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DEVON ENERGY
Oklahoma City, Oklahoma

C-147 Registration Package for Trionyx Recycling Containment and Recycling Facility Section 2 T25S R31E

Submitted: July 10, 2015

Terrapin Recycling Facility/Containment C-147

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C-147 and

Site Specific Information

June 2015

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

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

Form C-147
Revised March 31, 2015

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: Devon Energy Corporation (For multiple operators attach page with information) OGRID #: 6137
Address: 333 West Sheridan, Oklahoma City, Oklahoma 73102-8260
Facility or well name (include API# if associated with a well): Trionyx Containment and Recycling Facility
OCD Permit Number: 1RF-005 (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr _____ Section 2 Township 25S Range 31E County: Eddy
Surface Owner: ☐ Federal ☒ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.
☒ **Recycling Facility:**
Location of recycling facility (if applicable): Latitude 32.154854 Longitude -103.741236 NAD: ☐1927 ☒ 1983
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 32.154854 Longitude -103.741236 NAD: ☐1927 ☒ 1983
☐ For multiple or additional recycling containments, attach design and location information of each containment
☒ Lined ☒ Liner type: Thickness 30-mil (Secondary), 60-mil (Primary) ☒ LLDPE ☒ HDPE ☐ PVC ☐ Other _____
☒ String-Reinforced
Liner Seams: ☒ Welded ☒ Factory ☒ Other Field Welds Volume: 295,000bbls (Usable) Dimensions: L 400' x W 400' x D 20'
☐ 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 Game Fence

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.

- ☒ Design Plan - based upon the appropriate requirements.
- ☒ Operating and Maintenance Plan - based upon the appropriate requirements.
- ☒ Closure Plan - based upon the appropriate requirements.
- ☒ Site Specific Groundwater Data -
- ☒ 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): WALTER HARVEY Title: FIELD LANDMAN

Signature: Walter Harvey Date: 7-13-2015

e-mail address: WALTERHARVEY@DVN.COM Telephone: 575-748-1807

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

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

☐ OCD Conditions _____
☐ Additional OCD Conditions on Attachment

DISTANCE TO GROUNDWATER

Figure 1, Figure 2, Figure 7, and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 50 feet beneath the containment
Figure 1 is a geologic/ topographic map that shows:

1. The location of the proposed containment with the surface elevation.
2. Water wells from the OSE database are plotted as a green water droplet. OSE wells are often mislocated in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range.
3. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.
4. Wells with available data showed depth to water greater than 50 feet.
5. Figure 7 is a boring to a depth of 53' from the surface (auger refusal) at the impoundment location. No moisture or groundwater was noted during the drilling.

GEOLOGY

Our examination of the geology of the area near the proposed containment causes us to conclude that, on a regional basis, the uppermost water-bearing zone lay in the Triassic Chinle Formation, the basal unit of which is the Santa Rosa Sandstone. Existing data do not allow us to determine if the water in the Chinle is unconfined or confined. For a confined aquifer, the depth to groundwater is the top of the permeable unit (e.g. 100 feet) but the depth to groundwater (the potentiometric surface) can be a few feet below the ground surface.

Saturated alluvium exists southwest of the location within the Bell Lake Sink. Two wells were developed within this depression, both of which are abandoned. Alluvium also exists northeast of the site, but this unit does not appear to hold groundwater. The hydrogeology of the area is described in the next section.

Figure 1 is the same scale as geologic and topographic map that shows:

1. The location of the proposed containment.
2. Water wells measured by the USGS or other professionals, the formation completion depth of the well (see Legend) and the calculated elevation of the groundwater surface and the date of the observation.

HYDROGEOLOGY

To verify that depth to groundwater is greater than 50', USGS data and a deep boring were analyzed. The Misc data are measured water levels in wells or logged borings for hydrogeologic information. The available groundwater data and boring log are presented in Figures 1 and 7 respectively.

Water level data from the OSE database rely upon observed water levels by drillers during the completion of the water well. The OSE dataset provides some useful data in certain areas.

From the best available data, Devon has determined the depth to the groundwater surface beneath the proposed containment is greater than 50'.

DISTANCE TO SURFACE WATER

Figure 2 and the site visit demonstrates that the location is not within 300 feet of a continuously flowing watercourse or any other significant watercourse or 200 feet from lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark).

- No continuously flowing watercourses or other water bodies, as defined by NMOCD Rules, exist within the prescribed setback criteria for containment.
- The nearest surface water body is a lake/pond located about 1.5 mile southwest

DISTANCE TO PERMANENT RESIDENCE OR STRUCTURES

Figure 3 and the site visit demonstrates that the location is not within 1000 feet from an occupied permanent residence, school, hospital, institution, church, or other structure in existence at the time of initial application.

- The nearest structures are oil and gas wells and tank batteries.

Distance to Non-Public Water Supply

Figures 1 and 3 demonstrate that the location is not 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, or within 1,000 horizontal feet of any other fresh water well or spring, in existence at the time of initial application.

- Figure 1 shows the locations of all area water wells, active or plugged.
- There are no known domestic water wells located within 1,000 feet of the proposed containment.
- No springs were identified within the mapping area (see Figure 3).

Distance to Municipal Boundaries and Fresh Water Fields

Figure 4 demonstrates that the location is not within incorporated municipal boundaries or within defined municipal fresh water well fields covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended

- The closest municipality is Carlsbad, NM approximately 33 miles to the northwest.
- The closest public well field is located approximately 35 miles to the northwest.

Distance to Wetlands

Figure 3 demonstrates the location is not within 300 feet of wetlands.

Distance to Subsurface Mines

Figure 3 and our general reconnaissance of the area demonstrate that the nearest mines are caliche pits. This location is not within an area overlying a subsurface mine.

Distance to High or Critical Karst Areas

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

- The proposed temporary containment is located within a "low" potential karst area.
- The nearest "high" or "critical" potential karst area is located approximately 11 miles southwest of the site.
- No evidence of solution voids were observed near the site during the field inspection.

Distance to 100-Year Floodplain

Figure 6 demonstrates that the location is within an area designated as having minimal flood hazard by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

- Our field inspection and examination of the topography permits a conclusion that the location is not within any floodplain and has low risk for flooding.

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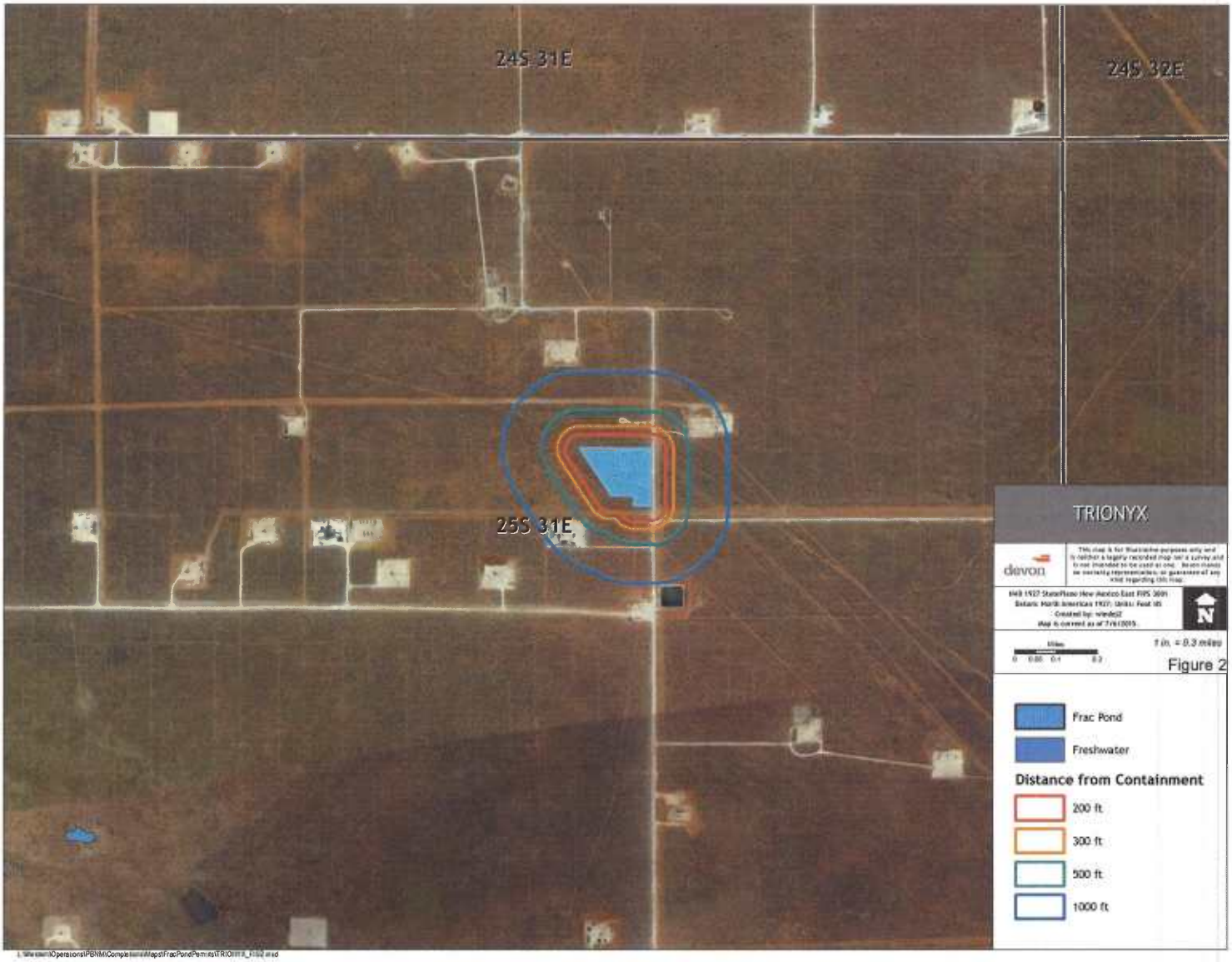
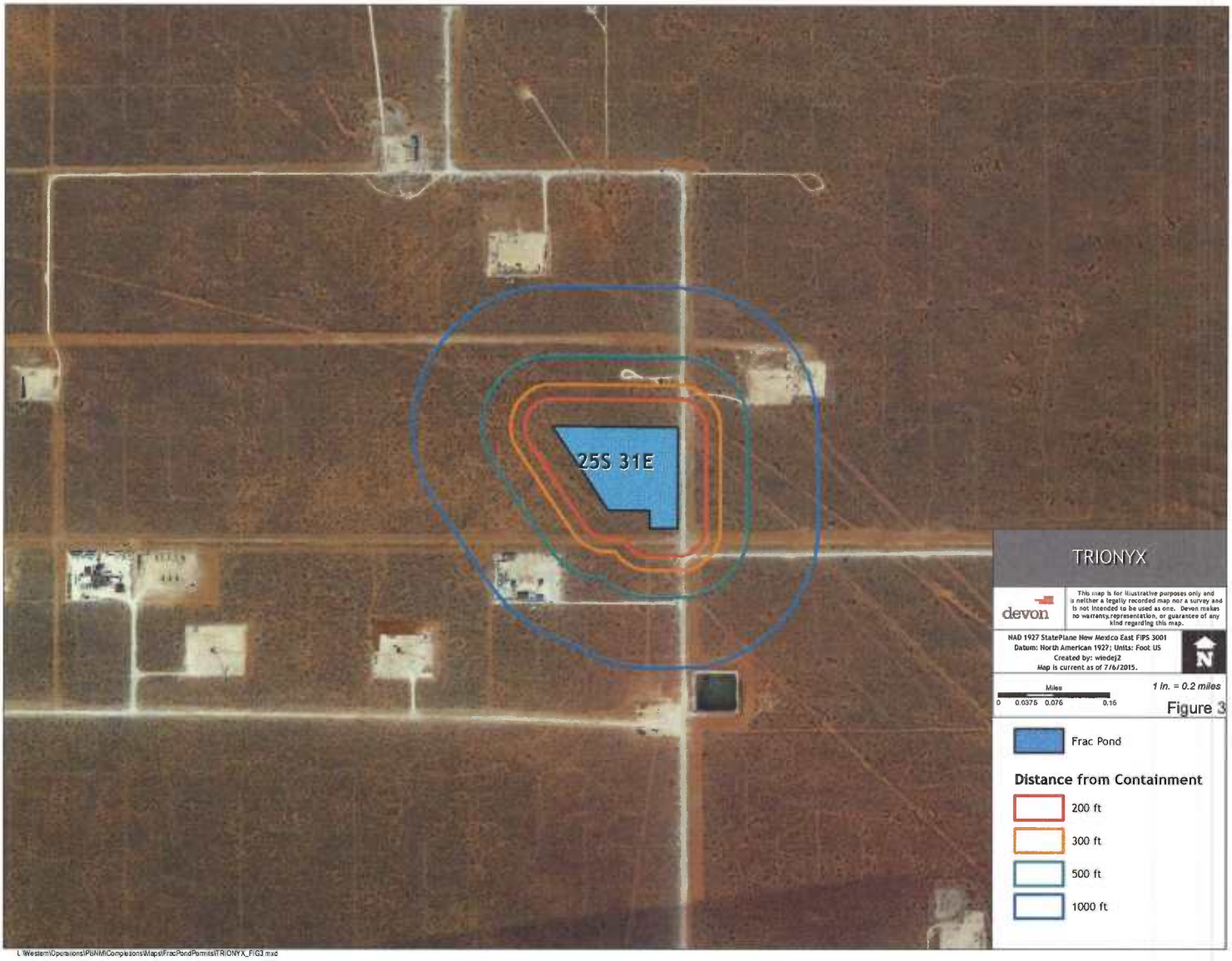
Figures

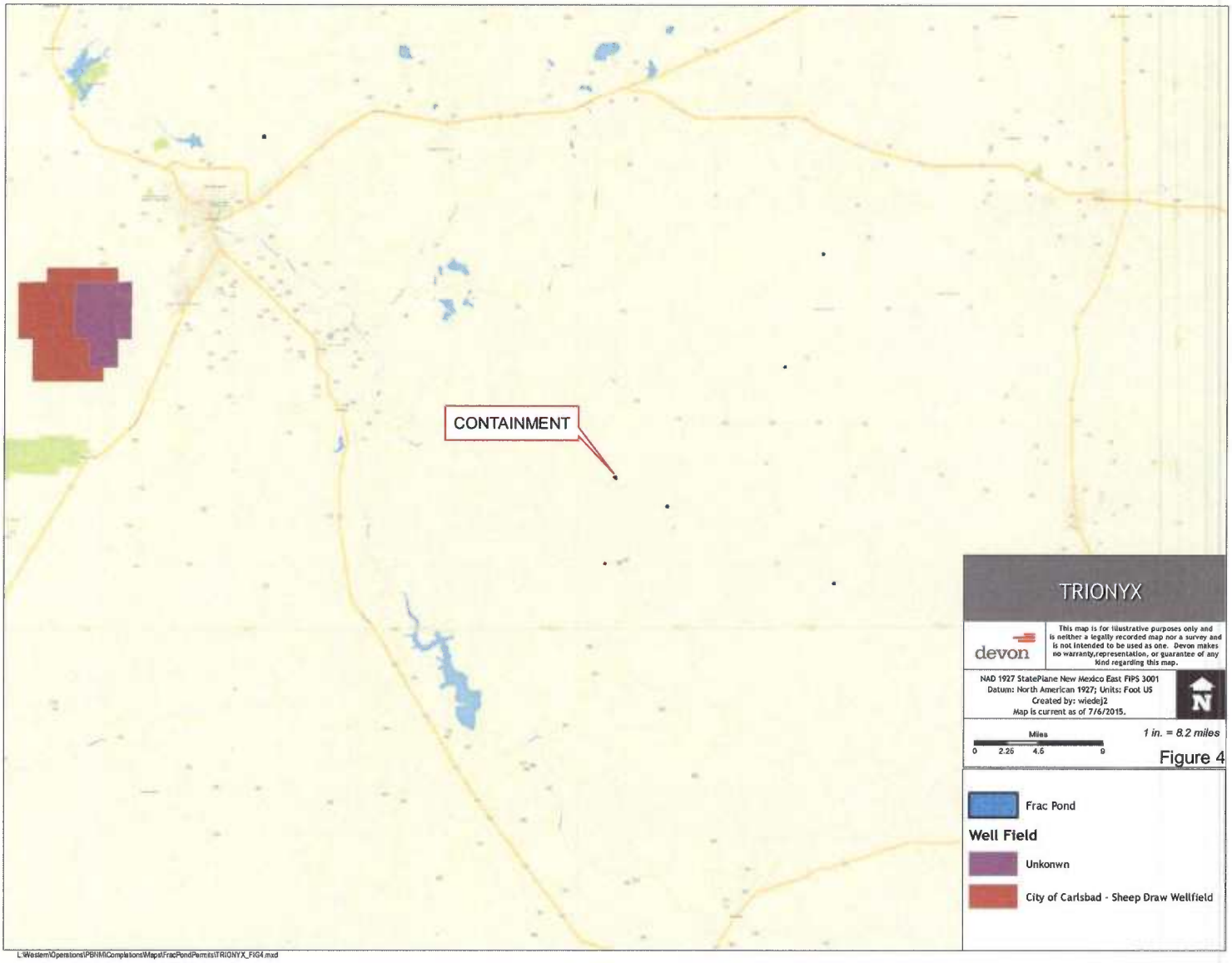
June 2015

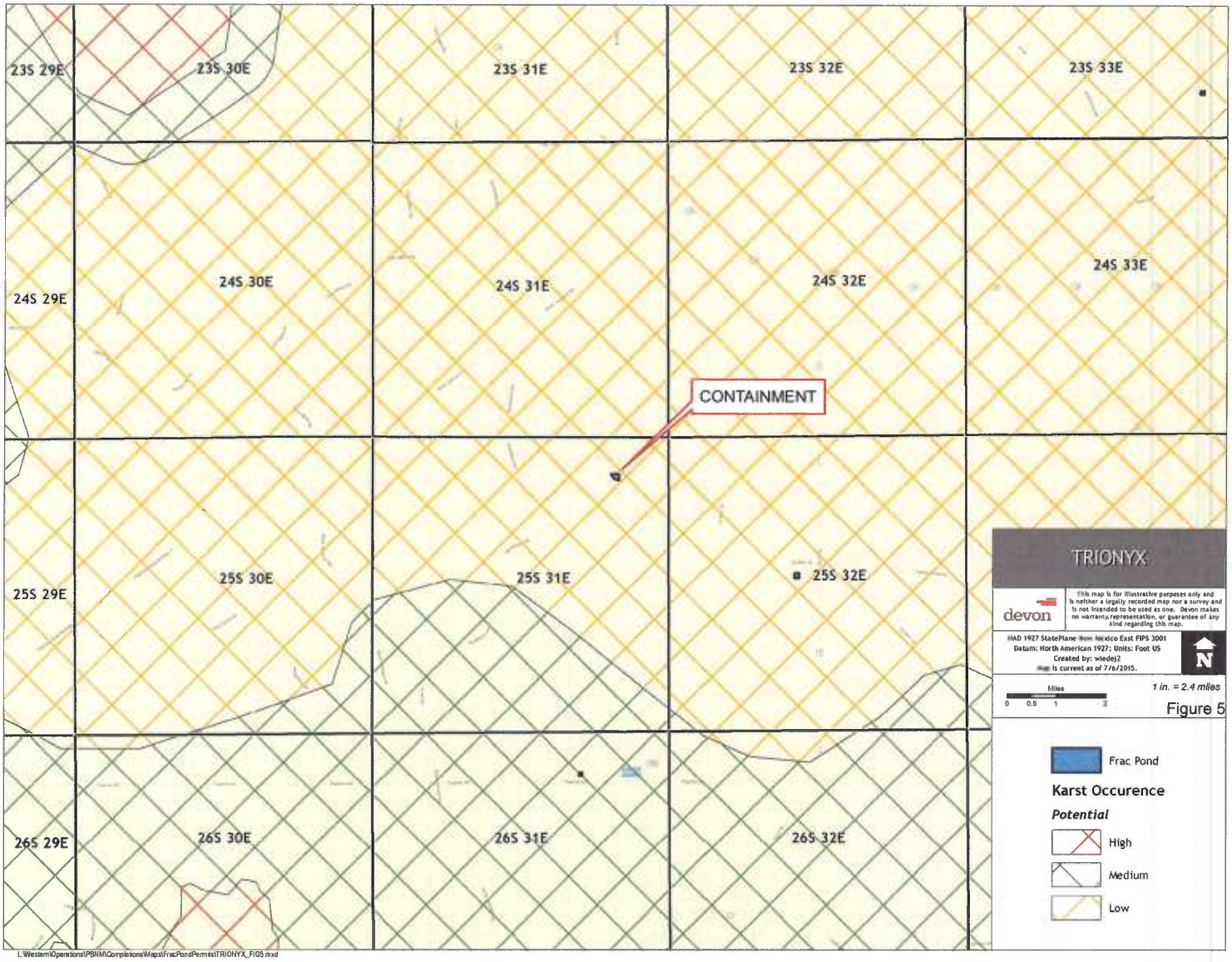
Figure 1

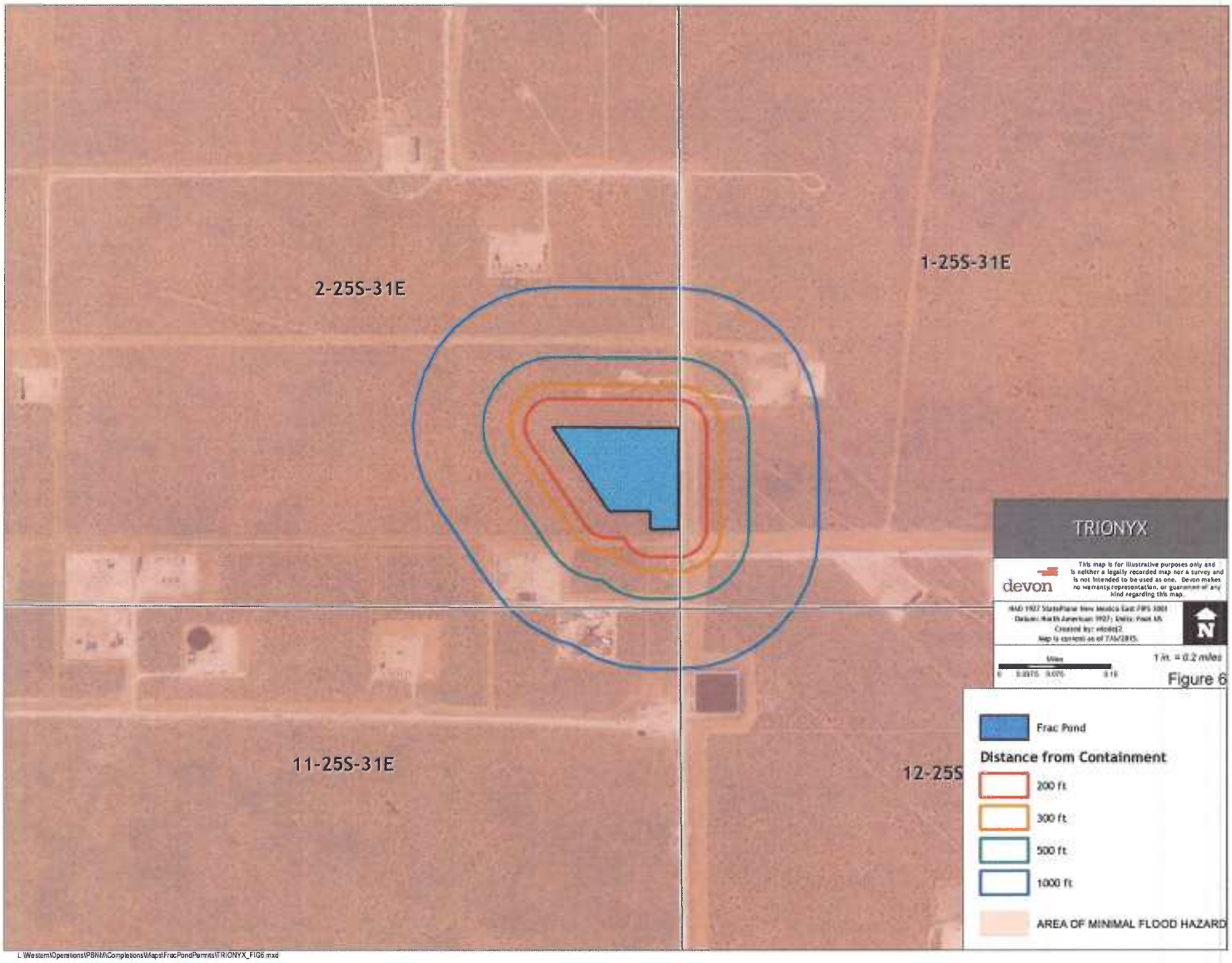
L:\Western\Operations\PB\NM\Completions\Maps\FracPondPermits\TRIONYX_Fig1.mxd


24S 31E
24S 32E
25S 31E
TRIONYX
devon
1 in. = 0.3 miles
Figure 2
Frac Pond
Freshwater
Distance from Containment
200 ft
300 ft
500 ft
1000 ft


25S 31E
TRIONYX
devon
This map is for illustrative purposes only and is neither a legally recorded map nor a survey and is not intended to be used as one. Devon makes no warranty, representation, or guarantee of any kind regarding this map.
NAD 1927 StatePlane New Mexico East FIPS 3001
Datum: North American 1927; Units: Foot US
Created by: wiedej2
Map is current as of 7/6/2015.
N
Miles
0 0.0375 0.075 0.15
1 In. = 0.2 miles
Figure 3
Frac Pond
Distance from Containment
200 ft
300 ft
500 ft
1000 ft
L:\Western\Operations\PGNM\Completions\Maps\FracPondPermits\TRIONYX_FIG3.mxd


CONTAINMENT
TRIONYX
devon
This map is for illustrative purposes only and is neither a legally recorded map nor a survey and is not intended to be used as one. Devon makes no warranty,representation, or guarantee of any kind regarding this map.
NAD 1927 StatePlane New Mexico East FIPS 3001
Datum: North American 1927; Units: Foot US
Created by: wiedej2
Map is current as of 7/6/2015.
N
Miles
0 2.25 4.5 9
1 in. = 8.2 miles
Figure 4
Frac Pond
Well Field
Unkonwn
City of Carlsbad - Sheep Draw Wellfield
L:\Western\Operations\PBNM\Completions\Maps\FracPondPermits\TRIONYX_FIG4.mxd


23S 29E
23S 30E
23S 31E
23S 32E
23S 33E
24S 29E
24S 30E
24S 31E
24S 32E
24S 33E
CONTAINMENT
25S 29E
25S 30E
25S 31E
25S 32E
26S 29E
26S 30E
26S 31E
26S 32E
TRIONYX
devon
This map is for illustrative purposes only and is neither a legally recorded map nor a survey and is not intended to be used as one. Devon makes no warranty, representation, or guarantee of any kind regarding this map.
NAD 1927 StatePlane New Mexico East FIPS 3001
Datum: North American 1927; Units: Foot US
Created by: wiedej2
Map is current as of 7/6/2015.
N
Miles
0 0.5 1 2
1 in. = 2.4 miles
Figure 5
Frac Pond
Karst Occurence
Potential
High
Medium
Low
L:\Western\Operations\PBNM\Completions\Maps\FracPondPermits\TRIONYX_FIG5.mxd


2-25S-31E
1-25S-31E
11-25S-31E
12-25S
TRIONYX
devon
This map is for illustrative purposes only and is neither a legally recorded map nor a survey and is not intended to be used as one. Devon makes no warranty,representation, or guarantee of any kind regarding this map.
N
1 in. = 0.2 miles
Figure 6
Frac Pond
Distance from Containment
200 ft
300 ft
500 ft
1000 ft
AREA OF MINIMAL FLOOD HAZARD
L:\Western\Operations\PBNM\Completions\Maps\FracPondPermits\TRIONYX_FIG6.mxd

BORING LOG NO. B-1

PROJECT: TRIONYX WATER IMPOUNDMENT

CLIENT: DEVON ENERGY CORPORATION
OKLAHOMA CITY, OK

SITE: 30 MILES EAST OF LOVING
LOVING, NEW MEXICO

LOCATION See Exhibit A-2

Latitude: 32.154854° Longitude: -103.741236°

Approximate Surface Elev: 3470 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
			5			41-50/2"				
			10			40-50/2"				
			15			39-50/2"				
20.0	3450+/-		20			42-50/2"				
			25			50/5"				
			30							

SILTY CLAYEY SAND WITH GRAVEL (SC-SM), white, very dense, carbonate indurations

SILTY SAND (SM), light brown to red, very dense, carbonate indurations

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes

Figure 7

WATER LEVEL OBSERVATIONS

Terracon
1640 Hickory Loop, Suite 105
Las Cruces, New Mexico

Boring Started: 6/26/2015 | Boring Completed: 6/26/2015

Drill Rig: CME 75 | Driller: R. Sosa

Project No.: 68155071 | Exhibit: A-4

BORING LOG NO. B-1

PROJECT: TRIONYX WATER IMPOUNDMENT

CLIENT: DEVON ENERGY CORPORATION
OKLAHOMA CITY, OK

SITE: 30 MILES EAST OF LOVING
LOVING, NEW MEXICO

LOCATION See Exhibit A-2

Latitude: 32.154854° Longitude -103.741236°

Approximate Surface Elev: 3470 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SILTY SAND (SM), light brown to red, very dense, carbonate indurations *(continued)*					50/5"				
		35			50/5"				
		40			50/5"				
		45			50/5"				
		50			50/5"				
53.0	3417+/-								
Auger Refusal due to very dense Carbonate Cemented Soils at 53 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (If any).
See Appendix C for explanation of symbols and abbreviations.

Notes

Figure 7

WATER LEVEL OBSERVATIONS

Terracon
1640 Hickory Loop, Suite 105
Las Cruces, New Mexico

Boring Started: 6/26/2015	Boring Completed: 6/26/2015
Drill Rig: CME 75	Driller: R. Sosa
Project No.: 68155071	Exhibit: A-4

LEGAL DESCRIPTION

Being a 10.24 acre tract of land situated in Lea County, New Mexico and being a portion of the southeast quarter of the southeast quarter of Section 2, Township 25 South, Range 31 East, New Mexico Principal Meridian and being more particularly described as follows:

COMMENCING at found bent General Land Office brass cap dated 1939 for the common corner of said Section 2 and Sections 1, 11 and 12, all in Township 25 South, Range 31 East, New Mexico Principal Meridian, from which corner a found General Land Office brass cap dated 1939 bears North 89 degrees 50 minutes 47 seconds West, a distance of 2,658.02 feet for the south quarter section corner of said Section 2 and the north quarter section corner of said Section 11;

THENCE North 36 degrees 19 minutes 30 seconds West, a distance of 875.19 feet to the POINT OF BEGINNING at the southwest corner of the herein described tract;

THENCE North 33 degrees 47 minutes 47 seconds West, a distance of 724.42 feet to a point for the northwest corner of the herein described tract;

THENCE South 89 degrees 42 minutes 41 seconds East, a distance of 900.02 feet to a point for the northeast corner of the herein described tract;

THENCE South 00 degrees 16 minutes 50 seconds East , a distance of 730.00 feet to a point for corner;

THENCE North 89 degrees 42 minutes 41 seconds West, a distance of 200.00 feet to a point for corner;

THENCE North 00 degrees 16 minutes 50 seconds West, a distance of 130.00 feet to a point for corner;

THENCE North 89 degrees 42 minutes 41 seconds West, a distance of 300.00 feet to the POINT OF BEGINNING AND CONTAINING 10.24 acres of land, more or less;

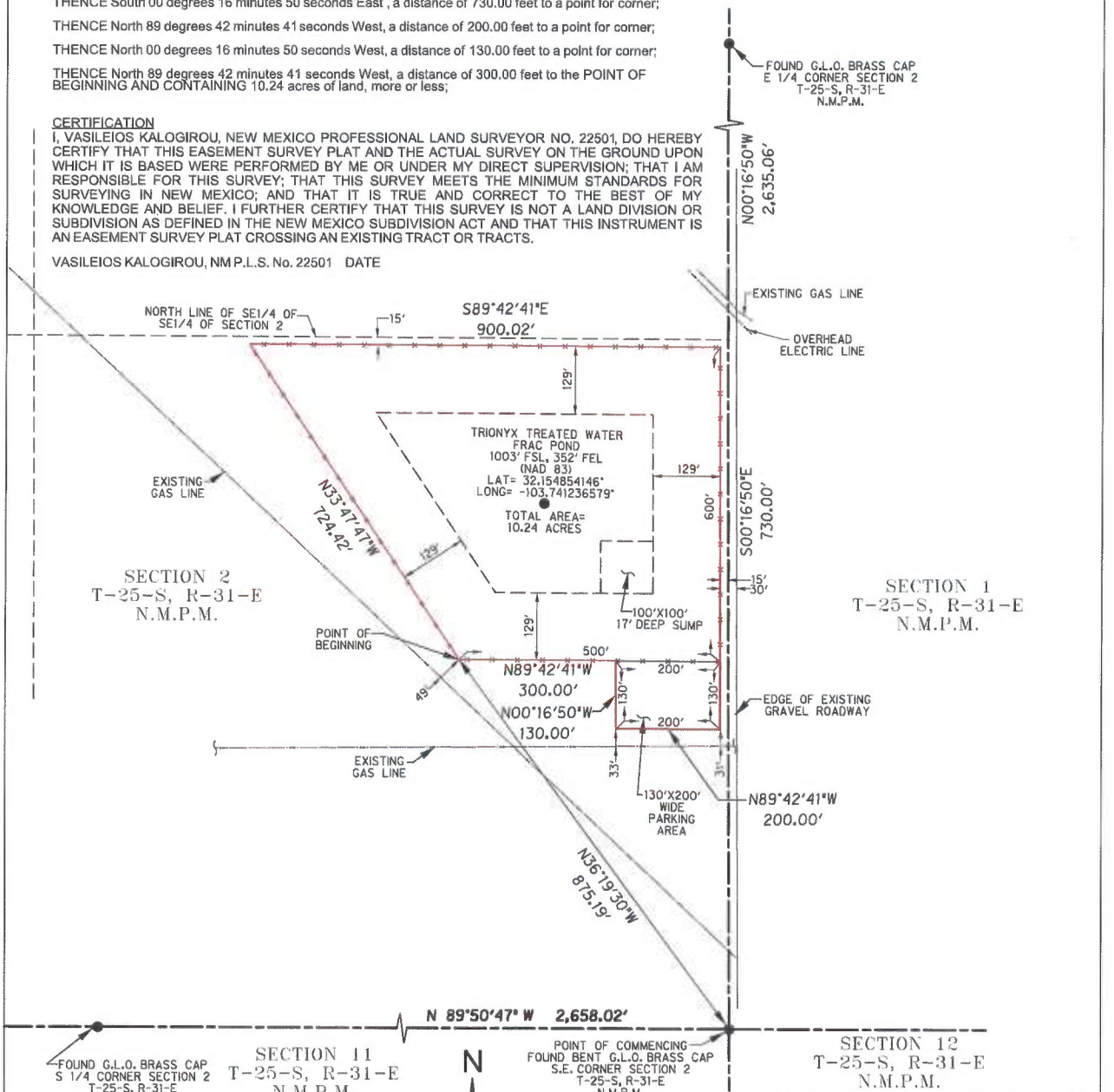
CERTIFICATION

I, VASILEIOS KALOGIROU, NEW MEXICO PROFESSIONAL LAND SURVEYOR NO. 22501, DO HEREBY CERTIFY THAT THIS EASEMENT SURVEY PLAT AND THE ACTUAL SURVEY ON THE GROUND UPON WHICH IT IS BASED WERE PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION; THAT I AM RESPONSIBLE FOR THIS SURVEY; THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO; AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I FURTHER CERTIFY THAT THIS SURVEY IS NOT A LAND DIVISION OR SUBDIVISION AS DEFINED IN THE NEW MEXICO SUBDIVISION ACT AND THAT THIS INSTRUMENT IS AN EASEMENT SURVEY PLAT CROSSING AN EXISTING TRACT OR TRACTS.

VASILEIOS KALOGIROU, NM P.L.S. No. 22501 DATE

VASILEIOS KALOGIROU NEW MEXICO 22501 PROFESSIONAL SURVEYOR

05-21-2015



NOTES:

THE BASIS OF BEARING IS THE NEW MEXICO COORDINATE SYSTEM OF 1983, EAST ZONE (3001), AS DERIVED BY GPS MEASUREMENTS AND ADJUSTED WITH CORS STATIONS. DISTANCES SHOWN HEREON ARE SURFACE, BASED ON A COMBINED SCALE FACTOR OF 1.000158511.

ALL GEOGRAPHIC COORDINATES SHOWN HEREON WERE CONVERTED USING CORPSCON VERSION 6.0.1.

UNLESS OTHERWISE NOTED, ALL MEASUREMENTS TO LEASE, UNIT, AND SURVEY LINES ARE PERPENDICULAR TO SAID LINES.

THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.

LEGEND

—x—x—	PROPOSED FENCE
———	SECTION LINE
- - - -	PROPOSED LEASE LINE
FNL	FROM NORTH SECTION LINE
FWL	FROM WEST SECTION LINE
N.M.P.M.	NEW MEXICO PRINCIPAL MERIDIAN

DEVON ENERGY CORPORATION
TRIONYX TREATED WATER FRAC POND

LOCATED IN SECTION 2, T-25-S, R-31-E N.M.P.M.

LEA COUNTY, NEW MEXICO

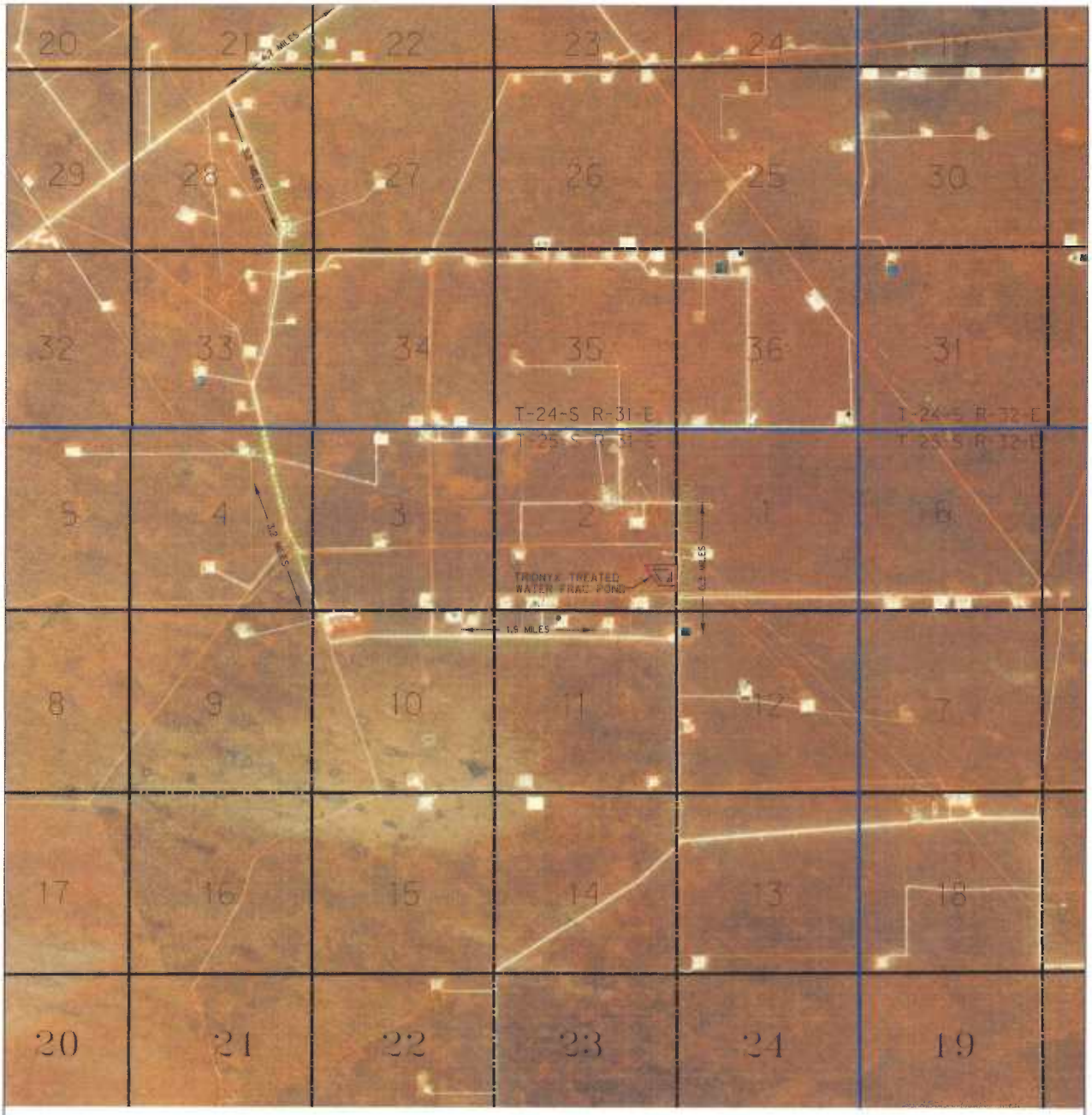
HALFF

DATED: 5/22/2015
BY: Vasileios Kalogirou

TBPLS FIRM NO. 10029600
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
1201 North Bowser Road~ Richardson, TEXAS ~ 75081-2275
SCALE: 1"=200' (214)-346-6200 AVO. 30915-W004

devon

5/22/2015 3:32:51 PM ah1979 HALFF I:\30000s\30915\WO04\CADD\Sheets\VEXH-30915-WO04-Sheet1.dgn



N

0 1500 3000 4500 6000

SCALE: 1"=3000'

DEVON ENERGY CORPORATION

TRIONYX TREATED WATER FRAC POND

LOCATED IN
SECTION 2, T-25-S, R-31-E
N.M.P.M.

LEA COUNTY, NEW MEXICO

DIRECTIONS TO LOCATION

FROM INTERSECTION OF JAL HIGHWAY WITH BUCK JACKSON ROAD, TRAVEL SOUTHWESTERLY ALONG BUCK JACKSON ROAD FOR 4.7 MILES UNTIL THE INTERSECTION WITH BUCKHORN ROAD. THEN TURN LEFT ON BUCKHORN ROAD AND TRAVEL GENERALLY SOUTHERLY ALONG BUCKHORN ROAD FOR 3.2 MILES UNTIL ITS INTERSECTION WITH A GRAVEL ROAD. TURN LEFT ON THE GRAVEL ROAD FOR 1.9 MILES TILL ITS INTERSECTION WITH ANOTHER GRAVEL ROAD. TURN LEFT ON GRAVEL ROAD AND TRAVEL FOR 0.3 MILES IN A NORTHERLY DIRECTION. THE SITE IS LOCATED ON YOUR LEFT HAND SIDE.

LEGEND

- PROPOSED FENCE
- SECTION LINE
- PROPOSED LEASE LINE
- FNL FROM NORTH SECTION LINE
- FWL FROM WEST SECTION LINE

HALFF

DATED: 5/22/2015
BY: Vasilelos Kalogirou

TBPLS FIRM NO. 10029600
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
1201 North Bowser Road~ Richardson, TEXAS ~ 75081-2275
SCALE: 1"=3000' (214)-346-6200 AVO. 30915-W004

devon

SHEET 2 OF 4

9/2[illegible]015 2:41:56 PM ali1979 HALFF I:\30000s\30915\WO04\CADD\Sheets\VEXH-30915-WO04-Sheet2.dgn

N

0 500 1000 1500 2000

SCALE: 1"=1000'

DEVON ENERGY CORPORATION

TRYONIX TREATED WATER FRAC POND

LOCATED IN
SECTION 2, T-25-S, R-31-E
N.M.P.M.

LEA COUNTY, NEW MEXICO

LEGEND

- PROPOSED FENCE
- SECTION LINE
- PROPOSED LEASE LINE
- FNL FROM NORTH SECTION LINE
- FWL FROM WEST SECTION LINE

HALFF

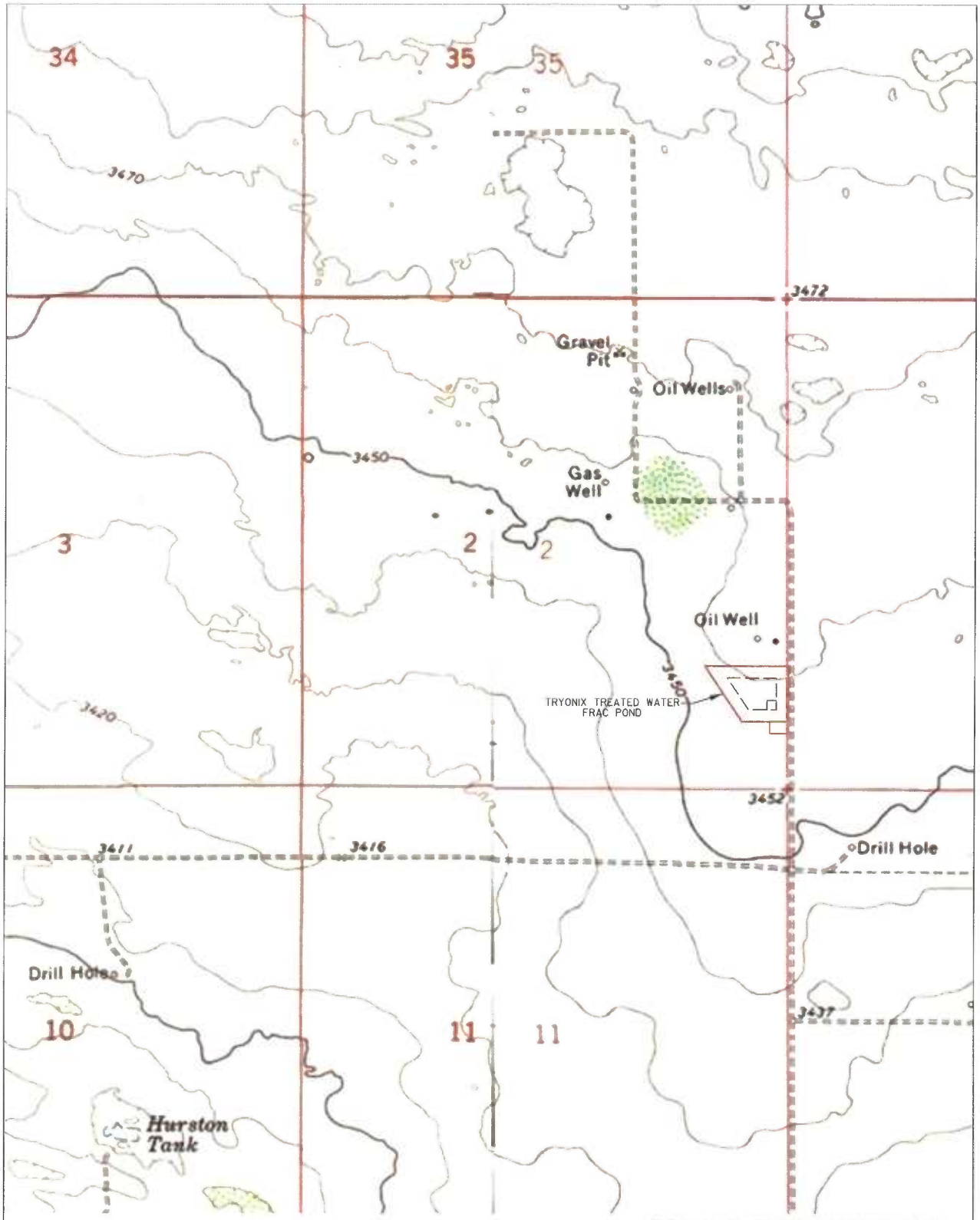
DATED: 5/22/2015
BY: Vasilelos Kalogirou

devon

TBPLS FIRM NO. 100296000
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
1201 North Bowser Road~ Richardson, TEXAS ~ 75081-2275
SCALE: 1"=1000' (214)-346-6200 AVO. 30915-W004

SHEET 3 OF 4

5/22/2015 2:59:56 PM ah1979 HALFF I:\30000s\30915\WO04\CADD\Sheets\VEXH-30915-WO04-Sheet3.dgn



N

0 500 1000 1500 2000

SCALE: 1"=1000'

LEGEND

PROPOSED FENCE
SECTION LINE
PROPOSED LEASE LINE
FNL FROM NORTH SECTION LINE
FWL FROM WEST SECTION LINE

DEVON ENERGY CORPORATION
TRYONIX TREATED WATER FRAC POND

LOCATED IN SECTION 2, T-25-S, R-31-E N.M.P.M.

LEA COUNTY, NEW MEXICO

HALFF

DATED: 5/22/2015
BY: Vasilelos Kalogirou

devon

TBPLS FIRM NO. 10029600
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
1201 North Bowser Road~ Richardson, TEXAS ~ 75081-2275
SCALE: 1"=1000' (214)-346-6200 AVO. 30915-W004

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Terrapin Recycling Facility/Containment C-147

devon

Site Survey

June 2015

devon

Appendix A

Engineering Drawings

June 2015

NOTES:

1. EXISTING TOPOGRAPHY IS FROM USGS DIGITAL ELEVATION MODEL (DEM).
2. LOCATION OF EXISTING SITE ELEMENTS IS APPROXIMATE.

LEGEND:

- PROPOSED MAJOR CONTOURS
- PROPOSED MINOR CONTOURS
- x PROPOSED FENCE

SCALE

0 X

NOT FOR CONSTRUCTION

TRIONYX PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION
LOVING, NEW MEXICO

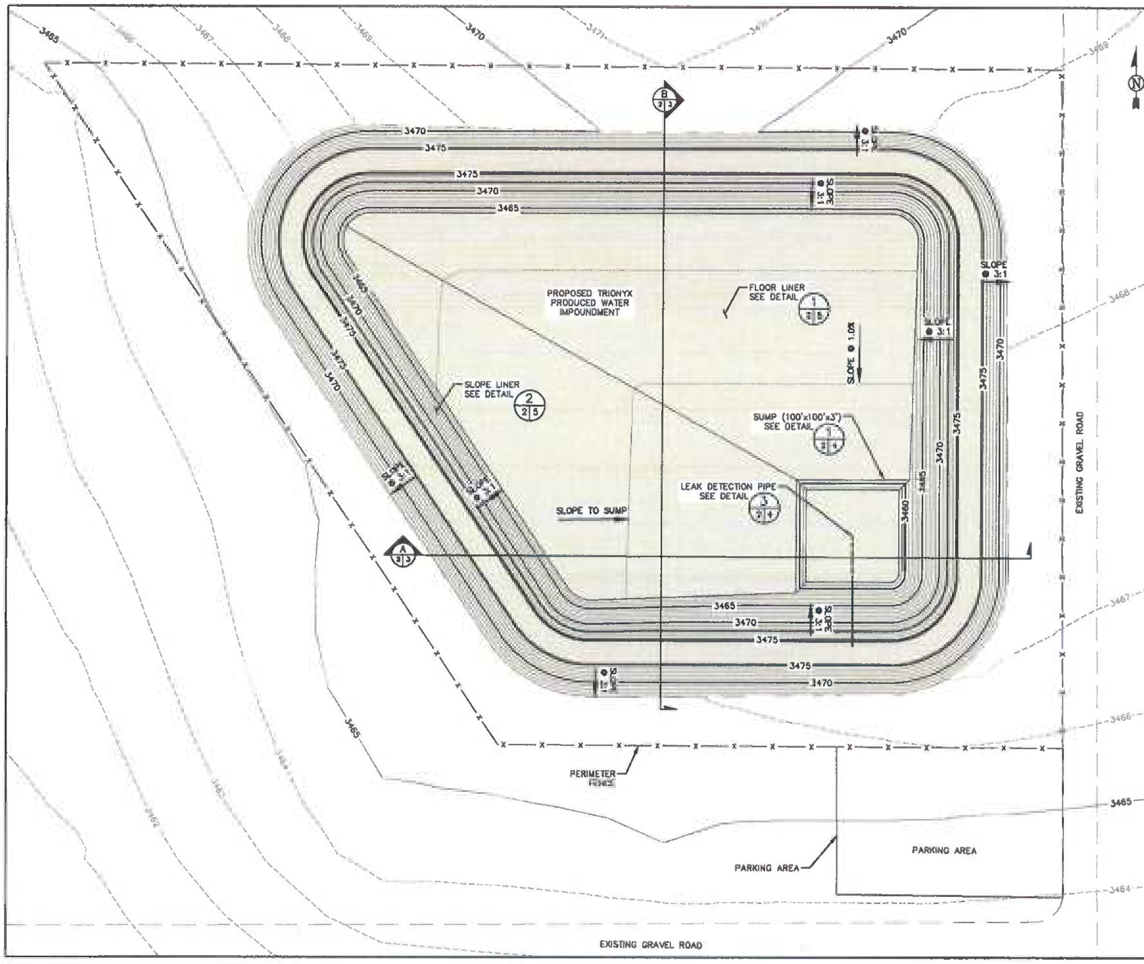
SHEET TITLE: AERIAL SITE OVERVIEW

CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
Little Rock, Arkansas 72205
PH: (501) 221-7288 FX: (501) 221-7779

DRAWN BY: JES
CHECKED BY: BM
DATE: JUN. 4, 2015
SCALE: 1" = 150'

JOB NUMBER: DEVO-10031

SHEET NO.: 1



NOTES:

1. EXISTING TOPOGRAPHY IS FROM USGS DIGITAL ELEVATION MODEL (DEM).
2. LOCATION OF EXISTING SITE ELEMENTS IS APPROXIMATE.
3. EXISTING UTILITIES ARE NOT SHOWN. CONTRACTOR IS RESPONSIBLE FOR LOCATING EXISTING UTILITIES PRIOR TO START OF ANY WORK. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITIES DUE TO WORK PERFORMED UNDER THIS CONTRACT.
4. PROPOSED CONTOURS SHOWN ARE TOP OF SUBGRADE.
5. SLOPE FINISHED GRADE AWAY FROM TOE OF LEVEE.

POND NOTES:

1. CAPACITIES:

TOTAL CAPACITY:	398,640 BBL
3' FREEBOARD CAPACITY:	295,674 BBL

2. BOTTOM OF SUMP ELEVATION IS 3458.15, OR 17.35 FEET FROM TOP OF LEVEE.

LEGEND:

- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- PROPOSED MAJOR CONTOURS
- PROPOSED MINOR CONTOURS
- —x— PROPOSED FENCE

SCALE
0 80'

NOT FOR CONSTRUCTION

TRIONYX PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION
LOVING, NEW MEXICO

SHEET TITLE: PROPOSED SITE PLAN

REVISIONS:

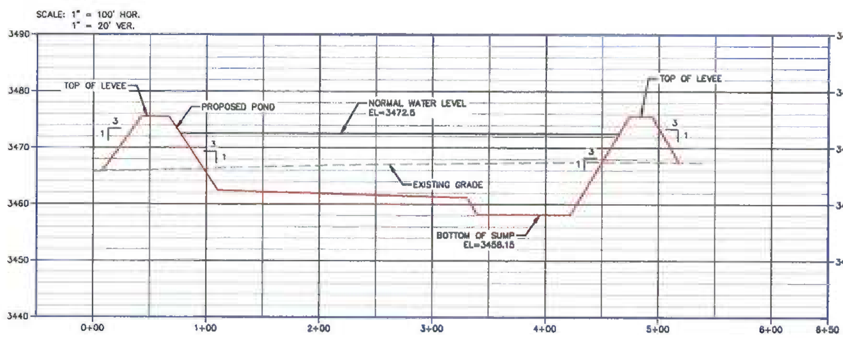
NO.	DATE	DESCRIPTION	BY

CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 South Shackleford Road
Little Rock, Arkansas 72205
PH: (501) 221-7122 FX: (501) 221-7775

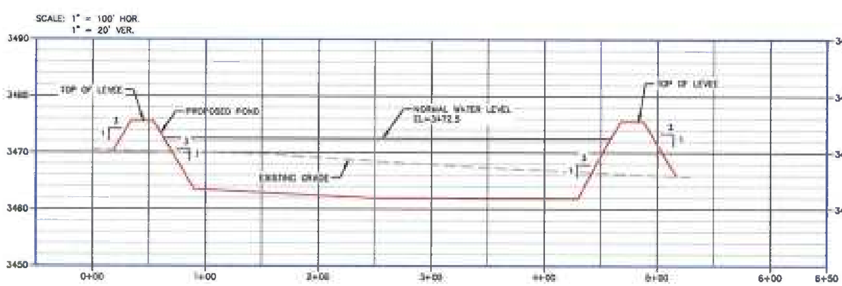
DESIGNED BY:	BW	DATE:	JUN. 4, 2015
DRAWN BY:	JAB	SCALE:	1" = 80'
CHECKED BY:	BW		

JOB NUMBER: DEVO-10031

SHEET NO.: 2



WEST–EAST POND SECTION (A 2 3)



NORTH–SOUTH POND SECTION (B 2 3)

NOT FOR CONSTRUCTION

TRIONYX PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

LOVING, NEW MEXICO

SHEET TITLE: PROPOSED POND SECTIONS

REVISIONS:

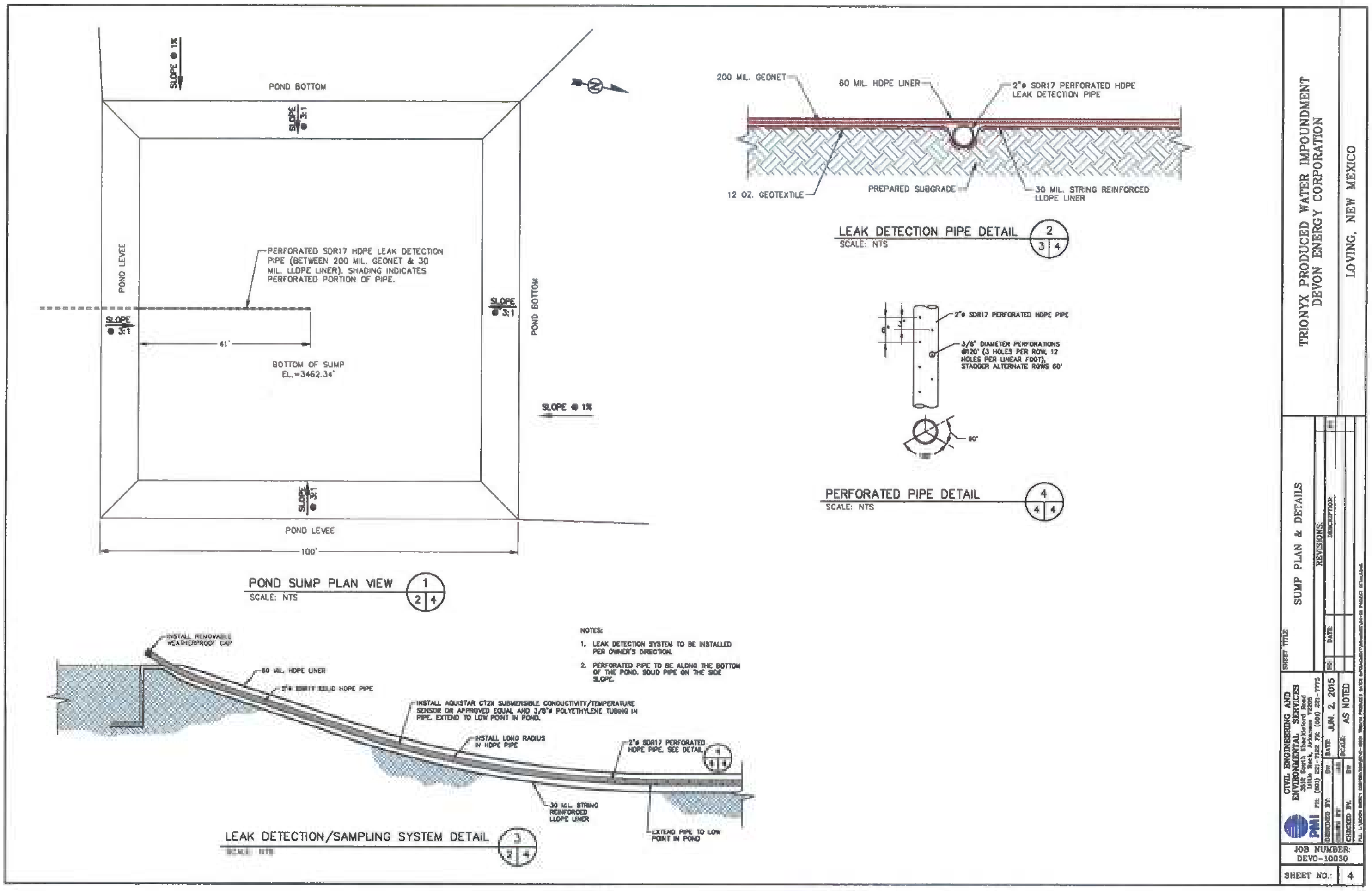
NO.	DATE	DESCRIPTION	BY

CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 South Shackleford Road
Little Rock, Arkansas 72205
PH: (501) 221-7122 FX: (501) 221-7770

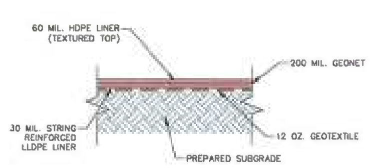
DESIGNED BY: SW DATE: JUN. 4, 2015
DRAWN BY: SCALE: AS NOTED
CHECKED BY: SW

JOB NUMBER: DEVO-10031

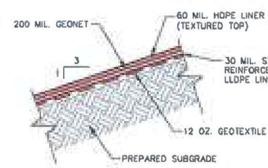
SHEET NO.: 3



POND SUMP PLAN VIEW
SCALE: NTS
POND BOTTOM
POND LEVEE
SLOPE @ 1%
SLOPE @ 3:1
PERFORATED SDR17 HDPE LEAK DETECTION PIPE (BETWEEN 200 MIL. GEONET & 30 MIL. LLDPE LINER). SHADING INDICATES PERFORATED PORTION OF PIPE.
41'
BOTTOM OF SUMP EL.=3462.34'
100'
LEAK DETECTION PIPE DETAIL
SCALE: NTS
200 MIL. GEONET
60 MIL. HDPE LINER
2"⌀ SDR17 PERFORATED HDPE LEAK DETECTION PIPE
12 OZ. GEOTEXTILE
PREPARED SUBGRADE
30 MIL. STRING REINFORCED LLDPE LINER
PERFORATED PIPE DETAIL
SCALE: NTS
2"⌀ SDR17 PERFORATED HDPE PIPE
3/8" DIAMETER PERFORATIONS @120° (3 HOLES PER ROW, 12 HOLES PER LINEAR FOOT). STAGGER ALTERNATE ROWS 60°
6"
3"
60°
LEAK DETECTION/SAMPLING SYSTEM DETAIL
INSTALL REMOVABLE WEATHERPROOF CAP
60 MIL. HDPE LINER
INSTALL AQUISTAR CT2X SUBMERSIBLE CONDUCTIVITY/TEMPERATURE SENSOR OR APPROVED EQUAL AND 3/8"⌀ POLYETHYLENE TUBING IN PIPE. EXTEND TO LOW POINT IN POND.
INSTALL LONG RADIUS IN HDPE PIPE
2"⌀ SDR17 PERFORATED HDPE PIPE. SEE DETAIL
30 MIL. STRING REINFORCED LLDPE LINER
EXTEND PIPE TO LOW POINT IN POND
NOTES:
1. LEAK DETECTION SYSTEM TO BE INSTALLED PER OWNER'S DIRECTION.
2. PERFORATED PIPE TO BE ALONG THE BOTTOM OF THE POND. SOLID PIPE ON THE SIDE SLOPE.
TRIONYX PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION
LOVING, NEW MEXICO
SUMP PLAN & DETAILS
REVISIONS
CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
JUN. 2, 2015
AS NOTED
JOB NUMBER: DEVO-10030
SHEET NO.: 4



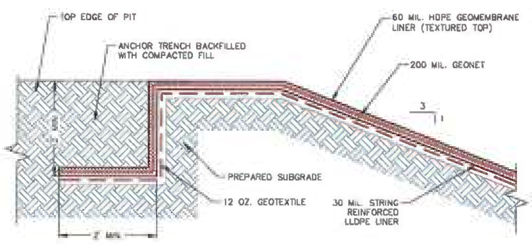
LINER SYSTEM FLOOR DETAIL 1 2|5
SCALE: NTS



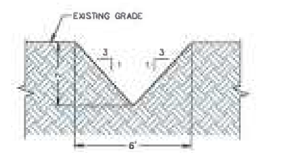
LINER SYSTEM SIDE SLOPE DETAIL 2 2|5
SCALE: NTS

GENERAL NOTES:

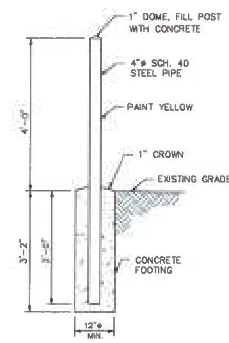
1. PREPARED SUBGRADE MEANS COMPACTED SMOOTH SUBGRADE FREE OF ROCK, ROOTS, WOOD DEBRIS, CONCRETE RUBBLE AND ANY SHARP OBJECTS THAT MIGHT PUNCTURE THE HDPE LINER.
2. IF SUBGRADE IS NOT FREE OF SHARP OBJECTS, THEN 16 OUNCE GEOTEXTILE MATERIAL SHALL BE INSTALLED UNDER ALL HDPE LINER.
3. ALL EMBANKMENT SLOPES SHALL HAVE A RATIO OF 3:1. COMPACTED EARTH EMBANKMENTS TO BE CONSTRUCTED WITH 12 INCH (MAXIMUM) LOOSE LIFTS, COMPACTED TO 90% STANDARD PROCTOR DENSITY.
4. PERFORM GEOTECHNICAL ANALYSIS OF EXISTING SOIL TO CONFIRM SOIL IS SUITABLE FOR USE IN THE LEVEE.



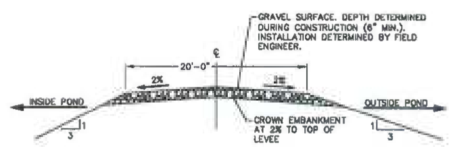
ANCHOR TRENCH DETAIL 3 2|5
SCALE: NTS



TYPICAL DRAINAGE SWALE DETAIL 4 2|5
SCALE: NTS



PIPE BOLLARD DETAIL 5 2|5
SCALE: NTS



TYPICAL CREST DETAIL 6 2|5
SCALE: NTS

TRIONYX PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

LOVING, NEW MEXICO

SHEET TITLE: PROJECT DETAILS

REVISIONS:

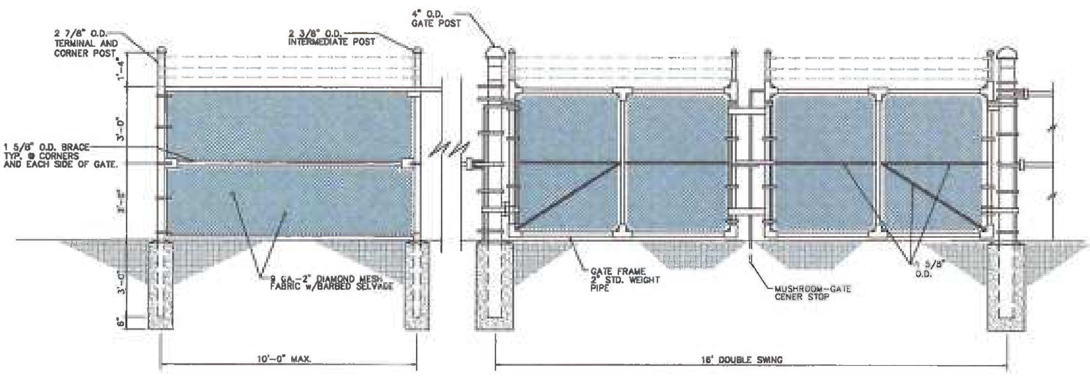
NO.	DATE	DESCRIPTION	BY

PMI
CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 South Shackleford Road
Little Rock, Arkansas 72205
PH: (501) 221-7122 FX: (501) 221-7775

DESIGNED BY: BY DATE: JUN. 2, 2015
DRAWN BY: JAB SCALE: AS NOTED
CHECKED BY: BY

JOB NUMBER: DEVO-10030

SHEET NO.: 5



FENCE/DBL SWING GATE DETAIL

SCALE: NTS

1 / 2 | 6

TRIONYX PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

LOVING, NEW MEXICO

SHEET TITLE: PROJECT DETAILS

REVISIONS:

NO.	DATE	DESCRIPTION	BY

PMI
CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 North Shackleford Road
Little Rock, Arkansas 72205
PH: (501) 221-7122 FX: (501) 221-7775

DESIGNED BY:	BW	DATE:	JUN. 2, 2015
DRAWN BY:	JAB	SCALE:	AS NOTED
CHECKED BY:	BW		

JOB NUMBER: DEVO-10030

SHEET NO.: 6

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Appendix B

Design and Construction Plan

June 2015

Design and Construction Plan

Applicable mandates in Rule 34 are underlined. This plan addresses construction of lined earthen containments. Appendix A presents Engineering Design Plans. Appendix C 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 inches by 24 inches 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:

- the operator's name,
- the location of the site by quarter-quarter or unit letter, section, township and range, and
- 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 7-foot 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 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. With respect to protection of birds, the operator will regularly inspect the lined earthen containment and report, within 30 days of discovery, any migratory or wildlife death to the appropriate wildlife agency as required by OCD Rules.

An Avian Protection Plan will be implemented by CEHMM as described in detail in the following section.

Thus, the recycling containment is otherwise protective of wildlife, including migratory birds. 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 and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring

As part of this plan, a geotechnical investigation will be performed to provide recommendations regarding the foundation for the containment liner (see following section). 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 A shows the

a. levee has inside grade no steeper than two horizontal feet to one vertical foot (2H: 1V).
b. levee outside grade is no steeper than three horizontal feet to one vertical foot (3H: 1V)
a. top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance..
b. caliche gravel placed on the outside levee provides additional erosion control.
c. The containment is excavated into the ground such that most of fluid force lies against native earth and the engineered foundation (see Appendix A and forthcoming geotechnical report with foundation recommendations)

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 30-mil LLDPE string reinforced. 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 1% toward the sump in the northeast corner. This slope combined with the highly transmissive geonet drainage layer provide for the earliest possible leak detection.

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

i. minimizing liner seams and orient them up and down, not across, a slope of the levee.
ii. use factory welded seams where possible.
iii. use field seams in geosynthetic material are thermally seamed and prior to field seaming, overlap liners four to six inches.
iv. minimize the number of field seams and comers and irregularly shaped areas.
v. provide for no horizontal seams within five feet of the slope's toe.
vi. use qualified personnel to perform field welding and testing.
vii. avoid excessive stress-strain on the liner
viii. The edges of all liners are anchored in the bottom of a compacted earth-filled trench that is at least 18 inches deep

At points of discharge into the lined earthen containment the pipe configuration (see Appendix A) effectively protects the liner from excessive hydrostatic force or mechanical damage during filling.

The design show 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 if the owner deems necessary during operations.

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

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

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Appendix C

Material Specifications

June 2015

PRODUCT DATA SHEET

GSE HyperNet Geonet

GSE HyperNet geonet is a synthetic drainage material manufactured from a premium grade high density polyethylene (HDPE) resin. The structure of the GSE HyperNet geonet is formed specifically to transmit fluids uniformly under a variety of field conditions. The geonet is formulated to be resistant to ultraviolet light for a period of time necessary to complete the installation.

[*]

AT THE CORE:
A synthetic geonet engineered specifically to transmit fluids consistently under a variety of field conditions.

Product Specifications

Tested Property	Test Method	Frequency	Minimum Average Roll Value			
			HyperNet	HyperNet HF	HyperNet HS	HyperNet UF
Transmissivity[1], gal/min/ft (m^2/sec)	ASTM D 4716	1/540,000 ft^2	9.66 (2 x 10^{-4})	14.49 (3 x 10^{-4})	28.98 (6 x10^{-4})	38.64 (8 x 10^{-4})
Density, g/cm^3	ASTM D 1505	1/50,000 ft^2	0.94	0.94	0.94	0.94
Tensile Strength (MD), lb/in	ASTM D 5035/7179	1/50,000 ft^2	45	55	65	75
Carbon Black Content, %	ASTM D 1603[3]/4218	1/50,000 ft^2	2.0	2.0	2.0	2.0
NOMINAL ROLL DIMENSIONS						
Geonet Thickness, mil	ASTM D 5199	1/50,000 ft^2	200	250	275	300
Roll Width[2], ft			15	15	15	15
Roll Length[2], ft			330	290	270	250
Roll Area, ft^2			4,950	4,350	4,050	3,750

NOTES:
- [1]Gradient of 0.1, normal load of 10,000 psf, water at 70° F, between steel plates for 15 minutes. Contact GSE for performance transmissivity value for use in design.
- [2]Roll widths and lengths have a tolerance of ±1%.
- [3]Modified.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

GSE ENVIRONMENTAL™

[DURABILITY RUNS DEEP] For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

TENCATE
Mirafi®

Brawler Industries, LLC
PO Box 60004
Midland, TX 79711

TENCATE GEOSYNTHETICS
Americas

Mirafi® 160N

Mirafi® 160N is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi® 160N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids. Mirafi® 160N meets AASHTO M288-06 Class 2 for Elongation > 50%.

TenCate Geosynthetics Americas Laboratories are accredited by a2La (The American Association for Laboratory Accreditation) and Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP). NTPEP Number: GTX-2012-01-003

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	160 (712)	160 (712)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	60 (267)	60 (267)
CBR Puncture Strength	ASTM D6241	lbs (N)	410 (1825)	
Apparent Opening Size (AOS)[1]	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
Permittivity	ASTM D4491	sec^{-1}	1.5	
Flow Rate	ASTM D4491	gal/min/ft^2 (l/min/m^2)	110 (4481)	
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70	

[1] ASTM D4751: AOS is a Maximum Opening Diameter Value

Physical Properties	Unit	Typical Value[2]
Roll Dimensions (width x length)	ft (m)	15 x 300 (4.5 x 91)
Roll Area	yd^2 (m^2)	500 (418)
Estimated Roll Weight	lb (kg)	199 (90)

[2] ASTM D4439 Standard Terminology for Geosynthetics: typical value, *n—for geosynthetics*, the mean value calculated from documented manufacturing quality control test results for a defined population obtained from one test method associated with on specific property.

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GAI-LAP 25-02

ACCREDITED
Testing Lab 1291.01 & 1291.02

Brawler Industries, LLC
PO Box 60004
Midland, TX 79711

DURA·SKRIM® J25DT1 & J30DT1

Textured Scrim Reinforced Polyethylene

RAVEN INDUSTRIES

Product Description

DURA·SKRIM® J25DT1 & J30DT1 are linear low density polyethylene geomembranes reinforced with a heavy encapsulated 1300 Denier polyester reinforcement. In addition to excellent dimensional stability the tri-directional reinforcement provides exceptional tear and tensile strength.

DURA·SKRIM J-Series membranes are formulated with thermal and UV stabilizers to assure a long service life. Custom colors are available based on minimum volume requirements.

Product Use

DURA·SKRIM J25DT1 & J30DT1 are used in applications that require exceptional outdoor life and demand high tear strength and resistance to thermal expansion.

DURA·SKRIM J25DT1 & J30DT1 are manufactured from a very chemical-resistant, linear low density polyethylene with excellent cold crack performance.

Size & Packaging

DURA·SKRIM J25DT1 & J30DT1 are available in a variety of widths and lengths to meet the project requirements. Large diameter mill rolls are available to assure an efficient seaming process. Factory welded panels are accordion folded and tightly rolled on a heavy-duty core for ease of handling and time saving installation.

DURA·SKRIM®

Remediation Liner

Product	Part #
DURA·SKRIM	J25DT1
DURA·SKRIM	J30DT1

APPLICATIONS

- Waste Lagoon Liners
- Floating Covers
- Potable Water Containment
- Modular Tank Liners
- Tunnel Liners
- Remediation Liners
- Earthen Liners
- Interim Landfill Covers
- Remediation Covers
- Landfill Caps
- Erosion Control Covers
- Fish Pond Liners
- Canal Liners
- Disposal Pit Liner
- Water Containment Ponds

DURA•SKRIM® J25DT1 & J30DT1

Textured Scrim Reinforced Polyethylene

PRO-FORMA DATA SHEET

PROPERTIES	TEST METHOD	DURA-SKRIM J25DT1 Typical Roll Averages	DURA-SKRIM J30DT1 Typical Roll Averages
Appearance		Gray/Gray	Gray/Gray
Thickness		25 mil	30 mil
Asperity Height	ASTM D 7466	>20 mil	>20 mil
Weight LBS/MSF, (OZ/YD^2)		115 (16.6)	128 (18.4)
Construction		Textured Scrim Reinforced Polyethylene	
***Ply Adhesion - lbf/in**	ASTM D 6636	15 or FTB	18 or FTB
Tensile Strength - lbf/in	ASTM D 7003	50 MD 62 TD	56 MD 68 TD
Tensile Elongation at Break % (film break)	ASTM D 7003	549 MD 590 TD	550 MD 585 TD
Tensile Elongation at Break % (scrim break)	ASTM D 7003	14 MD 24 TD	15 MD 24 TD
Tongue Tear Strength - lbf	ASTM D 5884	42 MD 50 TD	46 MD 54 TD
Grab Tensile - lbf (scrim break)	ASTM D 7004	130 DD	145 DD
Grab Tensile Elongation at Break % (scrim break)	ASTM D 7004	39	40
Puncture Resistance - lbf	ASTM D 4833	50	55
Maximum Use Temperature		180° F	180° F
Minimum Use Temperature		-70° F	-70° F

*Raven modified QC procedure
DD = Diagonal Directions

PRO-FORMA Sheet Contents:

The J25DT1 data listed in this Pro-Forma data sheet is representative of initial production runs. The J30DT1 data is extrapolated from the 25 mil version. These values may be revised at anytime without notice as additional test data becomes available.

DURA•SKRIM®

DURA♦SKRIM® J25DT1 and J30DT1 are unique textured scrim reinforced geomembranes manufactured using high strength virgin polyethylene resins. DURA♦SKRIM® J25DT1 and J30DT1 are reinforced with a tri-directional scrim reinforcement to maximize tear and puncture resistance. DURA♦SKRIM® J25DT1 and J30DT1 are manufactured utilizing a cast extrusion process to achieve a consistent friction surface with uniform asperity heights. Raven's exclusive GeoGrip™ Technology consists of durable random spike pattern and bidirectional bars for uniform stabilization.

RAVEN INDUSTRIES
Engineered Films Division
P.O. Box 5107
Sioux Falls, SD 57117-5107
Ph: (605) 335-0174 • Fx: (605) 331-0333

Toll Free: **800-635-3456**
Email: **efdsales@ravenind.com**
www.ravenefd.com
10/11 EFD 1270

Scan QR Code to download current technical data sheets via the Raven website.

PRODUCT DATA SHEET

GSE HD Smooth Geomembrane

GSE HD is a smooth high density polyethylene (HDPE) geomembrane manufactured with the highest quality resin specifically formulated for flexible geomembranes. This product is used in applications that require excellent chemical resistance and endurance properties.

[*]

AT THE CORE:
An HDPE geomembrane used in applications that require excellent chemical resistance and endurance properties.

Product Specifications

These product specifications meet GRI GM 13

Tested Property	Test Method	Frequency	Minimum Average Value				
			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/cm³	ASTM D 1505	200,000 lb	0.940	0.940	0.940	0.940	0.94
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 lb	 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 lb	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lb	54	72	108	144	180
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lb	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 lb	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Notched Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lb	500	500	500	500	500
Oxidative Induction Time, mins	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lb	>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, ft²			25,200	19,575	12,600	9,675	7,650

NOTES:
- (1)Dispersion only applies to mear 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 is available in rolls weighing approximately 3,900 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.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

GSE ENVIRONMENTAL™

[DURABILITY RUNS DEEP] For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

PRODUCT DATA SHEET

GSE HD Textured Geomembrane

GSE HD Textured is a co-extruded textured high density polyethylene (HDPE) geomembrane available on one or both sides. It is manufactured from the highest quality resin specifically formulated for flexible geomembranes. This product is used in applications that require increased frictional resistance, excellent chemical resistance and endurance properties.

[*]

AT THE CORE:
An HDPE geomembrane used in applications that require increased frictional resistance, excellent chemical resistance and endurance properties.

Product Specifications

These product specifications meet GRI GM13

Tested Property	Test Method	Frequency	Minimum Average Value				
			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	ASTM D 1505	200,000 lb	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 Dumbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lb	 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 lb	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lb	45	60	90	120	150
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lb	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 lb	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notched Constant Tensile Load(2), hr	ASTM D 5397, Appendix	200,000 lb	500	500	500	500	500
Oxidative Induction Time, mins	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lb	>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, ft²	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 membrane 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.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

GSE ENVIRONMENTAL™

[DURABILITY RUNS DEEP] For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

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Appendix D

Operating and Maintenance Plan

June 2015

OPERATING AND MAINTENANCE PROCEDURES

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

The operator will operate and maintain the lined earthen containment 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 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 containment is summarized below.

A. Via pipeline, produced water generated from nearby oil and gas wells is delivered to a treatment system located as indicated in the C-147.
B. After treatment, the produced water discharges into the containment
C. 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.
D. Whenever the maximum fluid capacity of the containment is reached, treatment and discharge to the containment ceases (see Freeboard and Overtopping Plan, below)
E. 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.
F. 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.
G. 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 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 discovery, 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 on site, 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 three feet of freeboard for the containment and will use a free-standing staff gauge to allow easy determination of the required 3-foot of freeboard.
10. As described in the design/construction plan, the injection or withdrawal of fluids from the containment is accomplished through a 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

- reading and recording the fluid height of staff gauges

- recording any evidence that the pond surface shows visible oil
- visually inspecting the containment's exposed liners
- 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

A. Inspect diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.
B. Inspect the leak detection system for evidence of damage or malfunction and monitor for leakage
C. 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.
D. 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.
E. 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-feet 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 identified in Appendix E.

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

I. Cease discharging treated produced water to the containment

II. Accelerate re-use of the treated produced water for purposes approved by the Division

III. 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 A, 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 (see Appendix A).

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-inch 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.

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Appendix E

Closure Plan

June 2015

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

- the condition that existed prior to the construction of the recycling containment or
- 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

1. 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.
2. 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:

3. 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, and that sample shall be analyzed for the constituents listed in Table I of 19.15.34.14.
4. After review of the laboratory results
    a. If any contaminant concentration is higher than the parameters listed in Table I, 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 I, 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

a. The operator will reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area.
b. 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.
c. The disturbed area shall then be reseeded in the first favorable growing season following closure of a recycling containment.

CLOSURE DOCUMENTATION

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

- the condition that existed prior to the construction of the recycling containment or
- 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

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    a. Dispose of the liquids in a division-approved facility, or
    b. Recycle, reuse or reclaim the water for reuse in drilling and stimulation.
2. 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:
3. 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, and that sample shall be analyzed for the constituents listed in Table I of 19.15.34.14.
4. After review of the laboratory results
    a. If any contaminant concentration is higher than the parameters listed in Table I, 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 I, 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

Reclamation and Re-vegetation

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