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REPORTS

DATE:

12/12/1996

Tipperary
CORPORATION

633 Seventeenth Street
Suite 1550
Denver, Colorado 80202

December 12, 1996

Mr. Wayne Price
Environmental Engineer
New Mexico Oil Conservation Division
P. O. Box 1980
Hobbs, New Mexico 88240

RE: LIST OF PITS TO BE CLOSED BY TIPPERARY CORP. IN THE TATUM, LEA COUNTY, NEW MEXICO AREA.

Dear Mr Price:

Attached is the list of pits in the Tatum New Mexico area which Whole Earth Environmental intends to close for Tipperary Corporation next week. I am still searching for more detailed spot information on the Satellite #4 pit location, and will forward it to you as soon as possible. Please let me know if there is any more information that you need.

Sincerely,

Robert H. Fehlmann

Robert H. Fehlmann
Environmental Coordinator

PIT LIST
TATUM AREA, NEW MEXICO
(LEA COUNTY)

1. Sohio State "A" --- State Lease K2371 - Unit "P"
   T11S-R33E-Sec.4
   660' FSL - 1980' FEL

2. Satellite #4 --- Fee Lease
   T11S-R33E-Sec. 12
   NE/4

3. Vera #1 --- State Lease K3985 - Unit "E"
   T11S-R33E-Sec. 32
   1980' FNL - 810' FWL

4. State NBN #1 --- State Lease K2654 - Unit "N", (Oil & Gas #E2654)
   T11S-R33E-Sec. 16
   660' FSL - 1982.5' FWL

5. State NBF #1 --- State Lease - Unit "N", (Oil & Gas #1402)
   T11S-R33E-Sec. 22
   1980' FNL - 1980' FWL

6. Mable COM #1 --- State Lease - K3905, (Oil & Gas #5846)
   T11S- R33E-Sec. 29
   660' FNL - 660' FEL

7. Bell State "A" --- Fee Lease - Unit "C"
   T11S-R33E-Sec. 21
   720' FNL - 1980' FWL

8. G.S. State #1 --- State Lease - Unit "G"
   T11S-R33E-Sec. 8
   2086 FNL - 1874' FEL

9. Iva COM #1 - Fee Lease - Unit "H"
   T11S-R33E-Sec. 20
   2130' FNL - 660' FEL

PIT LIST
TATUM AREA, NEW MEXICO
(LEA COUNTY)

Est. GROUND WATER DEPTHS

1. Sohio State "A" — State Lease K2371 - Unit "P"
   T11S-R33E-Sec.4 (Apr 9 & 10) 38'-41'
   660' FSL - 1980' FEL

2. Satellite #4 — Fee Lease
   T11S-R33E-Sec. 12 25'-47'
   NE/4 SE

3. Vera #1 — State Lease K3985 - Unit "E"
   T11S-R33E-Sec. 32 (29 & 30) 64'
   1980' FNL - 810' FWL

4. State NBN #1 — State Lease K2654 - Unit "N", (Oil & Gas #E2654)
   T11S-R33E-Sec. 16 26'
   660' FSL - 1982.5' FWL

5. State NBF #1 — State Lease - Unit "N", (Oil & Gas #1402)
   T11S-R33E-Sec. 22 33'-34'
   1980' FNL - 1980' FWL

6. Mable COM #1 — State Lease - K3905, (Oil & Gas #5846) 64'
   T11S- R33E-Sec. 29
   660' FNL - 660' FEL

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DEC 13 1996
RECEIVED

7. Bell State "A" — Fee Lease - Unit "C" 45'
   T11S-R33E-Sec. 21
   720' FNL - 1980' FWL

8. G.S. State #1 — State Lease - Unit "G" 44'
   T11S-R33E-Sec. 8
   2086 FNL - 1874' FEL

9. Iva COM #1 - Fee Lease - Unit "H"
   T11S-R33E-Sec. 20 (Apr 17) - 26'
   2130' FNL - 660' FEL

cc: JERRY SEXTON
GARY WINK
JACK GRIFFIN

WHOLE EARTH

Whole Earth Environmental, Inc.
19606 San Gabriel, Houston, Texas 77084
713/492-7077 Fax: 713/492-7077

December 11, 1996

OCD HOBBS OFFICE
DEC 12 1996
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Oil Conservation Division
1000 West Broadway
Hobbs, New Mexico 88241

Attn: Wayne Price

Dear Wayne:

In furtherance of our telecon yesterday morning, we plan to begin work on closing four Tipperary Corporation pits located near Tatum, New Mexico next Monday, December 16.

These pits are identified as:

Satellite # 4
NBM
Vera 1
Sohio A

At least three of these pits are located on State Lands and will be closed in a manner that addresses potential sodium chloride impact on the surface soils. We propose to measure the soil electrical conductivity by means of a Horiba EC Analyzer and remediate all conductivity levels down to < 5.0 mmhos / cm.

Procedures
The overall closure protocol for the pits are contained within the attached procedure QP-32. The detailed testing procedures are contained within the attached QP-06, QP-17 and QP-19. Quality Control / Quality Assurance methods are contained within the attached QP-25 and QP-55.

As I know Mr. Olson prefers to see laboratory analyses for final confirmation levels of BTEX, we will be sending them to Environmental Labs of Texas for testing in accordance with EPA Method 8020.

Closure Ranking
Depth to groundwater: > 100'.
Distance to water source or private domestic water source: > 1,000'
Distance to surface water body: > 1,000 ft.

In accordance with the ranking guidelines, we request to close all four pits to the 5,000 ppm TPH concentration allowable. Benzene and total BTEX will be less than 10 and 50 ppm respectively.

Each pit closure report will be accompanied by the official OCD ***PIT REMEDIATION AND CLOSURE REPORT*** as contained within the guidelines.

Wayne, I know I've really shorted you on the leadtime for this project but I'm hoping to hit the favorable weather window forecast for next week. It's a lot of paper to go through but I would sincerely appreciate your early review of the proposed procedures and protocols. If any changes are required, I'm certain that we can formalize them prior to the actual commencement of the project.

Thank you again for all of your help and guidance.

Warmest regards,

Mike Griffin
President
Whole Earth Environmental, Inc.

cc: Bob Fehlmann / Tipperary Corporation

QP-32

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Pit Closure and Remediation Procedure
San Juan Vulnerable Area

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure is to be used in remediating pits contained within the San Juan Vulnerable Area of New Mexico.

2.0 Scope

This procedure is to be considered site specific and is not to be used for any purpose other than defined in Section 1 of this procedure.

3.0 Preliminary Staging

3.1 Scout all locations to be remediated. Make a determination regarding accessibility, soil conditions, need for soil amendments, special equipment requirements, availability of topsoils, etc. If the location is located near residential housing or retail establishments, determine appropriate hours of operation.

3.2 Prepare a sequence of closure taking into account logistics, appropriate hours of operation, and client schedules.

3.3 **Prior to performing any remediation activities, it will be necessary to contact "One Call" at least forty-eight hours prior to the start of any excavation. The One Call confirmation number shall appear on the closure report.**

3.4 Provide the client with a schedule of closure advising the sequence and estimated time to completion for all scheduled sites.

3.5 **Provide the client and all appropriate regulatory authorities with emergency phone numbers for Whole Earth and any sub-contractors on the project.**

3.6 Determine the location and phone number for the nearest emergency medical treatment facility. Give the information to all sub-contractors.

4.0 Safety

4.1 At the start of each day's activities, a safety meeting will be held and documented by the Whole Earth Senior Tech. The meeting will address the day's activities and objectives, work rules, and procedures. It shall be stressed that anyone on the location may shut down the project for any safety related reason.

4.2 The Senior Tech shall insure that all personnel working on the location are equipped with two way communication, and are attired in steel toed boots, an OSHA approved hard hat, long pants and sleeved shirts. Anyone who is not properly dressed shall not be allowed on location.

4.3 The Senior Tech shall go over the location with a an electronic line finder to determine the accuracy of the One Call site survey. Any new lines shall be staked with yellow pin flags along the line's entire length on the pad plus a minimum distance of twenty-five feet outside the pad perimeter. The pin flag spacing shall be a maximum of five foot centers and the placement of the flags shall be such that it straddles the line.

5.0 Site Preparation

5.1 Remove any fencing, stakes or ancillary equipment from the pit site. Care shall be taken to preserve the integrity of the materials removed. Mesh screens and barbed wire shall be carefully rolled into coils and set aside. Stakes and poles shall be removed by chaining and lifting vertically so as not to bend them. Flow lines with screwed connections shall be disassembled with a pipe wrench. Welded lines shall be excavated as necessary and moved out of the immediate area. **Whole Earth shall not remove any line by torch cutting.**

5.2 Prior to any excavation activities the Senior Tech shall survey the area surrounding the location for a minimum distance of fifty feet looking for evidence of archeological artifacts or raptor nesting. If discovered, the Tech will immediately cease operations and contact the client for further instructions.

5.3 If called for in the contract, the Senior Tech shall photograph the location and retain the photo-documentation for the closure report.

5.4 The Senior Tech shall determine the appropriate closure methods for the location in accordance with the following:

6.0 Excavation

6.1 The Senior Tech shall insure that the pit is free of standing oil or water. If a sufficient quantity exists within the pit to hinder remediation efforts, a vacuum truck shall be called out to remove the liquid. If the removed fluids are not transported to a facility owned and operated by the client, the Senior Tech shall prepare a manifest for each location describing the pit contents, approximate volume, date and time. A copy of the manifest shall be included within the Closure Report.

6.2 In high clay soils, the Senior Tech may opt to first inject the pit with surfactants and flocculents in order to increase permeability. A sample of the pit contents shall be "bench tested" prior to injection to determine the appropriate volumes and ratios of injection amendments. The client shall be provided with MSDS details of all amendments prior to their introduction to the field.

6.3 The Senior Tech shall direct the equipment operator as to the direction of excavation, the location of the remediation pile(s).

6.4 Once the hydrocarbon impacted soils have been removed, the Senior Tech shall obtain a minimum of one soil sample from each side and from the bottom of the pit. The samples shall be tested in accordance with Whole Earth Quality Procedures **QP-06** for TPH, **QP-17 for VOC** and **QP-19** for BTEX. QC shall be in accordance with **QP-25** and **QP-55.**

6.5 Excavation will continue until the closure standards of the client have been met or until an impermeable rock layer has been encountered. The TPH, VOC and / or BTEX concentrations of the pit walls and bottom shall be recorded on the Closure Report.

6.6 If requested by the client, photo-documentation will be taken at the maximum depth of excavation of the pit. Such photographs shall be included within the Closure Report.

7.0 Remediation

7.1 The excavated materials may be segregated at the time of removal from the pit into three categories: light, medium and heavy end hydrocarbon contamination. The soils containing light end, aromatic contamination shall be tested using **QP-06** to establish a base line. A sample (3-6 cu. yds) of the soils shall then be lifted to the maximum elevation of the heavy equipment's capacity and slowly "feathered" down in a manner that exposes the soil to as much air movement as possible. The sample pile shall be re-tested and the process repeated until a concentration differential of less than 15% is achieved. The Senior Tech shall make an estimate of the total volume of light end contamination present within the remediation pile.

7.2 The Senior Tech shall similarly test the medium end pile to determine the volatilization capacity and total volume.

7.3 The Senior Tech shall make an estimate of the total volume of the soils contaminated with heavy end hydrocarbons.

7.4 Based on the ratio of the volumes and concentrations of the piles, the closure concentration requirements, and the availability of topsoils, the Senior Tech shall prepare and execute a remediation plan for the site.

7.5 If mixing and blending with fresh topsoils obtained from the location is to be employed, the Senior Tech shall monitor the progress of the activity by taking periodic samples of the mixture pile and recording the results in the field notebook.

7.6 Prior to replacement into the excavated hole, the Senior Tech shall test and document the TPH and BTEX or VOC concentrations on a minimum frequency of each thirty cubic yards. No materials exceeding the closure standards will be replaced into the pit. The replacement material concentrations will be recorded in the field notes and Closure Report.

7.7 If composting is required, the light and medium end hydrocarbon contaminated soils will be remediated and re-deposited into the pit in accordance with the above procedures. The compost material shall be deposited immediately atop the pit, mixed and blended as necessary with bio-mass materials and the average concentrations recorded within the field notes. The compost pile shall be periodically monitored and amendments added as necessary to achieve closure standards.

8.0 Site Restoration

8.1 Upon completion of all remediation activities, the Senior Tech. will restore the location to pre-remediation conditions. This shall include compaction of the pit area, leveling the pad, and contouring any areas from which soils have been obtained.

8.2 If the excavation shall be left open overnight, the hole shall be fenced with wire mesh and / or barbed wire to insure livestock safety. The wire strands will be additionally marked with yellow "CAUTION" tape.

8.3 If left overnight, the excavated materials shall be either covered with a tarpaulin or a berm created down-slope of the excavated material of sufficient size to contain any potential run-off.

8.4 If requested by the client, a photograph of the location at the conclusion of remediation activities shall be taken and included within the Closure Report.

9.0 Documentation

9.1 The following shall be considered as the minimum documentation required:

A. Plat map of the location showing the approximate dimensions of the pad, the relationship of the pit to the pad and wellhead, dimensions of the pit, and any remaining composting areas.

B. TPH, and VOC or speciated BTEX analysis of sidewalls and bottom of pit at maximum excavation

C. TPH and VOC or speciated BTEX analysis of materials being redeposited into excavation.

D. Copies of all confirmation samples sent to outside, independent laboratories to include all appropriate Chain of Custody documentation.

E. Daily Calibration Logs specifying instrument accuracy.

F. OCD ***PIT REMEDIATION AND CLOSURE REPORT*** form as contained within the ***UNLINED SURFACE IMPOUNDMENT CLOSURE GUIDELINES*** (February 1993).

QP-06

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Conducting Field TPH Analysis

Completed By:	Approved By:	Effective Date: / /

1.0 Purpose

To define the procedure to be used in conducting total percentage hydrocarbon testing in accordance with EPA Method 418.1 (modified) using the "MEGA" TPH Analyzer.

2.0 Scope

This procedure is to be used for field testing and on site remediation information.

3.0 Procedure

3.1 The G.A.C. "MEGA" TPH analyzer is an instrument that measures concentrations of aliphatic hydrocarbons by means of infra-red spectrometry. It is manufactured to our specifications and can accurately measure concentrations from two parts per million through 100,000 parts per million. The unit is factory calibrated however minor calibration adjustments may be made in the field. Quality Procedure 25. defines the field calibration methods to be employed.

3.2 Prior to taking the machine into the field, insert a 500 ppm and 5,000 ppm calibration standard into the sample port of the machine. Zero out the Range dial until the instrument records the exact standard reading.

3.3 Once in the field, insert a large and small cuvette filled with clean Freon 113 into the sample port of the machine. Use the range dial to zero in the reading. If the machine does not zero, do not attempt to adjust the span dial. Immediately implement Quality Procedure 25 .

3.4 Place a 100 g. weight standard on the field scale to insure accuracy. Zero out the scale as necessary.

3.5 Tare a clean 100 ml. sample vial with the Teflon cap removed. Add 10 g. (+/- .01 g), of sample soil into the vial taking care to remove rocks or vegetable matter from the sample to be tested. If the sample is wet, add up to 5 g. silica gel or anhydrous sodium sulfate to the sample after weighing.

3.6 Dispense 10 ml. Freon 113 into the sample vial.

3.7 Cap the vial and shake for five minutes.

3.8 Carefully decant the liquid contents of the vial into a filter/dessicant cartridge and affix the cartridge cap. Recap the sample vial and set aside.

3.9 Insert the metal tip of the pressure syringe into the cap opening and slowly pressurize. **WARNING: APPLY ONLY ENOUGH PRESSURE ON THE SYRINGE TO EFFECT FLOW THROUGH THE FILTERS. TOO MUCH PRESSURE MAY CAUSE THE CAP TO SEPARATE FROM THE BODY OF THE CARTRIDGE.** Once flow is established through the cartridge direct the flow into the 5 cm. cuvette until the cuvette is full. Reverse the pressure on the syringe and remove the syringe tip from the cartridge cap. Set the cartridge aside in a vertical position.

3.10 The cuvette has two clear and two frosted sides. Hold the cuvette by the frosted sides and carefully insert into the sample port of the machine. Read the right hand digital read-out of the instrument. If the reading is less than 1,000 ppm. the results shall be recorded in the field Soil Analysis Report. If the result is higher than 1,000 ppm, continue with the dilution procedure.

4.0 Dilution Procedure

4.1 When initial readings are greater than 1,000 ppm using the 5 cm. cuvette, pour the contents of the 5 cm. cuvette into a 1 cm. cuvette. Insert the 1. cm cuvette into the metal holder and insert into the test port of the instrument.

4.2 Read the left hand digital read-out of the machine. If the results are less than 10,000 ppm, record the results into the field Soil Analysis Report. If greater than 10,000 ppm, continue the dilution process. **Concentrations >10,000 ppm are to be used for field screen purposes only.**

4.3 Pour the contents of the small cuvette into a graduated glass pipette. Add 10 ml. pure Freon 113 into the pipette. Shake the contents and pour into the 1 cm. cuvette. Repeat step 4.2. adding two zeros to the end of the displayed number. If the reported result is greater than 100,000 ppm. the accuracy of further readings through additional dilutions is extremely questionable. **Do not use for reporting purposes.**

4.4 **Pour all sample Freon into the recycling container**.

QP-17

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Measuring and Reporting TPH / VOC Results for San Juan Basin Pit Closures

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure outlines the methods to be employed in measuring and recording the results of TPH and VOC confirmation testing for the San Juan Basin area's closure protocol.

2.0 Scope

This procedure shall only be used for pit closures within New Mexico. This procedure does not address possible remediation methods.

3.0 Procedure

3.1 After excavation, soil samples shall be obtained from the bottom and each of the four sides of each pit and subjected to TPH analysis in accordance with Whole Earth Quality Procedure **QP-06.**

3.2 Each test sample shall be identified as North Wall, South Wall, East Wall South Wall or Bottom. The results of each acceptable test shall be placed in the appropriate blank space on the attached field form.

3.3 Upon completion of the TPH testing, a minimum of five additional samples shall be obtained from different sections of the testing area and subjected to VOC analysis in accordance with Whole Earth Quality Procedure **QP-18**. If the results of the VOC analysis indicate a VOC concentration greater than 100 ppm, a speciated analysis for BTEX shall be performed in accordance with Whole Earth **QP-19.**

3.4 The test results for each of the five samples shall be recorded on the field form within the appropriate blank space.

3.5 The balance of the information needed to complete the field form shall be filled in prior to the Auditor leaving the location.

4.0 Records

4.1 If the information is recorded electronically by means of a field laptop computer, the file shall be labeled by the well name and a hard copy report printed within twenty-four hours of the field tests being completed.

4.2 If the field form is hand written, it shall be turned in to the Field Superintendent at the end of each day and shall then be entered into the computer data base within forty-eight hours of the tests being completed.

5.0 Remediation

5.1 The actual soil remediation may occur by several means including aeration and dilution, land farming, composting, soil washing, sparging, or off-site disposal. If on-site land farming is to be employed, the land farm area should be constructed in a manner that minimises storm water run-off. The soil within the landfarm may have amendments such as bio-mass materials, flocculents, turpines, or surfactants **only with the permission of the client and all cognizent regulatory authorities.** The soils should be tested at least once each thirty days for TPH, VOC and BTEX concentrations, and aerated by disking or turning as required.

Whole Earth Environmental
New Mexico Pit Closure
Report Form

Client Name:	**Example**	**Pit Name:**	**Example**
Sampling Date:	**Example**	**Technician:**	**Example**
S/N TPH:	O1152	**Cal. Log No.**	**Example**
S/N VOC:	49556-283	**Cal. Log No.**	**Example**
S/N BTEX:	365010F	**Cal. Log No.**	**Example**

Test Results

	N. Wall	S. Wall	E. Wall	W. Wall	Bottom
TPH					
Benzene					
Toluene					
C8+					

Fill Material

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
TPH					
Benzene					
Toluene					
C8+					

Signature of Technician: _____

QP-19

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Sampling and Testing Protocol
BTEX Speciation in Soil

Completed By:	Approved By:	Effective Date: / /

1.0 Purpose

This procedure is to be used to determine the concentrations of Benzene, Toluene, Ethyl-Benzene and Xylene (BTEX) in soils.

2.0 Scope

This procedure is to be used as the standard field measurement for soil BTEX concentrations. It is not to be used as a substitute for full spectrographic speciation of organic compounds.

3.0 Procedure

3.1 Sample Collection and Preparation

3.1.1 Collect at least 500 g. of soil from the sample collection point. Take care to insure that the sample is representative of the general background to include visible concentrations of hydrocarbons and soil types. If necessary, prepare a composite sample of soils obtained at several points in the sample area. Take care to insure that no loose vegetation, rocks or liquids are included in the sample(s).

3.1.2 The soil sample(s) shall be immediately inserted into a one quart or larger polyethylene freezer bag and sealed. When sealed, the bag should contain a nearly equal space between the soil sample and trapped air.

3.1.3 The sealed samples shall be allowed to set for a minimum of five minutes at a minimum temperature of 75^{0}F.

3.1.4 The sealed sample bag should be massaged to break up any clods, and to provide the soil sample with as much exposed surface area as practically possible.

3.2 Sampling Procedure

3.2.1 The instrument to be used in conducting VOC concentration testing shall be a Photovac Ion-chromatograph with BTEX Module. Prior to use the instrument shall be zeroed out in accordance with QP-55.

3.2.2 Carefully open one end of the collection bag and insert the probe tip into the bag taking care that the probe tip not touch the soil sample or the side walls of the bag. If VOC analysis was conducted on the sample prior to BTEX analysis, care should be taken to insure that a sufficient air volume exists in the bag to provide accurate results. **If the available air space within the bag is insufficient to run a full analysis, the sample shall be discarded.**

3.2.3 Set the instrument to retain the highest result reading value. Record the reading onto the Field Analytical Report Form and additionally enter the location code into the instrument data logger.

4.0 After testing, the soil samples shall be returned to the sampling location, and the bags collected for off-site disposal. **IN NO CASE SHALL THE SAME BAG BE USED TWICE. EACH SAMPLE CONTAINER MUST BE DISCARDED AFTER EACH USE.**

QP-25

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Instrument Calibration and Quality Assurance Analysis for General Analysis "MEGA" TPH Analyzer

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure outlines the methods to be employed in calibrating the GAC MEGA TPH analyzer and for determining and reporting of accuracy curves.

2.0 Scope

This procedure shall be followed each day that the instrument is used.

3.0 Procedure

3.1 Turn the instrument on and allow to warm up with no cuvette in the receptacle. The instrument will take between five and ten minutes to come to equilibrium as can be determined by the concentration display readings moving a maximum of 5 ppm on the low scale. If the instrument continues to display erratic readings greater than 5 ppm, remove the cover and check both the mirrors and chopper to insure cleanliness.

3.2 All TPH standards shall be purchased form Environmental Resources Corporation and as a condition of their manufacture subject to independent certification by third party laboratories. Each standard is received with a calibration certificate.

3.3 Insert the low range (100 ppm) calibration standard into the receiving port and note the result on the right hand digital display. If the displayed reading is less than 98 ppm or greater than 102 ppm, remove the circuit board cover panel and zero out the instrument in accordance with QP-26.

(Note: Except in New Mexico, set the span to read 105% of actual standard).

3.4 Repeat the process with the mid range (500 ppm) calibration standard. If the displayed reading is less than 490 ppm or greater than 510 ppm zero out the span as described in QP-26.

3.5 Repeat the process again with the 1,000 and 5,000 ppm calibration standards.

3.6 Pour clean Freon 113 into a filter cartridge and extract into 10 ml cuvette. Insert the cuvette into the receiving port and zero out the instrument reading using the far right adjustment knob on the instrument. Repeat using the 1 ml cuvette and the left hand zero dial.

4.0 Determining & Reporting Instrument Accuracy

4.1 After making the fine adjustment with the zero dials reinsert each calibration standard into the instrument and note the concentration values. ***If <u>any</u> concentration value exceeds 2% of the standard set point, repeat all steps in section 3.0 of this Procedure.*** Note the actual concentration values displayed by the instrument after each calibration standard.

4.2 The four calibration standards shall be used in reporting span deviation as follows:

Standards Range			
100 ppm	**500 ppm**	**1,000 ppm**	**5,000 ppm**
0-250 ppm	251-750 ppm	751-2,500 ppm	2,501-10,000 ppm

4.3 Divide the actual instrument reading value of each calibration sample by the concentration shown on the standard (e.g.. 501 ppm instrument reading / 500 ppm standard = 1.002%). These readings shall be reported for each test performed.

5.0 Recalibration

5.1 If any sample exceeds the concentration of 1,000 ppm on the 10 ml cuvette or 10,000 ppm on the 1 ml cuvette, the cuvette must be thoroughly rinsed with clean Freon and the instrument re-zeroed in accordance with 3.6 of this procedure.

QP-55

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Instrument Calibration and Quality Assurance Analysis for Photovac Gas Chromatograph

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure outlines the methods to be employed in calibrating the Photovac analyzer in the BTEX mode and for determining and reporting of accuracy curves.

2.0 Scope

This procedure shall be followed each day that the instrument is used.

3.0 Procedure

Start-up

3.1 Turn the instrument on and press the Battery button. A battery status report will appear on the screen. If the charge level is less than 8.0, either charge the battery or insert a fresh battery pack.

3.2 Open carrier gas valve on right side of instrument. The instrument is now tuning the lamp. If any "boot" problems occur during warm-up, the "chck" symbol will appear on the screen. Pressing TUTOR will prompt the instrument to provide details. The instrument will not progress beyond the start-up mode until all prompts are cleared.

3.3 The next screen display will be "purj" and will last approximately ten minutes. The instrument is purging the column.

Calibrate

3.4 Connect the regulator to cylinder of calibration gas. Connect calibration adapter and tee assembly to both the regulator and instrument. **DO NOT FORCE ANY CONNECTION!**

3.5 Inspect the open end of the tee vent to insure unobstructed flow.

3.6 Enter CAL on the key pad. The instrument will query "benzene?". Following the prompts and using the key pad, set the concentrations to those defined on the calibration gas bottle. Follow the same procedure for toluene, ethyl-benzene and xylene. After each compound, the instrument will read that the next analysis will be a calibration.

3.7 Press ENTER on key pad. The instrument will calibrate itself for the concentrations specified.

Confirmation Sample

3.8 After each calibration, run the calibration gas through the instrument once again. The display readings should be **exactly** those of the concentrations displayed on the calibration gas bottle. **If they are not, the instrument needs factory calibration; do not use.**

4.0 Recalibration

4.1 The instrument is designed with software that prompts you to recalibrate each day, each thirty minutes of use, and after running a sample with high concentrations of one or more of the detected compounds.

5.0 Reporting Instrument Accuracy

5.1 The instrument accuracy as certified by the factory is 15% within one decade of instrument set point. Lower detection limits are 0.1 ppm for benzene and 1.0 ppm for toluene, ethylbenzene and xylene.

5.2 These standards and detection limits must be shown on all reports in which the instrument is used.