1R - 271

REPORTS

DATE:

1999

Tipperary CORPORATION

Tipperary Corporation
Tatum Pit Closure Project
Vera # 1
Closure Report

Whole Earth Environmental
19606 San Gabriel
Houston, Tx. 77084

Tipperary CORPORATION

633 Seventeenth Street
Suite 1550
Denver, Colorado 80202

November 2, 1999

CERTIFIED MAIL

Mr. William C. Olson
New Mexico Oil Conservation Division
2040 South Pacheco
Santa Fe, NM 87505

RE: Request for Final Pit Closure
Vera #1
Sec 32E-T11N-R33E
Tatum Pit Closure Project
Lea County, NM

Dear Mr. Olson:

Please find enclosed additional data requested in your letter of August 6, 1999 which should allow you to complete your review of our request for final closure of the subject pit. The data included in the attached report is summarized below:

- Summary of pit closure including the OCD Pit Remediation Report, topographic base map, well site map with surveyed locations of pit and wells, water table elevations including a calculation of hydraulic gradient.
- Before and after photographs of pit closure.
- Pit closure protocol and procedures used.
- Results of all soil and water samples taken.
- Boring log of monitor well.
- Disposal manifests of all waste products.
- Vadsat modeling results.
- Liner material information.

We respectfully request final closure of the subject pit project. If you have any questions, please call me at (303) 293-9379.

Very truly yours,

Larry G. Sugano
Vice President - Engineering

cc: NMOCD Hobbs Office
Enclosures

Vera # 1
Closure Summary

Legal Description
State Lease K3985 - Unit "E"
T11S-R33E-Sec.32
1,980' FNL - 810' FWL

Pit Description
Vera # 1 is described as an unlined emergency upset pit that was used in conjunction with on-site separation and storage. The pit lies approximately 120 feet north of the separator within a raised berm approximately 2' in height. The actual pit dimensions were 50' X 50' x 3' in depth. The pit was covered in bird netting and surrounded by a four strand barbed wire fence.

There was a minor amount of free product within the pit consisting of heavily weathered asphaltic fractions however there is no evidence of surface staining surrounding the berm. There are no signs of stressed vegetation surrounding the pit.

Pit History
Vera # 1was logged on October 15, 1968 and completed shortly thereafter. Burro Pipeline was permitted in October of 1967 and was connected to the wellsite prior to 1970. All emergency discharges to the pit were discontinued prior to 1970.

Distance to Surface & Ground Waters
The attached plat map demonstrates that the pit is more than 1,000 ft. from a surface water body or private domestic water source. The vertical distance to ground water is 58' as determined on January 9, 1997. (See attached 7.5', hydro-geological plat maps and boring logs.)

Closure Standards
In accordance with the Oil Conservation Division *Unlined Surface Impoundment Closure Guidelines* (Feb. '93) the pit has a total ranking score of >19 and thus must be closed to a TPH concentration of less than 100 ppm.

Sampling Results

On January 10, 1997, Whole Earth supervised the coring of the pit and found hydrocarbon concentrations of less than 1,000 ppm TPH at a depth of between 10-15'. Due to the presence of free product within the pit, the coring was performed at the southeast corner, mid-way up the berm. (See attached field sampling report and plat map.) The field tests were conducted using EPA Method 418.1 (modified) in accordance with Whole Earth Quality Procedures QP-6 and QP-25 (enclosed).

Core samples obtained from the upper vadose zone of the aquifer revealed no detectable concentrations of volatile or semi-volatile compounds. (See attached Environmental Labs of Texas analytical reports.)

Closure Protocol

The pit was closed in accordance with the attached Protocol QP-42. Approximately 524 cubic yards of the most highly contaminated soil was excavated and transported to a licensed landfarm. The remaining contaminated soils were excavated to a total depth of approximately 15' below ground level and remediated by means of aeration and dilution with substrait materials immediately adjacent to the excavation. The side-walls and bottom of the excavation were sampled in accordance with WEQP-77 (enclosed) with the sampling witnessed by Mr. Wayne Price of the NMOCD Hobbs office.

A 20 mil liner was laid atop the excavation and filled with soils remediated to an average TPH and BTEX concentration of >10,000 ppm TPH and >10 ppm benzene concentration.

A monitor well was drilled at the southeast corner of the pit and initially sampled for RCRA 8 metals, volatile and semi-volatile compounds and BTEX. A split confirmation sample was collected by the NMOCD and submitted for independent review.

The pit was modeled by means of VADSAT and found to pose no calculated risk to the water table. Six subsequent quarterly BTEX samplings found no criteria contaminant concentration to be in excess of NMWQCC standards.

Pit Remediation and Closure Report

Operator: Tipperary Oil & Gas Corp Telephone: (303) 293-9379

Address: 633 Seventeenth St, Denver, CO 80202

Facility or Well Name: Vera # 1

Location: Unit or Qtr / Qtr Sec.: Sec E T T11S R 33E County Lea

Pit Type: Separator X Dehydrator _____ Other _____

Land Type: BLM X, State _____, Fee _____ Other _____

Pit Location: Pit Dimensions: length 50' width 50' depth 15'

Reference: wellhead _____ other (See Attached Plat Map

Footage from reference : _____

Direction from reference: _____ Degrees _____ East North _____

_____ West South _____

Depth to Ground Water:

Less than 50 feet (20 points)
50 feet to 99 feet (10 points)
Greater than 100 feet (0 points) 20

Wellhead Protection Area:

Yes (20 points)
No (0 points) 0

Distance to Surface Water:

Less than 200 feet (20 Points)
200 feet to 1000 feet (10 points)
Greater than 1000 feet (0 points) 0

Ranking Score (Total Points): 20

Date Remediation Started: 8-10-97 Date Completed: 8-20-97

Remediation Method: Excavation _____ Approx. cubic yards 1,388

Landfarmed X Insitu Bioremediation _____

Other _____

_____

Remediation Location: Onsite X Offsite _____

_____

General Description of Remedial Action: **(See Attached)**

Ground Water Encountered: No X Yes ____ Depth _____

Final Pit Closure Sampling: Sample Location (See attached)

_____

Sample Depth _____

Sample Date _____ Sample Time _____

Sample Results

Benzene (ppm) _____

Total BTEX (ppm) _____

Field Headspace (ppm) _____

TPH _____

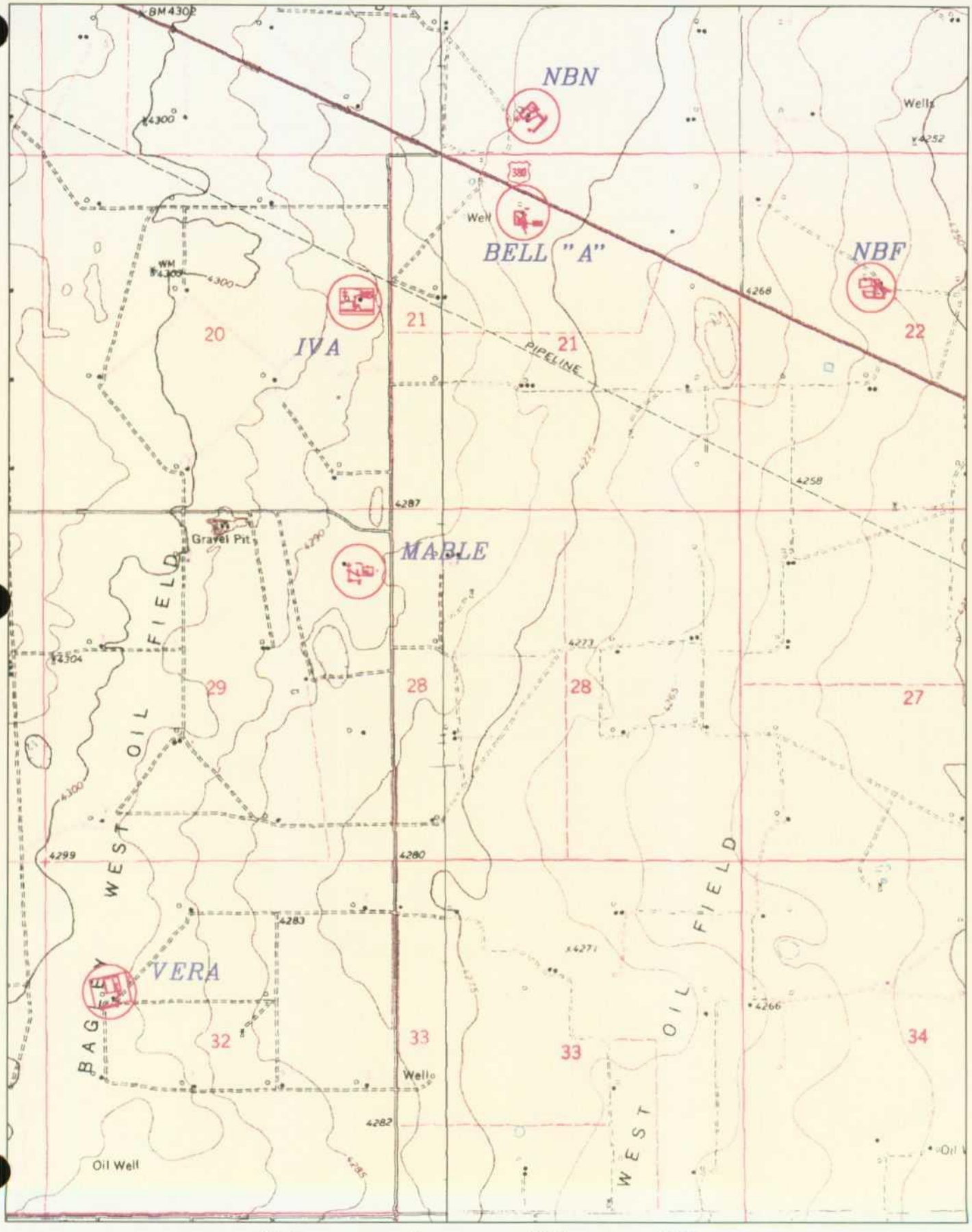
Ground Water Sample: Yes X No _____

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE OR BELIEF

Date 10/17/99 Printed Name _____

Signature _____ Title _____

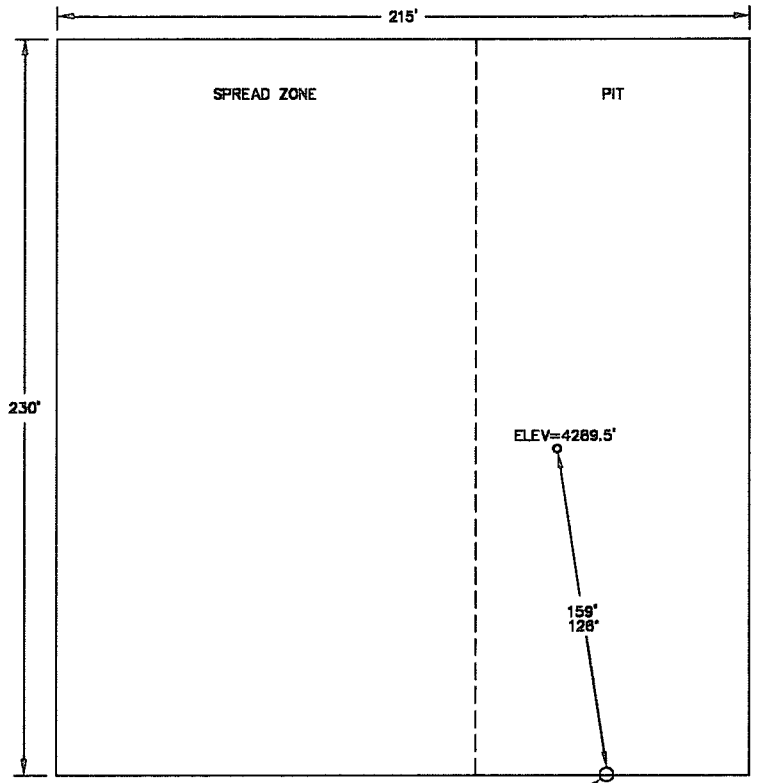
WHOLE EARTH ENVIROMENTAL, INC.



BASIN SURVEYS P.O. BOX 1786 – HOBBS, NEW MEXICO	W.O. Number: 9352	Drawn By: K. GOAD
	Date: 10-21-99	Disk: KJG #122 – WE9352.DWG

VERA

SCALE 1"=60'



HEATER

85'

PUMP JACK

195'

STORAGE TANK

Tipperary

Tipperary Corporation
Tatum Pit Closure Project
Monitor Well Water Elevation Table

Well Name	Monitor Well No.	Surface Elevation	Date Well Drilled	Water Depth @ Drill Date	Water Elevation	Water Depth @ 8/9/99	Water Elev. @ 8/9/99	Water Depth @ 10/21/99	Water Elev. @ 10/21/99	Depth Change Aug. / Oct. '99	Distance to Pit Center (ft)	Gradient (Ft. / Ft.)	Gradient (Ft. /100 Ft.)
Iva	Recovery Well	4,298.42	Aug-97	52.0	4,246.42								
	1	4,292.10	Aug-97	54.9	4,237.20	48.83	4,243.27	51.75	4,240.35	2.92	115	0.080174	8.02
	2	4,291.93	Aug-97	53.0	4,238.93	49.17	4,242.76	51.50	4,240.43	2.33	140	0.053500	5.35
Mable	Recovery Well	4,290.55	Aug-97	52.0	4,238.55								
	3	4,287.22	Aug-97	52.0	4,235.22	48.75	4,238.47	52.50	4,234.72	3.75	148	0.022500	2.25
	4	4,287.46	Aug-97	52.0	4,235.46	48.58	4,238.88	51.75	4,235.71	3.17	160	0.019313	1.93
Vera	Pit Center	4,292.98			4,289.50								
	5	4,298.90	Aug-97	63.0	4,235.90	61.50	4,237.40				159	-0.037233	-3.72
Bell	Pit Center	4,283.09			4,279.60								
	6	4,281.12	Aug-97	51.0	4,230.12	42.13	4,238.99	43.01	4,238.11	0.88	93	0.021183	2.12
	13	4,280.84	Oct-97	47.8	4,233.04	40.83	4,240.01	43.66	4,237.18	2.83	51	0.044118	4.41
	14	4,280.80	Oct-97	48.3	4,232.50	43.00	4,237.80	43.50	4,237.30	0.50	47	0.048723	4.87
	25	4,280.37	Mar-99	47.4	4,232.97	43.50	4,236.87	43.50	4,236.87	0.00	154	0.017662	1.77
NBN	Pit Center	4,282.45			4,282.45								
	7	4,281.59	Aug-97	50.0	4,231.59	43.50	4,238.09				107	0.008037	0.80
NBF	Pit Center	4,266.86			4,266.86								
	8	4,259.41	Aug-97	48.0	4,211.41	35.75	4,223.66	35.75	4,223.66	0.00	165	0.045152	4.52
	15	4,259.68	Oct-97	47.0	4,212.68	34.75	4,224.93	37.00	4,222.68	2.25	198	0.036263	3.63
	16	4,259.06	Oct-97	47.1	4,211.96	36.00	4,223.06	36.10	4,222.96	0.10	247	0.031579	3.16
	26	4,258.04	Mar-99	43.0	4,215.04	34.75	4,223.29	34.60	4,223.44	-0.15	387	0.022791	2.28
Sohio # 1	Pit Center	4,285.42			4,285.42								
	10	4,283.63	Aug-97	50.0	4,233.63	44.50	4,239.13	44.90	4,238.73	0.40	110	0.016273	1.63
	17	4,283.31	Oct-97	49.4	4,233.91	44.00	4,239.31	44.50	4,238.81	0.50	262	0.008053	0.81
	18	4,283.59	Oct-97	48.6	4,234.99	43.75	4,239.84	44.10	4,239.49	0.35	176	0.010398	1.04
	28	4,283.21	Mar-99	46.3	4,236.96	35.00	4,248.21	44.15	4,239.06	9.15	552	0.004004	0.40
	30	4,281.13	Aug-99	45.3	4,235.82	45.31	4,235.82	44.10	4,237.03	-1.21	776	0.005528	0.55
Sohio "A"	Pit Center	4,286.84			4,286.84								
	11	4,285.88	Aug-97	50.0	4,235.88	38.25	4,247.63	38.50	4,247.38	0.25	115	0.008348	0.83
	19	4,285.97	Sep-97	48.7	4,237.27	32.50	4,253.47	35.15	4,250.82	2.65	164	0.005305	0.53
	20	4,285.96	Sep-97	49.5	4,236.46	38.00	4,247.96	38.66	4,247.30	0.66	151	0.005828	0.58
	27	4,285.61	Mar-99	40.0	4,245.61	36.83	4,248.78	38.20	4,247.41	1.37	264	0.004659	0.47
	31	4,283.54	Aug-99	37.5	4,246.09	37.45	4,246.09	38.90	4,244.64	1.45	624	0.005288	0.53
G.S. State	Source Well	4,307.00	Sep-97	48.0	4,259.00								
	12	4,303.27	Aug-97	48.0	4,255.27	42.75	4,260.52	42.90	4,260.37	0.15	52	0.071731	7.17
	21	4,303.08	Oct-97	48.0	4,255.08	43.25	4,259.83	43.66	4,259.42	0.41	151	0.025960	2.60
	22	4,302.77	Oct-97	47.5	4,255.27	43.50	4,259.27	43.90	4,258.87	0.40	148	0.025203	2.52
	29	4,303.20	Mar-99	49.1	4,254.14	44.00	4,259.20	44.25	4,258.95	0.25	295	0.016475	1.65
Sat. # 4	Pit Center	4,211.49			4,208.00								
	9	4,208.66	Aug-97	31.0	4,177.66	26.17	4,182.49	26.75	4,181.91	0.58	80	0.035375	3.54
	23	4,209.03	Oct-97	28.0	4,181.03	26.25	4,182.78	27.15	4,181.88	0.90	158	0.015570	1.56
	24	4,208.64	Oct-97	28.9	4,179.74	26.08	4,182.56	26.45	4,182.19	0.37	150	0.019000	1.90

Note: Vera, Bell and Satellite 4 had significant subsidance within the pit area.
The red elevations include an added 3.49' (Ave. of seven other sites)
Correct elevations noted in column 6.

COORDINATE FILE : TIPARARY.CRD

LIST COORDINATES

	PT#	NORTH	EAST	ELEV
SOHIO A STATE 1 PIT	253	870084.293	760084.206	4286.84
SOHIO A STATE 1 MW11	254	869981.125	760134.902	4285.88
SOHIO A STATE 1 MW19	255	869974.033	760205.397	4285.97
SOHIO A STATE 1 MW28	256	869892.771	760255.240	4285.61
SOHIO A STATE 1 MW31	257	869667.200	760452.460	4283.54
SOHIO STATE 1 PIT	258	870105.632	761381.498	4285.42
SOHIO STATE 1 MW10	259	870027.049	761459.334	4283.63
SOHIO STATE 1 MW17	260	869969.168	761443.837	4283.31
SOHIO STATE 1 MW18	261	870017.865	761533.683	4283.59
SOHIO STATE 1 MW28	262	869892.594	761534.416	4283.21
SOHIO STATE 1 MW30	263	869677.360	761728.469	4281.13
VERA 1 PIT	264	846366.089	752525.766	4289.49
VERA #1 MW5	265	846217.026	752582.067	4298.90
STATE NBF 1 PIT	266	856893.939	764024.682	4266.86
STATE NBF 1 MW8	267	856806.388	764165.403	4259.41
STATE NBF 1 MW15	268	856747.667	764157.788	4259.68
STATE NBF 1 MW16	269	856774.041	764241.604	4259.06
STATE NBF 1 MW26	270	856658.728	764331.675	4258.04
BELL A 1 PIT	271	857796.692	758625.535	4279.64
BELL A 1 MW6	272	857857.556	758583.503	4281.12
BELL A 1 MW13	273	857754.617	758597.054	4280.84
BELL A 1 MW14	274	857821.944	758664.690	4280.80
BELL A 1 MW25	275	857614.080	758714.518	4280.37
GS STATE 1 SOURCE	276	867037.530	755087.975	4307.00
GS STATE 1 MW21	277	866953.249	755213.712	4303.08
GS STATE 1 MW22	278	866905.186	755154.733	4302.77
GS STATE 1 MW29	279	866798.038	755260.271	4303.20
GS STATE 1 MW?	280	867001.862	755131.639	4303.27
MABEL COM 1 SOURCE	281	852659.555	756329.277	4290.55
MABEL COM 1 MW3	282	852517.536	756370.356	4287.22
MABEL COM 1 MW4	283	852592.288	756473.774	4287.46
STATE NBN 1 PIT	284	859499.318	758793.854	4282.45
STATE NBN 1 MW7	285	859397.517	758825.203	4281.59
SATELLITE 4 MW9	286	866587.512	775890.421	4208.66
SATELLITE 4 MW23	287	866507.846	775901.105	4209.03
SATELLITE 4 MW24	288	866562.481	775964.699	4208.64
IVA COM 1 SOURCE	289	856721.216	756252.189	4298.42
IVA COM 1 MW1	290	856654.035	756344.507	4292.10
IVA COM 1 MW2	291	856695.146	756388.036	4291.93

HORIZONTAL DATUM NAD 83
VERTICAL DATUM NAVD 88

Photographs

This section contains the following photographs:

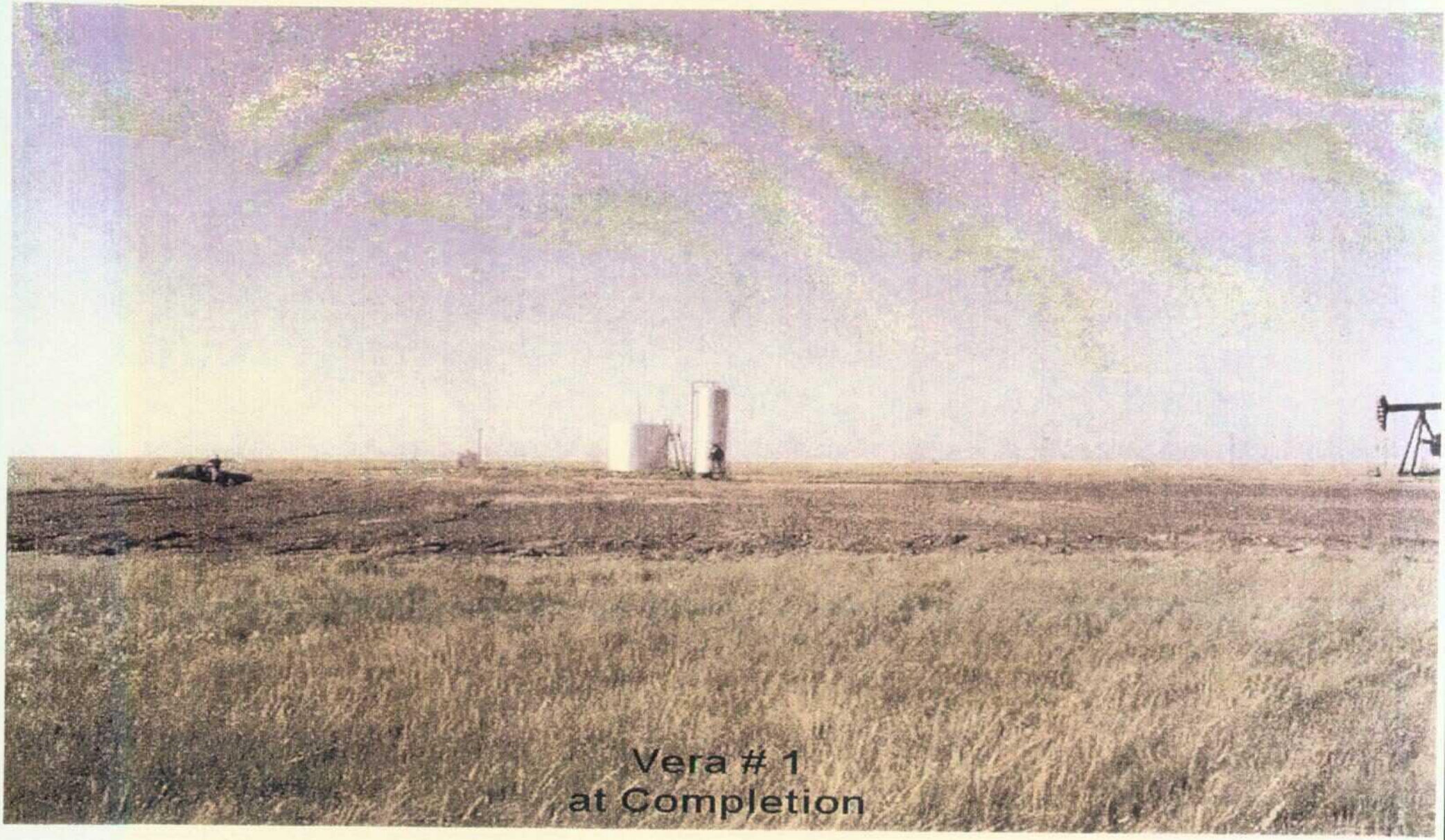
1. The site prior to excavation
2. The pit at the point of maximum excavation
3. Detail photographs of the liner installation
4. The site after final closure and contouring

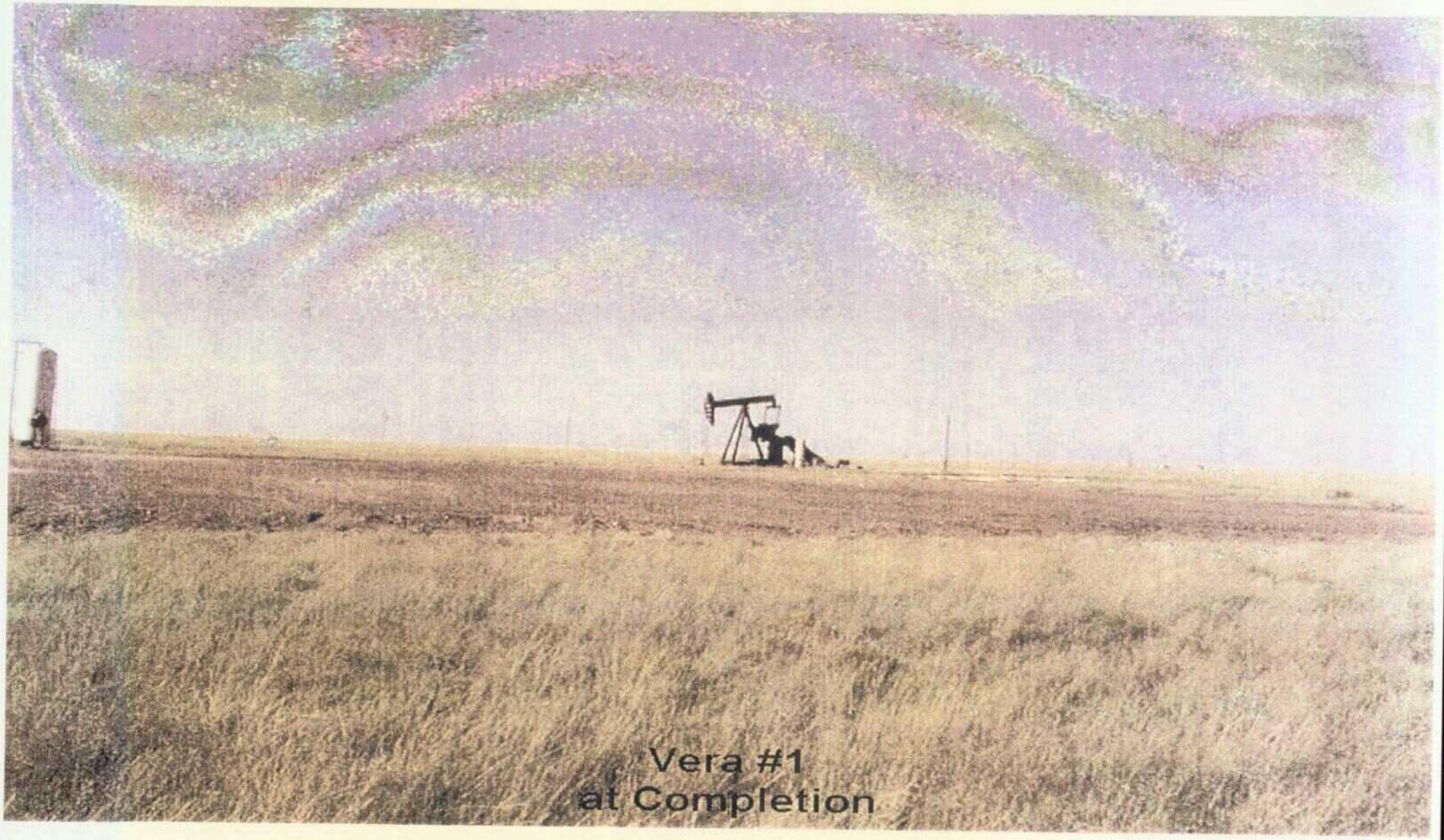

Vera # 1


Vera #1 at
Maximum Excavation


Vera #1 at
Maximum Excavation


Vera #1
Liner Detail


Vera # 1
at Completion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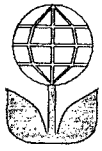
at Completion



Protocol

This section contains the approved remediation protocol that was used at this site.

Pit Remediation Protocol
Pits Requiring Modeling

1.0 Purpose

This protocol is to provide a detailed outline of the steps to be employed in the remediation and final closure for pits requiring risk assessment modeling.

2.0 Scope

This protocol is not site specific.

3.0 Preliminary

Prior to any field operations, Whole Earth Environmental shall conduct the following activities:

3.1 Client Review

3.1.1 Whole Earth shall meet with cognizant personnel within Client to review this protocol and make any requested modifications or alterations prior to submittal to the State of New Mexico Oil Conservation Division.

3.1.2 Changes to this protocol will be documented and submitted for final review by Client prior to submittal to the Oil Conservation Division.

3.2 Oil Conservation Division Review

3.2.1 Upon client approval, this protocol and associated modeling results will be submitted to the New Mexico Oil Conservation Division for review and comment. Recommended changes will be reviewed by the client prior to implementation.

3.2.2 Any recommended changes effecting costs will require a revised quotation to be issued to the client for approval prior to the commencement of any on-site remediation activity.

4.0 Safety

4.1 Prior to work on the site, Whole Earth shall obtain the location and phone numbers of the nearest emergency medical treatment facility. We will review all safety related issues with the appropriate Client personnel, sub-contractors and exchange phone numbers.

4.2 A tailgate safety meeting shall be held and documented each day. All sub-contractors must attend and sign the daily log-in sheet.

4.3 Anyone allowed on to location must be wearing sleeved shirts, steel-toed boots, and long pants. Each vehicle must be equipped with two-way communication capabilities.

4.4 Prior to any excavation, the area shall be surveyed with a line finder. If lines are discovered within the area to be excavated, they shall be marked with pin flags on either side of the line at maximum five-foot intervals.

5.0 Fluid Removal

Prior to any excavation, the pit fluids shall be removed by vacuum truck and transported to a licensed disposal facility. A shipping manifest and O.C.D. Form C-117-A shall be prepared for each load and included within the final closure report.

6.0 Excavation & Remediation

6.1 The site shall be excavated to a minimum depth of 10'. All excavated materials will be deposited immediately adjacent to the pit site.

6.2 The bottom of the pit and all four side walls will be tested for TPH and BTEX concentrations using WEQP-06 and WEQP-19. Excavation will continue until such concentrations are <10,000 ppm TPH, <10 ppm benzene and <50 ppm total BTEX.

6.3 Upon reaching the required depth and side wall dimensions, the bottom of the pit will be made as smooth as possible with excavation equipment. Sand will be deposited in the bottom of the pit in a minimum thickness of 6".

6.4 A polyethylene liner of a minimum thickness of 20 mils will be spread atop the sand to the pit edge and an additional 6" of sand deposited above it.

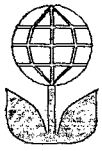
6.5 The excavated materials will be mixed and blended with additional topsoils obtained from the area immediately adjacent to the pit until the hydrocarbon concentrations fall below the maximum limits as described in Paragraph 6.2 of this protocol. The remediated materials will then be replaced into the excavated area, compacted and the surface contoured to provide for positive drainage.

6.6 The top two feet of the excavation shall be covered in remediated materials having a maximum TPH concentration of <100 ppm and benzene concentrations of <2 ppm.

7.0 Documentation & Reporting

7.1 At the conclusion of the pit remediation project, Whole Earth will prepare a closure report to include the following information:

- A plat map of the location showing the exact location of the pit, the dimensions prior to excavation and the actual excavated dimensions.
- Photographs of the pit prior to excavation, at the point of maximum excavation and after final closure
- Field Sampling Report to include the side wall and pit bottom TPH and BTEX concentrations after excavation.
- Field Sampling Report to include TPH and BTEX concentrations of all remediated materials deposited into the pit.
- Daily calibration records of each testing instrument
- Shipping manifests and OCD Form C-117-A
- Risk assessment model and supporting documentation
- M.S.D.S. and permeability certification of liner materials



Procedures

This section contains the copies of the detailed sample collection, testing, instrument calibration and bailing procedures employed on this project.

QP-06 Rev. C

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Conducting Field TPH Analysis

Completed By:	Approved By:	Effective Date: 02/15/97

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/desiccant 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 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.

4.1 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.

4.2 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 1cm. 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.

5.0 Split Samples

5.1 Each tenth test sample shall be a split sample. Decant approximately one half of the extraction solvent through a filter cartridge and insert into the instrument to obtain a concentration reading. Clean and rinse the cuvette and decant the remainder of the fluid to obtain a second concentration reading from the same sample. If the second reading varies by more than 1% from the original, it will be necessary to completely recalibrate the instrument.

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.

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 any 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 Re-calibration

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-28

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Developing Cased Water Monitoring Wells

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure outlines the methods to be employed to develop cased monitoring wells.

2.0 Scope

This procedure shall be used for developed, cased water monitoring wells. It is not to be used for standing water samples such as ponds or streams.

3.0 Preliminary

3.1 Prior to development, the static water level and height of the water column within the well casing will be measured with the use of an electric D.C. probe or a steel engineer's tape and water sensitive paste.

3.2 All measurements will be recorded within a field log notebook and subsequently reported within the driller's boring log report.

3.3 All equipment used to measure the static water level will be decontaminated after each use by means of Alconox, a phosphate free laboratory detergent, and water to reduce the possibility of cross-contamination. The volume of water in each well casing will be calculated.

4.0 Purging

4.1 Wells will be purged by removing a minimum of three well casing volumes by using a 2" decontaminated submersible pump or dedicated one liter Teflon bailer.

4.2 If a submersible is used the pump will be decontaminated prior to use by scrubbing the outside surface of tubing and wiring with an Alconox-water mixture, pumping an Alconox-water mixture through the pump, and a final flush with fresh water.

5.0 Water Disposal

5.1 All purge and decontamination water will be temporarily stored within a 60 gallon portable tank and then pumped into a permanent storage tank to be later disposed of in an appropriate manner.

QP-76 (Rev. A)

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Obtaining Water Samples (Cased Wells) Using One Liter Bailer

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure outlines the methods to be employed in obtaining water samples from cased monitoring wells.

2.0 Scope

This procedure shall be used for developed, cased water monitoring wells. It is not to be used for standing water samples such as ponds or streams.

3.0 Preliminary

3.1 Obtain sterile sampling containers from the testing laboratory designated to conduct analyses of the water. The shipment should include a Certificate of Compliance from the manufacturer of the collection bottle or vial and a Serial Number for the lot of containers. Retain this Certificate for future documentation purposes.

3.2 The following table shall be used to select the appropriate sampling container, preservative method and holding times for the various elements and compounds to be analyzed.

Compound to be Analyzed	Sample Container Size	Sample Container Description	Cap Requirements	Preservative	Maximum Hold Time
BTEX	40 ml.	VOA Container	Teflon Lined	HCl	7 days
TPH	1 liter	clear glass	Teflon Lined	HCl	28 days
PAH	1 liter	clear glass	Teflon Lined	Ice	7 days
Cation / Anion	1 liter	clear glass	Teflon Lined	None	48 Hrs.
Metals	1 liter	HD polyethylene	Any Plastic	Ice / HNO_3	28 Days
TDS	300 ml.	clear glass	Any Plastic	Ice	7 Days

4.0 Chain of Custody

4.1 Prepare a Sample Plan. The plan will list the well identification and the individual tests to be performed at that location. The sampler will check the list against the available inventory of appropriate sample collection bottles to insure against shortage.

4.2 Transfer the data to the Laboratory Chain of Custody Form. Complete all sections of the form except those that relate to the time of delivery of the samples to the laboratory.

4.3 Pre-label the sample collection jars. Include all requested information except time of collection. (Use a fine point Sharpie to insure that the ink remains on the label). Affix the labels to the jars.

5.0 Bailing Procedure

5.1 Identify the well from the site schematics. Place pre-labeled jar(s) next to the well. Remove the bolts from the well cover and place the cover with the bolts nearby. Remove the plastic cap from the well bore by first lifting the metal lever and then unscrewing the entire assembly.

5.2 The well may be equipped with an individual 1 liter bailing tube. If so, use the tube to bail a volume of water from the well bore equal to 10 liters for each 5' of well bore in the water table. (This assumes a 2" dia. Well bore).

5.3 Take care to insure that the bailing device and string do not become cross-contaminated. A clean pair of rubber gloves should be used when handling either the retrieval string or bailer. The retrieval string should not be allowed to come into contact with the ground.

6.0 Sampling Procedure

6.1 Once the well has been bailed in accordance with 5.2 of this procedure, a sample may be decanted into the appropriate sample collection jar directly from the bailer. The collection jar should be filled to the brim. Once the jar is sealed, turn the jar over to detect any bubbles that may be present. Add additional water to remove all bubbles from the sample container.

6.2 Note the time of collection on the sample collection jar with a fine Sharpie.

6.3 Place the sample directly on ice for transport to the laboratory. The preceding table shows the maximum hold times between collection and testing for the various analyses.

6.4 Complete the Chain of Custody form to include the collection times for each sample. Deliver all samples to the laboratory.

7.0 Documentation

7.1 The testing laboratory shall provide the following minimum information:

A. Client, Project and sample name.
B. Signed copy of the original Chain of Custody Form including data on the time the sample was received by the lab.
C. Results of the requested analyses
D. Test Methods employed
E. Quality Control methods and results

QP-77

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Obtaining Soil Samples for Transportation to a Laboratory

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure outlines the methods to be employed when obtaining soil samples to be taken to a laboratory for analysis.

2.0 Scope

This procedure shall be used for developed, cased water monitoring wells. It is not to be used for standing water samples such as ponds or streams.

3.0 Preliminary

3.1 Obtain sterile sampling containers from the testing laboratory designated to conduct analyses of the soil. The shipment should include a Certificate of Compliance from the manufacturer of the collection bottle or vial and a Serial Number for the lot of containers. Retain this Certificate for future documentation purposes.

3.2 If collecting TPH, BTEX, RCRA 8 metals, cation / anions or O&G, the sample jar may be a clear 4 oz. container with Teflon lid. If collecting PAH's, use an amber 4 oz. container with Teflon lid.

4.0 Chain of Custody

4.1 Prepare a Sample Plan. The plan will list the number, location and designation of each planned sample and the individual tests to be performed on the sample. The sampler will check the list against the available inventory of appropriate sample collection bottles to insure against shortage.

4.2 Transfer the data to the Laboratory Chain of Custody Form. Complete all sections of the form except those that relate to the time of delivery of the samples to the laboratory.

4.3 Pre-label the sample collection jars. Include all requested information except time of collection. (Use a fine point Sharpie to insure that the ink remains on the label). Affix the labels to the jars.

5.0 Sampling Procedure

5.1 Go to the sampling point with the sample container. If not analyzing for ions or metals, use a trowel to obtain the soil. Do not touch the soil with your bare hands. Use new latex gloves with each sample to help minimize any cross-contamination.

5.2 Pack the soil tightly into the container leaving the top slightly domed. Screw the lid down tightly. Enter the time of collection onto the sample collection jar label.

5.3 Place the sample directly on ice for transport to the laboratory.

5.4 Complete the Chain of Custody form to include the collection times for each sample. Deliver all samples to the laboratory.

6.0 Documentation

6.1 The testing laboratory shall provide the following minimum information:

A. Client, Project and sample name.
B. Signed copy of the original Chain of Custody Form including data on the time the sample was received by the lab.
C. Results of the requested analyses
D. Test Methods employed
E. Quality Control methods and results

Laboratory Analytical Reports

This section contains the following laboratory analytical results and associated chains of custody:

1. Side wall and bottom hole TPH and BTEX results (ELT Nos. 12256-12260) sampled 8/20/97.

2. Composite composite analysis of final top cover material (ELT No. 12423) sampled 8/29/97.

3. Volatile and semi-volatile compound analysis of monitor well (ELT No. 9910) sampled 1/9/97.

4. Quarterly BTEX sampling results of monitor well (ELT Nos. 12487, 13184, 14061, 14660, 15992, 16599) sampled 9/5/97, 12/3/97, 2/23/97, 6/25/98, 10/1/98 and1/6/99 respectively.

5. Analysis of RCRA 8 metals from the monitoring well (ELT No. 12487) sampled 9/6/97.

6. OCD run confirmation BTEX analysis of monitor well (AEN No. 9709051649) sampled 9/5/97.

7. Spreadsheet summary of BTEX analyses conducted at Vera Monitoring Well # 5.

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 1-281-646-8996

Receiving Date: 08/21/97
Sample Type: SOIL
Project : TIPPERARY
Project Location: NONE GIVEN

Analysis Date: BTEX 08/21/97
Analysis Date: DRO 08/22/97
Sampling Date: 08/20/97
Sample Condition: Intact/Iced

ELT#	FIELD CODE	BENZENE mg/kg	TOLUENE mg/kg	ETHYLBENZENE mg/kg	m,p-XYLENE mg/kg	o-XYLENE mg/kg	DRO (C10-C28) mg/kg
12249	NBF BOTM	<.100	<.100	<.100	0.390	0.247	3,547
12250	MABLE EAST (RE-TEST)	<.100	1.657	0.444	3.185	3.531	7,398
12251	BELL NORTH	<.100	0.841	0.376	1.917	2.475	5,746
12252	BELL SOUTH	<.100	<.100	<.100	0.18	<.100	<10
12253	BELL EAST	<.100	<.100	<.100	<.100	<.100	163
12254	BELL WEST	<.100	<.100	<.100	<.100	<.100	147
12255	BELL BOTTOM	<.100	0.186	<.100	0.250	0.391	3,951
12256	VERA NORTH	<.100	<.100	<.100	<.100	<.100	122
12257	VERA SOUTH	<.100	<.100	<.100	0.200	0.279	10
12258	VERA EAST	<.100	<.100	<.100	<.100	<.100	2,302
12259	VERA WEST	<.100	<.100	<.100	<.100	<.100	571
12260	VERA BOTTOM	<.100	<.100	<.100	<.100	<.100	89
	% IA	93	88	89	86	88	108
	% EA	111	104	100	96	100	100
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001	<10

METHODS: SW 846-8020,5030,8015m DRO

Michael R. Fowler
Michael R. Fowler

10-27-97
Date

Environmental Lab of Texas, Inc.

12600 West I-20 Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Mike Griffin

Phone #:

FAX #:

Company Name & Address: Whole Earth Environmental

Project #:

Project Name: Tipperary

Project Location:

Sampler Signature:

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	BTEX 8021B/5030	TPH 418.1 8015M DRO	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
12250	Mable	1	402		✓						✓			8-20	1058	✓	✓						
12251	Bell North	1													1340	✓	✓						
12252	South	1													1346	✓	✓						
12253	East	1													1346	✓	✓						
12254	West	1													1346	✓	✓						
12255	↓ Bottom	1													1346	✓	✓						
12256	Vera North	1													1123	✓	✓						
12257	South	1													1120	✓	✓						
12258	East	1													1118	✓	✓						
12259	West	1													1119	✓	✓						
12260	Bottom	1	↓												1116	✓	✓						

Relinquished by:	Date:	Time:	Received by:
	8-21-97	0800	Rahn de Jacob
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 1-281-646-8996

Receiving Date: 09/01/97
Sample Type: SOIL
Project: TIPPERARY
Project Location: TATUM,N.M.

Analysis Date: 09/02/97
Sampling Date: 08/29/97
Sample Condition: Intact/Iced

ELT#	FIELD CODE	BENZENE mg/kg	TOLUENE mg/kg	ETHYLBENZENE mg/kg	m,p-XYLENE mg/kg	o-XYLENE mg/kg	DRO (C10-C28) mg/kg
12421	IVA FINAL	<.100	<.100	<.100	0.105	<.100	<10
12422	MABLE FINAL	<.100	0.165	0.129	0.255	<.100	11
12423	VERA FINAL	<.100	0.126	<.100	0.192	<.100	10
12424	BELL FINAL	<.100	<.100	<.100	<.100	<.100	24
12425	NBN FINAL	<.100	<.100	<.100	<.100	<.100	103
12426	NBF FINAL	<.100	<.100	<.100	<.100	<.100	<10
12427	SOHIO A FINAL	0.186	0.312	0.232	0.737	0.580	6,702
12428	SOHIO 1 FINAL	<.100	0.373	0.142	0.463	0.342	15,016
12429	G.S. FINAL	<.100	<.100	<.100	<.100	<.100	15
12430	SAT. 4 FINAL	*	*	*	*	*	*
12431	G.S. BOTTOM (RE TEST)	<.100	<.100	<.100	0.217	0.166	2,963
	% IA	98	95	96	95	99	107
	% EA	93	85	81	78	80	93
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001	<10

* NOTE SAMPLE CONTAINER WAS EMPTY.

METHODS: SW 846-8020,5030,8015m DRO

Michael R. Fowler

10-27-97
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: M. Gallegos
Phone #:
FAX #:
Company Name & Address: Tipperary
Project #:
Project Name: Tatum P.t closure
Project Location: Tatum, N.M
Sampler Signature: M. Gallegos

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	ANALYSES REQUEST: BTEX 8020/5030	TPH 418.1 8015	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
12421	Pva Final				X						X			8-29		X	X						
12422	Mable "				X						X			"		X	X						
12423	Vera "				X						X			"		X	X						
12424	Bell "				X						X			"		X	X						
12425	NBN "				X						X			"		X	X						
12426	NBE "				X						X			"		X	X						
12427	Sabine A "				X						X			"		X	X						
12428	Sabine I "				X						X			"		X	X						
12429	GS "				X						X			"		X	X						
12430	Sat. 4 "				X						X			"		X	X						
12431	GS Bottom (Retest)				X						X			"		X	X						

Relinquished by:	Date:	Time:	Received by:
M. Gallegos	8:30	6:11 A.M.	
Relinquished by:	Date: 9-1-97	Time: 0930	Received by: Rebecca Patel
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS: Sat. 4 - Sample Container Empty

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 800-854-4358

Receiving Date: 01/10/97
Reporting Date: 01/23/97
Project Name: TATUM PIT SAMPLING
Project Location: WEST OF TATUM, NM
Field Code: VERA #1

Analysis Date: 01/22/97
Sampling Date: 01/09/97
Sample Type: SOIL
Sample Condition: C&I

Volatiles EPA SW 846-8240, (ppm) Compounds	ELT# 9910	PQL	% IA	Method Blank	% EA
Chloromethane	ND	0.1	110	ND	
Vinyl chloride	ND	0.1	101	ND	
Bromomethane	ND	0.1	100	ND	
Chloroethane	ND	0.1	105	ND	
Trichlorofluoromethane	ND	0.1	102	ND	
Acetone	ND	0.1	100	ND	
1,1-Dichloroethane	ND	0.1	95	ND	69
Iodomethane	ND	1.0	92	ND	
Vinyl Acetate	ND	1.0	107	ND	
Carbon Disulfide	ND	0.1	100	ND	
Methylene Chloride	ND	0.1	110	ND	
trans-1,2-Dichloroethene	ND	0.1	98	ND	
1,1-Dichloroethane	ND	0.1	102	ND	
2-Butanone	3.651	1.0	108	ND	
Chloroform	ND	0.1	106	ND	
1,1,1-Trichloroethane	ND	0.1	91	ND	
Carbon Tetrachloride	ND	0.1	94	ND	
Benzene	ND	0.1	96	ND	110
1,2 Dichloroethane	ND	0.1	97	ND	
Trichloroethene	ND	0.1	83	ND	108
1,2-Dichloropropane	ND	0.1	95	ND	
Dibromomethane	ND	0.1	115	ND	
Bromochloromethane	ND	0.1	124	ND	
2-Chloroethyl Vinyl ether	ND	1.0	123	ND	
4-Methyl 2-Pentanone	ND	1.0	120	ND	
cis 1,3 Dichloropropene	ND	0.1	105	ND	
Toluene	ND	0.1	96	ND	119
trans 1,3-Dichloropropene	ND	0.1	89	ND	
1,1,2-Trichloroethane	ND	0.1	98	ND	
Dibromochloromethane	ND	0.1	105	ND	
Tetrachloroethene	ND	0.1	107	ND	
Chlorobenzene	ND	0.1	98	ND	107

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 800-854-4358

Receiving Date: 01/10/97
Reporting Date: 01/23/97
Project Name: TATUM PIT SAMPLING
Project Location: WEST OF TATUM, NM
Field Code: VERA #1

Analysis Date: 01/22/97
Sampling Date: 01/09/97
Sample Type: SOIL
Sample Condition: C&I

Volatiles EPA SW 846-8240, (ppm) Compounds	ELT# 9910	PQL	% IA	Method Blank	% EA
Ethylbenzene	ND	0.1	89	ND	
m&p Xylene	ND	0.1	87	ND	
o-Xylene	ND	0.1	90	ND	
Styrene	ND	0.1	95	ND	
Bromoform	ND	0.1	113	ND	
1,1,2,2-Tetrachloroethane	ND	0.1	87	ND	
1,2,3-Trichloropropane	ND	0.1	108	ND	

SYSTEM MONITORING COMPOUNDS	% RECOVERY
Dibromofluoromethane	96
Toluene-d8	100
4-Bromofluorobenzene	65

ND=<PQL

Michael R. Fowler

Michael R. Fowler

1-27-97

Date

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 800-854-4358

Receiving Date: 01/10/97
Sample Type: SOIL
Project : TATUM PIT SAMPLING
Project Location: WEST OF TATUM, NM
Field Code: VERA #1
ELT# 9910

Analysis Date: 01/19/97
Sampling Date: 01/09/97
Sample Condition: Intact/Iced

8270 COMPOUNDS	REPORTING LIMIT	SAMPLE Concentration ppm	QC	RPD	% EA	% IA
N-Nitrosodimethylamine	0.01	ND				
2-Picoline	0.01	ND				
Methyl methanesulfonate	0.01	ND				
Ethyl methanesulfonate	0.01	ND				
Phenol	0.01	ND	91	11	84	95
Aniline	0.05	ND				
bis(2-Chloroethyl)ether	0.05	ND				
2-Chlorophenol	0.05	ND		8	74	
1,3-Dichlorobenzene	0.01	ND				
1,4-Dichlorobenzene	0.01	ND	94	10	73	93
Benzyl alchohol	0.05	ND				
1,2-Dichlorobenzene	0.01	ND				
2-Methylphenol	0.01	ND				
bis(2-Chloroisopropyl)ether	0.05	ND				
4-Methylphenol/3-Methylphenol	0.01	ND				
Acetophenone	0.05	ND				
n-Nitrosodi-n-propylamine	0.01	ND		5	79	
Hexachloroethane	0.01	ND				
Nitrobenzene	0.01	ND				
N-Nitrosopiperidine	0.05	ND				
Isophorone	0.05	ND				
2-Nitrophenol	0.05	ND	93			94
2,4-Dimethylphenol	0.05	ND				
bis(2-Chloroethoxy)methane	0.01	ND				
Benzoic acid	0.1	ND				
2,4-Dichlorophenol	0.05	ND	87			96
1,2,4-Trichlorobenzene	0.01	ND		9	79	
a,a Dimethylphenethylamine	0.1	ND				
Naphthalene	0.01	ND				
4-Chloroaniline	0.05	ND				
2,6-Dichlorophenol	0.05	ND				
Hexachlorobutadiene	0.01	ND	95			97
N-Nitroso-di-n-butylamine	0.05	ND				
4-Chloro-3-methylphenol	0.05	ND	97	12	81	93

ELT# 9910

SAMPLE

8270 COMPOUNDS	Reporting Limits	Concentration ppm	QC	RPD	%EA	%IA
2-Methylnaphthalene	0.01	ND				
1,2,4,5-Tetrachlorobenzene	0.01	ND				
Hexachlorocyclopentadiene	0.01	ND				
2,4,6-Trichlorophenol	0.05	ND	86			94
2,4,5-Trichlorophenol	0.05	ND				
2-Chloronaphthalene	0.01	ND				
1,-Chloronaphthalene	0.01	ND				
2-Nitroaniline	0.05	ND				
Dimethylphthalate	0.01	ND				
Acenaphthylene	0.01	ND				
2,6-Dinitrotoluene	0.01	ND				
3-Nitroaniline	0.05	ND				
Acenaphthene	0.01	ND	97	3	81	92
2,4-Dinitrophenol	0.05	ND				
Dibenzofuran	0.05	ND				
Pentachlorobenzene	0.01	ND				
4-Nitrophenol	0.05	ND		4	80	
1-Napthylamine	0.05	ND				
2,4-Dinitrotoluene	0.01	ND		6	79	
2-Napthylamine	0.05	ND				
2,3,4,6-Tetrachlorophenol	0.05	ND				
Fluorene	0.01	ND				
Diethylphthalate	0.01	ND				
4-Chlorophenyl-phenylether	0.01	ND				
4-Nitroaniline	0.05	ND				
4,6-Dinitro-2-methylphenol	0.01	ND				
n-Nitrosodipenlamine & Diphenylam	0.01	ND	93			90
Diphenylhydrazine	0.05	ND				
4-Bromophenyl-phenylether	0.01	ND				
Phenacetin	0.05	ND				
Hexachlorobenzene	0.01	ND				
4-Aminobiphenyl	0.05	ND				
Pentachlorophenol	0.05	ND	89	6	79	95
Pentachloronitrobenzene	0.05	ND				
Pronamide	0.01	ND				
Phenanthrene	0.01	ND				
Anthracene	0.01	ND				
Di-n-butylphthalate	0.01	ND				
Fluoranthene	0.01	ND	92			95
Benzidine	0.1	ND				
Pyrene	0.01	ND		6	88	
p-Dimethylaminoazobenzene	0.01	ND				
Butylbenzylphthalate	0.01	ND				

ELT# 9910

SAMPLE

8270 COMPOUNDS	Reporting Limits	Concentration ppm	QC	RPD	%EA	%IA
Di-n- octlphthalate	0.01	ND	89			92
Benzo[b]fluoranthene	0.01	ND				
7,12-Dimethylbenz(a)anthracene	0.01	ND				
Benzo[k]fluoranthene	0.01	ND				
Benzo [a] pyrene	0.01	ND	96			91
3-Methylcholanthrene	0.01	ND				
Dibenzo (a,j) acridine	0.01	ND				
Indeno [1,2,3-cd] pyrene	0.01	ND				
Dibenz [a,h] anthracene	0.01	ND				
Benzo [g,h,i] perylene	0.01	ND				

METHOD: EPA SW 846-8270, 3551

SURROGATES	% RECOVERY
2-Fluorophenol SURR	87
Phenol-d6 SURR	79
Nitrobenzene-d5 SURR	92
2-Fluorobiphenyl SURR	96
2,4,6-Tribromophenol SURR	82
Terphenyl-d14 SURR	91

Michael R. Fowler

Michael R. Fowler

1-27-97

Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Whole Earth Environ

Phone #: (800) 850-4345

FAX #:

Company Name & Address: 1760's Sam Gibbs Houston, Tx 77055

Project #:

Project Name: Tatum N.E. Sampling

Project Location: West of Tatum, N. Mex.

Sampler Signature:

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX 8020/5030	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI	Chlorides
9907	GC State #1				✓						✓			1-10	9:00a	✓	✓				✓		✓
9908	State NBF #1				✓						✓			1-9	7:00p	✓	✓				✓		✓
9909	Jones #1				✓						✓			1-9	5:00a	✓	✓				✓		✓
9910	Vera #1				✓						✓			1-9	10:00a	✓	✓				✓		✓
9911	State Mobil #1				✓						✓			1-8	5:00	✓	✓				✓		✓
9912	Bell State A				✓						✓			1-8	2:00p	✓	✓				✓		✓
9913	Mobil Com.				✓						✓			1-6	2:00p	✓	✓				✓		✓
~~9914~~																							

Relinquished by:	Date:	Time:	Received by:
	1-10-97	2:50	
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 281-646-8996

Receiving Date: 09/08/97
Sample Type: WATER
Project #: TIPPERARY
Project Name: TIPPERARY
Project Location: TATUM

Analysis Date: 09/12 THRU 9/22
Sampling Date: 9/5 & 9/6/97
Sample Condition: Intact/Iced

ELT#	FIELD CODE	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	Cl mg/l	SO4 mg/l	CO3 mg/l	HCO3 mg/l
12477	IVA COM SW	48	19	1,853	961	1,702	<1	<1	2,037
12478	GS #12	232	54	782	180	1,595	43	<1	671
12481	BELL #6	28	10	791	134	1,064	245	<1	647
12482	NBN #7	57	12	51	134	85	113	<1	244
12483	SOHIO 1 #10	437	125	762	23	2,127	52	<1	317
12484	SOHIO A #11	2,477	303	1,872	413	7,551	105	<1	85
12485	SAT. 4 #9	70	16	92	24	156	75	<1	317
12486	NBF #8	84	13	46	22	67	125	<1	232
12487	VERA #5	**	**	**	**	106	85	<1	403
QUALITY CONTROL		2.041	0.501	1.973	2.079	9572	55		
TRUE VALUE		2.000	0.500	2.000	2.000	10000	50		
% PRECISION		102	100	99	104	96	110		

Methods: EPA SW 7140, 7450, 7770, 7610, 9252, 9038, EPA 310.2

** NOTE: NOT ENOUGH SAMPLE

Michael R. Fowler

9-22-97
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: | Phone #: | FAX #:

Company Name & Address: Tipperary

Project #: | Project Name: | Sampler Signature:

Project Location:

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX 8021B/5030	TPH 418.1 / 8015M	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI	PAH	Ions/Cation
12485	Sal. 4 #9	3		X							X			9/6		X			X					X	X
12486	NBF #8	3		X							X			9/6		X			X					X	X
12487	Vera #5	3		X							X			9/5		X			X					X	X
12488	Mable MW #3	2		X							X			9/5		X									
12489	Mable MW #4	2		X							X			9/5		X									
12490	LSL #1 @ 5'	1			X						X			9/4	2:37	✓	✓								
12491	LSL #2 @ 5'	1			X						X			9/4		✓	✓								
12492	LSL #3 @ 5'	1			X						X			8/3		✓	✓								
12493	LSL #4 @ 5'	1			X						X			8/3		✓	✓								
12494	LSL #5 @ 5'	1			X						X			8/3		✓	✓								
12495	LSL #6 @ 5'	1			X						X			8/3		✓	✓								

Relinquished by:	Date:	Time:	Received by:
	09-08-97	0730	J McMurrey
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS:

P-09

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

(23)

TIPPERARY
ATTN: MR. VICTOR A. VICE
P.O. BOX 857
TATUM, NM 88267
FAX: 800-854-4358

Receiving Date: 12/03/97
Sample Type: WATERS
Project: TATUM, NM
Project Location: TATUM, NM

Analysis Date: 12/03/97
Sampling Date: 12/03/97
Sample Condition: Intact/Iced

ELT#	FIELD CODE	BENZENE (mg/l)	TOLUENE (mg/l)	ETHYLBENZENE (mg/l)	m,p-XYLENE (mg/l)	o-XYLENE (mg/l)
13184	VERA MW-5	0.002	0.001	0.003	0.014	0.005
13185	G.S. STATE MW-21	0.166	0.013	0.059	0.705	0.010
13186	SOHIO STATE "1" MW-10	2.148	0.082	0.173	0.930	0.313
13187	SOHIO STATE "1" MW-17	1.409	0.053	0.116	0.535	0.192
13188	SOHIO STATE "1" MW-16	2.063	0.178	0.118	<0.001	<0.001
13189	SOHIO STATE "A" MW-19	0.009	0.002	0.003	0.541	0.318
13190	SOHIO STATE "A" MW-20	0.284	0.005	0.008	0.044	0.004
13191	SAT "4" MW-9	0.067	0.009	0.006	0.033	0.008
13192	SAT "4" MW-23	0.040	0.012	0.009	0.042	0.019
13193	SAT "4" MW-24	0.017	0.006	0.005	0.025	0.011
	% IA	93	93	93	92	95
	% EA	101	101	103	102	104
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001

METHODS: SW 846-8020,5030

Michael R. Fowler

12-5-97
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Elliot Werner/Whole Earth
Phone #: 1-800 8542435 8
FAX #:
Company Name & Address: Tipperary P.O. Box 657 Tatum NM 88267
Project #:
Project Name: Tatum NM
Project Location:
Sampler Signature: Elliot Werner

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX 8020/5030	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
13174	NBN - MW-7	2	.5ml											12-3									
13175	NBF - MW 8	2																					
13176	NBF - MW-16	2																					
13177	Mable Com. MW-3	2																					
13178	" " MW-4	2																					
13179	Bell A MW-6	2																					
13180	" " MW 13	2																					
13181	" " MW 14	2																					
13182	IVA Com. MW-1	2																					
13183	" " MW-2	2																					
13184	Vera MW 5	2																					

Relinquished by:	Date:	Time:	Received by:
Elliot Werner	12-3-97	1505	
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS: Thanks Roland

ENVIRONMENTAL
LAB OF TEXAS, INC.
"Don't Treat Your Soil Like Dirt!"

TIPPERARY
ATTN: MR. VICTOR A. VICE
P.O. BOX 857
TATUM, NM 88267
FAX: 281-646-8996

Receiving Date: 03/24/98
Sample Type: WATER
Project : TATUM, NM
Project Location: TATUM, NM

Analysis Date: 3/24/98
Sampling Date: 3/23/98
Sample Condition: Intact/Iced

ELT#	FIELD CODE	BENZENE (mg/l)	TOLUENE (mg/l)	ETHYLBENZENE (mg/l)	m,p-XYLENE (mg/l)	o-XYLENE (mg/l)
14045	Satelite #4 MW #23	0.071	0.004	0.012	0.017	0.002
14046	Satelite #4 MW #24	0.001	<0.001	<0.001	0.003	0.001
14047	Bell "A" MW #13	0.011	0.007	0.004	0.011	0.004
14048	Bell "A" MW #14	0.904	0.002	0.004	0.006	0.002
14049	NBF MW #15	1.470	1.230	0.384	1.058	0.466
14050	NBF MW #16	1.029	0.086	0.084	0.173	0.047
14051	Sohio State #1 MW #17	1.101	0.108	0.130	0.376	0.148
14052	Sohio State #1 MW #18	1.396	0.269	0.159	0.823	0.366
14053	Sohio State A MW #19	0.042	0.017	0.010	0.034	0.017
14054	Sohio State A MW #20	0.539	0.016	0.014	0.075	0.014
14055	G.S. State #1 MW #21	0.233	0.019	0.067	0.221	0.014
14056	G.S. State #1 MW #22	0.050	0.017	0.016	0.086	0.026
14057	Iva Com MW #1	0.003	0.003	0.001	0.007	0.008
14058	Iva Com MW #2	0.002	0.001	<0.001	0.005	0.002
14059	Mable Com MW #3	0.006	0.006	0.007	0.029	0.006
14060	Mable Com MW #4	0.019	0.004	0.002	0.018	0.003
14061	Vera MW #5	0.003	0.001	<0.001	0.004	0.002
14062	Bell "A" MW #6	0.236	0.002	0.019	0.016	0.008
14063	NBN MW #7	0.009	0.001	0.001	0.004	0.002
14064	NBN MW #8	0.048	0.036	0.013	0.038	0.011
	% IA	98	92	90	90	92
	% EA	110	104	101	103	103
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001

METHODS: SW 846-8020,5030

Michael R. Fowler

3-25-98
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: VICTOR A. VICE

Phone #: 1-800-854-4358

FAX #:

Company Name & Address: TIPPERARY OIL & GAS

Project #: TATUM, N. MEXICO #8267

Project Name:

Project Location:

Sampler Signature: Victor A Vice

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX 8020/5030	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
14057	TVA COM #M/W #1	1				X					X			3-23		X							
58	" " #M/W #2	1																					
59	MABLE COM. #M/W #3	1																					
60	" " " M/W #4	1																					
61	VERA M/W #5	1																					
62	BELL 'A' M/W #6	1																					
63	NBN M/W #7	1																					
64	" " #8	1																					
65	SATELITE #4 M/W #9	1																					
66	SOHIO STATE #1 M/W #10	1																					
67	SOHIO STATE "A" M/W #11	1																					

Relinquished by:	Date:	Time:	Received by:
Victor A Vice	03-24-98	1120	J McMurry
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

TIPPERARY
ATTN: MR. VICTOR A. VICE
P.O. BOX 857
TATUM, NM 88267
FAX: 1-281-846-8998

Receiving Date: 06/26/98
Sample Type: WATER
Project: TATUM, NM
Project Location: TATUM, NM

Analysis Date: 06/26/98
Sampling Date: 06/25/98
Sample Condition: Intact/Iced

ELT#	FIELD CODE	BENZENE (mg/l)	TOLUENE (mg/l)	ETHYLBENZENE (mg/l)	m,p-XYLENE (mg/l)	o-XYLENE (mg/l)
14657	IVA COM M/W #1	0.006	0.005	0.002	0.008	0.009
14658	MABLE COM M/W #3	0.009	0.011	0.009	0.033	0.009
14659	MABLE COM M/W #4	0.020	0.006	0.003	0.015	0.005
14660	VERA M/W #5	0.007	0.006	0.005	0.011	0.008
14661	BELL A M/W #6	0.203	0.008	0.015	0.017	0.006
14662	NBN M/W #7	0.009	0.007	0.007	0.016	0.009
14663	NBF M/W #8	0.034	0.003	0.007	0.011	0.003
14664	SATELITE #4 M/W #9	0.055	0.003	0.010	0.011	0.002
14665	SOHIO STATE #1 M/W #10	1.313	0.113	0.206	0.611	0.180
14666	SOHIO STATE A M/W #11	0.093	0.009	0.005	0.020	0.014
14667	BELL A M/W #13	0.016	0.014	0.005	0.015	0.006
14668	BELL A M/W #14	0.735	0.009	0.005	0.011	0.004
14669	NBF M/W #15	1.415	1.165	0.270	0.927	0.412
14670	NBF M/W #16	1.058	0.113	0.070	0.145	0.060
14671	SOHIO STATE #1 M/W #17	1.111	0.138	0.118	0.379	0.174
14672	SOHIO STATE #1 M/W #18	1.357	0.272	0.131	0.589	0.252
14673	SOHIO STATE A #1 M/W #19	0.029	0.010	0.007	0.022	0.011
14674	SOHIO STATE A #1 MW/ #20	0.517	0.009	0.008	0.081	0.009
14675	GS STATE #1 M/W #21	0.047	0.009	0.019	0.086	0.038
14676	GS STATE #1 M/W #22	0.183	0.012	0.062	0.077	0.010
14677	SATELITE #4 M/W #23	0.002	<.001	0.001	0.003	0.001
14678	SATELITE #4 M/W #24	0.003	0.003	0.002	0.006	0.003
14679	IVA COM WINDMILL SW #1	1.174	1.290	0.265	1.262	1.241
	% IA	99	95	92	90	94
	% EA	98	95	94	92	95
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001

METHODS: SW 846-8020,5030

Michael R. Fowler

6-29-98
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: VICTOR A. DICE

Phone #: 1-800-854-4358

FAX #:

Company Name & Address: TIPPERARY OIL & GAS P.O. BOX 857

Project #: TOTUM, N.MEX 88267

Project Name:

Project Location: TOTUM, N.M.

Sampler Signature:

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX 8020/5030	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI	Chloride
14657	TUA COM M/W #1	1												6-25-98		X								
14658	MABLE COM M/W #3	1														X								
14659	" " #4	1														X								
14660	UECA M/W #5	1														✓								96
14661	BELLA M/W #6	1														X								
14662	NBN M/W #7	1														X								
14663	UBF M/W #8	1														X								
14664	SATELITE #4 M/W #9	1														X								
14665	SOHIO STATE #1 M/W #10	1														X								
14666	SOHIO STATE A M/W #11	1														X								

Relinquished by:	Date:	Time:	Received by:
	6-26-98	1035	
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

TIPPERARY
ATTN: MR. VICTOR A. VICE
P.O. BOX 857
TATUM, NM 88267
FAX: 505-398-6510
FAX: 281-646-8996

Receiving Date: 09/30/98
Sample Type: Water
Project: None Given
Project Location: Tatum, New Mexico

Analysis Date: 9/30 & 10/01/98
Sampling Date: 09/29/98
Sample Condition: Intact/Iced

ELT#	FIELD CODE	BENZENE (mg/l)	TOLUENE (mg/l)	ETHYLBENZENE (mg/l)	m,p-XYLENE (mg/l)	o-XYLENE (mg/l)
15590	Iva Com M/W #1	0.004	0.004	0.002	0.006	0.007
15591	Mable Com M/W #3	0.010	0.015	0.010	0.041	0.017
15592	Vera M/W #5	0.003	0.003	0.001	0.004	0.004
15593	Bell A M/W #6	0.130	0.002	0.003	0.004	0.002
15594	NBN M/W #7	0.006	0.007	0.001	0.006	0.003
15595	NBF M/W #8	0.005	0.004	0.001	0.004	0.004
15596	Satellite #4 M/W #9	0.036	0.002	0.006	0.003	0.001
15597	Sohio St. #1 M/W #10	2.541	0.106	0.182	0.167	0.098
15598	Sohio St. "A" M/W #11	0.070	0.010	0.003	0.014	0.011
15599	Bell A M/W #13	0.003	0.002	0.002	0.004	0.002
15600	NBF M/W #15	3.027	1.630	0.225	0.811	0.393
15601	Sohio St. #1 M/W #17	0.872	0.105	0.071	0.242	0.129
15602	Sohio St. "A" M/W #19	0.033	0.015	0.005	0.018	0.011
15603	G.S. State M/W #21	0.128	0.005	0.069	0.030	0.008
15604	Satellite #4 M/W #23	0.048	0.023	0.001	0.004	0.002
15605	Iva Com M/W #2	0.003	0.002	<0.001	0.003	0.001
15606	Mable Com M/W #4	0.007	0.002	<0.001	0.002	0.001
15607	Bell A M/W #14	0.175	0.002	0.001	0.002	0.001
15608	NBF M/W #16	1.046	0.065	0.037	0.100	0.039
15609	Sohio St. #1 M/W #18	0.542	0.072	0.025	0.093	0.054
15610	Sohio St. "A" M/W #20	0.464	0.011	0.008	0.045	0.011
15611	G.S. State M/W #22	0.049	0.011	0.028	0.040	0.018
15612	Satellite #4 M/W #24	0.002	0.001	<0.001	0.002	<0.001
	% IA	100	94	91	90	95
	% EA	98	97	93	91	93
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001

METHODS: SW 846-8020,5030

Raland K. Tuttle

10-5-98
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Vic Vice

Phone #: 505-398-6507
FAX #: 505-398-6610
" 1-800-854-4358 "Wide Earth. "Mike"

Company Name & Address: Tipperary Oil & Gas

Project #:

Project Name:

Project Location: Tatum, New Mexico

Sampler Signature: D. A. Vice

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX 8020/5030	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
15590	LUA Com M/W #1 #2	1												9-29-98									
15591	Mable Com M/W # 3 #4	1																					
15592	UECA # M/W #5	1																					
15593	Bell A M/W #6	1																					
15594	NBN M/W. #7	1																					
15595	NBF M/W #8	1																					
15596	SATILITE #4 M/W #9	1																					
15597	Sohio ST. #1 M/W #10	1																					
15598	Sohio ST "A" M/W #11	1																					
15599	Bell A M/W #13 #14	1																					
15600	NBF M/W #15 #16	1																					

Relinquished by:	Date:	Time:	Received by:
[signature]	09-30-98	0855	[signature]
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS:

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

TIPPERARY
ATTN: MR. VICTOR A. VICE
P.O. BOX 857
TATUM, NM 88267
FAX: 505-398-6510
FAX: 281-648-8996

Receiving Date: 01/08/99
Sample Type: Water
Project : None Given
Project Location: Tatum, New Mexico 88237

Analysis Date: 01/08/99
Sampling Date: 01/06 & 01/07/99
Sample Condition: Intact/Iced/HCl

ELT#	FIELD CODE	BENZENE (mg/l)	TOLUENE (mg/l)	ETHYLBENZENE (mg/l)	m,p-XYLENE (mg/l)	o-XYLENE (mg/l)
16587	Sohio St. #1 - #17	0.676	0.136	0.094	0.339	0.163
16588	Sohio St. #1 - #18	1.10	0.247	0.107	0.415	0.203
16589	Sohio Sta. M/W #12	0.040	0.014	0.006	0.021	0.013
16590	Sohio Sat. M/W #20	0.341	0.010	0.005	0.026	0.008
16591	GS State M/W #21	0.133	0.010	0.054	0.056	0.006
16592	GS State M/W #22	0.039	0.010	0.020	0.048	0.017
16593	Sat. #3 M/W #23	0.004	0.003	0.001	0.004	0.002
16594	Sat. #4 M/W #24	0.004	0.003	<0.001	0.002	<0.001
16595	Ivs Com. M/W #1	0.003	0.001	<0.001	0.002	0.004
16596	Ivs Com. M/W #2	0.004	0.001	<0.001	0.003	0.001
16597	Mabie Com. M/W #3	<0.001	0.002	0.012	0.042	0.016
16598	Mabie Com. M/W #4	0.007	0.002	0.002	0.006	0.002
16599	Vess M/W #5	0.002	0.002	0.001	0.004	0.002
16600	Bell A M/W #6	0.127	0.001	0.003	0.005	0.001
16601	NBN M/W #7	0.003	<0.001	<0.001	0.002	<0.001
16602	NBF M/W #8	0.026	0.001	0.003	0.003	<0.001
16603	Sat. 4 M/W #9	0.034	0.003	0.006	0.005	0.001
16604	Sohio St. #1 M/W #10	1.00	0.067	0.156	0.214	0.095
16605	Sohio Sta. M/W #11	0.061	0.011	0.005	0.016	0.012
16606	Bell A M/W #13	0.001	<0.001	<0.001	0.003	0.001
16607	Bell A M/W #14	0.154	<0.001	0.002	0.003	0.001
16608	NBF M/W #15	1.63	1.49	0.182	0.726	0.350
16609	NBF M/W #16	1.47	0.122	0.047	0.144	0.062
	% IA	86	85	87	85	87
	% EA	90	90	89	88	90
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001

METHODS: SW 846-8020,5030

Raland K Tuttle

Raland K. Tuttle

1-11-99

Date

Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: V.A. Vice 7. Whole Earth

Phone #: 1-800-864-4358

FAX #: 505-398-6509

Company Name & Address: Tipperary Oil & Gas

Tatom, N. Mex #88267

Project #: M/W

Project Name:

Project Location: Tatum, N. Mex

Sampler Signature: D.A. [signature]

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME
16595 / 16596	IVA Com. M/W #1 #2	2												1/6/99	
16597 / 16598	Mable Com. " # 3 #4	2												1/6/99	
16599	Vera # M/W #5	2												1/6/99	
16600	Bell A M/W # 6	2												1/6/99	
16601	NBN M/W #7	2												1/6/99	
16602	NBF M/W #8	2												1/6/99	
16603	Satilite 4 - M/W #9	2												1/6/99	
16604	Sohio ST#1 - M/W #10	2												1/7/99	
16605	Sohio STA - M/W #11	2												1/7/99	
16606 / 16607	Bell A M/W # 13 #14	2												1/6/99	
16608 / 16609	NBF M/W # 15-16	2												1/6/99	

ANALYSIS REQUEST: BTEX 8020/5030 | TPH 418.1 | TCLP Metals Ag As Ba Cd Cr Pb Hg Se | Total Metals Ag As Ba Cd Cr Pb Hg Se | TCLP Volatiles | TCLP Semi Volatiles | TDS | RCI

Relinquished by:	Date:	Time:	Received by:
[signature]	01-08-99	0855	J. McMurry
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS:

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

metals

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 281-646-8996

Receiving Date: 09/08/97
Sample Type: WATER
Project : TIPPERARY
Project Location: NONE GIVEN

Analysis Date: 09/15-09/17/97
Sampling Date: 09/05-09/06/97
Sample Condition: Intact/Iced

TOTAL METALS (ppm)

ELT#	Field Code	Ag	As	Ba	Cd	Cr	Hg	Pb	Se
12477	IVA COM SW	<0.01	<0.002	<0.10	0.011	<0.03	<0.001	<0.10	<0.002
12478	GS #12	<0.01	<0.002	<0.10	<0.005	<0.03	<0.001	<0.10	<0.002
12481	BELL # 6	<0.01	<0.002	<0.10	<0.005	<0.03	<0.001	<0.10	<0.002
12482	NBN # 7	0.01	<0.002	<0.10	<0.005	<0.03	<0.001	<0.10	0.004
12483	SOHIO 1 #10	0.01	<0.002	<0.10	0.009	0.37	<0.001	<0.10	<0.002
12484	SOHIO A #11	0.04	<0.002	<0.10	0.034	0.07	<0.001	0.19	<0.002
12485	SAT. 4 #9	0.04	<0.002	<0.10	<0.005	<0.03	<0.001	<0.10	<0.002
12486	NBF # 8	<0.01	<0.002	<0.10	<0.005	<0.03	0.001	<0.10	0.002
12487	VERA # 5	<0.01	<0.002	<0.10	<0.005	<0.03	<0.001	<0.10	<0.002
	Minimum Detection Limit (MDL)	0.01	0.002	0.10	0.002	0.03	0.001	0.1	0.002
	% IA	103	94	98	104	103	100	96	112
	% EA	109	106	94	108	102	88	103	105

METHODS: EPA SW 846-3005, 7760, 7062, 7080, 7130, 7190, 7470, 7420, 7742

Michael R. Fowler
Michael R. Fowler

10-14-97
Date

GAS CHROMOTOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 8020)
CLIENT : NMED-OCD AEN I.D.: 709315
PROJECT # : (none)
PROJECT NAME : TIPPERARY PIT CLOSURE PROJECT

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	VERACOM MW#1 9709051649	AQUEOUS	9/5/97	NA	9/9/97	1

PARAMETER	DET. LIMIT	UNITS	04
BENZENE	0.5	UG/L	< 0.5
TOLUENE	0.5	**UG/L**	**1.1**
ETHYLBENZENE	0.5	**UG/L**	**4.2**
TOTAL XYLENES	0.5	**UG/L**	**47**
METHYL-t-BUTYL ETHER	2.5	UG/L	< 2.5

SURROGATE:
BROMOFLUOROBENZENE (%) 106
SURROGATE LIMITS (80 - 120)

CHEMIST NOTES:
N/A

American Environmental Network (NM), Inc.
Albuquerque • Phoenix • Pensacola • Portland • Pleasant Hills • Columbia

CHAIN OF CUSTODY

DATE: 9/8/97 PAGE: 2 OF 2

AEN LAB I.D. 709315

PROJECT MANAGER: BILL OLSON

COMPANY: NMOCD
ADDRESS: 2040 S PACHECO
SANTA FE NM 87505
PHONE: 505-827-7154
FAX: -8177
BILL TO: S.A.B.
COMPANY:
ADDRESS:
SAMPLED BY W. PRICE - NMOCD

ANALYSIS REQUEST

SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF CONTAINERS
VERA COM MW#1	9/5/97	4:19 PM	WATER	3
970905 1649				
MW#1 (IS MW #5 TIPP #)				

Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTXE/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)	504 EDB☐ / DBCP☐	Polynuclear Aromatics (610/8310)	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	General Chemistry:	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:
				X											X (CHLORIDES *)					

LAB INFORMATION

PROJ. NO.:
PROJ. NAME: TIPPERARY PIT CLOSURE PROJECT
P.O. NO.:
SHIPPED VIA:

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) X
CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER
METHANOL PRESERVATION ☐
COMMENTS: FIXED FEE ☐
* - RUN CHLORIDES ONLY IF ENOUGH SAMPLE.
ALL MW'S PURGED 5 SAT CASING VOLUMES BEFORE SAMPLING. SAMPLES TAKEN USING 3" & 1" AE BAILER.

RELINQUISHED BY: 1

Signature: Time: 1:00 PM
Printed Name: W PRICE Date: 9/8/97
Company: NMOCD

RECEIVED BY: 1

Signature: Time:
Printed Name: Date:
Company:

RELINQUISHED BY: 2

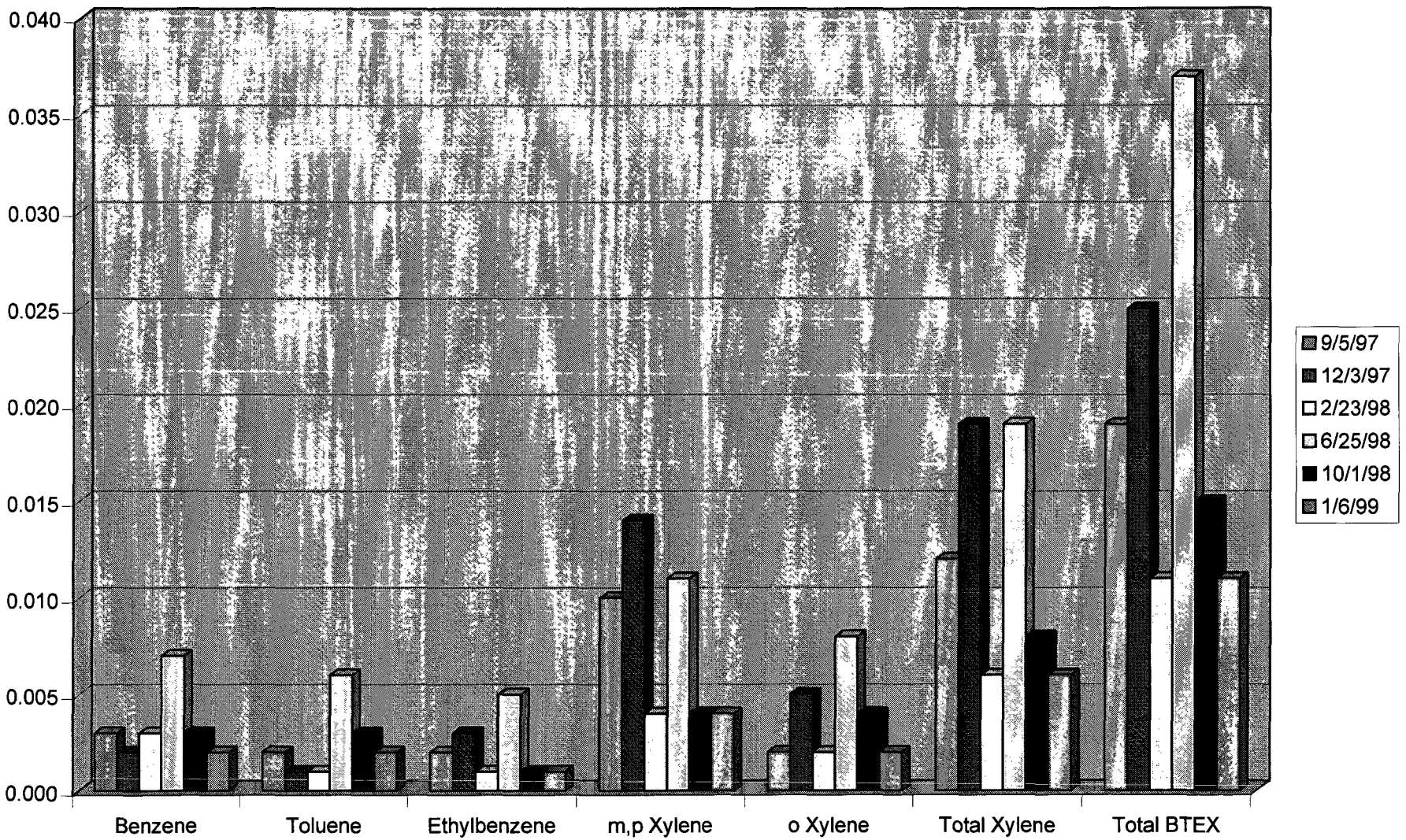
Signature: Time
Printed Name: Date.
Company.

RECEIVED BY: (LAB) 2

16:10
9/8/97

4/1/96 Inc.: American Environmental Network (NM), Inc. • 2709-D Pan American Freeway, NE • Albuquerque, New Mexico 87107 DISTRIBUTION: White, Canary - AEN Pink - ORIGINATOR

Monitor Well # 5



Monitor Well # 5
Vera # 1
Sampling Results

Lab #	12487	13184	14061	14660	15592	16599
Sample Date	9/5/97	12/3/97	2/23/98	6/25/98	10/1/98	1/6/99
Benzene	0.003	0.002	0.003	0.007	0.003	0.002
Toluene	0.002	0.001	0.001	0.006	0.003	0.002
Ethylbenzene	0.002	0.003	0.001	0.005	0.001	0.001
m,p Xylene	0.010	0.014	0.004	0.011	0.004	0.004
o Xylene	0.002	0.005	0.002	0.008	0.004	0.002
Total Xylene	0.012	0.019	0.006	0.019	0.008	0.006
Total BTEX	0.019	0.025	0.011	0.037	0.015	0.011

Boring Log

This section contains the boring log for the monitoring well at this site.

BORING LOG

PAGE 1 OF 2	DATE: 1-6-97	DRILL START: 8:45 AM DRILL STOP: 1:30 PM

ATKINS ENGINEERING ASSOCIATES, INC

2904 West Second Street, Roswell, New Mexico 88202-8158

PROJECT NAME: Tipperary Corp. - Whole Earth Environmental, Inc.
Mike Griffin
Job #98464.00

SITE LOCATION: Caprock, New Mexico

BORING LOCATION: S. of NM Hwy. 380
Int Com
Vera

TH NUMBER: 5

AUGER TYPE: HOLLOW STEM

CASING ELEVATION: N/A

DRILLED BY: ATKINS ENGINEERING ASSOCIATES, Inc.

LOGGED BY: Mort Bates

Depth (Feet)	SPT	Symbol	STRATUM DESCRIPTION	Well Construction Details	PID Reading	Lab Analysis	Lab Analysis
			Silty Clay w/Caliche, Brown, Firm, Dry				
5			Silty Clay w/Caliche, Tan, Firm, Dry				
10			Caliche w/Silty Clay, Tan, Hard, Dry				
15							
20			Caliche, Gray, Hard, Dry				
25			Silty Clay w/Caliche, Tan, Firm, Dry				
30							

BORING LOG

PAGE 2 OF 2	DATE: 1-9-97	DRILL START: 8:45 AM DRILL STOP: 1:30 PM

ATKINS ENGINEERING ASSOCIATES, INC
2004 West Second Street, Roswell, New Mexico 88202-8166

PROJECT NAME: Tipperary Corp. - Whole Earth Environmental, Inc.
Mike Griffin
Job #90464.00

SITE LOCATION: Caprock, New Mexico

BORING LOCATION: S. of NM Hwy. 380
~~Ice~~ Com
Vera

TH NUMBER: 5

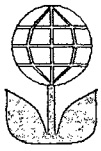
AUGER TYPE: HOLLOW STEM

CASING ELEVATION: N/A

DRILLED BY: ATKINS ENGINEERING ASSOCIATES, Inc.

LOGGED BY: Mort Bates

Depth (Feet)	SPT	Symbol	STRATUM DESCRIPTION	Well Construction Details	PID Reading	Lab Analysis	Lab Analysis
			Silty Clay w/Caliche, Tan, Firm, Dry (Cont'd)				
			Caliche, Gray, Hard, Dry				
05			Silty Clay w/Caliche, Tan, Hard, Dry				
10							
15							
20							
25							
30							
35							
40			Silty Clay w/Caliche, Tan, Firm, Saturated				
			TD = ±59 ft.				
			Lost 35 feet of center rod with center bit. Damaged 35 feet of Auger				



Disposal Manifests

This section contains the treatment cell location and disposal manifests of all wastes removed from the site.

Contaminated Soils Shipment Manifest

1. Manifest Document No. 105871-97

2. Page ___ of ___

3. Generator's Name and Mailing Address

Tipperary Oil & Gas
P. O. Box 857
Tatum, NM 88267

4. Generator Phone No.

505-398-6509

5. Generator Contact

Vic Vice

6. Transporter 1 Company Name

Gandy Corporation

7. ID No.

S.C.C. 14225

8. Transporter 2 Company Name

9. ID No.

10. Designated Disposal Facility Name and Site Address

Gandy Marley, Inc. Contaminated Soils Landfarm
7200 East Second Street
PO Box 1658
Roswell, NM 88201

11. Facility Permit Number

12. Facility Phone No.

(505) 398 - 4960

GENERATOR

13. Description of Waste	14. Containers No.	14. Containers Type	15. Total Quantity	16. Unit Wt/Vol
a. Contaminated soils and sludges from Vera #1		dt	524.	yds
b.				
c.				

17. Special Handling Instructions and Additional Information

18. Generator's Certification: *I hereby declare that the contents of the 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 federal, state, and international laws.*

FURTHER, I represent and warrant that the waste material as described on this manifest is either exempt from the Resource Conservation and Recovery Act of 1976, OR has been characterized as non-hazardous material by virtue of appropriate laboratory analysis done in accordance with EPA-approved testing methods

Printed/Typed Name	Signature	Date
Vic Vice	J.A. Vice	09 08 97

TRANSPORTER

19. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date
Rue Mauk	Rue Mauk	09 08 97

20. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date

21. Discrepancy Information

GMI

Operator Certification of receipt of materials described on this manifest except as noted in item 21.

Gandy Marley, Inc.
P.O. Box 1658 Roswell, NM 88202
Phone 505-625-9206 Fax 505-625-9706

Tipperary Oil & Gas
P.O. Box 857
Tatum, NM 88267

9/22/97

Detailed Report of material received between 8-1-97 and 8-31-97

EXEMPT OCD

Origin: SATALLITE #4

Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/18/97	1897	OCD EXEMPT SLUDGES	Gandy Inc.	7	185	BBLS
8/19/97	1942	OCD EXEMPT SLUDGES	Gandy Inc.	7	360	BBLS
		SATALLITE #4 Total Units.			545 BBLS	
		EXEMPT OCD Total BBLS.			545 BBLS	

Origin: BELL STATE A

Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/16/97	1890	OCD EXEMPT SOILS	Gandy Inc.	7	160	Yards
8/18/97	1892	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/18/97	1893	OCD EXEMPT SOILS	Gandy Inc.	7	14	Yards
8/18/97	1895	OCD EXEMPT SOILS	Gandy Inc.	7	60	Yards
		BELL STATE A Total Units.			262 Yards	

Origin: GULF STATION #1

Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/30/97	1941	OCD EXEMPT SOILS	Gandy Inc.	7	120	Yards
		GULF ~~STATION~~ STATE #1 Total Units.			120 Yards	

Origin: NMB NBN

Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/22/97	1926	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/22/97	1928	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/22/97	1929	OCD EXEMPT SOILS	Gandy Inc.	7	22	Yards
8/22/97	1931	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
		NMB Total Units.			106 Yards	

Origin: VERA

Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/21/97	1915	OCD EXEMPT SOILS	Gandy Inc.	7	42	Yards
8/21/97	1916	OCD EXEMPT SOILS	Gandy Inc.	7	42	Yards
8/21/97	1917	OCD EXEMPT SOILS	Gandy Inc.	7	42	Yards
8/21/97	1919	OCD EXEMPT SOILS	Gandy Inc.	7	40	Yards
8/22/97	1918	OCD EXEMPT SOILS	Gandy Inc.	7	246	Yards
8/22/97	1920	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/22/97	1921	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/22/97	1922	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/22/97	1924	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards

Gandy Marley, Inc.
P.O. Box 1658 Roswell, NM 88202
Phone 505-625-9206 Fax 505-625-9706

Tipperary Oil & Gas
P.O. Box 857
Tatum, NM 88267

9/22/97

Detailed Report of material received between 8-1-97 and 8-31-97

VERA Total Units. 524 Yards

Origin: SATALLITE #4

Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/18/97	1894	OCD EXEMPT SOILS	Gandy Inc.	7	56	Yards
8/18/97	1896	OCD EXEMPT SOILS	Gandy Inc.	7	42	Yards
8/18/97	1898	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/20/97	1943	OCD EXEMPT SOILS	Gandy Inc.	7	190	Yards

SATALLITE #4 Total Units. 316 Yards

Origin: SOHIO A#1

Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/23/97	1934	OCD EXEMPT SOILS	Gandy Inc.	7	63	Yards

SOHIO A#1 Total Units. 63 Yards

Origin: SOHIO A#1 STATE

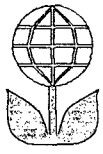
Date:	Ticket No:	Discripition:	Transporter:	Cell:	Units	Unit Type:
8/22/97	1923	OCD EXEMPT SOILS	Gandy Inc.	7	22	Yards
8/22/97	1925	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/22/97	1927	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/22/97	1930	OCD EXEMPT SOILS	Gandy Inc.	7	14	Yards
8/22/97	1932	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/23/97	1935	OCD EXEMPT SOILS	Gandy Inc.	7	56	Yards
8/23/97	1937	OCD EXEMPT SOILS	Gandy Inc.	7	56	Yards
8/23/97	1938	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/27/97	1933	OCD EXEMPT SOILS	Gandy Inc.	7	28	Yards
8/27/97	1936	OCD EXEMPT SOILS	Gandy Inc.	7	14	Yards
8/27/97	1939	OCD EXEMPT SOILS	Gandy Inc.	7	14	Yards
8/27/97	1940	OCD EXEMPT SOILS	Gandy Inc.	7	84	Yards

SOHIO A#1 STATE Total Units. 400 Yards

EXEMPT OCD Total Yards. 1791 Yards

EXEMPT OCD Total Units. 2336 Units

Tipperary Oil & Gas Total Units. 2336 Units



VADSAT Modeling

This section contains the original contaminant migration model used in the preparation of the remediation protocol for this site.

Modeling Data Entry
Vera # 1

Control Data	Entry	U / M
Deterministic	Yes	
Monte Carlo	No	
Evaporation	No	
Biodecay	No	
Low Permeability Layer Below Contamination	No	

Source Data		
Waste Zone Thickness	48	ft.
Waste Zone Area	2,500	sq. ft.
Ratio of Length to Width	1	
Soil Thickness above Waste Zone	10	ft.
Contaminant Concentration in Soil / Waste Zone	10	ppm
Hydrocarbon Concentration in Soil / Waste Zone	10,000	ppm

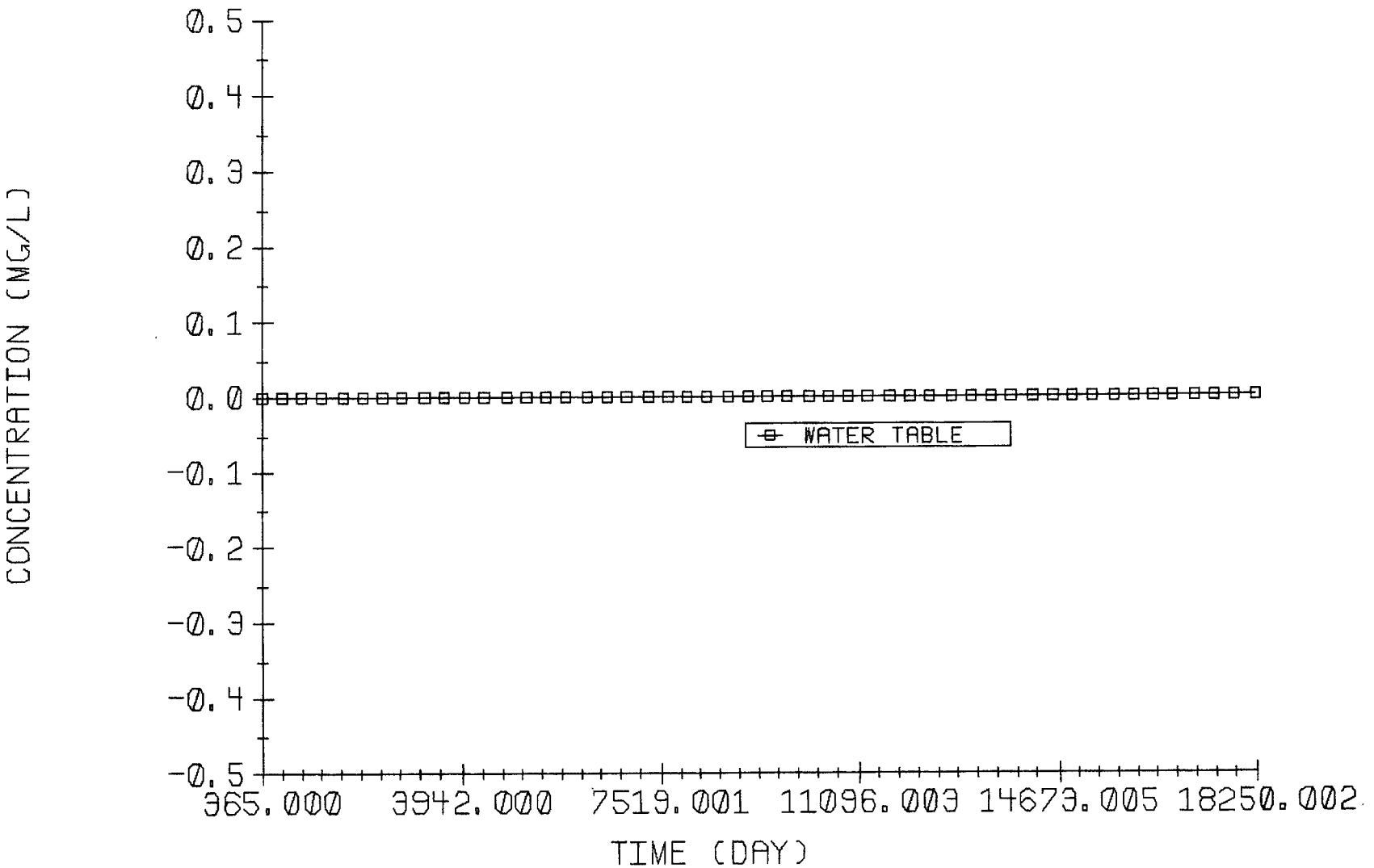
Chemical Data	
Benzene	Yes

Unsaturated Zone		
Biodecay Cooefficient	0	
Organic Carbon Fraction	0	
Soil Database	Clay	
Hydrological Database	Sedimentary	
Unsaturated Zone Thickness	1	meter
Soil Database	Clay	
van Genuchten n	1.09	(Default)
Residual Water Content	0.01001	
Unsaturated Zone Dispersivity	0	**Internally**

Saturated Zone		
Biodecay Cooefficient	0	
Aquifer Porosity	0.2	(Default)
Organic Carbon Fraction	0	
Longitudinal Dispersivity	0	**Internally**
Ratio of Long. / Trans. Dispersivities	3	
Ratio of Trans. / Vert. Dispersivities	3	
Hydrological Database	Sedimentary	
Aquifer Thickness	60	ft.
Aquifer Gradient	0.00357	
Saturated Hydraulic Conductivity	0.0986	ft / day

Net Infiltration Rate	0.00001	ft / day

CONCENTRATION VS. TIME



Liner Details

This section contains the MSDS and technical description of the liner material used in this project.

Falcon Environmental Lining Systems, Inc.

P.O. Box 4306 Odessa, Texas 79760
5200 Johnson Rd. 79764
Phone: (915) 366-2611
1-800-842-0945
FAX: (915) 366-2999

TECHNICAL SPECIFICATION SHEET
20 MIL BLACK POLYETHYLENE

PROPERTIES	TEST METHOD	VALUE
Thickness mils	ASTM D 1593	20
Density lb/cm3	ASTM D792	57.7 lbs.
Tensile Strength at Yeild	ASTM D638	40 lbs.
Tensile Strength at Break	ASTM D638	88 lbs.
Elongation at Break	ASTM D638	700 %
Hydrostatic Resistance	ASTM D751	122
Puncture Resistance	FTMS 101 C	36
Tear Resistance	ASTM D1004	13
Volatile Loss	ASTM 1203	<1%
Resistance to Soil Burial	ASTM G22	-4%
Low Temp, Failure	ASTM D746	<-94
Dimensional Stability %Change	ASTM D1204	<2
Environmental Stress Crack Resistance Hours to failure	ASTM D5397 Method A	>400
Carbon Black %	ASTM D1603	2.75
WVTR GH2O/100 in 2/24 hrs (g H2O/m2/24 hrs.	ASTM E96 Method A73 F, 50% RH	.020 (.022)

Section 4 - PHYSICAL HAZARDS

Stability	Unstable	Conditions to Avoid	Temperatures over 570 F will release combustible gases.
	Stable X		

Incompatibility (Materials to Avoid): None

Hazardous Decomposition Products: The following combustion products may be generated: Carbon dioxide, carbon monoxide, water vapor, and trace volatile organic compounds.

Hazardous Polymerization	May Occur	Conditions to Avoid	N/A
	Will not Occ X		

Section 5 - HEALTH HAZARDS

Threshold Limit Value: N/A

Signs and Symptoms of Exposure

1. Acute Overexposure: Not Determined
2. Chronic Overexposure: Not Determined

Medical Conditions Generally Aggravated by Exposure: There are no known medical conditions aggravated by exposure to this product.

Chemical Listed as Carcinogen or Potential Carcinogen		National Toxicology Program	Not Listed	I.A.R.C. Monographs	Not Listed	OSHA	Not Listed
OSHA Permissible Exposure Limit	None	ACGIH Threshold Limit Value	None	Other Exposure Limit Used	None		

Emergency and First Aid Procedures: Most problems will result from exposure to molten materials.

1. Inhalation: Immediately remove victim from area to fresh air. Seek medical attention.
2. Eyes: If contacted by molten material, immediately flush eyes with plenty of cool water for at least 15 minutes. Do not permit victim to rub eyes. Immediately seek medical attention.
3. Skin: If contact by molten material, cool immediately with cool water. Do not attempt to remove any solidified material. Immediately seek medical attention.
4. Ingestion: If material is ingested, contact a physician or Poison Control Center as appropriate whenever any foreign object is swallowed.

Section 6 - SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type): N/A

Ventilation	Local Exhaust	Mechanical (General)	Special	Other
N/A	N/A	N/A	N/A	N/A

Protective Gloves: Wear protective gloves during thermal processing.

Eye Protection: Wear eye protection during thermal processing.

Other Protective Clothing or Equipment: Wear protective sleeves when processing material at elevated temperatures to minimize the possibility of thermal burns.

Section 7 - SPECIAL PRECAUTIONS AND SPILL / LEAK PROCEDURES

Precautions to be Taken in Handling and Storage: This product should be stored in a manner that they are not exposed to ultra-violet light, excessive moisture, heat and sources of ignition. A static charge may be present on finished products.

Other Precautions:

Steps to be Taken in Case Material is Released or Spilled: Spilled material should be swept up and discarded. Comply with applicable federal, state or local regulations.

Waste Disposal Methods: Dispose in accordance with local regulations

IMPORTANT - Do not leave blank spaces. If information is unavailable, unknown or does not apply, so indicate

TOTAL P.03

MATERIAL SAFETY DATA SHEET

QUICK IDENTIFIER (In Plant Common Name)
RHFCO 2000B, 3000B, 4000B Part No. 2000B, 3000B 4000B

Manufacturer's Name	RAVEN INDUSTRIES INC.	Emergency Telephone Numbers	800-635-3456 605-335-0174
Address	P.O. Box 5107 Sioux Falls, SD 57117	Other Information	1812 "E" Avenue Sioux Falls, SD 57104
Signature of Person Responsible for Preparation		Date Prepared	January 14, 1999

Section 1 - IDENTITY

Common Name (Used on Labels) (Trade Name & Synonyms)	RHFCO 2000B, 3000B, 4000B	CAS Number(s)	26221-73-8 1333-86-4 25213-02-9
Chemical Name	Copolymer of Ethylene and Octene-1	Chemical Family	Polyolefin
Formula	(CH2 - CH2) n		

Section 2 - HAZARDOUS INGREDIENTS

Principal Hazardous Component(s) - Chemical and Common Name(s)	%	Threshold Limit Value (units
None		

Section 3 - PHYSICAL & CHEMICAL CHARACTERISTICS (Fire & Explosion Data)

Boiling Point	Not Applicable (N/A)			Specific Gravity	0.93	Vapor Pressure, mmHg	N/A
Percent Volatile by Volume (%)	0	Vapor Density	N/A	Evaporation Rate	N/A		
Solubility in Water	Insoluable in Water			Reactivity in Water	Not Reactive in Water		
Appearance and Odor	Black, odorless plastic film.						
Flash Point	N/A	Flammability Limits in Air, by Volume (%)	Lower N/A	Upper N/A	Auto Ignition Temperature	> 650 F (estimated)	
Extinguisher Media	Use water spray, dry chemical, foam or carbon dioxide						
Special Fire Fighting Procedures	Fire fighters should wear a self-contained breathing apparatus when there is a possibility of exposure to smoke, fumes or hazardous decomposition products. If possible, water should be applied as a spray from a fogging nozzle since this material is a surface burning material.						
Unusual Fire and Explosion Hazards							