AVOID: N/A MFR
HAZARDOUS DECOMP PRODUCTS: N/A MFR
HAZARDOUS POLY OCCUR: NO
CONDITIONS TO AVOID POLY: WILL NOT OCCUR.

Health Hazard Data

LD50 LC50 MIXTURE: LD50 N/A MFR
ROUTE OF ENTRY INHALATION: YES
ROUTE OF ENTRY SKIN: NO
ROUTE OF ENTRY INGESTION: YES
HEALTH HAZ ACUTE AND CHRONIC: SEE SIGN & SYMPTOMS OF OVEREXPOSURE.
CARCINOGENICITY NTP: YES
CARCINOGENICITY IARC: YES
CARCINOGENICITY OSHA: NO
EXPLANATION CARCINOGENICITY: BENZO(B)FLUORANTHENE:NTP,MAY REASONABLY BE ANTICIPATED TO BE CARC.IARC,ANIMAL CARCINOGEN(FPN).RPTD ANIMAL (MFR).
SIGNS SYMPTOMS OF OVEREXP: REPORTED ANIMAL CARCINOGEN.
MED COND AGGRAVATED BY EXP: N/K FPN
EMERGENCY FIRST AID PROC: EYES:FLUSH WITH PLENTY OF POTABLE WATER FOR AT LEAST 15 MINUTES,THEN OBTAIN PROMPT MEDICAL ATTENTION (FPN).SKIN: PROMPTLY WASH SKIN WITH MILD SOAP & LARGE VOLUMES OF WATER REMOVE CONTAMINATED CLOTHING.CONTACT PHYSICIAN.INHAL:IMMEDIATELY MOVE TO FRESH AIR.CONTACT PHYSICIAN.INGEST:NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON,NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT.IMMED CONTACT PHYS.

Precautions for Safe Handling and Use

STEPS IF MATL RELEASED SPILL: SWEEP UP MATERIAL.AVOID GENERATING DUST.
NEUTRALIZING AGENT: N/K FPN
WASTE DISPOSAL METHOD: COMPLY WITH ALL APPLICABLE FEDERAL,STATE,OR LOCAL REGULATIONS.
PRECAUTIONS HANDLING STORING: REFRIGERATE IN SEALED CONTAINER.AVOID GENERATING DUST.PROTECT FROM EXPOSURE TO LIGHT.
OTHER PRECAUTIONS: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.

Control Measures

RESPIRATORY PROTECTION: WEAR SELF CONTAINED BREATHING APPARATUS.NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FPN).
VENTILATION: USE ONLY IN EXHAUST HOOD.
PROTECTIVE GLOVES: WEAR GLOVES
EYE PROTECTION: SAFETY GLASSES WITH SIDESHIELDS(FPN)
OTHER PROTECTIVE EQUIPMENT: N/A
WORK HYGIENIC PRACTICES: OBSERVE GOOD WORK HYGIENIC PRACTICES(FPN).
SUPPL SAFETY HEALTH DATA:

Transportation Data

TRANSPORTATION ACTION CODE:
TRANSPORTATION FOCAL POINT: N

TRANS DATA REVIEW DATE: 89101
DOT PSN CODE: LVM
DOT SYMBOL:
DOT PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
DOT CLASS: 6.1
DOT ID NUMBER: UN2811
DOT PACK GROUP: III
DOT LABEL: KEEP AWAY FROM FOOD
DOT DOD EXEMPTION NUMBER: N/R
IMO PSN CODE: LYT
IMO PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
IMO REG PAGE NUMBER: 6236
IMO UN NUMBER: 2811
IMO UN CLASS: 6.1
IMO SUBSID RISK LABEL: -
IATA PSN CODE: UKJ
IATA UN ID NUMBER: 2811
IATA PROPER SHIP NAME: POISONOUS SOLID, N.O.S.
IATA UN CLASS: 6.1
IATA SUBSID RISK CLASS:
IATA LABEL: KEEP AWAY FROM FOOD
AFI PSN CODE: UKJ
AFI SYMBOLS:
AFI PROP SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
AFI CLASS: 6.1
AFI ID NUMBER: UN2811
AFI PACK GROUP: III
AFI LABEL: KEEP AWAY FROM FOOD
AFI SPECIAL PROV:
AFI BASIC PAC REF: 10-13
MMAC CODE:
N O S SHIPPING NAME:
ADDITIONAL TRANS DATA:

Disposal Data

DISPOSAL DATA ACTION CODE:
DISPOSAL DATA FOCAL POINT:
DISPOSAL DATA REVIEW DATE:
RECNUM FOR THIS DISP ENTR:
TOT DISP ENTRIES PER NSN:
LANDFILL BAN ITEM:
DISPOSAL SUPPLEMENTAL DAT:
EPAHAZWST 1ST CODE NEW:
EPAHAZWST 1ST NAME NEW:
EPAHAZWST 1ST CHAR NEW:
EPAACUTEHAZARD 1ST NEW:
EPAHAZWST 2ND CODE NEW:
EPAHAZWST 2ND NAME NEW:
EPAHAZWST 2ND CHAR NEW:
EPAACUTEHAZARD 2ND NEW:
EPAHAZWST 3RD CODE NEW:
EPAHAZWST 3RD NAME NEW:
EPAHAZWST 3RD CHAR NEW:
EPAACUTE 3RD HAZARD NEW:

Label Data

LABEL REQUIRED: YES
TECHNICAL REVIEW DATE:
LABEL DATE:
MFR NUMBER:
LABEL STATUS: F
COMMON NAME:
CHRONIC HAZARD: N/P
SIGNAL WORD:
ACUTE HEALTH HAZARD NONE:
ACUTE HEALTH HAZARD SLIGHT:
ACUTE HEALTH HAZARD MODERATE:
ACUTE HEALTH HAZARD SEVERE:
CONTACT HAZARD NONE:
CONTACT HAZARD SLIGHT:
CONTACT HAZARD MODERATE:
CONTACT HAZARD SEVERE:
FIRE HAZARD NONE:
FIRE HAZARD SLIGHT:
FIRE HAZARD MODERATE:
FIRE HAZARD SEVERE:
REACTIVITY HAZARD NONE:
REACTIVITY HAZARD SLIGHT:
REACTIVITY HAZARD MODERATE:
REACTIVITY HAZARD SEVERE:
SPECIAL HAZARD PRECAUTIONS: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
PROTECT EYE:
PROTECT SKIN:
PROTECT RESPIRATORY:
LABEL NAME: SUPELCO INC
LABEL STREET: SUPELCO PARK
LABEL P O BOX:
LABEL CITY: BELLEFONTE
LABEL STATE: PA
LABEL ZIP CODE: 16823
LABEL COUNTRY: US
LABEL EMERGENCY NUMBER:
YEAR PROCURED:

ULTRA SCIENTIFIC -- PAH MIXTURE, US-106
MATERIAL SAFETY DATA SHEET
NSN: 685000N041079
Manufacturer's CAGE: 0MU35
Part No. Indicator: A
Part Number/Trade Name: PAH MIXTURE, US-106

General Information

Company's Name: ULTRA SCIENTIFIC
Company's Street: 250 SMITH ST
Company's City: NO KINGSTOWN
Company's State: RI
Company's Country: US
Company's Zip Code: 02852
Company's Emerg Ph #: 401-294-9400
Company's Info Ph #: 401-294-9400
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 17APR92
Safety Data Review Date: 06APR93
MSDS Serial Number: BSFFX
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
2136 MG/KG.
Ingredient Sequence Number: 01
Percent: 48.54
NIOSH (RTECS) Number: PA8050000
CAS Number: 75-09-2
OSHA PEL: 500 PPM;1000 PPM, C
ACGIH TLV: 50 PPM

Proprietary: NO
Ingredient: BENZENE (SARA III). LD50 (ORAL,RAT): 3320 MG/KG.
Ingredient Sequence Number: 02
Percent: 48.54
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1 PPM;5 STEL
ACGIH TLV: 10 PPM

Proprietary: NO
Ingredient: ACENAPHTHENE (SARA III)
Ingredient Sequence Number: 03
Percent: 0.182
NIOSH (RTECS) Number: AB1000000
CAS Number: 83-32-9
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ACENAPHTHYLENE (SARA III)
Ingredient Sequence Number: 04
Percent: 0.182
NIOSH (RTECS) Number: AB1254000
CAS Number: 208-96-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ANTHRACENE (SARA III)
Ingredient Sequence Number: 05
Percent: 0.182
NIOSH (RTECS) Number: CA9350000
CAS Number: 120-12-7
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZ[A]ANTHRACENE (SARA III)
Ingredient Sequence Number: 06
Percent: 0.182
NIOSH (RTECS) Number: CV9275000
CAS Number: 56-55-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZ(E)ACEPHENANTHRYLENE; (BENZO[B]FLUORANTHENE) (SARA III)
Ingredient Sequence Number: 07
Percent: 0.182
NIOSH (RTECS) Number: CU1400000
CAS Number: 205-99-2
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

✓ Proprietary: NO
Ingredient: BENZO(K)FLUORANTHENE (SARA III)
Ingredient Sequence Number: 08
Percent: 0.182
NIOSH (RTECS) Number: DF6350000
CAS Number: 207-08-9
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZO[GHI]PERYLENE (SARA III)
Ingredient Sequence Number: 09
Percent: 0.182
NIOSH (RTECS) Number: DI6200500
CAS Number: 191-24-2
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

✓ Proprietary: NO
Ingredient: BENZO[A]PYRENE (SARA III)
Ingredient Sequence Number: 10
Percent: 0.182
NIOSH (RTECS) Number: DJ3675000
CAS Number: 50-32-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: CHRYSENE (SARA III)
Ingredient Sequence Number: 11
Percent: 0.182
NIOSH (RTECS) Number: GC0700000
CAS Number: 218-01-9
OSHA PEL: 0.2 MG/M3
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: DIBENZ[A,H]ANTHRACENE
Ingredient Sequence Number: 12
Percent: 0.182
NIOSH (RTECS) Number: HN2625000
CAS Number: 53-70-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FLUORANTHENE (SARA III). LD50 (ORAL,RAT): 2000 MG/KG.
Ingredient Sequence Number: 13
Percent: 0.182
NIOSH (RTECS) Number: LL4025000
CAS Number: 206-44-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FLUORENE (SARA III)
Ingredient Sequence Number: 14
Percent: 0.182
NIOSH (RTECS) Number: LL5670000
CAS Number: 86-73-7
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: INDENO[1,2,3-CD]PYRENE (SARA III)
Ingredient Sequence Number: 15
Percent: 0.182
NIOSH (RTECS) Number: NK9300000
CAS Number: 193-39-5
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: NAPHTHALENE (SARA III). LD50 (ORAL,RAT): 1780 MG/KG.
Ingredient Sequence Number: 16
Percent: 0.182
NIOSH (RTECS) Number: QJ0525000
CAS Number: 91-20-3
OSHA PEL: 10 PPM;15 PPM STEL
ACGIH TLV: 10 PPM;15 PPM STEL

Proprietary: NO
Ingredient: PHENANTHRENE (SARA III). LD50 (ORAL,RAT): 700 MG/KG.
Ingredient Sequence Number: 17
Percent: 0.182
NIOSH (RTECS) Number: SF7175000
CAS Number: 85-01-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: PYRENE (SARA III)
Ingredient Sequence Number: 18
Percent: 0.182
NIOSH (RTECS) Number: UR2450000
CAS Number: 129-00-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: SUPDAT: 207-08-9, AND 193-39-5, IARC VOL SUP7, P56, 1987 (FP

N).
Ingredient Sequence Number: 19
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 19:BENZ(A)ANTHRACENE:IARC MONOGRAPHS, SUPPLEMENT, VOL 7, PG 56, 1987:GROUP 2A. NTP 7TH ANNUAL RPT ON (ING 19)
Ingredient Sequence Number: 20
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 20:CARCINS, 1994:ANTIC TO BE CARCIN. BLENO(1,2,3-CO) PYRENE, BENZO(K)FLUORANTHENE, BEN(E)ACEPHENANTHYRYLENE: (ING 22)
Ingredient Sequence Number: 21
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 21:IARC MONO, SUPP, VOL 7, PG56, 1987:GROUP 2B. NTP 7TH ANNUAL RPT ON CARCINS, 1994:ANTIC TO BE CARCIN.
Ingredient Sequence Number: 22
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: LIQUID

Fire and Explosion Hazard Data

Flash Point: NOT APPLICABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER, OR WATER SPRAY.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HCL AND PHOSGENE (FP N).

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZERS.
Hazardous Decomp Products: HCL, PHOSGENE (FP N).
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENTS.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CONTAINS CARCINOGEN(S) OR CANCER SUSPECT AGENT(S). TOXIC; IRRITANT. ALL CHEMS SHOULD BE CONSIDERED HAZARDOUS-DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. CHLOROCARBON MATERIALS HAVE PRODUCED SENSITIZATION OF MYOCARDIUM TO EPINEPHRINE IN LABORATORY ANIMALS AND COULD

HAVE SIMILAR EFFECT IN HUMANS. (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: METHYLENE CHLORIDE: CAS # 56-55-3, 205-99-2, 207-08-9, 50-32-8, 53-70-3, 193-39-5 ANTIC TO BE CARCINOGEN AND (SUPDAT)
Signs/Symptoms Of Overexp: HEALTH HAZARDS: ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY OR CHRONICALLY EXPOSED TO CHLOROCARBONS (FP N).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE: FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT REMOVE TO FRESH AIR. GIVE OXYGEN, IF NECESSARY. CONTACT PHYSICIAN. INGESTION: CALL MD IMMEDIATELY (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DUE TO SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. LEAKING BOTTLE MAY BE PLACED IN PLASTIC BAG AND NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR SAND.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS CONCERNING DISPOSAL.
Precautions-Handling/Storing: KEEP TIGHTLY CLOSED, AND STORE IN A COOL, DRY PLACE.
Other Precautions: MATL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN SAFE HNDLG OF HAZ CHEMS. NO SMOKING IN AREA OF USE. DO NOT USE IN GENERAL VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFS. HEAT &/OR UV RADIA MAY CAUSE FORM OF HCL &/OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: GENERAL VENTILATION SUFFICIENT TO KEEP AIRBORNE CONCENTRATION BELOW CURRENT EXPOSURE LIMITS (FP N).
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APRV CHEM WORK GOG&FULL LGTH FCSHLD
Other Protective Equipment: CHEMICAL RESISTANT CLOTHING SUCH AS LABORATORY COAT AND/OR A RUBBER APRON TO PREVENT CONTACT WITH EYES, SKIN, & CLTHG.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER. CARCIN COMMENTS: SARCOMAGEN (NTP 6TH ANN RPT, 1991); GRP 2B (IARC), BENZENE: KNOWN CARCIN & LEUKEMOGEN (NTP 6TH ANN RPT, 1991); GRP 1 (IARC VOL SUP7, P120, '87), OSHA 29CFR11910.1028, JUL'92), GRP 2A (IARC), CAS #56-55-3, 50-32-8, 53-70-3, GRP 2B, (IARC) CAS #205-99-2, (ING 19)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 06APR93
Label Date: 02APR93
Label Status: G
Common Name: PAH MIXTURE, US-106
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X

Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: KEEP TIGHTLY CLOSED, AND STORE IN A COOL, DRY PLACE. ACUTE: TOXIC; IRRITANT. INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEATS (FP N). ALL CHEMS SHOULD BE CONSIDERED HAZARDOUS-DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. CHRONIC: CANCER HAZARD. METHYLENE CHLORIDE AND BENZENE, CAS #56-55-3, 205-99-2, 50-32-8, 53-70-3, AND 193-39-5, MAY CAUSE LUNG CANCER, SARCOMAS AND OTHER CANCERS (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ULTRA SCIENTIFIC
Label Street: 250 SMITH ST
Label City: NO KINGSTOWN
Label State: RI
Label Zip Code: 02852
Label Country: US
Label Emergency Number: 401-294-9400

CORNELL PDC

Material Safety Data Sheets

Planning Design & Construction

DOD Hazardous Material Information
July, 1998
For Cornell University Convenience Only

CHRYSENE 0.1G CATALOG NO 48565.

FSC: 6810
NIIN: 00N010748
NSN: 681000N0107485
MANUFACTURERS CAGE: 54968
PART NO INDICATOR: A
PART NUMBER TRADE NAME: CHRYSENE 0.1G CATALOG NO 48565.

General Information

ITEM NAME:
MANUFACTURERS NAME: SUPELCO,INC.
MANUFACTURERS STREET: SUPELO PARK
MANUFACTURERS P O BOX:
MANUFACTURERS CITY: BELLEFONTE
MANUFACTURERS STATE: PA
MANUFACTURERS COUNTRY:
MANUFACTURERS ZIP CODE: 16823-0048
MANUFACTURERS EMERG PH: 814-359-3441
MANUFACTURERS INFO PH: 814-359-3441
DISTRIBUTOR VENDOR 1:
DISTRIBUTOR VENDOR 1 CAGE:
DISTRIBUTOR VENDOR 2:
DISTRIBUTOR VENDOR 2 CAGE:
DISTRIBUTOR VENDOR 3:
DISTRIBUTOR VENDOR 3 CAGE:
DISTRIBUTOR VENDOR 4:
DISTRIBUTOR VENDOR 4 CAGE:
SAFETY DATA ACTION CODE:
SAFETY FOCAL POINT: N
RECORD NO FOR SAFETY ENTRY: 001
TOT SAFETY ENTRIES THIS STK: 001
STATUS: SE
DATE MSDS PREPARED: 10MAR88
SAFETY DATA REVIEW DATE: 01MAR89
SUPPLY ITEM MANAGER:
MSDS PREPARERS NAME:
PREPARERS COMPANY:

APPENDIX B

ATTACHMENTS A - E

Attachment A—Site Safety & Health Plan Employee Acknowledgment

Employee Name		
Project Name	Project Location	Project Number

Employee Statement of Acknowledgment

I hereby certify that I have read and that I understand the safety and health guidelines contained in Site Safety and Health Plan for the above-named project.

Employee Signature ____________________ Date

In the Case of an Emergency, contact::

	Name	Relationship	Phone No.
1.			
2.			

Name of Site Safety Officer Receiving This Form	
Signature of Site Safety Officer	Date

Forward completed form to the Health and Safety Director. Place a copy in project file.

Attachment B—Site Safety & Health Plan
Site Activity and Safety Briefing

Project Name	Project Location	Project Number
Name of Site Safety Officer	Signature of Site Safety Officer	

Who attended the briefing?

Names of BC Employees	Names of Subcontractor(s) employees

What items were discussed?

- ☐ Site Safety and Health Plan
- ☐ Specific Accident/Incident
- ☐ Protective Equipment To Be Used
- ☐ Emergency Hospital Route
- ☐ Other ______________________________
- ☐ Hazardous Site Conditions/Activities
- ☐ Changes/Solutions to Specific Accident(s)
- ☐ Location of Emergency Telephone Number
- ☐ Work Schedule

Do any items require assistance from BC Health and Safety Staff? (If yes, describe the item and type of assistance required.)

☐ YES ☐ NO

Forward a copy of this form to Health & Safety Director. Place completed form in project file.

Attachment C—Site Safety & Health Plan
Safety Plan Implementation Checklist

Project Name

Project Location (city and state)

Date

Name of Site Safety Officer

Weather Conditions

Project Number

BC Staff Present Name ______________________ Office ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

Indicate the status of each of the following.

1.	Is a copy of the Site Safety and Health Plan (SSHP) on site?	☐ YES	☐ NO	☐ N/A
2.	Is the personal protective equipment required by the SSHP available and being used correctly?	☐ YES	☐ NO	☐ N/A
3.	Have the work zones been delineated?	☐ YES	☐ NO	☐ N/A
4.	Has a decontamination station been set up as required by the SSHP?	☐ YES	☐ NO	☐ N/A
5.	Are the decontamination procedures being followed?	☐ YES	☐ NO	☐ N/A
6.	Is access to the exclusion zone being controlled?	☐ YES	☐ NO	☐ N/A
7.	Has the site activities briefing and tailgate safety meeting been provided?	☐ YES	☐ NO	☐ N/A
8.	Is the list of emergency telephone numbers posted at the support zone?	☐ YES	☐ NO	☐ N/A
9.	Are directions to nearest emergency medical assistance posted at the support zone?	☐ YES	☐ NO	☐ N/A
10.	Is emergency equipment available and functional, as required by the SSHP?	☐ YES	☐ NO	☐ N/A
11.	Has the nearest toilet facility been identified or a portable facility been set up?	☐ YES	☐ NO	☐ N/A
12.	Has an adequate supply of drinking water been provided?	☐ YES	☐ NO	☐ N/A
13.	Has water for decontamination been provided?	☐ YES	☐ NO	☐ N/A
14.	Have the instruments for environmental and exposure monitoring been calibrated and set up as required by the SSHP?	☐ YES	☐ NO	☐ N/A
15.	Are the instruments being used properly and periodically checked during the shift for battery charge status?	☐ YES	☐ NO	☐ N/A
16.	Have trenches and excavations been clearly marked?	☐ YES	☐ NO	☐ N/A
17.	Have trenches and excavations been shored or sloped as required by soil type and work activities?	☐ YES	☐ NO	☐ N/A
18.	Are dust suppression measures being used?	☐ YES	☐ NO	☐ N/A
19.	Is food and tobacco consumption being restricted to the support zone?	☐ YES	☐ NO	☐ N/A
20.	Has a confined space been identified as part of this project?	☐ YES	☐ NO	☐ N/A
21.	Are the confined space entry procedures being correctly implemented?	☐ YES	☐ NO	☐ N/A
22.	Has the work/rest cycle for the shift been established?	☐ YES	☐ NO	☐ N/A
	TIME ON (minutes): ____________ TIME OFF (minutes): ____________			
23.	Has a shaded rest area been set up in the support zone?	☐ YES	☐ NO	☐ N/A

Place completed form [illegible]

Attachment E—Site Safety & Health Plan
Environmental Monitoring Documentation

Project Name

Project Number

Employee Name

Project Location

Equipment Used (check as appropriate)

	Calibrated	Date	Used	Date(s)
OVA (Organic Vapor Analyzer)/FID	☐	____________	☐	____________
OVM (Organic Vapor Monitor)/PID	☐	____________	☐	____________
HNU	☐	____________	☐	____________
TLV Sniffer	☐	____________	☐	____________
Photovac TIP	☐	____________	☐	____________
Combustible Gas Meter/Explosimeter	☐	____________	☐	____________
Other ____________	☐	____________	☐	____________

Instrument	Date	Time	Readout Value	Area Monitored	Changes in PPE			User's Initials
					YES	NO	Type of PPE	

Place completed form in project file.

Attachment D
Notice of Unsafe Conditions

Contractor	Date
Project Name	Project Number

THIS NOTICE...

This notice is to advise you, the prime Contractor on the above-named Contract, that this Representative of the Owner of the above-mentioned Project has observed (on the date shown above) an unsafe condition on the Project.

These conditions are listed as follows:

ITEM	CONDITION

By this Notice, the Owner or its Representatives shall not assume any responsibility under the GENERAL CONDITIONS or assume any liability for the existence or correction thereof, for the unsafe conditions, or any others that may have been unnoticed.

These conditions shall be remedied as soon as possible within a safe working period. If these corrections are not made, the Owner will be forced to remove all field staff from the job. No payment shall be made for any work installed after this date without first examination of work in accordance with the GENERAL CONDITIONS.

Signature of Owner's Representative	Title	Date
Received by (Signature of Contractor's Representative)	Title	Date

Place a copy of completed form in project file.

APPENDIX C

EMERGENCY CONTACT NUMBERS

HOBBS, NEW MEXICO

4001 S. Hwy 18, 88240, District 30
(505) 393-7726

EMERGENCY NUMBER Request for Fire, Sheriff, and Paramedics	**911**
LEPC Lea County 300 N. Turner Hobbs, NM 88240 Attn: David Hooten	**(505) 397-9231**
FIRE DEPARTMENT: Hobbs Fire Department 301 E. White Street Hobbs, NM 88240	**911** **(505) 397-7252**
HOSPITAL: Lea County Regional Hospital 5419 Lovington Hwy. Hobbs, NM 88240	**(505) 392-6581**
NATIONAL RESPONSE CENTER	**(800) 424-8802**
EMERGENCY RESPONSE CENTER	
CHEMTREC	**(800) 424-9300**
CHEMICAL REFERRAL CENTER	**(800) 262-8200**
PLANT/DISTRICT CONTACTS: Allan Childs	
Robert Middleton 164 Stonecrest Court #50 Hobbs, NM 88240	**(505) 392-1230**
SUGGESTED LOCAL NUMBERS:	
Vacuum Truck: AA Oilfield Service	**(505) 392-2577**
Rowland Truckin	**(505) 397-4994**
Wrecker: P&W Wrecker	**(505) 393-3715**

APPENDIX G

HISTORIC RECORDS

Champion
Technologies, Inc.

P.O. BOX 450499
HOUSTON, TEXAS 77245-0499

Telephone (713) 431-2561

CERTIFIED RETURN RECEIPT NO. P 334 055 551
February 15, 1996

State of New Mexico
Energy, Minerals and Natural Resources Department
2040 South Pacheco
Santa Fe, NM 87505-5472

ATTN: Mark Ashley, OCD Division
RE: Discharge Plan Requirement GW-199
Hobbs Facility
Lea County, New Mexico

Dear Mark,

Enclosed is the analytical data I promised you in my last letter of February 6. This data includes analysis of two (2) soil samples and two (2) undiluted waste streams. The soil samples were taken adjacent to the septic tank lateral lines at two different depths. The waste samples are taken from what we call the chlorinated waste, and from the metal salt waste.

If I can be of further assistance, please write or give me a call.

Sincerely,

Joe Schornick

Joe Schornick
Environmental Spe
Champion Technolo

cc: Mel Davis

Is your RETURN ADDRESS completed on the reverse side?

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write *"Return Receipt Requested"* on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
State of New Mexico
Energy, Minerals and Natural
Resources Dept.
2040 South Pacheco
Santa Fe, NM 87505-5472
ATTN: Mark Ashley

4a. Article Number
P 334 055-551

4b. Service Type
☐ Registered ☒ Certified
☐ Express Mail ☐ Insured
☒ Return Receipt for Merchandise ☐ COD

7. Date of Delivery
2-21

5. Received By: *(Print Name)*

6. Signature *(Addressee or Agent)*

8. Addressee's Address *(Only if requested and fee is paid)*

PS Form 3811, December 1994

Domestic Return Receipt

Thank you for using Return Receipt

Hall Environmental
Analysis Laboratory

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite C
Albuquerque, NM 87109
(505) 345-3975

2/9/96

Harrison Drilling
3206 Enterprise Dr.
Hobbs, NM 88240

Dear Allan Childs,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these levels (denoted by the < sign) has been made.

Please don't hesitate to contact me for any additional information or clarifications.

Sincerely,

2/12/96

Scott Hallenbeck, Lab Manager

Russell Zittlosen, Inorganics
Lab Manager

Project: 9601024/Champion Technologies, Inc.,Hobbs, NM

Results for sample: BH#1 7.5'- 8.0'

Date collected: 1/6/96	Date received: 1/8/96
Date extracted: NA	Date analyzed: 1/15/96
Client: Harrison Drilling, Inc.	
Project Name: Champion Technologies, Inc.,Hobbs, NM	HEAL #: 9601024-1
Project Manager: Allan Childs	Sampled by: C. Harrison
Matrix: Non-Aqueous	

Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	<0.05	mg/kg
Bromodichloromethane	nd	<0.01	mg/kg
Bromoform	nd	<0.05	mg/kg
Bromomethane	nd	<0.05	mg/kg
Carbon Tetrachloride	nd	<0.01	mg/kg
Chlorobenzene	nd	<0.01	mg/kg
Chloroethane	nd	<0.01	mg/kg
Chloroform	nd	<0.01	mg/kg
Chloromethane	nd	<0.01	mg/kg
2-Chloroethylvinyl Ether	nd	<0.05	mg/kg
Dibromochloromethane	nd	<0.01	mg/kg
1,3-Dichlorobenzene	nd	<0.01	mg/kg
1,2-Dichlorobenzene	nd	<0.01	mg/kg
1,4-Dichlorobenzene	nd	<0.01	mg/kg
Dichlorodifluoromethane	nd	<0.01	mg/kg
1,1-Dichloroethane	nd	<0.01	mg/kg
1,2-Dichloroethane	nd	<0.01	mg/kg
1,1-Dichloroethene	nd	<0.01	mg/kg
1,2-Dichloroethene (Cis)	nd	<0.01	mg/kg
1,2-Dichloroethene (Trans)	nd	<0.01	mg/kg
1,2-Dichloropropane	nd	<0.01	mg/kg
cis-1,3-Dichloropropene	nd	<0.01	mg/kg
trans-1,3-Dichloropropene	nd	<0.01	mg/kg
Ethylbenzene	nd	<0.05	mg/kg
Dichloromethane	nd	<0.1	mg/kg
1,1,2,2-Tetrachloroethane	nd	<0.01	mg/kg
Tetrachloroethene (PCE)	nd	<0.01	mg/kg
Toluene	nd	<0.05	mg/kg
1,1,1-Trichloroethane	nd	<0.01	mg/kg
1,1,2-Trichloroethane	nd	<0.01	mg/kg
Trichloroethene (TCE)	nd	<0.01	mg/kg
Vinyl Chloride	nd	<0.01	mg/kg
Xylenes (Total)	nd	<0.05	mg/kg
Trichlorofluoromethane	nd	<0.01	mg/kg
MTBE	nd	<0.1	mg/kg

BFB (Surrogate) Recovery = 101 %   BCM (Surrogate) Recovery = 81 %

Results for sample: BH#1 7.5'- 8.0'

Date collected: 1/6/96	Date received: 1/8/96
Date extracted: 1/15/96	Date analyzed: 1/16/96
Client: Harrison Drilling, Inc.	
Project Name: Champion Technologies, Inc.,Hobbs, NM	HEAL #: 9601024-1
Project Manager: Allan Childs	Sampled by: C. Harrison
Matrix: Non-Aqueous	

Test: EPA 418.1

Compound	Result	Units
TPH	160	PPM (mg/kg)

Dilution Factor = 1

Results for sample: BH#1 8.0'-8.5'

Date collected: 1/6/96
Date received: 1/8/96
Date extracted: NA
Date analyzed: 1/15/96
Client: Harrison Drilling, Inc.
Project Name: Champion Technologies, Inc.,Hobbs, NM
HEAL #: 9601024-2
Project Manager: Allan Childs
Sampled by: C. Harrison
Matrix: Non-Aqueous

Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	<0.05	mg/kg
Bromodichloromethane	nd	<0.01	mg/kg
Bromoform	nd	<0.05	mg/kg
Bromomethane	nd	<0.05	mg/kg
Carbon Tetrachloride	nd	<0.01	mg/kg
Chlorobenzene	nd	<0.01	mg/kg
Chloroethane	nd	<0.01	mg/kg
Chloroform	nd	<0.01	mg/kg
Chloromethane	nd	<0.01	mg/kg
2-Chloroethylvinyl Ether	nd	<0.05	mg/kg
Dibromochloromethane	nd	<0.01	mg/kg
1,3-Dichlorobenzene	nd	<0.01	mg/kg
1,2-Dichlorobenzene	nd	<0.01	mg/kg
1,4-Dichlorobenzene	nd	<0.01	mg/kg
Dichlorodifluoromethane	nd	<0.01	mg/kg
1,1-Dichloroethane	nd	<0.01	mg/kg
1,2-Dichloroethane	nd	<0.01	mg/kg
1,1-Dichloroethene	nd	<0.01	mg/kg
1,2-Dichloroethene (Cis)	nd	<0.01	mg/kg
1,2-Dichloroethene (Trans)	nd	<0.01	mg/kg
1,2-Dichloropropane	nd	<0.01	mg/kg
cis-1,3-Dichloropropene	nd	<0.01	mg/kg
trans-1,3-Dichloropropene	nd	<0.01	mg/kg
Ethylbenzene	nd	<0.05	mg/kg
Dichloromethane	nd	<0.1	mg/kg
1,1,2,2-Tetrachloroethane	nd	<0.01	mg/kg
Tetrachloroethene (PCE)	nd	<0.01	mg/kg
Toluene	nd	<0.05	mg/kg
1,1,1-Trichloroethane	nd	<0.01	mg/kg
1,1,2-Trichloroethane	nd	<0.01	mg/kg
Trichloroethene (TCE)	nd	<0.01	mg/kg
Vinyl Chloride	nd	<0.01	mg/kg
Xylenes (Total)	nd	<0.05	mg/kg
Trichlorofluoromethane	nd	<0.01	mg/kg
MTBE	nd	<0.1	mg/kg

BFB (Surrogate) Recovery = 96 %

BCM (Surrogate) Recovery = 86 %

Results for sample: BH#1 8.0'-8.5'

Date collected: 1/6/96	Date received: 1/8/96
Date extracted: 1/15/96	Date analyzed: 1/16/96
Client: Harrison Drilling, Inc.	
Project Name: Champion Technologies, Inc.,Hobbs, NM	HEAL #: 9601024-2
Project Manager: Allan Childs	Sampled by: C. Harrison
Matrix: Non-Aqueous	

Test: EPA 418.1

Compound	Result	Units
TPH	25	PPM (mg/kg)

Dilution Factor = 1

Test: Inorganics

Compound	9601024-1 BH#1 7.5'-8.0'	9511001-8 BH#1 8.0'-8.5'	9601024-1 BH#1 7.5'-8.0' Duplicate	Detection Limit	Units	Method Number	Analysis Date
Total As	4.9	6.8	-	0.5	mg/kg	7061	1/26
Total Ag	<1.0	<1.0	<1.0	1.0	mg/kg	7760	1/31
Total Ba	1,410	1,710	1,350	50	mg/kg	7080	1/31
Total Cd	<0.5	<0.5	<0.5	0.5	mg/kg	7131	1/31
Total Hg	<0.01	<0.01	<0.01	0.01	mg/kg	7470	1/26
Total Cr	7.0	12	7.0	1.0	mg/kg	7191	1/31
Total Pb	<5	<5	<5	5	mg/kg	7421	1/29
Total Se	<0.5	<0.5	-	0.5	mg/kg	7741	1/26
EC	6.52	5.62	ISS	0.1	mmhos	120.1	2/1
pH	8.0	7.9	ISS	-	-	150.0	1/19
W.S Ca	378	320	ISS	0.10	mg/L	215.1	2/6
W.S. Mg	164	158	ISS	0.01	mg/L	242.1	2/6
W.S. Na	408	355	ISS	0.10	mg/L	273.1	2/6
W.S. K	5.40	5.06	ISS	0.05	mg/L	258.1	2/6
W.S. Cl	1,800	1,510	ISS	0.5	mg/L	300.0	1/25
W.S. SO_4	182	219	ISS	1	mg/L	300.0	1/25
W.S. CO_3	<2	<2	ISS	2	*	310.1	1/26
W.S. HCO_3	65	60	ISS	2	*	310.1	1/26
W.S. NO_3	4.6	4.2	ISS	0.3	mg/L	300.0	1/25
W.S.PO_4	<0.1	<0.1	ISS	0.1	mg/L	300.0	1/25

*mg/L $CaCO_3$ equivalent

pH determined from 1 to 1 paste.

EC, Cations and Anions determined from 1 to 1 paste extract.

Water soluble carbonate quantity dependent on soil to water ratio due to calcareous nature of soil.

W.S. = Water Soluble

ISS = Insufficient sample

Results for QC:Reagent Blank

Date extracted: NA
Date analyzed: 1/15/96
Client: Harrison Drilling, Inc.
Project Name: Champion Technologies, Inc.,Hobbs, NM
HEAL #: RB 1/15
Project Manager: Allan Childs
Sampled by: NA
Matrix: Non-Aqueous

Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	<0.05	mg/kg
Bromodichloromethane	nd	<0.01	mg/kg
Bromoform	nd	<0.05	mg/kg
Bromomethane	nd	<0.05	mg/kg
Carbon Tetrachloride	nd	<0.01	mg/kg
Chlorobenzene	nd	<0.01	mg/kg
Chloroethane	nd	<0.01	mg/kg
Chloroform	nd	<0.01	mg/kg
Chloromethane	nd	<0.01	mg/kg
2-Chloroethylvinyl Ether	nd	<0.05	mg/kg
Dibromochloromethane	nd	<0.01	mg/kg
1.3-Dichlorobenzene	nd	<0.01	mg/kg
1.2-Dichlorobenzene	nd	<0.01	mg/kg
1.4-Dichlorobenzene	nd	<0.01	mg/kg
Dichlorodifluoromethane	nd	<0.01	mg/kg
1.1-Dichloroethane	nd	<0.01	mg/kg
1.2-Dichloroethane	nd	<0.01	mg/kg
1.1-Dichloroethene	nd	<0.01	mg/kg
1.2-Dichloroethene (Cis)	nd	<0.01	mg/kg
1.2-Dichloroethene (Trans)	nd	<0.01	mg/kg
1.2-Dichloropropane	nd	<0.01	mg/kg
cis-1.3-Dichloropropene	nd	<0.01	mg/kg
trans-1.3-Dichloropropene	nd	<0.01	mg/kg
Ethylbenzene	nd	<0.05	mg/kg
Dichloromethane	nd	<0.1	mg/kg
1.1.2.2-Tetrachloroethane	nd	<0.01	mg/kg
Tetrachloroethene (PCE)	nd	<0.01	mg/kg
Toluene	nd	<0.05	mg/kg
1.1.1-Trichloroethane	nd	<0.01	mg/kg
1.1.2-Trichloroethane	nd	<0.01	mg/kg
Trichloroethene (TCE)	nd	<0.01	mg/kg
Vinyl Chloride	nd	<0.01	mg/kg
Xylenes (Total)	nd	<0.05	mg/kg
Trichlorofluoromethane	nd	<0.01	mg/kg
MTBE	nd	<0.1	mg/kg

BFB (Surrogate) Recovery = 100 %

BCM (Surrogate) Recovery = 93 %

Results for QC:Reagent Blank

Date extracted: 1/15/96	Date analyzed: 1/16/96
Client: Harrison Drilling, Inc.	
Project Name: Champion Technologies, Inc.,Hobbs, NM	HEAL #: RB 1/15
Project Manager: Allan Childs	Sampled by: NA
Matrix: Non-Aqueous	

Test: EPA 418.1

Compound	Result	Units
TPH	<20	PPM (mg/kg)

Dilution Factor = 1

Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: NA	Date analyzed: 1/15/96
Client: Harrison Drilling, Inc.	
Project Name: Champion Technologies, Inc.,Hobbs, NM	HEAL #: 9601024-2 MS/MSD
Project Manager: Allan Childs	Sampled by: NA
Matrix: Non-Aqueous	

Test: EPA 8010/8020

Compound	Sample Result	Result Added	Matrix Recov.	MS %	MSD Recov.	MSD %	RPD
Benzene	<0.05	1.00	0.96	96	0.92	92	4
Toluene	<0.05	1.00	0.88	88	0.87	87	1
Ethylbenzene	<0.05	1.00	0.87	87	0.83	83	4
Xylenes	<0.05	3.00	0.97	97	0.93	93	4
trans-1,2-DCE	<0.01	1.00	0.90	90	0.91	91	1
1,1 - DCA	<0.01	1.00	1.05	105	0.98	98	7
1,1,1 - TCA	<0.01	1.00	0.85	85	0.83	83	2
Carbon tet	<0.01	1.00	1.18	118	1.17	117	1
TCE	<0.01	1.00	1.16	116	1.15	115	1
PCE	<0.01	1.00	1.07	107	0.99	99	8

Test: EPA 418.1

Blank Spike:

Compound	Sample	Amount Spiked	Result Recovered	% Recovery
Total Petroleum Hydrocarbons	<20	100	102	102

Sample Duplicate 9601038-8:

Compound	Sample	Sample Duplicate	RPD
Total Petroleum	<20	<20	NA

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
2403 San Mateo NE, Suite P-13
Albuquerque, New Mexico 87110
505.880.1803

Client: HARRISON DRILLING

Address: 3206 ENTERPRISE DR.
HOBBS, NM 88240

Phone #: (505) 392 ~~6894~~ 6768

Fax #: (505) 392-9151

Project Name: CHAMPION TECHNOLOGIES, INC
HOBBS, NM

Project #: LEACH FIELD #1

Project Manager: ALLAN CHILDS

Sampler: CLAIBORNE HARRISON

Samples Cold? ☑ Yes ☐ No

ANALYSIS REQUEST

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative			HEAL No.	BTEX (Method 602/8020)	BTEX + MTBE (602/8020)	TPH Method 8015 MOD (Gas/Diesel)	BTEX + TPH + MTBE (Gasoline Only)	BTEX + MTBE + TPH (Gas + Diesel)	TPH (Method 418.1)	601/602 Volatiles	EDB (Method 504.1)	EDC	610 (PNA or PAH)	8010/8020/418.1	Cations/Anions	RCRA 8 - METALS TOTAL	[illegible]
					HgCl$_2$	HCl	Other															
1-6-96	1500	SOIL	BH #1 7.5'-8.0'	Brass Liner				9601024-1	SEE			REMARKS							X	X	X	
1-6-96	1500	SOIL	BH #1 8.0'-8.5'	Brass Liner				-2	SEE			REMARKS							X	X	X	
1-6-96	1500	SOIL	BH #1 8.0' Composite	8 oz. JAR					HOLD -			DO	NOT			RUN						
1-6-96	1500	SOIL	BH #1 8.0' Composite	8 oz. JAR					HOLD -			DO	NOT			RUN						

Date: 1-8-96	Time: 10:00	Relinquished By: (Signature) C. Harrison	Received By: (Signature)
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

Remarks: MAINTAIN METAL EXTRACT FOR 3 MONTHS
WRT Analysis Request, please see enclosed correspondence noting highlighted segment. Call if [illegible] have any questions. C. Harrison

Hall Environmental Analysis Laboratory

Hall Environmental Analysis Laboratory
4901 Hawkins N.E.
Albuquerque, NM 87109
(505)345-3975

2/13/96

Harrison Drilling
3206 Enterprise Dr.
Hobbs, NM 88204

Dear Mr. Allan Childs,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these levels (denoted by the < sign) has been made.

Please don't hesitate to contact me for any additional information or clarifications.

Sincerely,

2/13/96

Scott Hallenbeck, Lab Manager

Project: 9602004/Champion Technologies

Results for sample: Chlorinated Waste

Date collected: 1/25/96	Date received: 2/1/96
Date extracted: 2/12/96	Date analyzed: 2/12/96
Client: Harrison Drilling	
Project Name: Champion Technologies	HEAL #: 9602004-1
Project Manager: Allan Childs	Sampled by: A. Childs/S. Seed
Matrix: Aqueous	

Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	<5,000	PPB (µg/L)
Bromodichloromethane	nd	<2,000	PPB (µg/L)
Bromoform	nd	<10,000	PPB (µg/L)
Bromomethane	nd	<10,000	PPB (µg/L)
Carbon Tetrachloride	nd	<2,000	PPB (µg/L)
Chlorobenzene	nd	<2,000	PPB (µg/L)
Chloroethane	nd	<2,000	PPB (µg/L)
Chloroform	925,000	<2,000	PPB (µg/L)
Chloromethane	nd	<2,000	PPB (µg/L)
2-Chloroethylvinyl Ether	nd	<10,000	PPB (µg/L)
Dibromochloromethane	nd	<2,000	PPB (µg/L)
1,3-Dichlorobenzene	nd	<2,000	PPB (µg/L)
1,2-Dichlorobenzene	nd	<2,000	PPB (µg/L)
1,4-Dichlorobenzene	nd	<2,000	PPB (µg/L)
Dichlorodifluoromethane	nd	<2,000	PPB (µg/L)
1,1-Dichloroethane	nd	<2,000	PPB (µg/L)
1,2-Dichloroethane	520,000	<2,000	PPB (µg/L)
1,1-Dichloroethene	nd	<2,000	PPB (µg/L)
1,2-Dichloroethene (Cis)	nd	<2,000	PPB (µg/L)
1,2-Dichloroethene (Trans)	nd	<2,000	PPB (µg/L)
1,2-Dichloropropane	nd	<2,000	PPB (µg/L)
cis-1,3-Dichloropropene	nd	<2,000	PPB (µg/L)
trans-1,3-Dichloropropene	nd	<2,000	PPB (µg/L)
Ethylbenzene	nd	<5,000	PPB (µg/L)
Dichloromethane	nd	<20,000	PPB (µg/L)
1,1,2,2-Tetrachloroethane	nd	<2,000	PPB (µg/L)
Tetrachloroethene (PCE)	nd	<2,000	PPB (µg/L)
Toluene	nd	<5,000	PPB (µg/L)
1,1,1-Trichloroethane	nd	<2,000	PPB (µg/L)
1,1,2-Trichloroethane	nd	<2,000	PPB (µg/L)
Trichloroethene (TCE)	nd	<2,000	PPB (µg/L)
Vinyl Chloride	nd	<2,000	PPB (µg/L)
Xylenes (Total)	nd	<5,000	PPB (µg/L)
Trichlorofluoromethane	nd	<2,000	PPB (µg/L)
MTBE	nd	<25,000	PPB (µg/L)

BFB (Surrogate) Recovery = 91 %   BCM (Surrogate) Recovery = 102 %

Dilution Factor = 10,000

Results for sample: Chlorinated Waste

Date collected: 1/25/96	Date received: 2/1/96
Date extracted: 2/12/96	Date analyzed: 2/12/96
Client: Harrison Drilling	
Project Name: Champion Technologies	HEAL #: 9602004-1
Project Manager: Allan Childs	Sampled by: A. Childs/S. Seed
Matrix: Aqueous	

Test: EPA 418.1

Compound	Result	Units
TPH	42	PPB (µg/L)

Dilution Factor = 5

Results for sample: Chromate Waste

Date collected: 1/29/96	Date received: 2/1/96
Date extracted: 2/12/96	Date analyzed: 2/12/96
Client: Harrison Drilling	
Project Name: Champion Technologies	HEAL #: 9602004-2
Project Manager: Allan Childs	Sampled by: A. Childs/S. Seed
Matrix: Aqueous	

Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	<1,250	PPB (µg/L)
Bromodichloromethane	nd	<500	PPB (µg/L)
Bromoform	nd	<2,500	PPB (µg/L)
Bromomethane	nd	<2,500	PPB (µg/L)
Carbon Tetrachloride	nd	<500	PPB (µg/L)
Chlorobenzene	nd	<500	PPB (µg/L)
Chloroethane	nd	<500	PPB (µg/L)
Chloroform	nd	<500	PPB (µg/L)
Chloromethane	nd	<500	PPB (µg/L)
2-Chloroethylvinyl Ether	nd	<2,500	PPB (µg/L)
Dibromochloromethane	nd	<500	PPB (µg/L)
1,3-Dichlorobenzene	nd	<500	PPB (µg/L)
1,2-Dichlorobenzene	nd	<500	PPB (µg/L)
1,4-Dichlorobenzene	nd	<500	PPB (µg/L)
Dichlorodifluoromethane	nd	<500	PPB (µg/L)
1,1-Dichloroethane	nd	<500	PPB (µg/L)
1,2-Dichloroethane	640	<500	PPB (µg/L)
1,1-Dichloroethene	nd	<500	PPB (µg/L)
1,2-Dichloroethene (Cis)	nd	<500	PPB (µg/L)
1,2-Dichloroethene (Trans)	nd	<500	PPB (µg/L)
1,2-Dichloropropane	nd	<500	PPB (µg/L)
cis-1,3-Dichloropropene	nd	<500	PPB (µg/L)
trans-1,3-Dichloropropene	nd	<500	PPB (µg/L)
Ethylbenzene	21,000	<1,250	PPB (µg/L)
Dichloromethane	nd	<5,000	PPB (µg/L)
1,1,2,2-Tetrachloroethane	nd	<500	PPB (µg/L)
Tetrachloroethene (PCE)	nd	<500	PPB (µg/L)
Toluene	88,000	<1,250	PPB (µg/L)
1,1,1-Trichloroethane	nd	<500	PPB (µg/L)
1,1,2-Trichloroethane	nd	<500	PPB (µg/L)
Trichloroethene (TCE)	nd	<500	PPB (µg/L)
Vinyl Chloride	nd	<500	PPB (µg/L)
Xylenes (Total)	110,000	<1,250	PPB (µg/L)
Trichlorofluoromethane	nd	<500	PPB (µg/L)
MTBE	nd	<6,250	PPB (µg/L)

BFB (Surrogate) Recovery = 101%   BCM (Surrogate) Recovery = 113 %

Dilution Factor = 2,500

Results for sample: Chromate Waste

Date collected: 1/29/96	Date received: 2/1/96
Date extracted: 2/12/96	Date analyzed: 2/12/96
Client: Harrison Drilling	
Project Name: Champion Technologies	HEAL #: 9602004-2
Project Manager: Allan Childs	Sampled by: A. Childs/S. Seed
Matrix: Aqueous	

Test: EPA 418.1

Compound	Result	Units
TPH	1,100	PPB (µg/L)

Dilution Factor = 100

Hall Environmental Analysis Laboratory

PRELIMINARY REPORT

Client: Harrison Drilling
Address: 3206 Enterprise Dr.
Hobbs, NM 88204

Report Date: 2/9/96

Project: Champion Technologies
Project Number: Hobbs
Project Manager: Allan Childs
Date Collected: 1/25,29/1996
Date Received: 1/31/96
Sample Matrix: Aqueous/Solvent

Total Metal Analyses

Digestion Method: 3020 & 3030
Metals **Units:** PPM (mg/L) **Date Digested:** 2/5,6/96

HEAL LAB ID	Sample ID	Ag	As	Ba	Cd	Cr	Hg	Pb	Se
9602004-1	Chlorinated Waste-Aqueous	0.11	nd	nd	0.012	1.81	nd	0.38	nd
9602004-2	Chromate Waste-Aqueous	0.23	<0.050*	nd	nd	3.88	nd	0.09	0.012
9602004-1	Chlorinated Waste-Solvent	2	nd	nd	nd	nd	nd	nd	nd
9602004-2	Chromate Waste-Solvent	280	nd	nd	nd	nd	nd	nd	nd
9602004-1	*Duplicate-Solvent*	2	nd	nd	nd	nd	nd	nd	nd
9602004-2	Duplicate-Aqueous	0.18	<0.050*	nd	nd	3.89	nd	0.09	0.015
Method ID		7760	7060	7080	7130	7190	7470	7420	7740
Date Analyzed		2/8/96	2/8/96	2/8/96	2/8/96	2/8/96	2/8&9/96	2/8/96	2/8/96
MRL	Aqueous	0.01	0.005	0.5	0.005	0.02	0.0002	0.10	0.005
MRL	Solvent	0.5	0.3	30	0.3	1	0.01	5.0	0.3

* = High background readings due to sample matrix necessitated higher reporting limit
nd = Not detected, ie below MRL

Anion Analyses

Method: 300.0
Units: PPM (mg/L) **Date Analyzed:** 2/6,7/96

HEAL LAB ID	Sample ID	F	Cl	NO_2-N	Br	NO_3-N	PO_4-P	SO_4
9602004-1	Chlorinated Waste-Aqueous	6	12,300	nd	100	2	318	832
9602004-2	Chromate Waste-Aqueous	130	13,300	nd	103	33	24	30,500
9602004-2	Duplicate-Aqueous	7	12,300	nd	105	2	313	813
MRL		0.05	0.5	0.05	0.1	0.05	0.05	1.0

Other Analytes

Metals **Units:** PPM (mg/L)

HEAL LAB ID	Sample ID	Na	K	Mg	Ca				
9602004-1	Chlorinated Waste-Aqueous	6,000	603	243	905				
9602004-2	Chromate Waste-Aqueous	5,830	468	198	543				
9602004-2	Duplicate-Aqueous	5,890	473	196	546				

Method ID		7770	7610	7450	7140				
Date Analyzed		2/9/96	2/9/96	2/9/96	2/9/96				
MRL		0.05	0.05	0.005	0.10				

Reviewed by:

Russell H. Zittlosen
Inorganic Laboratory Manager

Results for QC: Matrix Spike/Matrix Spike Dup

Date extracted: NA	Date analyzed: 2/12/96
Client: Harrison Drilling	
Project Name: Champion Technologies	HEAL #: 9602004-1
Project Manager: Allan Childs	Sampled by: NA
Matrix: Aqueous	

Test: EPA 8010/8020

Compound	Sample Result	Amount Added	Matrix Spike	MS %	MS Dup	MSD %	RPD
Benzene	<0.5	20.0	20.2	101	20.8	104	3
Toluene	<0.5	20.0	20.4	102	21.2	106	4
1,1-DCE	<0.2	20.0	24.0	120	21.8	109	11
Trans-1,2-DCE	<0.2	20.0	20.4	102	19.8	99	3
1,2-DCA	<0.2	20.0	18.8	94	21.7	108	14
Carbon Tet.	<0.2	20.0	20.0	100	21.6	108	8
TCE	<0.2	20.0	22.8	114	23.2	116	2
PCE	<0.2	20.0	21.1	106	21.6	108	2

Results for QC: Reagent Blank/ Dup/ Spike

Date extracted: 2/12/96	Date analyzed: 2/12/96
Client: Harrison Drilling	
Project Name: Champion Technologies	HEAL #: RB/Dup/Spike 2/12
Project Manager: Allan Childs	Sampled by: NA
Matrix: Aqueous	

Test: EPA 418.1

Reagent Blank 12/29:

Compound	Result	Units
TPH	<20	PPM (mg/kg)

Dilution Factor = 1

9602004-2 Dup:

Compound	Sample Result	Dup Result	RPD
TPH	1,100	1,200	9

9512099-2 Spike

Compound	Sample Result	Amount Added	Amount Recovery	% Recovery
TPH	<1.0	5.0	5.1	102

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite C
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: Harrison Drilling
[illegible] Harrison

Address: 3206 Enterprise Dr.
Hobbs, NM 88204

Phone #: Harrison - 505-392-6768
Champion - 505-393-7724

Fax #: 505-392-9151 Harrison

Project Name: Champion Technologies

Project #: Hobbs

Project Manager: Allan Childs

Sampler: Allan Childs/Sam Seed

Samples Cold? ☒ Yes ☐ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative HgCl$_2$	Preservative HCl	Preservative Other	HEAL No.
1-25-96	1030	WATER	CHLORINATED WASTE					9602004-1
1-29-96	0850	WATER	CHROMATE WASTE					-2

ANALYSIS REQUEST

- BTEX + MTBE (602/8020)
- BTEX + MTBE + TPH (Gasoline Only)
- TPH Method 8015 MOD (Gas/Diesel)
- THP (Method 418.1)
- 8010/8020 Volatiles
- EDB (Method 504)
- EDC
- 8310 (PNA or PAH)
- RCRA 8 Metals
- Cations (Na, K, Ca, Mg)
- Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)
- Basic Soil Test (PH, EC, SAR, PSA)
- 8080 Pesticides / PCB's
- Air Bubbles or Headspace (Y or N)

Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)
X 1/31/96	X 1100	X Sam Seed	
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature) 2/1

Remarks: ANALYSIS REQ. AS PER PREVIOUS CORRESPONDENCE.

Champion Technologies, Inc.

P.O. BOX 450499
HOUSTON, TEXAS 77245-0499

Telephone (713) 431-2561

CERTIFIED RETURN RECEIPT NO. Z 153 537 241

October 11, 1996

Mr. Roger Anderson
Environmental Bureau Chief
New Mexico Energy, Minerals and Natural Resource Department
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505

RE: Discharge Plan; Hobbs Facility, Lea County, NM

Dear Mr. Anderson:

Enclosed (Attachment I) is a second analysis for the septic tank laterial at the Hobbs site showing similar results as the first analysis submitted to your office, February 15 , 1996.

It is Champion's opinion, the total chromium is within background levels per the attachment II table and poses little threat to the groundwater. The groundwater is also protected in that the chromium is the salt of a weak acid and must migrate through approximately 15 feet of caleche and another 15-20 feet of soil before entering the groundwater. The caleche is an alkali based soil and will likely capture and hold the chromium much like an ion exchange bed. Champion also has a policy of no disposal of laboratory chemicals down the drains, therefore it is very likely the chromium is naturally occurring or migrated via air and ground from prior use of large amounts of chromium in the region. Attachment II, which is provided by Champion's independent consultant does tend to indicate the total chromium is at levels consistent with background levels for this region.

The analysis also shows minor levels of total arsenic and total barium with the leachable fraction expected to be well below RCRA limits. Champion does not use any of these chemicals at the Hobbs site and has been provided data (attachment II) from an independent consultant indicating these levels are with statistical naturally occurring levels for this region. Based on the data and analysis of the well water, it is unlikely there is any threat to groundwater.

Champion's independent consultant is in the process of compiling a report to further demonstrate Champion's position of little or no impact to the groundwater. It would be appreciated if the OCD would provide input in the selection of additional sampling sites if further analytical work is required.

Should you have any questions call me at the number on this letter.

Sincerely,

Mel K Davis

Melvin K. Davis
Manger
Environmental, Health and Safety

cc: File - Hobbs, NM OCD
Richard Finley
Clarence Meyer

ATTACHMENT I

Hall Environmental
Analysis Laboratory

Hall Environmental Analysis Laboratory
4901 Hawkins N.E.
Albuquerque, NM 87109
(505)345-3975

8/19/96

Harrison Drilling
3206 Enterprise Dr.
Hobbs, NM 88204

Dear Mr. Allen Childs,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these levels (denoted by the < sign) has been made.

Please don't hesitate to contact me for any additional information or clarifications.

Sincerely,

COPY #1

Scott Hallenbeck, Lab Manager

Project: 9607088/Champion Hobbs

Results for sample: Water Well

Date collected: 7/30/96	Date received: 7/30/96
Date extracted: NA	Date analyzed: 7/31/96
Client: Harrison Drilling	
Project Name: Champion Hobbs	HEAL #: 9607088-1
Project Manager: Allen Childs	Sampled by: C. Harrison
Matrix: Aqueous	

Test: EPA 8020

Compound	Result	Units
MTBE	<2.5	PPB (µg/L)
Benzene	<0.5	PPB (µg/L)
Toluene	<0.5	PPB (µg/L)
Ethylbenzene	<0.5	PPB (µg/L)
Total Xylenes	<0.5	PPB (µg/L)

BFB (Surrogate) Recovery = 92%

Dilution Factor = 1

Hall Environmental
Analysis Laboratory

Client:	Harrison Drilling	**Project:**	Champion-Hobbs
Address:	3206 Enterprise Dr. Hobbs, NM 88240	**Project Number:**	
		Project Manager:	Allen Childs
		Date Collected:	7/30/96
		Date Received:	7/30/96
Report Date:	8/2/96	**Sample Matrix:**	Aqueous
Analysis Date	8/2/96	**Extraction Date**	8/2/96

Analytical Results - 418.1

Final volume of Freon-113 used (ml)	50
Sample volume (ml)	1000

HEAL ID	Client ID	Absorbance	Dilution	TPH (mg/l)
9607088-1	Water Well	0.007	1	<1.0

QA/QC

Ext Blk 8/2	N/A	-0.002	1	<1.0

Sample ID:	Sample Amount	Spike	Recovery	% Recovery
Blk. Spike 8/2	<1.0	5.0	4.8	96

Sample ID:	Sample Amount	Duplicate	RPD
Blk. Dup. 8/2	<1.0	<1.0	N/A

Sincerely:

Jerry Richardson
Semi-Volatiles Supervisor

Scott Hallenbeck
Laboratory Manager

Hall Environmental
Analysis Laboratory

Client:	Harrison Drilling	**Project:**	Champion-Hobbs
Address:	3206 Enterprise Dr. Hobbs, NM 88240	**Project Number:**	
		Project Manager:	Allen Childs
		Date Collected:	7/30/96
		Date Received:	7/30/96
Report Date:	8/2/96	**Sample Matrix:**	Soil
Analysis Date:	8/2/96	**Extraction Date**	8/2/96

Analytical Results - 418.1

Final volume of Freon-113 used (ml)	20
Sample weight (g)	10

HEAL ID	Client ID	Absorbance	Dilution	T P H (mg/kg)
9607088-2	BH #1 A	-0.002	1	<20
9607088-3	BH #2	-0.003	1	<20

QA/QC

Ext Blk 8/2	N/A	-0.001	1	<20

Sample ID:	Sample Amount	Spike	Recovery	% Recovery
9607088-2	<20	100	96	96

Sample ID:	Sample Amount	Duplicate	RPD
9607088-2	<20	<20	NA

Sincerely:

Jerry Richardson
Semi-Volatiles Supervisor

Scott Hallenbeck
Laboratory Manager

Hall Environmental
Analysis Laboratory

Client: Harrison Drilling
Address: 3206 Enterprise Dr.
Hobbs, NM 88240

Report Date: August 15,1996

Project: Champion - Hobbs
Project Number:
Project Manager: Allen Childs
Date Collected: 7/30/96
Date Received: 7/30/96
Sample Matrix: Soil & Aqueous

FINAL RESULTS

Analytical Results

Digestion Method: USEPA 3050 & 3020 **Digestion Date:** 7/31/96

HEAL LAB ID	Sample ID	Silver ppm	Arsenic ppm	Barium ppm	Cadmium ppm	Chromium ppm	Mercury ppm
9607088-1	Water Well	<0.01	0.007	<0.5	<0.005	0.08	<0.0002
9607088-2	BH #1A	<0.5	2.5	210	<0.3	7.0	<0.1
9607088-3	BH #2	<0.5	2.3	370	<0.3	6.0	<0.1
9607088-2d	Duplicate	<0.5	2.5	190	<0.3	8.5	<0.1
Method ID		7760	7060	7080	7130	7190	7470
Date Analyzed		8/14/96	8/2/96	8/8/96	8/14/96	8/8/96	8/8/96
MRL Soil		0.5	0.3	30	0.3	1	0.1
MRL Water		0.01	0.005	0.5	0.005	0.02	0.0002

Comments: Soil results based on a as received moisture basis.

HEAL LAB ID	Sample ID	Lead ppm	Selenium ppm				
9607088-1	Water Well	0.080	<0.005				
9607088-2	BH #1A	<5.0	<0.3				
9607088-3	BH #2	<5.0	<0.3				
9607088-2d	Duplicate	<5.0	<0.3				
Method ID		7420	7740				
Date Analyzed		8/14/96	8/1/96				
MRL Soil		5	0.3				
MRL Water		0.002	0.005				

Reviewed by:

Russell H. Zittlosen

Russell H. Zittlosen
Inorganic Laboratory Manager

Results for sample: Trip Blank

Date collected: NA	Date received: 7/30/96
Date extracted: NA	Date analyzed: 7/31/96
Client: Harrison Drilling	
Project Name: Champion Hobbs	HEAL #: 9607088-4
Project Manager: Allen Childs	Sampled by: NA
Matrix: Aqueous	

Test: EPA 8020

Compound	Result	Units
MTBE	<2.5	PPB (μg/L)
Benzene	<0.5	PPB (μg/L)
Toluene	<0.5	PPB (μg/L)
Ethylbenzene	<0.5	PPB (μg/L)
Total Xylenes	<0.5	PPB (μg/L)

BFB (Surrogate) Recovery = 93%

Dilution Factor = 1

Results for QC: Reagent Blank

Date extracted: NA	Date analyzed: 7/31/96
Client: Harrison Drilling	
Project Name: Champion Hobbs	HEAL #: RB 7/31
Project Manager: Allen Childs	Sampled by: NA
Matrix: Aqueous	

Test: EPA 8020

Compound	Result	Units
MTBE	<2.5	PPB (µg/L)
Benzene	<0.5	PPB (µg/L)
Toluene	<0.5	PPB (µg/L)
Ethylbenzene	<0.5	PPB (µg/L)
Total Xylenes	<0.5	PPB (µg/L)

BFB (Surrogate) Recovery = 104%

Dilution Factor = 1

Results for : Matrix Spike/Matrix Spike Duplicate

Date extracted: NA	Date analyzed: 7/31/96
Client: Harrison Drilling	
Project Name: Champion Hobbs	HEAL #: MS/MSD 9607085-4
Project Manager: Allen Childs	Sampled by: NA
Matrix: Aqueous	

Test: EPA 8020

Compound	Sample Result	Amount Added	Matrix Spike	MS %	MS Dup	MSD %	RPD
MTBE	<2.5	40.0	36.9	92	36.3	91	2
Benzene	<0.5	20.0	19.4	97	19.4	97	0
Toluene	<0.5	20.0	19.7	99	19.4	97	2
Ethylbenzene	<0.5	20.0	19.1	96	19.2	96	1
Total Xylenes	<0.5	60.0	58.5	98	58.7	98	0

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite C
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: HARRISON DRILLING

3206 ENTERPRISE DR.
HOBBS, NM 88240

Phone #: (505) 392-6768

Fax #: (505) 392-9151

Project Name: CHAMPION - HOBBS

Project #:

Project Manager: ALLEN CHILDS

Sampler: C. HARRISON

Samples Cold? ☑ Yes ☐ No

ANALYSIS REQUEST

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative			HEAL No.	BTEX + MTBE (602/8020)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015 MOD (Gas/Diesel)	TPH (Method 418.1)	8010/8020 Volatiles	EDB (Method 504)	EDC	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	Basic Soil Test (PH; EC, SAR, PSA)	8080 Pesticides / PCB's				Air Bubbles or Headspace (Y or N)
					$HgCl_2$	HCl	Other																		
7-30	0900	H_2O	WATER WELL		✓			9607098-1	✓			✓					✓								
7-30	0900	SOIL	BH #1 A	BRASS LINER				-2				✓					✓								
7-30	0900	SOIL	BH #2	BRASS LINER				-3				✓					✓								
			Trip Blank					-4	✓																

Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)
7-30	1400	CHarrison	7/30
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

Remarks:

ATTACHMENT II

AME/CODE: [redacted]

CONCENTRATIONS (ppm)

ARAMETER	EPA Sample Numbers	Ambient Background 1.	
		Western U.S. 2.	Eastern U.S. 2.
atrix Type		Soil	Soil
luminum		54,000	33,000
hromium		38	36
erium		560	300
eryllium		0.6	0.6
obalt		0	7
Copper		21	14
Iron		20,000	15,000
kel		16	13
anganese		390	290
Zinc		51	36
Boron		22	32
Vanadium		66	46
Silver		<.50	-
Arsenic		6.1	5.4
Antimony		<150	-
Selenium		0.25	0.39
Thallium		-	-
Mercury		0.055	0.096
Tin		<10	<10
Cadmium		<1	<1
Lead		18	14
Ammonia		-	-
Cyanide		-	-
Sulfide		-	-
ation No.		1. Ambient background concentrations apply only to soil matrix samples. Values obtained from "<u>Geochemistry of Some Rocks, Soils, Plant and Vegetables in the Conterminous United States</u>" Geological Survey Professional Paper	
ample Station ocation			

Reference for East/West Division is the 97° W longitudinal line which bisects Region VI.

*Concentration corrected for lab blank concentration

Champion Technologies, Inc.
Committed to Improvement

3130 FM 521
Fresno, Texas 77545
P.O. Box 450499
Houston, Texas 77245
713/431-2561
Fax: 713/431-1655
Fax: 713/431-2784

FAX TRANSMISSION COVER SHEET

Date: October 11, 1996
To: Rex Meyer
Fax: 713-398-0008 Geo Monitoring Services
Subject:
Sender: Melvin K. Davis

YOU SHOULD RECEIVE 14 PAGE(S), INCLUDING THIS COVER SHEET. IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL 713/431-2561.

Comments:
Rex, per our conversation about Champion's Hobbs, NM site. Let me know what information you need for an independent report. Give me an approximate cost est. Do you need to make a trip to Hobbs? I would think only if CCD needs further analytical work.

SAMPLING & EXCAVATION OF CHAMPION TECHNOLOGIES, INC.

HOBBS, NEW MEXICO FACILITY

June, 1998

Project 19423

Prepared By

PSC
PHILIP SERVICES
CORP.

PHILIP SERVICES CORPORATION
7904 Interstate 20 West
Midland, Texas 79706
(915) 563-0118

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 FIELD ACTIVITIES 1

3.0 ANALYTICAL RESULTS 1

4.0 WASTE DISPOSITION 2

1.0 INTRODUCTION

Philip Services (Philip) has completed the oversight of excavation of soils from four areas at the Champion Technologies, Inc. (CTI) facility located at 4001 South Highway 18 in Hobbs, New Mexico. Soil samples from each of the four excavated areas and from one drum containing soil, one drum containing sludge, and one drum containing liquids were collected and submitted for laboratory analysis.

The excavation and sampling were performed at the request of CTI in response to a letter of violation received by CTI from the New Mexico Environment Department (NMED) dated January 30, 1998, following a compliance evaluation inspection of the facility. The letter of violation and CTI's response to that letter are included in this report in **Appendix I.**

2.0 FIELD ACTIVITIES

Philip was on site April 15, 1998, to oversee the excavation of soil from four areas at the facility (Items 8, 10, 11, and 19; NMED letter, CTI response). The locations of the four areas are shown in **Figure 1** and **Appendix II.**

One five-point composite soil sample was collected from each of the four excavated areas and (Areas 1-4) submitted for laboratory analysis to perform a hazardous waste determination as requested by NMED. The soils were excavated by CTI personnel and screened in the field for volatile organic compounds by Philip personnel using a photoionization detector (PID).

The excavated soils were placed into a Department of Transportation (DOT) approved drum. One five-point composite sample consisting of excavated soils from each of the four areas and soil contained in a drum at the facility (Item 14) were submitted for laboratory analysis to perform a hazardous waste determination as requested by NMED.

Two additional samples, one from a drum of liquids (Item 7), and one from a drum of sludge (Item 9), were collected and submitted for laboratory analysis to perform a hazardous waste determination as requested by NMED.

3.0 ANALYTICAL RESULTS

One five-point composite soil sample was collected from each of the four (4) excavated areas and submitted to Trace Analysis, Inc. (Trace) of Lubbock, Texas for analysis of volatiles using EPA method 8260 and semi-volatiles using EPA method 8270. Laboratory results are included in this report in **Appendix III**. All analytes were below detection limits except for 1,2,4-Trimethylbenzene at a concentration of 51 parts per billion (ug/kg) in Area 3 excavation. On May 27, 1998, Philip personnel were on site to overexcavate soils and collect an additional composite soil sample at Area 3. The sample was submitted for analysis of volatiles. All analytical results including 1,2,4- Trimethylbenzene were below detection limits.

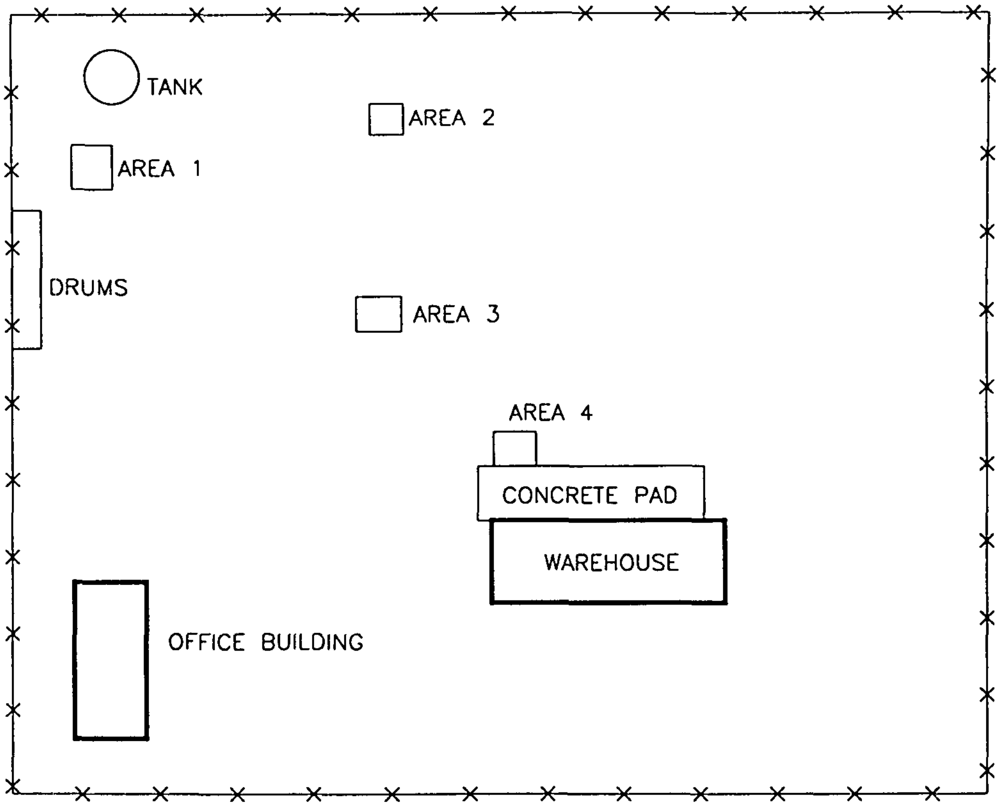
A composite sample, from the four (4) excavated and one (1) drum of soil, was collected and submitted to Trace for analysis of TCLP volatiles and semi-volatiles, RCI, paint filter test using EPA method SW 846-9095, TCLP Metals using EPA method SW 846-1311, 6010B, 7470, benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA method 8021B, and total petroleum hydrocarbons (TPH) using EPA method 418.1. The analyte concentrations were below detection limits for the TCLP volatiles and semi-volatiles. Of the eight (8) TCLP metals analyzed, only Barium was detected with a concentration of 0.28 ppm. The RCI results indicate the soil is a non-reactive, non-corrosive, and non-ignitable with no sulfide or cyanide concentrations detected. In addition, the soils passed the paint filter test. The total BTEX was 2.19 ppm with concentrations of benzene below detection limit, toluene at 0.322 ppm, ethylbenzene at 0.134 ppm, and xylenes at 1.73. The concentration of TPH was 6,900 ppm.

Two samples, one from the drum of liquid and one from the drum of sludge, were collected and submitted to Trace for analysis of TCLP volatiles using EPA method SW 846-1311, 8260, TCLP semi-volatiles using EPA method SW 846-1311, 8270, and RCI using EPA method SW 846-Chapter 7 7.3, Chapter 7 7.2, 1010. The analytical results for the TCLP semi-volatiles and volatiles were below detection limits for both the liquid and sludge sample.

The RCI analytical results indicate the liquid is non-reactive, corrosive, with a pH of 13.2, and has a flashpoint of <70° Farenheight. The sludge is reactive, non-corrosive, non-ignitable, with a pH of 4.3. No cyanides or sulfides were detected in the liquid, however cyanides were detected in the sludge with an analyte concentration of 550 parts per million (ppm).

4.0 WASTE DISPOSITION

Based on the analytical results, the overexcavated soils from the four (4) areas and the drum previously located on site are non-hazardous and can be disposed of at Controlled Recovery Inc. (CRI) of Hobbs, New Mexico. The drum of sludge is reactive and contains cyanides at a concentration of 550 parts per million (above the EPA limit of 250 ppm). The drum of liquid is corrosive. The sludge and the liquid can be disposed of at Waste Control Specialist (WCS) of Andrews, Texas.



NOT TO SCALE N

COL. 19423A-001

PHILIP SERVICES CORP.	TITLE: SITE PLAN	DWN: TMM	DES.: JK	PROJECT NO.: 19423 CHAMPION TECH. INC. TEXAS
		CHKD: JK	APPD:	
		DATE: 6/9/98	REV.: 0	FIGURE 1

APPENDIX I

CORRESPONDENCE

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

January 30, 1998

Tommy Morrison
District Manager
Champion Technologies, Inc.
P.O Box 2187
Hobbs, NM 88240

RE: Letter of Violation
NMD 986674869

Dear Mr. Morrison:

On November 6, 1997, the New Mexico Environment Department (NMED) - Hazardous and Radioactive Materials Bureau (HRMB) conducted a compliance evaluation inspection of your facility, Champion Technologies, Inc. (CTI). Based on review of the information obtained, NMED has determined that CTI has violated the New Mexico Hazardous Waste Management Regulations (20 NMAC 4.1) as specified below.

In accordance with §74-4-10 NMSA 1978 (Repl. Pamp. 1993), NMED may: (1) issue a compliance order requiring compliance immediately or within a specified time period or assessing a civil penalty for any past or current violations of up to $10,000 per day of noncompliance with each violation or both; or (2) commence a civil action in district court for appropriate relief, including a temporary or permanent injunction. Any such order issued may include a suspension or revocation of any permit issued by NMED.

At this time, NMED is suspending the enforcement options listed above if CTI can provide NMED with a satisfactory resolution to the violations or a detailed plan of corrective action acceptable to NMED within fifteen (15) working days of receipt of this letter. If NMED does not receive satisfactory information, then NMED reserves the right to initiate formal enforcement action.

The following violations were noted:

1. CTI has failed to keep two, 5-gallon containers of waste closed at a satellite accumulation point located in the laboratory. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(c)(1)(i).

2. CTI has failed to mark ten boxes located in the hazardous waste storage area, which contain approximately 480 (200ml) bottles of corrosive waste with the words "Hazardous Waste", and with accumulation start dates. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

3. CTI has failed to label five, 5-gallon buckets of spent chlorinated solvents located in the hazardous waste storage area with the words "Hazardous Waste", and with accumulation start dates.. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

4. CTI has failed to label one 55-gallon drum containing spent chlorinated solvents located in the hazardous waste storage area with the words "Hazardous Waste", and with the accumulation start date. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

5. CTI has failed to label one 55-gallon drum of "chromate" waste located in the hazardous waste storage area with the words "Hazardous Waste", and with the accumulation start date. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(4).

6. CTI has failed to keep the container noted in ¶5 closed. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.34(d)(2).

7. CTI has failed to perform a hazardous waste determination on the contents of an approximately 200-gallon storage tank located in the southwest portion of the yard near the a drum storage area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

8. CTI has failed to perform a hazardous waste determination on the contaminated soil underneath and around the tank noted in ¶7. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

9. CTI has failed to perform a hazardous waste determination on the contents in approximately fiftysix, 5-gallon buckets stored on pallets in the southwest portion of the yard near the drum storage area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

10. CTI has failed to perform a hazardous waste determination on an area of ground contamination near the drum storage area on the west end of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

11. CTI has failed to perform a hazardous waste determination on contaminated soil which leaked from a large, white tank that has been decommissioned. The tank is located centrally in the yard closer to the western boundary of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

12. CTI has failed to perform a hazardous waste determination on the contents stored in two, cut, poly drums located centrally in the yard near the western boundary. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

13. CTI has failed to perform a hazardous waste determination on the contents of three, ~30-gallon plastic catch basins located randomly near the drum storage area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

14. CTI has failed to perform a hazardous waste determination on an open, 55-gallon drum of contaminated soil located centrally, near the western boundary of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

15. CTI has failed to perform a hazardous waste determination on the contents of a white, ~40-gallon poly drum located centrally near the west fence of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR 262.11.

16. CTI has failed to perform a hazardous waste determination on the contents of one 55-gallon poly drum with the lid cut off. The poly drum is located next to one of the plastic catch basins noted in ¶13. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

17. CTI has failed to perform a hazardous waste determination on the content of one 55-gallon drum (half-full) located centrally in the yard due west of the facility parking lot. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

18. CTI has failed to perform a hazardous waste determination on the content of a cube-shaped storage tank located in the decommissioned tank area in the northwest portion of the yard. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

19. CTI has failed to perform a hazardous waste determination of contaminated soil derived from a leaking product tank located next to the loading pad in the bulk, chemical storage tank area. This is a violation of 20 NMAC 4.1.300, which incorporates federal regulation 40 CFR §262.11.

Any action taken in response to this letter does not relieve CTI of its obligation to comply with 20 NMAC 4.1 in other activities which it conducts, nor does it relieve CTI of its obligation to comply with any other applicable laws or regulations. In addition, CTI will have to pay the annual hazardous waste fees for calendar year 1997 in accordance with AHWFR-1, Part V, which will be due August 1, 1998.

Champion
Technologies, Inc.

P.O. BOX 450499
HOUSTON TEXAS 77245-0499

Telephone (281) 431-2561
Fax (281) 431-1655

February 20, 1998

Mr. John Tynkowych
State of New Mexico
Environment Department
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502

Subject: Letter of Violation
NMD 986674869

Dear Mr. Tynkowych:

On February 9, 1998, Champion Technologies, Inc. (CTI) received your letter of violation. CTI has addressed each of the nineteen (19) items on the following pages.

CTI believes this response will be a satisfactory resolution to the items. CTI will begin immediate action upon approval from your department. If there are any questions, please contact Mel Davis or myself at the address on the letterhead. The fax number is also listed .

Sincerely Yours,

Ralph Corry

Ralph Corry
Environmental Specialist

cc: Charlie Hainebach
Richard Finley
Clarence Meyer
Mike Moran
Rick Braddock
Tom Morrison
Allan Childs
Mel Davis

Response to items 1 thru 19 of this letter of Violation:

1. These containers are now closed. It is aganist company policy to leave any containers open.

2. These are samples from the oilfield that were acidified in order to test. The contents of these sample bottles will be poured into a large container. The material will then be disposed at a TSD as a D002 Hazardous Waste.

3. CTI poured the contents of these containers into a 55 gallon drum which was properly labeled. The drum was shipped to a TSD for disposal. See attached manifest #01359057. CTI was already in the process of disposing of this material at the time of the inspection.

4. CTI properly labeled and shipped this drum to a TSD for disposal. See attached manifest #01359057. CTI was already in the process of disposing of this material at the time of the inspection.

5. CTI has now labeled this 55-gallon drum with a "Hazardous Waste" label and filled in the accumulation start date.

6. This container is now closed.

7. CTI will empty the contents of this container (s) into a accumulation container (s) which will have other liquid material from items noted in #9, #12, #13, #15, #16, #17, and #18. All accumulation container (s) will be RCRA emptied.

   CTI will then sample this accumulation container for TCLP and RCI. Based on our product knowledge, no metals, herbicide or pesticides are expected so therefore these will not be analyzed in the TCLP. The waste will then be disposed at a permitted TSD.

   The 200-gallon tank will be marked properly and will be placed in an area that has secondary containment.

visit →

GC/ms
no TCLP

8. CTI will contract a remediation company to remove any probable contaminated soil. A composite sample of the soil in each "cleaned area" will be analyzed for volatiles and semi-volatiles. Based on our knowledge of product composition, no metals are expected to be present. If analysis indicates further soil removal is necessary, then more soil will be removed.

   This contaminated soil will be placed in a accumulation container (s) i.e; rolloff, Gaylord box with other contaminated soil from the facility site. A composite sample of all the contaminated soil removed will be analyzed for TCLP except for metals, pesticides or herbicides. (CTI does not produce or sell any of these herbicides or pesticides.) CTI will also have the contaminated soil in the accumulation container(s) analyzed for TPH, BETX, RCI and paint filter. However, disposal depending on analysis, may not be required.

All of the soil removal, sampling, testing and subsequent disposal if required will be completed through a remediation company.

9. See #7 for action

10. See #8 for action

11. See #8 for action

12. See #7 for action

13. See #7 for action

14. This soil from the 55 gallon drum will be placed into a accumulation container (s) with other contaminated soil from the facility site. Then a composite sample of all the contaminated soil removed will be analyzed for TCLP except for metals, pesticides or herbicides. (CTI does not produce or sell any of these herbicides or pesticides.) CTI will also have the contaminated soil in the accumulation container(s) analyzed for TPH, BETX, RCI and paint filter. However, disposal depending on levels, may not be required.

Check where is it?

Outback

15. See #7or action

16. See #7 for action

17. See #7 for action

18. See #7 for action

19. See #8 for action

EXAS NATURAL RESOURCE
ONSERVATION COMMISSION
O. Box 13087
ustin, Texas 78711-3087

ORDER # 102424

ease print or type (Form designed for use on elite (12-pitch) typewriter)

Form approved OMB No. 2050-0039 expires 09/30/96

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. [illegible] 5 6 6 7 4 3 6 Manifest Document No.
2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
[illegible] TECHNOLOGIES
2 MI SO OF TOWN ON HWY 18
P.O. BOX 2187
HOBBS, NM 88240

4. Generator's Phone (505) 393-7726 EMERGENCY CONTACT: BOX 15

A. State Manifest Document Number 01359057

B. State Generator's ID

5. Transporter 1 Company Name VAN WATERS AND ROGERS

6. US EPA ID Number

C. State Transporter's ID 49201

D. Transporter's Phone 915-366-3243

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
HEAT ENERGY ADVANCED TECHNOLOGIES
4460 SINGLETON BLVD
DALLAS, TX 75212

10. US EPA ID Number

G. State Facility's ID 50029

H. Facility's Phone 214-637-6434

11A HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
	a. RQ, HAZARDOUS WASTE, LIQUID, N.O.S. (1,1,1 TRICHLOROETHANE, CHLOROFORM) 9, NA3082, PG III, (RQ=10), (EPA F002 D022), (ERG 171)	002	D	00800	P	F002 D022 OUTS202H
	b.					
	c.					
	d.					

J. Additional Descriptions for Materials Listed Above
11A. 1151363580 CHLORINATED SOLVENTS

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
WEAR APPROPRIATE PROTECTIVE GEAR WHEN HANDLING.
EMERGENCY CONTACT: CHEMTREC: 1-800-424-9300. CALLER MUST IDENTIFY VAN WATERS & ROGERS AS SHIPPER.

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name Robert Middleton
Signature Robert Middleton
Month Day Year 01 14 98

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name GEORGE BEANE
Signature George Beane
Date Month Day Year 01 14 98

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name
Signature
Date Month Day Year

GENERATOR

TRANSPORTER

FACILITY

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

March 18, 1998

Ralph Corry
Environmental Specialist
Champion Technologies, Inc.
P.O. Box 450499
Houston, TX 77245-0499

Re: Response to Letter of Violation

Dear Mr. Corry:

The New Mexico Environment Department (NMED) has received your response to the January 30, 1998 Letter of Violation (LOV). Based on review of the information submitted, the NMED has determined that some of the violations cited in the referenced LOV have been inadequately addressed.

Specifically, Champion Technologies, Inc. (Champion) did not address whether the container used to accumulate the waste stream referenced in violation #2 would be labeled and an accumulation start date applied to that container. Regarding violation numbers 7,9,12,13,15,16,17, and 18, NMED requires that the sampling analysis results be forwarded for our review. In addition, the sampling results of the soils collected per violation numbers 8,10,11,14 and 19 should also be forwarded for NMED's review. Moreover, once a hazardous waste determination has been made, and subsequently proven to be hazardous, manifests to the permitted TSD must be provided to NMED before this enforcement case can be closed.

If you have further questions, please contact Mr. Frank Sanchez or myself at (505) 827-1513 or (505) 827-1508, respectively.

Sincerely,

Michael

for John Tymkowych
Program Manager
RCRA Inspection/Enforcement Section
Hazardous and Radioactive Materials Bureau

Champion
Technologies, Inc.

P.O. BOX 450499
HOUSTON, TEXAS 77245-0499

Telephone (281) 431 2561
Fax (281) 431 [illegible]

Return Receipt # P 072 792 043

March 27, 1998

Mr. John Tymkowych
State of New Mexico
Environment Department
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502

Subject: Letter of Violation
NMD 986674869

Dear Mr. Tynkowych:

Champion Technologies, Inc (CTI) received your letter dated March 18, 1998. In response to violation #2, CTI has properly labeled each box with a " Hazardous Waste" label and an accumulation start date of November 6, 1997 as follows:

HAZARDOUS WASTE LIQUIDS
CORROSIVE LIQUID-D002

The contents of the sample bottles will be poured into a large container that is labeled with a Hazardous Waste label with the same information as above and with the same accumulation start date. The material will then be disposed at a TSD as a D002 Hazardous Waste.

In regards to items number 7,9,12,13,15,16,17, and 18, CTI will forward the sampling analyses results to NMED for your review before disposing. In addition, the sampling results of the soils collected in items number 8,10,11,14 and 19 will also be forwarded for NMED's review. Once a hazardous waste determination has been made, and subsequently proven to be hazardous, manifests to the permitted TSD will be provided to NMED.

If there are any questions, please contact Mel Davis or myself at the address on the letterhead. The fax number is also listed.

Sincerely Yours,

Ralph Corry

Ralph Corry
Environmental Specialist

cc: Charlie Hainebach
Richard Finley
Clarence Meyer
Mike Moran
Rick Braddock
Tom Morrision
Allan Childs
Mel Davis

PHILIP
ENVIRONMENTAL

Title
Project No.
File Name
By
Check by

Project Name
Phase
File No.
Date
Date

① TCLP & RCI - no metals, herbicide, pesticide

~~630~~ liq 693

~~145~~ 160

~~[illegible]~~ 192 352

~~175~~ ~~320~~

Soil - Vol & semi vol →

TCLP	TPH	BETX	RCI	paint filter
~~760~~	~~55~~	~~60~~	~~145~~	~~50~~
836	60	66	160	55

How many containers together
5 areas of soil?

① Sample
⑥ Samples / one each area

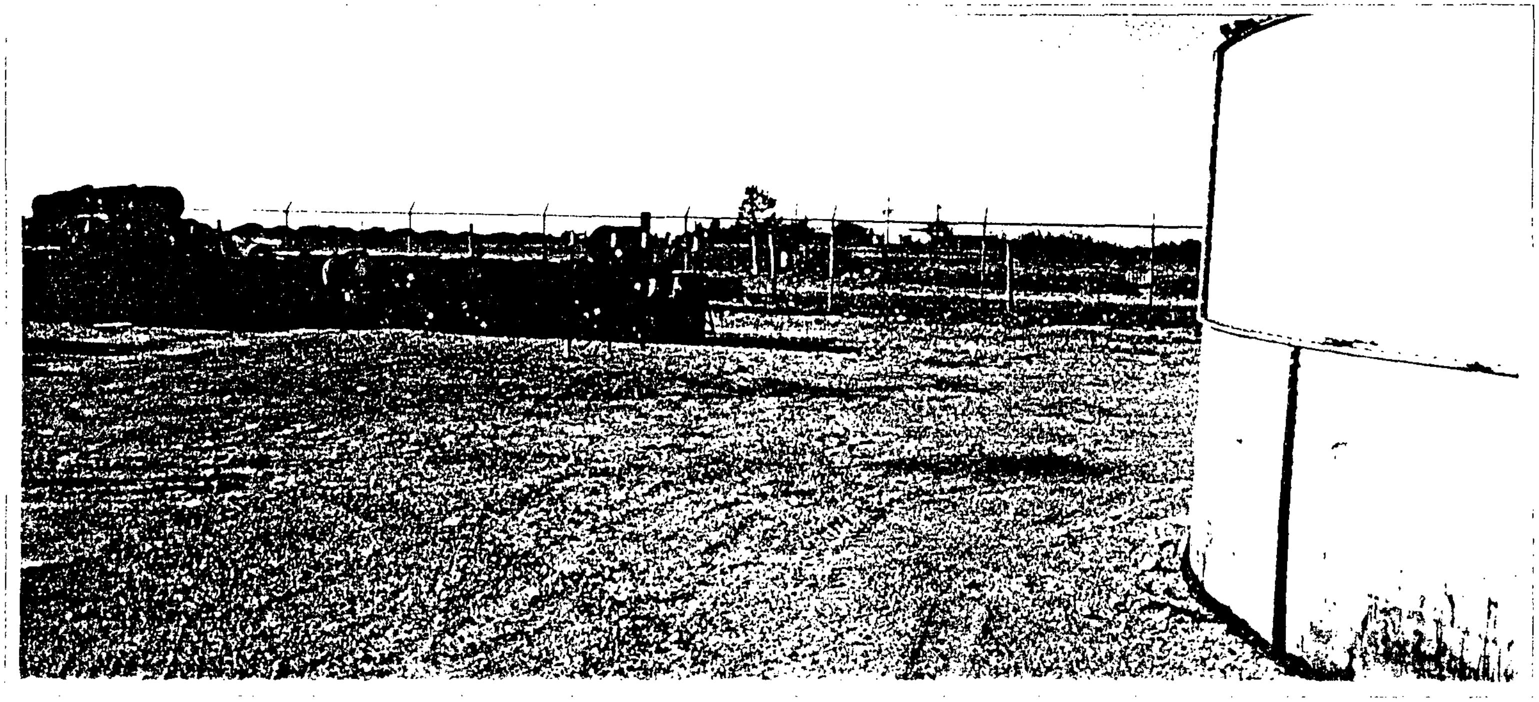
Operator & hoe $45 hour
PM $45 hour

Disposal GRI? what facility
Rolloff

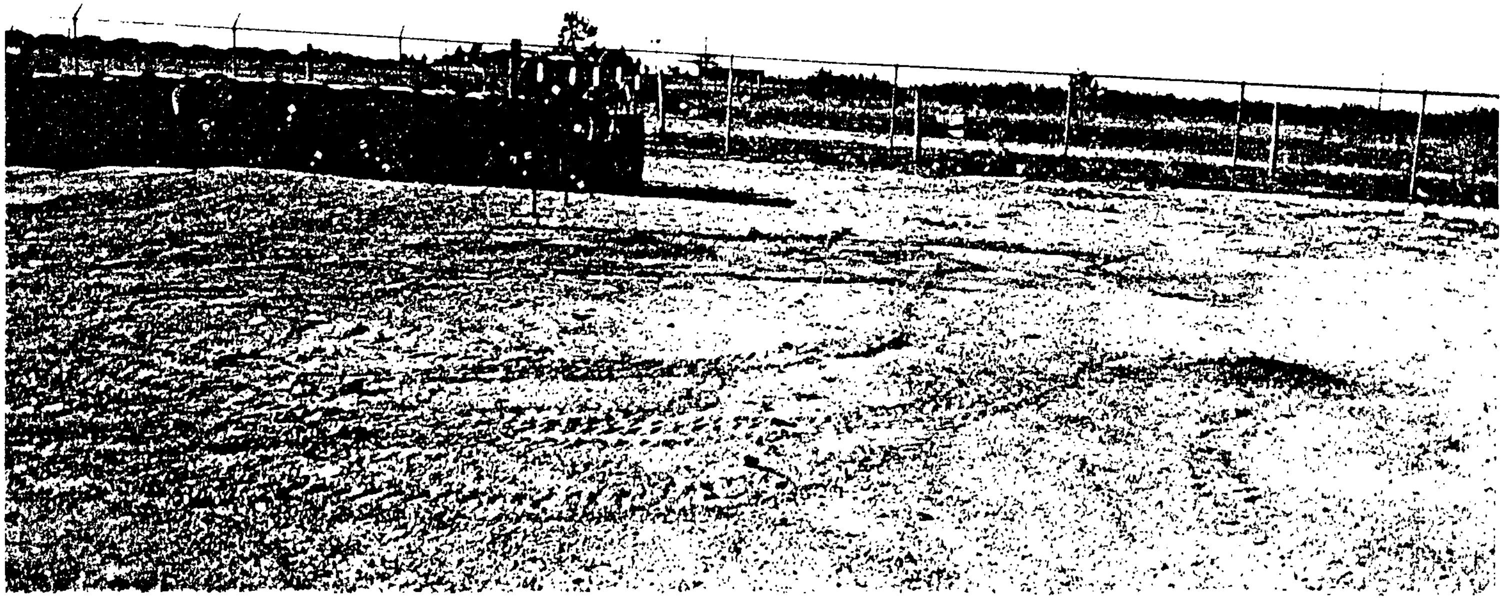
1 was a tank →
1' x 3'

APPENDIX II

SITE PHOTOGRAPHS



Area 1



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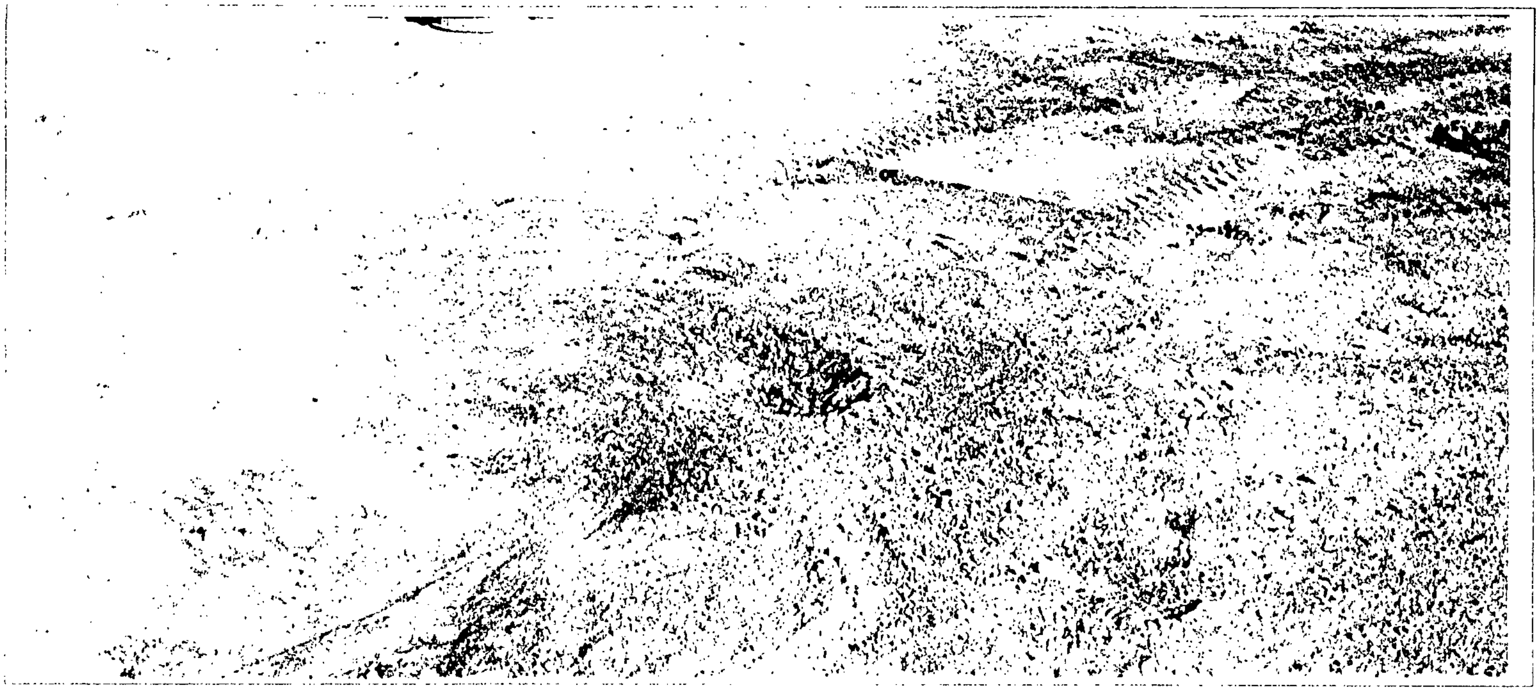
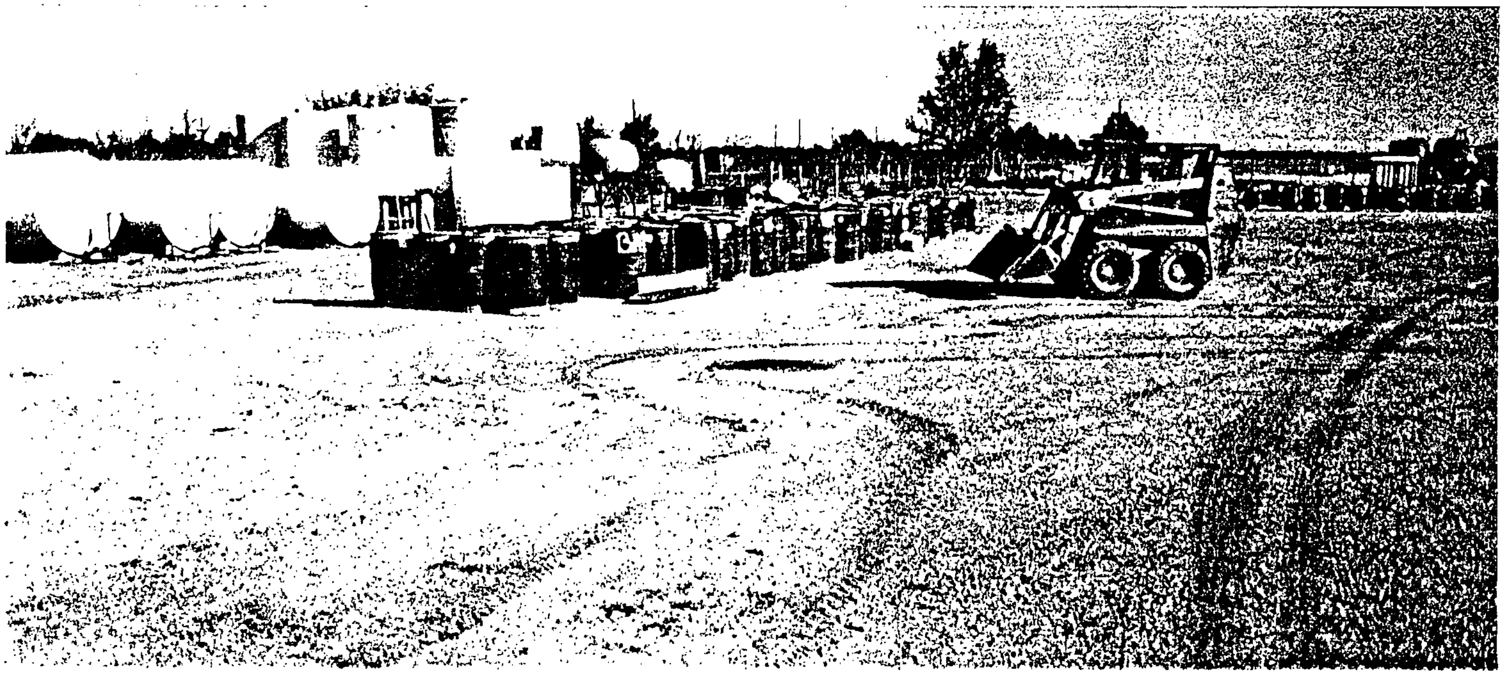


Area 2



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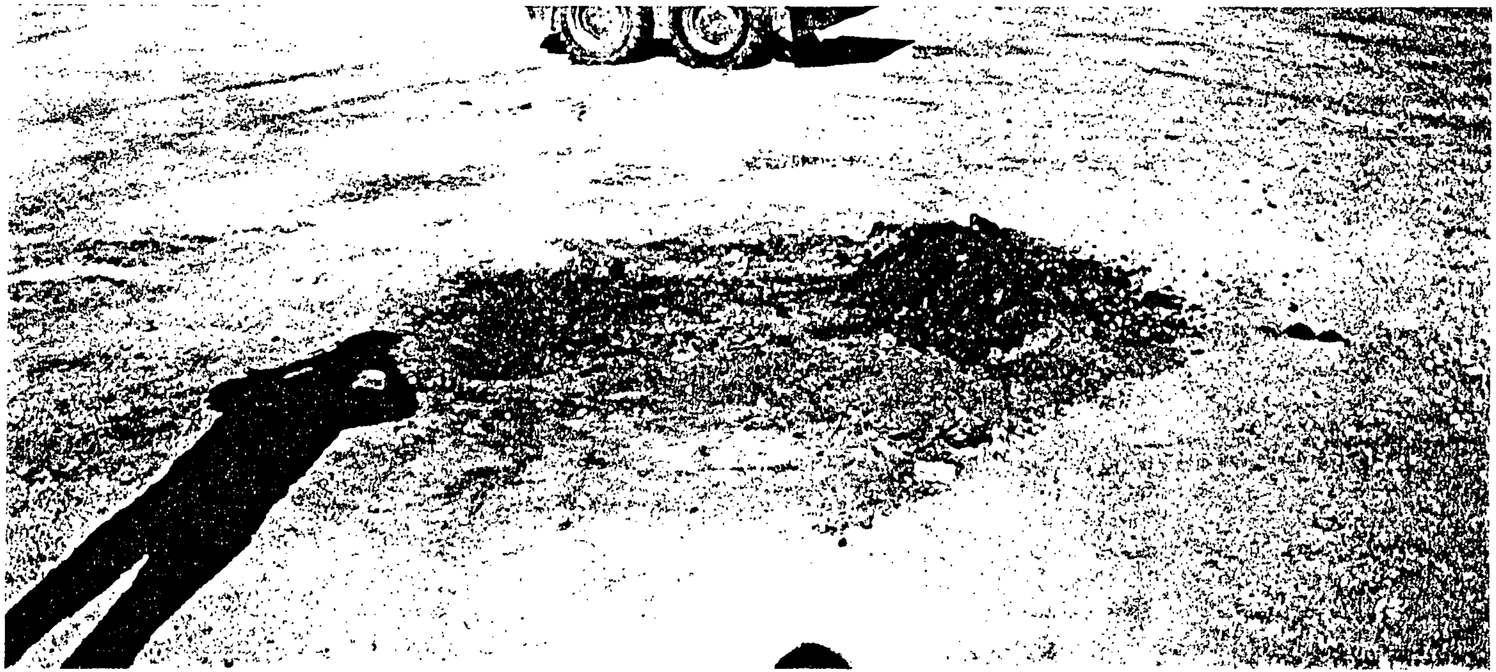

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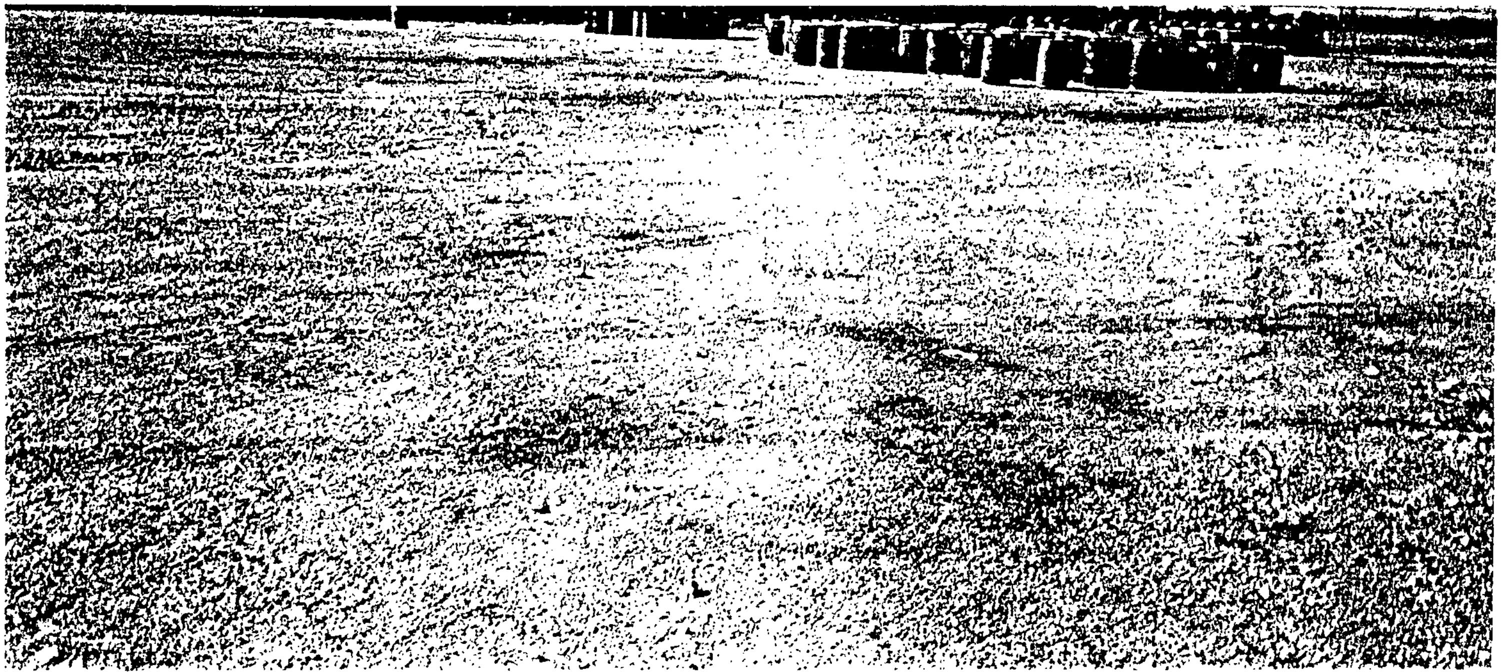

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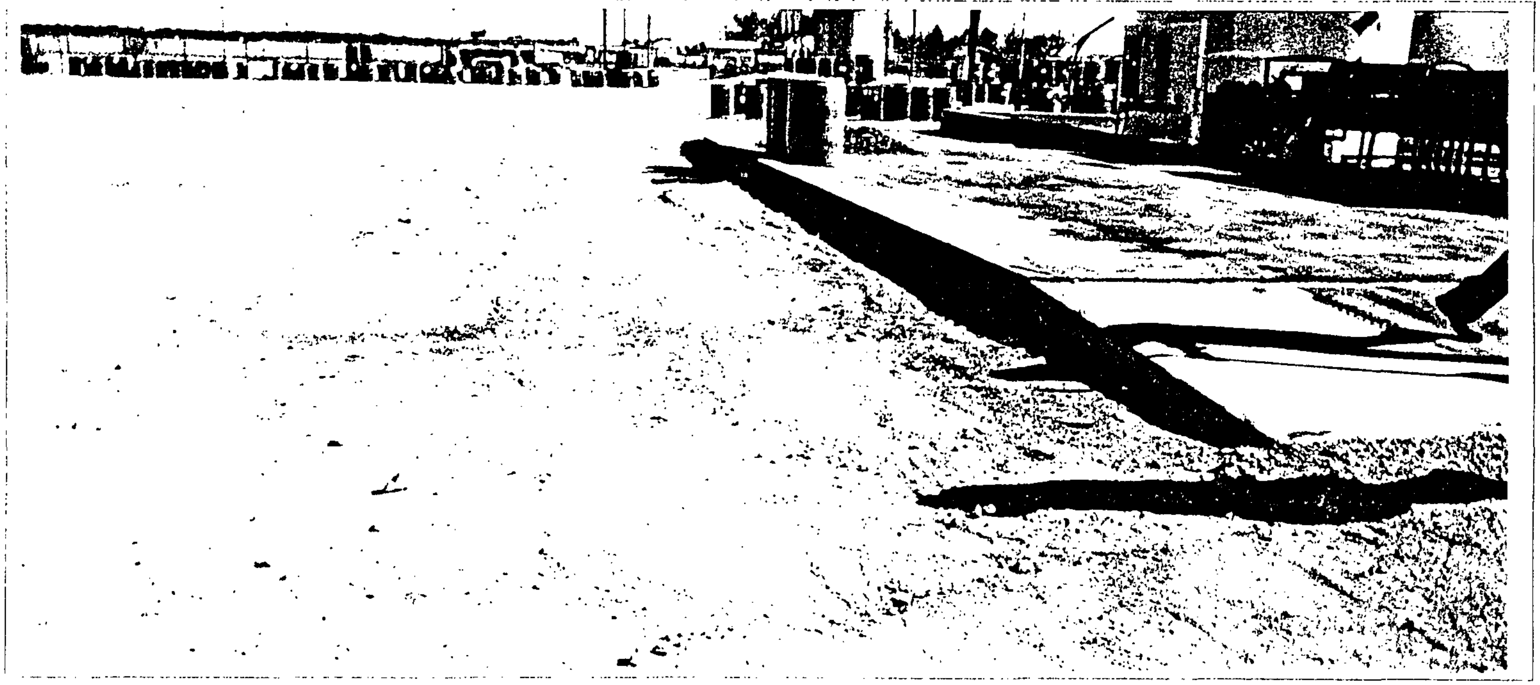

Area 4

Area 4

Drummed Soils from Areas 1 - 4

APPENDIX III

LABORATORY ANALYSIS

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

May 21, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

Extraction Date: 05/17/98
Analysis Date: 05/19/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TCLP METALS (mg/L)

TA#	Field Code	As	Se	Cd	Cr	Pb	Ag	Ba	Hg
	EPA LIMIT =	5.0	1.0	1.0	5.0	5.0	5.0	100.0	0.20
T96412	Soil Comp.	<0.10	<0.10	<0.02	<0.05	<0.10	<0.05	0.28	<0.010
ICV		1.0	1.0	1.0	1.0	1.0	0.19	1.0	0.047
CCV		0.99	1.0	0.99	1.0	0.99	0.19	1.0	0.046
Reporting Limit		0.10	0.10	0.02	0.05	0.10	0.05	0.10	0.010
RPD		10	0	9	15	5	0*	4	2
% Extraction Accuracy		100	105	115	80	90	80*	100	110
% Instrument Accuracy		99	100	99	100	99	95	100	93

***NOTE: LCS/LCSD used for RPD and Extraction Ag due to high dilution required for matrix sample.**

CHEMIST: As, Se, Cd, Cr, Pb, Ag, Ba: RR Hg: SA
METHODS: EPA SW 846-1311, 6010B, 7470.
TCLP METALS SPIKE: 20 mg/L As, Se, Cd, Cr, Pb, Ba; 10 mg/L Ag; 0.050 mg/L Hg.
TCLP METALS CV: 1.0 mg/L As, Se, Cd, Cr, Pb, Ba; 0.20 mg/L Ag; 0.050 mg/L Hg.

Director, Dr. Blair Leftwich

5-21-98
Date

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

Prep Date: 04/23/98
Analysis Date: 04/23/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

June 11, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

TA#	FIELD CODE	TRPHC (mg/kg)
T96412	Soil Comp.	6,900
QC	Quality Control	96
REPORTING LIMIT		10
RPD		7
% Extraction Accuracy		104
% Instrument Accuracy		96

METHODS: EPA SW 846-3550; EPA 418.1.
CHEMIST: MS
TRPHC SPIKE: 250 mg/kg TRPHC.
TRPHC QC: 100 mg/L TRPHC.

Director, Dr. Blair Leftwich

6-11-98
DATE

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

June 11, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Prep Date: 04/29/98
Analysis Date: 04/29/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TA#	FIELD CODE	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	M,P,O XYLENE (mg/kg)	TOTAL BTEX (mg/kg)
T96412	Soil Comp.	<0.050	0.322	0.134	1.73	2.19
QC	Quality Control	0.111	0.112	0.113	0.338	
REPORTING LIMIT		0.050	0.050	0.050	0.050	
RPD		0	1	2	3	
% Extraction Accuracy		108	109	114	123	
% Instrument Accuracy		111	112	113	113	

METHODS: EPA SW 846-8021B, 5030.
CHEMIST: JG
BTEX SPIKE: 5 mg/kg BTEX.
BTEX QC: 0.100 mg/L BTEX.

Director, Dr. Blair Leftwich

6-11-98
Date

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

PAGE 1 of 2

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Prep Date: 04/23/98
Analysis Date: 04/23/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

FIELD CODE: Area 1
TA #: T96407

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dichlorodifluoromethane	25	ND				
Chloromethane	25	ND				
Vinyl chloride	50	ND	85			85
Bromomethane	125	ND				
Chloroethane	25	ND				
Trichlorofluoromethane	25	ND				
1,1-Dichloroethene	25	ND	110	6	93	110
Methylene chloride	125	ND				
trans-1,2-Dichloroethene	25	ND				
1,1-Dichloroethane	25	ND				
cis-1,2-Dichloroethene	25	ND				
Chloroform	25	ND	102			102
2,2-Dichloropropane	25	ND				
Bromochloromethane	25	ND				
1,2-Dichloroethane	25	ND				
1,1,1-Trichloroethane	25	ND				
Carbon Tetrachloride	25	ND				
1,1-Dichloropropene	25	ND				
Benzene	25	ND		2	116	
1,2-Dichloropropane	25	ND	115			115
Trichloroethene	25	ND		2	116	
Dibromomethane	25	ND				
Bromodichloromethane	25	ND				
cis-1,3-Dichloropropene	25	ND				
trans-1,3-Dichloropropene	25	ND				
Toluene	25	ND	116	3	116	116
1,1,2-Trichloroethane	25	ND				
1,3-Dichloropropane	25	ND				
MTBE	25	ND				

PHILIP ENVIRONMENTAL

Project No: 19423

Project Location: Hobbs, New Mexico

Project Name: Champion Technologies, Inc.

TA #: T96407

Field Code: Area 1

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dibromochloromethane	25	ND				
1,2-Dibromoethane	25	ND				
Tetrachloroethene	25	ND				
Chlorobenzene	25	ND	120	1	114	120
1,1,1,2-Tertachloroethane	25	ND				
Ethylbenzene	25	ND	118			118
m & p-Xylene	25	ND				
Bromoform	25	ND				
Styrene	25	ND				
o-Xylene	25	ND				
1,1,2,2-Tetrachloroethane	25	ND				
1,2,3-Trichloropropane	25	ND				
Isopropylbenzene	25	ND				
Bromobenzene	25	ND				
2-Chlorotoluene	25	ND				
n-Propylbenzene	25	ND				
4-Chlorotoluene	25	ND				
1,3,5-Trimethylbenzene	25	ND				
tert-Butylbenzene	25	ND				
1,2,4-Trimethylbenzene	25	ND				
1,4-Dichlorobenzene	50	ND				
sec-Butylbenzene	25	ND				
1,3-Dichlorobenzene	50	ND				
4-Isopropyltoluene	25	ND				
1,2-Dichlorobenzene	50	ND				
n-Butylbenzene	25	ND				
1,2-Dibromo-3-chloropropane	125	ND				
1,2,3-Trichlorobenzene	125	ND				
Naphthalene	25	ND				
1,2,4-Trichlorobenzene	125	ND				
Hexachlorobutadiene	125	ND				

	% Recovery
Dibromofluoromethane	113
Toluene-d8	107
4-Bromofluorobenzene	105

ND = Not Detected

Methods: EPA SW 846-5030, 8260.
CHEMIST: AG

Director, Dr. Blair Leftwich

5-5-98

Date

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 08, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/27/98
Analysis Date: 04/29/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technol

TCLP Semi-Volatiles (mg/L)	EPA Limit	Reporting Limit	T96411 Drum Sludge	QC	RPD	%EA	%IA
Pyridine	5.0	0.05	ND	67	184*	2	84
1,4-Dichlorobenzene	7.5	0.05	ND	80	3	70	100
o-Cresol	200.0	0.05	ND	79	3	64	99
m,p-Cresol	200.0	0.05	ND	83	3	112	104
Hexachloroethane	3.0	0.05	ND	83	6	70	104
Nitrobenzene	2.0	0.05	ND	86	6	83	108
Hexachlorobutadiene	0.5	0.05	ND	96	4	90	120
2,4,6-Trichlorophenol	2.0	0.05	ND	79	5	77	99
2,4,5-Trichlorophenol	400.0	0.05	ND	74	3	69	93
2,4-Dinitrotoluene	0.13	0.05	ND	82	8	87	103
2,4-D	10.0	0.05	ND	77	7	104	96
Hexachlorobenzene	0.13	0.05	ND	73	5	74	91
2,4,5-TP	1.0	0.05	ND	73	10	98	91
Pentachlorophenol	100.0	0.05	ND	66	11	63	83

***NOTE: RPD out of limits <20%.**

Surrogates	**% RECOVERY**
2-Fluorophenol	36
Phenol-d6	26
Nitrobenzene-d5	59
2-Fluorobiphenyl	93
2,4,6-Tribromophenol	47
Terphenyl-d14	99

Methods: EPA SW 846-1311, 8270.
CHEMIST: MB

ND - Not Detected

Director, Dr. Blair Leftwich

5-8-98
DATE

TRACEANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 08, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/27/98
Analysis Date: 04/29/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technolc

TCLP Semi-Volatiles (mg/L)	EPA Limit	Reporting Limit	T96412 Soil Comp.	QC	RPD	%EA	%IA
Pyridine	5.0	0.05	ND	67	184*	2	84
1,4-Dichlorobenzene	7.5	0.05	ND	80	3	70	100
o-Cresol	200.0	0.05	ND	79	3	64	99
m,p-Cresol	200.0	0.05	ND	83	3	112	104
Hexachloroethane	3.0	0.05	ND	83	6	70	104
Nitrobenzene	2.0	0.05	ND	86	6	83	108
Hexachlorobutadiene	0.5	0.05	ND	96	4	90	120
2,4,6-Trichlorophenol	2.0	0.05	ND	79	5	77	99
2,4,5-Trichlorophenol	400.0	0.05	ND	74	3	69	93
2,4-Dinitrotoluene	0.13	0.05	ND	82	8	87	103
2,4-D	10.0	0.05	ND	77	7	104	96
Hexachlorobenzene	0.13	0.05	ND	73	5	74	91
2,4,5-TP	1.0	0.05	ND	73	10	98	91
Pentachlorophenol	100.0	0.05	ND	66	11	63	83

***NOTE: RPD out of limits <20%.**

Surrogates	**% RECOVERY**
2-Fluorophenol	48
Phenol-d6	33
Nitrobenzene-d5	78
2-Fluorobiphenyl	79
2,4,6-Tribromophenol	52
Terphenyl-d14	89

Methods: EPA SW 846-1311, 8270.
CHEMIST: MB

ND - Not Detected

5-8-98

Director, Dr. Blair Leftwich

DATE

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 08, 1998
Receiving Date: 04/17/98
Sample Type: Water
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/27/98
Analysis Date: 04/29/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technol

TCLP Semi-Volatiles (mg/L)	EPA Limit	Reporting Limit	T96413 Water Comp.	QC	RPD	%EA	%IA
Pyridine	5.0	0.05	ND	67	184*	2	84
1,4-Dichlorobenzene	7.5	0.05	ND	80	3	70	100
o-Cresol	200.0	0.05	ND	79	3	64	99
m,p-Cresol	200.0	0.05	ND	83	3	112	104
Hexachloroethane	3.0	0.05	ND	83	6	70	104
Nitrobenzene	2.0	0.05	ND	86	6	83	108
Hexachlorobutadiene	0.5	0.05	ND	96	4	90	120
2,4,6-Trichlorophenol	2.0	0.05	ND	79	5	77	99
2,4,5-Trichlorophenol	400.0	0.05	ND	74	3	69	93
2,4-Dinitrotoluene	0.13	0.05	ND	82	8	87	103
2,4-D	10.0	0.05	ND	77	7	104	96
Hexachlorobenzene	0.13	0.05	ND	73	5	74	91
2,4,5-TP	1.0	0.05	ND	73	10	98	91
Pentachlorophenol	100.0	0.05	ND	66	11	63	83

***NOTE: RPD out of limits <20%.**
****NOTE: Surrogate out of limits.**

Surrogates	**% RECOVERY**	
2-Fluorophenol	0**	**(21-100)**
Phenol-d6	0**	**(10-94)**
Nitrobenzene-d5	0**	**(35-114)**
2-Fluorobiphenyl	2**	**(42-116)**
2,4,6-Tribromophenol	1**	**(10-122)**
Terphenyl-d14	2**	**(33-141)**

Methods: EPA SW 846-1311, 8270.
CHEMIST: MB

ND - Not Detected

5-8-98

Director, Dr. Blair Leftwich

DATE

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ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

PAGE 1 of 2

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Prep Date: 04/20/98
Analysis Date: 04/20/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

FIELD CODE: Area 2
TA #: T96408

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dichlorodifluoromethane	25	ND				
Chloromethane	25	ND				
Vinyl chloride	50	ND	89			89
Bromomethane	125	ND				
Chloroethane	25	ND				
Trichlorofluoromethane	25	ND				
1,1-Dichloroethene	25	ND	97	12	100	97
Methylene chloride	125	ND				
trans-1,2-Dichloroethene	25	ND				
1,1-Dichloroethane	25	ND				
cis-1,2-Dichloroethene	25	ND				
Chloroform	25	ND	87			87
2,2-Dichloropropane	25	ND				
Bromochloromethane	25	ND				
1,2-Dichloroethane	25	ND				
1,1,1-Trichloroethane	25	ND				
Carbon Tetrachloride	25	ND				
1,1-Dichloropropene	25	ND				
Benzene	25	ND		8	91	
1,2-Dichloropropane	25	ND	103			103
Trichloroethene	25	ND		2	119	
Dibromomethane	25	ND				
Bromodichloromethane	25	ND				
cis-1,3-Dichloropropene	25	ND				
trans-1,3-Dichloropropene	25	ND				
Toluene	25	ND	97	10	103	97
1,1,2-Trichloroethane	25	ND				
1,3-Dichloropropane	25	ND				
MTBE	25	ND				

PHILIP ENVIRONMENTAL

Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.
TA #: T96408
Field Code: Area 2

PAGE 2 of 2

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dibromochloromethane	25	ND				
1,2-Dibromoethane	25	ND				
Tetrachloroethene	25	ND				
Chlorobenzene	25	ND	104	5	106	104
1,1,1,2-Tertachloroethane	25	ND				
Ethylbenzene	25	ND	95			95
m & p-Xylene	25	ND				
Bromoform	25	ND				
Styrene	25	ND				
o-Xylene	25	ND				
1,1,2,2-Tetrachloroethane	25	ND				
1,2,3-Trichloropropane	25	ND				
Isopropylbenzene	25	ND				
Bromobenzene	25	ND				
2-Chlorotoluene	25	ND				
n-Propylbenzene	25	ND				
4-Chlorotoluene	25	ND				
1,3,5-Trimethylbenzene	25	ND				
tert-Butylbenzene	25	ND				
1,2,4-Trimethylbenzene	25	ND				
1,4-Dichlorobenzene	50	ND				
sec-Butylbenzene	25	ND				
1,3-Dichlorobenzene	50	ND				
4-Isopropyltoluene	25	ND				
1,2-Dichlorobenzene	50	ND				
n-Butylbenzene	25	ND				
1,2-Dibromo-3-chloropropane	125	ND				
1,2,3-Trichlorobenzene	125	ND				
Naphthalene	25 ✓	ND				
1,2,4-Trichlorobenzene	125	ND				
Hexachlorobutadiene	125	ND				

	% Recovery
Dibromofluoromethane	89
Toluene-d8	87
4-Bromofluorobenzene	100

ND = Not Detected

Methods: EPA SW 846-5030, 8260.
CHEMIST: AG

5-5-98

Director, Dr. Blair Leftwich
Date

TRACEANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

PAGE 1 of 2

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Prep Date: 04/20/98
Analysis Date: 04/20/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

FIELD CODE: Area 3
TA #: T96409

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dichlorodifluoromethane	25	ND				
Chloromethane	25	ND				
Vinyl chloride	50	ND	89			89
Bromomethane	125	ND				
Chloroethane	25	ND				
Trichlorofluoromethane	25	ND				
1,1-Dichloroethene	25	ND	97	12	100	97
Methylene chloride	125	ND				
trans-1,2-Dichloroethene	25	ND				
1,1-Dichloroethane	25	ND				
cis-1,2-Dichloroethene	25	ND				
Chloroform	25	ND	87			87
2,2-Dichloropropane	25	ND				
Bromochloromethane	25	ND				
1,2-Dichloroethane	25	ND				
1,1,1-Trichloroethane	25	ND				
Carbon Tetrachloride	25	ND				
1,1-Dichloropropene	25	ND				
Benzene	25	ND		8	91	
1,2-Dichloropropane	25	ND	103			103
Trichloroethene	25	ND		2	119	
Dibromomethane	25	ND				
Bromodichloromethane	25	ND				
cis-1,3-Dichloropropene	25	ND				
trans-1,3-Dichloropropene	25	ND				
Toluene	25	ND	97	10	103	97
1,1,2-Trichloroethane	25	ND				
1,3-Dichloropropane	25	ND				
MTBE	25	ND				

PHILIP ENVIRONMENTAL

Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.
TA #: T96409
Field Code: Area 3

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dibromochloromethane	1	ND				
1,2-Dibromoethane	1	ND				
Tetrachloroethene	1	ND				
Chlorobenzene	1	ND	104	5	106	104
1,1,1,2-Tertachloroethane	1	ND				
Ethylbenzene	1	ND	95			95
m & p-Xylene	1	ND				
Bromoform	1	ND				
Styrene	1	ND				
o-Xylene	1	ND				
1,1,2,2-Tetrachloroethane	1	ND				
1,2,3-Trichloropropane	1	ND				
Isopropylbenzene	1	ND				
Bromobenzene	1	ND				
2-Chlorotoluene	1	ND				
n-Propylbenzene	1	ND				
4-Chlorotoluene	1	ND				
1,3,5-Trimethylbenzene	1	ND				
tert-Butylbenzene	1	ND				
1,2,4-Trimethylbenzene	1	51				
1,4-Dichlorobenzene	2	ND				
sec-Butylbenzene	1	ND				
1,3-Dichlorobenzene	2	ND				
4-Isopropyltoluene	1	ND				
1,2-Dichlorobenzene	2	ND				
n-Butylbenzene	1	ND				
1,2-Dibromo-3-chloropropane	5	ND				
1,2,3-Trichlorobenzene	5	ND				
Naphthalene	1	ND				
1,2,4-Trichlorobenzene	5	ND				
Hexachlorobutadiene	5	ND				

	% Recovery
Dibromofluoromethane	91
Toluene-d8	87
4-Bromofluorobenzene	100

ND = Not Detected

Methods: EPA SW 846-5030, 8260.
CHEMIST: AG

5-5-98

Director, Dr. Blair Leftwich

Date

TRACEANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

PAGE 1 of 2

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Prep Date: 04/20/98
Analysis Date: 04/20/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

FIELD CODE: Area 4
TA #: T96410

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dichlorodifluoromethane	25	ND				
Chloromethane	25	ND				
Vinyl chloride	50	ND	89			89
Bromomethane	125	ND				
Chloroethane	25	ND				
Trichlorofluoromethane	25	ND				
1,1-Dichloroethene	25	ND	97	12	100	97
Methylene chloride	125	ND				
trans-1,2-Dichloroethene	25	ND				
1,1-Dichloroethane	25	ND				
cis-1,2-Dichloroethene	25	ND				
Chloroform	25	ND	87			87
2,2-Dichloropropane	25	ND				
Bromochloromethane	25	ND				
1,2-Dichloroethane	25	ND				
1,1,1-Trichloroethane	25	ND				
Carbon Tetrachloride	25	ND				
1,1-Dichloropropene	25	ND				
Benzene	25	ND		8	91	
1,2-Dichloropropane	25	ND	103			103
Trichloroethene	25	ND		2	119	
Dibromomethane	25	ND				
Bromodichloromethane	25	ND				
cis-1,3-Dichloropropene	25	ND				
trans-1,3-Dichloropropene	25	ND				
Toluene	25	ND	97	10	103	97
1,1,2-Trichloroethane	25	ND				
1,3-Dichloropropane	25	ND				
MTBE	25	ND				

PHILIP ENVIRONMENTAL

Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.
TA #: T96410
Field Code: Area 4

8260 Compounds	Reporting Limit	Concentration (ug/kg)	QC	RPD	EA	IA
Dibromochloromethane	25	ND				
1,2-Dibromoethane	25	ND				
Tetrachloroethene	25	ND				
Chlorobenzene	25	ND	104	5	106	104
1,1,1,2-Tertachloroethane	25	ND				
Ethylbenzene	25	ND	95			95
m & p-Xylene	25	ND				
Bromoform	25	ND				
Styrene	25	ND				
o-Xylene	25	ND				
1,1,2,2-Tetrachloroethane	25	ND				
1,2,3-Trichloropropane	25	ND				
Isopropylbenzene	25	ND				
Bromobenzene	25	ND				
2-Chlorotoluene	25	ND				
n-Propylbenzene	25	ND				
4-Chlorotoluene	25	ND				
1,3,5-Trimethylbenzene	25	ND				
tert-Butylbenzene	25	ND				
1,2,4-Trimethylbenzene	25	ND				
1,4-Dichlorobenzene	50	ND				
sec-Butylbenzene	25	ND				
1,3-Dichlorobenzene	50	ND				
4-Isopropyltoluene	25	ND				
1,2-Dichlorobenzene	50	ND				
n-Butylbenzene	25	ND				
1,2-Dibromo-3-chloropropane	125	ND				
1,2,3-Trichlorobenzene	125	ND				
Naphthalene	25	ND				
1,2,4-Trichlorobenzene	125	ND				
Hexachlorobutadiene	125	ND				

	% Recovery
Dibromofluoromethane	91
Toluene-d8	88
4-Bromofluorobenzene	99

ND = Not Detected

Methods: EPA SW 846-5030, 8260.
CHEMIST: AG

Director, Dr. Blair Leftwich

5-5-98
Date

TRACEANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

May 06, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Sampling Date: 04/15/98
Sample Condition: I & C
Sample Received by: VW
Project Name: Champion Technologies, Inc
Project No: 19423
Project Location: Hobbs, New Mexico
Extraction Date: 04/20/98
Analysis Date: 04/24/98

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

TA # T96407
Field Code: Area 1

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
N-Nitrosodimethylamine	25	ND				
2-Picoline	25	ND				
Methyl methanesulfonate	25	ND				
Ethyl methanesulfonate	25	ND				
Phenol	25	ND	80	14	58	100
Aniline	125	ND				
bis(2-Chloroethyl)ether	125	ND				
2-Chlorophenol	125	ND		15	56	
1,3-Dichlorobenzene	25	ND				
1,4-Dichlorobenzene	25	ND	83	14	59	104
Benzyl alcohol	125	ND				
1,2-Dichlorobenzene	25	ND				
2-Methylphenol	25	ND				
bis(2-chloroisopropyl)ether	125	ND				
4-Methylphenol/3-Methylphenol	25	ND				
Acetophenone	125	ND				
n-Nitrosodi-n-propylamine	25	ND		15	62	
Hexachloroethane	25	ND				
Nitrobenzene	25	ND				
N-Nitrosopiperidine	125	ND				
Isophorone	125	ND				
2-Nitrophenol	125	ND	79			111
2,4-Dimethylphenol	125	ND				
bis(2-Chloroethoxy)methane	25	ND				
Benzoic acid	250	ND				
2,4-Dichlorophenol	125	ND	93			116
1,2,4-Trichlorobenzene	25	ND		13	65	
a,a-Dimethylphenethylamine	250	ND				
Naphthalene	25	ND				

PHILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA #T96407

Field Code: Area 1

ND = NOT DETECTED

SURROGATES	% RECOVERY
2-Fluorophenol SURR	49
Phenol-d6 SURR	75
Nitrobenzene-d5 SURR	96
2-Fluorobiphenyl SURR	127
2,4,6-Tribromophenol SURR	51
Terphenyl-d14 SURR	133

*NOTE: Matrix RPD out of range for Pentachlorophenol. LCS is within range.
**NOTE: Elevated reporting limits due to sample matrix interference.
Pentachlorophenol LCS: Spike: 5.87 Spike Dup: 6.24 RPD: 7 %EA: 58

METHODS: EPA SW 846-8270, 3550.
CHEMIST: MB

Director, Dr. Blair Leftwich

5-6-98
Date

HILIP ENVIRONMENTAL
'roject No: 19423
'roject Location: Hobbs, New Mexico
roject Name: Champion Technologies, Inc.

A# T96407
IELD CODE: Area 1

PA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
-Chloroaniline	125	ND				
.6-Dichlorophenol	125	ND				
lexachlorobutadiene	25	ND	96			120
-Nitroso-di-n-butylamine	125	ND				
-Chloro-3-methylphenol	125	ND	86	10	74	108
-Methylnaphthalene	25	ND				
.2,4,5-Tetrachlorobenzene	25	ND				
lexachlorocyclopentadiene	25	ND				
.4,6-Trichlorophenol	125	ND	84			105
.4,5-Trichlorophenol	125	ND				
-Chloronaphthalene	25	ND				
-Chloronaphthalene	25	ND				
-Nitroaniline	125	ND				
imethylphthalate	25	ND				
cenaphthylene	25	ND				
.6-Dinitrotoluene	25	ND				
-Nitroaniline	125	ND				
cenaphthene	25	ND	82	11	74	103
.4-Dinitrophenol	125	ND				
ibenzofuran	125	ND				
'entachlorobenzene	25	ND				
-Nitrophenol	125	ND		6	9	
-Napthylamine	125	ND				
.4-Dinitrotoluene	25	ND		2	88	
-Napthylamine	125	ND				
.3,4,6-Tetrachlorophenol	125	ND				
Fluorene	25	ND				
Diethylphthalate	25	ND				
-Chlorophenyl-phenylether	25	ND				
-Nitroaniline	125	ND				
.6-Dinitro-2-methylphenol	125	ND				
-Nitrosodiphenylamine & Diphenylamine	25	ND	83			104
Diphenylhydrazine	125	ND				

PHILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA# T96407	
FIELD CODE: Area 1	

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
4-Bromophenyl-phenylether	25	ND				
Phenacetin	125	ND				
Hexachlorobenzene	25	ND				
4-Aminobiphenyl	125	ND				
Pentachlorophenol	125	ND	77	67*	59	96
Pentachloronitrobenzene	125	ND				
Pronamide	25	ND				
Phenanthrene	25	ND				
Anthracene	25	ND				
Di-n-butylphthalate	25	ND				
Fluoranthene	25	ND	84			105
Benzidine	250	ND				
Pyrene	25	ND		0	93	
p-Dimethylaminoazobenzene	25	ND				
Butylbenzylphthalate	25	ND				
Benzo[a]anthracene	25	ND				
3,3-Dichlorobenzidine	125	ND				
Chrysene	25	ND				
bis(2-Ethylhexyl)phthalate	25	ND				
Di-n-octlphthalate	25	ND	90			112
Benzo[b]fluoranthene	25	ND				
7,12-Dimethylbenz(a)anthracene	25	ND				
Benzo[k]fluoranthene	25	ND				
Benzo[a]pyrene	25	ND	82			107
3-Methylcholanthrene	25	ND				
Dibenzo(a,j)acridine	25	ND				
Indeno[1,2,3-cd]pyrene	25	ND				
Dibenz[a,h]anthracene	25	ND				
Benzo[g,h,i]perylene	25	ND				

TRACEANALYSIS, INC.

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4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

May 06, 1998

Receiving Date: 04/17/98
Sample Type: Soil
Sampling Date: 04/15/98
Sample Condition: I & C
Sample Received by: VW
Project Name: Champion Technologies, Inc.
Project No: 19423
Project Location: Hobbs, New Mexico
Extraction Date: 04/20/98
Analysis Date: 04/24/98

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

TA # T96408
Field Code: Area 2

EPA 8270	Reporting Limit	Concentration (mg/kg)	QC	RPD	%EA	%IA
N-Nitrosodimethylamine	0.25	ND				
2-Picoline	0.25	ND				
Methyl methanesulfonate	0.25	ND				
Ethyl methanesulfonate	0.25	ND				
Phenol	0.25	ND	80	14	58	100
Aniline	1.25	ND				
bis(2-Chloroethyl)ether	1.25	ND				
2-Chlorophenol	1.25	ND		15	56	
1,3-Dichlorobenzene	0.25	ND				
1,4-Dichlorobenzene	0.25	ND	83	14	59	104
Benzyl alcohol	1.25	ND				
1,2-Dichlorobenzene	0.25	ND				
2-Methylphenol	0.25	ND				
bis(2-chloroisopropyl)ether	1.25	ND				
4-Methylphenol/3-Methylphenol	0.25	ND				
Acetophenone	1.25	ND				
n-Nitrosodi-n-propylamine	0.25	ND		15	62	
Hexachloroethane	0.25	ND				
Nitrobenzene	0.25	ND				
N-Nitrosopiperidine	1.25	ND				
Isophorone	1.25	ND				
2-Nitrophenol	1.25	ND	79			111
2,4-Dimethylphenol	1.25	ND				
bis(2-Chloroethoxy)methane	0.25	ND				
Benzoic acid	2.5	ND				
2,4-Dichlorophenol	1.25	ND	93			116
1,2,4-Trichlorobenzene	0.25	ND		13	65	
a,a-Dimethylphenethylamine	2.5	ND				
Naphthalene	0.25	ND				

ILIP ENVIRONMENTAL
roject No: 19423
roject Location: Hobbs, New Mexico
ject Name: Champion Technologies, Inc.

A# T96408
IELD CODE: Area 2

PA 8270	Reporting Limit	Concentration (mg/kg)	QC	RPD	%EA	%IA
Chloroaniline	1.25	ND				
6-Dichlorophenol	1.25	ND				
exachlorobutadiene	0.25	ND	96			120
Nitroso-di-n-butylamine	1.25	ND				
Chloro-3-methylphenol	1.25	ND	86	10	74	108
Methylnaphthalene	0.25	ND				
2,4,5-Tetrachlorobenzene	0.25	ND				
exachlorocyclopentadiene	0.25	ND				
4,6-Trichlorophenol	1.25	ND	84			105
4,5-Trichlorophenol	1.25	ND				
Chloronaphthalene	0.25	ND				
Chloronaphthalene	0.25	ND				
Nitroaniline	1.25	ND				
imethylphthalate	0.25	ND				
cenaphthylene	0.25	ND				
6-Dinitrotoluene	0.25	ND				
Nitroaniline	1.25	ND				
cenaphthene	0.25	ND	82	11	74	103
4-Dinitrophenol	1.25	ND				
ibenzofuran	1.25	ND				
entachlorobenzene	0.25	ND				
-Nitrophenol	1.25	ND		6	9	
-Napthylamine	1.25	ND				
4-Dinitrotoluene	0.25	ND		2	88	
-Napthylamine	1.25	ND				
3,4,6-Tetrachlorophenol	1.25	ND				
luorene	0.25	ND				
iethylphthalate	0.25	ND				
-Chlorophenyl-phenylether	0.25	ND				
-Nitroaniline	1.25	ND				
6-Dinitro-2-methylphenol	1.25	ND				
-Nitrosodiphenylamine & Diphenylamine	0.25	ND	83			104
iphenylhydrazine	1.25	ND				

PHILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA# T96408
FIELD CODE: Area 2

EPA 8270	Reporting Limit	Concentration (mg/kg)	QC	RPD	%EA	%IA
4-Bromophenyl-phenylether	0.25	ND				
Phenacetin	1.25	ND				
Hexachlorobenzene	0.25	ND				
4-Aminobiphenyl	1.25	ND				
Pentachlorophenol	1.25	ND	77	67*	59	96
Pentachloronitrobenzene	1.25	ND				
Pronamide	0.25	ND				
Phenanthrene	0.25	ND				
Anthracene	0.25	ND				
Di-n-butylphthalate	0.25	ND				
Fluoranthene	0.25	ND	84			105
Benzidine	2.5	ND				
Pyrene	0.25	ND		0	93	
p-Dimethylaminoazobenzene	0.25	ND				
Butylbenzylphthalate	0.25	ND				
Benzo[a]anthracene	0.25	ND				
3,3-Dichlorobenzidine	1.25	ND				
Chrysene	0.25	ND				
bis(2-Ethylhexyl)phthalate	0.25	ND				
Di-n-octlphthalate	0.25	ND	90			112
Benzo[b]fluoranthene	0.25	ND				
7,12-Dimethylbenz(a)anthracene	0.25	ND				
Benzo[k]fluoranthene	0.25	ND				
Benzo[a]pyrene	0.25	ND	82			107
3-Methylcholanthrene	0.25	ND				
Dibenzo(a,j)acridine	0.25	ND				
Indeno[1,2,3-cd]pyrene	0.25	ND				
Dibenz[a,h]anthracene	0.25	ND				
Benzo[g,h,i]perylene	0.25	ND				

Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA #T96408

Field Code: Area 2

ND = NOT DETECTED

SURROGATES	% RECOVERY
2-Fluorophenol SURR	37
Phenol-d6 SURR	51
Nitrobenzene-d5 SURR	50
2-Fluorobiphenyl SURR	55
2,4,6-Tribromophenol SURR	64
Terphenyl-d14 SURR	79

*NOTE: Matrix RPD out of range for Pentachlorophenol. LCS is within range.

Pentachlorophenol LCS: Spike: 5.87 Spike Dup: 6.24 RPD: 7 %EA: 58

METHODS: EPA SW 846-8270, 3550.
CHEMIST: MB

Director, Dr. Blair Leftwich

5-6-98
Date

TRACEANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

May 06, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Sampling Date: 04/15/98
Sample Condition: I & C
Sample Received by: VW
Project Name: Champion Technologies, inc.
Project No: 19423
Project Location: Hobbs, New Mexico
Extraction Date: 04/20/98
Analysis Date: 04/24/98

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

TA # T96409
Field Code: Area 3

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
N-Nitrosodimethylamine	12.5	ND				
2-Picoline	12.5	ND				
Methyl methanesulfonate	12.5	ND				
Ethyl methanesulfonate	12.5	ND				
Phenol	12.5	ND	80	14	58	100
Aniline	62.5	ND				
bis(2-Chloroethyl)ether	62.5	ND				
2-Chlorophenol	62.5	ND		15	56	
1,3-Dichlorobenzene	12.5	ND				
1,4-Dichlorobenzene	12.5	ND	83	14	59	104
Benzyl alcohol	62.5	ND				
1,2-Dichlorobenzene	12.5	ND				
2-Methylphenol	12.5	ND				
bis(2-chloroisopropyl)ether	62.5	ND				
4-Methylphenol/3-Methylphenol	12.5	ND				
Acetophenone	62.5	ND				
n-Nitrosodi-n-propylamine	12.5	ND		15	62	
Hexachloroethane	12.5	ND				
Nitrobenzene	12.5	ND				
N-Nitrosopiperidine	62.5	ND				
Isophorone	62.5	ND				
2-Nitrophenol	62.5	ND	79			111
2,4-Dimethylphenol	62.5	ND				
bis(2-Chloroethoxy)methane	12.5	ND				
Benzoic acid	125	ND				
2,4-Dichlorophenol	62.5	ND	93			116
1,2,4-Trichlorobenzene	12.5	ND		13	65	
a,a-Dimethylphenethylamine	62.5	ND				
Naphthalene	12.5	ND				

HILIP ENVIRONMENTAL
roject No: 19423
roject Location: Hobbs, New Mexico
roject Name: Champion Technologies, Inc.

TA# T96409	
FIELD CODE:	Area 3

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
4-Chloroaniline	62.5	ND				
2,6-Dichlorophenol	62.5	ND				
Hexachlorobutadiene	12.5	ND	96			120
N-Nitroso-di-n-butylamine	62.5	ND				
4-Chloro-3-methylphenol	62.5	ND	86	10	74	108
2-Methylnaphthalene	12.5	ND				
1,2,4,5-Tetrachlorobenzene	12.5	ND				
Hexachlorocyclopentadiene	12.5	ND				
2,4,6-Trichlorophenol	62.5	ND	84			105
2,4,5-Trichlorophenol	62.5	ND				
2-Chloronaphthalene	12.5	ND				
1-Chloronaphthalene	12.5	ND				
2-Nitroaniline	62.5	ND				
Dimethylphthalate	12.5	ND				
Acenaphthylene	12.5	ND				
2,6-Dinitrotoluene	12.5	ND				
3-Nitroaniline	62.5	ND				
Acenaphthene	12.5	ND	82	11	74	103
2,4-Dinitrophenol	62.5	ND				
Dibenzofuran	62.5	ND				
Pentachlorobenzene	12.5	ND				
4-Nitrophenol	62.5	ND		6	9	
1-Napthylamine	62.5	ND				
2,4-Dinitrotoluene	12.5	ND		2	88	
2-Napthylamine	62.5	ND				
2,3,4,6-Tetrachlorophenol	62.5	ND				
Fluorene	12.5	ND				
Diethylphthalate	12.5	ND				
4-Chlorophenyl-phenylether	12.5	ND				
4-Nitroaniline	62.5	ND				
4,6-Dinitro-2-methylphenol	62.5	ND				
n-Nitrosodiphenylamine & Diphenylamine	12.5	ND	83			104
Diphenylhydrazine	62.5	ND				

PHILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA# T96409
FIELD CODE: Area 3

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
4-Bromophenyl-phenylether	12.5	ND				
Phenacetin	62.5	ND				
Hexachlorobenzene	12.5	ND				
4-Aminobiphenyl	62.5	ND				
Pentachlorophenol	62.5	ND	77	67*	59	96
Pentachloronitrobenzene	62.5	ND				
Pronamide	12.5	ND				
Phenanthrene	12.5	ND				
Anthracene	12.5	ND				
Di-n-butylphthalate	12.5	ND				
Fluoranthene	12.5	ND	84			105
Benzidine	125	ND				
Pyrene	12.5	ND		0	93	
p-Dimethylaminoazobenzene	12.5	ND				
Butylbenzylphthalate	12.5	ND				
Benzo[a]anthracene	12.5	ND				
3,3-Dichlorobenzidine	12.5	ND				
Chrysene	12.5	ND				
bis(2-Ethylhexyl)phthalate	12.5	ND				
Di-n-octlphthalate	12.5	ND	90			112
Benzo[b]fluoranthene	12.5	ND				
7,12-Dimethylbenz(a)anthracene	12.5	ND				
Benzo[k]fluoranthene	12.5	ND				
Benzo[a]pyrene	12.5	ND	82			107
3-Methylcholanthrene	12.5	ND				
Dibenzo(a,j)acridine	12.5	ND				
Indeno[1,2,3-cd]pyrene	12.5	ND				
Dibenz[a,h]anthracene	12.5	ND				
Benzo[g,h,i]perylene	12.5	ND				

PHILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA #T96409

Field Code: Area 3

ND = NOT DETECTED

SURROGATES	% RECOVERY
2-Fluorophenol SURR	54
Phenol-d6 SURR	81
Nitrobenzene-d5 SURR	84
2-Fluorobiphenyl SURR	108
2,4,6-Tribromophenol SURR	74
Terphenyl-d14 SURR	110

*NOTE: Matrix RPD out of range for Pentachlorophenol. LCS is within range.

**NOTE: Elevated reporting limits due to sample matrix interference.

Pentachlorophenol LCS: Spike: 5.87 Spike Dup: 6.24 RPD: 7 %EA: 58

METHODS: EPA SW 846-8270, 3550.
CHEMIST: MB

Director, Dr. Blair Leftwich

5-6-98
Date

TRACEANALYSIS, INC.

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4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

May 06, 1998

Receiving Date: 04/17/98
Sample Type: Soil
Sampling Date: 04/15/98
Sample Condition: I & C
Sample Received by: VW
Project Name: Champion Technologies, Inc
Project No: 19423
Project Location: Hobbs, New Mexico
Extraction Date: 04/20/98
Analysis Date: 04/24/98

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

TA # T96410
Field Code: Area 4

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
N-Nitrosodimethylamine	5.0	ND				
2-Picoline	5.0	ND				
Methyl methanesulfonate	5.0	ND				
Ethyl methanesulfonate	5.0	ND				
Phenol	5.0	ND	80	14	58	100
Aniline	25	ND				
bis(2-Chloroethyl)ether	25	ND				
2-Chlorophenol	25	ND		15	56	
1,3-Dichlorobenzene	5.0	ND				
1,4-Dichlorobenzene	5.0	ND	83	14	59	104
Benzyl alcohol	25	ND				
1,2-Dichlorobenzene	5.0	ND				
2-Methylphenol	5.0	ND				
bis(2-chloroisopropyl)ether	25	ND				
4-Methylphenol/3-Methylphenol	5.0	ND				
Acetophenone	25	ND				
n-Nitrosodi-n-propylamine	5.0	ND		15	62	
Hexachloroethane	5.0	ND				
Nitrobenzene	5.0	ND				
N-Nitrosopiperidine	25	ND				
Isophorone	25	ND				
2-Nitrophenol	25	ND	79			111
2,4-Dimethylphenol	25	ND				
bis(2-Chloroethoxy)methane	5.0	ND				
Benzoic acid	50	ND				
2,4-Dichlorophenol	25	ND	93			116
1,2,4-Trichlorobenzene	5.0	ND		13	65	
a,a-Dimethylphenethylamine	50	ND				
Naphthalene	5.0	ND				

HILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA# T96410	
FIELD CODE:	Area 4

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
4-Chloroaniline	25	ND				
2,6-Dichlorophenol	25	ND				
Hexachlorobutadiene	5.0	ND	96			120
N-Nitroso-di-n-butylamine	25	ND				
4-Chloro-3-methylphenol	25	ND	86	10	74	108
2-Methylnaphthalene	5.0	ND				
1,2,4,5-Tetrachlorobenzene	5.0	ND				
Hexachlorocyclopentadiene	5.0	ND				
2,4,6-Trichlorophenol	25	ND	84			105
2,4,5-Trichlorophenol	25	ND				
2-Chloronaphthalene	5.0	ND				
1-Chloronaphthalene	5.0	ND				
2-Nitroaniline	25	ND				
Dimethylphthalate	5.0	ND				
Acenaphthylene	5.0	ND				
2,6-Dinitrotoluene	5.0	ND				
3-Nitroaniline	25	ND				
Acenaphthene	5.0	ND	82	11	74	103
2,4-Dinitrophenol	25	ND				
Dibenzofuran	25	ND				
Pentachlorobenzene	5.0	ND				
4-Nitrophenol	25	ND		6	9	
1-Napthylamine	25	ND				
2,4-Dinitrotoluene	5.0	ND		2	88	
2-Napthylamine	25	ND				
2,3,4,6-Tetrachlorophenol	25	ND				
Fluorene	5.0	ND				
Diethylphthalate	5.0	ND				
4-Chlorophenyl-phenylether	5.0	ND				
4-Nitroaniline	25	ND				
4,6-Dinitro-2-methylphenol	5.0	ND				
n-Nitrosodiphenylamine & Diphenylamine	5.0	ND	83			104
Diphenylhydrazine	25	ND				

PHILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA# T96410	
FIELD CODE: Area 4	

EPA 8270	Reporting Limit**	Concentration (mg/kg)	QC	RPD	%EA	%IA
4-Bromophenyl-phenylether	5.0	ND				
Phenacetin	25	ND				
Hexachlorobenzene	5.0	ND				
4-Aminobiphenyl	25	ND				
Pentachlorophenol	25	ND	77	67*	59	96
Pentachloronitrobenzene	25	ND				
Pronamide	5.0	ND				
Phenanthrene	5.0	ND				
Anthracene	5.0	ND				
Di-n-butylphthalate	5.0	ND				
Fluoranthene	5.0	ND	84			105
Benzidine	50	ND				
Pyrene	5.0	ND		0	93	
p-Dimethylaminoazobenzene	5.0	ND				
Butylbenzylphthalate	5.0	ND				
Benzo[a]anthracene	5.0	ND				
3,3-Dichlorobenzidine	5.0	ND				
Chrysene	5.0	ND				
bis(2-Ethylhexyl)phthalate	5.0	ND				
Di-n-octlphthalate	5.0	ND	90			112
Benzo[b]fluoranthene	5.0	ND				
7,12-Dimethylbenz(a)anthracene	5.0	ND				
Benzo[k]fluoranthene	5.0	ND				
Benzo[a]pyrene	5.0	ND	82			107
3-Methylcholanthrene	5.0	ND				
Dibenzo(a,j)acridine	5.0	ND				
Indeno[1,2,3-cd]pyrene	5.0	ND				
Dibenz[a,h]anthracene	5.0	ND				
Benzo[g,h,i]perylene	5.0	ND				

PHILIP ENVIRONMENTAL
Project No: 19423
Project Location: Hobbs, New Mexico
Project Name: Champion Technologies, Inc.

TA #T96410

Field Code: Area 4

ND = NOT DETECTED

SURROGATES	% RECOVERY
2-Fluorophenol SURR	49
Phenol-d6 SURR	106
Nitrobenzene-d5 SURR	93
2-Fluorobiphenyl SURR	119
2,4,6-Tribromophenol SURR	55
Terphenyl-d14 SURR	136

*NOTE: Matrix RPD out of range for Pentachlorophenol. LCS is within range.
**NOTE: Elevated reporting limits due to sample matrix interference.
Pentachlorophenol LCS: Spike: 5.87 Spike Dup: 6.24 RPD: 7 %EA: 58

METHODS: EPA SW 846-8270, 3550.
CHEMIST: MB

Director, Dr. Blair Leftwich

5-6-98
Date

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/21/98
Analysis Date: 04/21/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TA#	Field Code	REACTIVITY	SULFIDES (ppm)	CYANIDES (ppm)	CORROSIVITY ---	pH (s.u.)	IGNITABILITY
	EPA LIMIT =	---	500	250	---	<2 >12.5	---
T96411	Drum Sludge	Reactive	<10	550	Non-corrosive	4.3	Non-Ignitable
T96412	Soil Comp.	Non-reactive	<10	<2.5	Non-corrosive	6.6	Non-Ignitable
QC	Quality Control	---	---	---	---	8.0	---
RPD		0	0	0	0	0	0
% Extraction Accuracy		---	---	---	---	---	---
% Instrument Accuracy		---	---	---	---	100	---

METHODS: EPA SW 846-Chapter 7 7.3, Chapter 7 7.2, Chapter 7 7.1.
CHEMIST: RC

Director, Dr. Blair Leftwich

5-5-98
DATE

TRACEANALYSIS, INC.

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4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Water
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/21/98
Analysis Date: 04/21/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TA#	Field Code	REACTIVITY	SULFIDES (ppm)	CYANIDES (ppm)	CORROSIVITY ---	pH (s.u.)	FLASHPOINT (F)
	EPA LIMIT =	---	500	250	---	<2 >12.5	>140 F
T96413	Water Comp.	Non-reactive	<10	<2.5	Corrosive	13.2	<70 F
QC	Quality Control	---	---	---	---	8.0	---
RPD		0	0	0	0	0	0
% Extraction Accuracy		---	---	---	---	---	---
% Instrument Accuracy		---	---	---	---	100	---

METHODS: EPA SW 846-Chapter 7 7.3, Chapter 7 7.2, 1010.
CHEMIST: RC

Director, Dr. Blair Leftwich

5-5-98
DATE

TRACEANALYSIS, INC.

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4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Prep Date: 04/29/98
Analysis Date: 04/29/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TA#	FIELD CODE	PAINT FILTER TEST
T96412	Soil Comp.	Pass

METHODS: EPA SW 846-9095.
CHEMIST: JS

Director, Dr. Blair Leftwich

5-5-98
DATE

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/20/98
Analysis Date: 04/22/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TCLP VOLATILES (mg/L)	EPA LIMIT	Reporting Limit	T96411 Drum Sludge	QC	RPD	%EA	%IA
Vinyl chloride	0.20	0.5	ND	80	19	86	80
1,1-Dichloroethene	0.70	0.5	ND	98	16	80	98
Methyl Ethyl Ketone	200.0	5.0	ND	84	11	85	84
Chloroform	6.00	0.5	ND	92	13	106	92
1,2-Dichloroethane	0.50	0.5	ND	88	18	87	88
Benzene	0.50	0.5	ND	96	9	95	96
Carbon Tetrachloride	0.50	0.5	ND	91	5	113	91
Trichloroethene	0.50	0.5	ND	120	4	94	120
Tetrachloroethene	0.70	0.5	ND	119	5	83	119
Chlorobenzene	100.00	0.5	ND	112	3	90	112
1,4-Dichlorobenzene	7.50	0.5	ND	118	4	99	118

SURROGATES	% Recovery
Dibromofluoromethane	95
Toluene-d8	96
4-Bromofluorobenzene	99

ND = Not Detected

METHODS: EPA SW 846-1311, 8260.
CHEMIST: AG

5-5-98

Director, Dr. Blair Leftwich

DATE

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Soil
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/20/98
Analysis Date: 04/22/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TCLP VOLATILES (mg/L)	EPA LIMIT	Reporting Limit	T96412 Soil Comp.	QC	RPD	%EA	%IA
Vinyl chloride	0.20	0.001	ND	80	19	86	80
1,1-Dichloroethene	0.70	0.001	ND	98	16	80	98
Methyl Ethyl Ketone	200.0	0.010	ND	84	11	85	84
Chloroform	6.00	0.001	ND	92	13	106	92
1,2-Dichloroethane	0.50	0.001	ND	88	18	87	88
Benzene	0.50	0.001	ND	96	9	95	96
Carbon Tetrachloride	0.50	0.001	ND	91	5	113	91
Trichloroethene	0.50	0.001	ND	120	4	94	120
Tetrachloroethene	0.70	0.001	ND	119	5	83	119
Chlorobenzene	100.00	0.001	ND	112	3	90	112
1,4-Dichlorobenzene	7.50	0.001	ND	118	4	99	118

SURROGATES	**% Recovery**
Dibromofluoromethane	95
Toluene-d8	99
4-Bromofluorobenzene	94

ND = Not Detected

METHODS: EPA SW 846-1311, 8260.
CHEMIST: AG

5-5-98

Director, Dr. Blair Leftwich

DATE

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP ENVIRONMENTAL
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

May 05, 1998
Receiving Date: 04/17/98
Sample Type: Water
Project No: 19423
Project Location: Hobbs, New Mexico

Extraction Date: 04/20/98
Analysis Date: 04/22/98
Sampling Date: 04/15/98
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Champion Technologies, Inc.

TCLP VOLATILES (mg/L)	EPA LIMIT	Reporting Limit	T96413 Water Comp.	QC	RPD	%EA	%IA
Vinyl chloride	0.20	0.5	ND	80	19	86	80
1,1-Dichloroethene	0.70	0.5	ND	98	16	80	98
Methyl Ethyl Ketone	200.0	5.0	ND	84	11	85	84
Chloroform	6.00	0.5	ND	92	13	106	92
1,2-Dichloroethane	0.50	0.5	ND	88	18	87	88
Benzene	0.50	0.5	ND	96	9	95	96
Carbon Tetrachloride	0.50	0.5	ND	91	5	113	91
Trichloroethene	0.50	0.5	ND	120	4	94	120
Tetrachloroethene	0.70	0.5	ND	119	5	83	119
Chlorobenzene	100.00	0.5	ND	112	3	90	112
1,4-Dichlorobenzene	7.50	0.5	ND	118	4	99	118

SURROGATES	**% Recovery**
Dibromofluoromethane	99
Toluene-d8	102
4-Bromofluorobenzene	103

ND = Not Detected

METHODS: EPA SW 846-1311, 8260.
CHEMIST: AG

Director, Dr. Blair Leftwich

5-5-98
DATE

TraceAnalysis, Inc.

6701 Aberdeen Avenue, Ste. 9 Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298
1 (800) 378 1296

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

LAB Order ID # 309 / 310

Company Name: Philip Services Corporation
Phone #: (915) 563-0118
Address: 7904 IH 20 West, Midland, Tx 79706
Fax #: (915) 563-9526
Contact Person: JeFFrey Kindley
Invoice to: (If different from above) Same As Above
Project #: 19423
Project Name: Champion Technologies Inc
Project Location: Hobbs, New Mexico
Sampler Signature: Jeffrey Kindley

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	MATRIX: SOIL	MATRIX: AIR	MATRIX: SLUDGE	MATRIX:	PRESERVATIVE METHOD: HCL	PRESERVATIVE METHOD: HNO3	PRESERVATIVE METHOD: ICE	PRESERVATIVE METHOD: NONE	PRESERVATIVE METHOD:	SAMPLING: DATE	SAMPLING: TIME
96407	Area 1	1			✓									04/15/98	0940
08	Area 2	1			✓									04/15/98	1000
09	Area 3	1			✓									04/15/98	1030
10	Area 4	1			✓									04/15/98	1140
11	Drum Sludge	1			✓									04/15/98	1200
12	Soil Comp	1			✓									04/15/98	1215
13	Water Comp	1	1 Liter	✓										04/15/98	1220

ANALYSIS REQUEST
(Circle or Specify Method No.)

TCLP Vol
TCLP Semi Vol

LAB #	MTBE 8020/602	BTEX 8020/602	TPH	~~PAH 8270~~ Paint Filter	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC/MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 8080/608	BOD, TSS, PH	RCI	TCLP except Herbicides/Pesticides and metals	Volatiles	Semi-Volatiles	Turn Around Time if different from standard	Hold
96407		~~✓~~	~~✓~~	~~✓~~		~~✓~~									~~✓~~	~~✓~~	✓	✓		
08		~~✓~~	~~✓~~	~~✓~~		~~✓~~									~~✓~~	~~✓~~	✓	✓		
09		~~✓~~	~~✓~~	~~✓~~		~~✓~~									~~✓~~	~~✓~~	✓	✓		
10		~~✓~~	~~✓~~	~~✓~~		~~✓~~									~~✓~~	~~✓~~	✓	✓		
11						~~✓~~									✓	✓				
12		✓	✓	✓		~~✓~~									✓	✓	~~✓~~	~~✓~~		
13															✓	✓	~~✓~~	~~✓~~		

Relinquished by: Jeffrey Kindley	Date: April 16, 1998	Time: 12:40 PM	Received by: Helen Shelton	Date: 4/16/98	Time: 12:40 PM
Relinquished by: Helen Shelton	Date: 4/16/98	Time: 6:00 AM	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received at Laboratory by: Vicki Windham	Date: 4-17-98	Time: 10:30 a

LAB USE ONLY
Intact [✓ Y] / N
Headspace Y / N
Temp ~1 °
Log-in Review

REMARKS:
Normal Turnaround
Changes per Sharon 4-17
5-8
5-1
5-17

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C.

7 samples - HS

Carrier # Greyhound 155 758 9155

7314

TraceAnalysis, Inc.

6701 Aberdeen Avenue, Ste. 9 Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298
1 (800) 378 1296

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

LAB Order ID # 479

Company Name: Philip Services Corporation
Phone #: (915) 563-0118
Address: 4301 Raleigh Court Apt 1804, midland, TX 79707
Fax #: (915) 563-9526
Contact Person: JeFFrey Kindley
Invoice to. (If different from above) Same.
Project #: 19423
Project Name: Champion Technologies Inc.
Project Location: Hobbs, New Mexico
Sampler Signature: Jeffrey Kindley

ANALYSIS REQUEST (Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX					PRESERVATIVE METHOD					SAMPLING		MTBE 8020/602	BTEX 8020/602	TPH	PAH 8270	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC/MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 8080/608	BOD, TSS, PH	8260 Compounds				Turn Around Time if different from standard	Hold
				WATER	SOIL	AIR	SLUDGE		HCL	HNO3	ICE	NONE		DATE	TIME																				
99314	Area 3 (2')	1			✓							✓		[illegible]	1130															✓					

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Jeffrey Kindley	5/27/98	4:35PM	Helen Shelton	5/27/98	4:35 PM
Relinquished by: Helen Shelton	5/27/98	6:30PM	Received by:		
Relinquished by:			Received at Laboratory by: K C Windham	5-28-98	10:45 A

LAB USE ONLY

Intact [✓ Y] / N
Headspace Y / N
Temp 2 °
Log-in Review B

REMARKS:

Normal turnaround

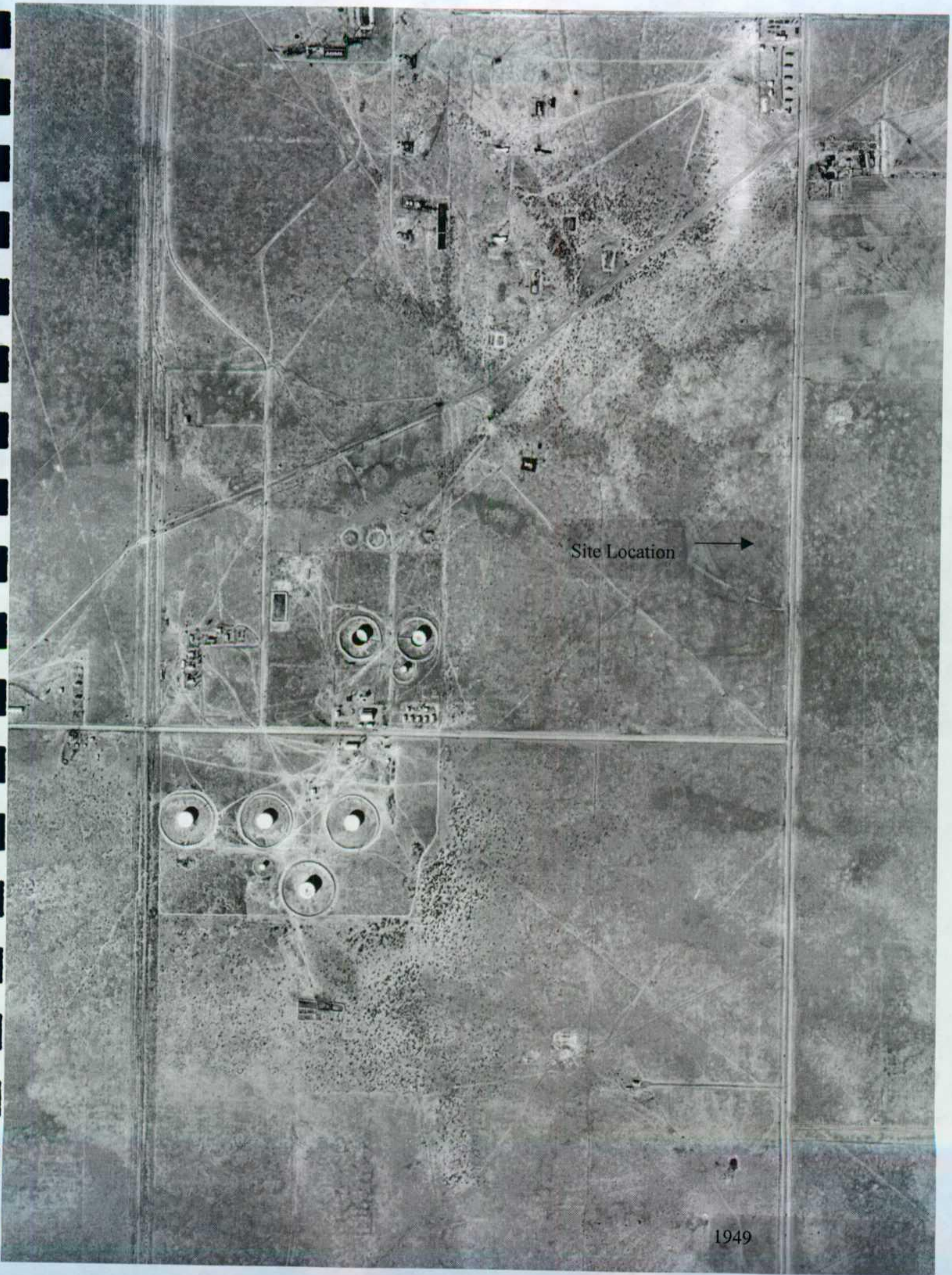
6-1

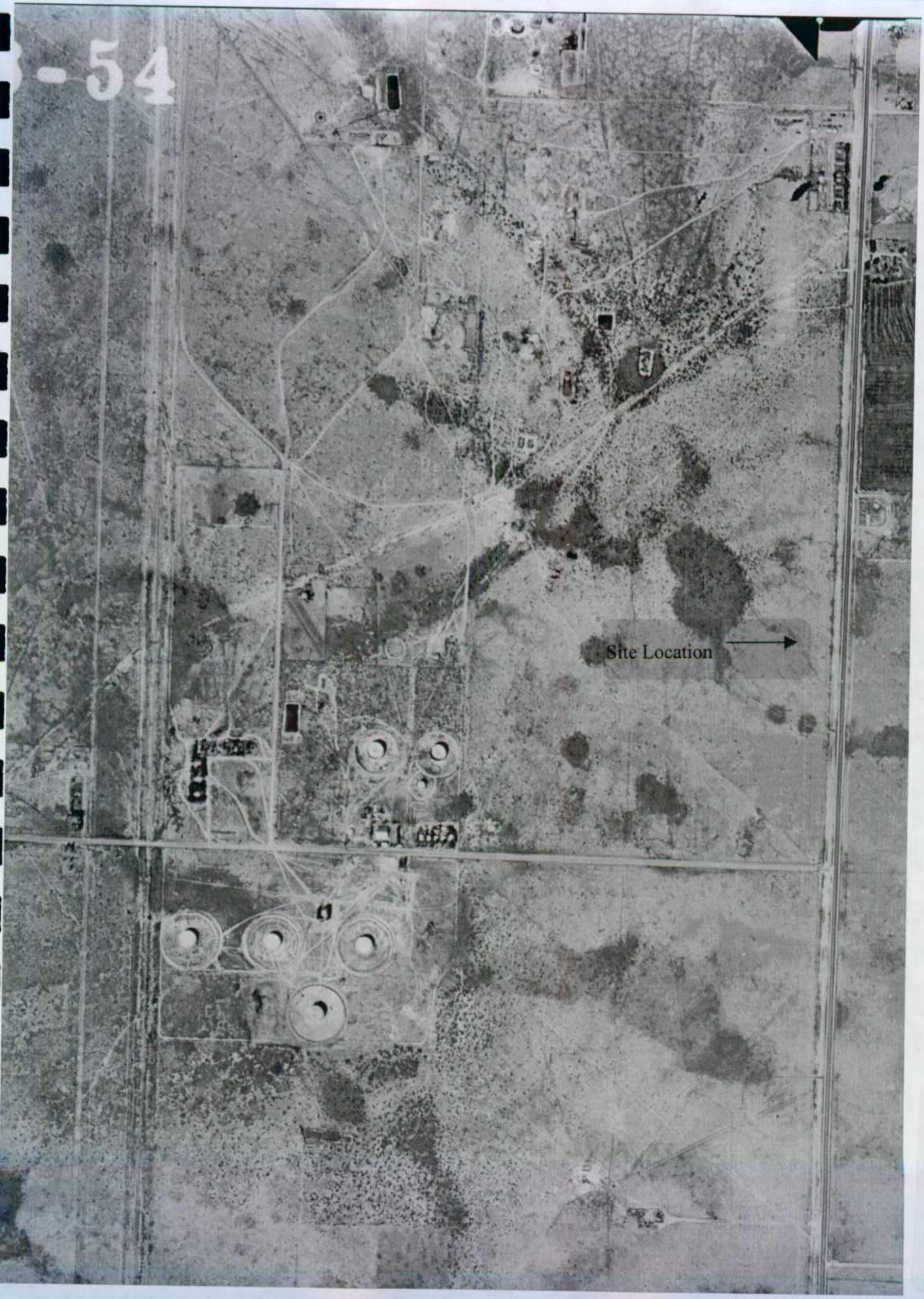
155 755 8841

constitutes agreement to Terms and Conditions listed on reverse side of C.O.C

1 sample - HS

Carrier # Greyhound


Site Location
1949



1954

1967