PLS 9-20-05 SF inc.

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised June 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

# Release Notification and Corrective Action

## OPERATOR

☒ Initial Report ☐ Final Report

| | |
|---|---|
| Name of Company New Mexico Salt Water Disp Co | Contact |
| Address P. O. Box 1518 Roswell, NM 88202 | Telephone No. |
| Facility Name Station 11 | Facility Type SWD Station 11 |

| | | |
|---|---|---|
| Surface Owner State of New Mexico | Mineral Owner | Lease No. |

## LOCATION OF RELEASE

| Unit Letter | Section | Township | Range | Feet from the | North/South Line | Feet from the | East/West Line | County |
|---|---|---|---|---|---|---|---|---|
| | 21 | 10S | 34E | 850 | North | 850 | West | Lea |

## NATURE OF RELEASE

| | | |
|---|---|---|
| Type of Release Produced Water | Volume of Release 1,000 bbl | Volume Recovered 950 bbl |
| Source of Release Pipeline | Date and Hour of Occurrence | Date and Hour of Discovery |
| Was Immediate Notice Given? ☐ Yes ☒ No ☐ Not Required | If YES, To Whom? | Occurred 9/14/05 AM<br>Discovered 9/14/05 AM |
| By Whom? | Date and Hour | |
| Was a Watercourse Reached? ☐ Yes ☒ No | If YES, Volume Impacting the Watercourse. | |

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

6" PVC T fitting broke between tank and pipeline. Water stayed within berms. Trucks immediately vacuumed up majority of water.

Describe Area Affected and Cleanup Action Taken.*

Bermed area affected. Water immediately recovered. New T installed. Will excavate impacted soil and back fill with clean soil.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

| | |
|---|---|
| Signature: | OIL CONSERVATION DIVISION |
| Printed Name: John C. Maxey, Jr. | Approved by District Supervisor: |
| Title: Agent | Approval Date: / Expiration Date: |
| E-mail Address: | Conditions of Approval: / Attached ☐ |
| Date: 9/16/05 Phone: 505/622-3770 | |

* Attach Additional Sheets If Necessary

| | |
|---|---|
| Post-it® Fax Note 7671 | Date 9-16-05 # of pages ▶ 1 |
| To OCD - Hobbs | From JOHN MAXEY |
| Co./Dept. | Co. NMSWD Co |
| Phone # 505-393-6161 | Phone # 505-622-3770 |
| Fax # 505-393-6720 | Fax # |

MS 9-20-05 SF. Lic.

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# Release Notification and Corrective Action

## OPERATOR

☒ Initial Report ☐ Final Report

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|---|---|
| Name of Company New Mexico Salt Water Disp Co | Contact |
| Address P. O. Box 1518 Roswell, NM 88202 | Telephone No. |
| Facility Name Station 11 | Facility Type SWD Station 11 |

| | | |
|---|---|---|
| Surface Owner State of New Mexico | Mineral Owner | Lease No. |

## LOCATION OF RELEASE

| Unit Letter | Section | Township | Range | Feet from the | North/South Line | Feet from the | East/West Line | County |
|---|---|---|---|---|---|---|---|---|
| | 21 | 10S | 34E | 850 | North | 850 | West | Lea |

## NATURE OF RELEASE

| | | |
|---|---|---|
| Type of Release Produced Water | Volume of Release 350 bbl | Volume Recovered 325 bbl |
| Source of Release Pipeline | Date and Hour of Occurrence | Date and Hour of Discovery |
| Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required | If YES, To Whom? | Occurred 9/19/05 AM<br>Discovered 9/19/05 AM |
| By Whom? Justin Johnson | Date and Hour | |
| Was a Watercourse Reached? ☐ Yes ☒ No | If YES, Volume Impacting the Watercourse. | |

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

4" Dresser sleeve between tank and pipeline parted. Water stayed within berms with 25 bbls outside berm on west side. Trucks immediately vacuumed up majority of water.

Describe Area Affected and Cleanup Action Taken.*

Bermed area affected. Water immediately recovered. New Dresser sleeve installed. NMSWDC preparing work plan for OCD concerning remediation.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

| | |
|---|---|
| Signature: | OIL CONSERVATION DIVISION |
| Printed Name: John C. Maxey, Jr. | Approved by District Supervisor: |
| Title: Agent | Approval Date: / Expiration Date: |
| E-mail Address: | Conditions of Approval: / Attached ☐ |
| Date: 9/19/05 Phone: 505/622-3770 | |

* Attach Additional Sheets If Necessary

Post-it® Fax Note 7671 | Date 9-20-05 | # of pages ▶ 1
To OCD - Hobbs | From John Maxey
Co./Dept. | Co. NMSWD Co.
Phone # 505-393-6161 | Phone # 505-622-3770
Fax # 505-393-0720 | Fax #

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1625 N. French Dr., Hobbs, NM 88240
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Form C-141
Revised October 10, 2003

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# Release Notification and Corrective Action

## OPERATOR

☐ Initial Report ☐ Final Report

| | |
|---|---|
| Name of Company | Contact |
| Address | Telephone No. |
| Facility Name | Facility Type |

| | | |
|---|---|---|
| Surface Owner | Mineral Owner | Lease No. |

## LOCATION OF RELEASE

| Unit Letter | Section | Township | Range | Feet from the | North/South Line | Feet from the | East/West Line | County |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**Latitude**_____ **Longitude**_____

## NATURE OF RELEASE

| | | |
|---|---|---|
| Type of Release | Volume of Release | Volume Recovered |
| Source of Release | Date and Hour of Occurrence | Date and Hour of Discovery |
| Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required | If YES, To Whom? | |
| By Whom? | Date and Hour | |
| Was a Watercourse Reached? ☐ Yes ☐ No | If YES, Volume Impacting the Watercourse. | |

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

Describe Area Affected and Cleanup Action Taken.*

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|---|---|---|
| Signature: | OIL CONSERVATION DIVISION | |
| Printed Name: | Approved by District Supervisor: | |
| Title: | Approval Date: | Expiration Date: |
| E-mail Address: | Conditions of Approval: | Attached ☐ |
| Date: Phone: | | |

* Attach Additional Sheets If Necessary

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Revised October 10, 2003

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# Release Notification and Corrective Action

## OPERATOR

☐ Initial Report ☐ Final Report

| | |
|---|---|
| Name of Company | Contact |
| Address | Telephone No. |
| Facility Name | Facility Type |

| | | |
|---|---|---|
| Surface Owner | Mineral Owner | Lease No. |

## LOCATION OF RELEASE

| Unit Letter | Section | Township | Range | Feet from the | North/South Line | Feet from the | East/West Line | County |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**Latitude**_____ **Longitude**_____

## NATURE OF RELEASE

| | | |
|---|---|---|
| Type of Release | Volume of Release | Volume Recovered |
| Source of Release | Date and Hour of Occurrence | Date and Hour of Discovery |
| Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required | If YES, To Whom? | |
| By Whom? | Date and Hour | |
| Was a Watercourse Reached? ☐ Yes ☐ No | If YES, Volume Impacting the Watercourse. | |

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

Describe Area Affected and Cleanup Action Taken.*

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|---|---|---|
| Signature: | OIL CONSERVATION DIVISION | |
| Printed Name: | Approved by District Supervisor: | |
| Title: | Approval Date: | Expiration Date: |
| E-mail Address: | Conditions of Approval: | Attached ☐ |
| Date: Phone: | | |

* Attach Additional Sheets If Necessary

TRANSMISSION VERIFICATION REPORT

TIME : 09/20/2005 08:04
NAME : EMNRD OCD
FAX : 5053930720
TEL : 5053936161
SER.# : BROM4J158511

| | |
|---|---|
| DATE,TIME | 09/20 08:03 |
| FAX NO./NAME | 17004763462 |
| DURATION | 00:00:37 |
| PAGE(S) | 03 |
| RESULT | OK |
| MODE | STANDARD ECM |

# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**
Governor
**Joanna Prukop**
Cabinet Secretary

**Mark E. Fesmire, P.E.**
Director
**Oil Conservation Division**

## FAX

TO: Glenn

FROM: Paul S.

RE: New Mexico Saltwater Disposal C-141

DATE: 9-20-05

# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**
Governor
**Joanna Prukop**
Cabinet Secretary

**Mark E. Fesmire, P.E.**
Director
**Oil Conservation Division**

## FAX

TO: John Maxey

FROM: Paul Sheeley

RE: re-submit - correct forms attached

DATE: 9-20-05

Please use correct C-141 form

NO. OF PAGES 5 INCLUDING COVERSHEET

Oil Conservation Division * 1625 N. French Drive * Hobbs, New Mexico 88240
Phone: (505) 393-6161 * Fax (505) 393-0720 * http://www.emnrd.state.nm.us

TRANSMISSION VERIFICATION REPORT

TIME : 09/20/2005 08:31
NAME : EMNRD OCD
FAX : 5053930720
TEL : 5053936161
SER.# : BROM4J158511

| | |
|---|---|
| DATE,TIME | 09/20 08:30 |
| FAX NO./NAME | 15056228643 |
| DURATION | 00:01:40 |
| PAGE(S) | 05 |
| RESULT | OK |
| MODE | STANDARD ECM |

# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**
Governor
**Joanna Prukop**
Cabinet Secretary

**Mark E. Fesmire, P.E.**
Director
**Oil Conservation Division**

## FAX

TO: John Maxey

FROM: Paul Sheeley

RE: re-submit - correct forms attached

DATE: 9-20-05

Please use correct C-141 form

NMSWD
(New Mexico Salt Water Disposal)
P. O. Box 1518
Roswell, New Mexico 88201
505/622-3770

November 15, 2005

Ms. Cheryl O'Connor, Esq.
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: Stage/Abatement Plan Proposal

Dear Ms. O'Connor:

In accordance with Notice of Violation issued to New Mexico Salt Water Disposal Company ("NMSWD") on September 16, 2005, I am enclosing NMSWD's Stage 1 abatement plan proposal for its Station 11 tank battery site.

Very truly yours,

Charles B. Read
President, Owner

CBR/lll

Cc: OCD District 1
1625 N. French Drive
Hobbs, NM 88240

Letter and Abatement Plan

This "Abatement Plan" sent to Chevy! did Glenn get copied? Dist. I Not notified for soil borings

## STAGE 1 ABATEMENT PLAN PROPOSAL

**NMSWD**
**Station #11 Tank Battery**
**Unit Letter D, Section 21**
**Township 10 South, Range 34 East**
**Lea County, New Mexico**

**November 14, 2005**

CMB Environmental and Geological Services, Inc. proposes to complete the *Stage One Abatement Plan* on the above described property as requested by the Owner, New Mexico Salt Water Disposal Company ("NMSWD") and the New Mexico Oil Conservation Division ("NMOCD"). This Stage 1 Abatement Plan is pursuant to and in accordance with the "*Notice of Violation*" issued to NMSWD on September 16, 2005 by the NMOCD and in compliance with Subsection E of 19.15.1.19 NMAC.

*The purpose of this Stage 1 Abatement Plan is to design and conduct a site investigation that will adequately define site conditions, and provide the data necessary to select and design an effective abatement option.*

Our work will conform to NMOCD Regulations; NMOCD approved Soil and Groundwater Sampling and Disposal Guidelines, OSHA Regulaitons, and other rules and regulations governing the work we propose herein. The work will be supervised by an experienced registered professional geologist and will be completed in an efficient, cost-effective manner.

### *1.0 Site Description:*

The NMSWD Station # 11 is located in unit letter D of Section 21 of Township 10 South, Range 34 East, NMPM, Lea County, New Mexico.

**Physical Setting of Site and Surface Characteristics**:

To arrive at NMSWD's Station # 11, drive from Caprock, New Mexico go east on NM 380 3.15 miles to county road (black top) turn north, go 10 miles and turn east on county road (black top), go 11 miles and turn south on caliche road, go 4.3 miles to a tee in the road, turn west, go 1 mile, turn south, follow road ¾ mile to NMSWD Station # 11.

**Soils:**

According to the U.S. Conservation Service Soil Survey of Lea County, New Mexico, soils in the area of the NMSWD Station # 11 are of the Brownfield Series.

*"The Brownfield series consists of well-drained soils that have a thick surface layer of fine sand and sandy clay loam subsoil. They are formed in wind-deposited sands on uplands in the northern part of Lea County. Slopes are 0-3 percent. The vegetation consists of tall and arid grasses and shrubs. The average annual precipitation is 12 to 15 inches, the average annual air temperature ranges from 58 degrees to 60 degrees Fahrenheit, and the frost free season is 195 to 205 days. Elevations range from 3600 to 4400 feet. Typically, the surface layer is a light brown fine sand about 22 inches thick. The subsoil is red sandy clay loam to a depth of 63 inches. Brownfield soils are sued mostly as range, but also as wildlife habitat and recreational areas."*

In the immediate area of NMSWDCO station # 11, the Brownfield-Springer association occurs.

*"This mapping unit is about 60 percent Brownfield fine sand, 30 percent Springer loamy fine sand, and 10 percent inclusions of Tivoli, Gomez, Patricia, and Amarillo Soils. The landscape is one of billowy and undulating, low sand dunes intermingled with early level sandy areas. The Springer soil has moderately rapid permeability. Runoff is very slow. Water intake is rapid, and available water holding capacity is 6 to 8 inches. Roots penetrate to a depth of 60 inches and more. Soil blowing is a severe hazard."*

**Topography:**

The general topography in the area of the NMSWDCO Station # 11 and surrounding area of Section 21, T.10.S. R. 34 E., Lea County, New Mexico is relatively flat to undulating, due to the nature of the sand dune development, with contours gently sloping to the east. Elevations range from 4220 feet ASL to 4200 feet ASL in section 21. Surface elevation of NMSWDCO Station # 11 is estimated to be 4217 feet ASL. **(See attached Topographic Maps / Satellite Images)**

## *2.0 Site History:*

**Nature of the Release that caused the alleged water pollution:**

On April 17, 2003 a volume of 20 barrels of produced water was released from the storage tanks at NMSWD Station #11 and was contained inside the bermed area surrounding the tank battery. This release was immediately reported to the

NMOCD District 1 Office, located in Hobbs, New Mexico. NMSWD filed, with the NMOCD, a form C-141 release notification. After the discharge, NMSWD immediately ordered and installed three new 1000 barrel fiberglass tanks to replace the older steel tanks at NMSWD Station # 11. The berm surrounding the tanks was also upgraded at this time.

**Summary of Previous Site Investigation**:

In October and November of 2003, CMB Environmental & Geological Services, Inc. conducted a subsurface site investigation of the soil affected by this release adjacent to the tank battery at NMSWDCO Station # 11. The investigation was conducted to determine the lateral and vertical extent of the alleged contamination caused by this April 17, 2003 release of water from the tank battery / produced water storage facility.

In October and November, 2003 Atkins Engineering Associates, Inc., of Roswell New Mexico, was mobilized to the site to commence drilling activities for the site investigation. Eight soil borings, 1, 2, 3, 4; 1A, 2A, 3A, &4A were drilled. The borings were drilled to depths ranging from 11' feet below ground surface to 36' feet below ground surface. (See Site Map) Two foot split spoon samples were taken from surface to total depth in all soil borings. Confirmation soil samples from the borings were collected and sent to Hall Environmental Analysis Laboratory, located in Albuquerque, NM, for chloride, Total Petroleum Hydrocarbons (TPH), and BTEX analysis. Hall Environmental Analysis Lab confirmed that there were no TPH or BTEX concentrations in the sampled soil borings. However, the soil samples collected contained chloride concentrations. A clay zone was encountered from 29-36 feet below ground surface in all soil borings. Perched water was found in soil boring 4A perched on top of the clay zone at 31 feet below ground surface. The capillary fringe, of this perched water, at a depth of 24-26 feet below ground surface and the perched water itself were sampled for any type of hydrocarbon, chloride, and metals. The clay zone was cored and sampled for porosity, hydraulic conductivity, and permeability soils testing.

*As a result of encountering the clay zone, CMB Environmental & Geological Services Inc. determined that additional drilling to the water table would be dangerous as penetrating this aquitard / clay zone holding this perched water, may open up a conduit for contamination to the principal groundwater aquifer below via the soil borings if the clay zone were penetrated.*

Based on research of nearby water wells in the area by CMB at the State of New Mexico State Engineers office located in Roswell, NM, it is anticipated that the first principal groundwater aquifer will be located at a depth of less than 100 feet below ground surface. The NMOCD Guidelines for soil contamination dictate that a level of 1000 PPM TPH concentration must be obtained in soil samples before for site closure of a leak, spill, or confirmed release from a tank battery.

<50'

From data obtained in the soil borings, soil contamination greater than or equal to the 1000 PPM level TPH did not occur on site. TPH concentrations in PPM from the soil boring samples are tabled below:

| Soil Boring | Depth: 0'-2' | 4'-6' | 9'-11' | 14'-16' | 19'-21' | 24'-26' | 29'-31' | 34'-36' |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| SB - 1 | | | ND | | | | | |
| SB - 1A | 32 | | 280 | 55 | ND | ND | ND | ND |
| SB - 2 | 170 | ND | ND | ND | | | | |
| SB - 2A | ND | | ND | ND | | | | |
| SB - 3 | | | ND | | | | | |
| SB - 3A | ND | ND | ND | | | | | |
| SB - 4 | ND | ND | ND | ND | | | | |
| SB - 4A | ND | ND | ND | | | | ND(H2O) | |

From data obtained in the soil borings, BTEX soil contamination did not occur on site in any significant concentrations. BTEX concentrations in PPM from the soil boring samples are tabled below:

| Soil Boring | Depth: 0'-2' | 4'-6' | 9'-11' | 14'-16' | 19'-21' | 24'-26' | 29'-31' | 34'-36' |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| SB - 1 | | | ND | | | | | |
| SB - 1A | ND | | 0.3 | ND | ND | ND | ND | ND |
| SB - 2 | ND | ND | ND | ND | | | | |
| SB - 2A | ND | | ND | ND | | | | |
| SB - 3 | | | ND | | | | | |
| SB - 3A | 0.03 | ND | ND | | | | ND | |
| SB - 4 | ND | ND | ND | ND | | | | |
| SB - 4A | ND | ND | ND | | | | ND(H2O) | |

Chloride concentrations in PPM from the soil boring samples are as tabled below: (Red Values indicate greater than 250 PPM Chloride Concentration)

| Soil Boring | Depth: 0'-2' | 4'-6' | 9'-11' | 14'-16' | 19'-21' | 24'-26' | 29'-31' | 34'-36' |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| SB - 1 | | | 1800 | | | | | |
| SB - 1A | 120 | | 380 | 1900 | 1800 | 3700 | 5000 | 2000 |
| SB - 2 | 330 | 580 | 500 | 1100 | | | | |
| SB - 2A | 350 | | 1400 | 900 | 870 | 690 | 1700 | 1000 |
| SB - 3 | | | 3600 | | | | | |
| SB - 3A | 170 | 3700 | 510 | 570 | 880 | 3200 | 5900 | 1900 |
| SB - 4 | 1600 | 88 | 2200 | 3400 | | | | |
| SB - 4A | 160 | 800 | 2100 | 3400 | 4500 | 8300 | 3900 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

The area around the produced water storage tanks and surrounding berm at NMSWD Station # 11 is an area of *"historic storage of produced water and occasional spills throughout the many years of its use".*

The soils surrounding tank battery and bermed area, accessible for "plant roots" to a depth of 60 inches below ground surface, did not indicate that the release of April 17, 2003 had any significant impact on the surface soils as the concentrations of chloride generally were in acceptable plant tolerance levels. The small amount of rainfall in the past several years would not have the ability to drive any surface chloride contamination to any significant depth below ground surface as most rainfall would evaporate or transpire due to the dry surface conditions present. No salt crystallization, wicking, or leaching of salt was evident on the ground surface surrounding the tank battery and bermed area at NMSWD Station # 11. The release of April 17, 2003 was contained by the existing bermed area surrounding the tank battery.

All Soil Borings did have significant concentrations of chloride below the ground surface after a depth of 9'feet. This should be expected, as the practices, protocols, and standard operating procedures of produced water disposal plants have drastically changed since the 1960's and 1970's when NMSWD first started using the facility.

As the produced water spilled onto the ground surface from various unreported historic spills from the tank battery and spread out, it quickly saturated the very porous sand close to the tank battery and caliche soils of the bermed area surrounding the tank battery. The produced water also pooled in low areas behind the tank battery as it spread out. The soil saturation tended to migrate vertically rather than horizontally due to the nature of the porosity and low horizontal permeability of the clayey sands in the area. For this reason some soil borings have high concentrations of chloride in close proximity to soil borings that have no significant chloride concentrations. The variable chloride concentrations in SB-4 and SB-4A (within 6 feet horizontal distance from each other) at depths of 0 feet – 2 feet and 4 feet to 6 feet below ground surface can be attributed to this phenomenon.

Through time and additional produced water releases, the chloride concentrations in the sands and clayey sands beneath the site were driven downward until they hit a fat clay zone at 29'feet to 31' feet below ground surface at the site. This fat clay zone was encountered in soil borings 1A, 2A, 3A, & 4A.

In soil boring 3A, a core sample of this clay from 34' feet to 36' feet below ground surface was sent to Daniel B Stephens Soils Testing Laboratory in Albuquerque, New Mexico for analysis. This clay sample was analyzed by the lab for Initial Moisture Content, Dry Bulk Density, Calculated porosity, Saturated Hydraulic Conductivity, Effective Porosity, and total organic carbon content.

The most important test components of this analysis of the clay sampled in SB-3A @ 34'-36'are as follows:

***Ksat (cm/sec) = 1.5E-08*** (Hydraulic Conductivity rate at which groundwater, at saturation, will flow through the sampled clay) this rate is extremely slow.

***Intrinsic Permeability: = 1.5E-13*** (the sampled clay is extremely impermeable)

***Effective Porosity: 5.5%*** (the sampled clay is not very porous)

The soil test analyses of the sampled clay in soil boring 3A show that the clay zone, underlying the site and encountered in soil borings 1A, 2A, 3A, and 4A, is a tight, non-porous, impermeable clay barrier. The soil analysis test results also show that it is unlikely that this clay barrier will allow any release of produced water to penetrate and migrate to any principal groundwater aquifer below.

High chloride concentrations encountered in the soil samples in soil borings 1A-4A are a result of numerous years of previous produced water releases from the facility and not a result of any recent releases. The concentrations of chloride seen in the soil borings are from previous *"historic"* releases that occurred long before the documented release on 04/17/03.

The most consistently high chloride concentrations are seen in all borings at a depth of 29-31 feet below ground surface which is at the top of the clay barrier underlying the site. The samples from SB-1A, SB-2A, and SB-3A, at a depth of 34-36 feet below ground surface, continued to have high concentrations of chloride but were on the average 43% lower in chloride concentration than the samples from the 29'-31' foot intervals.

In SB-4A a perched water zone, possibly caused by a previous *"historic"* release of produced water, was encountered at the top of the clay zone from 29-31 feet below ground surface. This perched water was only encountered in soil boring SB-4A. This perched water was sampled and tested for Volatile Organic Compounds, Chloride, Poly Aromatic Hydrocarbons, Mercury, Total recoverable metals, and total dissolved solids.

A summary of the analytical results is as follows:

| ***Soil Boring 4-A*** | ***Depth: 29'-'31':*** |
|---|---|
| ***Aqueous Sample:*** | ***PPM:*** |
| | |
| **BTEX** | **Non-Detect** |
| **TPH** | **Non-Detect** |
| **PAH's** | **Non-Detect** |
| **VOC's** | **Non-Detect** |
| **Arsenic** | **Non-Detect** |
| **Barium** | **0.45PPM** |
| **Cadmium** | **Non-Detect** |
| **Chromium** | **Non-Detect** |
| **Lead** | **Non-Detect** |
| **Selenium** | **Non-Detect** |
| **Silver** | **Non-Detect** |
| **Mercury** | **Non-Detect** |
| **TDS** | **70000 mg/l** |
| **Chloride** | **45000 PPM** |

Chloride concentrations of the perched water of 45000 PPM Chloride and 70,000 PPM TDS exceed acceptable NMWQCC and NMOCD Guidelines for groundwater chloride ant total dissolved solids concentrations.

Since April 18th of 2003, there have been five additional surface releases of produced formation water at the Station # 11 site that have been reported to the NMOCD in C-141 Forms by NMSWD. The total volume of these releases not recovered after their discovery is 110 barrels.

## *2.0 New Site Investigation and Workplan:*

NMSWD Inc., under the direction of their environmental consultant – CMB Environmental & Geological Services, Inc., propose a new site investigation be conducted that will define site geology and hydrogeology, the vertical and horizontal extent and magnitude of the vadose-zone and groundwater contamination, subsurface hydraulic conductivity, transmissivity, storativity, and rate and direction of contaminant migration, and an inventory of water wells within a 1 mile radius from the perimeter of the three dimensional body where the standards set forth by the NMOCD and NMWQCC are exceeded and the location and number of wells actually or potentially affected by the alleged pollution. Vertical and horizontal impacts of any alleged contamination to surface water and stream sediments will also be addressed.

CMB Environmental and Geological Services, Inc. proposes to complete the continued Site Investigation on the above described property as requested by the Owner, NMSWD and the NMOCD pursuant to and in accordance with the "*Notice of Violation*" issued to NMSWD on September 16, 2005 by the NMOCD. Our work will conform to NMOCD Regulations; NMOCD approved Soil and Groundwater Sampling and Disposal Guidelines, with OSHA Regulations, and other rules and regulations governing the work we propose herein. The work will be supervised by an experienced professional geologist and will be completed in an efficient, cost-effective manner.

**Consultant Services to Be Completed Prior to Field Activities**

CMB Environmental & Geological Services, Inc. will carefully evaluate all readily available previous file information on the environmental history of this property prior to commencing the field activities.

CMB Environmental & Geological Services, Inc. has reviewed and copied the facility files located in the office of NMSWD prior to submitting this proposal.

Prior to drilling access to the properties will be obtained from the on-site and off-site property owners.

Prior to drilling the on-site utilities will be cleared with New Mexico One-Call.

Prior to drilling the NMOCD will be notified 48 hours in advance.

Prior to drilling a HASP will be prepared and submitted to the drilling contractor and NMSWD.

Prior to drilling a certificate of liability insurance will be provided to the NMSWD

**Drilling Subcontractor Services to be provided**

All drilling services to be performed by subcontractor drilling company, using hollow-stem auger methods and will include the following:

1. Install one four inch soil boring / monitor well in the area where the previously drilled boring SB-4A encountered perched water, in accordance with NMED / NMOCD guidelines and standards, to delineate if this perched water is still present. Depth to the perched water in SB-4A was at 29 feet below ground surface, resting on top of a clay layer of low porosity and permeability. The 4 inch monitor well will be installed and finished with schedule 40, 4-inch PVC well materials with threaded joints, including a 0.010 inch slotted 10-foot long screen from the base and a solid riser pipe to the surface. The annular space will be occupied by a sand filter pack over the screened interval and two feet above it, a two foot bentonite seal, and cement / bentonite grout to the surface. The monitor well will be finished with a flush mounted vault. Locks

will be installed on the inside and outside of the vault to prevent tampering by other parties

2. If the perched water is again encountered, a pump test will be completed by CMB Environmental & Geological Services, Inc. to determine the "sustainability" of the alleged aquifer as per NMOCD guidelines and a report detailing the results will prepared and submitted to NMSWD and the NMOCD. All pumped or recovered water from this pump test will be placed in the NMSWD's on-site tank battery for disposal.

3. *Three additional soil borings / 2 inch monitor wells will be drilled and installed outside the perimeter of the NMSWD's Station 11 Tank Battery, off the tank battery site.* The purpose of these borings / monitor wells is to determine the vertical and horizontal extent of the alleged groundwater chloride contamination, and to determine and delineate the principal aquifer in the area's gradient and flow direction. These borings will include measurements of total aromatic hydrocarbons (TPH) at 5 feet to 6 feet below ground surface, on top of the clay zone anticipated at 29-32 feet below ground surface, and at the capillary fringe above the principal aquifer in the area (estimated to be 54-56 feet below ground surface) using an appropriate field instrument (PID). The borings will also include the submittal of three confirmation soil samples. One soil boring soil sample will be taken at 5 feet to 6 feet below ground surface, another at the top of the clay layer, anticipated to be between 30 feet and 32 feet below ground surface, and the other at 54-56 feet below ground surface, at the estimated capillary fringe of the water table / principal aquifer in the area. Although the principal water table aquifer is estimated at 54-56 feet below ground surface underneath the NMSWD's site, each soil boring will be drilled until water is encountered and then an additional ten feet drilled and ten feet of monitor well screen installed 10 feet below water table level. These borings may be drilled up to a total depth of 100 feet below ground surface depending on site conditions. These wells will be finished with schedule 40, 2 inch PVC well materials with threaded joints, including a 0.010 inch slotted 20 foot long screen from the base and a solid riser pipe to the surface. The annular space will be occupied by a sand filter pack over the screened interval and two feet above it, a two foot bentonite seal, and cement / bentonite grout to the surface. All two inch monitor wells will be finished with stick up well vaults. Locks will be installed on the inside and outside of the well vaults to prevent tampering by other parties.

4. All soil samples will be sent to Hall Environmental Laboratory located in Albuquerque, NM for laboratory analysis by the US EPA Methods' 8260 & 8270 for semi-volatile VOC's & Solvents, and EPA Method 8310, for PAH hydrocarbons, and Chloride. A water sample from each installed two inch monitor well will also be taken and analyzed at Hall Environmental Laboratory

for laboratory analysis by the US EPA Methods' 8260 & 8270 for semi-volatile VOC's & Solvents, and EPA Method 8310, for PAH hydrocarbons, TDS, and Chloride. All samples will be taken in accordance with NMOCD Sampling Protocols, Approved Methods, and Guidelines.

Decontamination will be performed to eliminate the possibility of cross-contamination between soil samples and individual borings. All sampling equipment will be decontaminated between each sample. Decontamination will consist of washing the sampling equipment with a detergent solution and double rinsing with clean tap water.

Additionally, the hand tools used by the sampler to select and divide samples will be given a final rinse with de-ionized water before use on each new sample. The drilling augers will be decontaminated between each boring by steam cleaning. A stiff brush will be used, if required, to remove soil adhering to the augers.

Completed monitoring wells will receive an appropriate surface finish, concrete aprons for well vaults, etc. Soil cuttings and other investigative wastes (i.e. well development water) will be managed in accordance with NMOCD guidelines. Waste Disposal if necessary will be in accordance to NMOCD Guidelines, and produced waste will be drummed and shipped to Gandy-Marley Land Disposal Farm if necessary. The drilling contractor and the consultant will ensure the property is fully restored to the O/O's satisfaction, and that the site is free of debris and other matter introduced or encountered during the drilling activities.

**Consultant Services Associated with Drilling Activities**

CMB will provide a professional geologist to locate the monitoring wells and borings and to generally oversee the drilling activities and document the work.

During hollow-stem auger drilling, a split-spoon sampler will be driven ahead of the augers to collect a minimally disturbed soil sample. Soil samples will be collected at the intervals described above. After retrieval of the sampler from the boring, the sampler will be opened and the sample will be split longitudinally. That half of the sample, which is to be set aside for analytical work, will be dealt with immediately. Following this, the other half of the sample will then be placed in a Mason-type jar, and heated, in order to screen it with a, field calibrated to 100 PPM Isobutylene, photoionization detector (PID) using the "jar headspace method". A PID with a lamp voltage of 10.6 eV or higher will be used to perform this screening. All samples from which sufficient soil is recovered will be screened in this manner. All results from this field-testing will be recorded.

It is anticipated that a minimum of three samples per boring will be submitted to a state-certified analytical laboratory for analysis although more samples will be submitted if conditions warrant it. One split spoon sample from each off site boring, at the clay layer anticipated to be at 30 feet to 32 feet below ground

surface, will be sent to Daniel B Stephens and Associates Soil Testing Laboratory Located in Albuquerque, NM for analysis of Hydraulic Conductivity, porosity, and fractional organic carbon content. One sample of the capillary fringe of the principal aquifer below the clay zone (or at whatever depth it is encountered) from one of the new borings will also be sent to Daniel B. Stephens and Associates laboratory for analysis of Hydraulic Conductivity, storativity, porosity, and fractional organic carbon content.

Boring logs will be prepared for all soil borings describing soils according to the Unified Soil Classification System. Characteristics, such as soil structure, voids, layering, lenses, odor, staining and mottling, will be noted on the logs.

The investigation described above will allow for the Scientist to make in-field, immediate qualitative assessment of the presence of ground water contamination, and to define the vertical and horizontal extent of soil contamination. Of course, laboratory samples will provide additional supporting evidence at a later date.

**Consultant Services Associated with Groundwater Sampling and Groundwater Investigation of the New Monitor Wells**

Following the installation of the new monitoring wells, each well will be developed by alternately surging and purging for a minimum of 30 minutes. Water will then be pumped from the well until ten well volumes have been removed or until clear water is produced. If the permeabilities of the aquifers are too low to permit the described development, the wells will be bailed dry and permitted to recover at least three times. The wells will be developed after a minimum of 12 hours. Well construction and development details will be documented on appropriate forms as required. All produced purge water will be filtered using a Granular Activated Carbon Filter and then purged onto the ground.

The new monitoring well(s) will be surveyed in accordance with current professional standards for conducting ground water investigations, which include standards set forth by the NMED / NMOCD. The following information will be obtained to the nearest 0.01 feet for each monitoring well:

1) Elevation of ground. (USGS Topographic Elevation)
2) Elevation of top of PVC casing. (USGS Topographic Elevation)
3) Horizontal location of well to the nearest 0.1 feet. (USGS Topographic Elevation)

This information will be tied into a known surveyed location and elevation, and will be referenced to mean sea level. (USGS Topographic Elevation)

***Groundwater Monitoring Program:***

Groundwater samples will be collected within 48 hours and in accordance with

CMB's standard QA/QC operating procedures described below. Groundwater samples will be analyzed for Semi-Volatile Organic Compounds, PAH's, & Solvents by EPA methods 8260, 8270, 8310, and chloride. Three additional quarters of groundwater samples will be collected from the three new monitor wells for the same parameters during initial stage 1 abatement plan.

***Quality Assurance & Quality Control of Groundwater & Soil Sampling***

The following procedures will be used during sample collection to provide quality assurance and quality control (QA/QC), to minimize loss of volatiles and to maintain the suitability of samples for analysis. Except for drinking water samples, the sample collection and analytical procedures will be consistent with SW-846: *Test Methods for Evaluating Solid Waste*, November 1986, and updates published by the U.S. EPA. QA/QC methods to be used are described below.

A state-certified laboratory will supply all sampling containers and preservatives, and a state-certified laboratory will perform analyses (Hall Environmental Analysis Laboratory in Albuquerque, NM).

All samples will be handled in such a manner as to minimize the loss of organic compounds to volatilization and biodegradation, and sampling equipment will be decontaminated between sampling events.

All samples collected will be discrete (not composite) samples. Soil from a given sample collected during drilling activities which is to be submitted for laboratory analytical work will be handled and prepared before soil from that sample is used for field screening (SW-846).

All samples for analysis will be placed in a cooler on ice at a temperature of 4 C. immediately following collection.

Samples will be delivered to the laboratory on either the day they are collected or the morning of the next day, unless the samples are collected on a Friday, in which case they will be delivered no later than Monday morning. Where possible, sample collection on Fridays will be avoided.

Chain-of-custody procedures will be utilized throughout the sampling/delivery process.

1) One trip blank per sampling event

Documentation of the sampling and QA/QC procedures will include notes available for NMED / NMOCD inspection. These notes will document the procedures for sampling and all other routine activities, logs of all routine and non-routine instrument calibrations performed on field equipment, and field notes describing the sequence of activities that took place in the investigation.

**Reports**

Upon completion of the above scope of work, CMB will prepare and submit to NMSWD and the NMOCD a report that meets or exceeds the requirements set forth in the NMOCD Guidelines, including a description of the vertical and horizontal extent of any possible soil and groundwater contamination encountered in the investigation. The report will also address any encountered phase separated hydrocarbon; any encountered highly contaminated soils, surface water bodies, potable water wells, and other water supplies within 1 mile that may potentially be affected by the alleged release. The groundwater investigation described above will allow for the calculation of hydraulic gradients and favored contaminant pathways and migration routes.

Maps will be prepared documenting the groundwater contours, groundwater gradient, the lateral extent of soil and ground water contamination encountered in the investigation, soil contamination contour maps, groundwater plume maps, drawings of release site, area and vicinity maps, and cross sections through the contaminated zone. Well data logs and completion diagrams for each soil boring and monitor well will be provided. Tables will include contaminant concentration tables and ground water elevation tables.

Site-specific conditions identified with drilling will also be addressed in the report.

Quarterly progress reports of the groundwater sampling and monitoring will also be submitted after completion of the quarterly groundwater sampling events.

**Estimated Schedule for all Stage 1 Abatement Activities:**

***January 2006***, Drilling and installation of 3 new 2 inch monitor wells, one 4 inch sentinel / monitor well on top of clay zone and aquifer sustainability pump test of perched water. Groundwater sampling and laboratory analysis of groundwater from the three new monitor wells. Conduct professional survey location of new monitor wells.

***March 2006***: Final Site Investigation Report detailing findings of the investigation.

***April 2006***: First quarter sampling event of monitor wells. Possible stage 2 abatement plan submitted

***June 2006:*** First Quarter Monitor Well Quarterly Report Submitted

***July 2006:*** Second Quarter sampling event of monitor wells.

***September 2006:*** Second Quarter Monitor Well Quarterly Report Submitted

***October 2006:*** Third Quarter sampling event of monitor wells

***December 2006:*** Third Quarter Monitor Well Quarterly Report Submitted

***January 2007:*** Fourth Quarter sampling event of monitor wells

***March 2007:*** Fourth Quarter Monitor Well Quarterly Report Submitted

**References**

CMB and/or its key employees have a long list of references for which similar work has been performed both within New Mexico and in other states Clayton M. Barnhill is a registered professional geologist in the states of Texas and Wyoming.

**Closing**

Questions on this proposal will receive my prompt response.

Sincerely,
**CMB Environmental and Geological Services, Inc.**

***Clayton M. Barnhill, PG***
**November 14, 2005**

No steps for clean-up.
No plugging procedures.
GW depth < 50'

STATEMENT OF QUALIFICATIONS:

Clayton M. Barnhill, Consulting Geologist / Hydrogeologist
President and Owner of CMB Environmental & Geological Services, Inc.

EDUCATION:

40 Hour OSHA Health and Safety Training
8 Hour Hazardous Materials Refresher / Supervisor
Confined Space Entrant / Attendant

| | |
|---|---|
| Oklahoma State University<br>Graduate School of Geology<br>9 Graduate Credit Hours | Ground-Water Hydrology and<br>Contamination Program, 1993<br>3.7 GPA |
| University of Arizona | B.Sc. Geochemistry, 1980 |

REGISTRATION:

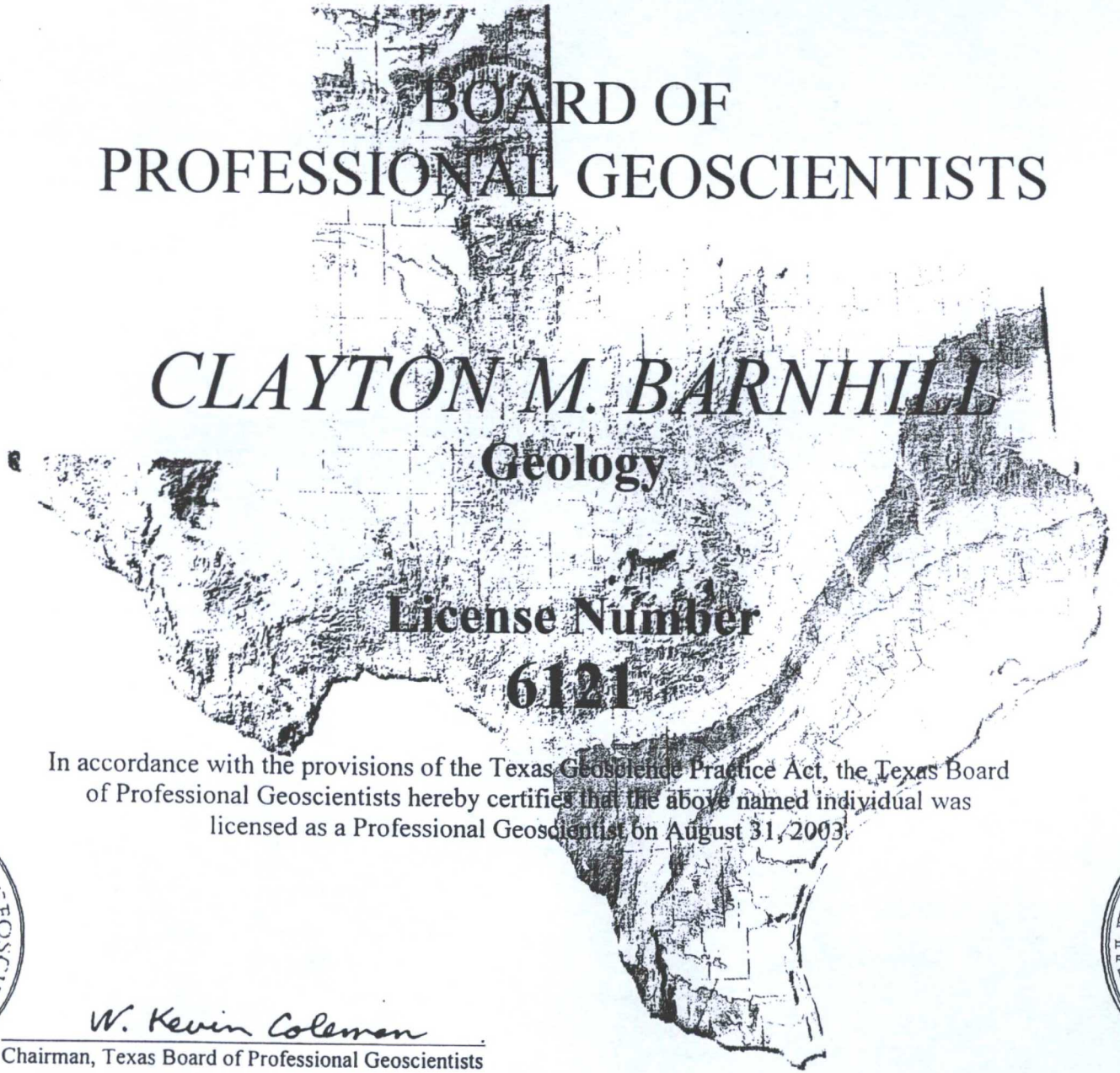
American Institute of Professional Geologists, Certified Professional Geologist # 7145
New Mexico Environment Department UST/ Petroleum Storage Tank Bureau Certified Scientist # 246
Wisconsin Division of Safety & Buildings (Petroleum Environmental Cleanup Fund) PECFA Consultant # 261265
State of Wyoming Registered Professional Geologist No. PG-3072
State of Texas Registered Professional Geologist, PG License Number 6121

PROFESSIONAL EXPERIENCE:

Mr. Barnhill has 24 years of total geological experience, domestically and internationally, supervising exploration and drilling programs for minerals, oil and gas, and environmental site assessment, sampling, and remediation. Mr. Barnhill completed Oklahoma State University's, graduate school program, *Practical Approaches to Ground-Water Hydrology and Contamination*, in August of 1993. Since that time, Mr. Barnhill has prepared several Phase I, II, and III reports, and completed several Phase II and III –V, investigative, redmediation, environmental drilling, groundwater and soil sampling, and recovery projects under the guidelines of the New Mexico, Wisconsin, Oklahoma, and Texas Environment Departments and the US EPA in southeast New Mexico, Wisconsin, Oklahoma, and west Texas. This work included investigation and remediation of unsaturated and saturated zone contamination and the supervision of the investigation and remediation of unsaturated and saturated zone contamination. Various clients include; Cypress Engineering Services, Freese and Nichols, Berry Land and Cattle Company, The Alamo Band Navajo Nation, Hi - Pro Feeds, Queen Oil and Gas Company, Enron Oil and Gas Company, Transwestern Pipeline Company, Navajo Refining Company, BP Amoco Pipeline Company, The NMED, The FAA, The Town of Silver City, Waide Construction Company, Wakefield Oil Company, Tri-City Landfill Grant County-NM, Bank of America, First Federal Savings Bank, Camp Dresser, & Mckee, Intera, Daniel B. Stephens & Associates Inc., Souder Miller & Associates, MBF Services, Clayton Environmental Services., Bascor Environmental Inc., Soil Investigations, Inc., Harding Lawson Associates, Century 21 Real Estate, US Army Corp. of Engineers, Nature's Dairy, Baca Linda Dairy, Break-Away-Dairy, Blue Sky Farms, Sundance Dairies, Sand Creek Consultants Inc., RESPEC / Inc., SEMS Inc., Williams, Inc., Atkins Engineering Associates, Barron's Engineering Solutions, C& S, Inc., and Coldwell Bankers.

# STATE OF TEXAS

## BOARD OF PROFESSIONAL GEOSCIENTISTS



*CLAYTON M. BARNHILL*

**Geology**

**License Number**

**6121**

In accordance with the provisions of the Texas Geoscience Practice Act, the Texas Board of Professional Geoscientists hereby certifies that the above named individual was licensed as a Professional Geoscientist on August 31, 2003.

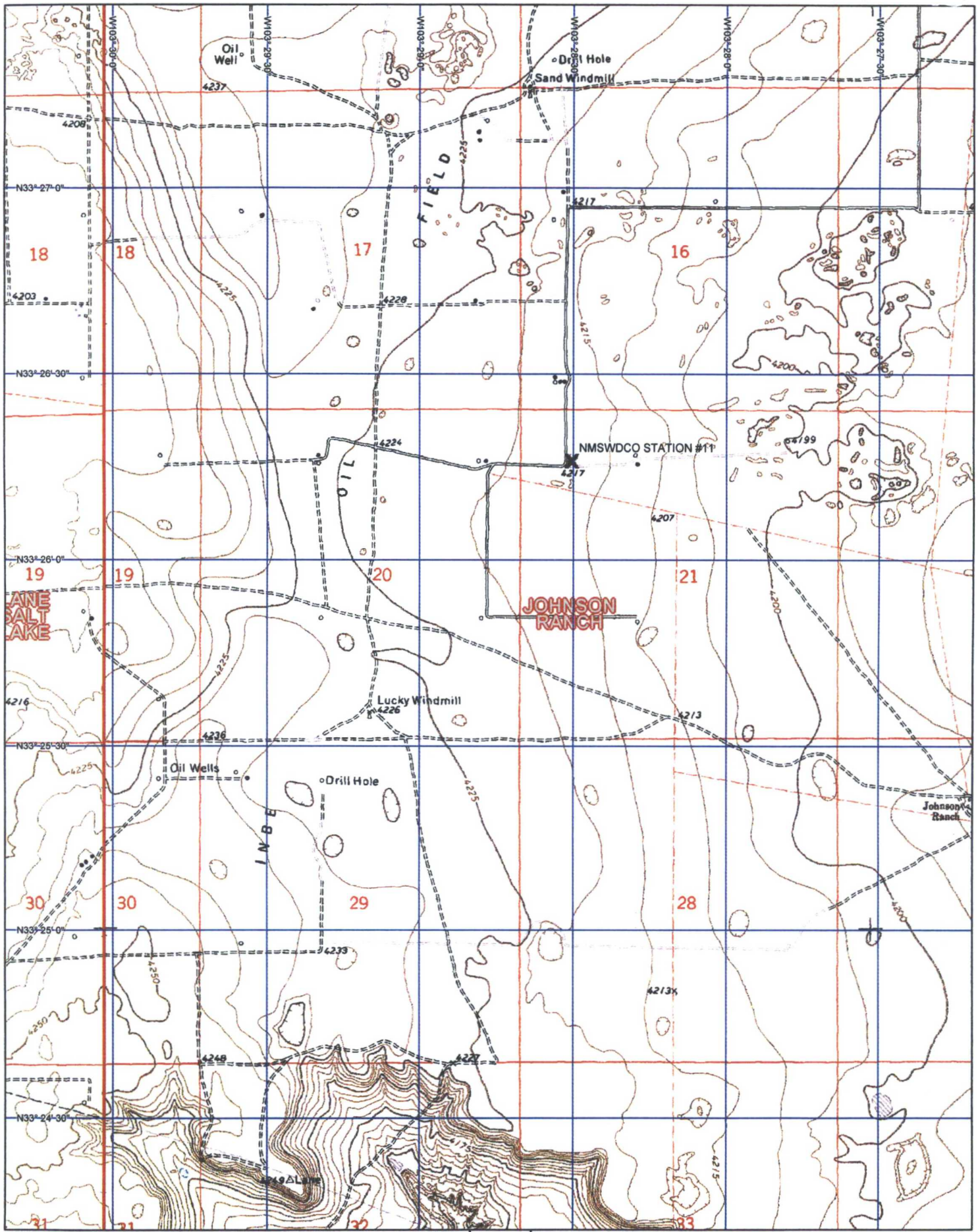
BOARD OF PROFESSIONAL GEOSCIENTISTS X THE STATE OF TEXAS

W. Kevin Coleman

Chairman, Texas Board of Professional Geoscientists

THE STATE OF TEXAS

Texas map courtesy of the Bureau of Economic Geology, The University of Texas at Austin





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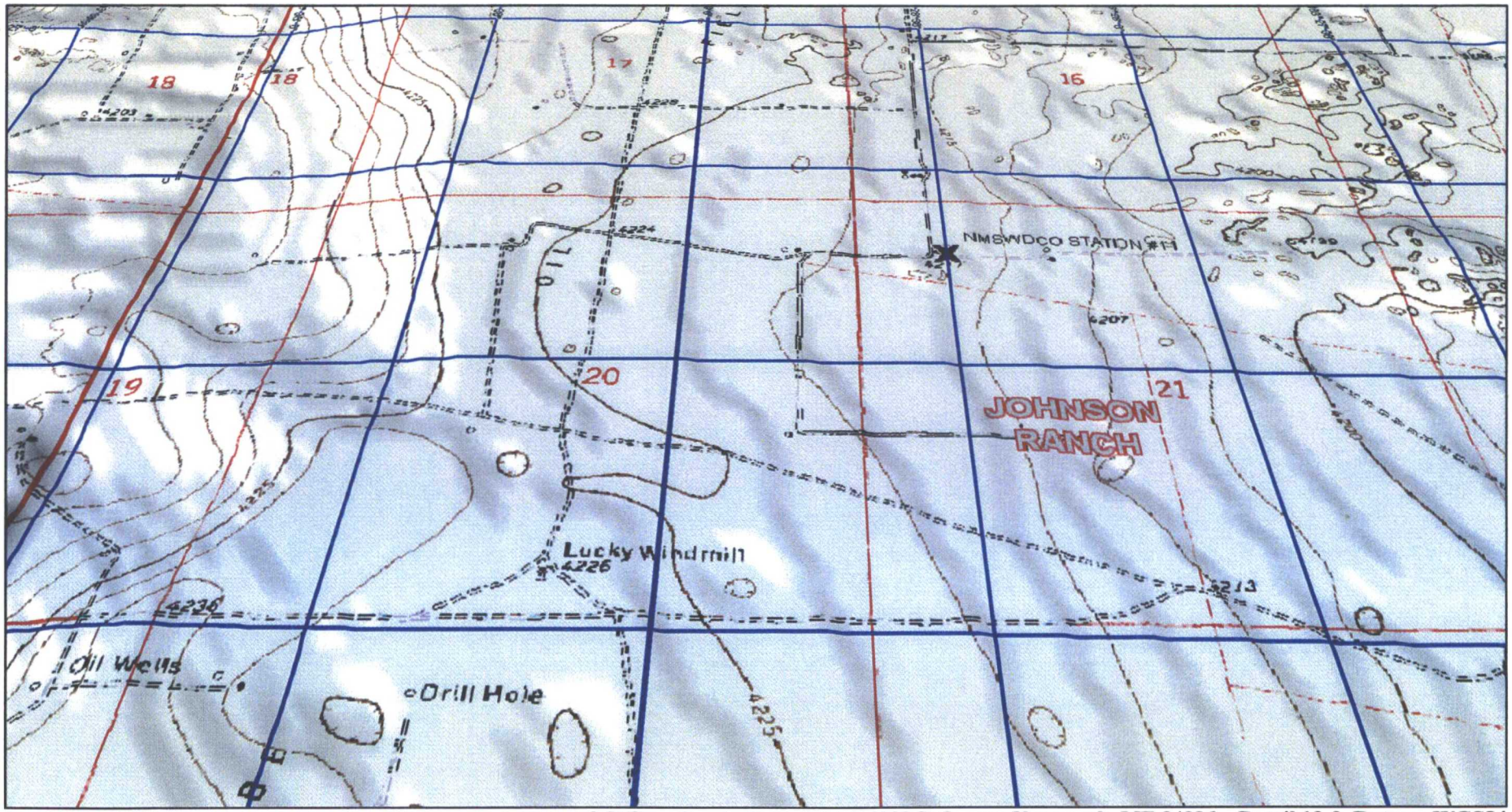


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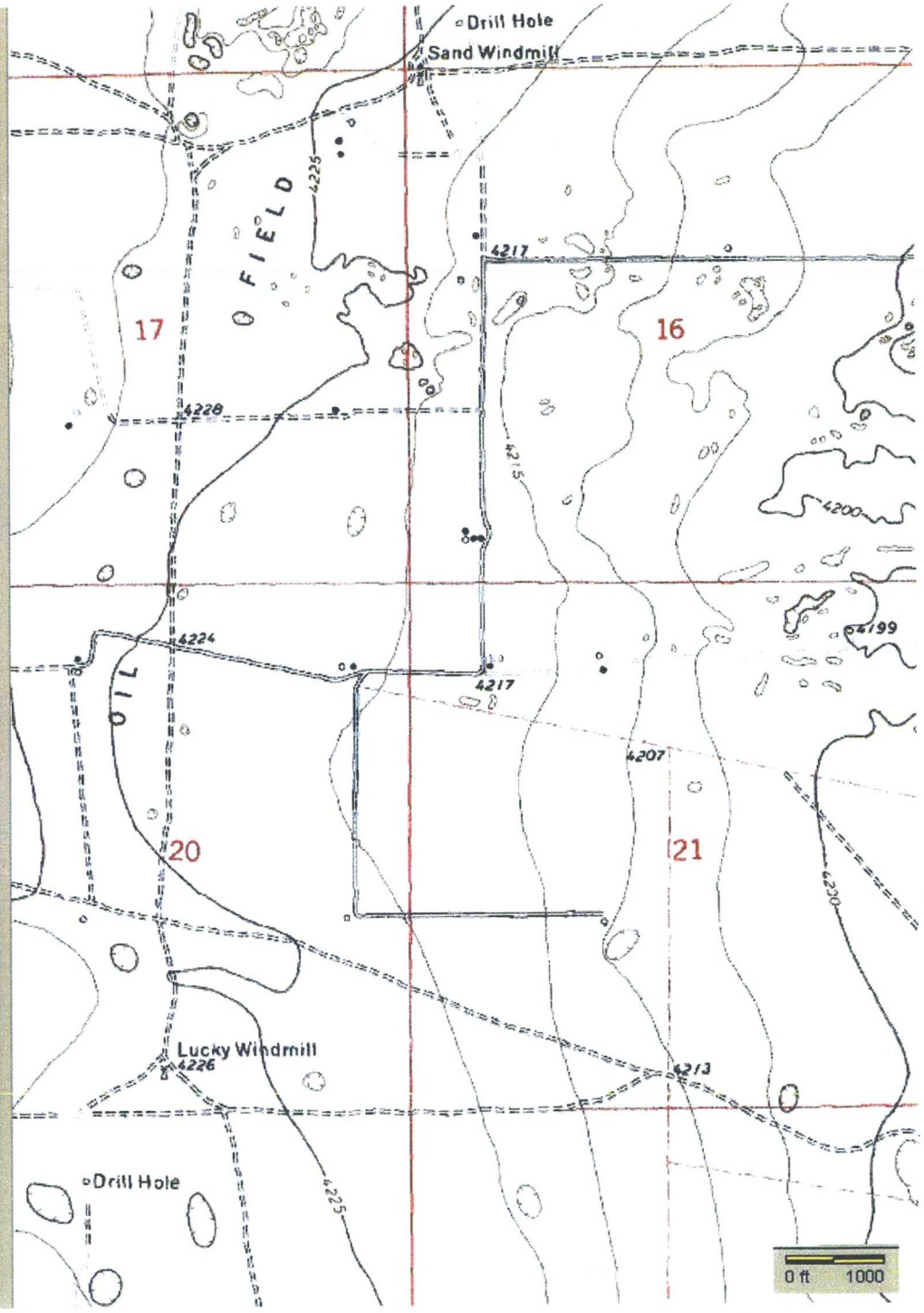
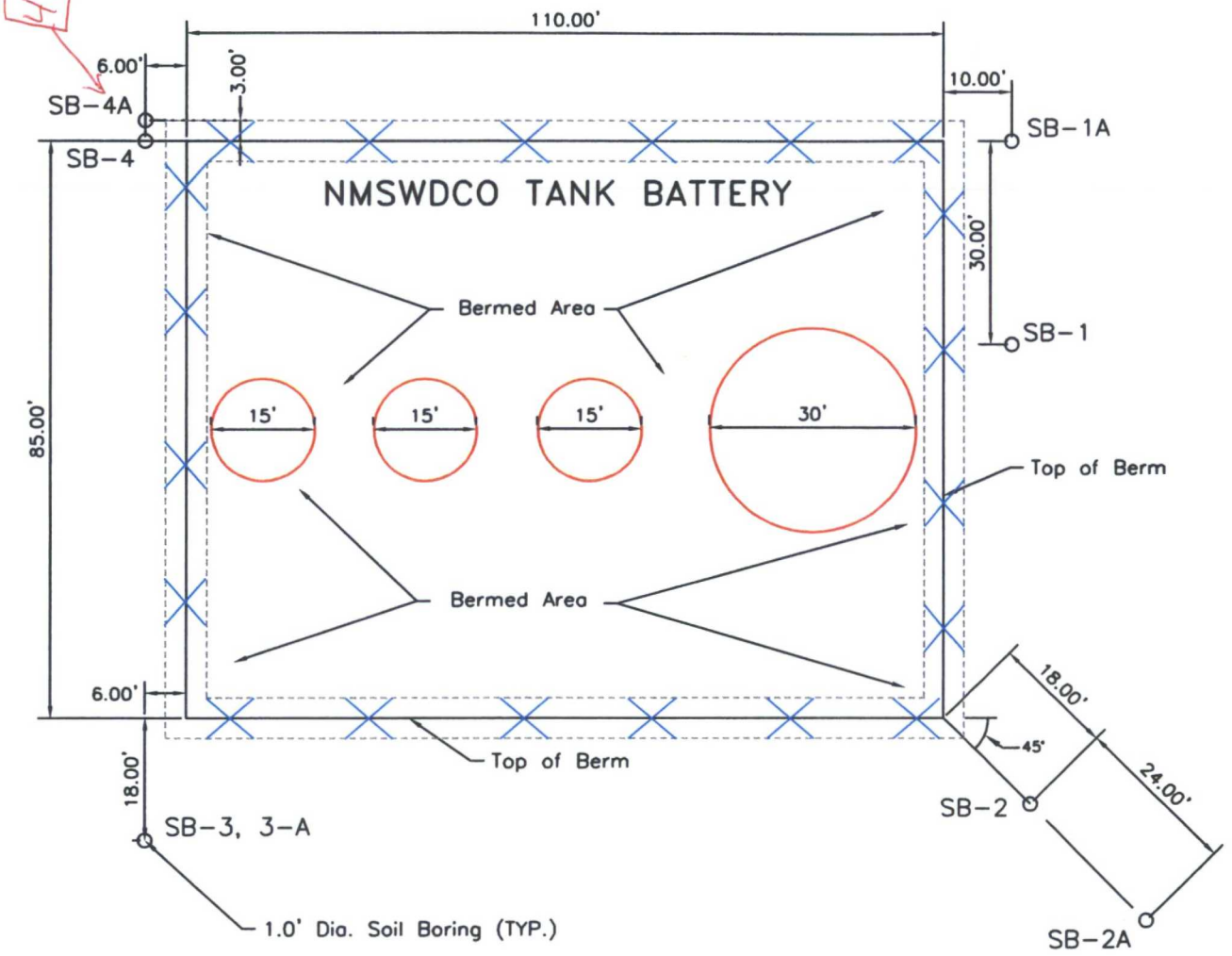

Drill Hole
Sand Windmill
OIL FIELD
17
16
20
21
4225
4217
4228
4215
4200
4199
4224
4217
4207
4220
Lucky Windmill
4226
4213
Drill Hole
4225
0 ft
1000

aqueous [45K cl]




CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC.

***SITE INVESTIGATION***

*SOIL BORING LOCATION MAP*

*Clayton M. Barnhill 02/04*
*NMED / USTB Certified Scientist #246*

| DATE: MARCH, 2004 | DRAWN BY: HTDS | JOB NO. 403001 | EXHIBIT NO. 1 |
|---|---|---|---|
| | | SCALE: NONE | |