District I
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1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Department
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-147
Revised April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: ☒ Recycling Facility ☒ Recycling Containment*

Type of action: ☒ Permit ☐ Registration
☐ Modification ☐ Extension
☐ Closure ☐ Other (explain) _____

*** At the time C-147 is submitted to the division for a Recycling Containment, a copy shall be provided to the surface owner.**

Be advised that approval of this request does not relieve the operator of liability should operations result in pollution of surface water, ground water or the environment. Nor does approval relieve the operator of its responsibility to comply with any other applicable governmental authority's rules, regulations or ordinances.

1.
Operator: Mewbourne Oil Company (For multiple operators attach page with information) OGRID #: 14744
Address: _____
Facility or well name (include API# if associated with a well): Derringer Federal Recycle Facility North Pit
OCD Permit Number: 2RF-168 (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr SW/4 NE/4 Section 18 Township 20S Range 29E County: Eddy
Surface Owner: ☒ Federal ☐ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.
☒ **Recycling Facility:**
Location of recycling facility (if applicable): Latitude 32.577656° Longitude -104.111062° NAD83
Proposed Use: ☐ Drilling* ☒ Completion* ☐ Production* ☐ Plugging *
The re-use of produced water may NOT be used until fresh water zones are cased and cemented
☐ Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***
☐ Fluid Storage
☐ Above ground tanks ☒ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type _____
☐ Activity permitted under 19.15.36 NMAC explain type: _____ ☐ Other explain _____
☐ For multiple or additional recycling containments, attach design and location information of each containment
☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date: _____

3.
☒ **Recycling Containment:**
☒ Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)
Center of Recycling Containment (if applicable): Latitude 32.576928° Longitude -104.111950° NAD83
☐ For multiple or additional recycling containments, attach design and location information of each containment
☒ Lined ☐ Liner type: Thickness 60/40 mil ☒ LLDPE ☒ HDPE ☐ PVC ☐ Other 60mil HDPE Primary/40mil LLDPE Secondary
☐ String-Reinforced
Liner Seams: ☒ Welded ☐ Factory ☐ Other _____ Volume: 505K bbl Dimensions: L 490 x W 560 x D 16TD/13OD
☐ Recycling Containment Closure Completion Date: _____

4.

Bonding:

☒ Covered under bonding pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC **(These containments are limited to only the wells owned or operated by the owners of the containment.)**

☐ Bonding in accordance with 19.15.34.15(A)(1). Amount of bond $_____ **(work on these facilities cannot commence until bonding amounts are approved)**

☐ Attach closure cost estimate and documentation on how the closure cost was calculated.

5.

Fencing:

☐ Four foot height, four strands of barbed wire evenly spaced between one and four feet

☒ Alternate. Please specify 6-ft Chain Link with barbed wire top

6.

Signs:

☒ 12"x 24", 2" lettering, providing Operator's name, site location, and emergency telephone numbers 4801 Business Park Blvd. Hobbs NM

☐ Signed in compliance with 19.15.16.8 NMAC

7.

Variances:

Justifications and/or demonstrations that the proposed variance will afford reasonable protection against contamination of fresh water, human health, and the environment.

Check the below box only if a variance is requested:

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Siting Criteria for Recycling Containment

Instructions: The applicant must provide attachments that demonstrate compliance for each siting criteria below as part of the application. Potential examples of the siting attachment source material are provided below under each criteria.

General siting	
Ground water is less than 50 feet below the bottom of the Recycling Containment. NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells	☐ Yes ☒ No ☐ NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality	☐ Yes ☒ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	☐ Yes ☒ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	☐ Yes ☒ No
Within a 100-year floodplain. FEMA map	☐ Yes ☒ No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; aerial photo; satellite image	☐ Yes ☒ No
Within 500 horizontal feet of a spring or a fresh water well used for domestic or stock watering purposes, in existence at the time of initial application. - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 500 feet of a wetland. - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	☐ Yes ☒ No

9.
Recycling Facility and/or Containment Checklist:
Instructions: Each of the following items must be attached to the application. Indicate, by a check mark in the box, that the documents are attached.

- [X] Design Plan - based upon the appropriate requirements.
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- [X] Closure Plan - based upon the appropriate requirements.
- [X] Site Specific Groundwater Data -
- [X] Siting Criteria Compliance Demonstrations –
- [ ] **Certify that notice of the C-147 (only) has been sent to the surface owner(s)**

10.
Operator Application Certification:
I hereby certify that the information and attachments submitted with this application are true, accurate and complete to the best of my knowledge and belief.

Name (Print): Kyle Mitchell Title: Engineer
Signature: Kyle Mitchell Date: 11/23/21
e-mail address: kmitchell@mewbourne.com Telephone: 575-602-5857

11.
OCD Representative Signature: Victoria Venegas **Approval Date:** 12/06/2021
Title: Environmental Specialist **OCD Permit Number:** 2RF-168

- [X] OCD Conditions
- [X] Additional OCD Conditions on Attachment

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☐ Modification ☐ Extension
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I hereby certify that the information and attachments submitted with this application are true, accurate and complete to the best of my knowledge and belief.

Name (Print): Kyle Mitchell Title: Engineer
Signature: Kyle Mitchell Date: 11/23/21
e-mail address: kmitchell@newbourne.com Telephone: 575-602-5857

11.
OCD Representative Signature: Victoria Venegas **Approval Date:** 12/06/2021

Title: Environmental Specialist **OCD Permit Number:** 2RF-168

- [X] OCD Conditions
- [X] Additional OCD Conditions on Attachment

C-147 Registration Package
Derringer Federal Recycle Facility
Section 18, T20S, R29E
Eddy County, New Mexico

Prepared For

MEWBOURNE OIL COMPANY

Prepared By

ENVIROTECH
ENGINEERING & CONSULTING, INC.

TYLER JOE WILLIAMS
NEW MEXICO
26432
PROFESSIONAL ENGINEER
9/30/2021
EXP 12/31/2022

September 2021

ENVIROTECH
ENGINEERING & CONSULTING, INC.

2500 North Eleventh Street • Enid, OK 73701 • (580) 234-8780 • Fax (580) 237-4302 • www.envirotechconsulting.com

September 30th, 2021

Ms. Emily Hernandez
New Mexico EMNRD
Oil Conservation Division

RE: Mewbourne Oil Company – Derringer Federal Recycle Facility

Ms. Hernandez:

ENVIROTECH ENGINEERING & CONSULTING has respectfully submits the following submittal package pursuant to NMAC Title 19 Chapter 15 Rule 34- Produced Water, Drilling Fluids, & Liquid Oil Field Waste. The following submittal package includes:

- C-147 forms for two (2) containments meeting the design requirements contained in Rule 34
- A Site Assessment and Geotechnical Report to show that the proposed facility poses no threat to the natural environment and meets the siting criteria laid out in Rule 34
- Engineering Drawings for the proposed facility that have been reviewed and approved by a Professional Engineer licensed in the State of New Mexico
- A plan for Design and Construction of the proposed facility
- A section that outlines the requirements for Material Specifications
- A plan for the Operation and Maintenance of the proposed facility
- A plan for the closure of the facility and well as a closure cost estimate of the proposed facility that has been reviewed and approved by a Professional Engineer licensed in the State of New Mexico

No variances from the Rule are necessary and this submittal demonstrates compliance with all mandates of Rule 34 for containments. Since the proposed recycling facility meets the criteria outlined in NMAC 19.15.34.9.B.7, the facility also requires registration. The Rule does not require approval by OCD in advance of using the containments.

This package contains some items that some reviewers have considered variances in the past. The following items are:

- Historically, multiple facilities have been approved by the NMOCD with the use of 40-mil LLDPE as a secondary liner. The language of the rule is:

  > *"Secondary liners shall be 30-mil LLDPE string reinforced or equivalent with hydraulic conductivity no greater than 1 x 10-9 cm/sec"*

  It is EnviroTech's position given that multiple previous facilities have been approved for use of 40-mil LLDPE as a replacement of the 30-mil string reinforced liner, a precedent has been set by NMOCD that NMOCD sees the two liner systems as equivalent. Therefore, no variance is needed to use 40-mil LLDPE in lieu of 30-mil string reinforced LLDPE as a secondary liner in a double lined system per the language of Rule 34.

- Historically, multiple facilities have been approved by the NMOCD with the use of ultra-sonic bird deterrents in leu of netting. The language of the rule is:

  "The operator shall ensure that a recycling containment is screened, netted or otherwise protective of wildlife, including migratory birds."

  It is EnviroTech's position given that multiple previous facilities have been approved using ultra-sonic bird deterrents as a replacement for bid netting, a precedent has been set by NMOCD that NMOCD sees the two protective systems as equivalent. Therefore, no variance is needed to use ultra-sonic bird deterrents in lieu of bird netting per the language of Rule 34.

- EnviroTech believes using a 6-ft chain link fence in lieu of a 4-strand barbed wire fence is not a variance. The language of the rule in Section 19.15.34.12.D.1 is:

  "The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access"

  EnviroTech believes that use of a 6-ft chain link fence will preclude unauthorized access of both humans and wildlife than the required 4-strnad barbed wire fence in 19.15.34.12.D.2. Feral swine and deer are known to be present in the area. Feral swine can easily burrow under the bottom strand of barbed wire and deer can jump over the top strand. As a result, implementing the fence system specified in D.2 would result in a violation of D.1. EnivroTech believes that compliance with D.1 is the critical component of Rule 34 and should take precedent over D.2. Therefore, no variance is required.

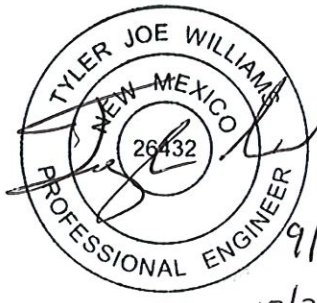
Should you have any questions or require additional information, please contact me by phone at 580-234-8780 or by email at twilliams@envirotechconsulting.com at your convenience.

Thank you for your consideration.

Best regards,

ENVIROTECH ENGINEERING & CONSULTING, INC.

Tyler Williams, P.E.
President and Principal Engineer



9/30/2021
Exp 12/31/2022

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Signature: Kyle Mitchell Date: 9/29/2021
e-mail address: kmitchell@mewbourne.com Telephone: 575 602 5857

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☐ Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***
☐ Fluid Storage
☐ Above ground tanks ☒ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type _____
☐ Activity permitted under 19.15.36 NMAC explain type: _____ ☐ Other explain _____
☐ For multiple or additional recycling containments, attach design and location information of each containment
☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date: _____

3.
☒ **Recycling Containment:**
☒ Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)
Center of Recycling Containment (if applicable): Latitude 32.575762° Longitude -104.110724° NAD83
☐ For multiple or additional recycling containments, attach design and location information of each containment
☒ Lined ☐ Liner type: Thickness 60/40 mil ☒ LLDPE ☒ HDPE ☐ PVC ☐ Other 60mil HDPE Primary/40mil LLDPE Secondary
☐ String-Reinforced
Liner Seams: ☒ Welded ☐ Factory ☐ Other _____ Volume: 505K bbl Dimensions: L 490 x W 560 x D 16TD/13OD
☐ Recycling Containment Closure Completion Date: _____

4.
Bonding:

☐ Covered under bonding pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC **(These containments are limited to only the wells owned or operated by the owners of the containment.)**

☒ Bonding in accordance with 19.15.34.15(A)(1). Amount of bond $ 1,278,840 **(work on these facilities cannot commence until bonding amounts are approved)**

☒ Attach closure cost estimate and documentation on how the closure cost was calculated.

5.
Fencing:

☐ Four foot height, four strands of barbed wire evenly spaced between one and four feet

☒ Alternate. Please specify 6-ft Chain Link with barbed wire top

6.
Signs:

☒ 12"x 24", 2" lettering, providing Operator's name, site location, and emergency telephone numbers

☐ Signed in compliance with 19.15.16.8 NMAC

7.
Variances:

Justifications and/or demonstrations that the proposed variance will afford reasonable protection against contamination of fresh water, human health, and the environment.

Check the below box only if a variance is requested:

☐ Variance(s): Requests must be submitted to the appropriate division district for consideration of approval. If a Variance is requested, include the variance information on a separate page and attach it to the C-147 as part of the application.

If a Variance is requested, it must be approved prior to implementation.

8.
Siting Criteria for Recycling Containment

Instructions: The applicant must provide attachments that demonstrate compliance for each siting criteria below as part of the application. Potential examples of the siting attachment source material are provided below under each criteria.

General siting

Ground water is less than 50 feet below the bottom of the Recycling Containment. NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells	☐ Yes ☒ No ☐ NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality	☐ Yes ☒ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	☐ Yes ☒ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	☐ Yes ☒ No
Within a 100-year floodplain. FEMA map	☐ Yes ☒ No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; aerial photo; satellite image	☐ Yes ☒ No
Within 500 horizontal feet of a spring or a fresh water well used for domestic or stock watering purposes, in existence at the time of initial application. - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 500 feet of a wetland. - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	☐ Yes ☒ No

9.
Recycling Facility and/or Containment Checklist:
Instructions: Each of the following items must be attached to the application. Indicate, by a check mark in the box, that the documents are attached.

- [x] Design Plan - based upon the appropriate requirements.
- [x] Operating and Maintenance Plan - based upon the appropriate requirements.
- [x] Closure Plan - based upon the appropriate requirements.
- [x] Site Specific Groundwater Data -
- [x] Siting Criteria Compliance Demonstrations –
- [ ] **Certify that notice of the C-147 (only) has been sent to the surface owner(s)**

10.
Operator Application Certification:
I hereby certify that the information and attachments submitted with this application are true, accurate and complete to the best of my knowledge and belief.

Name (Print): Kyle Mitchell Title: Engineer
Signature: Kyle Mitchell Date: 9/29/2021
e-mail address: kmitchell@mewbourne.com Telephone: 575 602 5857

11.
OCD Representative Signature: _____ **Approval Date:** _____

Title: _____ **OCD Permit Number:** _____

- [ ] OCD Conditions _____
- [ ] Additional OCD Conditions on Attachment

CONTENTS

1. SITE CRITERIA FOR RECYCLING CONTAINMENT

1.1 LOCATION

The Mewbourne Derringer Federal water recycle facility (collectively referred to as the containment), is proposed to be located in the N/2 of Section 18, Township 20 South, Range 29 East of Eddy County, New Mexico.

1.2 DISTANCE TO GROUNDWATER

1.2.1 HYDROLOGY

According to information reviewed from the Bureau of Land Management (BLM) Carlsbad Field Office, the proposed Containment location is located within the Capitan Reef aquifer system. Available groundwater within the area of the proposed Containment is noted to be within the Carlsbad Groundwater Basin, by the New Mexico Office of the State Engineer (OSE). The Carlsbad Basin contains two major water-bearing features including shallower alluvial aquifer systems and a deeper "artesian" carbonate system.

A Water Well Database Report provided by Banks Information Solutions (Banks), contained herein as *Appendix B*, was reviewed to identify the location and type of water wells located within a 1-mi radius of the proposed recycle facility location site boundaries.

According to Banks, one (1) water well was identified as located within a 1-mi radius of the site and no water wells were identified as located within the proposed site boundaries. Water well locations are presented in the Banks report.

The water well identified within a 1-mi radius of the proposed facility is classified as a "prospecting well" owned by Devon Energy. The well is located approximately 875-ft northwest of the proposed facility location and was drilled to a total depth of 140-ft below ground surface. The recorded groundwater depth was reported as 100-ft below ground surface.

Documentation of the OSE database search conducted by Banks of the above listed sections is contained herein as *Appendix B*. A map showing the location of OSE groundwater well relative to the site location is presented in the Banks report, and a map of Declared Groundwater Basins presenting the area of mapped basin systems from the New Mexico State Office of the Engineer is presented as *Figure 1*. In addition, *Figure 1A* shows the site location in reference to Bureau of Land Management Declared Aquifers in the State of New Mexico.

The New Mexico Oil and Gas Division (NMOCD) requires that groundwater (freshwater as defined by NMOCD rules) at the location be greater than 50-ft below the containment bottom. *Figure 1* is an aerial map that demonstrates the following to meet these criteria:

1. The location of the proposed containment shown on an aerial photograph with surface elevation (taken from the United States Geologic Survey (USGS) Illinois Camp SE 7.5 Minute Series Topographic Map).
2. A one-mile radius from the site, and location of water wells in comparison to that radius. It should be noted, OSE wells can be mis-located as older wells are plotted in the center of the quarter, quarter, quarter section, township, and range. Note – only wells labeled as domestic or irrigation are plotted.
3. The total depth of the groundwater well closest to the site and depth to water is plotted on the map.

The water well search contained no records for wells located on the site, and one (1) well was located within a one (1) mile radius of the site. The water well is located approximately 875-ft from the site and contained groundwater at a depth of 100-ft below ground surface. In addition, groundwater was encountered on the site during the onsite borings at depths of 55- and 62-ft below ground surface. Therefore, the area of the proposed pit may require additional engineering design to achieve the required 50-ft of separation between the bottom of the containment and groundwater.

1.2.2 GEOLOGY

A geological map for the vicinity of the site was obtained from the New Mexico Bureau of Land Management, Carlsbad Field Office and was used to review the geologic setting for the proposed containment location. Based on the review of the geologic map, the containment location lies within the Halocene to Pleistocene age Eolian and Piedmont alluvial deposits. These deposits consist of interbedded wind-deposited sands and alluvial deposits.

Area stratigraphy to a depth of 75-ft below ground surface (bgs) was obtained from geotechnical borings conducted on the site by COZ Engineering LLC on August 11, 2021. The boring logs recorded silty sand, clayey sand, and sandy lean clay with varying amounts of gravel and carbonate inundations. Groundwater was recorded at a depth of approximately 55- and 62-ft below ground surface.

Figure 2 is reproduction of the USGS Illinois Camp SE New Mexico-Texas 7.5-Minute Series geologic map. *Figure 2* shows the following:

1. Location of the proposed Containment
2. Geologic setting of the Containment

1.3 DISTANCE TO MUNICIPAL BOUNDARIES AND FRESH WATER FIELDS

Figure 3 demonstrates that the location is not located within incorporated municipal boundaries or within a defined municipal freshwater field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3. *Figure 3* illustrates the following:

1. The closest municipality to the site is Carlsbad, New Mexico located approximately 11-mi southwest of the containment location. In addition, the municipality of Lakewood, New Mexico is located approximately 18-mi west-northwest, and Artesia, New Mexico is located approximately 21-mi northwest of the site.
   The closest municipal well field is located approximately 19-mi southwest of the containment location serving the community of Carlsbad, New Mexico.

1.4 DISTANCE TO SUBSURFACE MINES

According to the New Mexico Mining and Minerals Division the nearest mines to the site are surface mines including caliche pits and stone aggregate. The site location is not within an area overlying a subsurface mine. *Figure 4* illustrates the following.

1. The nearest registered mine to the containment location is a caliche pit mine located approximately 2-mi to the south, as shown on *Figure 4*. There are no subsurface mines within the vicinity of the containment location.

1.5 DISTANCE TO HIGH OR CRITIAL KARST AREAS (UNSTABLE AREAS)

Figure 5 shows the location of the temporary containments with respect to BLM Karst areas.

1. The proposed Containment is located within a "high" potential karst area.
2. Voids or other evidence of karsting was not observed during the site inspection, or during drilling of the onsite borings. Carbonate inundated sand was recorded at a depth of 25- to 35-ft below ground surface in one onsite boring.

1.6 DISTANCE TO 100-YEAR FLOODPLAIN

The Federal Emergency Management Agency (FEMA) Flood Insurance maps were reviewed for the location of the site. The site is located on FEMA map panel number 35015C0850D, which was noted as "unincorporated." The area of the containment location is mapped as "Zone X." *Figure 6* demonstrates the area of the site is not located within a 100-year Floodplain.

1. The site is located within "Zone X." Zone X is described as areas located outside of flood hazards.

1.7 DISTANCE TO SURFACE WATER

Figure 7 is reproduction of the USGS Illinois Camp SE 7.5-Minute Series topographic map that demonstrates the site location is not within 300-ft of a continuously flowing watercourse or other significant watercourse, or within 200-ft of a lakebed, sinkhole, or playa lake (as measured from the ordinary high-water mark). *Figure 7* demonstrates the following:

1. No continuously flowing watercourses or other water bodies defined by NMOCD
2. The closest surface water body is Lone Tree Draw located approximately 2.5 miles southwest of the proposed containment.

1.8 DISTANCE TO PERMANENT RESIDENCES OR STRUCTURES

Figure 8 is reproduction of the USGS Illinois Camp SE New Mexico-Texas 7.5-Minute Series topographic map that demonstrates the site location is not within 1,000-ft of an occupied permanent residence, school, hospital, institution, church, or other permanent structure in existence at the time of initial application. The nearest structures to the site location appear to be oil field tank batteries.

1.9 DISTANCE TO NON-PUBLIC WATER SUPPLY

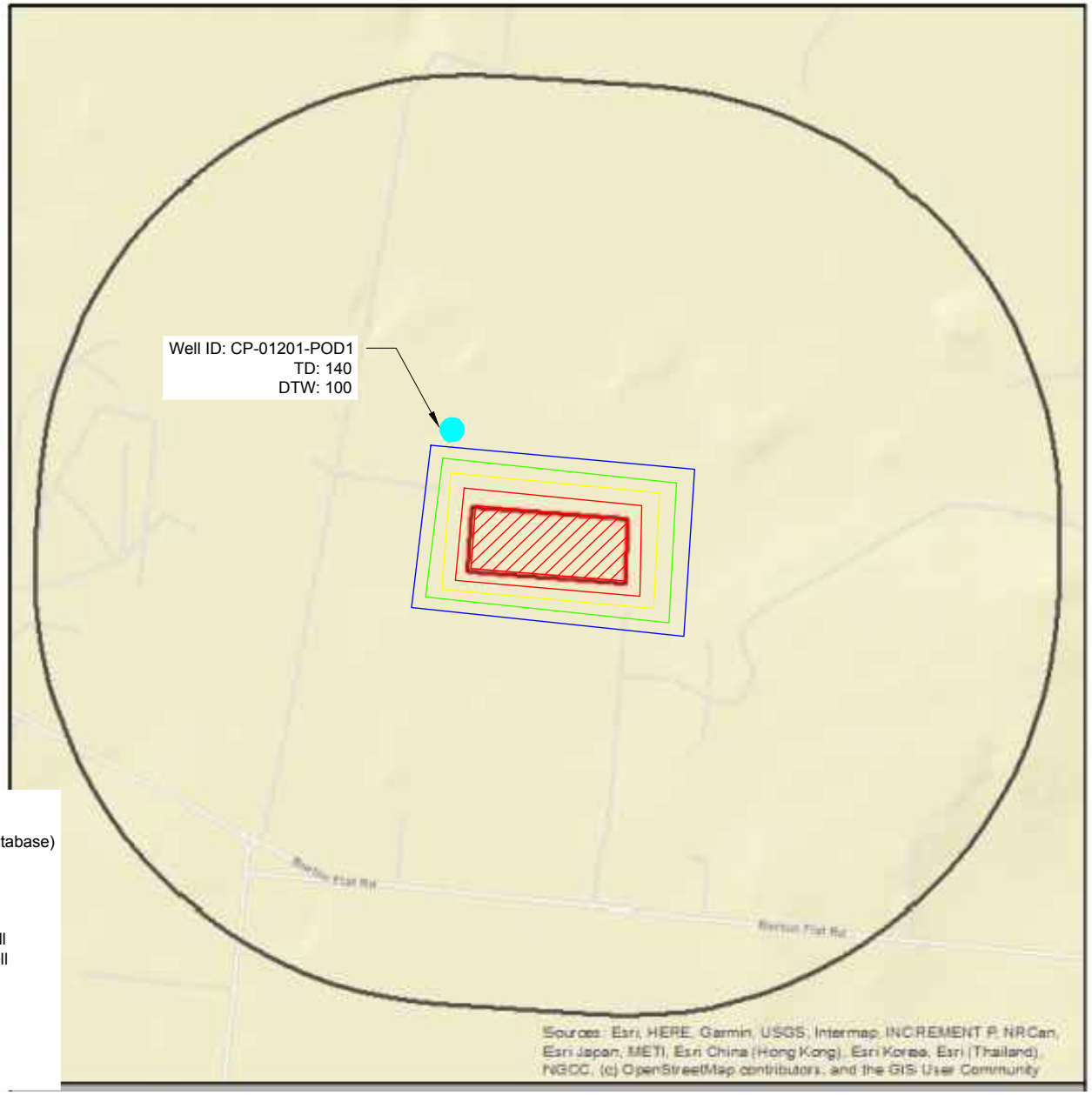
The site is not located within 500-horizontal feet of a private, domestic fresh water well or spring that less than five households use for domestic or stock watering purposes. In addition, the site is not located within 1,000-ft of any other fresh water well or spring, as documented at the time of this application. *Figure 1* illustrates the following.

1. *Figure 1* shows the location of area water wells, active or plugged, relative to the proposed site location.
2. There are no known domestic water wells located within 1,000-ft of the proposed site location.
3. No springs were identified within the mapping area; refer to *Figure 7*.

1.10 DISTANCE TO WETLANDS

The U.S Fish and Wildlife National Wetlands Inventory maps were reviewed for the area of the site. *Figure 9* demonstrates the site is not located within an area of a mapped wetland.

1. The nearest designated wetlands to the site is a freshwater pond with a wetland code PUBKx (Palustrine, Unconsolidated Bottom, Artificially Flooded, Excavated). National Wetlands Inventory mapped wetlands are not located within 500 feet of the proposed pit locations.



MAP LEGEND

- Water Well Location (OSE iWATERS Database)
- NR - Not Recorded in OSE Well Database
- TD - Total Depth
- DTW - Depth to Water
- bgs - Below Ground Surface
- C-00000 - Carlsbad Basin Groundwater Well
- CP-00000 - Capitan Basin Groundwater Well

Distance from Containment:

- 200 ft
- 300 ft
- 500 ft
- 1,000 ft

NORTH

Scale: N.T.S.

MEWBOURNE OIL COMPANY

FIGURE - 1

OSE Groundwater Well Location Map

Derringer Federal Containment Ponds

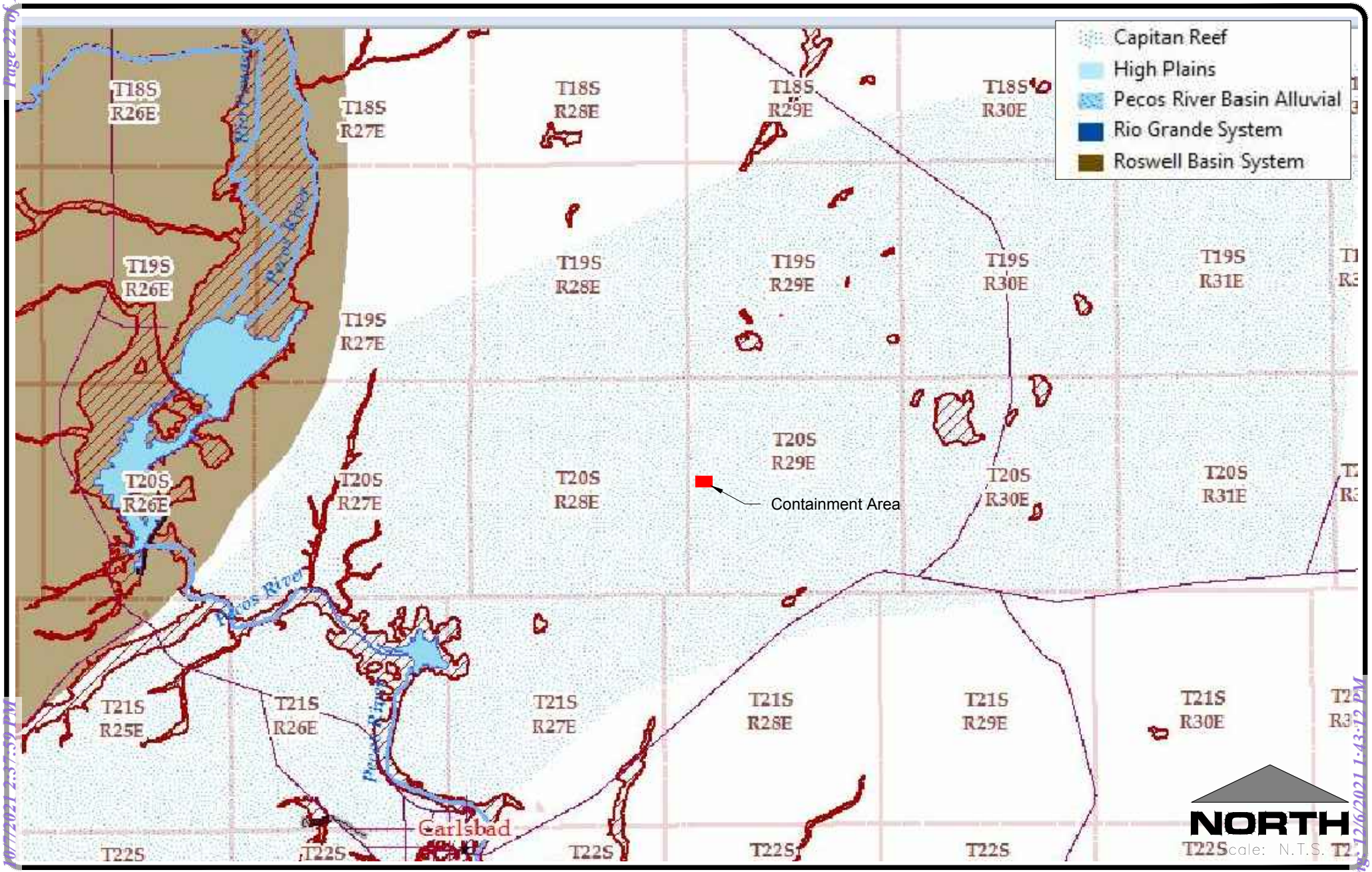
Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

ENVIROTECH ENGINEERING & CONSULTING, INC.

2500 North 11th Street -, Enid, Oklahoma 73701
Phone (580) 234-8780, Fax (580) 237-4302
C.A. #1960 - Expiration Data: 6-30-2022
www.envirotechconsulting.com



MEWBOURNE OIL COMPANY

FIGURE - 1a

BLM Aquifer Map

Derringer Federal Containment Ponds

Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

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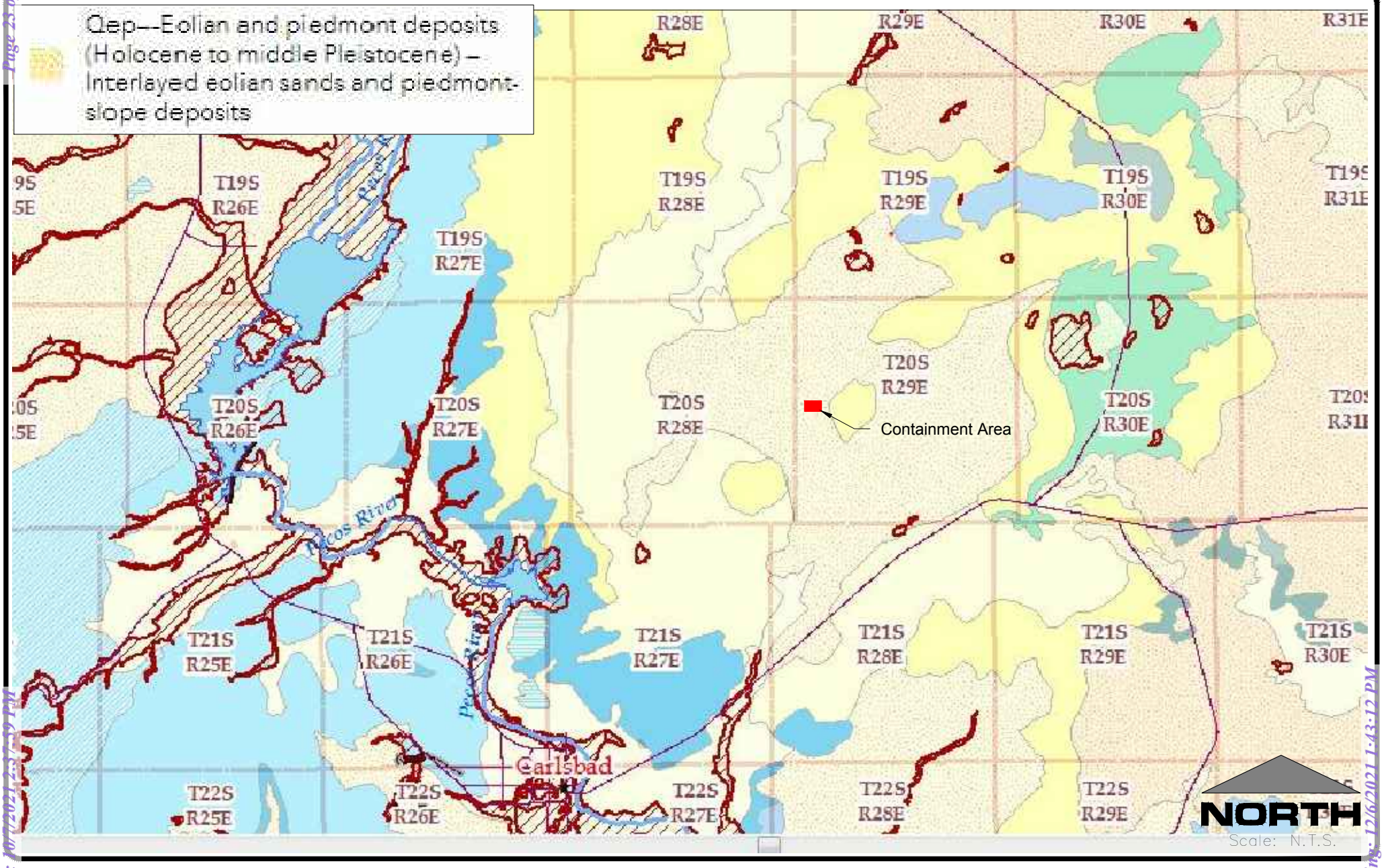

MEWBOURNE OIL COMPANY

FIGURE - 2

Geological Map

Derringer Federal Containment Ponds

Project No. 021116-00

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

ENVIROTECH ENGINEERING & CONSULTING, INC.
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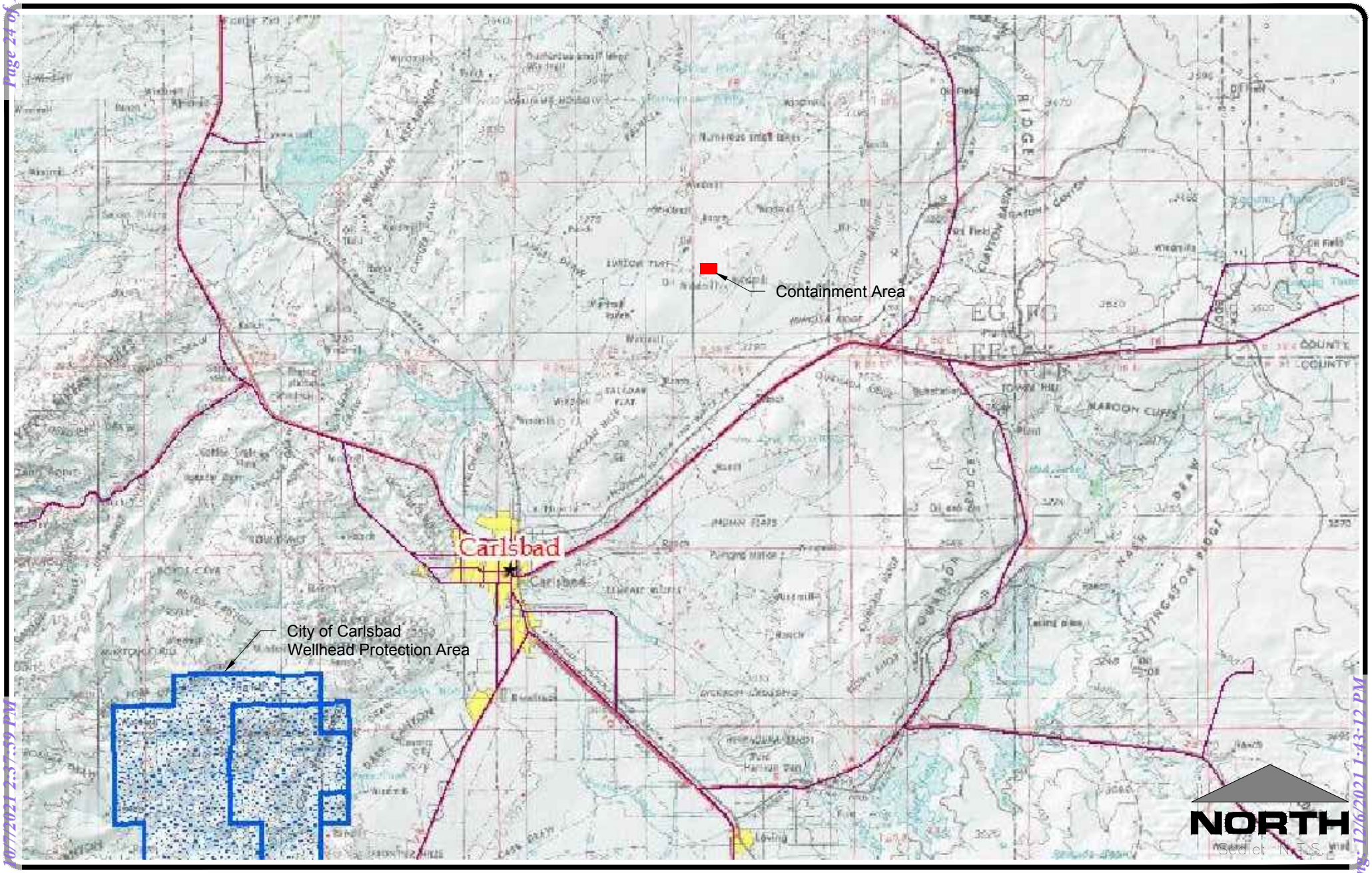

MEWBOURNE OIL COMPANY

FIGURE - 3

Distance from Municipalities & Freshwater Fields

Derringer Federal Containment Ponds

Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

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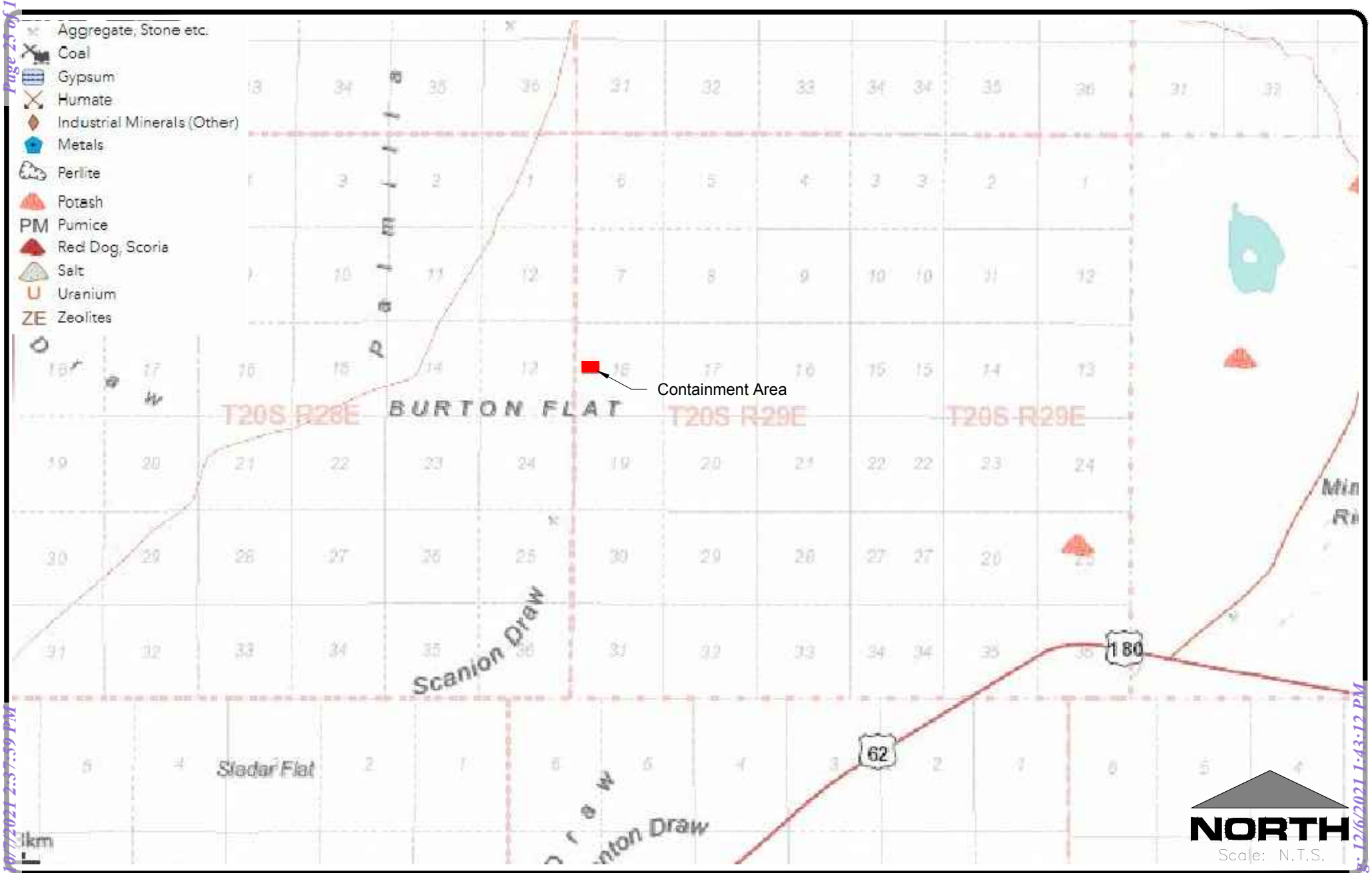

MEWBOURNE OIL COMPANY

FIGURE - 4

New Mexico Mine Location Map

Derringer Federal Containment Ponds

Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

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2500 North 11th Street -, Enid, Oklahoma 73701
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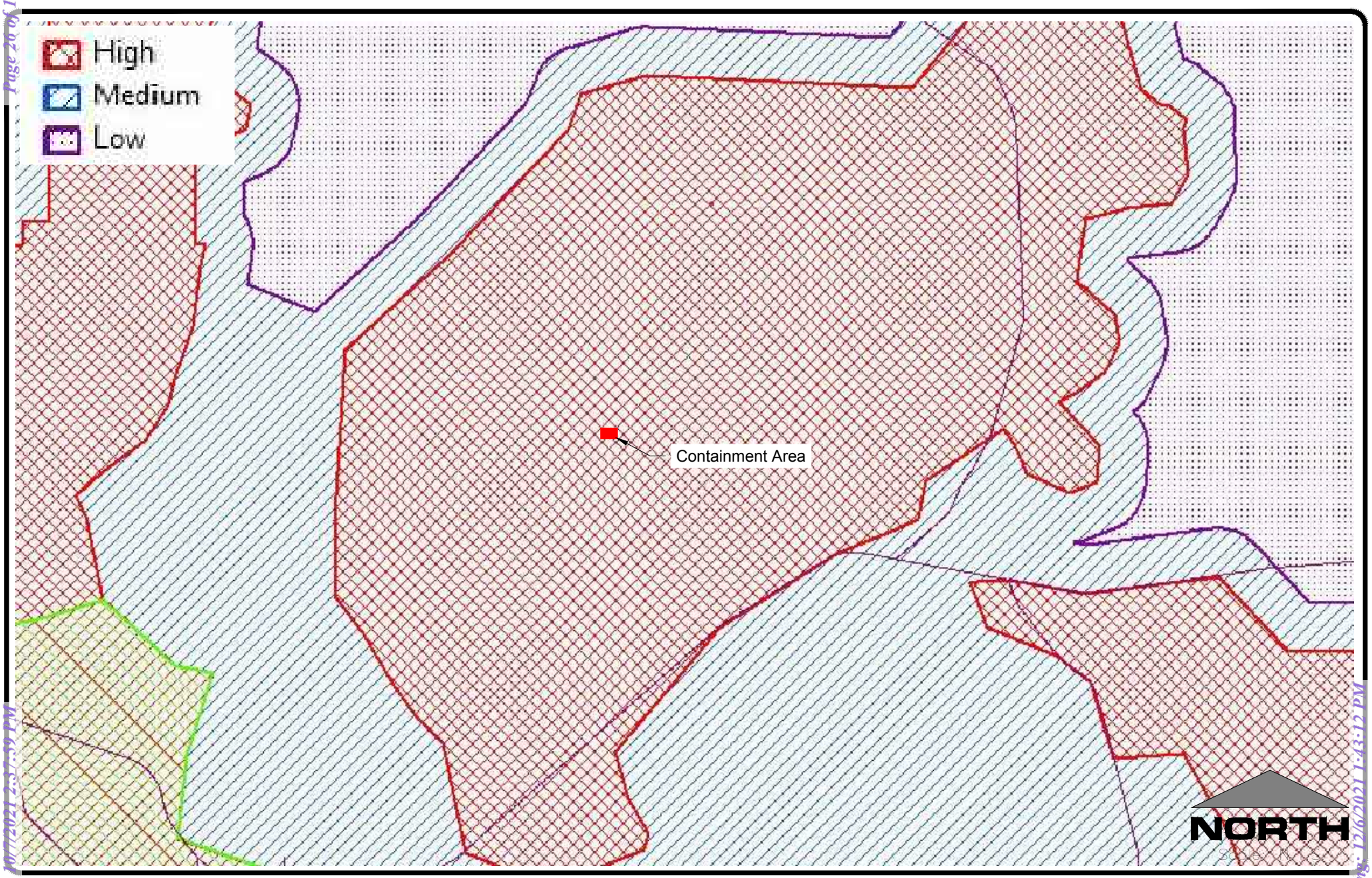

MEWBOURNE OIL COMPANY

FIGURE - 5

Distance to Karst Map

Derringer Federal Containment Ponds

Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

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MEWBOURNE OIL COMPANY

FIGURE - 6

FEMA Map

Derringer Federal Containment Ponds

Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

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ENGINEERING & CONSULTING, INC.
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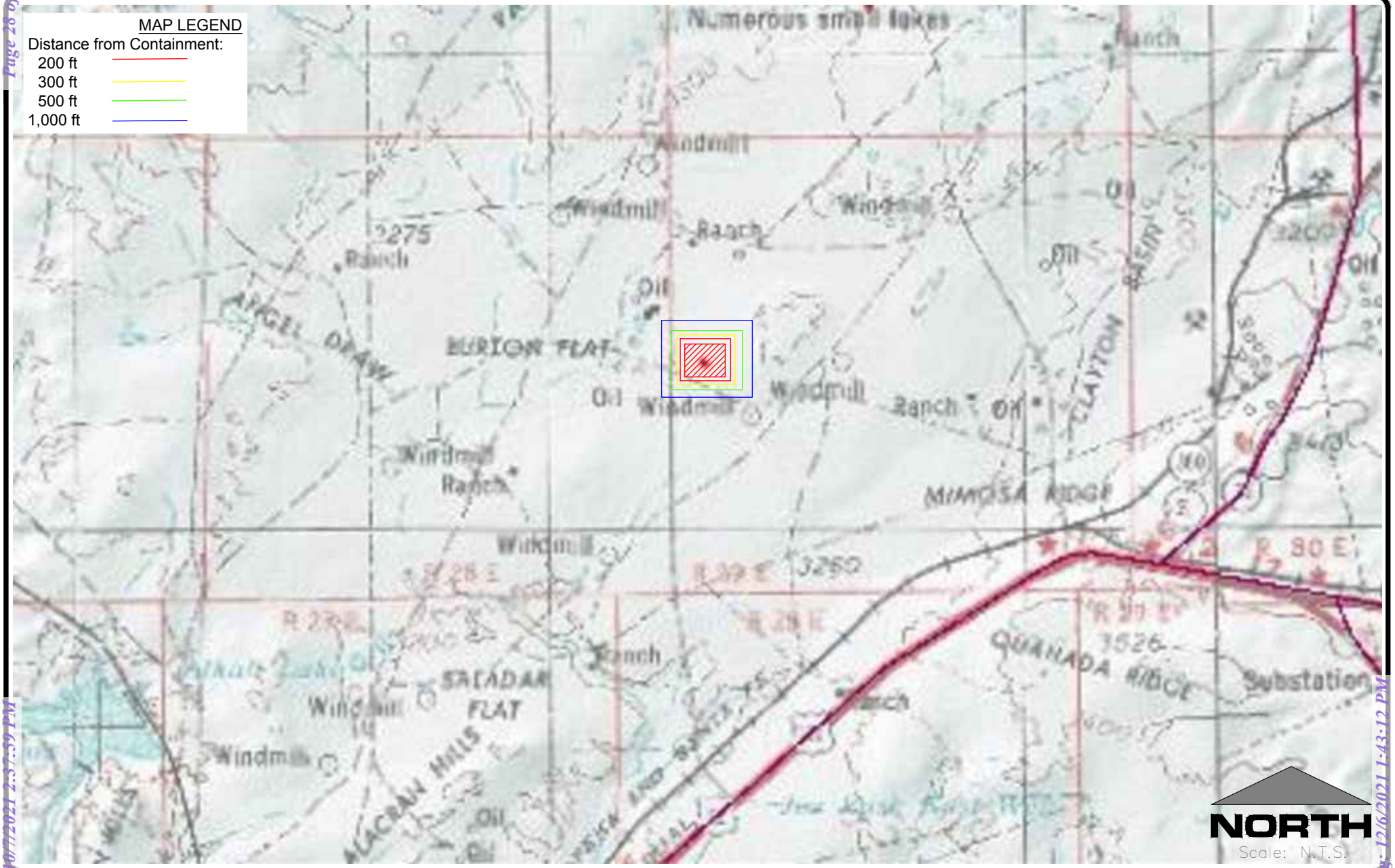

Distance from Municipalities, Permanent Structures, & Surface Water

Derringer Federal Containment Ponds

Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

MEWBOURNE OIL COMPANY

FIGURE - 7

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www.envirotechconsulting.com

MEWBOURNE OIL COMPANY

FIGURE - 8

Location of Wetlands Map

Derringer Federal Containment Ponds

Project No. 021116-01

Section 18, Township 20 South, Range 29 East, Eddy County, NM

Mewbourne Oil Company

ENVIROTECH ENGINEERING & CONSULTING, INC.
2500 North 11th Street -, Enid, Oklahoma 73701
Phone (580) 234-8780, Fax (580) 237-4302
C.A. #1960 - Expiration Data: 6-30-2022
www.envirotechconsulting.com

Prepared for:

ENVIROTECH ENGINEERING and CONSULTING, INC
2500 North 11th
Enid, OK 73703

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Water Well Report

Mewbourne Oil

NM

PO #: 021116-01

ES-137690

Thursday, September 30, 2021

Table of Contents

Banks Environmental Data, Inc. - 1601 Rio Grande, Ste. 331 - Austin, TX 78701 - 800.531.5255 P - 512.478.1433 F
www.banksenvdata.com

Geographic Summary

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Location
NM
Target location is 0.052 square miles and has a 1.01 mile perimeter

Coordinates	
Longitude & Latitude in Degrees Minutes Seconds	NA
Longitude & Latitude in Decimal Degrees	NA
X and Y in UTM	NA

Elevation
NA

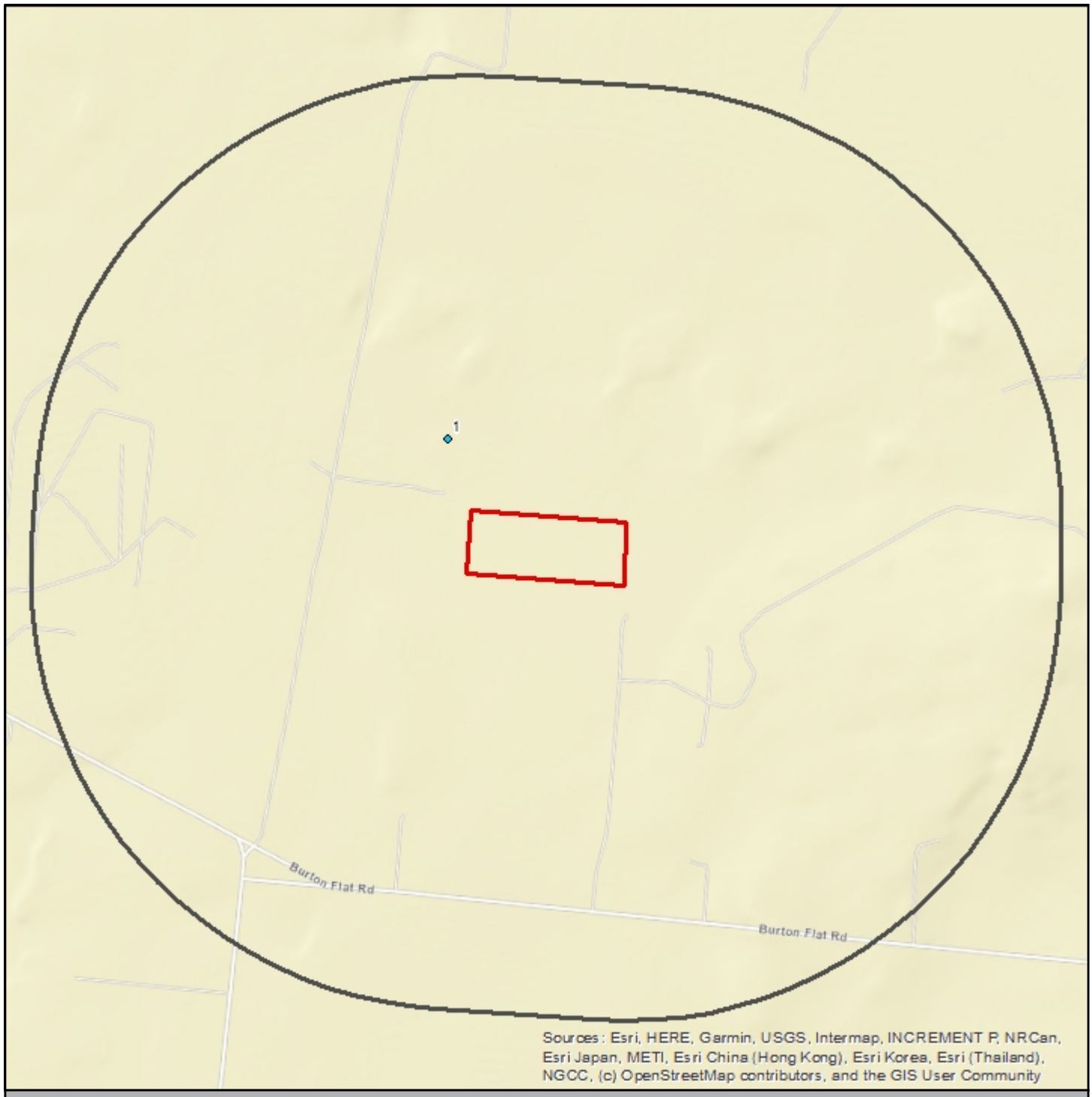
Zip Codes Searched

Search Distance	Zip Codes (historical zip codes included)
Target Property	88210, 88211, 88254, 88255
1 mile	88220, 88221, 88255, 88263, 88268, 88210, 88211, 88254, 88255

Topos Searched

Search Distance	Topo Name
Target Property	Illinois Camp SE (1985)
1 mile	Angel Draw (1985), Illinois Camp SE (1985)

Summary Map - 1 Mile Buffer



Mewbourne Oil

Well
Well Cluster
Target Property
Search Buffer

1 : 21,000
1 inch = 0.331 miles
1 inch = 1750 feet
1 centimeter = 0.210 kilometers
1 centimeter = 210 meters

N

Lambert Conformal Conic Projection
1983 North American Datum
First Standard Parallel: 33 0' 00" North
Second Standard Parallel: 45 0' 00" North
Central Meridian: 96 0' 00" West
Latitude of Origin: 39 0' 00" North

Banks Environmental Data, Inc. - 1601 Rio Grande, Ste. 331 - Austin, TX 78701 - 800.531.5255 P - 512.478.1433 F
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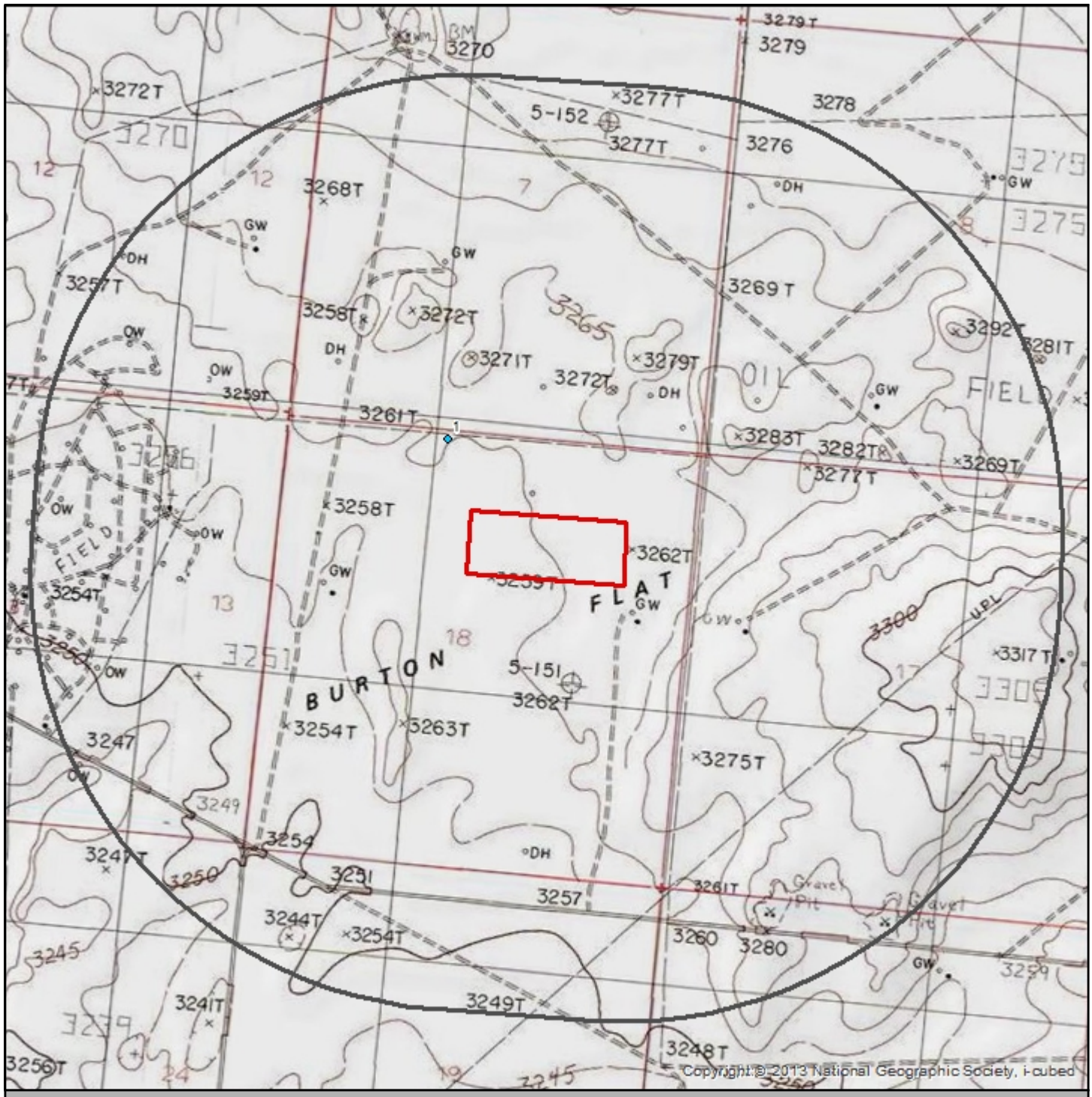
Topographic Overlay Map - 1 Mile Buffer

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Mewbourne Oil

- Well
- Well Cluster
- Target Property
- Search Buffer

Target Property Quad Name(s)
Illinois Camp SE (1985)

1 : 21,000
1 inch = 0.331 miles
1 inch = 1750 feet

Lambert Conformal Conic Projection
1983 North American Datum
First Standard Parallel: 33 0' 00" North
Second Standard Parallel: 45 0' 00" North
Central Meridian: 96 0' 00" West
Latitude of Origin: 39 0' 00" North

N

Banks Environmental Data, Inc. - 1601 Rio Grande, Ste. 331 - Austin, TX 78701 - 800.531.5255 P - 512.478.1433 F
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Current Imagery Overlay Map - 1 Mile Buffer

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Mewbourne Oil

Well
Well Cluster
Target Property
Search Buffer

1 : 21,000
1 inch = 0.331 miles
1 inch = 1750 feet
1 centimeter = 0.210 kilometers
1 centimeter = 210 meters

N

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Latitude of Origin: 39 0' 00" North

Banks Environmental Data, Inc. - 1601 Rio Grande, Ste. 331 - Austin, TX 78701 - 800.531.5255 P - 512.478.1433 F
www.banksenvdata.com

Water Well Details

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Map ID	Source ID	Dataset	Owner of Well	Type of Well	Depth Drilled	Completion Date	Longitude	Latitude	Elevation	Driller's Logs
1	CP-01201-POD1	NM WW	DEVON ENERGY CO	72-12-1 PROSPECTING OR DEVELOPMENT OF NATURAL RESOURCE	140	10/24/2013	-104.11587	32.58045	3262 ft	N/A

Well Summary

Water Well Dataset	# of Wells
NM WW	1
Total Count	**1**

Dataset Descriptions and Sources

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Dataset	Source	Dataset Description	Update Schedule	Data Requested	Data Obtained	Data Updated	Source Updated
NM WW - New Mexico Water Wells	New Mexico Office of the State Engineer	This WATERS dataset contains all groundwater records and water rights applications compiled by New Mexico Office of the State Engineer (OSE). OSE is in the process of digitizing all records, all wells have not yet been plotted.	Quarterly	09/29/2021	09/29/2021	09/29/2021	09/08/2021
NM WW HIST - New Mexico Historical Water Wells	New Mexico Office of the State Engineer	This dataset contains all groundwater records found at the New Mexico Office of the State Engineer Water Rights Division district office. Groundwater rights are administered and filed at the district level: Albuquerque (District I), Roswell (District II),		N/A	N/A	N/A	N/A
WW USGS - USGS Water Wells	U.S. Geological Survey	This dataset contains groundwater well records from the U.S. Geological Survey.	Semi-annually	07/27/2021	07/27/2021	07/28/2021	07/27/2021

Disclaimer

The Banks Environmental Data Water Well Report was prepared from existing state water well databases and/or additional file data/records research conducted at the state agency and the U.S. Geological Survey. Banks Environmental Data has performed a thorough and diligent search of all groundwater well information provided and recorded. All mapped locations are based on information obtained from the source. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or the actual driller. It may be possible that some water well schedules and logs have never been submitted to the regulatory authority by the water driller and, thus, may explain the possible unaccountability of privately drilled wells. It is uncertain if the above listing provides 100% of the existing wells within the area of review. Therefore, Banks Environmental Data cannot fully guarantee the accuracy of the data or well location(s) of those maps and records maintained by the regulatory authorities.

APPENDIX A
GEOTECH REPORT

COZ Engineering, LLC

GEOTECHNICAL ENGINEERING REPORT

DERRINGER FEDERAL SWD #1 RECYCLING FACILITY
SITE 3

EDDY COUNTY, NEW MEXICO
Project No. 4221069
August 18, 2021

Prepared for:

ENVIROTECH ENGINEERING & CONSULTING, INC.
Enid, Oklahoma

Prepared by:

COZ ENGINEERING, LLC
Las Cruces, New Mexico

COZ Engineering, LLC

PO Box 13331
Las Cruces, New Mexico 88013
Cell: 575.642.7671
Email: thecoz42@gmail.com

August 18, 2021

Envirotech Engineering & Consulting, Inc.
2500 North Eleventh Street
Enid, OK 73701

Attn. Tyler Williams, PE
P: 580.234.8780
E: twilliams@envirotechconsulting.com

Re: Geotechnical Engineering Report
Derringer Federal SWD #1 Recycling Facility Site 3
Lat.: 32.577474, Long.: -104.111496
Eddy County, New Mexico
COZ Report No. 4221069

Dear Mr. Williams:

The following is a geotechnical engineering report for the proposed Derringer Federal SWD #1 Recycling Facility Site 3 in Eddy County, New Mexico. Recommendations for earthwork, construction, embankments and other geotechnical considerations are presented in the report.

Thank you for the opportunity to provide this geotechnical engineering report. If you have any questions or concerns, please contact me at (575)-642-7671.

Sincerely,
COZ Engineering, LLC

Dan Cosper, P.E.

Derringer Federal SWD #1 Recycling Facility Site 3
August 18, 2021
COZ Report No. 4221069

Appendix:

Site Plan
Boring Logs
Laboratory Results

Derringer Federal SWD #1 Recycling Facility Site 3
August 18, 2021
COZ Report No. 4221069

Site Investigation:

A subsurface investigation was performed for the proposed Derringer Federal SWD #1 Recycling Facility Site 3 originally to be located at Lat.: 32.577483° Long.: -104.117775° (identified by Boring B-1) about 15 miles northeast of Carlsbad, New Mexico. However, due to groundwater being encountered at a depth of 55 feet below ground surface (bgs) in the boring, a second location was chosen by the client during our field exploration. The second location was at Lat.: 32.577474° Long.: -104.111496° (identified by Boring B-2). The groundwater table was encountered at a depth of 62 feet (bgs) in the boring. Subsequently, the client decided to use this second location as the area for the proposed recycling facility. A total of six (6) test borings were advanced within the project area (one boring at the abandoned location and five borings at the newly chosen location). The borings were terminated at depths of 20 and 75 feet below ground surface (bgs).

Site Conditions:

The finalized project area contained sparse to dense creosote bush, mesquite bush and native grasses at the time of the field exploration. Soils investigated at this site were comprised of silty sand, clayey sand and sandy lean clay with varying amounts of gravel and carbonate indurations from the surface to the total explored depths of about 20 and 75 feet bgs.

The groundwater table at the finalized location was encountered at a depth of 62 feet bgs during the field investigation.

Based upon visual observations and the borings conducted at the site, it is my opinion that sinkholes or cavities associated with the karst topography prevalent in the region will not be a significant issue for construction activities. Some shallow dissolution cavities and animal burrows were noted at the site but appeared to be contained near the surface (within about a 5-foot depth). Additionally, voids were not encountered in the borings advanced at the site.

Planned Construction:

Based on the information provided, the project will include the construction of a mud recycling facility.

Site Grading:

Areas for planned construction should be clear of debris, vegetation and any oversized or deleterious material prior to grading operations. Fill construction shall not be allowed on surfaces that contain vegetation or rocks larger than four inches in greatest dimension. No fill shall be placed that contains vegetative material as decomposition of that material can cause voids and possibly result in surface settlement. Voids in the soil matrix created or encountered during grading operations shall be backfilled with compacted fill material.

Positive drainage away from embankments should be provided throughout the life of the project. Areas adjacent to embankments that could retain water should be sealed or eliminated.

Soil Improvements:

Subgrade preparation (beneath embankments and engineered fills) should consist of scarifying the native soil surface a minimum thickness of 10 inches, moisture conditioning (+/- 2% of optimum moisture content per ASTM D-698) and compaction to a minimum of 95% of standard Proctor density (per ASTM D-698). Engineered fill materials should be placed in 10-inch maximum lifts, moisture conditioned to within 2% of optimum moisture content (per ASTM D-698) and compacted to a minimum of 95% of standard Proctor density (per ASTM D-698).

Fill Material:

Engineered fill material for this project should meet the following gradation criteria:

Sieve	% Passing
4"	100
¾	70-100
#4	50-100
#200	50 max.

The plasticity index of the minus #40 sieve portion should not exceed ten (10). The upper on-site soils meet the above specifications.

Excavation of Embankment Areas:

Difficult excavations due to very dense cemented soils will require particular attention in the design and construction.

The soils below the new embankments should be scarified ten inches, moisture conditioned and compacted. The interior/exterior width of subgrade preparation should extend to the intersection of the slopes of the embankment fill. Once the subgrade

preparation has been observed and approved by the geotechnical engineer, embankment fill operations can initiate.

Embankment Placement:

Once the subgrade has been prepared, on-site embankment material stockpiles should be moisture conditioned in preparation for lift placement. The embankments should be constructed as a unit from the bottom elevation to the rim elevation.

The distal slopes of the embankments should be overbuilt and cut to final grade to provide compaction to these edges of the embankments. The embankments should be constructed in strict accordance with the project plans and specifications.

Seismic Site Classification:

The seismic site classification is based upon the soil profile in the upper 100 feet as defined by the weighted average of standard penetration blow-counts or shear wave velocity in accordance with Section 20.4 of the ASCE 7 and the International Building Code (IBC). Based upon my field investigation, it is my opinion that the Seismic Site Classification is **C ("Very Dense Soil or Soft Rock")**. The maximum depth of the borings advanced at the site was 75 feet. Therefore, soil properties below the maximum boring depth to 100 feet were estimated based on my experience with the general area. Deeper borings or geophysical testing would be required to confirm the conditions below the current boring depth.

Testing and Inspection:

It is recommended that all site grading operations be inspected by a geotechnical engineer. The inspecting engineer should be responsible for immediately reporting any site or soil conditions that vary significantly from this report.

The testing of materials should be made at the following:

1) One (1) soil density every 5,000 square feet of prepared subgrade and embankment fill areas (ASTM D-1556, ASTM D-2167, or ASTM D-2922, ASTM D-3017).

2) One (1) sieve analysis and plasticity index per material used according to ASTM D-422 and ASTM D-4318.

3) One (1) proctor per each type of material used according to ASTM D-698.

Report Limitations:

The conclusions, recommendations and opinions presented herein are:

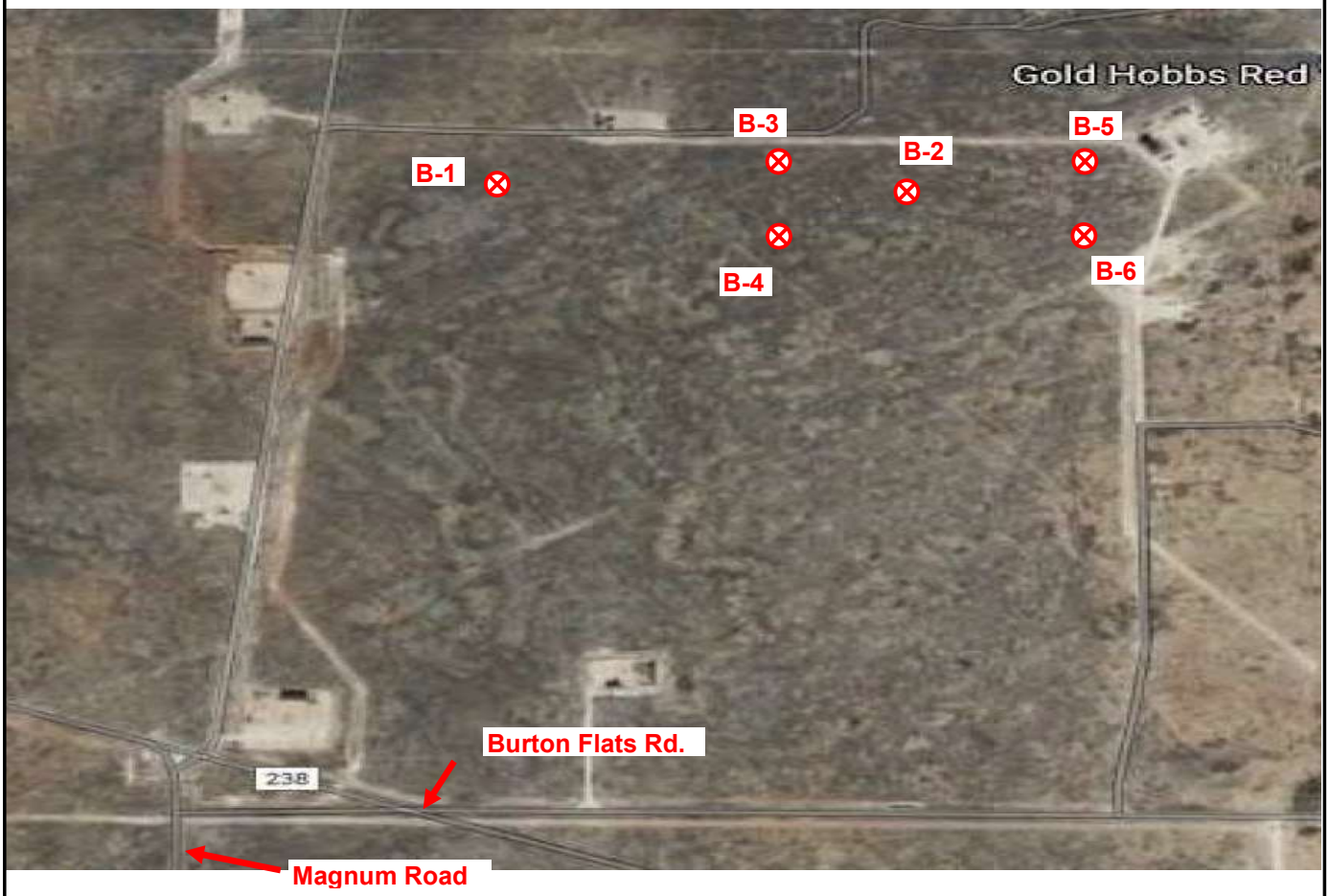
1) Based upon evaluation and interpretation of the findings of the field and laboratory program.

2) Based upon an interpolation of soil conditions between and beyond the explorations.

3) Subject to confirmation of the conditions encountered during construction.

4) Based upon the assumption that sufficient observation and testing will be provided during construction.

There is no other warranty, either express or implied. Any person using this report for bidding or construction purposes should perform such independent investigation as he deems necessary to satisfy himself as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project. If conditions are encountered during construction that appear to differ from those indicated in this report, I should be notified immediately.



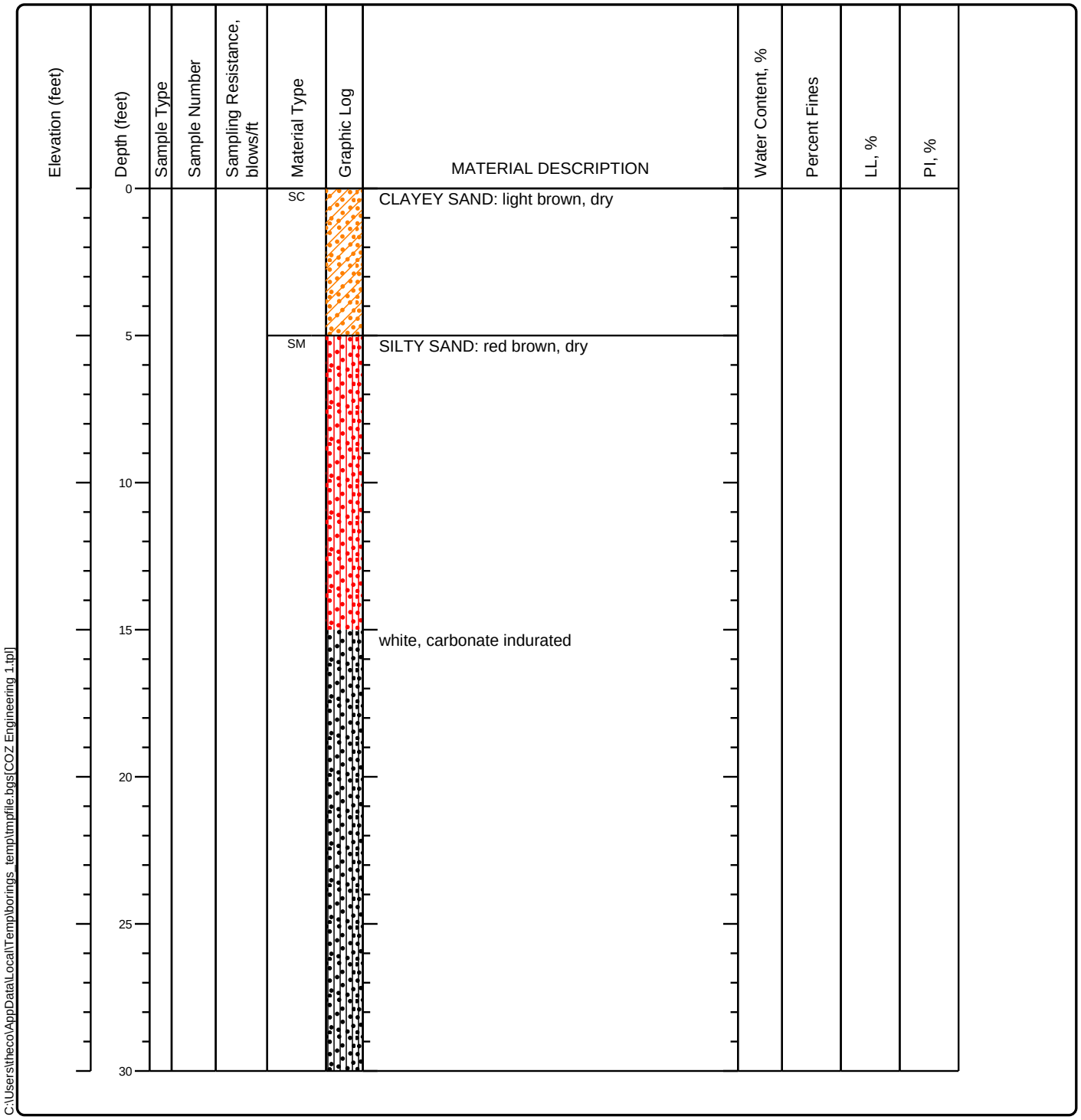
N

⊗ Approximate Boring Location

Project Manager: DC Drawn by: DC Checked by: DC Approved by: DC	Project No. 4221069 Scale: AS SHOWN File Name: Figures Date: 8-17-21	COZ Engineering, LLC PO Box 13331 Las Cruces, NM 88013	BORING LOCATION PLAN Derringer Federal SWD #1 Site 3 Eddy County, NM	Exhibit 1

Project: **Derringer Federal SWD #2 Recycling Facility Site 3** Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM** Project Number: **4221069**	Log of Boring B-1 **Sheet 1 of 3**

Date(s) Drilled **8-11-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **75 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **EDI**	Approximate Surface Elevation
Groundwater Level and Date Measured **55 feet bgs, 8-11-21**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **32.577483 -104.117775**	



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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Log of Boring B-1

Sheet 2 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	30				SC		CLAYEY SAND: red brown, dry				
	35										
	40										
	45				CL		SANDY LEAN CLAY: light brown, dry				
	50										
	55				SC		55 feet bgs ▼ CLAYEY SAND: red brown, water bearing at 55 feet bgs				
	60										
	65										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Log of Boring B-1
Sheet 3 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	65				SC		CLAYEY SAND: red brown, water bearing at 55 feet bgs				
	70										
	75						Bottom of Boring				
	80										
	85										
	90										
	95										
	100										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3** Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM** Project Number: **4221069**	Log of Boring B-2 **Sheet 1 of 3**

Date(s) Drilled **8-12-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **75 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **EDI**	Approximate Surface Elevation
Groundwater Level and Date Measured **62 feet bgs, 8-12-21**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **32.577474 -104.111496**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SC		CLAYEY SAND: light brown, dry				
	5										
	10				SM		SILTY SAND: red brown, dry				
	15										
	20										
	25						white , carbonate indurated				
	30										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Log of Boring B-2
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	30						white , carbonate indurated				
	35				SC		CLAYEY SAND: red brown, dry				
	40										
	45										
	50				CL		SANDY LEAN CLAY: light brown, dry to moist				
	55										
	60						62 feet bgs ▼				
	65				SC		CLAYEY SAND: red brown, water bearing at 62 feet bgs				

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Log of Boring B-2
Sheet 3 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	65				SC		CLAYEY SAND: red brown, water bearing at 62 feet bgs				
	70						light brown				
	75						Bottom of Boring				
	80										
	85										
	90										
	95										
	100										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Log of Boring B-3
Sheet 1 of 1

Date(s) Drilled **8-12-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **EDI**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **32.578289 -104.113716**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SC		CLAYEY SAND: light brown, dry, very dense				
	5		1	21\31\50				9.5	26.5	24	8
	10		2	24\30\50	SM		SILTY SAND: red brown, dry, very dense				
	15		3	7\12\14	CL		SANDY LEAN CLAY: red brown, dry to moist, very stiff				
	20		4	5\11\13	SM		SILTY SAND: red brown, dry, medium dense				
							Bottom of Boring				
	25										
	30										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Log of Boring B-4
Sheet 1 of 1

Date(s) Drilled **8-12-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **EDI**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **32.576906 -104.113681**	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
0				SC		CLAYEY SAND: light brown, dry, very dense				
5		1	14\25\50				8.7	38.4	22	7
10		2	30\22\50	CL		SANDY LEAN CLAY: light brown, dry to moist, hard				
15		3	20\28\50	SM		SILTY SAND: red brown, dry, very dense				
20		4	18\16\21			dense				
						Bottom of Boring				
25										
30										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3** Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM** Project Number: **4221069**	Log of Boring B-5 **Sheet 1 of 1**

Date(s) Drilled **8-12-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **EDI**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **32.578271 -104.109015**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: light brown, dry, dense				
	5		1	11\21\28				8.8	36.4		NP
	10		2	14\30\50			red brown, very dense				
	15		3	30\50							
	20		4	14\22\25			dense				
							Bottom of Boring				
	25										
	30										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Log of Boring B-6
Sheet 1 of 1

Date(s) Drilled **8-12-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **EDI**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **32.576781 -104.109088**	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
0				SC		CLAYEY SAND: light brown, dry, medium dense				
5		1	6\7\9				11.9	45.4	25	10
10		2	28\31\50			very dense				
15		3	12\37\50	CL		SANDY LEAN CLAY: red brown, dry to moist, hard				
20		4	17\27\50	SM		SILTY SAND: red brown, dry, very dense				
						Bottom of Boring				
25										
30										

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Project: **Derringer Federal SWD #2 Recycling Facility Site 3**
Project Location: **N. of Magnum Rd. and Burton Flats Rd., Eddy County, NM**
Project Number: **4221069**

Key to Log of Boring
Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1 Elevation (feet): Elevation (MSL, feet).
2 Depth (feet): Depth in feet below the ground surface.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Sample Number: Sample identification number.
5 Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
6 Material Type: Type of material encountered.
7 Graphic Log: Graphic depiction of the subsurface material encountered.
8 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
9 Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
10 Percent Fines: The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.
11 LL, %: Liquid Limit, expressed as a water content.
12 PI, %: Plasticity Index, expressed as a water content.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)
Clayey SAND (SC)
Silty SAND (SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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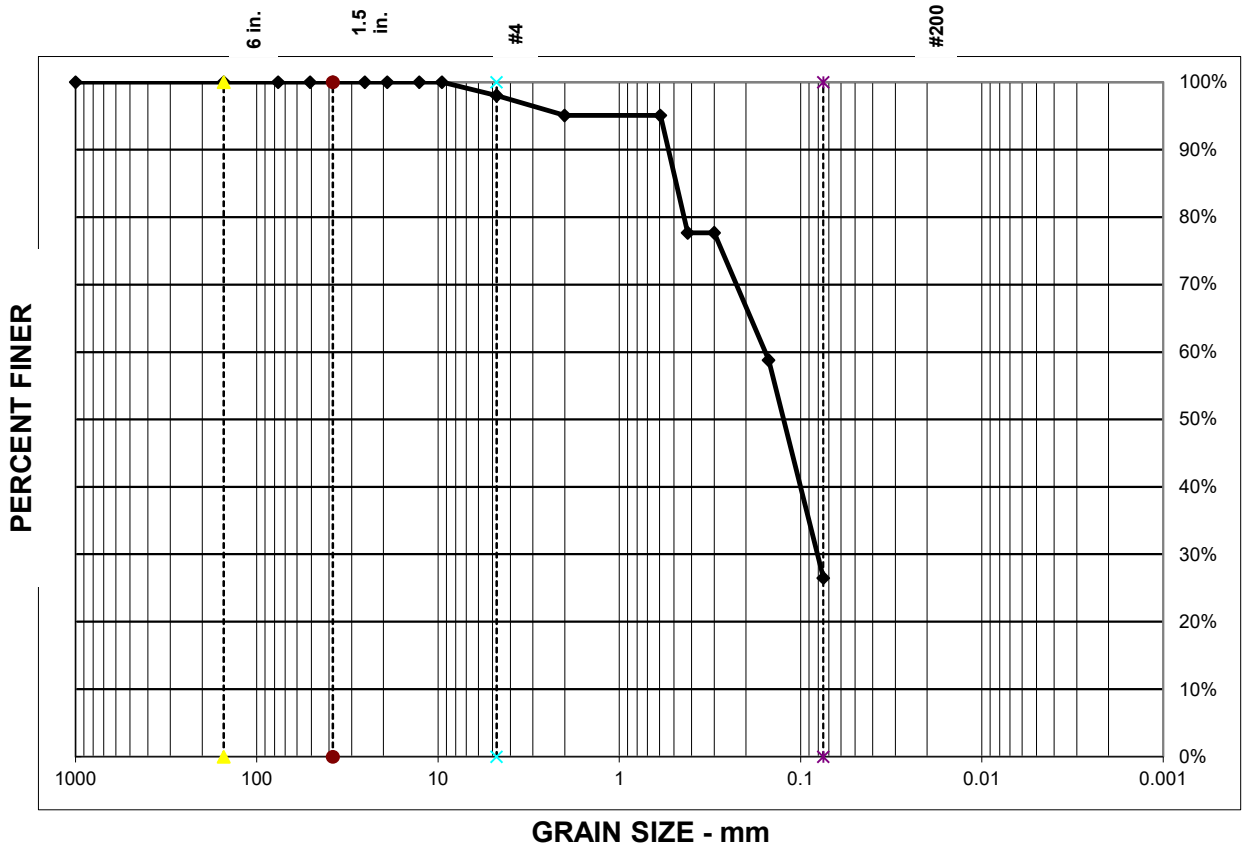
Figure B-1

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	98%	95%	78%	59%	26.5%
Specification								

% GRAVEL =	2%		**D_{85} =** 0.5	**D_{15} =**	
% SAND =	71%		**D_{60} =** 0.2	**D_{10} =**	
% SILT & CLAY =	27%		**D_{50} =** 0.1	**C_U =**	
			D_{30} = 0.1	**C_C =**	

Sample Date: 8/12/21
Project No.: 4221069
Project Name: Derringer Federal SWD #1 Site 3
Report Date: 8/17/21
Sample Location: B-3 at 0-10'
Liquid Limit: 24 **Plasticity Index:** 8
USCS Classification: SC
Material Description: Clayey Sand
In-Situ Moisture Content: 9.5%

COZ Engineering, LLC
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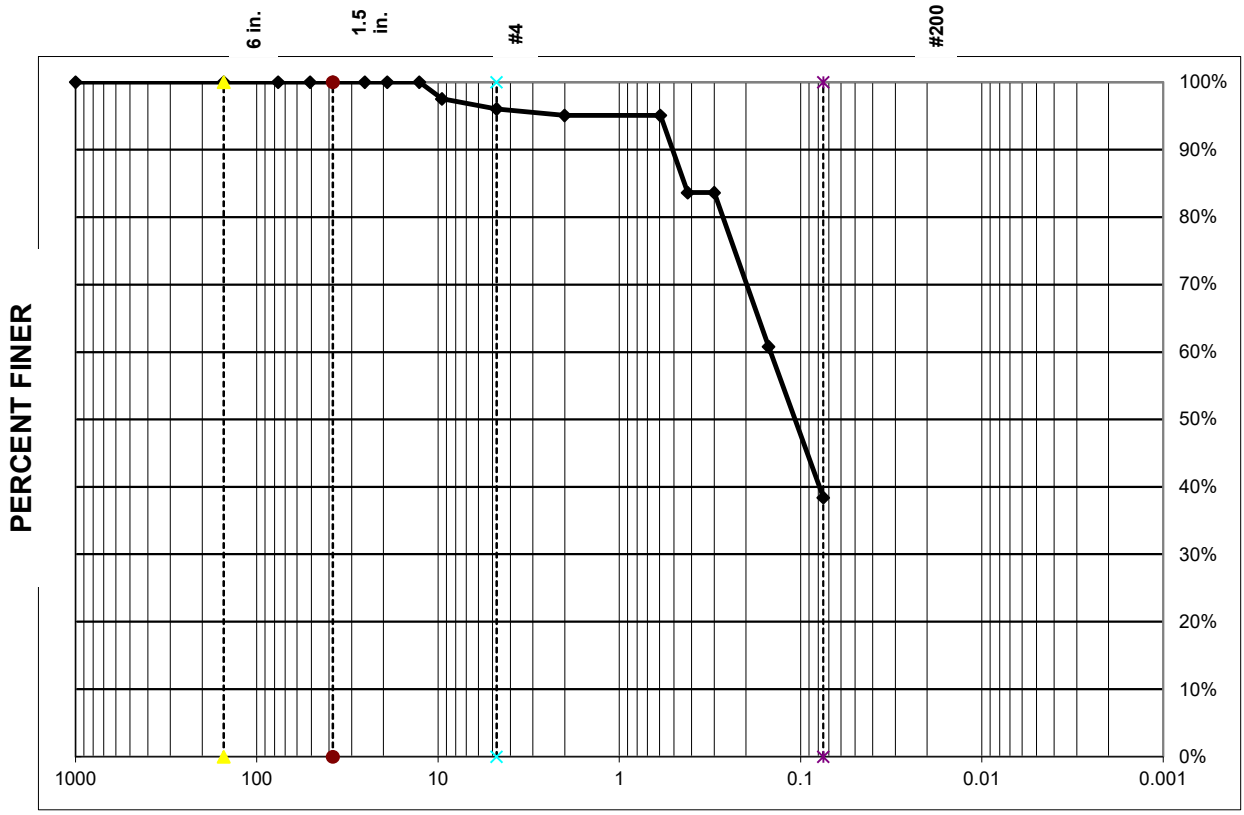
Las Cruces, NM 88013
(575) 642-7671

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	98%	96%	95%	84%	61%	38.4%
Specification								

% GRAVEL =	4%		**D_{85} =** 0.4	**D_{15} =**	
% SAND =	58%		**D_{60} =** 0.1	**D_{10} =**	
% SILT & CLAY =	38%		**D_{50} =** 0.1	**C_U =**	
			D_{30} =	**C_C =**	

Sample Date: 8/12/21
Project No.: 4221069
Project Name: Derringer Federal SWD #1 Site 3
Report Date: 8/17/21
Sample Location: B-4 at 0-10'
Liquid Limit: 22 **Plasticity Index:** 7
USCS Classification: SC
Material Description: Clayey Sand
In-Situ Moisture Content: 8.7%

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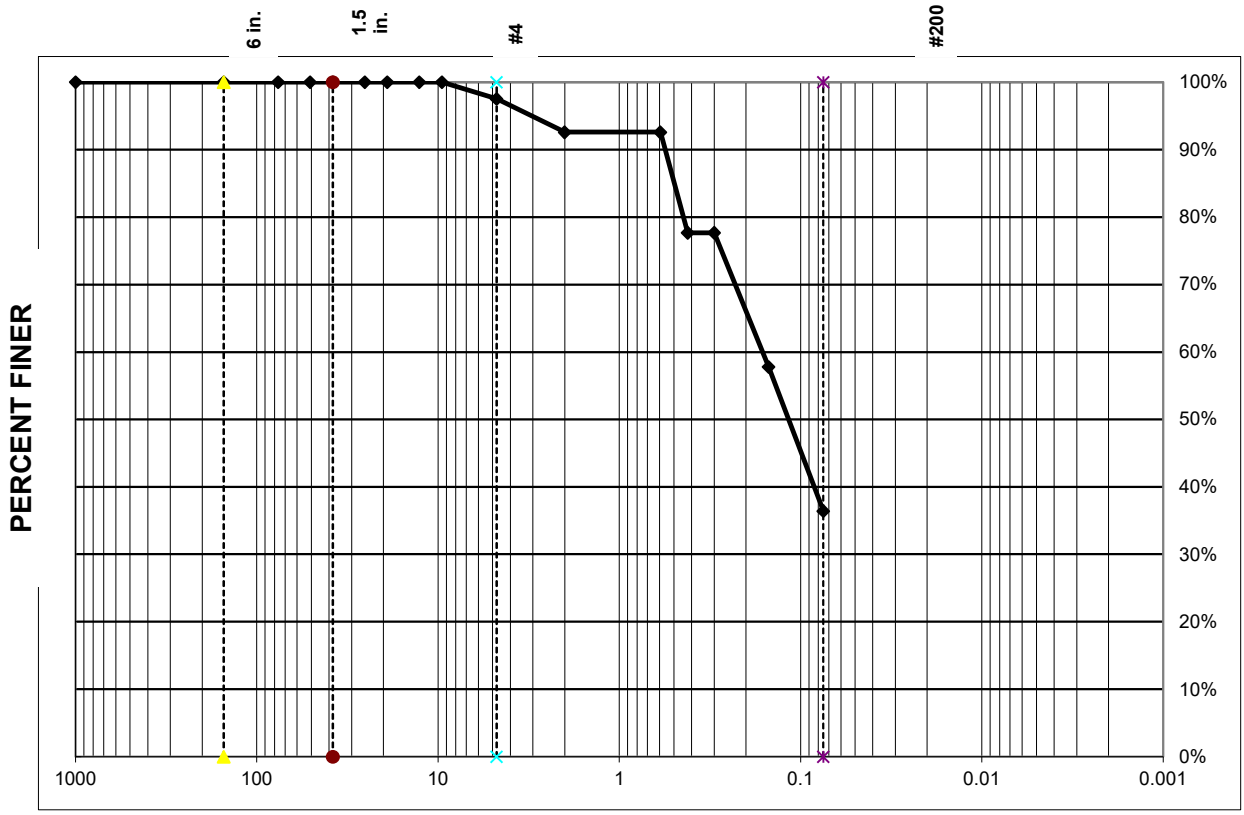
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

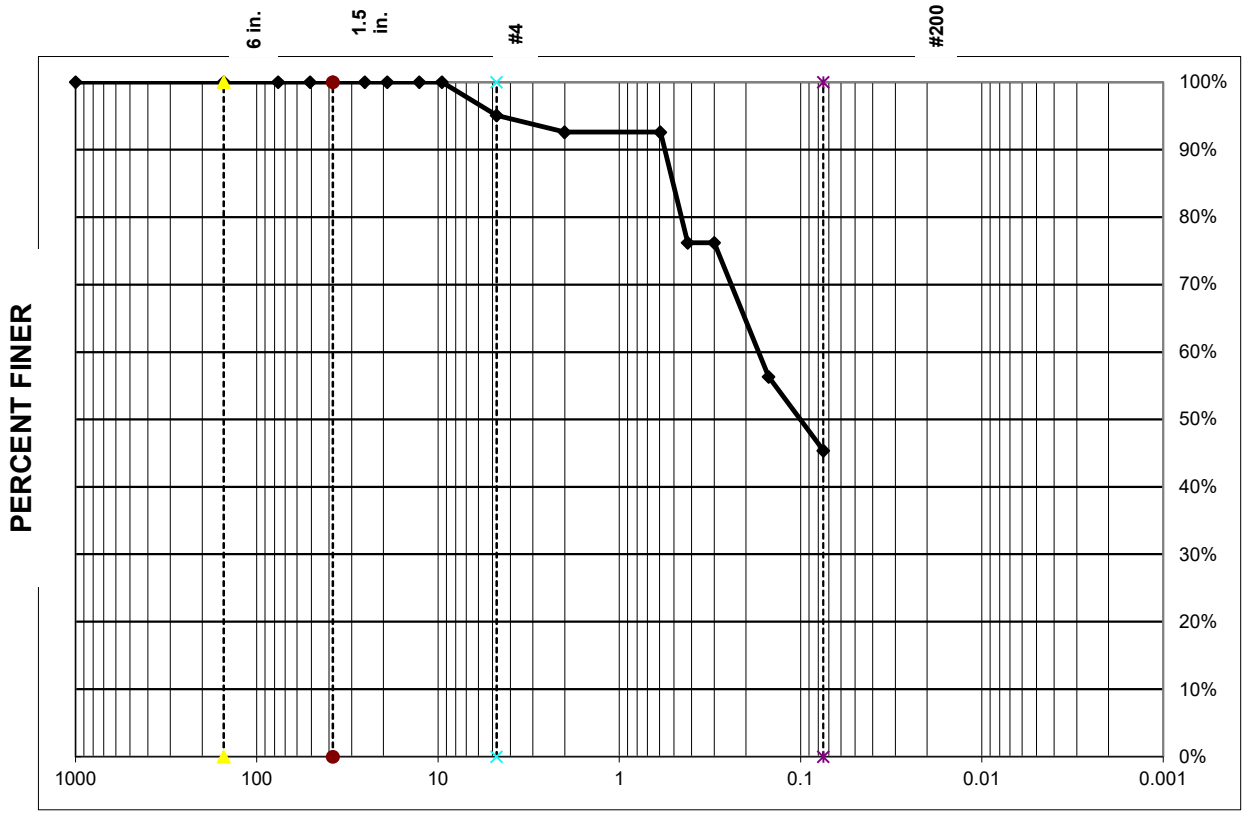
Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	98%	93%	78%	58%	36.4%
Specification								

% GRAVEL =	2%	**D_{85} =** 0.5	**D_{15} =**
% SAND =	61%	**D_{60} =** 0.2	**D_{10} =**
% SILT & CLAY =	36%	**D_{50} =** 0.1	**C_U =**
		D_{30} =	**C_C =**

Sample Date: 8/12/21
Project No.: 4221069
Project Name: Derringer Federal SWD #1 Site 3
Report Date: 8/17/21
Sample Location: B-5 at 0-10'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SM
Material Description: Silty Sand
In-Situ Moisture Content: 8.8%

COZ Engineering, LLC
PO Box 13331
Las Cruces, NM 88013
(575) 642-7671

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	95%	93%	76%	56%	45.4%
Specification								

% GRAVEL =	5%	**D_{85} =** 0.5	**D_{15} =**
% SAND =	50%	**D_{60} =** 0.2	**D_{10} =**
% SILT & CLAY =	45%	**D_{50} =** 0.1	**C_U =**
		D_{30} =	**C_C =**

Sample Date: 8/12/21
Project No.: 4221069
Project Name: Derringer Federal SWD #1 Site 3
Report Date: 8/17/21
Sample Location: B-6 at 0-10'
Liquid Limit: 25 **Plasticity Index:** 10
USCS Classification: SC
Material Description: Clayey Sand
In-Situ Moisture Content: 11.9%

COZ Engineering, LLC
PO Box 13331
Las Cruces, NM 88013
(575) 642-7671

APPENDIX B
ENGINEERING DRAWINGS

DERRINGER FEDERAL RECYCLE

Mewbourne Oil Company

Section 18, Township 20 South, Rang 29 East

32° 34' 39.2334", -104° 6' 39.8232"
32.577565°, -104.111062°

Project Location Google Maps Location

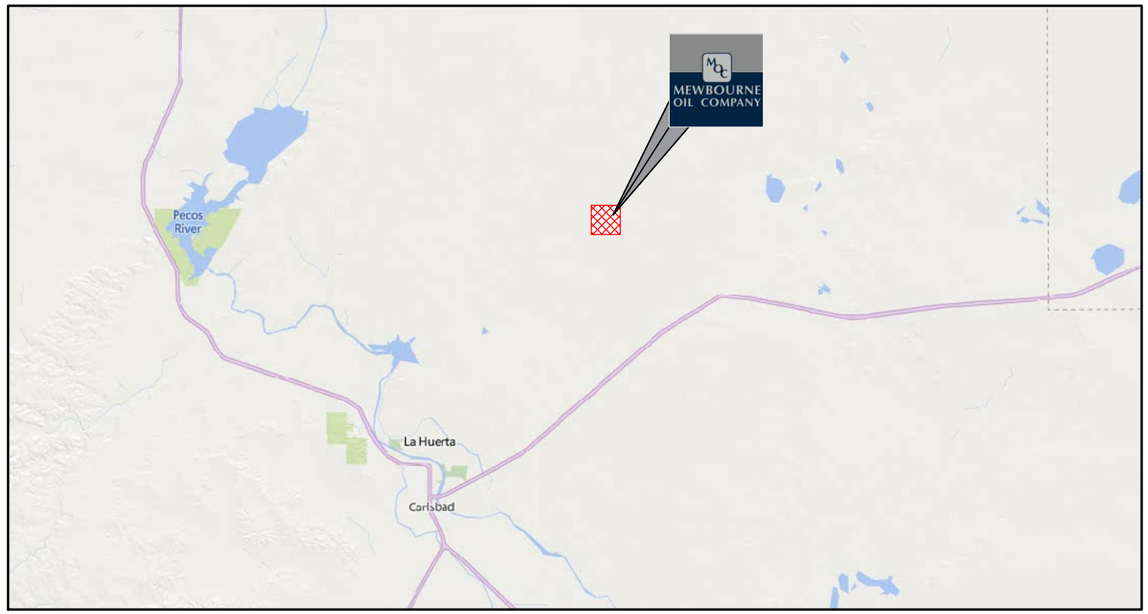
Electronic Plans

Contacts

Mewbourne Oil Company - Kyle Mitchell -(575)-602-5857

Envirotech Engineering Consulting - Mitchell Ratke, EIT 580-234-8780 (Design Engineer)

Envirotech Engineering Consulting - Tyler Williams, PE 580-234-8780 (Supervising Engineer)



Index to Drawings
11" X17"

Sheet No.	Description
1.	Cover Sheet
2.	Project Location Plan
3.	Site Plan
4.	Staking Plan
5.	Capacity Tables
6.	Cross Sections
7.	Cross Sections
8.	Sump Plan & Details
9.	Liner Details
10.	Fence Details

TYLER JOE WILLIAMS
NEW MEXICO
21432
PROFESSIONAL ENGINEER

9/30/2021

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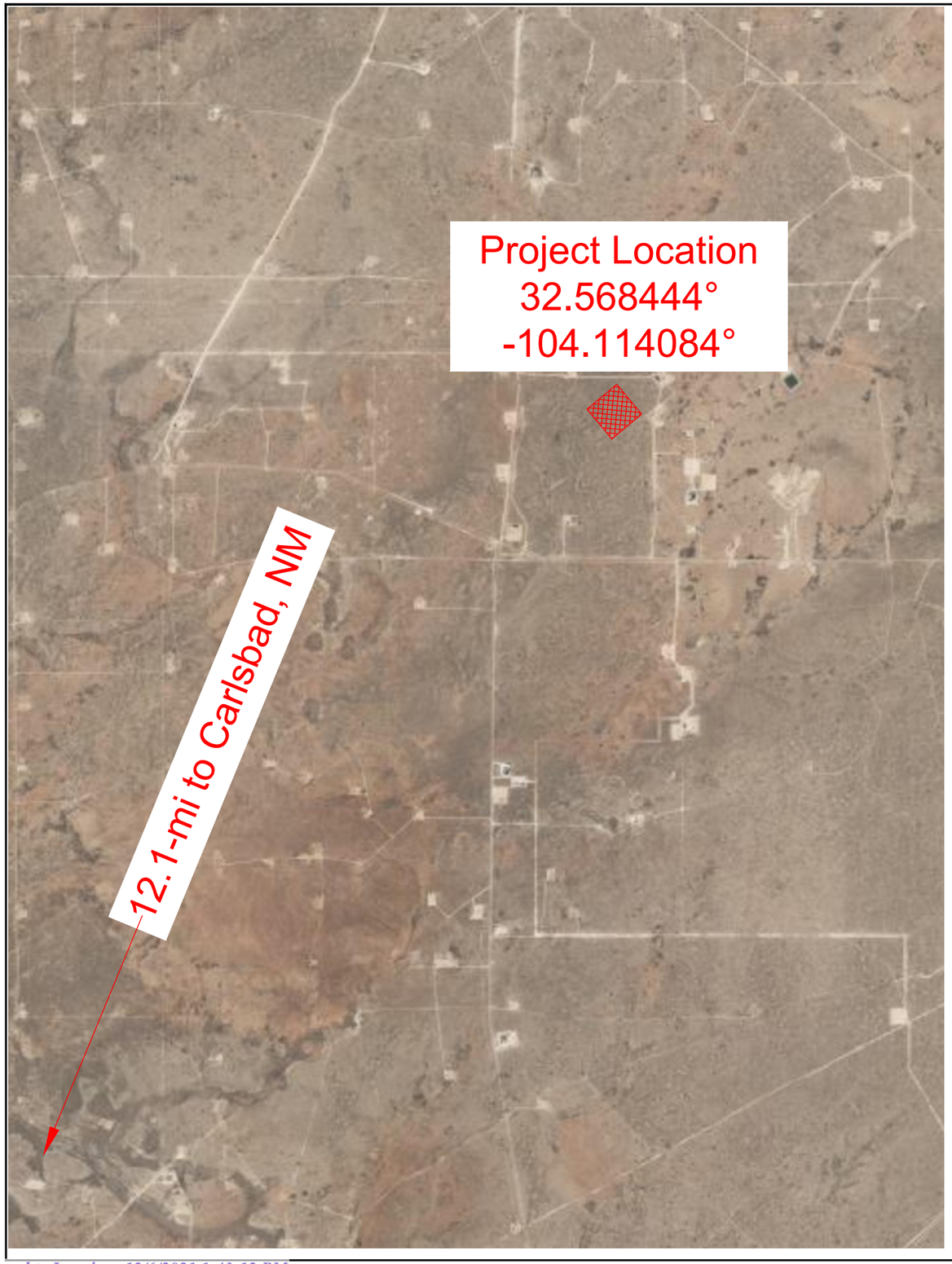

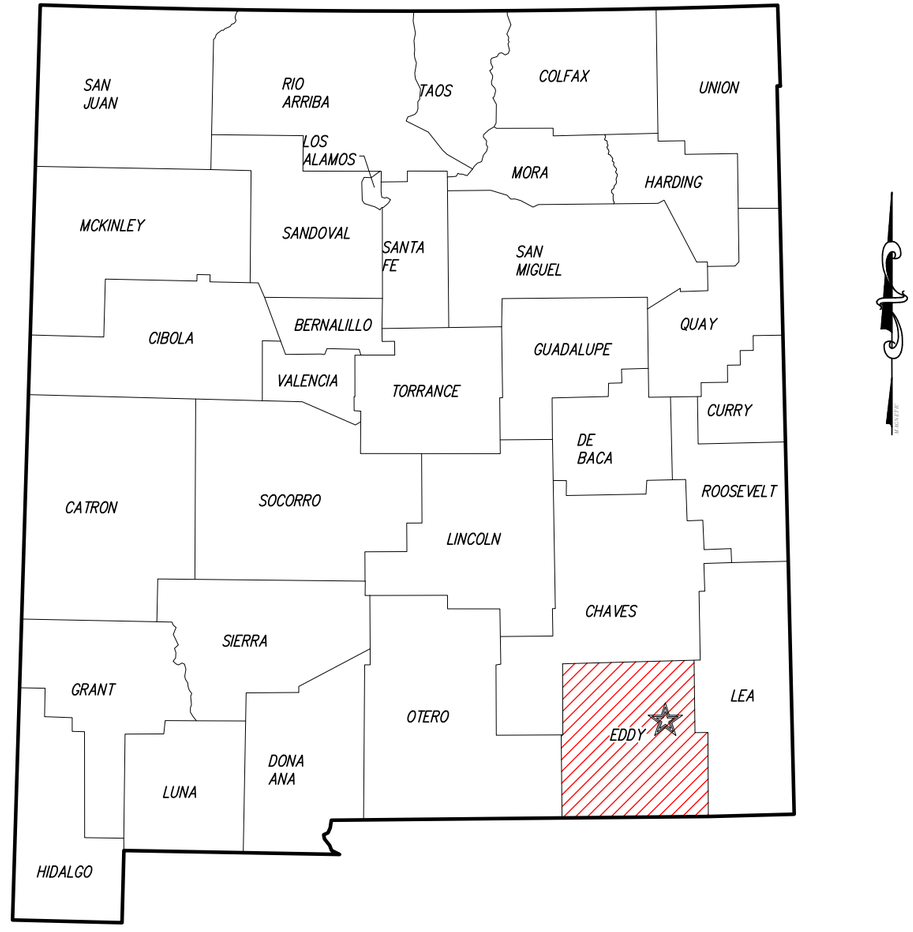

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MEWBOURNE OIL COMPANY

Project Location

Derringer Federal Recycle

Mewbourne Oil Company

Section 18, Township 20 South, Range 29 East

Eddy County, New Mexico USA

TYLER JOE WILLIAMS
NEW MEXICO
23432
PROFESSIONAL ENGINEER

9/30/2021

Date:	September 2021
Scale:	NTS
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked By:	T. Williams
Project No.	021116-06

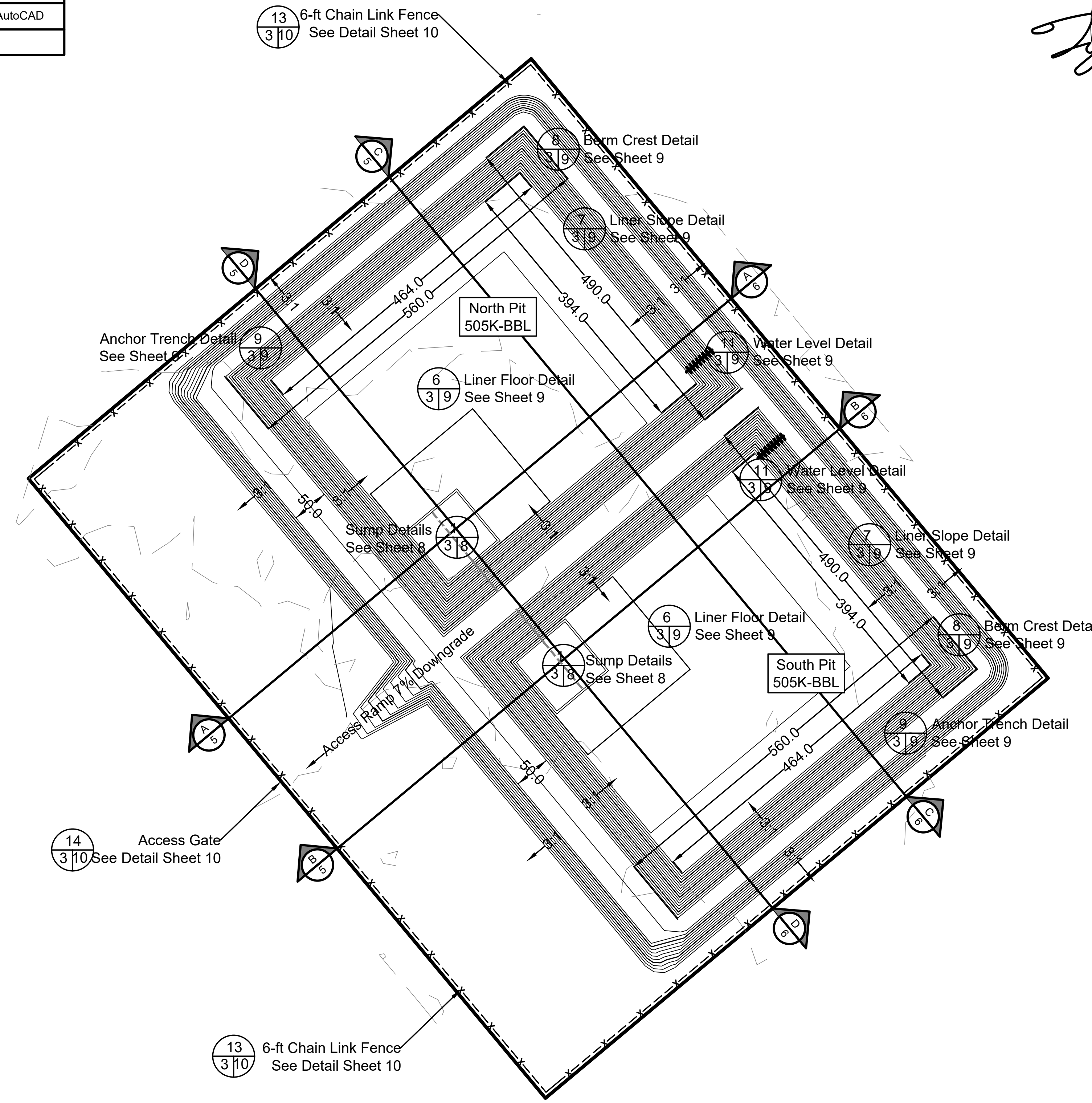
Sheet 02 of 10

On Site Earthwork Quantities

Site	Stratum	Surface 1	Surface 2	Fill Factor	Cut cubic yard	Fill cubic yard	NET cubic yard	Method
Morita	PIT EARTHWORK	Existing	Proposed	20%	98,275	98,136	139	AutoCAD

Liner Bid Quantities

Type	Location	Square ft.
60 Mil HDPE	Storage Pits	581,000
40 Mil HDPE	Storage Pits	581,000
200 Mil Geonet	Storage Pits	581,000



GRAPHIC SCALE

0 200 300 400 600

(IN FEET)

1 inch = 200 ft.

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9/30/2021

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MEWBOURNE OIL COMPANY

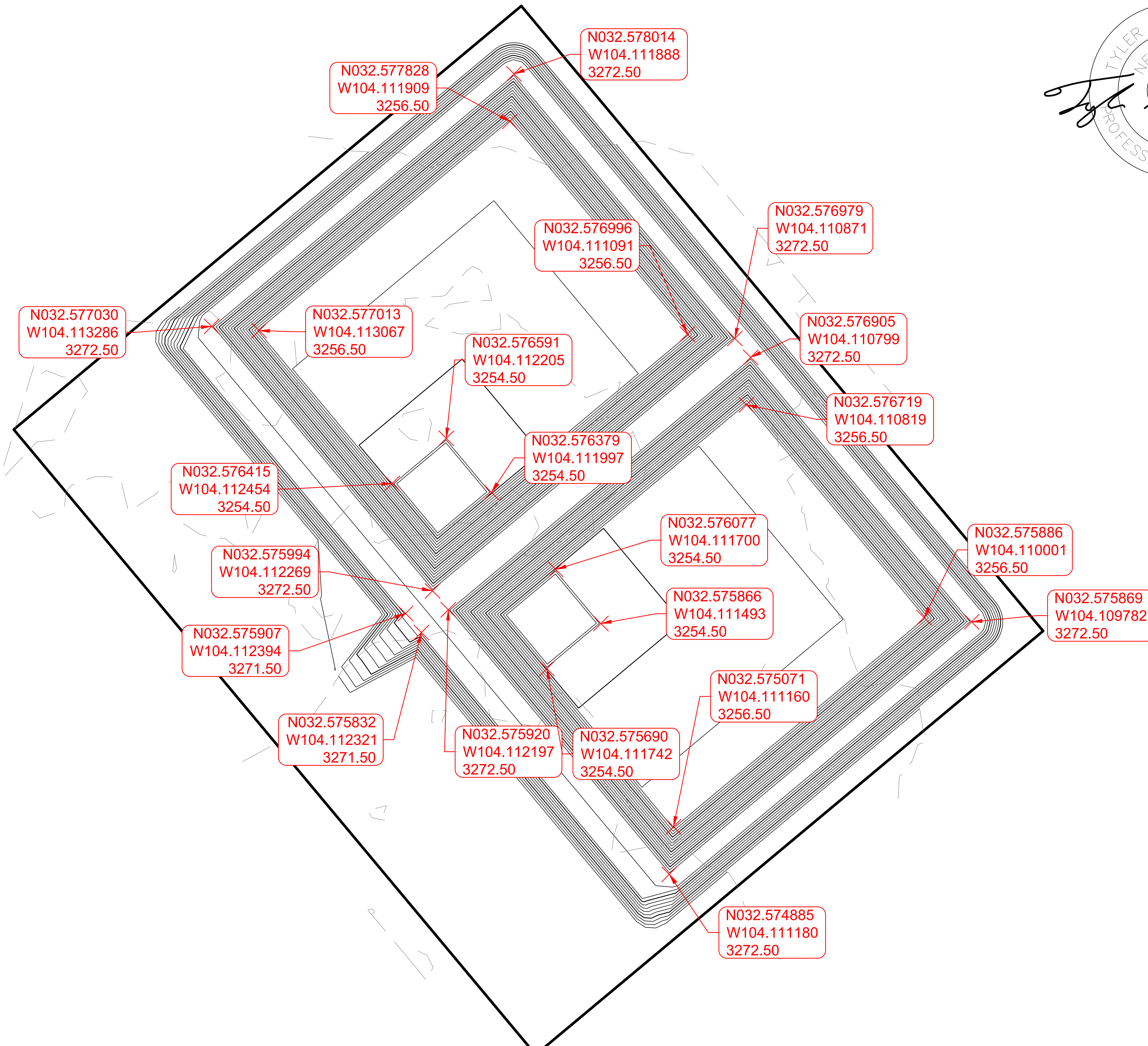
Site Plan

Derringer Federal Recycle

Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

Date:	September 2021
Scale:	1" = 200'
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked By:	T. Williams
Project No.	021116-00

Sheet 03 of 10



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9/30/2021

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MEWBOURNE OIL COMPANY

Staking Plan

Derringer Federal Recycle
Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

Date:	September 2021
Scale:	NTS
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked By:	T. Williams
Project No.	021116-00

Sheet 04 of 10

9/30/2021

Owner **Mewbourne Oil Company**
Site Name **Derringer Federal North Pit**

Lagoon Feature	Top FB	Bottom	Max Liq. Level
Sideslope Ratio	**3**		3
Maximum Depth (ft)	**16.00**		13.00
Pit Top Width (ft)	**490**	394	466.0
Pit Top Length (ft)	**560**	464	536.0
Maximum Total Vol (ft^3)	3,633,152		2,837,978
Maximum Total Vol (bbls)	647,047		505,430

Plt Liq Depth ft	Storage ft	Surface Area ac	Remaining Stor Vol ft3	Gallons Storage gal	BBLS Storage bbls	Percent of Total Volume %	Vol in Pit ft^3	Vol in Pit bbls	Vol in Pit ac-ft	Percent Total Vol %
16.00	0.0	6.30	-	-	-	0.0%	3,633,152	647,047	83.41	100%
15.5	0.0	6.30	-	-	-	0.0%	3,496,738	622,752	80.27	96%
15.0	0.0	6.30	-	-	-	0.0%	3,361,890	598,737	77.18	93%
14.5	0.0	6.30	-	-	-	0.0%	3,228,599	574,998	74.12	89%
14.0	0.0	6.30	-	-	-	0.0%	3,096,856	551,535	71.09	85%
13.5	0.0	6.30	-	-	-	0.0%	2,966,652	528,347	68.10	82%
13.0	0.0	6.30	-	-	-	0.0%	2,837,978	505,430	65.15	78%
12.5	0.5	6.23	92,053	688,556	16,394	2.5%	2,710,825	482,785	62.23	75%
12.0	1.0	6.16	185,402	1,386,807	33,019	5.1%	2,585,184	460,409	59.35	71%
11.5	1.5	6.08	280,056	2,094,819	49,877	7.7%	2,461,046	438,301	56.50	68%
11.0	2.0	6.01	376,024	2,812,660	66,968	10.3%	2,338,402	416,458	53.68	64%
10.5	2.5	5.94	473,315	3,540,396	84,295	13.0%	2,217,243	394,880	50.90	61%
10.0	3.0	5.87	571,938	4,278,096	101,859	15.7%	2,097,560	373,565	48.15	58%
9.5	3.5	5.80	671,902	5,025,827	119,663	18.5%	1,979,344	352,512	45.44	54%
9.0	4.0	5.73	773,216	5,783,656	137,706	21.3%	1,862,586	331,718	42.76	51%
8.5	4.5	5.67	875,889	6,551,650	155,992	24.1%	1,747,277	311,182	40.11	48%
8.0	5.0	5.60	979,930	7,329,876	174,521	27.0%	1,633,408	290,902	37.50	45%
7.5	5.5	5.53	1,085,348	8,118,403	193,295	29.9%	1,520,970	270,878	34.92	42%
7.0	6.0	5.46	1,192,152	8,917,297	212,317	32.8%	1,409,954	251,106	32.37	39%
6.5	6.5	5.39	1,300,351	9,726,625	231,586	35.8%	1,300,351	231,586	29.85	36%
6.0	7.0	5.33	1,409,954	10,546,456	251,106	38.8%	1,192,152	212,317	27.37	33%
5.5	7.5	5.26	1,520,970	11,376,856	270,878	41.9%	1,085,348	193,295	24.92	30%
5.0	8.0	5.20	1,633,408	12,217,892	290,902	45.0%	979,930	174,521	22.50	27%
4.5	8.5	5.13	1,747,277	13,069,632	311,182	48.1%	875,889	155,992	20.11	24%
4.0	9.0	5.06	1,862,586	13,932,143	331,718	51.3%	773,216	137,706	17.75	21%
3.5	9.5	5.00	1,979,344	14,805,493	352,512	54.5%	671,902	119,663	15.42	18%
3.0	10.0	4.94	2,097,560	15,689,749	373,565	57.7%	571,938	101,859	13.13	16%
2.5	10.5	4.87	2,217,243	16,584,978	394,880	61.0%	473,315	84,295	10.87	13%
2.0	11.0	4.81	2,338,402	17,491,247	416,458	64.4%	376,024	66,968	8.63	10%
1.5	11.5	4.75	2,461,046	18,408,624	438,301	67.7%	280,056	49,877	6.43	8%
1.0	12.0	4.68	2,585,184	19,337,176	460,409	71.2%	185,402	33,019	4.26	5%
0.5	12.5	4.62	2,710,825	20,276,971	482,785	74.6%	92,053	16,394	2.11	3%

Owner **Mewbourne Oil Company**
Site Name **Derringer Federal South Pit**

Lagoon Feature	Top FB	Bottom	Max Liq. Level
Sideslope Ratio	**3**		3
Maximum Depth (ft)	**16.00**		13.00
Pit Top Width (ft)	**490**	394	466.0
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9.0	4.0	5.73	773,216	5,783,656	137,706	21.3%	1,862,586	331,718	42.76	51%
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MEWBOURNE OIL COMPANY

Pit Capacities

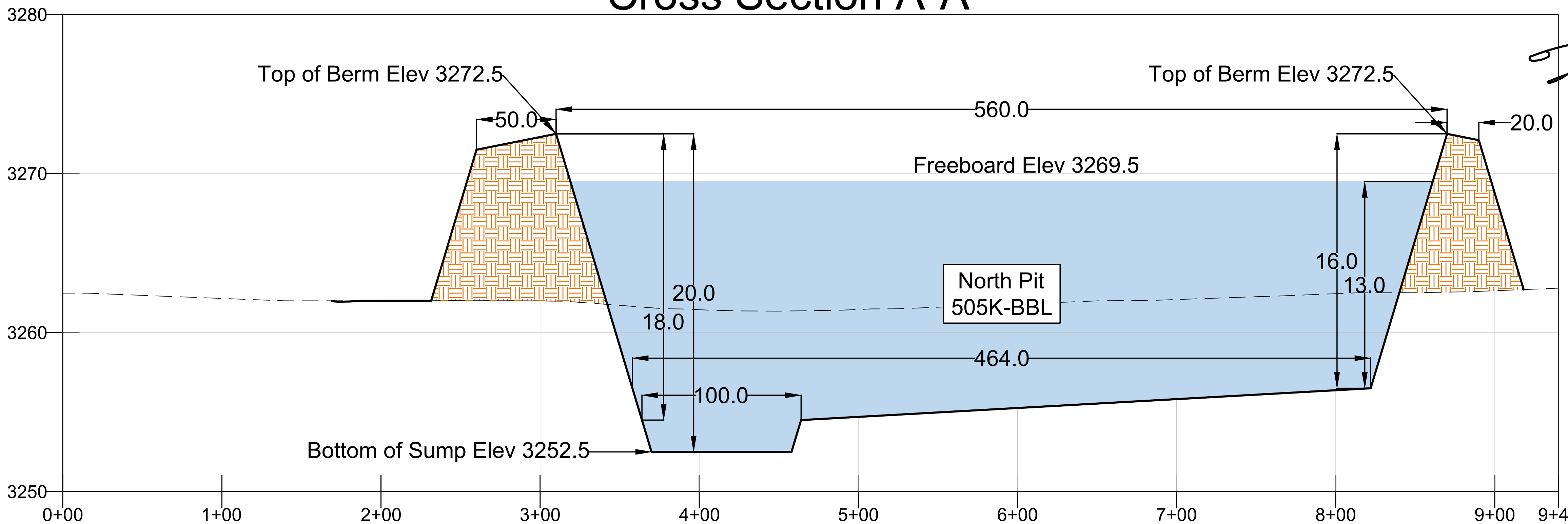
Derringer Federal Recycle

Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

Date:	September 2021
Scale:	NTS
Designed by:	M. Rake
Drawn by:	M. Rake
Checked By:	T. Williams
Project No.	021116-04

Sheet 05 of 10

Cross Section A-A



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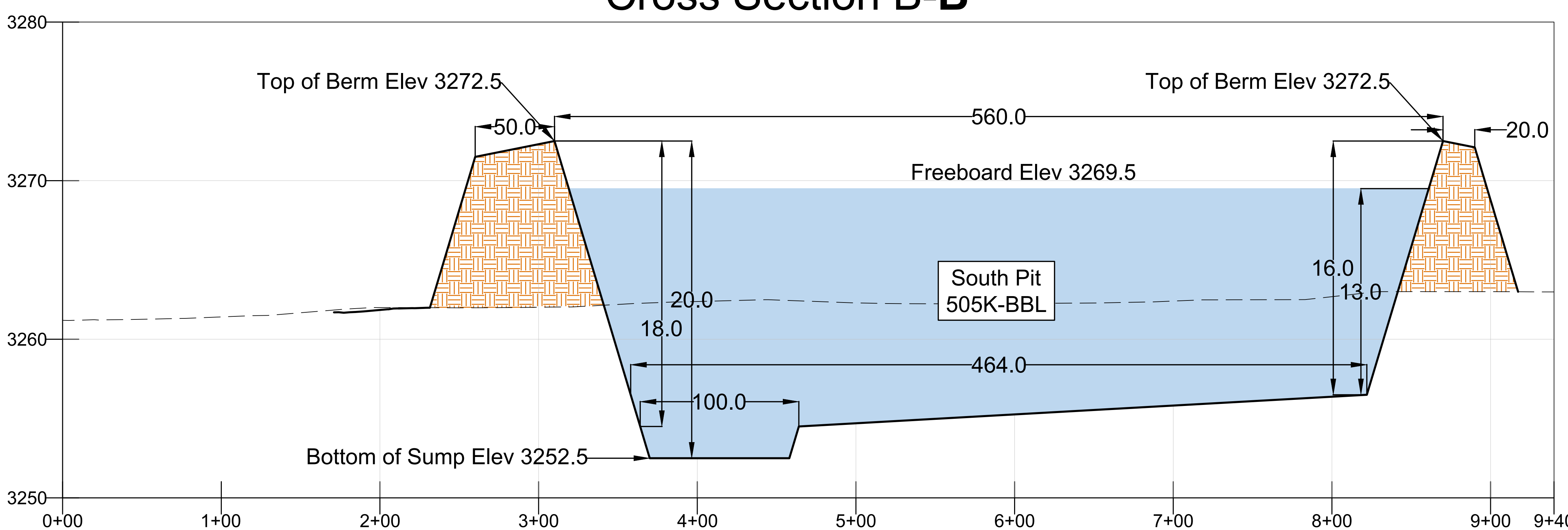

TYLER JOE WILLIAMS
NEW MEXICO
25432
PROFESSIONAL ENGINEER
9/30/2021

NO.	DATE	REVISION	DRAWN BY	CHECKED BY

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MEWBOURNE OIL COMPANY

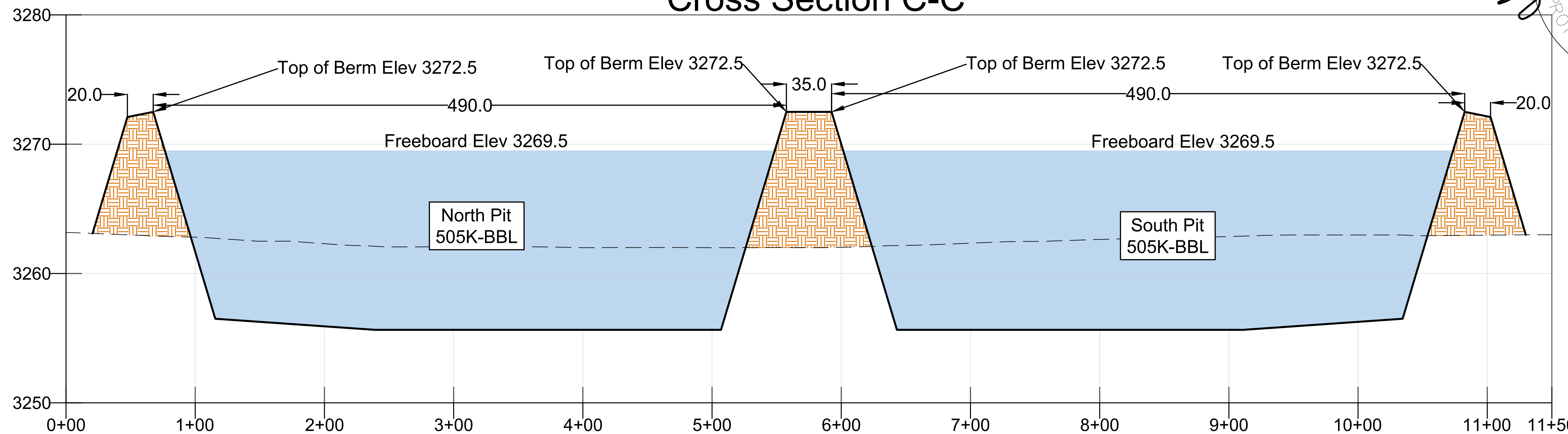
Cross Sections

Derringer Federal Recycle
Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

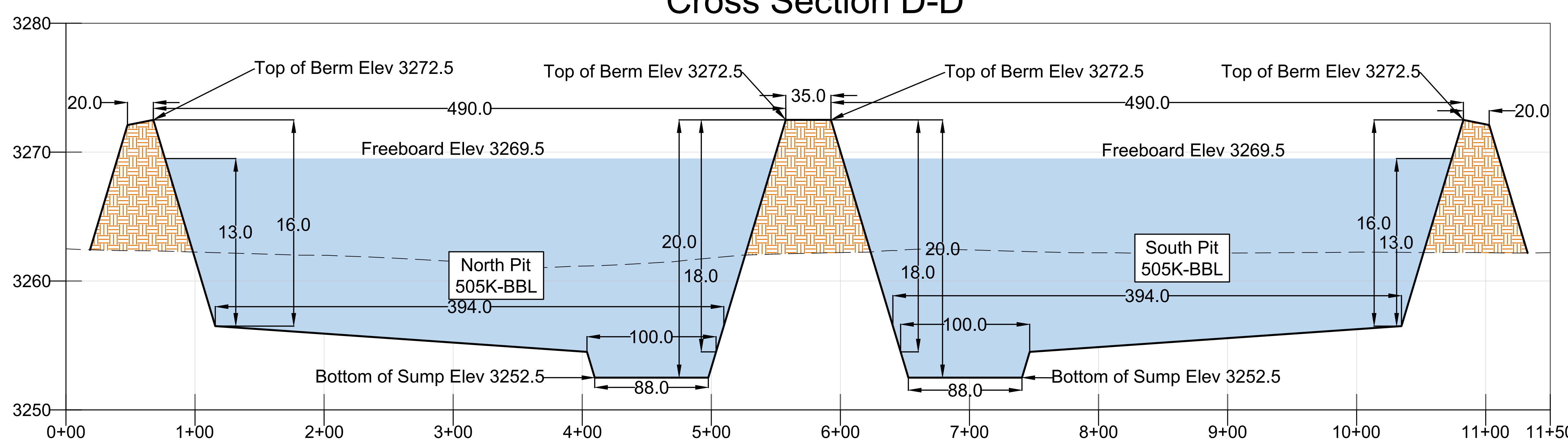
Date:	September 2021
Scale:	NTS
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked By:	T. Williams
Project No.	021116-00

Sheet 06 of 10

Cross Section C-C



Cross Section D-D



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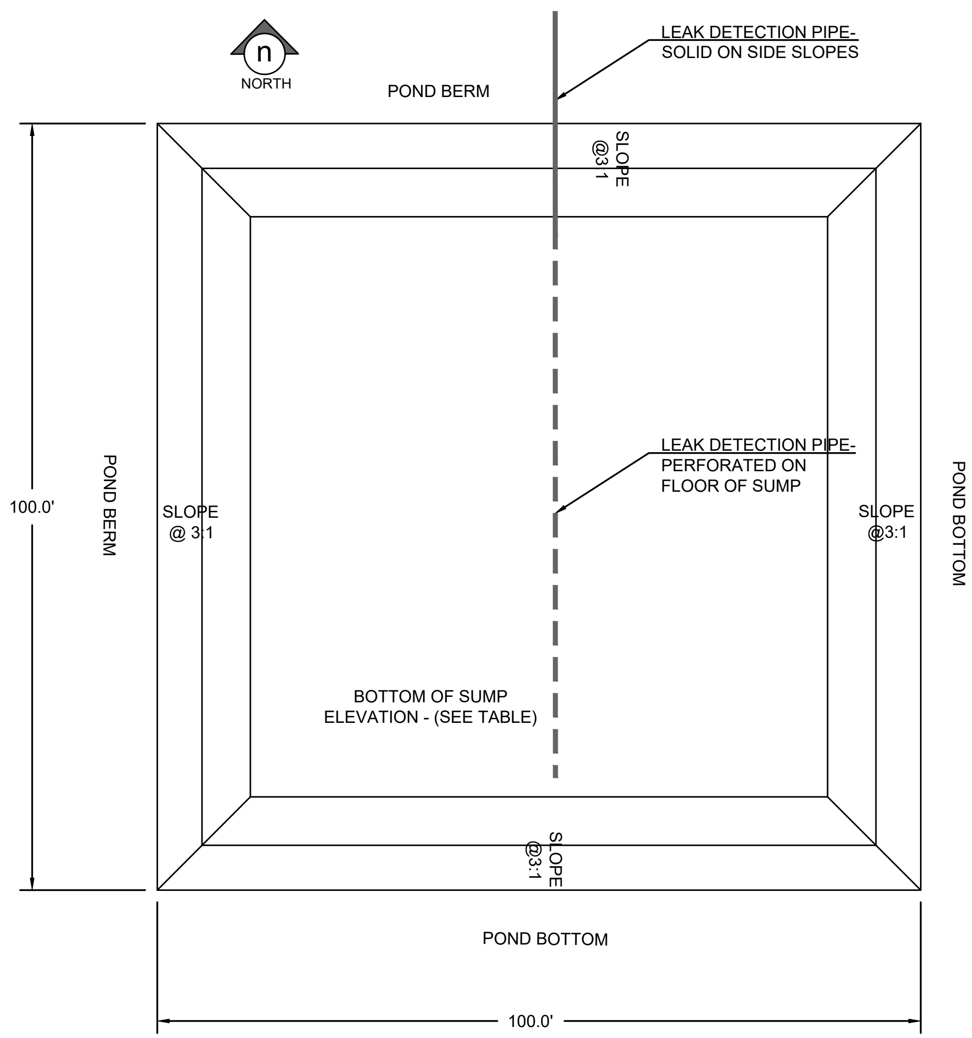
MEWBOURNE OIL COMPANY

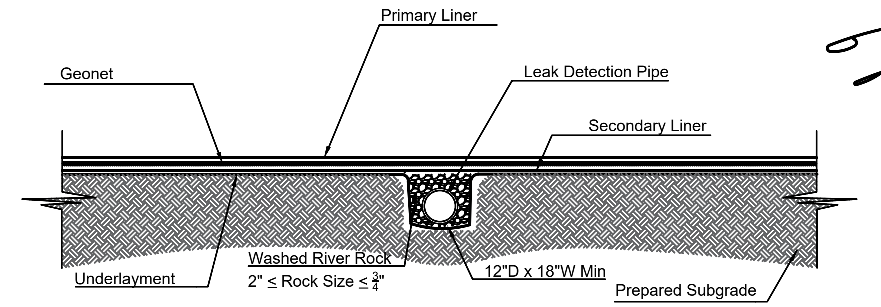
Cross Sections
Deringer Federal Recycle
Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

Date:	September 2021
Scale:	NTS
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked By:	T. Williams
Project No.	021116-00

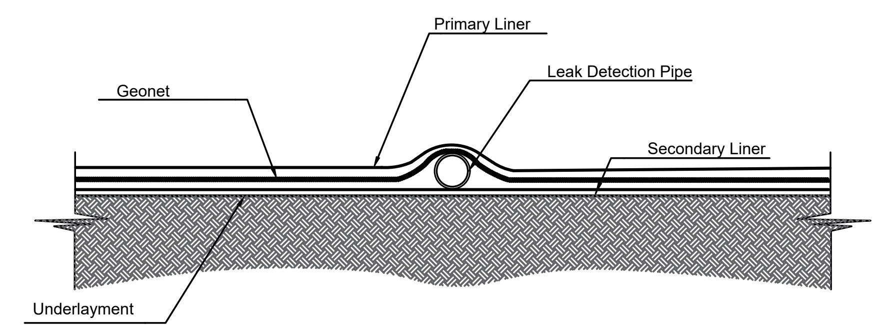
Sheet 07 of 10



POND SUMP PLAN VIEW (1, 3 | 10)
Not to Scale



SUMP LEAK DETECTION PIPE DETAIL (3, 3 | 8)
Not to Scale



SIDE SLOPE LEAK DETECTION PIPE DETAIL (4, 3 | 8)
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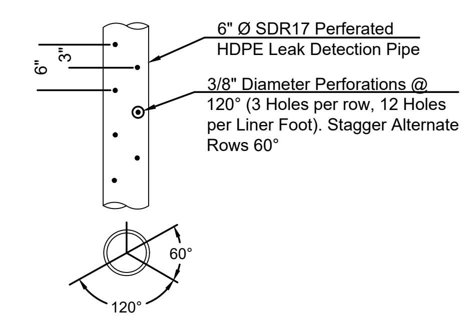
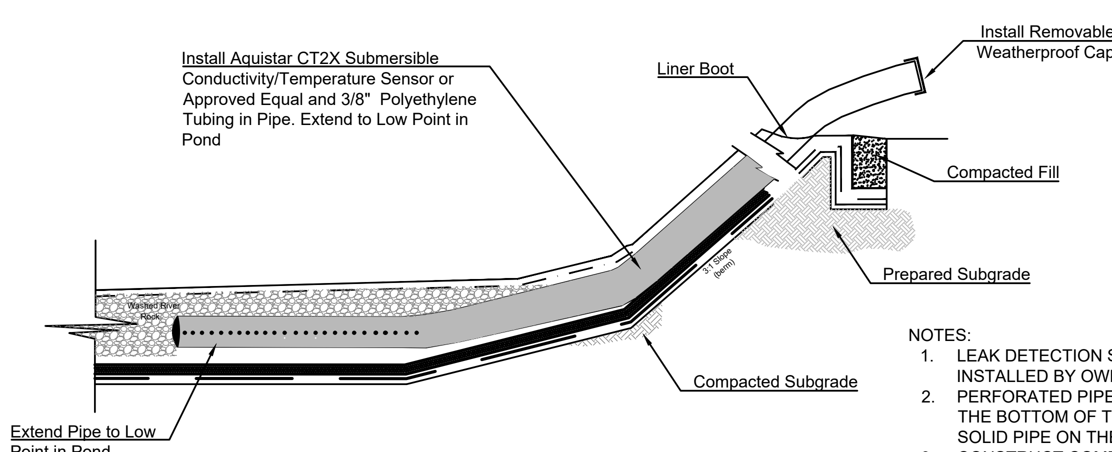


PERFORATED PIPE DETAIL (5, 3 | 8)
Not to Scale



LEAK DETECTION/SAMPLING SYSTEM DETAIL (2, 3 | 8)
Not to Scale

NOTES:
1. LEAK DETECTION SYSTEM TO BE INSTALLED BY OWNER.
2. PERFORATED PIPE TO BE ALONG THE BOTTOM OF THE POND. SOLID PIPE ON THE SIDE SLOPE.
3. CONSTRUCT COMPACTED SUBGRADE TO 95% STANDARD PROCTOR AS PER ASTM D-698.
4. EXTEND 60 MIL. RUB SHEET 1.0-FT PAST TOP OF SHOULDER OF SUMP.
5. WASH RIVER ROCK SHALL BE 3/8" MIN. & 3/4" MAX.

REFERENCE TABLE

DETAIL	DESCRIPTION
PRIMARY LINER	60 mil HDPE LINER
LEAK DETECTION	200 mil Geonet
SECONDARY LINER	40 mil HDPE LINER
UNDERLAYMENT	Compacted Subgrade
SUMP	North and South Pit 3252.5-ft ELEVATION
BERM (ROAD CREST)	DESIGN ELEV. 3272.5-ft - ROAD CREST 25-ft
LEAK DETECTION PIPING	6-in SDR17 PERFORATED HDPE PIPE LEAK DETECTION PIPE

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C.A. #1580 - Expiration Date: 6-30-2022
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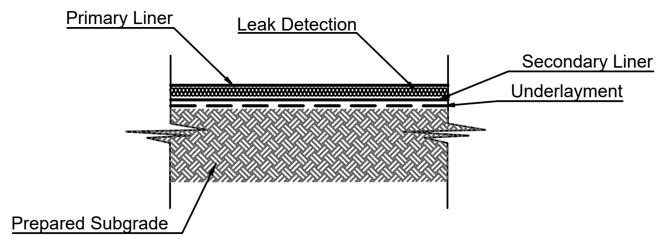
MEWBOURNE OIL COMPANY

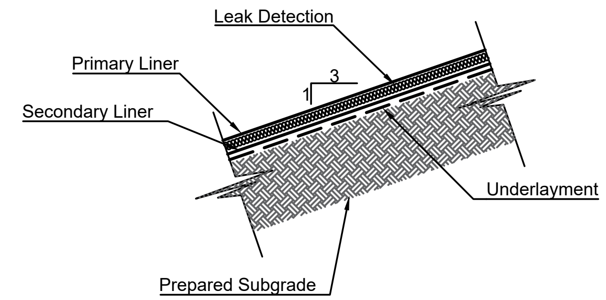
Sump Details
Deringer Federal Recycle
Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

Date: September 2021
Scale: NTS
Designed by: M. Ratke
Drawn by: M. Ratke
Checked By: T. Williams
Project No. 021116-00

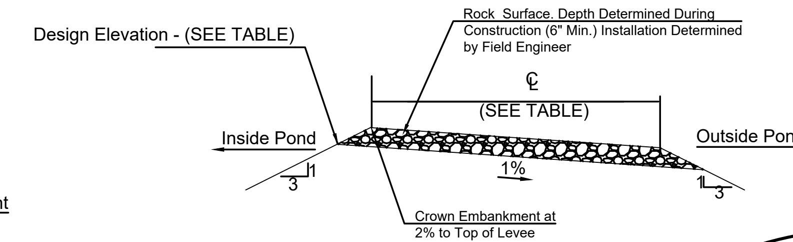
Sheet 08 of 10



LINER SYSTEM FLOOR DETAIL 6 3|9
Not to Scale



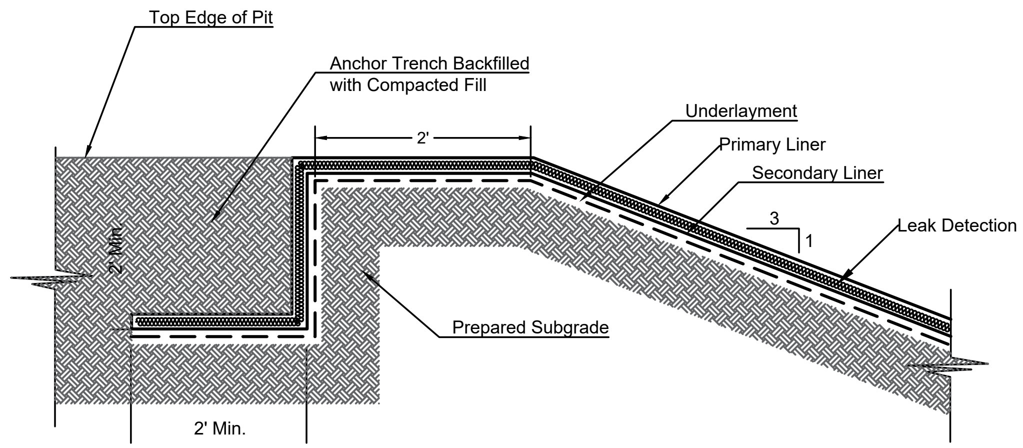
LINER SYSTEM SIDE SLOPE DETAIL 7 3|9
Not to Scale



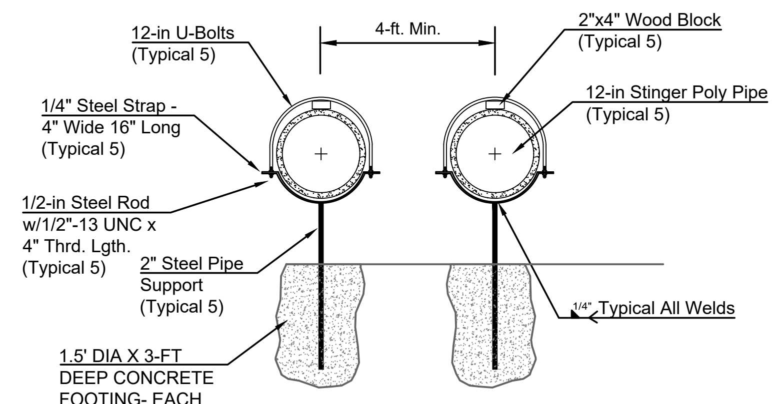
TYPICAL CREST DETAIL 8 3|9
Not to Scale

TYLER JOE WILLIAMS
NEW MEXICO
26432
PROFESSIONAL ENGINEER
9/30/2021

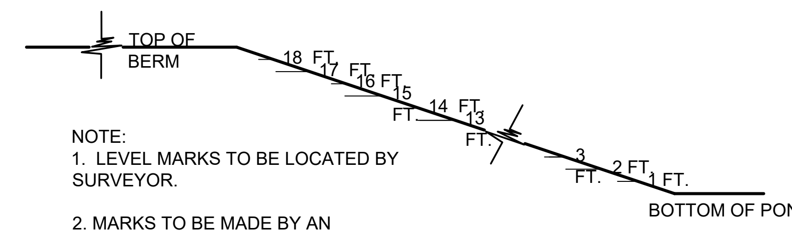
ENVIROTECH ENGINEERING & CONSULTING, INC.



ANCHOR TRENCH DETAIL 9 3|9
Not to Scale



Stinger System Anchor Detail 10 3|9
Not to Scale



NOTE:
1. LEVEL MARKS TO BE LOCATED BY SURVEYOR.

2. MARKS TO BE MADE BY AN EXTRUSION WELDER USING BLACK FILAMENT (OR WHITE FILAMENT ON BLACK LINER).

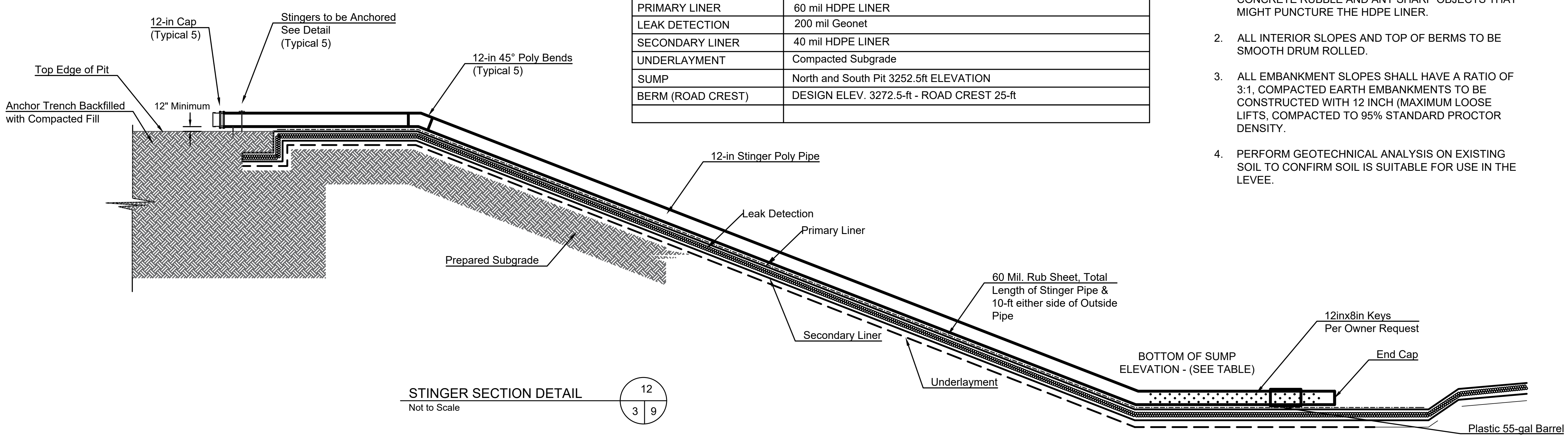
3. MARKS SHOULD REFERENCE LOWEST POINT ON BERM.

WATER LEVEL MARKS 11 3|9
Not to Scale

REFERENCE TABLE

DETAIL	DESCRIPTION
PRIMARY LINER	60 mil HDPE LINER
LEAK DETECTION	200 mil Geonet
SECONDARY LINER	40 mil HDPE LINER
UNDERLAYMENT	Compacted Subgrade
SUMP	North and South Pit 3252.5ft ELEVATION
BERM (ROAD CREST)	DESIGN ELEV. 3272.5-ft - ROAD CREST 25-ft

GENERAL NOTES:
1. PREPARED SUBGRADE MEANS COMPACTED SMOOTH SUBGRADE FREE OF ROCK, ROOTS, WOOD DEBRIS, CONCRETE RUBBLE AND ANY SHARP OBJECTS THAT MIGHT PUNCTURE THE HDPE LINER.
2. ALL INTERIOR SLOPES AND TOP OF BERMS TO BE SMOOTH DRUM ROLLED.
3. ALL EMBANKMENT SLOPES SHALL HAVE A RATIO OF 3:1, COMPACTED EARTH EMBANKMENTS TO BE CONSTRUCTED WITH 12 INCH (MAXIMUM LOOSE LIFTS, COMPACTED TO 95% STANDARD PROCTOR DENSITY.
4. PERFORM GEOTECHNICAL ANALYSIS ON EXISTING SOIL TO CONFIRM SOIL IS SUITABLE FOR USE IN THE LEVEE.



STINGER SECTION DETAIL 12 3|9
Not to Scale

MEWBOURNE OIL COMPANY

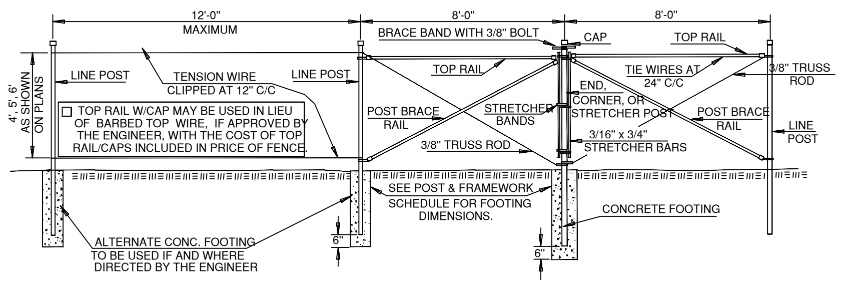
Liner Details
Deringer Federal Recycle
Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

Date: September 2021
Scale: NTS
Designed by: M. Ratke
Drawn by: M. Ratke
Checked By: T. Williams
Project No. 021116-00

Sheet 09 of 10

9/30/2021

TYLER JOE WILLIAMS
NEW MEXICO
26432
PROFESSIONAL ENGINEER

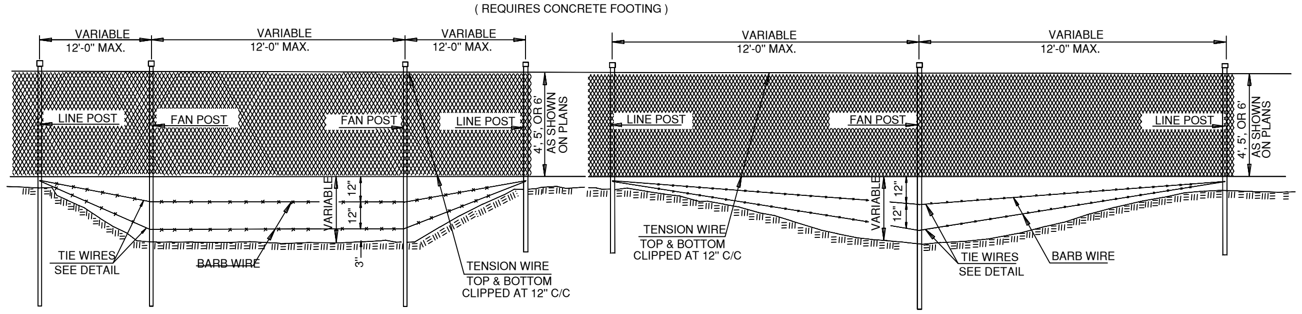


TYPICAL LINE POST DETAIL

NOTE: LINE POSTS MAY BE DRIVEN OR EARTH EMBEDED SEE SPECIFICATIONS

END, CORNER, & STRETCHER DETAILS

USE STRETCHER DETAILS AT ALL CORNERS, BENDS IN R/W, ON HILLTOPS, IN VALLEYS OR DEEP DEPRESSIONS, AND AT 500' MAXIMUM SPACING. (REQUIRES CONCRETE FOOTING)

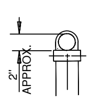


BARRIER FENCE 13 / 3 10

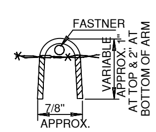
Not to Scale

FAN DETAILS

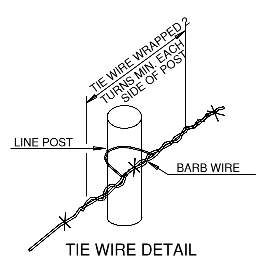
NOT IN CURRENT DESIGN. INCLUDED IN PLAN SET IN THE EVENT A DRAINAGE FAN IS NEEDED



ALTERNATE POST CAP DETAIL (W/TOP RAIL)



SECTION A-A



TIE WIRE DETAIL

POST & FRAMEWORK SCHEDULE

	LINE POST				END, CORNER, OR STRETCHER POSTS		GATE POSTS ○ 6' WIDE & LESS	GATE POSTS ○ OVER 6' TO 12' WIDE	GATE POSTS ○ OVER 12' TO 18' WIDE	TOP RAIL OR POST BRACE RAIL		GATE FRAMES GATES UP TO 6' WIDE	GATE FRAMES GATES OVER 6' TO 12'	GATE FRAMES GATES OVER 12' TO 18'
SHAPE	○	C	C	I	○	▲	○	○	○	○	▯	○	○	○
NOMENCLATURE	1.5" PIPE	ROLL FORMED HEAVY "C"	ROLL FORMED STAND. "C"	"H" RAIL	2" PIPE	ROLL FORMED	2.5" PIPE	3.5" PIPE	5.0" PIPE	1 1/4" PIPE	ROLL FORMED	1 1/4" PIPE	1 1/2" PIPE	1 1/2" PIPE
DIMENSIONS	1.9" O.D. 1.6" I.D. 0.145" THK	2.25" x 1.7" 0.121" THK	1.875" x 1.625" 0.105" THK	2.25" x 1.7" 0.125" THK	2.38" O.D. 2.07" I.D. 0.154" THK	3.5" x 3.5" 0.128" THK	2.88" O.D. 2.47" I.D. 0.203" THK	4.0" O.D. 3.55" I.D. 0.226" THK	5.563" O.D. 5.047" I.D. 0.258" THK	1.66" O.D. 1.44"I.D. 0.11" THK	1.625" x 1.25" 0.075" THK	1.66" O.D. 1.44" I.D. 0.11" THK	1.9" O.D. 1.67" I.D. 0.114" THK	1.9" O.D. 1.61" I.D. 0.145" THK
CRITICAL AXIS SEC. MODULUS	.326 IN.^{3}	.506 IN.^{3}	.368 IN.^{3}	.661 IN.^{3}	.561 IN.^{3}	1.00 IN.^{3}	1.06 IN.^{3}	2.39 IN.^{3}	▼ 5.45 IN.^{3}	◐ 0.195 IN.^{3}	0.165 IN.^{3}	◐ 0.195 IN.^{3}	◐ 0.270 IN.^{3}	▼ 0.326 IN.^{3}
WEIGHT	2.72 LBS./LIN. FT.	2.64 LBS./LIN. FT.	1.85 LBS./LIN. FT.	3.26 LBS./LIN. FT.	3.65 LBS./LIN. FT.	4.85 LBS./LIN. FT.	5.79 LBS./LIN. FT.	9.11 LBS./LIN. FT.	14.62 LBS./LIN. FT.	1.81 LBS./LIN. FT.	1.35 LBS./LIN. FT.	1.81 LBS./LIN. FT.	2.17 LBS./LIN. FT.	2.72 LBS./LIN. FT.
LENGTH FOR GIVEN FENCE FAB. HT 4	6'-10" W/CONC. FOOTING; 7'- 4" WHEN DRIVEN.				7'-4" W/CONC. FOOTING				7'-10"					
5	8'- 1" W/CONC. FOOTING; 8'- 7" WHEN DRIVEN.				8'-7" W/CONC. FOOTING				9'- 1"					
6	9'- 4" W/CONC. FOOTING; 9'-10" WHEN DRIVEN.				9'-10" W/CONC. FOOTING				10'- 4"					
EMBEDMENT FOR GIVEN FENCE FAB. HT 4	24" IN CONC. FOOTING; 30" WHEN DRIVEN.				30" IN CONC. FOOTING				36"					
5	27" IN CONC. FOOTING; 33" WHEN DRIVEN.				33" IN CONC. FOOTING				39"					
6	30" IN CONC. FOOTING; 36" WHEN DRIVEN.				36" IN CONC. FOOTING				42"					
FOOTING DIM. IN EARTH	9" DIA. 36" DEEP				9" DIA.	14" DIA.	12" DIA.	16" DIA.	18" DIA.					
FOOTING DIM. IN ROCK	4" DIA. 9" DEEP				4" DIA. 9" DIA.	6" DIA. 16" DIA.	5" DIA. 12" DIA.	6" DIA. 16" DIA.	8" DIA. 24" DIA.					

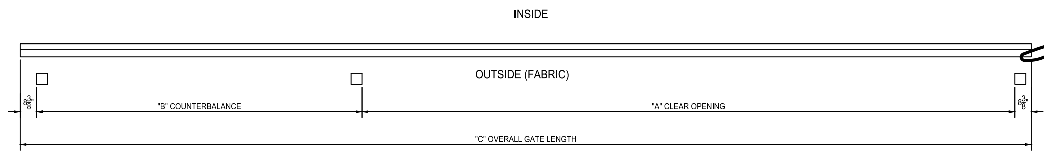
○ MAXIMUM WIDTH OF SINGLE SWING GATE TO BE 18 FT.; OPENING MAY BE UP TO 36 FT. WIDE

DIAMETERS AS SHOWN ARE MINIMUM VALUES. DEPTHS FOR ROCK ARE MINIMUMS. DEPTHS SHOWN FOR CONCRETE FOOTINGS IN EARTH ARE MINIMUM FOR 6 FT. HIGH FENCE, AND MAY BE REDUCED 3 IN. FOR EACH FOOT OF FENCE HEIGHT LESS THAN 6 FT. HIGH.

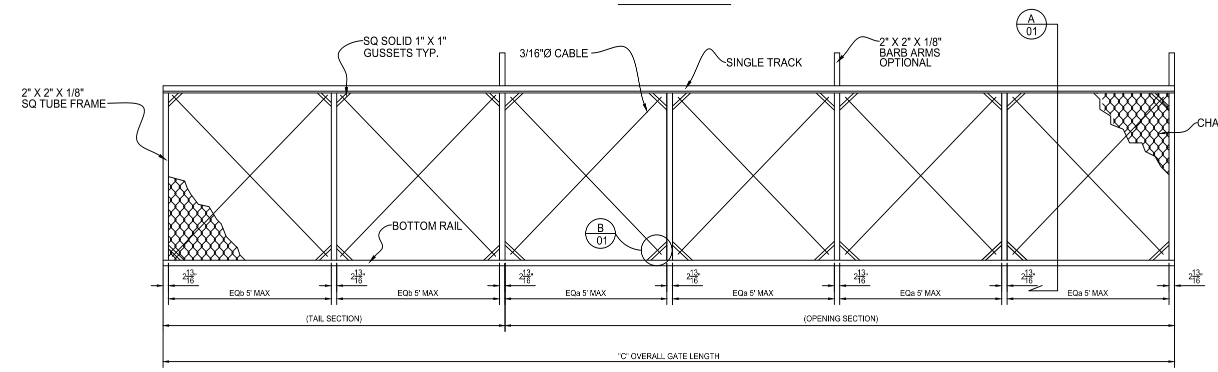
▲ WIRE FABRIC TO BE WOVEN INTO LOCK LOOPS FOR THE ENTIRE WIDTH OF THE FABRIC.

▼ SECTION MODULUS AS SHOWN IS BASED UPON ASTM A53, AND AASHTO M181. SEE SPECIFICATIONS FOR SUBSTITUTION FORMULA ON CLASS 2 COLD FORMED STEEL PIPE.

◐ SECTION MODULUS AS SHOWN IS BASED UPON ASTM A 501 AND AASHTO M 181. SEE SPECIFICATIONS FOR SUBSTITION FORMULA ON CLASS 2 COLD FORMED STEEL PIPE.



PLAN VIEW

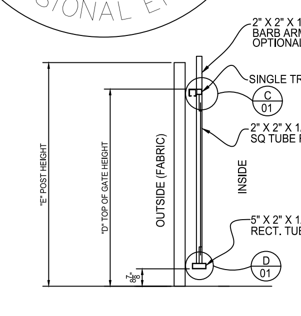


ELEVATION VIEW ALUMINUM CANTILEVER GATE

OUTSIDE LOOKING IN

DOUBLE HUNG GATE DETAIL 14 / 3 10

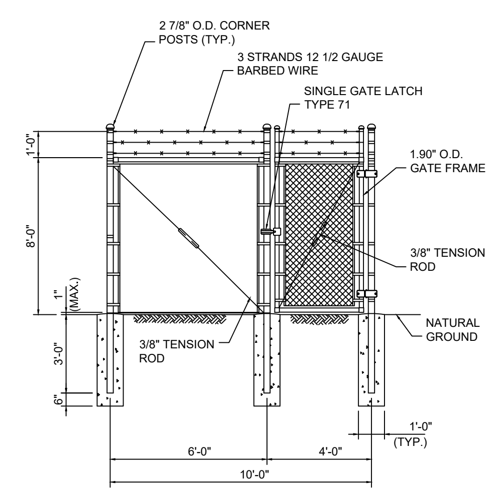
Not to Scale



A SECTION

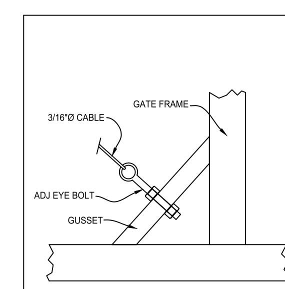
CRITICAL DIMENSIONS

	DESCRIPTION	FORMULA	DIMENSION
"A"	CLEAR OPENING	A	24
"B"	COUNTERBALANCE	A/2	12
"C"	OVERALL GATE LENGTH	A + B + 12"	37
"D"	TOP OF GATE HEIGHT	D	6
"E"	POST HEIGHT	E	6.5
ADJOINING FENCE HEIGHT			
BARB ARMS REQUIRED		YES	
GATE STORAGE IN OPEN POSITION (OUTSIDE LOOKING IN)			

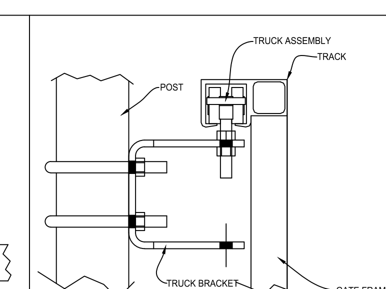


MAN GATE DETAIL 15 / 3 10

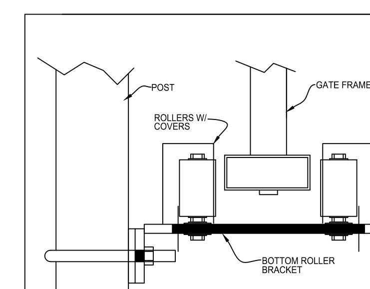
Not to Scale



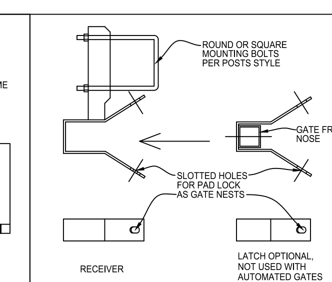
B DETAIL



C DETAIL



D DETAIL



GATE RECEIVER DETAIL

ENVIROTECH
ENGINEERING & CONSULTING, INC.
2500 North 11th Street - Enid, Oklahoma 73701
Phone (580) 234-8780, Fax (580) 237-4302
C.A. #1860 - Expiration Date 6-30-2022
www.envirotechconsulting.com

MEWBOURNE OIL COMPANY

Fence Details

Derringer Federal Recycle
Mewbourne Oil Company
Section 18, Township 20 South, Range 29 East
Eddy County, New Mexico USA

Date:	September 2021
Scale:	NTS
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked By:	T. Williams
Project No.	021116-00

Sheet 10 of 10

APPENDIX C
DESIGN & CONSTRUCTION PLAN

Mewbourne Oil Company (Mewbourne) is proposing to construct two (2) storage pits in the N/2 of Section 18, Township 20 South, Range 29 East, Eddy County, New Mexico. The Derringer Federal Facility shall consist of two basins with a total operational volume of approximately 505,000-bbl each.

OPERATION AND MAINTENANCE PROCEDURES

Applicable mandates in Rule 34 are underlined. This plan addresses construction of lined earthen containments as well as an AST. *Appendix B* presents Engineering Design Plans. *Appendix D* provides liner and geotextile specifications.

Field conditions may create the need for minor modification of the containment design (e.g. changing the length, width, or depth.)

Dike Protection and Structural Integrity

Design elements are addressed in the section of this submission containing the foundation recommendations. The recommendations are based on site-specific data. The operator, engineer, and selected contractor will review the recommendations prior to beginning the earthwork and adhere to the specific recommendations.

The design and operation provide for the confinement of produced water to prevent releases and to prevent overtopping due to wave action or rainfall. Additionally, the design prevents run-on of surface water as the containment is surrounded by an above-grade levee (berm) and diversion ditch to prevent run-on of surface water.

Stockpile Topsoil

Where topsoil is present, prior to constructing containment, the operator will strip and stockpile the topsoil for use as the final cover or fill at the time of closure. The topsoil will be stockpiled adjacent to perimeter fence surrounding the containment or incorporated into the levee.

Signage

The design calls for an upright sign no less than 12-in by 24-in with lettering not less than two inches in height in a conspicuous place on the fence surrounding the containment. The sign is posted in a manner and location such that a person can easily read the legend. The sign will provide the following information:

1. The operator's name,
2. The location of the site by quarter-quarter or unit letter, section, township and range, and
3. Emergency telephone numbers.

Fencing

The design provides for a fence to enclose the Recycling Containment in a manner that deters unauthorized wildlife and human access. The design calls for a 6-ft tall chain link and barbed wire fence around the containment to exclude wildlife (see detail on last page of engineering design). This fence provides greater wildlife (and human) deterrence than the minimum required barbed wire fence with four strands evenly spaced in the interval between one foot and four feet above ground level. The fence will be gated to provide access for maintenance and placement of pumps and other necessary equipment. As stated in the O&M plan, the operator will ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

Netting and Protection of Wildlife

The game fence on the containment levee will be effective in excluding antelope, coyotes, and most other terrestrial wildlife.

The Recycling Containment is otherwise protective of wildlife, including migratory birds. The containment will contain treated produced water that has not shown to be a material threat to birds due to hydrogen sulfide gas or floating, free-phase hydrocarbons. The O&M plan calls for the operator to inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency ad to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

The containment will have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. Geotextile may be placed under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.

Appendix C shows:

1. The levee has an inside grade no steeper than three horizontal feet to one vertical foot (3H:1V).
2. The levee outside grade is no steeper than three horizontal feet to one vertical foot (3H:1V).
3. The top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance.
4. The caliche gravel placed on the outside levee provides additional erosion control.

Field conditions may create the need for changes to the design. Any changes to the construction or grade requirements due to unforeseen conditions will be reviewed and approved prior to initiating installation of the liner system. Any design change that does not

conform to the NMOCD Rule will be the subject of a variance request and will be submitted **to the OCD for review and approval.**

LINER AND DRAINAGE GEOTEXTILE INSTALLATION

The containment has a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions.

The primary (upper) liner is a geomembrane liner composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. It is 60-mil HDPE. The secondary liner is 40-mil LLDPE. Liner compatibility meets or exceeds a subsequent relevant publication to EPA SW-846 method 9090A.

The Recycling Containment design has a leak detection system between the upper and lower geomembrane liners of 200-mil geonet to facilitate drainage. The leak detection system consists of a properly designed drainage and collection and removal system placed above the lower geomembrane liner in depressions and sloped to facilitate the earliest possible leak detection. The containment floor design calls for a slope of approximately 0.5% toward the sump. This slope, combined with the highly transmissive geonet drainage layer, provides for the earliest possible leak detection.

The liners and drainage material will be installed consistent with the manufacture's specifications (See *Appendix D*). In addition to any specifications of the manufacturer, protocols for liner installation include measures to:

1. Minimize liner seams and orient them up and down, not across, a slope of the levee.
2. Use factory welded seams where possible.
3. Field seams in geosynthetic material are thermally seamed; prior to field seaming, overlap liner four to six inches.
4. Minimize the number of field seams and corners and irregularly shaped areas.
5. Provide for no horizontal seams within five feet of the slope's toe.
6. Use qualified personnel to perform field welding and testing.
7. Avoid excessive stress-strain on the liner.
8. The edges of all liners are anchored in the bottom of a compacted earth-filled trench that is at least 18-in deep.

At points of discharge into the lined earthen containment and AST, the pipe configuration (see *Appendix B*) effectively protects the liner from excessive hydrostatic force or mechanical damage during filling. The design shows that at any point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines do not penetrate the liner.

Pumping from the containment to hydraulic fracturing operations is the responsibility of stimulation contractors. Typically, numerous lines are permanently placed in the containment

with floats attached to prevent damage to the liner system. The containment may be equipped with permanent HDPE stinger (supported by a sacrificial liner or geotextile) for withdrawal of fluid during operations, if the owner deems necessary. External discharge or suction lines do not penetrate the liner.

LEAK DETECTION AND FLUID REMOVAL SYSTEM INSTALLATION

The leak detection system, contains the following design elements:

1. The 200-mil Hypernet drainage material between the primary and secondary liner is sufficiently permeable to allow the transport of fluids to the observation ports (*Appendix B*).
2. The containment floor, sloped towards the monitoring riser pipe, facilitates the earliest possible leak detection of the containment bottom. A pump may be placed in an observation port to provide for fluid removal.
3. Piping will withstand chemical attack from any seepage, structural loading from stresses and disturbances from overlying water, cover materials, equipment operation, and expansion or contraction (see *Appendix D*).
4. The slope of the interior subgrade is approximately 1%.

APPENDIX D
MATERIAL SPECIFICATIONS

GEOMEMBRANE SPECIFICATION

This specification covers the technical requirements for the Manufacturing and Installation of the geomembrane. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications

1.1 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
2. D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
3. D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
4. D 1603 Test Method for Carbon Black in Olefin Plastics
5. D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
6. D 4218 Standard Test Method for Determination of Carbon Black in Polyethylene Compounds
7. D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
8. D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
9. D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
10. D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
11. D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes
12. D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods

13. D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

14. D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test)

B. Geosynthetic Research Institute

1. GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

2. GRI GM 17 Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

1.2 DEFINITIONS

A. Lot - A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

B. Construction Quality Assurance Consultant (CONSULTANT) – The Party, independent from MANUFACTURER and INSTALLER, that is responsible for observing and documenting activities related to quality assurance during the lining system construction.

C. ENGINEER- The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.

D. Geomembrane Manufacturer (MANUFACTURER) - The party responsible for manufacturing the geomembrane rolls.

E. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) – The Party, independent from the OWNER, MANUFACTURER, and INSTALLER, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the OWNER.

F. INSTALLER- The Party responsible for field handling, transporting, storing, deploying, seaming, and testing of the geomembrane seams.

G. Panel- Unit area of geomembrane that will be seamed in the field that is larger than 100-ft^2.

H. Patch - Unit area of geomembrane that will be seamed in the field that is less than 100-ft^2.

I. Subgrade Surface - Soil layer surface which immediately underlies the geosynthetic material(s).

1.3 SUBMITTALS POST-AWARD

A. Furnish the following product data, in writing, to ENGINEER prior to installation of the geomembrane material:

1. Resin Data shall include the following:
    a. Certification stating that the resin meets the specification requirements (see *Table 1.9B*).
2. Geomembrane Roll
    a. Statement certifying no recycled polymer and no more than 10% rework of the same type of material is added to the resin (product run may be recycled).

B. The INSTALLER shall furnish the following information to the ENGINEER and OWNER prior to installation:

1. Installation layout drawings
    a. Must show proposed panel layout including field seams and details
    b. Must be approved prior to installing the geomembrane
2. Approved drawings will be for concept only; actual panel placement will be determined by site conditions.
3. Installer's Geosynthetic Field Installation Quality Assurance Plan

C. The INSTALLER will submit the following to the ENGINEER upon completion of installation:

1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents
2. Material and installation warranties
3. As-built drawings showing actual geomembrane placement and seams including typical anchor trench detail

1.4 QUALITY ASSURANCE

A. The OWNER will engage and pay for the services of a Geosynthetic Quality Assurance Consultant and Laboratory to monitor geomembrane installation.

1.5 QUALIFICATIONS

A. MANUFACTURER

1. Geomembrane shall be manufactured by the following:
    a. GSE Lining Technology, LLC
    b. approved equal
2. MANUFACTURER shall have manufactured a minimum of 10,000,000-ft^2 of polyethylene geomembrane during the last year.

B. INSTALLER

1. Installation shall be performed by one of the following installation companies (or approved equal)
    a. GSE Lining Technology, LLC
    b. GSE Approved Installers
2. INSTALLER shall have installed a minimum of 5,000,000-ft^2 of HDPE geomembrane during the last two years.
3. INSTALLER shall have worked in a similar capacity on at least 5 projects similar in complexity to the project described in the contract documents, and with at least 500,000-ft^2 of HDPE geomembrane installation on each project.
4. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.
5. The INSTALLER shall provide a minimum of one Master Seamer for work on the project.
    a. Must have completed a minimum of 1,000,000-ft^2 of geomembrane seaming work using the type of seaming apparatus proposed for the use on this Project.

1.6 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the MANUFACTURER. The label will identify:

   a. manufacturer's name

   b. product identification

   c. thickness

   d. length

   e. width

   f. roll number

B. Delivery- Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage- The onsite storage location for geomembrane material, provided by the CONTRACTOR to protect the geomembrane from punctures, abrasions and excessive dirt and moisture, should have the following characteristics:

   a. level (no wooden pallets)

   b. smooth

   c. dry

   d. protected from theft and vandalism

   e. adjacent to the area being lined

D. Handling- Materials are to be handled so as to prevent damage.

1.7 WARRANTY

A. Material shall be warrantied, on a pro-rata basis, against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.

B. Installation shall be warrantied against defects in workmanship for a period of 1 year from the date of geomembrane completion.

1.8 GEOMEMBRANE PROPERTIES

A. Material shall be smooth/textured polyethylene geomembrane as shown on the drawings.

B. Resin

1. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.
2. Natural resin (without carbon black) shall meet the following requirements:

Table 1.9B RAW MATERIAL PROPERTIES			
Property	**Test Method**	**HDPE**	**LLDPE**
Density (g/cm3)	ASTM D 1505	≥0.932	≥0.915
Melt Flow Index (g/10 min)	ASTM D 1238 (190/2.16)	≤1.0	≤1.0
OIT (minutes)	ASTM D 3895 (1 atm/200^{0}C)	≥100	≥100

C. Geomembrane Rolls

1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
2. Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width, and MANUFACTURER.
4. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in *Section 1.09 D* and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.

D. Smooth surfaced geomembrane shall meet the requirements shown in the following data sheets below:

1. *Table 1.1* for Black HDPE
2. *Table 1.2* for Green HDPE

3. *Table 1.3* for White HDPE
    a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
    b. The white surface shall be installed upwards.
4. *Table 1.4* for Smooth Leak Location Liner HDPE
    a. The geomembrane shall have a coextruded, electrically conductive layer.
    b. The conductive layer is installed downward.
    c. Electrical testing shall be performed after liner installation by the INSTALLER.
5. *Table 1.5* for Smooth White Leak Location Liner HDPE
    a. The geomembrane shall have a coextruded, electrically conductive layer.
    b. The conductive layer is installed downward.
    c. The geomembrane shall be a white-surfaced, coextruded geomembrane.
    d. The white surface shall be installed upwards.
    e. Electrical testing shall be performed after liner installation by the INSTALLER.
6. *Table 1.6* for Black LLDPE
7. *Table 1.7* for White-surfaced LLDPE
    a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
    b. The white surface shall be installed upwards.
8. *Table 1.8* for Leak Location Liner LLDPE
    a. The geomembrane shall have a coextruded, electrically conductive layer.
    b. The conductive layer is installed downward.
    c. Electrical testing shall be performed after liner installation by the INSTALLER.
9. *Table 1.9* for White Leak Location Liner LLDPE

a. The geomembrane shall be a white-surfaced, coextruded geomembrane.

b. The white surface shall be installed upwards.

c. The geomembrane shall have a coextruded, electrically conductive layer.

d. The conductive layer is installed downward.

e. Electrical testing shall be performed after liner installation by the INSTALLER.

TABLE 1.1: GSE HD SMOOTH GEOMEMBRANE

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(2), ft			1,120	870	560	430	340
Roll Width(2), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ± 1%.
- GSE HD Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 1.2: GSE GREEN SMOOTH GEOMEMBRANE							
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(3)], ft			1,120	870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE Green Smooth may have an overall ash content of 3.0% due to the green layer. These values apply to the black layer only.
- [(2)]Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ± 1%.
- GSE Green Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 1.3: GSE WHITE SMOOTH GEOMEMBRANE							
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)	Note(2)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(3), ft			1,120	870	560	430	340
Roll Width(3), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- (1)GSE White Smooth may have an overall ash content of 3.0% due to the white layer. These values apply to the black layer only.
- (2)Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 4.1: GSE LEAK LOCATION SMOOTH GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	72	108	144	180
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE Leak Location Smooth may have an overall ash content of 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- [(2)]Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ± 1%.
- GSE Leak Location Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

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TABLE 1.5: GSE LEAK LOCATION WHITE SMOOTH GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	72	108	144	180
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE Leak Location White Smooth may have an overall ash content of 3.0% due to the white and conductive layers. These values apply to the black layer only.
- [(2)]Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ± 1%.
- GSE Leak Location White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 1.6: GSE ULTRAFLEX SMOOTH GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Value**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(2), ft			870	560	430	340
Roll Width(2), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ±1 %.
- GSE UltraFlex is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

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TALBE 1.7: GSE ULTRAFLEX WHITE SMOOTH GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Value**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex White Smooth may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 1.8: GSE ULTRAFLEX LEAK LOCATION LINER SMOOTH GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Value**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex Leak Location Smooth may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 1.9: GSE ULTRAFLEX LEAK LOCATION LINER WHITE SMOOTH GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Value**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex Leak Location White Smooth may have an overall ash content greater than 3.0% due to the white and conductive layers. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

E. Textured surfaced geomembrane shall meet the requirements shown in the following data sheets below.

1. *Table 2.1* for Black coextruded textured HDPE
2. *Table 2.2* for Green coextruded textured HDPE
3. *Table 2.3* for White coextruded textured HDPE
   a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b. The white surface shall be installed upwards.
4. *Table 2.4* for Leak Location Liner coextruded textured HDPE
   a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b. The white surface shall be installed upwards.
5. *Table 2.4* for White Leak Location Liner coextruded textured HDPE
   a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b. The white surface shall be installed upwards.
6. *Table 2.6* for Black coextruded textured LLDPE
7. *Table 2.7* for White coextruded textured LLDPE
   a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b. The white surface shall be installed upwards.
8. *Table 2.8* for Leak Location Liner coextruded textured LLDPE
   a. The geomembrane shall have a coextruded, electrically conductive layer.
   b. The conductive layer is installed downward.
   c. Electrical testing shall be performed after liner installation by the INSTALLER.
9. *Table 2.9* for White Leak Location Liner coextruded textured LLDPE
   a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b. The white surface shall be installed upwards.
   c. The geomembrane shall have a coextruded, electrically conductive layer.
   d. The conductive layer is installed downward.
   e. Electrical testing shall be performed after liner installation by the INSTALLER.

TABLE 2.1: GSE HD TEXTURED GEOMEMBRANE							
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[1]	Note[1]	Note[1]	Note[1]	Note[1]
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load[2], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[3], ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width[3], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [1]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [2]NCTL for GSE HD Textured is conducted on representative smooth geomembrane samples.
- [3]Roll lengths and widths have a tolerance of ± 1%.
- GSE HD Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

MEWBOURNE OIL COMPANY

TABLE 2.2 GSE GREEN TEXTURED GEOMEMBRANE							
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load[(3)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [(1)]GSE Green may have an overall ash content greater than 3.0% due to the green layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE Green Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE Green Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 2.3: GSE WHITE TEXTURED GEOMEMBRANE							
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load[(3)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [(1)]GSE White may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE White Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 2.4: GSE LEAK LOCATION LINER TEXTURED GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Notch Constant Tensile Load[(3)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [(1)]GSE Leak Location may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE Leak Location Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE Leak Location Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 2.5: GSE LEAK LOCATION LINER WHITE TEXTURED GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	40 36	60 54	80 72	100 90
Density, g/cm3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	60	90	120	150
Carbon Black Content[1], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[2]	Note[2]	Note[2]	Note[2]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Notch Constant Tensile Load[2], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[4], ft	Double-Sided Textured Single-Sided Textured		700 780	520 540	400 410	330 330
Roll Width[4], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [1]GSE Leak Location White may have an overall ash content greater than 3.0% due to the conductive and white layers. These values apply to the non-conductive black layer only.
- [2]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [3]NCTL for GSE Leak Location White Textured is conducted on representative smooth geomembrane samples.
- [4]Roll lengths and widths have a tolerance of ±1%.
- GSE Leak Location White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 2.6: GSE ULTRAFLEX TEXTURED GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	60 250	90 250	120 250	150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[1]	Note[1]	Note[1]	Note[1]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[2], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[2], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [1]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [2]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 2.7: GSE ULTRAFLEX WHITE TEXTURED GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	60 250	90 250	120 250	150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [(1)]GSE UltraFlex White Textured may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 2.8: GSE ULTRAFLEX LEAK LOCATION TEXTURED GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	60 250	90 250	120 250	150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [(1)]GSE UltraFlex Leak Location Textured may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 2.9: GSE ULTRAFLEX LEAK LOCATION WHITE TEXTURED GEOMEMBRANE						
Tested Property	**Test Method**	**Frequency**	**Minimum Average Values**			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	60 250	90 250	120 250	150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
• [(1)]GSE UltraFlex Leak Location White Textured may have an overall ash content greater than 3.0% due to the white and conductive layers. These values apply to the non-conductive black layer only.
• [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
• [(3)]Roll lengths and widths have a tolerance of ±1%.
• GSE UltraFlex Leak Location White Textured is available in rolls weighing approximately 4,000 lb.
• All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
• *Modified.

F. Extrudate Rod or Bead

1. Extrudate material shall be made from same type resin as the geomembrane.
2. Additives shall be thoroughly dispersed.
3. Materials shall be free of contamination by moisture or foreign matter.

1.9 EQUIPMENT

A. Welding equipment and accessories shall meet the following requirements:

1. Gauges showing temperatures in apparatus such as extrusion welder or fusion welder shall be present.
2. An adequate number of welding apparatus shall be available to avoid delaying work.
3. Power source must be capable of providing constant voltage under combined line load.

1.10 DEPLOYMENT

A. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.

B. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.

C. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:

1. Geomembranes shall be installed according to site-specific specifications, and GSE Conductive should be installed with the Conductive layer down.

   Note: A spark tester or ohm meter can be used to determine Conductive layer.

2. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
3. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
4. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.

5. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 8 psi.
6. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.

D. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

1.11 FIELD SEAMING

A. Seams shall meet the following requirements:

1. To the maximum extent possible, orient seams parallel to the line of the slope, i.e., down and not across slope.
2. Minimize number of field seams in corners, odd-shaped geometric locations, and outside corners.
3. Slope seams (panels) shall extend a minimum of 5-ft beyond the grade break into the flat area.
4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the CONSULTANT and INSTALLER.
5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-in overlap is commonly suggested.

B. During Welding Operations

1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding

1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
2. Clean geomembrane surfaces by disc grinder or equivalent.
3. Purge welding apparatus of heat-degraded extrudate before welding.

D. Hot Wedge Welding

1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.

2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
3. Protect against moisture build-up between sheets.

E. Trial Welds

1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
3. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
4. Cut four, 1-in wide by 6-in long test strips from the trial weld.
5. Quantitatively test specimens for peel adhesion, and then for shear strength.
6. Trial weld specimens shall pass when the results shown in the following tables for HDPE and LLDPE are achieved in both peel and shear test.

TABLE 1.12.6A: MINIMUM WELD VALUES FOR HDPE GEOMEMBRANES

Property	Test Method	30	40	60	80	100	120
Peel Strength (fusion), ppi	ASTM D 6392	49	65	98	130	162	196
Peel Strength (extrusion), ppi	ASTM D 6392	39	52	78	104	130	157
Shear Strength (fusion & ext.), ppi	ASTM D 6392	61	81	121	162	203	242

TABLE 1.2.6B: MINIMUM WELD VALUES FOR LLDPE GEOMEMBRANES

Property	Test Method	30	40	60	80	100
Peel Strength (extrusion), ppi	ASTM D 6392	36	48	72	96	120
Peel Strength (fusion), ppi	ASTM D 6392	38	50	75	100	125
Shear Strength (fusion & ext.), ppi	ASTM D 6392	45	60	90	120	150

a. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).

b. The break is ductile.

7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.

8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.

F. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. INSTALLER shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

G. Defects and Repairs

1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.

2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

1.12 FIELD QUALITY ASSURANCE

A. MANUFACTURER and INSTALLER shall participate in and conform to all terms and requirements of the Owner's quality assurance program. CONTRACTOR shall be responsible for assuring this participation.

B. Quality assurance requirements are as specified in this Section and in the Field Installation Quality Assurance Manual if it is included in the contract.

C. Field Testing

1. Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming.

a. Vacuum Testing

1) Shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.

b. Air Pressure Testing

1) Shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.

c. Spark Testing

1) Shall be performed accordance with ASTM D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate

Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test).

d. Other approved methods.

2. Destructive Testing (performed by CONSULTANT with assistance from INSTALLER)

a. Location and Frequency of Testing

1) Collect destructive test samples at a frequency of one per every 500 lineal feet of seam length.

2) Test locations will be determined after seaming.

3) Exercise Method of Attributes as described by GRI GM-14 (Geosynthetic Research Institute, http://www.geosynthetic-institute.org) to minimize test samples taken.

b. Sampling Procedures are performed as follows:

1) INSTALLER shall cut samples at locations designated by the CONSULTANT as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.

2) CONSULTANT will number each sample, and the location will be noted on the installation as-built.

3) Samples shall be 12-in wide by minimal length with the seam centered lengthwise.

4) Cut a 2-in wide strip from each end of the sample for field-testing.

5) Cut the remaining sample into two parts for distribution as follows:

a) One portion for INSTALLER, 12-in by 12-in

b) One portion for the Third-Party laboratory, 12-in by 18-in

c) Additional samples may be archived if required.

6) Destructive testing shall be performed in accordance with ASTM D 6392, Standard Test Method for Determiningg the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

7) INSTALLER shall repair all holes in the geomembrane resulting from destructive sampling.

8) Repair and test the continuity of the repair in accordance with these Specifications.

3. Failed Seam Procedures

a) If the seam fails, INSTALLER shall follow one of two options:

1) Reconstruct the seam between any two passed test locations.

2) Trace the weld to intermediate location at least 10-ft minimum or where the seam ends in both directions from the location of the failed test.

b) The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10-ft long.

c) If sample passes, then the seam shall be reconstructed or capped between the test sample locations.

d) If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

1.13 REPAIR PROCEDURES

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.

B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.

C. INSTALLER shall be responsible for repair of defective areas.

D. Agreement upon the appropriate repair method shall be decided between CONSULTANT and INSTALLER by using one of the following repair methods:

1. Patching- Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.

2. Abrading and Re-welding- Used to repair short section of a seam.

3. Spot Welding- Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.

4. Capping- Used to repair long lengths of failed seams.

5. Flap Welding- Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.

6. Remove the unacceptable seam and replace with new material.

E. The following procedures shall be observed when a repair method is used:

1. All geomembrane surfaces shall be clean and dry at the time of repair.

2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.

3. Extend patches or caps at least 6 inches for extrusion welds and 4-in for wedge welds beyond the edge of the defect, and around all corners of patch material.

F. Repair Verification

1. Number and log each patch repair (performed by CONSULTANT).

2. Non-destructively test each repair using methods specified in this Specification.

2 OZ GEOTEXITLE

1.1 SCOPE

This specification covers the technical requirements for the Manufacturing and Installation of the nonwoven geotextile. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
1. ASTM D 5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles
2. ASTM D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
3. ASTM D 4533, Standard Test Method for Index Trapezoidal Tearing Strength of Geotextiles
4. ASTM D 4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
5. ASTM D 4491, Standard Test Method for Water Permeability of Geotextiles by Permittivity
6. ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile
7. ASTM D 4354, Standard Practice for Sampling of Geosynthetics for Testing
8. ASTM D 4759, Standard Practice for Determining the Specifications Conformance of Geosynthetics

1.3 SUBMITTALS

A. Prior to material delivery to project site, the contractor shall provide the engineer with a written certification or manufacturers quality control data which displays that the geotextile meets or exceeds minimum average roll values (MARV) specified herein.

B. The contractor shall submit, if required by the engineer, manufacturer's quality control manual for the geotextile to be delivered to the site.

2. PRODUCT

2.1 GEOTEXTILE

A. The nonwoven needle-punched geotextile specified herein shall be made from staple fiber.
B. The geotextile shall be manufactured from prime quality virgin polymer.
C. The geotextile shall be able to withstand direct exposure to ultraviolet radiation from Sun for up to 30 days without any noticeable effect on index or performance properties.
D. Geotextile shall meet or exceed all material properties listed in *Table 1*.

TABLE 1: GEOTEXTILE PROPERTIES

Property	Test Method	Test Frequency	Value
Mass per Unit Area, oz/yd^2	ASTM D 5261	90,000-ft^2	12
Grab Tensile Strength, lb	ASTM D 4632	90,000-ft^2	320
CBR Puncture Strength, lb	ASTM D 6241	540,000-ft^2	925
Grab Elongation, %	ASTM D 4632	90,000-ft^2	50
Trapezoidal Tear Strength, lb	ASTM D 4533	90,000-ft^2	125
UV Resistance, % retained after 500 hours	ASTM D 4355	per formulation	70

2.2 MANUFACTURE

All rolls of the geotextile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number, and roll dimensions.

2.3 TRANSPORT

A. Transportation of the geotextile shall be the responsibility of the contractor.

B. During shipment, the geotextile shall be protected from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, or other damaging or deleterious conditions.

C. Upon delivery at the job site, the contractor shall ensure that the geotextile rolls are handled and stored in accordance with the manufacturer's instructions as to prevent damage.

3. EXECUTION

3.1 QUALITY ASSURANCE

A. The engineer shall examine the geotextile rolls upon delivery to the site and report any deviations from project specifications to the contractor.

3.2 INSTALLATION

A. The geotextile shall be handled in such a manner as to ensure that it is not damaged in any way. Should the contractor damage the geotextile to the extent that it is no longer usable as determined by these specifications or by the engineer, the contractor shall replace the geotextile at his own cost.

B. The geotextile shall be installed to the lines and grades as shown on the contract drawings and as described herein.

C. The geotextile shall be rolled down the slope in such a manner as to continuously keep the geotextile in tension by self-weight. The geotextile shall be securely anchored in an anchor trench where applicable, or by other approved or specified methods.

D. In the presence of wind, all geotextiles shall be weighted by sandbags or approved equivalent. Such anchors shall be installed during placement and shall remain in place until replaced with cover material.

E. The contractor shall take necessary precautions to prevent damage to adjacent or underlying materials during placement of the geotextile. Should damage to such material occur due to the fault of the contractor, the latter shall repair the damaged materials at his own cost and to the satisfaction of the engineer.

F. During placement of the geotextile, care shall be taken not to entrap soil, stones or excessive moisture that could hamper subsequent seaming of the geotextile as judged by the engineer.

G. The geotextile shall not be exposed to precipitation prior to being installed and shall not be exposed to direct sunlight for more than 15 days after installation.

H. The geotextile shall be seamed using heat seaming or stitching methods as recommended by the manufacturer and approved by the engineer. Sewn seams shall be made using polymeric thread with chemical resistance equal to or exceeding that of the geotextile. All sewn seams shall be continuous. Seams shall be oriented down slopes perpendicular to grading contours unless otherwise specified. For heat-seaming, fusion welding techniques recommended by the manufacturer shall be used.

I. The contractor shall not use heavy equipment to traffic above the geotextile without approved protection.

J. The geotextile shall be covered as soon as possible after installation and approval. Installed geotextile shall not be left exposed for more than 15 days.

K. Material overlying the geotextile shall be carefully placed to avoid wrinkling or damage to the geotextile.

SINGLE SIDED GEOCOMPOSITE

1.1 SCOPE

This specification covers the technical requirements for the manufacturing and installation of the geocomposite drainage layer. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM D 1238 Standard Test Method for Melt Flow Rates of Thermoplastics
2. by Extrusion Plastometer
3. D 1505-98 Standard Test Method for Density of Plastics by the Density-Gradient Technique
4. ASTM D 4218, Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle Furnace Technique D 1603-94 Standard Test Method for Carbon Black in Olefin Plastics
5. D 4355-02 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
6. D 4491-99 Standard Test Method for Water Permeability of Geotextiles by Permittivity
7. D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
8. D 4716-00 Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
9. D 4751-99 Standard Test Method for Determining Apparent Opening Size of a Geotextile
10. D 6241 Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile- Related Products Using a 50-mm Probe D 4833-88 (1996) Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
11. D 5261-92 (1996) Standard Test Method for Measuring the Mass Per Unit Area of Geotextiles
12. D7005-03 Determining The Bond Strength (Ply-Adhesion) of Geocomposites
13. D 7179 Standard Test Method for Determining Geonet Breaking Force

B. Relevant publications from the Environmental Protection Agency (EPA):
   1. Daniel, D.E. and R.M. Koerner, (1993), Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities, EPA/600/R-93/182.

1.3 DEFINITIONS

A. Construction Quality Assurance Consultant (CONSULTANT) – The Party, independent from MANUFACTURER and INSTALLER, that is responsible for observing and documenting activities related to quality assurance during the lining system construction.

B. ENGINEER - The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.

C. Geocomposite Manufacturer (MANUFACTURER) - The party responsible for manufacturing the geocomposite rolls.

D. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) - The Party, independent from the MANUFACTURER and INSTALLER, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the OWNER.

E. INSTALLER- Party responsible for field handling, transporting, storing and deploying the geocomposite.

F. Lot- A quantity of resin (usually the capacity of one rail car) used to manufacture polyethylene geocomposite rolls. The finished rolls will be identified by a roll number traceable to the resin lot.

1.4 QUALIFICATIONS

A. MANUFACTURER
   1. Geocomposite shall be manufactured by the following:
      a. GSE Lining Technology, Inc.
      b. Approved Equal

2. MANUFACTURER shall have manufactured a minimum of 10,000,000-ft^2 of polyethylene geocomposite material during the last year.

B. INSTALLER

1. INSTALLER shall have installed a minimum of 500,000 square feet of geocomposite in the last 3 years.
2. INSTALLER shall have worked in a similar capacity on at least 5 projects similar in complexity to the project described in the contract documents, and within at least 50,000 square feet of geonet installation on each project.
3. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.

1.5 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling- Each roll delivered to the site shall be wrapped and labeled by the MANUFACTURER. The label will identify:

1. Manufacturer's name
2. Product identification
3. Length
4. Width
5. Roll number

B. Delivery- Rolls will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage- The on-site storage location provided by the CONTRACTOR to protect the geonet from abrasions, excessive dirt and moisture, shall have the following characteristics:

1. Level (no wooden pallets)
2. Smooth
3. Dry
4. Protected from theft and vandalism
5. Adjacent to the area being lined

D. Handling

1. The CONTRACTOR and INSTALLER shall handle all rolls in such a manner to ensure they are not damaged in any way.
2. The INSTALLER shall take any necessary precautions to prevent damage to underlying layers during placement of the drainage material.

1.6 WARRANTY

A. Material shall be warranted, on a pro-rata basis against defects for a period of 1-year from the date of the geocomposite installation.

B. Installation shall be warranted against defects in workmanship for a period of 1-year from the date of geocomposite completion.

2. PRODUCTS

2.1 GEOCOMPOSITE PROPERTIES

A. A geocomposite shall be manufactured by extruding two crossing strands to form a bi-planar drainage net structure with a non-woven geotextile bonded to one or both sides.

B. The geocomposite specified shall have properties that meet or exceed the values listed in the following data sheets below.

TABLE 1: GEOCOMPOSITE PROPERTIES			
Property	**Test Method**	**Frequency**	**Value**
Geocomposite			
Transmissivity (1), gal/min/ft (m2/sec) Single-Sided Composite	ASTM D 4716	1/540,000-ft^2	6.2 (1.3 x 10-3)
Ply Adhesion, lb/in	ASTM D 7005	1/50,000-ft^2	0.5
Geonet			
Geonet Core Thickness, mil (1)	ASTM D 5199	1/50,000-ft^2	270
Transmissivity (2), gal/min/ft (m2/sec)	ASTM D 4716	1/540,000-ft^2	19 (4 x 10-3)
Compressive Strength, lbs/ft	ASTM D 6364	1/540,000-ft^2	40,000
Density, g/cm3	ASTM D 1505	1/50,000-ft^2	0.94
Tensile Strength (MD), lb/in	ASTM D 7179	1/50,000-ft^2	100
Carbon Black Content, %	ASTM D 4218	1/50,000-ft^2	2.0
8 oz. Geotextile (prior to lamination)			
Mass per Unit Area, oz/yd2	ASTM D 5261	1/90,000-ft^2	8
Grab Tensile Strength, lb	ASTM D 4632	1/90,000-ft^2	220
Grab Elongation	ASTM D 4632	1/90,000-ft^2	50%
CBR Puncture Strength, lb	ASTM D 6241	1/540,000-ft^2	575
Trapezoidal Tear Strength, lb	ASTM D 4533	1/90,000-ft^2	90
AOS, US Sieve (mm)	ASTM D 4751	1/540,000-ft^2	80 (0.180)
Permittivity, sec-1	ASTM D 4491	1/540,000-ft^2	1.3
Water Flow Rate, gpm/ft2	ASTM D 4491	1/540,000-ft^2	95
UV Resistance, % Retained	ASTM D 4355 (after 500 hours)	per formulation	70

Note: The design engineer shall prepare the table above based on the GSE product data sheet and then delete this note

C. Resin

1. Resin shall be new first quality, compounded polyethylene resin.
2. Natural resin (without carbon black) shall meet the following additional minimum requirements:

TABLE 2: RAW MATERIAL PROPERTIES		
Property	**Test Method[(1)]**	**Value**
Density (g/cm^3)	ASTM D 1505	>0.94
Melt Flow Index (g/10 min)	ASTM D 1238	$\leq$ 1.0

[1]GSE utilizes test equipment and procedures that enable effective and economical confirmation that the product will conform to specifications based on the noted procedures. Some test procedures have been modified for application to geosynthetics. All procedures and values are subject to change without prior notification.

2.2 MANUFACTURING QUALITY CONTROL

The geocomposite shall be manufactured in accordance with the Manufacturer's Quality Control Plan submitted to and approved by the ENGINEER.

The geocomposite shall be tested according to the test methods and frequencies listed on *Table 1* which has been prepared based on product data sheets.

3. EXECUTION

3.1 FAMILIARIZATION

A. Inspection

1. Prior to implementing any of the work in the Section to be lined, the INSTALLER shall carefully inspect the installed work of all other Sections and verify that all Work is complete to the point where the installation of the Section may properly commence without adverse impact.
2. If the INSTALLER has any concerns regarding the installed work of other Sections, he shall notify the Project ENGINEER.

3.2 MATERIAL PLACEMENT

A. The geocomposite roll should be installed in the direction of the slope and in the intended direction of flow unless otherwise specified by the ENGINEER.

B. If the project contains long, steep slopes, special care should be taken so that only full length rolls are used at the top of the slope.

C. In the presence of wind, all geocomposites shall be weighted down with sandbags or the equivalent. Such sandbags shall be used during placement and remain until replaced with cover material.

D. If the project includes an anchor trench at the top of the slopes, the geocomposite shall be properly anchored to resist sliding. Anchor trench compacting equipment shall not come into direct contact with the geocomposite.

E. In applying fill material, no equipment can drive directly across the geocomposite. The specified fill material shall be placed and spread utilizing vehicles with a low ground pressure.

F. The cover soil shall be placed in the geocomposite in a manner that prevents damage to the geocomposite. Placement of the cover soil shall proceed immediately following the placement and inspection of the geocomposite.

3.3 SEAMS AND OVERLAPS

A. Each component of the geocomposite will be secured or seamed to the like component at overlaps.

B. Geonet Components

1. Adjacent edges of the geonet along the length of the geocomposite roll shall be placed with the edges of each geonet butted against each other.
2. The overlaps shall be joined by tying the geonet structure with cable ties. These ties shall be spaced every 5 feet along the roll length.
3. Adjoining geocomposite rolls (end to end) across the roll width should be shingled down in the direction of the slope, with the geonet portion of the top overlapping the geonet portion of the bottom geocomposite a minimum of 12 inches across the roll width.

4. The geonet portion should be tied every 6 inches in the anchor trench or as specified by the ENGINEER.

3.4 REPAIR

A. Prior to covering the deployed geocomposite, each roll shall be inspected for damage resulting from construction.

B. Any rips, tears or damaged areas on the deployed geocomposite shall be removed and patched. The patch shall be secured to the original geonet by tying every 6 inches with the approved tying devices. If the area to be repaired is more than 50 percent of the width of the panel, the damaged area shall be cut out and the two portions of the geonet shall be cut out and the two portions of the geonet shall be joined in accordance with *Subsection 3.03*.

APPENDIX E

OPERATING AND MAINTENANCE PLAN

Mewbourne Oil Company (Mewbourne) is proposing to construct two (2) storage pits in the N/2 of Section 18, Township 20 South, Range 29 East, Eddy County, New Mexico. The Derringer Federal Facility shall consist of two basins with a total operational volume of approximately 505,000-bbl each.

OPERATION AND MAINTENANCE PROCEDURES

In this plan, underlined text represents the language of the Rule.

The operator will operate and maintain the lined earthen containments and the AST to contain liquids and solids (blow sand and minimal precipitates from the treated produced water) and maintain the integrity of the liner system in a manner that prevents contamination of fresh water and protects public health and the environment as described below. The purpose of the lined earthen containment and AST is to facilitate recycling, reuse, and reclamation of produced water derived from nearby oil and gas wells. During periods when water for E&P operations is not needed, produced water will discharge to one of the injection wells in the operator's SWD system. The containment will not be used for the disposal of produced water or other oilfield waste.

The operation of the Recycling Containment is summarized below:

1. Via pipeline, produced water generated from nearby oil and gas wells is delivered to a treatment system located as indicated in the C-147.
2. After treatment, the produced water discharges into the containment.
3. When required, treated produced water is removed from the containment for E&P operations. At this time, treated produced water will be used for drilling beneath the fresh water zones (beneath surface casing), for well stimulation (e.g. hydraulic fracturing) and other E&P uses as approved by OCD.
4. Whenever the maximum fluid capacity of the containment is reached, treatment and discharge to the containment ceases (see Freeboard and Overtopping Plan, below).
5. The operator will keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.
6. The operator will maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.
7. The containment shall be deemed to have ceased operations if less than 20 % of the total fluid capacity is used every six months following the first withdrawal of produced water for use. The operator will report cessation of operations to the appropriate division district office. The appropriate division district office may grant an extension to this determination of cessation of operations not to exceed six months.

The operation of the lined earthen containment and AST will follow the mandates listed below:

1. The operator will not discharge into or store any hazardous waste (as defined by 40 CFR 261 and NMAC 19.15.2.7.H.3) in the containments.
2. If the containment's primary liner is compromised above the fluid's surface, the operator will repair the damage or initiate replacement of the primary liner within 48 hours of discovery or seek an extension of time from the Division District office.
3. If the primary liner is compromised below the fluid's surface, the operator will remove all fluid above the damage or leak within 48 hours of discover, notify the division district office, and repair the damage or replace the primary liner.
4. If any penetration of the containment liner is confirmed by sampling of fluid in the leak detection system (see Inspection and Monitoring Plan), the operator will:
   a. Begin and maintain fluid removal from the leak detection/pump-back system,
   b. Notify the District office within 48 hours (phone or email) of the discovery,
   c. Identify the location of the leak, and
   d. Repair the damage or, if necessary, replace the containment liner.
5. The operator will install, or maintain onsite, an oil absorbent boom or other device to contain an unanticipated release and the operator will remove any visible layer of oil from the surface of the recycling containment.
6. The operator will report releases of fluid in a manner consistent with NMAC 19.15.29.
7. The containment will be operated to prevent the collection of surface water run-on.
8. The operator will maintain the containment free of miscellaneous solid waste or debris.
9. The operator will maintain at least 3-ft of freeboard for the containment and will use a free-standing staff gauge to allow easy determination of the required 3-ft of freeboard.
10. As described in the design/construction plan, the injection or withdrawal of fluids from the containment is accomplished through hardware that prevents damage to the liner by erosion, fluid jets, or impact from installation and removal of hoses or pipes.
11. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
12. The operator will maintain the fences in good repair.

MONITORING, INSPECTION, AND REPORTING PLAN

The operator will inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request.

Weekly inspections consist of:

1. Reading and recording the fluid height of staff gauges,
2. Recording any evidence that the pond surface shows visible oil,

3. Visually inspecting the containment's exposed liners, and
4. Checking the leak detection system for any evidence of a loss of integrity of the primary liner.

As stated above, if a liner's integrity is compromised, or if any penetration of the liner occurs above the water surface, then the operator will notify the District office within 48 hours (phone or email).

Monthly, the operator will:

1. Inspect diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.
2. Inspect the leak detection system for evidence of damage or malfunction and monitor for leakage.
3. Inspect the containment for dead migratory birds and other wildlife. Within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.
4. Report to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.
5. Record sources and disposition of all recycled water.

The operator will maintain a log of all inspections and make the log available for the appropriate Division District office's review upon request. An example of the log is attached to this section of the permit application.

FREEBOARD AND OVERTOPPING PREVENTION PLAN

The method of operation of the containment allows for maintaining freeboard with very few potential problems. When the capacity of the containment is reached (3-ft of freeboard), the discharge of treated produced water ceases and the produced water generated by nearby oil and gas wells is managed by one of the injection wells as identified in *Appendix G*.

If rising water levels suggest that 3-ft of freeboard will not be maintained, the operator will implement one or more of the following options:

1. Cease discharging treated produced water to the containment.
2. Accelerate re-use of the treated produced water for purposes approved by the Division.
3. Transfer treated produced water from the containment to injection wells.

The reading of the staff gauge typically occurs daily when treatment operations are ongoing and weekly when discharge to the containment is not occurring.

PROTOCOL FOR LEAK DETECTION MONITORING, FLUID REMOVAL, AND REPORTING

As shown in *Appendix C*, the leak detection system includes a monitoring system. Any fluid released from the primary liner will flow to the collection sump, where fluid level monitoring is possible at the monitoring riser pipe associated with the leak detection system.

Staff may employ a portable electronic water level meter to determine if fluid exists in the monitoring riser pipe. Obtaining accurate readings of water levels in a sloped pipe beneath a containment can be a challenge. An electrician's wire snake may be required to push the probe to the bottom of the port and the probe may be fixed in a 2-in pipe "dry housing" to avoid false readings due to water condensation on the pipe. There are many techniques to determine the existence of water in the sumps, including low-flow pumps and a simple small bailer affixed to an electrician's snake. The operator will use the method that works best for this containment.

If seepage from the containment into the leak detection system is suspected by a positive fluid level measurement, the operator will:

1. Re-measure fluid levels in the monitoring riser pipe on a daily basis for one week to determine the rate of seepage.
2. Collect a water sample from the monitoring riser pipe to confirm the seepage is treated produced water from the containment via field conductivity and chloride measurements.
3. Notify NMOCD of a confirmed positive detection in the system within 48 hours of sampling (initial notification).
4. Install a pump into the monitoring riser pipe sump to continually (manually on a daily basis or via automatic timers) remove fluids from the leak detection system into the containment until the liner is repaired or replaced.
5. Dispatch a liner professional to inspect the portion of the containment suspected of leakage during a "low water" monitoring event.
6. Provide NMOCD a second report describing the inspection and/or repair within 20 days of the initial notification.

If the point of release is obvious from a low water inspection, the liner professional will repair the loss of integrity. If the point of release cannot be determined by the inspection, the liner professional will develop a more robust plan to identify the point(s) of release. The inspection plan and schedule will be submitted to OCD with the second report. The operator will implement the plan upon OCD approval.

APPENDIX F
CLOSURE PLAN

Mewbourne Oil Company (Mewbourne) is proposing to construct two (2) storage pits in the N/2 of Section 18, Township 20 South, Range 29 East, Eddy County, New Mexico. The Derringer Federal Facility shall consist of two basins with a total operational volume of approximately 505,000-bbl each.

CLOSURE PLAN

In this plan, underlined text represents the language of the Rule.

After operations cease, the operator will remove all fluids within 60 days and close the containment within six months from the date the operator ceases operations from the containment for use.

The operator shall substantially restore the impacted surface area to

1. The condition that existed prior to the construction of the recycling containment or
2. To a condition imposed by federal, state trust land, or tribal agencies on lands managed by those agencies as these provisions govern the obligations of any operator subject to those provisions.

EXCAVATION AND REMOVAL CLOSURE PLAN - PROTOCOLS AND PROCEDURES

The workover pit is expected to contain a small volume of solids, the majority of which will be windblown sand and dust with some mineral precipitates from the water.

The operator will remove all liquids from the pits and either:

a. Dispose of the liquids in a division-approved facility, or
b. Recycle, reuse, or reclaim the water for reuse in drilling and stimulation

The operator will close the recycling containment by first removing all fluids, contents, and synthetic liners and transferring these materials to a Division approved facility.

After the removal of the pit contents and liners, soils beneath the workover pit will be tested by collection of a five-point (minimum) composite sample, which includes stained or wet soils, if any. That sample shall be analyzed for the constituents listed in *Table 1* of *19.15.34.14*.

After review of the laboratory results:

a. If any contaminant concentration is higher than the parameters listed in *Table 1*, additional delineation may be required, and the operator must receive approval before proceeding with closure.
b. If all contaminant concentrations are less than or equal to the parameters listed in *Table 1*, then the operator will proceed to:
    i. Backfill with non-waste containing, uncontaminated earthen material or

ii. Undertake an alternative closure process pursuant to a variance request after approval by OCD.

The operator will reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area.

Topsoils and subsoils shall be replaced to their original relative positions and contoured so as to achieve erosion control, long-term stability, and preservation of surface water flow patterns.

The disturbed area shall then be reseeded in the first favorable growing season following closure of a recycling containment.

CLOSURE DOCUMENTATION

Within 60 days of closure completion, the operator shall submit a closure report on Form C-147, including required attachments, to document all closure activities including sampling results and the details on any backfilling, capping or covering, where applicable. The closure report shall certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in division rules or directives.

The operator shall notify the division when reclamation and re-vegetation are complete. Specifically, the notice will document that all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds.

Mewbourne Oil Co
Derringer Federal Recycle
Closure Cost Estimate

	Item	Units	Quanity	$/Unit	Estimate Cost
	Facility Closure				
1	Fluid removal				
	Derringer Federal North Pit (505,000 bbls)	bbls	505,000	$ 1.20	$ 606,000.00
	Derringer Federal South Pit (505,000 bbls)	bbls	505,000	$ 1.20	$ 606,000.00
2	Vac truck (final fluid removal)	hrs	8	$ 105.00	$ 840.00
3	Liner removal (fold-in-place)				
	(Rostabout crews - 18 hrs)	hrs	18	$ 150.00	$ 2,700.00
	(Track hoe - 18 hrs)	hrs	18	$ 150.00	$ 2,700.00
4	Equipment removal				
	Tank clean-out and residue haul-off	ea	5	$ 1,000.00	$ 5,000.00
	Equipment removal (tanks, gun barrel, FWKO)	ea	5	$ 800.00	$ 4,000.00
	Electrical decomissioning (pumps and panels)	ea	8	$ 100.00	$ 800.00
	Misc equipment clean-up and removal	hr	40	$ 125.00	$ 5,000.00
5	Site Restoration				
	Dozier - push in berms (bid)	ea	1	$ 38,000.00	$ 38,000.00
	and final grading of the site				
	Re-vegetation	ea	1	$ 4,800.00	$ 4,800.00
	Plug and Abandon Monitoring Wells	ea	3	$ 1,000.00	$ 3,000.00
	Estimated Total				**$ 1,278,840.00**

ENVIROTECH
ENGINEERING & CONSULTING, INC.

2500 North Eleventh Street ❒ Enid, OK 73701 ❒ (580) 234-8780 ❒ Fax (580) 237-4302 ❒ www.envirotechconsulting.com

November 16, 2021

Ms. Victoria Venegas – Environmental Specialist
Environmental Bureau
EMNRD – Oil Conservation Division
811 S. First St.
Artesia NM 88210
victoria.venegas@state.enm.us

Re: Response to Email dated October 13,2021 to Mewbourne Oil Co. - Derringer Federal Recycle Facility Pits.

On behalf of Mewbourne Oil Company, ENVIROTECH ENGINEERING & CONSULTING, INC. hereby submit the below response to the request for Supplemental Information email dated October 13th, 2021. Below are the Reponses addressing each of the clarification requests. Clarification numbering corresponds to the Email number for requested clarification.

Item #:

1. A karst survey conducted by Cave and Karst Surface Evaluation has been included with this letter. Cave and Karst Survey Evaluation is a Bureau of Land Management approved pedestrian karst surveying company. This report is the results of the GPS Mapping method required by the Bureau of Land Management. The findings show no surface evidence of karsting in the area of the Derringer Federal Facility.
2. In the original application the language *"In addition, groundwater was encountered on the site during the onsite borings at depths of 55-and 62-ft below ground surface. Therefore, the area of the proposed pit may require additional engineering design to achieve the required 50-ft of separation between the bottom of the containment and groundwater"* was included. While groundwater was encountered at are depth of 55-ft bgs, the bore was not on the property containing the proposed facility and should be disregarded. No additional engineering measure will be needed to satisfy Rule 34. Enclosed is an updated application narrative with revised language stating that groundwater was encountered at 62-ft bgs at the proposed facility.

3. Per Appendix A Geotech Report and Item #2, the bore conducted to locate groundwater on the facility found groundwater at 62-ft bgs. The bottom of the containments only extend 9-ft below the elevation of the groundwater determination bore surface elevation. This leaves a separation distance of 53-ft from the bottom of the containment to groundwater level. This puts the proposed containments in compliance with NMAC 19.15.34.11.A.(1) so no variance request is needed.

Please do not hesitate to contact us via phone, or at the email listed below, if you have any questions or comments regarding this information.

Sincerely,

Mr. Mitchell Ratke, EIT
ENVIROTECH ENGINEERING
(580) 234-8780
2500 N. 11th Street
Enid, OK 73701
mratke@envirotechconsulting.com

Enclosure: *Updated C-147 Application Narrative*
BLM Karst Report

Justification for use of ERI rather than GPR in the Burton Flats, Eddy County New Mexico

The soils and alluvium of the Burton flats consist mostly of gypsite and clay minerals. While ground penetrating radar is not impossible to use in these materials, it is challenging and poses several issues. The main issue is that the clay minerals in the soil attenuate the radar signal (of a system with a center frequency high enough to resolve the typical void size in the area) to the point that the depth of investigation is generally less than 2 meters (6.6 feet). While some subsurface karst features are within that distance from the surface, the majority are between 8 and 20 meters in depth, out of range of the radar. A lower frequency radar could penetrate deeper, but not much, and the resolution wouldn't be high enough to see the smaller features. An alternative geophysical method that works quite well in these types of soils is electrical resistivity imaging (ERI). ERI at its most basic uses a set of four electrodes placed in the ground. Two electrodes are used to inject an electrical current into the ground, the other two electrodes are used to measure the voltage produced by the current. The known injected current and the measured voltage can then be used to determine the electrical resistance of the ground. Since air (as in an air-filled, subsurface void) has nearly infinite resistance, these voids show up extremely well using electrical resistivity. ERI is a complementary geophysical method to GPR and typically works very well in areas where GPR does not (as in the case of the Burton Flats). In addition to the physics involved, there are practical issues as well. The amount of time it would take to complete a comprehensive GPR survey using either a cart system, or physically moving the antennas for each measurement are prohibitive. In the former case, using a cart, the vegetation would need to be cleared prior to the survey. With the area cleared of vegetation, approximately an acre can be covered per day. In the latter case, using a unit without the cart, a measurement would have to be taken, then the antennas moved, the next measurement taken and so on. With this method, approximately a quarter of an acre per day can be covered. With ERI, no vegetation removal is required (at least in the area of the proposed infrastructure in this particular case) and between 6 and 8 acres per day can be covered. The depth to which electrical resistivity can reach is limited by the array length and the resolution of the survey is limited by the electrode spacing. Typically we use 4- to 5-meter electrode spacing which gives unambiguous results regarding subsurface voids that are between 2 to 2.5 meters in diameter or larger to a depth of 15 to 20 meters. Smaller or deeper voids still show up but can be harder to interpret. Please see the attached paper for further information.

DRILL SITE CONSULTING
822 W. DELAWARE
HOBBS, NM 88242

MEWBOURNE: DERRINGER RECYCLE POND+ INFRASTRUCTURE #3
SECTION 18, TOWNSHIP 20 SOUTH, RANGE 29 EAST
EDDY COUNTY, NEW MEXICO

CAVE AND KARST SURFACE EVALUATION

AUGUST 18, 2021

BLM PROJECT NUMBER, NM

Work was started on August 17, 2021.
Work was completed on August 18, 2021.

The MEWBOURNE: DERRINGER RECYCLE POND AND INFRASTRUCTURE ROWs were identified. A 100 meter corridor was walked around the access road and the flow line ROWs. A 200 meter perimeter was walked around the recycle pond. All of the required easements were walked and checked for cave and karst concerns.

Points were verified by using Garmin GPSMAP 64 hand-held GPS units with 13S, WGS 84 as the datum.

The POINT LOCATION #'s are for determining the route and serve no other purpose. The ROW was not staked.

RECYCLE POND

POINT LOCATION	EUTM	NUTM	DESCRIPTION
NW (W) POND CORNER	583143	3604721	POINT NOT STAKED
NE (E) POND CORNER	583356	3604890	POINT NOT STAKED
SW (S) POND CORNER	583380	3604451	POINT NOT STAKED
SE (E) POND CORNER	583601	3604637	POINT NOT STAKED

The lease road to the north of the proposed pool was used as the northern boundary. Lease roads and drill pads were used as the eastern boundary.

200 METER CLEARANCE PROCEDURE:

50 meter interval transects were walked from North to South on these coordinates , 582900E, 582950E, 583100E, 583150E, 583300E, 583350, 583500, and 583550E, starting at 3604950N and ending at 3604760N, 3604650N, 3604450N, 3604400N, 3604250N, 3604200N, 3604300N and 3604350N.

And

50 meter interval transects were walked from South to North on these coordinates, 583000E, 583050E, 583200E, 583250E, 583400E, 583450E, 583600E, and 583650E, starting at 3604600N, 3604500N, 3604300N, 3604250N, 583200N, and 3604350N.

FINDINGS DISCOVERED DURING THE 200 METER PERIMITER CLEARANCE:

1. MEWBOURNE GAS BPL AT 583000E, 3604865N RUNNING NE/SW
2. OIL FIELD EQUIPMENT STORAGE AT 583003E, 3604906N
3. OLD TWO TRACK ROAD AT 583203E, 3604609N RUNNING NE/SW
4. OLD TWO TRACK ROAD AT 583300E, 3604355N RUNNING NE/SW
5. BPL AT 583300E, 3604270N RUNNING NE/SW
6. BPL AT 583300E, 3604266N RUNNING NE/SW
7. STEEL FLOW LINE AT 583652E, 3604815N RUNNING NE/SW

INFRASTRUCTURE FACILITIES:

FLOW LINE

POINT LOCATION	EUTM	NUTM	DESCRIPTION
#1, BOL, 0+00.0	582947	3603826	BOL AT EDGE OF PAD EXTENSION
#2, 2+00.0	582947	3603887	ROUTE POINT
#3, 4+00.0	582948	3603948	ROUTE POINT
#4, 6+00.0	582948	3604008	ROUTE POINT
#5, BPL, 8+00.0	582947	3604063	BPL
#6, TWO TRACK	582948	3604075	C/L OLD TWO TRACK
#7, BPL, ??	582948	3604083	BPL, ??
#8, 10+00.0	582948	3604130	ROUTE POINT
#9, 12+00.0	582948	3604192	ROUTE POINT
#10, 14+00.0	582948	3605253	ROUTE POINT
#11, 16+00.0	582948	3604313	ROUTE POINT
#12, PI	582949	3604349	ROUTE POINT PI ESTABLISHED

Points #1 through #12 were cleared on a prior Mewbourne Derringer project.

#13	**582974**	**3604363**	**ROUTE POINT ESTABLISHED**
#14	**583021**	**3604400**	**ROUTE POINT ESTABLISHED**
#15	**583070**	**3604437**	**ROUTE POINT ESTABLISHED**
#16	**583119**	**3604475**	**ROUTE POINT ESTABLISHED**
#17	**583169**	**3604512**	**ROUTE POINT ESTABLISHED**
#18	**583216**	**3604548**	**ROUTE POINT ESTABLISHED**
#19, TWO TRACK	**583238**	**3604566**	**C/L TWO TRACK ROAD**
#20, BPL	**583240**	**3604569**	**MEWBOURNE H P GAS BPL**
#21, EOL	**583260**	**3604586**	**EOL, END OF FLOW LINE, ROUTE POINT ESTABLISHED**

ACCESS ROAD

POINT LOCATION	**EUTM**	**NUTM**	**DESCRIPTION**
#1, BOR	**582500**	**3604344**	**BEGIN ACCESS ROAD, ROUTE POINT ESTABLISHED**
#2, ROAD	**582511**	**3604345**	**C/L ROAD**
#3, FLOW LINES	**582517**	**3604345**	**4 POLY FLOW LINES**
#4, POWER	**582521**	**3604345**	**4 WIRE O/H POWER LINES**
#5, FLOW LINE	**582522**	**3604345**	**12” LAY FLAT FLOW LINE**
#6	**582529**	**3604345**	**ROUTE POINT ESTABLISHED**
#7, OLD TWO TRACK	**582535**	**3604345**	**OLD TWO TRACK**
#8, BPL	**582559**	**3604346**	**LM ENERGY CRUDE BPL**
#9, BPL	**582564**	**3604346**	**LM TOUCHDOWN GAS BPL**
#10	**582621**	**3604343**	**ROUTE POINT ESTABLISHED**
#11, POWER	**582629**	**3604345**	**4 WIRE O/H POWER LINE**
#12, BPL	**582676**	**3604343**	**BPL**
#13, TWO TRACK	**582688**	**3604347**	**C/L TWO TRACK LINE**
#14, BPL	**582728**	**3604346**	**BPL**
#15	**582745**	**3604346**	**ROUTE POINT ESTABLISHED**
#16	**582805**	**3604347**	**ROUTE POINT ESTABLISHED**
#17	**582866**	**3604347**	**ROUTE POINT ESTABLISHED**
#18	**582927**	**3604348**	**ROUTE POINT ESTABLISHED**
#19, PI	**582947**	**3604349**	**ROUTE PI POINT ESTABLISHED**
#20	**582980**	**3604375**	**ROUTE POINT ESTABLISHED**

#21	583029	3604411	ROUTE POINT ESTABLISHED
#22	583091	3604460	ROUTE POINT ESTABLISHED
#23, BPL ??	583093	3604460	BPL ??
#24	583124	3604485	ROUTE POINT ESTABLISHED
#25	583176	3604523	ROUTE POINT ESTABLISHED
#26	583221	3604560	ROUTE POINT ESTABLISHED
#27, TWO TRACK	583234	3604571	C/L TWO TRACK
#28, BPL	583236	3604572	MEWBOURNE H P GAS BPL
#29, EOR	583257	3604587	END ACCESS ROAD, ROUTE POINT ESTABLISHED

There are no cave or karst concerns.

The ground was composed of red/brown sandy soil.

This evaluation includes only features apparent on the surface and does not include features which may exist sub-surface.

Photographs were taken.

David S. Belski
Cave and Karst Surface Evaluation

BEGINNING OF ROAD, ESTABLISHED START POINT, 582500E, 3604344N

END OF ROAD & END OF FLOW LINE, ESTABLISHED END POINT, 583257E, 604587N

OIL FIELD EQUIPMENT STORAGE AREA, 583003E, 3604906E

CONTENTS

1. SITE CRITERIA FOR RECYCLING CONTAINMENT

1.1 LOCATION

The Mewbourne Derringer Federal water recycle facility (collectively referred to as the containment), is proposed to be located in the N/2 of Section 18, Township 20 South, Range 29 East of Eddy County, New Mexico.

1.2 DISTANCE TO GROUNDWATER

1.2.1 HYDROLOGY

According to information reviewed from the Bureau of Land Management (BLM) Carlsbad Field Office, the proposed Containment location is located within the Capitan Reef aquifer system. Available groundwater within the area of the proposed Containment is noted to be within the Carlsbad Groundwater Basin, by the New Mexico Office of the State Engineer (OSE). The Carlsbad Basin contains two major water-bearing features including shallower alluvial aquifer systems and a deeper "artesian" carbonate system.

A Water Well Database Report provided by Banks Information Solutions (Banks), contained herein as *Appendix B*, was reviewed to identify the location and type of water wells located within a 1-mi radius of the proposed recycle facility location site boundaries.

According to Banks, one (1) water well was identified as located within a 1-mi radius of the site and no water wells were identified as located within the proposed site boundaries. Water well locations are presented in the Banks report.

The water well identified within a 1-mi radius of the proposed facility is classified as a "prospecting well" owned by Devon Energy. The well is located approximately 875-ft northwest of the proposed facility location and was drilled to a total depth of 140-ft below ground surface. The recorded groundwater depth was reported as 100-ft below ground surface.

Documentation of the OSE database search conducted by Banks of the above listed sections is contained herein as *Appendix B*. A map showing the location of OSE groundwater well relative to the site location is presented in the Banks report, and a map of Declared Groundwater Basins presenting the area of mapped basin systems from the New Mexico State Office of the Engineer is presented as *Figure 1*. In addition, *Figure 1A* shows the site location in reference to Bureau of Land Management Declared Aquifers in the State of New Mexico.

The New Mexico Oil and Gas Division (NMOCD) requires that groundwater (freshwater as defined by NMOCD rules) at the location be greater than 50-ft below the containment bottom. *Figure 1* is an aerial map that demonstrates the following to meet these criteria:

1. The location of the proposed containment shown on an aerial photograph with surface elevation (taken from the United States Geologic Survey (USGS) Illinois Camp SE 7.5 Minute Series Topographic Map).
2. A one-mile radius from the site, and location of water wells in comparison to that radius. It should be noted, OSE wells can be mis-located as older wells are plotted in the center of the quarter, quarter, quarter section, township, and range. Note – only wells labeled as domestic or irrigation are plotted.
3. The total depth of the groundwater well closest to the site and depth to water is plotted on the map.

The water well search contained no records for wells located on the site, and one (1) well was located within a one (1) mile radius of the site. The water well is located approximately 875-ft from the site and contained groundwater at a depth of 100-ft below ground surface. In addition, groundwater was encountered on the site during the onsite borings at a depth of 62-ft below ground surface leaving a separation distance from bottom of containment to groundwater of 53-ft.

1.2.2 GEOLOGY

A geological map for the vicinity of the site was obtained from the New Mexico Bureau of Land Management, Carlsbad Field Office and was used to review the geologic setting for the proposed containment location. Based on the review of the geologic map, the containment location lies within the Halocene to Pleistocene age Eolian and Piedmont alluvial deposits. These deposits consist of interbedded wind-deposited sands and alluvial deposits.

Area stratigraphy to a depth of 75-ft below ground surface (bgs) was obtained from geotechnical borings conducted on the site by COZ Engineering LLC on August 11, 2021. The boring logs recorded silty sand, clayey sand, and sandy lean clay with varying amounts of gravel and carbonate inundations. Groundwater was recorded at a depth of approximately 62-ft below ground surface on the proposed facility leaving a separation distance of 53-ft between groundwater and the bottom of the containment.

Figure 2 is reproduction of the USGS Illinois Camp SE New Mexico-Texas 7.5-Minute Series geologic map. *Figure 2* shows the following:

1. Location of the proposed Containment
2. Geologic setting of the Containment

1.3 DISTANCE TO MUNICIPAL BOUNDARIES AND FRESH WATER FIELDS

Figure 3 demonstrates that the location is not located within incorporated municipal boundaries or within a defined municipal freshwater field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3. *Figure 3* illustrates the following:

1. The closest municipality to the site is Carlsbad, New Mexico located approximately 11-mi southwest of the containment location. In addition, the municipality of Lakewood, New Mexico is located approximately 18-mi west-northwest, and Artesia, New Mexico is located approximately 21-mi northwest of the site.
   The closest municipal well field is located approximately 19-mi southwest of the containment location serving the community of Carlsbad, New Mexico.

1.4 DISTANCE TO SUBSURFACE MINES

According to the New Mexico Mining and Minerals Division the nearest mines to the site are surface mines including caliche pits and stone aggregate. The site location is not within an area overlying a subsurface mine. *Figure 4* illustrates the following.

1. The nearest registered mine to the containment location is a caliche pit mine located approximately 2-mi to the south, as shown on *Figure 4*. There are no subsurface mines within the vicinity of the containment location.

1.5 DISTANCE TO HIGH OR CRITIAL KARST AREAS (UNSTABLE AREAS)

Figure 5 shows the location of the temporary containments with respect to BLM Karst areas.

1. The proposed Containment is located within a "high" potential karst area.
2. Voids or other evidence of karsting was not observed during the site inspection, or during drilling of the onsite borings. Carbonate inundated sand was recorded at a depth of 25- to 35-ft below ground surface in one onsite boring.

1.6 DISTANCE TO 100-YEAR FLOODPLAIN

The Federal Emergency Management Agency (FEMA) Flood Insurance maps were reviewed for the location of the site. The site is located on FEMA map panel number 35015C0850D, which was noted as "unincorporated." The area of the containment location is mapped as "Zone X." *Figure 6* demonstrates the area of the site is not located within a 100-year Floodplain.

1. The site is located within "Zone X." Zone X is described as areas located outside of flood hazards.

1.7 DISTANCE TO SURFACE WATER

Figure 7 is reproduction of the USGS Illinois Camp SE 7.5-Minute Series topographic map that demonstrates the site location is not within 300-ft of a continuously flowing watercourse or other significant watercourse, or within 200-ft of a lakebed, sinkhole, or playa lake (as measured from the ordinary high-water mark). *Figure 7* demonstrates the following:

1. No continuously flowing watercourses or other water bodies defined by NMOCD
2. The closest surface water body is Lone Tree Draw located approximately 2.5 miles southwest of the proposed containment.

1.8 DISTANCE TO PERMANENT RESIDENCES OR STRUCTURES

Figure 8 is reproduction of the USGS Illinois Camp SE New Mexico-Texas 7.5-Minute Series topographic map that demonstrates the site location is not within 1,000-ft of an occupied permanent residence, school, hospital, institution, church, or other permanent structure in existence at the time of initial application. The nearest structures to the site location appear to be oil field tank batteries.

1.9 DISTANCE TO NON-PUBLIC WATER SUPPLY

The site is not located within 500-horizontal feet of a private, domestic fresh water well or spring that less than five households use for domestic or stock watering purposes. In addition, the site is not located within 1,000-ft of any other fresh water well or spring, as documented at the time of this application. *Figure 1* illustrates the following.

1. *Figure 1* shows the location of area water wells, active or plugged, relative to the proposed site location.
2. There are no known domestic water wells located within 1,000-ft of the proposed site location.
3. No springs were identified within the mapping area; refer to *Figure 7*.

1.10 DISTANCE TO WETLANDS

The U.S Fish and Wildlife National Wetlands Inventory maps were reviewed for the area of the site. *Figure 9* demonstrates the site is not located within an area of a mapped wetland.

1. The nearest designated wetlands to the site is a freshwater pond with a wetland code PUBKx (Palustrine, Unconsolidated Bottom, Artificially Flooded, Excavated). National Wetlands Inventory mapped wetlands are not located within 500 feet of the proposed pit locations.

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 54758

CONDITIONS

Operator:	OGRID:
MEWBOURNE OIL CO P.O. Box 5270 Hobbs, NM 88241	14744
	Action Number: 54758
	Action Type: [C-147] Water Recycle Short (C-147S)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	NMOCD has reviewed and apprpoved with conditions, the recycling containment application and related documents, submitted by [14744] MEWBOURNE OIL CO on October 7, 2021, for 2RF-168 - DERRINGER FEDERAL RECYCLE FACILITY ID fVV2133637688 in Unit Letter G, Section - 18, Township - 20S, Range - 29E, Eddy County, New Mexico.	12/6/2021