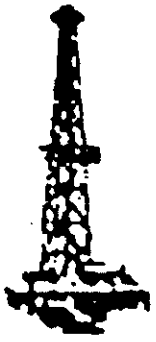
FINAL REMEDIATION & CLOSURE REPORT



Chaparral Energy

RECEIVED

MAR 0 8 1999

ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Monarch White "A" State # 1 Remediation Project

Whole Earth Environmental
19606 San Gabriel
Houston, Tx. 77084

Chaparral Energy, Inc. (405) 478-8770 • FAX (405) 478-1947

701 Cedar Lake Blvd. • Oklahoma City, OK 73114

2 March 1999

New Mexico Oil Conservation Division
Attn: Mr. Bill Olson
2040 South Pacheco Street
Santa Fe, New Mexico 87504

Re: Monarch Corporation
White "A" State #1
Sec. 15-T10S-R32E
Lea County, New Mexico

Dear Sir:

Enclosed with this letter is a copy of the final remediation/closure report for the captioned well. It is our understanding this remediation complies with all requirements set forth by your office and that the location is acceptable to the tenant.

Should you require anything further, please contact the undersigned.

Sincerely,

Robert C. Lang IV, REM, CEA
Environmental and Special Projects Engineer

RCL/me

Encl.

Executive Summary

Site Survey
On April 27th, 1998, Whole Earth Environmental surveyed Monarch Corporation's White "A" State # 1 well site for the purpose of developing a closure protocol. The survey revealed an area 210' X 125' enclosed within a gated barbed wire fence having significant surface staining and small areas of free product consisting of a heavy gravity crude oil. The color and viscosity of the oil can best be likened to that of roofing tar.

The area had been previously remediated first by superficially mixing dairy cow manure and cotton "gin trash" into the hydrocarbons and later by the erection of a forced air sparging system on a limited area of the site. Neither remediation treatment appeared to have provided substantive reductions in hydrocarbon concentrations.

Atkins Engineering drilled, cased, developed and sampled a monitor well (MW # 1) to a total depth of 71' below ground level at the southeast corner of the pit. Water samples from the well were tested for the presence of BTEX, TPH and chlorides, (ELT no. 14288), and found to contain detectable but negligible BTEX and TPH concentrations. The chloride concentrations within the sample were significantly elevated (2,785 ppm).

Remediation Activities
Chaparral Energy submitted a revised closure protocol to the OCD on November 3rd, 1998 that was subsequently approved with comments by Mr. Olson on December 2nd. Whole Earth began excavation of the site on January 18th, 1999. The remediation methods employed on the project were (1) to remove all accessible hydrocarbon concentrations in excess of 100,000 ppm TPH, (2) erect an impermeable polyethylene liner below the disturbed areas and (3) to mix and blend the remaining contaminants with fresh soil and sand until the average TPH concentrations were less than 10,000 ppm TPH. In addition, a second monitor well was erected at a distance of 125' southeast of monitor well # 1 in order to determine the lateral extent of contamination.

Upon excavation, it was discovered that the majority of the contamination lay atop an undisturbed, dense caliche at an average depth of less than three feet. The substrate caliche layer was obviously undisturbed and quite resistant to any form of excavation. The only method that proved even marginally effective was the use of a single ripper blade on a D6H bulldozer. When dual rippers were attempted, the equipment was not capable of pulling through the stone. Due to the extreme viscosity of the product, it had little to no penetration of the caliche layer.

A total of 786 cubic yards of material was scraped from the surface and transported to Gandy – Marley, Inc. A like amount of fresh topsoil was transported back to the location for use as blending material.

Two smaller pit areas having the approximate dimensions of 100' X 20' X 6' were discovered at the northeast corner of the site. The soil texture within these pits consisted of highly fractured caliche having a faint blue color normally associated with produced water contamination. Both areas were excavated to a depth of 8' below ground level and lined with a 30 mil polyethylene liner. Side wall and bottom hole samples were collected and analyzed for TPH, BTEX and chlorides. (ELT nos. 16796 ~ 16799 and 16857 ~ 16862).

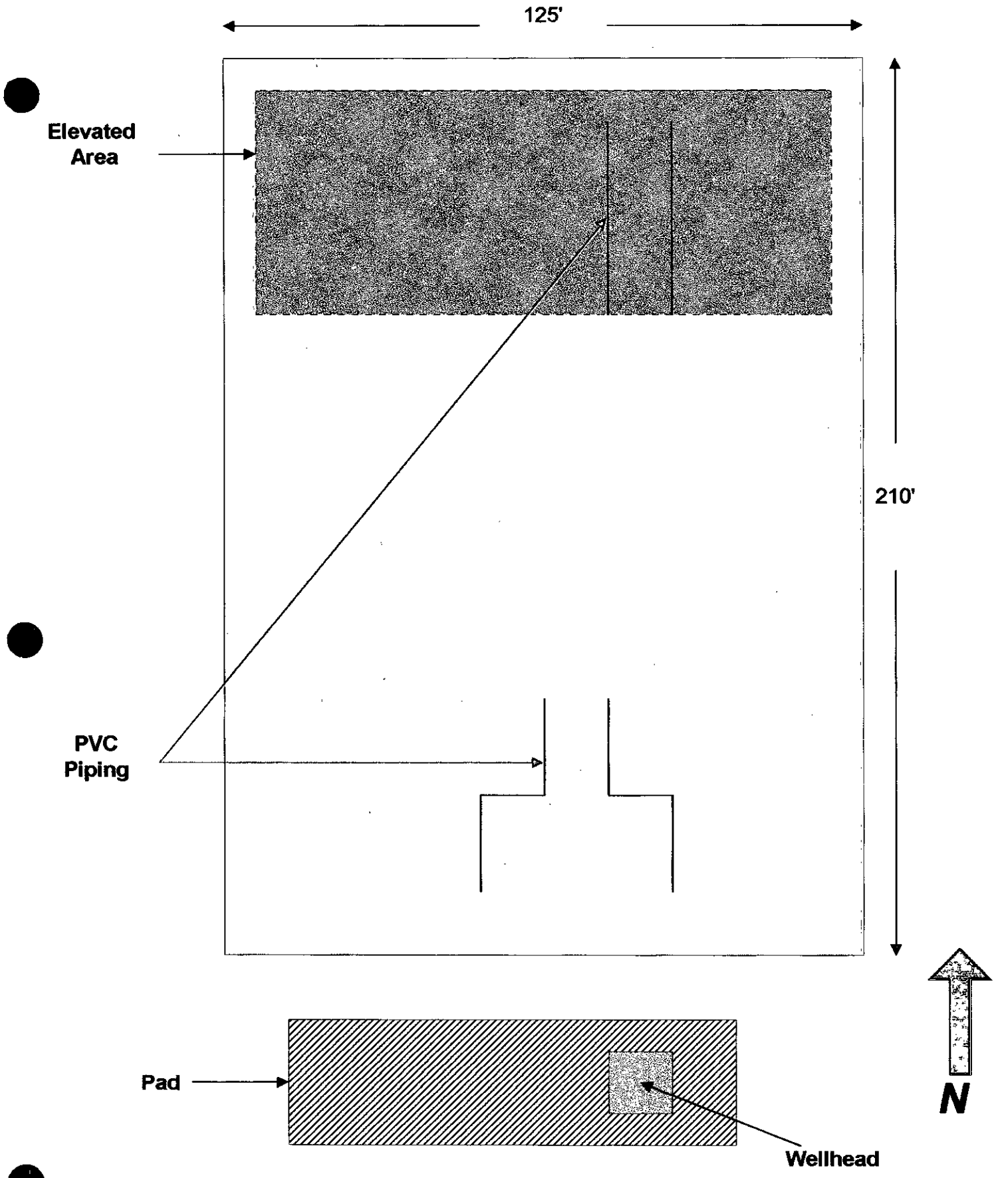
The entire location was blended and cross-mixed with fresh soils until the TPH concentrations were reduced below 10,000 ppm. Confirmation samples were collected and analyzed for BTEX (ELT nos. 16839 and 16840). The entire pit area was then covered in a layer of fresh topsoil to an average depth of 6". A cement pump jack base found immediately south of the pit area was buried in place at a depth sufficient to insure that the top of the cement was a minimum distance of 5' below ground level.

Ground Water Investigation

A second water monitoring well was drilled, cased, developed and tested by Atkins Engineering on January 21st. Water samples were analyzed for BTEX and chlorides and found to contain non-detectable concentrations of BTEX and only 74 ppm total chlorides (ELT no. 16856).

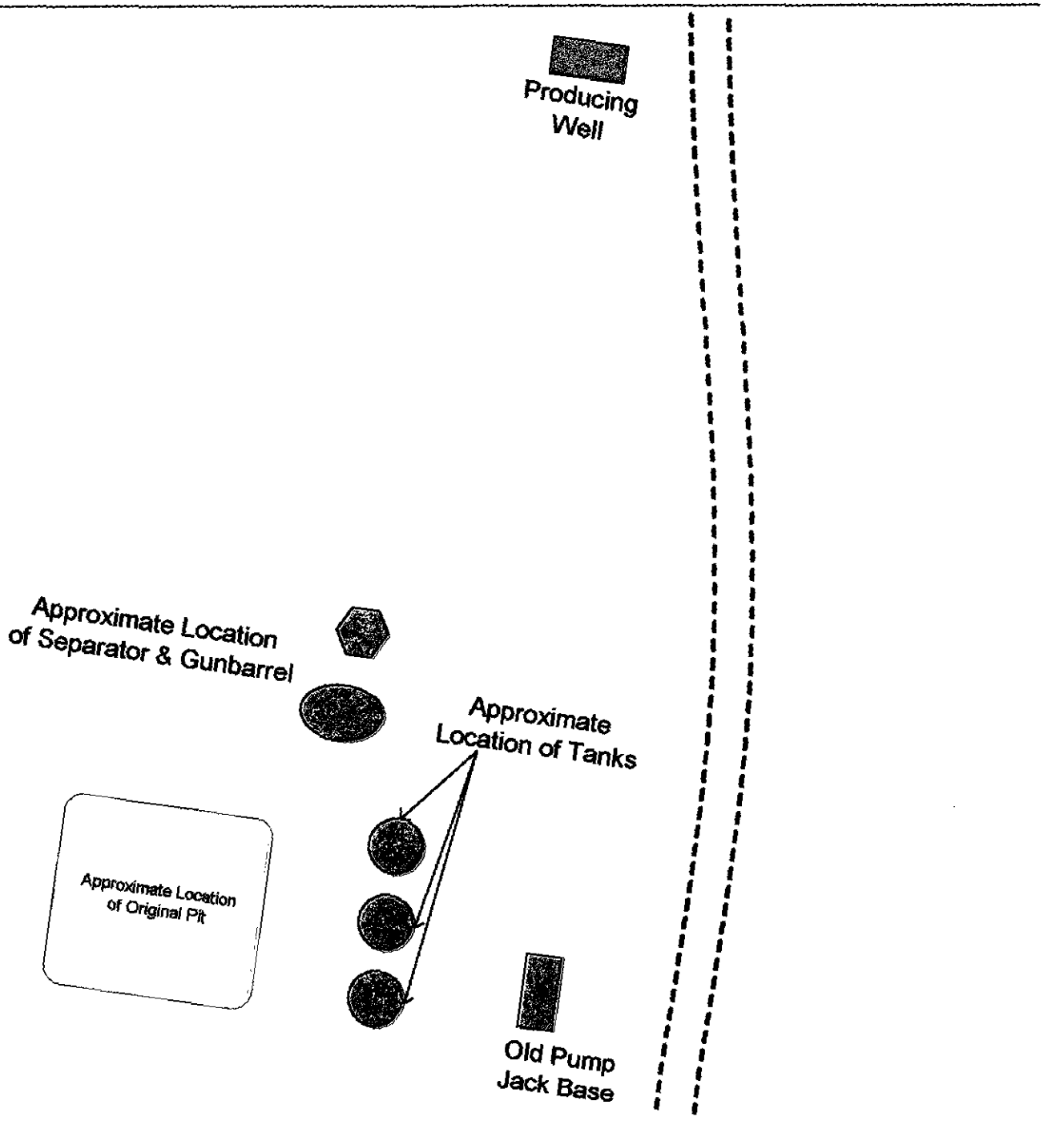
Modeling

At the conclusion of the project, the site was re-modeled based on actual distances to ground water and concentrations at depth. The model predicts that no detectable benzene concentrations will migrate to the monitoring well within a one hundred year interval.

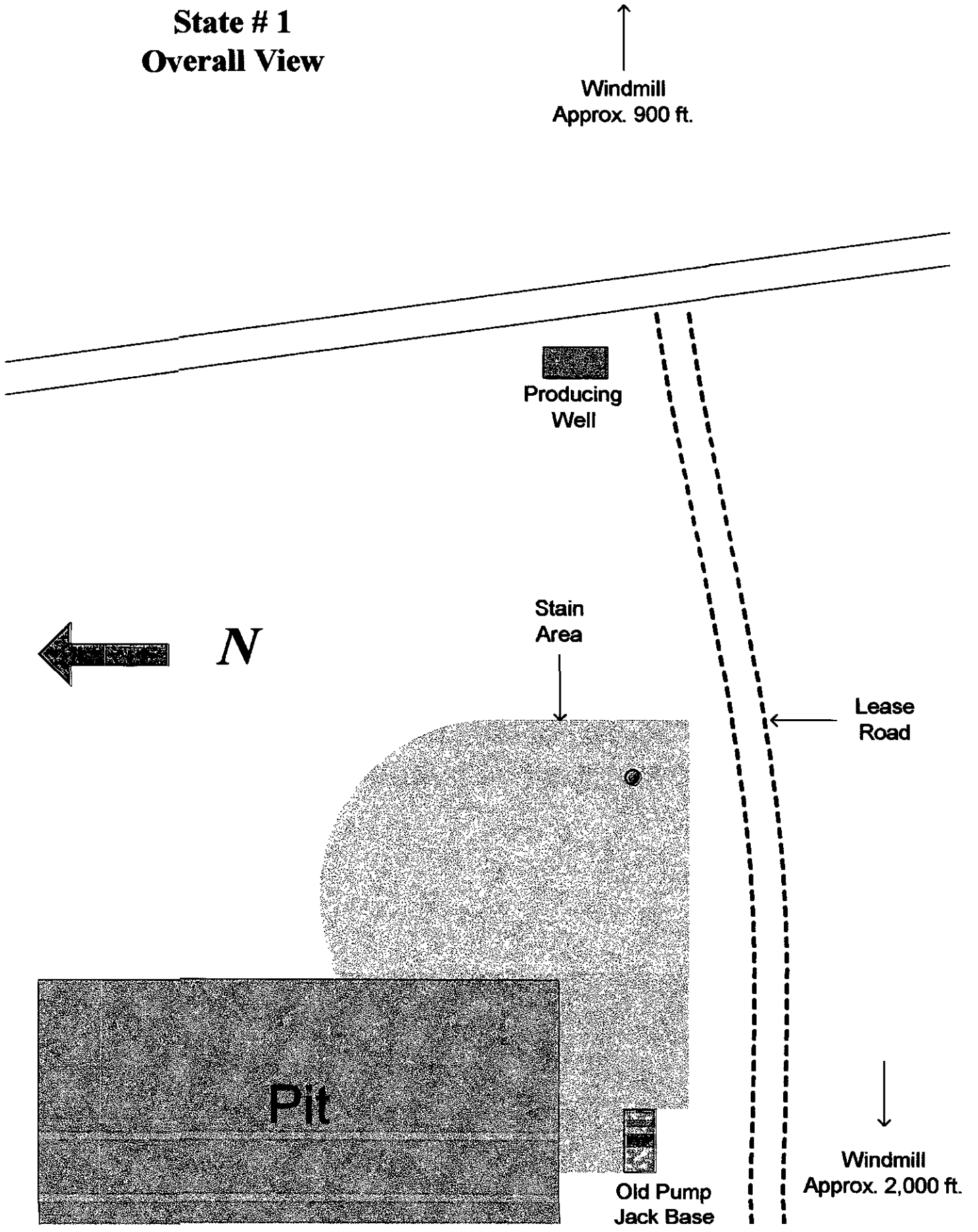


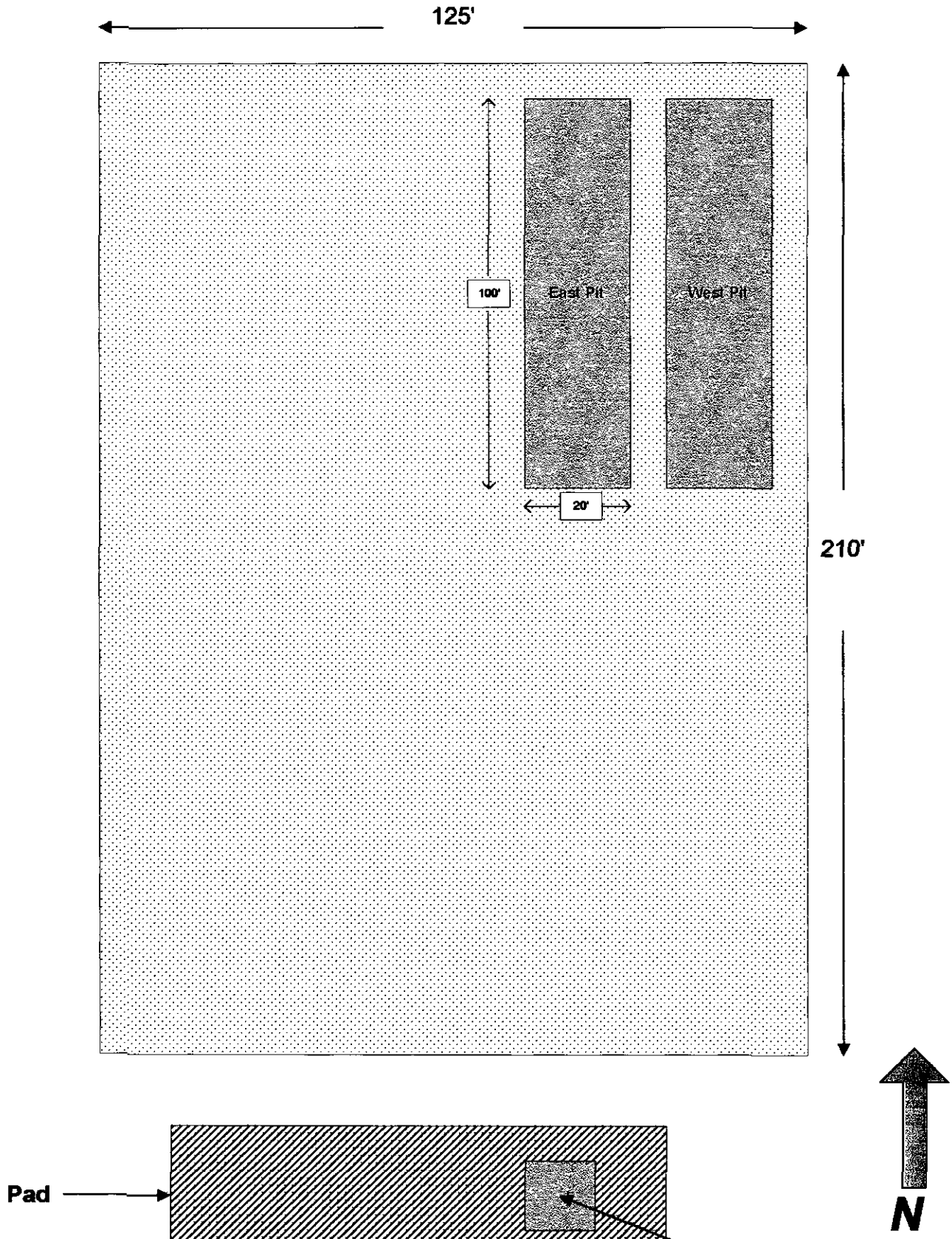
Chaparall White A
State # 1

Monarch White "A"
State # 1
Estimated Original Layout



Monarch White "A"
State # 1
Overall View





Chaparall
White "A" State # 1
Liner Locations

East Pit Liner Installation Detail

East Pit Liner Installation Detail


East Pit Excavation Detail


East Pit Liner Preparation Detail

West Pit Liner Installation Detail

West Pit Liner Installation Detail


Final Contour


Final Contour

GANDY-MARLEY, INC.
P.O. Box 1658
Roswell, NM 88202
(505) 625-9206
Fax (505) 625-9706

No 2442

LEASE OPERATOR/SHIPPER/COMPANY: Chaparral Energy

LEASE NAME: White State A #1

TRANSPORTER COMPANY: Gandy TIME: 5 00 AM/PM

DATE: 1/29/99 VEHICLE NO.: 503 DRIVER NO.: 503

CHARGE TO: Gandy

TYPE OF MATERIAL

OCD

[ ] Other Material: [x] Contaminated soil [ ] C-117 No.:_____
[ ] BS&W content:_____

Description: Exempt

VOLUME OF MATERIAL [ ]:YARDS 72 : CELL# 10 : [ ]_____

AS A CONDITION TO GANDY-MARLEY, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. §6901, et seq., THE NM HEALTH AND SAF. CODE, §361.001, et seq. AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED CONTAMINATED SOILS AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

ALSO AS A CONDITION TO GANDY-MARLEY, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, TRANSPORTER REPRESENTS AND WARRANTS THAT ONLY THE MATERIAL DELIVERED BY OPERATOR/SHIPPER TO TRANSPORTER IS NOW DELIVERED BY TRANSPORTER TO GANDY-MARLEY, INC.'S FACILITY FOR DISPOSAL.

THIS WILL CERTIFY that the above Transporter loaded the material represented by this Transporter Statement at the above described location, and that it was tendered by the above described shipper. This will certify that no additional materials were added to this load, and that the material was delivered without incident.

DRIVER: M. Frey

FACILITY REPRESENTATIVE: Tim Thumper

White - Gan Canary - Shipper Pink - Gan Gold - Transporter

119883

GANDY•MARLEY, INC.
P.O. Box 1658
Roswell, NM 88202
(505) 625-8206
Fax (505) 625-8706

No. 2443

LEASE OPERATOR/SHIPPER/COMPANY: Chaparral Energy

LEASE NAME: White

TRANSPORTER COMPANY: Gandy TIME: AM/PM

DATE: 1/19/98 VEHICLE NO.: 302 DRIVER NO.: [redacted]

CHARGE TO: Gandy

TYPE OF MATERIAL

OCD

[ ] Other Material: [x] Contaminated soil [ ] C-117 No.:_____
[ ] BS&W content:_____

Description: Exempt

VOLUME OF MATERIAL [ ]:YARDS 15Y : CELL# 10 : [ ]_____

AS A CONDITION TO GANDY•MARLEY, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. §6901, et seq., THE NM HEALTH AND SAF. CODE, §361.001, et seq. AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED CONTAMINATED SOILS AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

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DRIVER: [signature]

FACILITY REPRESENTATIVE: [signature]

White - GM Canary - Shipper Pink - GM Gold - Transporter

11883

GANDY-MARLEY, INC.
P.O. Box 1658
Roswell, NM 88202
(505) 625-8208
Fax (505) 625-8706

No 2441

LEASE OPERATOR/SHIPPER/COMPANY: Chaparral Energy

LEASE NAME: White State A #1

TRANSPORTER COMPANY: Gandy TIME: AM/PM

DATE: 1/19/99 VEHICLE NO.: 507 DRIVER NO.: 507

CHARGE TO: Gandy

TYPE OF MATERIAL

OCD

[ ] Other Material: [x] Contaminated soil [ ] C-117 No.:_____
[ ] BS&W content:_____

Description: Exempt

VOLUME OF MATERIAL: YARDS 48 : CELL# 10 : [ ] _____

AS A CONDITION TO GANDY-MARLEY, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. §6901, et seq., THE NM HEALTH AND SAF. CODE, §361.001, et seq. AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED CONTAMINATED SOILS AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

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DRIVER: _____

FACILITY REPRESENTATIVE: Jim Thompson

1/19/99

White - GMI Canary - Shipper Pink - GMI Gold - Transporter

GANDY-MARLEY, INC.

P.O. Box 1658
Roswell, NM 88202
(505) 625-8208
Fax (505) 625-8706

No 2439

LEASE OPERATOR/SHIPPER/COMPANY: CHAPARRAL Energy 118830

LEASE NAME: WHITE ST A # 1

TRANSPORTER COMPANY: GANDY TIME: 5 00 AM/PM

DATE: 1/19/99 VEHICLE NO.: 306 DRIVER NO.: [redacted]

CHARGE TO: GANDY

TYPE OF MATERIAL

OCD

[ ] Other Material: [X] Contaminated soil [ ] C-117 No.:_____

[ ] BS&W content:_____

Description: EXEMPT

132

VOLUME OF MATERIAL [X] YARDS [redacted] CELL# 10 : [ ] _____

AS A CONDITION TO GANDY-MARLEY, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. §6901, et seq., THE NM HEALTH AND SAF. CODE, §361.001, et seq. AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED CONTAMINATED SOILS AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

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DRIVER: James Kirkendall

FACILITY REPRESENTATIVE: Jim Thompson

#118830
13-HRS

White - GM Canary - Shipper Pink - GM Gold - Transporter

GANDY-MARLEY, INC.

P.O. Box 1658
Roswell, NM 88202
(505) 625-8208
Fax (505) 626-8706

No 2439

LEASE OPERATOR/SHIPPER/COMPANY: CHAPARRAL

LEASE NAME: WHITE ST A #1

TRANSPORTER COMPANY: GANDY TIME: 5:15 AM/PM

DATE: 1/13/99 VEHICLE NO.: 507 DRIVER NO.:

CHARGE TO: GANDY

TYPE OF MATERIAL

OCD

[ ] Other Material: [X] Contaminated soil [ ] C-117 No.:_____
[ ] BS&W content:_____

Description: EXEMPT

VOLUME OF MATERIAL [ ]:YARDS 84 72: CELL# 10 : [ ]_____

AS A CONDITION TO GANDY-MARLEY, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. §6901, *et seq.*, THE NM HEALTH AND SAF. CODE, §361.001, *et seq.* AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED CONTAMINATED SOILS AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

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DRIVER: [signature]

FACILITY REPRESENTATIVE: [signature]

White - GMI Canary - Shipper Pink - GMI Gold - Transporter

GANDY-MARLEY, INC.
P.O. Box 1658
Roswell, NM 88202
(505) 625-8206
Fax (505) 625-8706

No 2451

LEASE OPERATOR/SHIPPER/COMPANY: Chesapeake Energy

LEASE NAME: White & State #1

TRANSPORTER COMPANY: Gandy **TIME:** AM/PM

DATE: 1-30-99 **VEHICLE NO.:** 306 **DRIVER NO.:**

CHARGE TO: Gandy

TYPE OF MATERIAL

OCD

[ ] Other Material: [✓] Contaminated soil [ ] C-117 No.:_____
[ ] BS&W content:_____

Description: Exempt 60 yards sand

VOLUME OF MATERIAL [ ]:YARDS 60 : **CELL#** 10 : [ ] mixed

AS A CONDITION TO GANDY-MARLEY, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. §6901, et seq., THE NM HEALTH AND SAF. CODE, §361.001, et seq. AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED CONTAMINATED SOILS AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

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DRIVER: [signature]

FACILITY REPRESENTATIVE: Gandy

White - GMI Canary - Shipper Pink - GMI Gold - Transporter #123002,

GANDY-MARLEY, INC.
P. O. Box 1658
Roswell, NM 88202
(505) 625-8206
Fax (505) 625-8705

No 2444

LEASE OPERATOR/SHIPPER/COMPANY: Chaparral Energy

LEASE NAME: White State A #1

TRANSPORTER COMPANY: Gandy TIME: AM/PM

DATE: 1/20/99 VEHICLE NO.: 202 DRIVER NO.: 2

CHARGE TO: Gandy

TYPE OF MATERIAL

OCD

[ ] Other Material: [x] Contaminated soil [ ] C-117 No.:_____

[ ] BS&W content:_____

Description: Exempt 40 Sand

VOLUME OF MATERIAL: YARDS 66 : CELL# 20 : [ ] _____

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DRIVER: James Tidwell

FACILITY REPRESENTATIVE: _____

White - GMR Canary - Shipper Pink - GMR Gold - Transporter

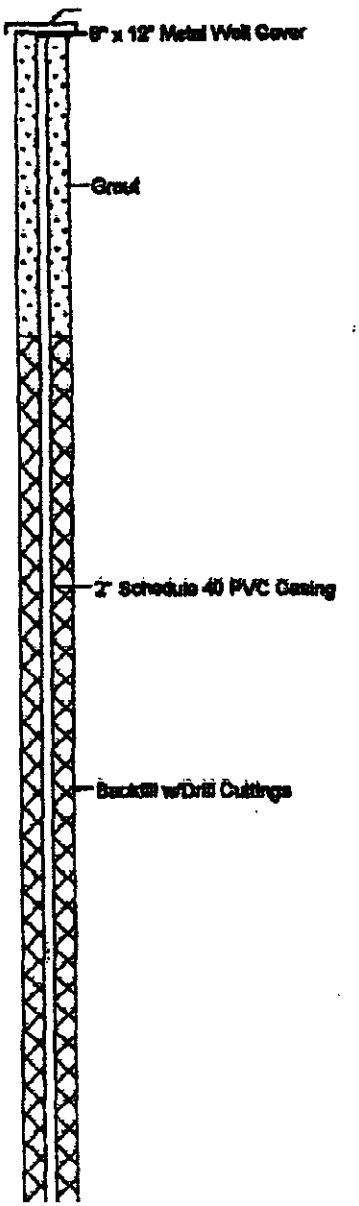
#118834

Atkins Engineering Associates, Inc. P.O. Box 3166 Roswell, New Mexico 88202	LOG OF BORING Monarch Corporation MW-1 (Page 1 of 2)

Chaparral Energy, Inc. 701 Cedar Lake Boulevard Oklahoma City, OK 73114	Date	: 4-27-08	Site Location	: White "A" State #1; Sec. 16 : T19S, R28E, Lea County
	Drill Start	: 8:40 A.M.		
Contact: Mr. Mike Griffin-Whole Earth	Drill End	: 5:30 P.M.	Auger Type	: Hollow Stem
Job #98192	Boring Location	: SE corner of pit	Logged By	: Mort Bolce

Depth in feet	GRAPHIC	USCS	Samples	DESCRIPTION
0				Caliche Rock w/Silty Clay, Brown, Firm, Damp
				Caliche Clay, Tan, Firm, Dry
5			1	
				Caliche Rock, White, Hard, Dry
10			2	
				Caliche Rock w/Clay, Tan, Firm, Dry
				Caliche Rock, White, Hard, Dry
15			3	Caliche Rock w/Clay, Tan, Firm, Damp
				Caliche w/Clay, Tan, Firm, Damp
20			4	
				Silty Sandy Clay, Reddish-Tan, Firm, Damp
25			5	
30		CL	6	
35			7	

Well: MW-1
Elev.:



Atkins Engineering Associates, Inc. P.O. Box 3156 Roswell, New Mexico 88202	LOG OF BORING Monarch Corporation MW-1 (Page 2 of 2)

Chaparral Energy, Inc. 701 Cedar Lake Boulevard Oklahoma City, OK 73114	Date	: 4-27-98	Site Location	: White "A" State #1, Sec. 15 ; T10S, R32E, Lea County
	Drill Start	: 8:40 A.M.		
	Drill End	: 9:30 P.M.	Auger Type	: Hollow Stem
Contact: Mr. Mike Griffin-Whole Earth	Boring Location	: SE corner of pit	Logged By	: Mort Bates
Job #98192				

Depth in feet	GRAPHIC	USCS	Samples	DESCRIPTION
40		CL		
				Silty Sandy Clay, Tan, Firm, Damp
45				
		CL		
50				
55				WL @ 55.83
		CL		Sandy Clay, Tan, Loose, Moist
				Sandy Clay, Tan, Firm, Saturated
60				
		CL		
65				
70				TD = 71 Ft.
75				

Well: MW-1
Elev.:

- Backfill w/Drill Cuttings
- 2" Schedule 40 PVC Casing
- Seal
- 8/16"Sand Pack
- 2" .020 PVC Screen

Atkins Engineering Associates, Inc. P.O. Box 3156 Roswell, New Mexico 88202	LOG OF BORING Monarch Corporation MW #2 (Page 1 of 2)

Chaparral Energy Inc.
701 Cedar Lake Blvd.
Oklahoma City, OK 73114

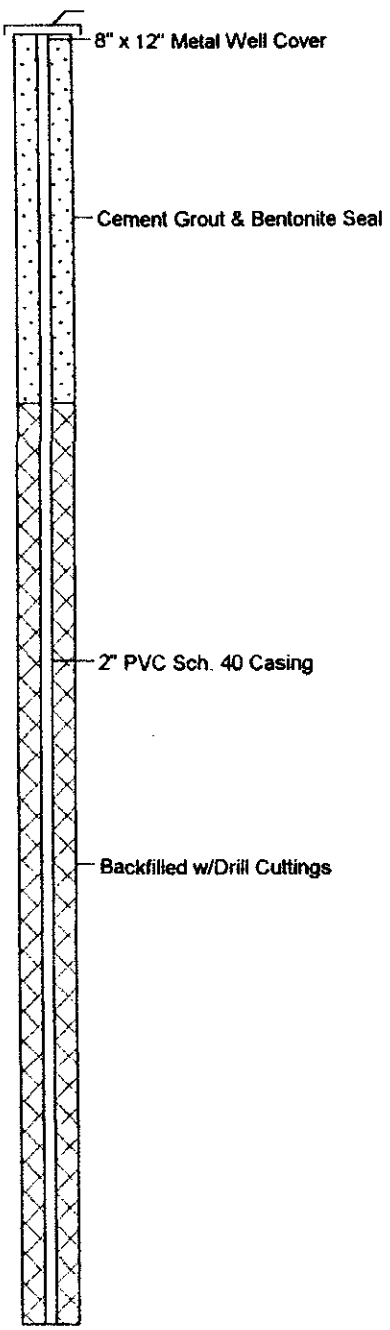
Contact: Mike Griffin

Job #99114

Date	: 1-21-99	Site Location	: White "A" State #1, Sec. 15,
Drill Start	: 8:15 A.M.	Auger Type	: Hollow Stem T10S, R32E
Drill End	: 4:00 P.M.	Logged By	: Mort Bates
Boring Location	: 130 ft. SE of MW #1		

Depth in feet	GRAPHIC	USCS	Samples	DESCRIPTION
0		CL		Silty clay w/Caliche Rock, Tan, Firm, Dry
				Caliche, Tan, Firm to Hard, Dry
15				Caliche w/Clay, Tan, Firm, Dry
20				Silty Clayey Sand, Reddish Tan, Firm, Dry
25		SC		
30				
35				

Well: MW-2
Elev.:



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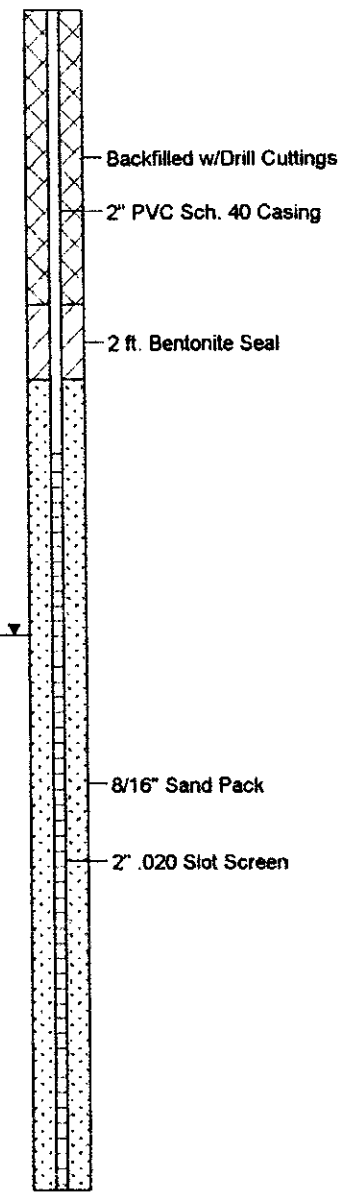
Atkins Engineering Associates, Inc. P.O. Box 3156 Roswell, New Mexico 88202	LOG OF BORING Monarch Corporation MW #2 (Page 2 of 2)

Chaparral Energy Inc.
701 Cedar Lake Blvd.
Oklahoma City, OK 73114
Contact: Mike Griffin
Job #99114

Date	: 1-21-99	Site Location	: White "A" State #1, Sec. 15,
Drill Start	: 8:15 A.M.	Auger Type	: Hollow Stem T10S, R32E
Drill End	: 4:00 P.M.	Logged By	: Mort Bates
Boring Location	: 130 ft. SE of MW #1		

Well: MW-2
Elev.:

Depth in feet	GRAPHIC	USCS	Samples	DESCRIPTION
35		SC		Silty Clayey Sand, Reddish-Tan, Firm, Dry
				Silty Sandy Clay, Tan, Loose, Damp
40				
45		CL		
50				WL @ 52 ft.
				Sandy Clay, Tan, Soft, Saturated
55				
60		CL		
65				
				TD = 67 ft.
70				Bailed well - recovered 8 gals before recovering water sample.



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Site Profile

White "A" State # 1 is the site of a partially remediated production pit location located immediately north of Hwy. 380 approximately 20 miles west of Tatum, New Mexico. The physical dimensions of the pit are approximately 210' X 125' X 5' average depth. The pit lies immediately north of the wellhead.

The pit was partially remediated by mixing and stirring the contaminated soils with a mixture of "gin trash" and dairy cow manure in an effort to expedite natural bio-remedial activities. Similarly a PVC manifold was installed over portions of the pit to enhance air, water and nutrient flow to the cell.

The Ogallala Aquifer is situated at a vertical distance of between 29'-55' (depending on seasonal variation) below the ground surface. No free standing ponds or streams exist within a one mile radius of the site.

The site is located within a semi-arid area. The soil morphology within the pit is fractured caliche, blow sand and the introduced bio-augmentation agents. A dense sandstone layer should exist immediately atop the Ogallala sands at a vertical distance of approximately 20'-25' below ground level.

The surface rights are owned by the State of New Mexico and are leased to a third party independent rancher. The primary land use is that of the grazing of beef cattle.

Protocol

This section contains a copy of the remediation protocol used on this project.

Pit Remediation Protocol
Chaparral Energy
Tatum Pit Closure Project

1.0 Purpose

This protocol is provide a detailed outline of the steps to be employed in the remediation and final closure of the Chaparral Energy White "A" State # 1 pit.

2.0 Scope

This protocol is site specific for the above stated site.

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 Chaparral 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 Chaparral 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 Chaparral 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. The area will be photographed prior to any excavation or fluid removal.

4.5 Each pit area will be swept with a Ludlam 2350 to determine if NORM is present in concentrations greater than 40μr / hr.

5.0 Fluid Removal

Prior to any excavation, the pit fluids shall be removed by vacuum truck and transported to the Gandy / Marley, Inc. Landfarm. A shipping manifest and O.C.D. Form C-117-A shall be prepared for each waste load.

6.0 Compaction & Coring

6.1 Soils which are highly saturated with hydrocarbons, (>20% generally), will be excavated and transported to the Gandy / Marley, Inc. Landfarm. A shipping manifest and O.C.D. Form C-117-A shall be prepared for each waste load. Care will be taken to insure that these soils remain within the truck during transport.

6.2 Atkins Engineering Associates, Inc. will drill a monitor well immediately adjacent to the southeast corner of the pit center using a continuous core sampler. The monitor well will be cased and screened in accordance with OCD guidelines. Whole Earth will collect water samples in accordance with our procedures WEQP-76 & WEQP-77. Confirmation samples will be analyzed by Environmental Labs of Texas for BTEX and DRO using EPA Methods 8020, 5030 and 8015m.

6.3 If the monitor well indicates the presence of "free product', two additional monitor wells will be drilled, cased and sampled in accordance with paragraph 6.2 of this protocol. The location of the two additional wells will be a minimum distance of 100' down gradient from the initial monitoring well and at a lateral distance of 50' from a continuation of the initial monitoring well and pit center.

6.4 If free product is discovered within the initial monitoring well, a recovery well will be drilled and developed in the approximate pit center at the completion of all remediation and surface reclamation activities.

7.0 Modeling

7.1 Whole Earth will model the migration potential of the plume on VADSAT using the results of the field screen analyses. If the results reflect a zero percentage probability of the plume impacting ground water, the OCD will be immediately notified and excavation operations begun.

7.2 The confirmation samples will be modeled upon receipt to verify a zero percentage probability. All modeling data will be included within the final closure documentation.

8.0 Excavation & Remediation

8.1 The site shall be excavated to the maximum contaminant concentrations specified in paragraph 8.2 of this protocol. All excavated material will be deposited immediately adjacent to the pit site.

8.2 The bottom of the pit and all four side walls will be tested for TPH and Benzene concentrations using WEQP-06 and WEQP-19. Excavation will continue until such concentrations are <100,000 ppm TPH, <10 ppm benzene and <50 ppm total BTEX. Confirmation samples will be collected and analyzed as described in 6.3 of this protocol.

8.3 Upon reaching the required depth and side wall concentrations, 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 to a minimum thickness of 6".

8.4 A polyethylene liner of a minimum thickness of 30 mils will be spread atop the sand to the pit edge and an additional 6" of sand deposited above it.

8.5 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 8.2 of this protocol. The remediated materials will then be replaced into the excavated area, compacted and the surface contoured to provide for positive drainage.

8.6 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. The area will be seeded with a mixture of local grasses.

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, BTEX and chloride concentrations after excavation.
- Field Sampling Report to include TPH, BTEX and chloride 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 copies of the detailed sample collection and field testing 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-12

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Soil Sample Preparation:
Moisture Weight Percentage

Completed By: Approved By: Effective Date: / /

1.0 Purpose

This procedure outlines the methods to be employed in preparing samples to be tested for electrical conductivity and cation exchange capacities.

2.0 Scope

This procedure shall be followed when preparing any electrical conductivity, (EC), or cation exchange capacity, (CEC), testing.

3.0 Procedure

3.1 Field collection of all soil samples shall be in plastic containers. Samples may be stored for a maximum of five days prior to processing.

3.2 Homogenize sample thoroughly. Test for hydrophobic characteristics as follows:

a. examine for visible globs of oil or grease
b. press soil sample to determine if it compresses into a damp mass
c. test to determine if the sample stains filter paper

If the sample exhibits hydrophobic characteristics, prepare in accordance with 3.3.2 below. Otherwise, prepare in accordance with 3.3.1.

3.3.1 Weigh 120 +/- 0.1g sample into tared crucible and dry at 105^{0} C for 1 hour. Cool and reweigh. Repeat until weight difference is less than 1% value.

3.3.2 Weigh 120 +/- 0.1 g sample into tared crucible and dry in oven at 250^0 C for one hour. Cool and heat with propane torch until sample just begins to smoke. Maintain gradual heating until smoke dissipates (approximately 1/2 hour). **DO NOT ALLOW THE SAMPLE TO CATCH FIRE OR EXCEED 390^0 C.** Cool and reweigh. Grind to pass 2mm sieve.

3.4 Report percent moisture to three significant figures as follows:

Moisture % = [(W - D)/D] X 100
W = wet sample weight
D = dry sample weight

3.5 *References*

Diagnosis and Improvement of Saline and Alkali Soils; U.S. Salinity Laboratory Staff, Agriculture Handbook No. 60; 1954

Deuel & Holliday, Soil Remediation for the Petroleum Extraction Industry; Houston, Tx. 1993.

QP-13

WHOLE EARTH ENVIRONMENTAL
QUALITY PROCEDURE

Procedure for Preparing a Paste Extraction

Completed By:	Approved By:	Effective Date: / /

1.0 Purpose

This procedure defines the methods to be employed in preparing a paste extraction to be analyzed for conductivity and exchangeable cations.

2.0 Scope

This procedure shall be used in all electrical Conductivity (EC) and Cation Exchange Capacity (CEC) tests.

3.0 Procedure

3.1 All samples shall be prepared in accordance with QP-12.

3.2 Weigh 100 +/- 0.1g soil sample into tared sample reservoir of filter assembly. Add deionized reagent water to fill pores, stirring gently with plastic stirrer to achieve saturation. The solid/water mixture is consolidated occasionally by tapping the container on the workbench. At saturation the surface of the mixture glistens and flows slightly when tipped. Let stand for one hour. The mixture should not stiffen or puddle; add more sample or water as required and allow to stand for one additional hour.

3.3 Analyze paste extract directly for EC and pH.

3.4 Connect filter assembly to vacuum assembly and filter extract until air begins to pass through filter. Analyze directly for Na, Ca, Mg, K.

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 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-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.

7.0 Documentation

7.1 The testing laboratory shall provide the following minimum information:

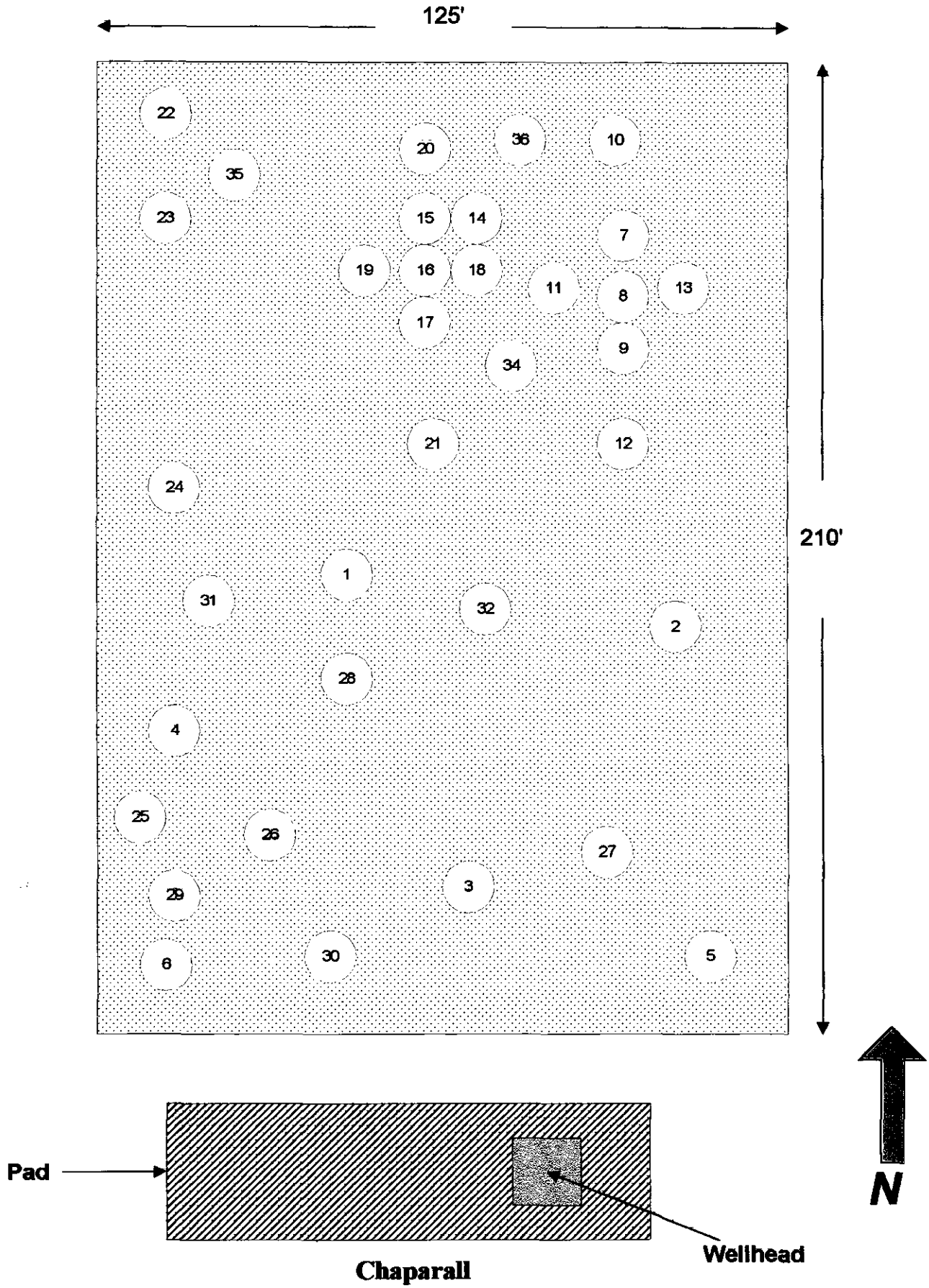
A. Client, Project and sample name.
B. Signed copy of the original Chain of Custody Form including data on the time the sample was received by the lab.
C. Results of the requested analyses
D. Test Methods employed
E. Quality Control methods and results

Field Testing Results

This section contains the results of field testing of TPH and chlorides conducted by Whole Earth during the excavation and remediation phases of the project. TPH testing was performed in accordance with WEQP-06 and conductivity testing in accordance with WEQP-12 and WEQP-13.

Whole Earth Environmental
Field Test
Analytical Results

Sample No.	Date	Analysis	Result	Tech.	Depth	Comments
1	1/18/99	TPH	>100,000	EW	Surface	Viscous, black "roofing tar"
2	1/18/99	TPH	56,000	EW	Surface	Viscous, black "roofing tar"
3	1/18/99	TPH	33,000	MG	Surface	Viscous, black "roofing tar"
4	1/18/99	TPH	>100,000	EW	Surface	Viscous, black "roofing tar"
5	1/18/99	TPH	1,520	EW	1'	Clean, undisturbed calichi
6	1/18/99	TPH	206	MG	3'	Clean, undisturbed calichi
7	1/20/99	TPH	5,660	MG	4'	Gray, gassy
8	1/20/99	TPH	4,100	MG	5'	Rubble
9	1/20/99	TPH	354	EW	8'	Clean, undisturbed calichi
10	1/20/99	TPH	287	MG	8'	Clean, undisturbed calichi
11	1/20/99	TPH	479	MG	8'	Clean, undisturbed calichi
12	1/20/99	TPH	336	MG	8'	Clean, undisturbed calichi
13	1/20/99	TPH	1,110	EW	8'	Clean, undisturbed calichi
14	1/20/99	TPH	>10,000	EW	4'	Gray, gassy
15	1/20/99	TPH	>10,000	EW	6'	Gray, gassy
16	1/21/99	TPH	5,960	EW	8'	Clean, undisturbed calichi
17	1/21/99	TPH	4,160	EW	8'	Clean, undisturbed calichi
18	1/21/99	TPH	4,420	MG	4'	Clean, undisturbed calichi
19	1/21/99	TPH	3,940	EW	4'	Clean, undisturbed calichi
20	1/21/99	TPH	3,240	EW	3'	Clean, undisturbed calichi
21	1/21/99	TPH	3,620	EW	4'	Clean, undisturbed calichi
22	1/22/99	TPH	1,780	EW	2'	Clean, undisturbed calichi
23	1/22/99	TPH	2,550	EW	4'	Clean, undisturbed calichi
24	1/22/99	TPH	1,660	EW	3'	Clean, undisturbed calichi
25	1/22/99	TPH	1,050	EW	Surface	Soils mixed & blended w / sand
26	1/22/99	TPH	501	EW	Surface	Soils mixed & blended w / sand
27	1/22/99	TPH	266	EW	Surface	Soils mixed & blended w / sand
28	1/22/99	TPH	3,610	EW	Surface	Soils mixed & blended w / sand
29	1/22/99	TPH	5,720	EW	Surface	Soils mixed & blended w / sand
30	1/22/99	TPH	851	EW	Surface	Soils mixed & blended w / sand
31	1/22/99	TPH	2,430	EW	Surface	Soils mixed & blended w / sand
32	1/22/99	TPH	1,610	EW	Surface	Soils mixed & blended w / sand
33	1/22/99	TPH	4,230	EW	Surface	Soils mixed & blended w / sand
34	1/22/99	TPH	91	EW	Surface	Soils mixed & blended w / sand
35	1/22/99	TPH	806	EW	Surface	Soils mixed & blended w / sand
36	1/22/99	TPH	417	EW	Surface	Soils mixed & blended w / sand



Chaparall
White "A" State # 1
Sampling Locations

Laboratory Testing Results

This section contains the results of the Chain of Custody and laboratory confirmation results of soil and water samples obtained from the site. Soil samples were collected in accordance with WEQP-77; water samples in accordance with WEQP-76. The laboratory procedures used were SW 846-8020, 5030 and EPA method 418.1. Chlorides were analyzed in accordance with SW 846-9252. Quality control results are noted on each analysis.

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
Phone #: 1-800-654-4358
FAX #:
Company Name & Address: Whole Earth / Chaparral
Project #:
Project Name: White 'A' State Lease Tank Btry
Project Location: Caprock
Sampler Signature:

ANALYSIS REQUEST

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 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	Chlorides
16839	Cover up	1			X						X					✓	✓							
16840	Cover up	1			X						X					✓	✓							
16841	Water > 1 Sample.	1		X							X					✓								
16842	Water	1		X							X					✓								

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[signature]	1-25-99	11:10 AM	[signature]
Relinquished by:	Date:	Times:	Received by:
Relinquished by:	Date:	Times:	Received by Laboratory:

REMARKS
Call M. Griffin concerning H_2O's

P. 03

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: Mike Griffin
Phone #: (800) 854-4358
FAX #:
Company Name & Address:
Project #:
Project Name: Chaparral
Project Location: Tatum, NM
Sampler Signature: M. Griffin

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
16856	MW-2	1	L	✓							✓			1-27	6:30
16857	B	1	40ml		✓						✓			1-24	11:40
16858	WW	1			✓						✓			"	11:45
16859	NW	1			✓						✓			"	✓
16860	SW	1			✓						✓			"	✓
16861	EW	1			✓						✓			✓	✓
16862	EPS	1	—		✓						✓			1-23	4:20

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	Chlorides
✓	✓							✓

Relinquished by:	Date:	Time:	Received by:
M. Griffin	1-27-99	1010	
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS:

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. Griffin

Phone #: (800) 854-4388

FAX #: (281) 492-8669

Company Name & Address: Whole Earth Environ.

Project #: Chaparral White # State A

Project Name :

Project Location: Tatum, NM

Sampler Signature: M. Griffin

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	MATRIX: SOIL	MATRIX: AIR	MATRIX: SLUDGE	MATRIX: OTHER	PRESERVATIVE METHOD: HCL	PRESERVATIVE METHOD: HNO3	PRESERVATIVE METHOD: ICE	PRESERVATIVE METHOD: NONE	PRESERVATIVE METHOD: OTHER	SAMPLING: DATE	SAMPLING: TIME	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	Chlorides
16796	East				✓									1-19	8:20	✓	✓							✓
16797	Bottom				✓									✓	✓	✓	✓							✓
16798	North				✓									✓	/	✓	✓							✓
16799	West				✓									✓	/	✓	✓							✓

Relinquished by:	Date:	Time:	Received by:
M. Griffin	1-20-99	1100	Ralph [illegible]
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS

Chlorides on separate report

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: 1-281-492-8669

Receiving Date: 01/20/99
Sample Type: Soil
Project Name: Chaparral White State A
Project #: None Given
Project Location: Tatum, N.M.

Analysis Date: 01/20/99
Sampling Date: 01/19/99
Sample Condition: Intact

ELT#	FIELD CODE	BENZENE mg/kg	TOLUENE mg/kg	ETHYLBENZENE mg/kg	m,p-XYLENE mg/kg	o-XYLENE mg/kg	TPH mg/kg
16796	East	<0.100	0.113	0.103	<0.100	<0.100	860
16797	Bottom	<0.100	<0.100	<0.100	<0.100	<0.100	250
16798	North	<0.100	<0.100	<0.100	0.103	<0.100	250
16799	West	<0.100	<0.100	<0.100	0.114	<0.100	330
	% IA	112	109	107	106	108	100
	% EA	107	102	100	100	101	109
	BLANK	<0.100	<0.100	<0.100	<0.100	<0.100	<10

METHODS: SW 846-8020,5030, EPA 418.1

Raland K Tuttle
Raland K. Tuttle

1-25-99
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: 1-281-646-8998

Receiving Date: 01-27-99
Sample Type: Soil
Project Name: CHAPARRAL
Project #: NONE GIVEN
Project Location: Tatum, NM

Analysis Date: 01/27/99
Sampling Date: 1/23-1/24/99
Sample Condition: Iced/Intact

ELT#	FIELD CODE	BENZENE mg/kg	TOLUENE mg/kg	ETHYLBENZENE mg/kg	m,p-XYLENE mg/kg	o-XYLENE mg/kg	TPH mg/kg
16857	B	0.266	3.20	7.36	4.30	1.87	12,550
16858	WW	0.343	6.24	6.04	7.81	4.75	14,275
16859	NW	0.708	2.72	5.03	2.69	1.49	18,350
16860	SW	1.08	10.0	17.4	13.2	6.64	16,000
16861	EW	0.189	.723	3.08	2.39	1.51	25,550
16862	EPS	<0.100	<0.100	<0.100	<0.100	<0.100	300
	% IA	102	98	96	94	95	100
	% EA	103	96	96	98	93	109
	BLANK	<0.100	<0.100	<0.100	<0.100	<0.100	<10

METHODS: SW 846-8020.5030. EPA 418.1

Raland K. Tuttle

1-29-99
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: 1-281-646-8996

Receiving Date: 01/25/99
Sample Type: Soil
Project Name: White "A" State Lease Tank Battery
Project #: None Given
Project Location: Caprock

Analysis Date: 01/26/99
Sampling Date: None Given
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
16839	Cover Up	<0.100	<0.100	<0.100	<0.100	<0.100
16840	Cover Up	<0.100	0.289	1.08	0.702	0.330
	% IA	104	99	100	97	100
	% EA	105	99	98	95	96
	BLANK	<0.100	<0.100	<0.100	<0.100	<0.100

METHODS: SW 846-8020,5030

Raland K Tuttle
Raland K. Tuttle

1-29-99
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: 281-646-8996

Receiving Date: 01/25/99
Sample Type: Soil
Project #: None Given
Project Name: White "A" State Lease Tank Battery
Project Location: Caprock

Analysis Date: 01/26/99
Sampling Date: None Given
Sample Condition: Intact/Iced

ELT#	FIELD CODE	TPH mg/kg	Chlorides mg/kg
16839	Cover Up	300	43
16840	Cover Up	7225	255
	QUALITY CONTROL	515	5211
	TRUE VALUE	515	5000
	% PRECISION	100	104

METHODS: SW 846-9252, EPA 418.1

Raland K. Tuttle

1-29-99
Date

ENVIRONMENTAL LAB OF TEXAS, INC.

"Don't Treat Your Soil Like Dirt!"

WHOLE EARTH ENVIRONMENTAL
ATTN: MR. MIKE GRIFFIN
19606 SAN GABRIEL
HOUSTON, TEXAS 77084
FAX: 281-646-6996

RECEIVING DATE: 01/27/99
SAMPLE TYPE: Water
PROJECT #: None Given
PROJECT NAME: Chaparral
PROJECT LOCATION: Tatum, New Mexico

ANALYSIS DATE: 02/01/99
SAMPLING DATE: 01/27/99
SAMPLE CONDITION: Intact/Iced

ELT#	FIELD CODE	Chlorides (mg/L)
16856	MW-2	74
	REPORTING LIMIT	0.5
	RPD	9
	% EXTRACTION ACCURACY	91
	% INSTRUMENT ACCURACY	97

Methods: EPA 300.0

Raland K Tuttle
Raland K. Tuttle

2-2-99
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: 1-281-646-8996

Receiving Date: 01/25/99
Sample Type: Water
Project Name: White "A" State Lease Tank Battery
Project #: None Given
Project Location: Caprock

Analysis Date: 01/27/99
Sampling Date: None Given
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
16841	Water	<0.001	<0.001	<0.001	<0.001	<0.001
	% IA	102	98	96	94	95
	% EA	104	96	94	92	95
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001

METHODS: SW 846-8020,5030

Raland K. Tuttle

Raland K. Tuttle

1-29-99
Date

VADSAT Modeling

The enclosed VADSAT contaminant migration model is based upon new distance and concentration factors determined by actual site conditions after excavation. The results show that the actual remaining concentrations of TPH and BTEX below the liner will not reach the water table within a one hundred year span. The modeled results are supported by the test results of two monitor wells that were erected immediately down-gradient of the site. Chaparral will continue to monitor the water within these wells on an annual basis for a minimum period of five years.

Modeling Data Entry
Chaparral Energy
White State "A" # 1
Hydrocarbon Migration Model

Control Data	Entry	U / M
Deterministic	Yes	
Monte Carlo	No	
Evaporation of Chemicals	Yes	
Adsorbed Phase Biodecay	Yes	
Low Permeability Layer Below Contamination	Not Present	

Source Data		
Waste Zone Thickness	2	meters
Waste Zone Area	26,250	Sq. Feet
Ratio of Length to Width	1.46 : 1	
Soil Thickness Above Waste Zone	0.5	Feet
Contaminant Concentration in Soil / Waste Zone	100	ppm (benzene)
Hydrocarbon Concentration in Soil / Waste Zone	25,550	ppm

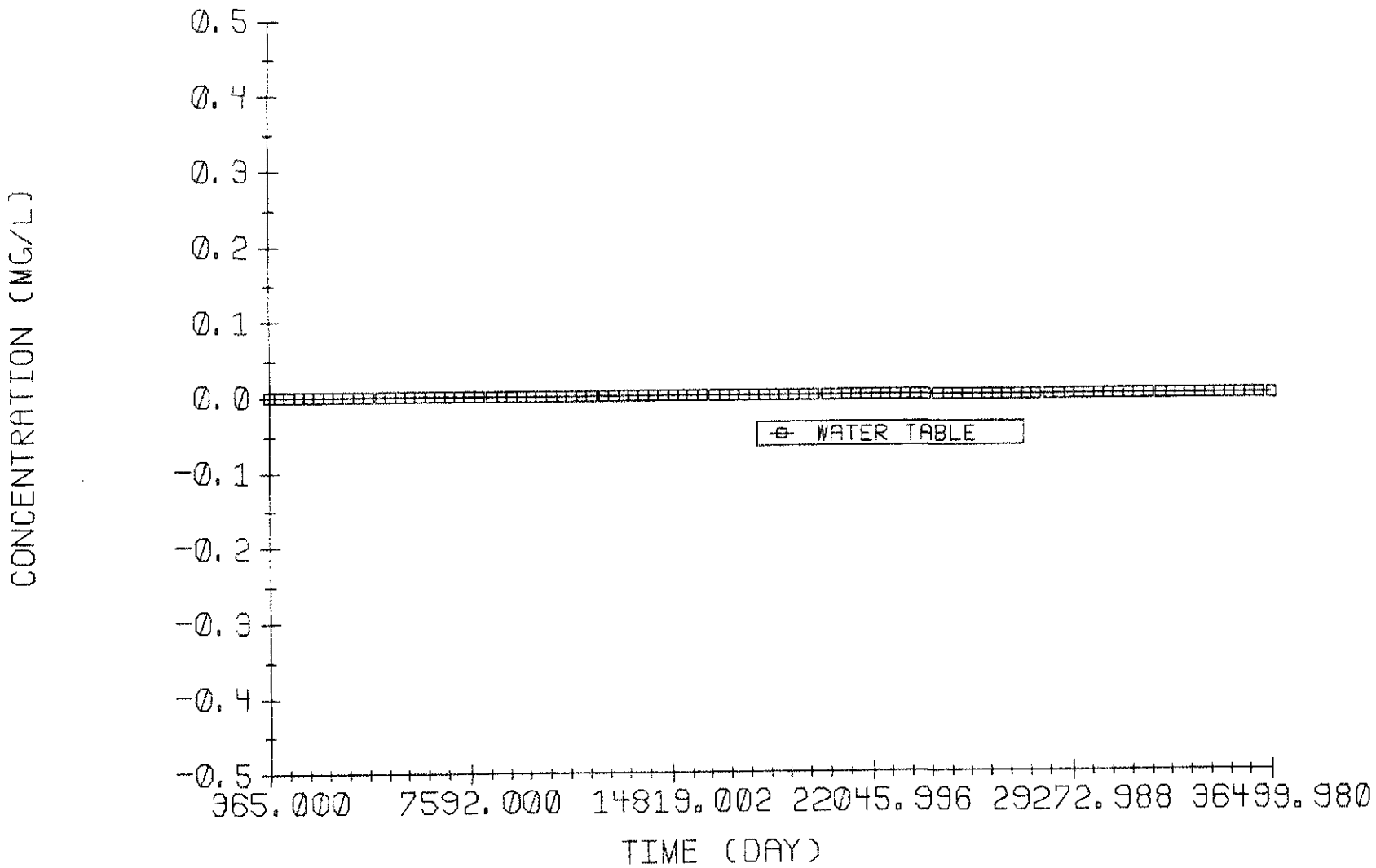
Chemical Data	
Benzene	Yes

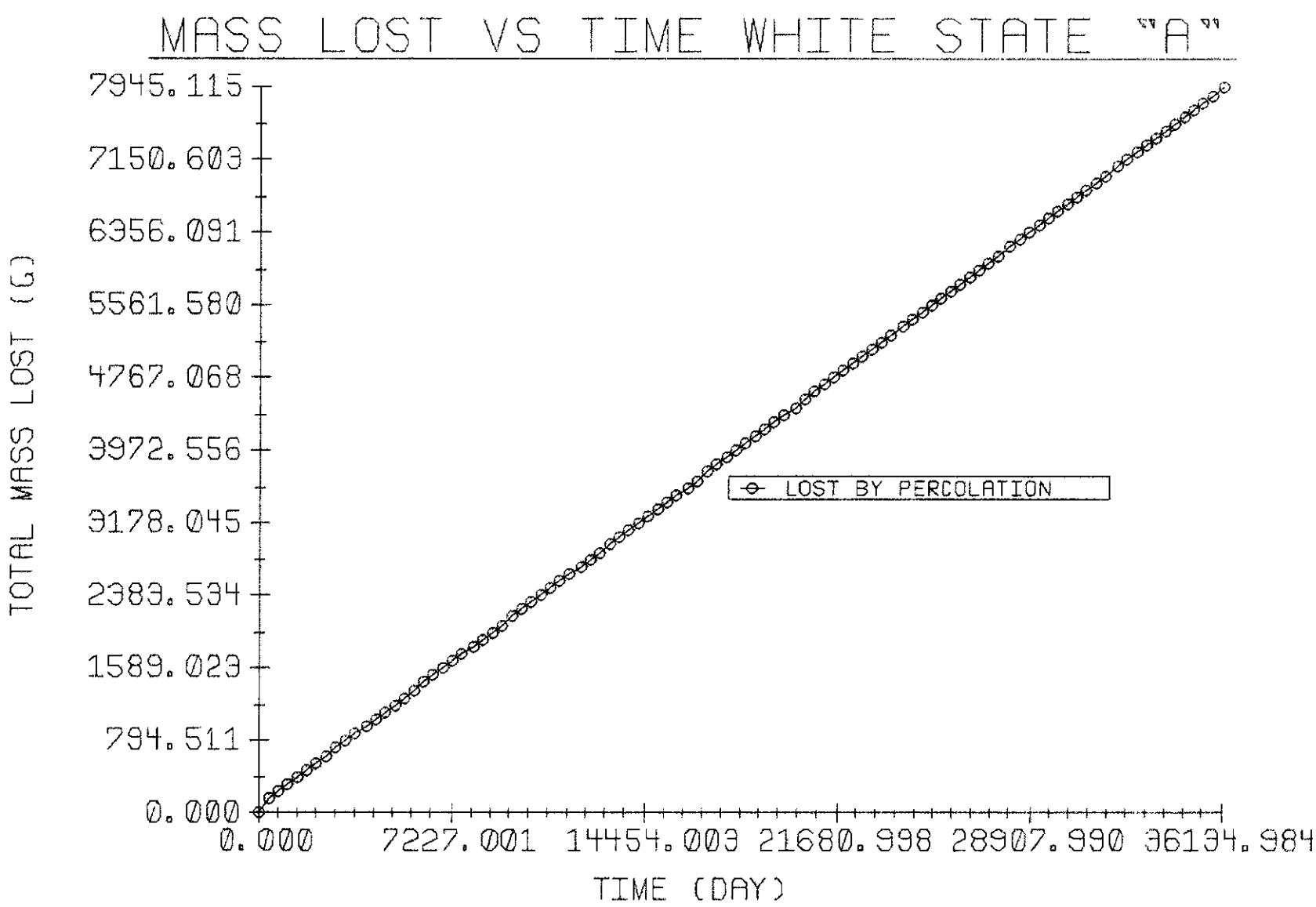
Unsaturated Zone		
Biodecay Cooefficient	0	1 / day
Organic Carbon Fraction	0.00E+00	
Soil Database	Sandy Clay	
Hydrological Database	Sedimentary	
Unsaturated Zone Thickness	20	Feet
Soil Database	Sandy Clay	
van Genuchten n	1.09	(Default)
Residual Water Content	0.01001	
Unsaturated Zone Dispersivity	0	*Internally*

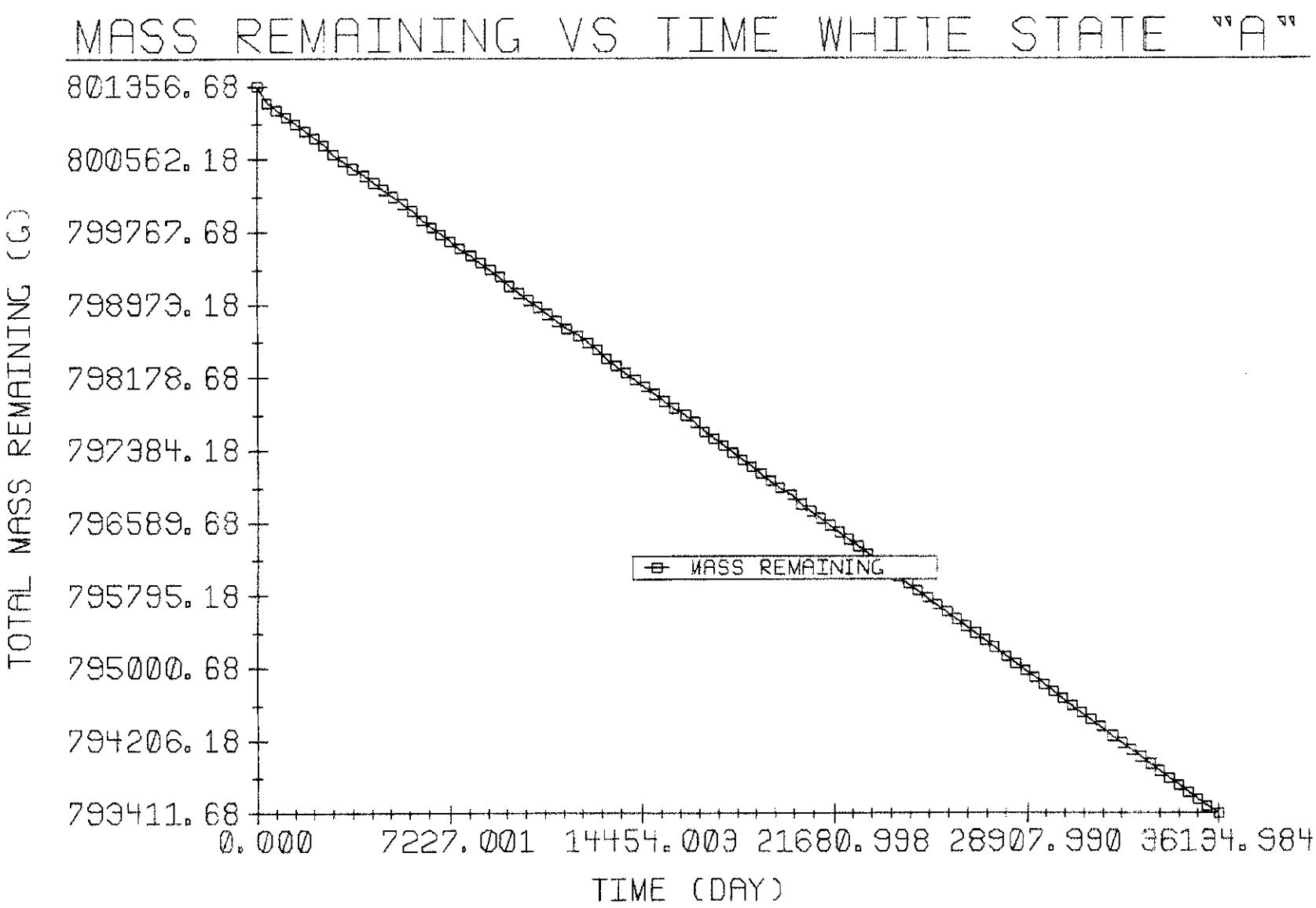
Saturated Zone		
Biodecay Cooefficient	0	
Aquifer Porosity	0.2	(Default)
Organic Carbon Fraction	0	Internally
Longitudinal Dispersivity	0	Internally
Ratio of Long. / Trans. Dispersivities	3	
Ratio of Trans. / Vert. Dispersivities	87	Default
Hydrological Database	Sedimentary	
Aquifer Thickness	10	meters
Aquifer Gradient	0.00357	Default
Saturated Hydraulic Conductivity	0.13	meters / day

Net Infiltration Rate	0.00001	ft. / day

CONCENTRATION VS. TIME WHITE STATE "A"




MASS LOST VS TIME WHITE STATE "A"
TOTAL MASS LOST (G)
7945.115
7150.603
6356.091
5561.580
4767.068
3972.556
3178.045
2383.534
1589.023
794.511
0.000
0.000
7227.001
14454.003
21680.998
28907.990
36134.984
TIME (DAY)
LOST BY PERCOLATION


MASS REMAINING VS TIME WHITE STATE "A"
801356.68
800562.18
799767.68
798973.18
798178.68
797384.18
796589.68
795795.18
795000.68
794206.18
793411.68
TOTAL MASS REMAINING (G)
MASS REMAINING
0.000
7227.001
14454.003
21680.998
28907.990
36134.984
TIME (DAY)