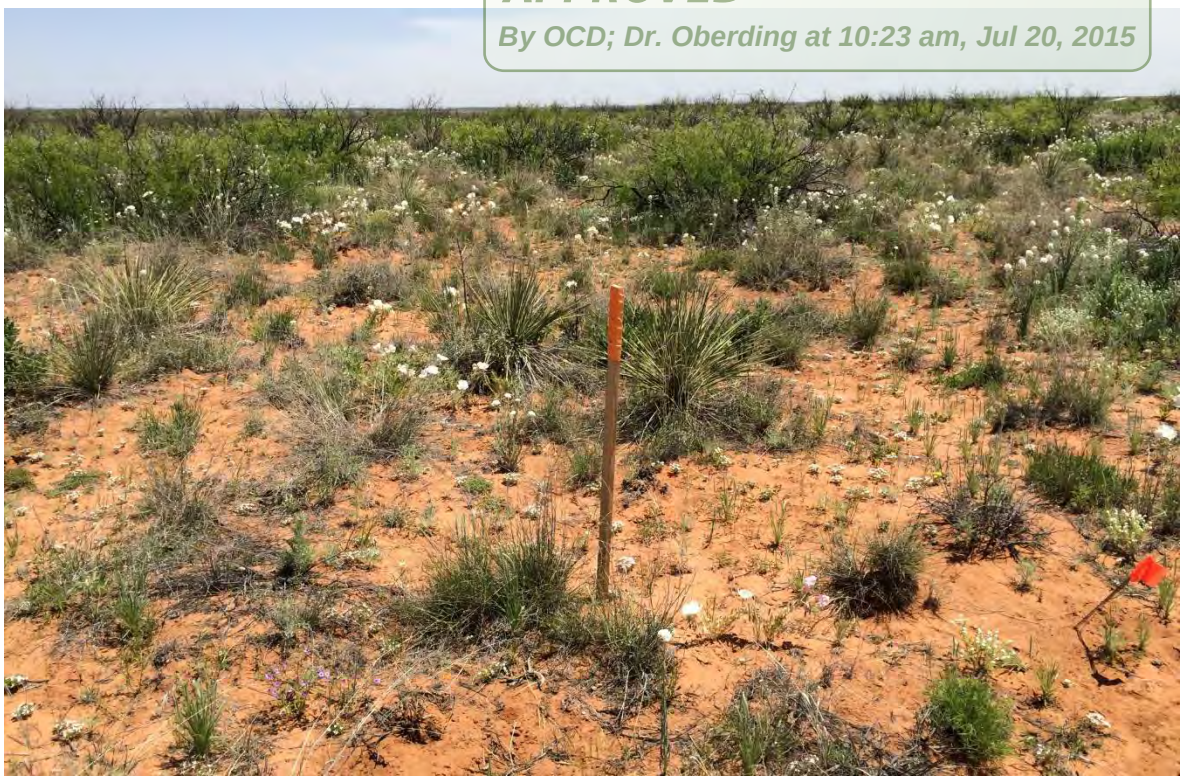
July 2015

C-147 Registration Package for Rattlesnake Recycling Containment and Recycling Facility
Section 16 T26S R34E, Lea County



View to southeast from northwest corner of Rattlsnake Containment. Low stabilized sand dunes characterize the site

Prepared for:
Devon Energy Production Company
Oklahoma City, Oklahoma

Prepared by:

R.T. Hicks Consultants, Ltd.
901 Rio Grande NW
F-142
Albuquerque, New Mexico

R. T. HICKS CONSULTANTS, LTD.

Artesia ▲ Carlsbad ▲ Durango ▲ Midland
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

June 24, 2015

Dr. Tomas Oberding
NMOCD District 1
1625 French Drive
Hobbs, NM 88240
Via E-Mail

RE: Devon Rattlesnake Recycling Facility and Containment
C-147 Registration Package

Dear Dr. Oberding:

Enclosed is a fully assembled C-147 registration for a recycling facility and containment located in Section 16 T26S R34E. I believe the attached registration is complete and meets all of the criteria for approval under NMOCD Rules. Please let us know if you need any additional information or clarification regarding the application. Note the surface owner is copied on this transmission.

Sincerely,
R.T. Hicks Consultants

Randall Hicks
Principal

Copy: Devon Energy
Ed Martin, SLO (surface owner)

C-147 and
Site Specific Information

R.T. Hicks Consultants, Ltd.
901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

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 (For multiple operators attach page with information) OGRID #: 6137

Address: 333 W. Sheridan, Oklahoma City, OK 73102-8260

Facility or well name (include API# if associated with a well): Rattlesnake Containment and Recycling Facility

OCD Permit Number: _____ (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr _____ Section 16 Township 26S Range 34E County: Lea

Surface Owner: ☐ Federal ☒ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.

☒ **Recycling Facility:**

Location of recycling facility (if applicable): Latitude _____ Longitude _____ 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:** Rattlesnake

☐ Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)

Center of Recycling Containment (if applicable): Latitude 32.0406127 Longitude -103.479173 NAD: ☐1927 ☒ 1983

☐ For multiple or additional recycling containments, attach design and location information of each containment

☒ Lined ☒ Liner type: Thickness 60mil (HDPE primary) 30-mil (LLDPE secondary) ☒ LLDPE ☒ HDPE ☐ PVC ☐ Other _____

☒ String-Reinforced

Liner Seams: ☒ Welded ☒ Factory ☒ Other Field Welds Volume: 304,685 bbl Dimensions: L 400 x W 400 x D 17.21 (at sump)

☐ 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_____Chain link_(see registration)_____

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: 6-23-2015

e-mail address: Walter.Harvey@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, 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 blue triangle inside colored circles that indicate well depth (see legend). OSE wells are often mis-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range.
3. Water wells from the USGS database as large colored triangles that represent the unit in which the well was completed.
4. Water wells, which are not documented in the public databases but were identified by field inspection or other published reports as colored squares.
5. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

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 Quaternary Bolson deposits, the Triassic Chinle Formation, and in limited areas, the Tertiary Ogallala Formation. Existing data do not allow us to determine if the water in the Chinle is unconfined or confined, but the Bolson deposits and Ogallala are unconfined. For a confined aquifer, the actual depth to groundwater is the bottom of the overlying aquitard but the measured depth to groundwater (the potentiometric surface) can be a few feet below the ground surface due to confining pressure. For unconfined aquifers, which we believe lie beneath the proposed containment, the depth to groundwater in a well is distance between ground surface and groundwater.

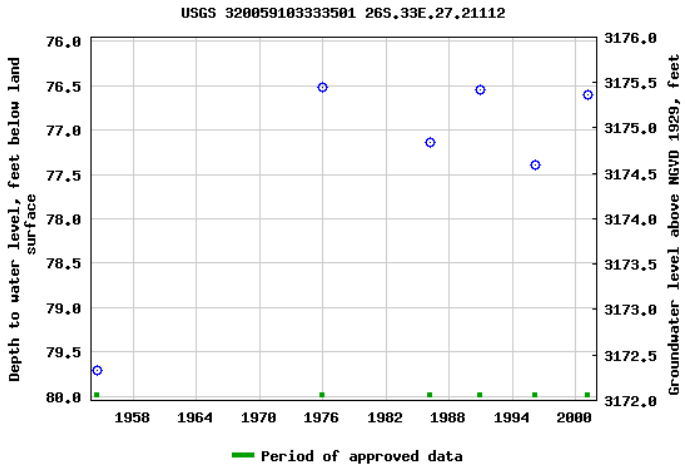
Figure 2 is the same scale as geologic and topographic map (Figure 1) that shows:
1. The location of the proposed containment.
2. Water wells measured by the USGS or other professionals, the formation completion depth of the USGS well (see Figure 2 Legend) and the calculated elevation of the groundwater surface and the date of the observation.
3. Isocontour lines displaying the elevation of the groundwater surface of the uppermost aquifer.

Hydrogeology

We relied upon the most recent data measured by the USGS to create the water table elevation map shown in Figure 2 as well as the "Misc" well data (see Figure 1). The Misc data are measured water levels in wells or logged borings for hydrogeologic information. This dataset can contain errors (generally of location) that are not often present in the USGS data; but all of the Misc wells shown in Figure 2 have been evaluated by Hicks Consultants by comparison with topographic maps, air photos or site inspections. 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. The Rattlesnake area contains sufficient high-quality data that we did not rely on OSE data for the potentiometric surface.

Although the data used to create Figure 2 span 60 years (1954-2015), there is little evidence of significant change in the water table elevation. For example, USGS-368 in the northeastern quadrant of Figure 2, which was measured in 1996, is the same well as Misc-296 (measured in 1954). The difference in the water table elevation is 0.33 feet. In the southwest quadrant of Figure 2 the same relationship exists. The hydrograph ofUSGS-238 from the USGS website[1] (chart at left) documents that water levels have been relatively constant from 1976 to 2000, varying by only one foot. The first available measurement in 1954 shows the depth to water is only 2.5 feet less than the later measurements.



From these data and the discussion in Appendix A, we conclude:

- Based upon the groundwater map of the regional aquifer (permeable units in the upper Chinle/Dockum, Bolsum and Ogallala), the elevation of the groundwater surface beneath the proposed containment is less than 3,150 feet above mean sea level.
- The distance between the bottom of a 20-foot deep containment and the potentiometric surface of the regional aquifer is at least (3,327-20-3150 =) 157 feet.

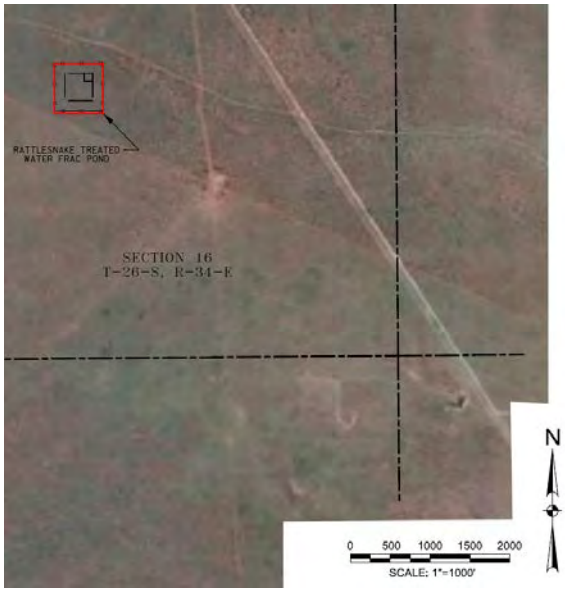
Distance to Surface Water

Figure 3 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 mile west
- A blue-line arroyo is about 800 feet due east of the northeast corner of the proposed containment. Uphill from the end of the blue-line on Figure 3 would be the next lower order tributary. According to Figure 3, the distance from the edge of the containment to the edge of the road/drainage is about 300 feet, which is the setback requirement.
- Our site inspections did not identify a defined bed and bank in this drainage (next order tributary). Instead, we found the two-track road, as shown in the site inspection photo section of this registration) and as shown on the USGS Topographic map.

[1] http://nwis.waterdata.usgs.gov/usa/nwis/gwlevels/?site_no=320059103333501

- The inset figure from the survey (see site inspection section) shows that the fenced area of the proposed containment (red line) is a little more than 200 feet from the trace of the two-track road and the closed edge of the containment lies about 400 feet from the road.



Although the distance between the jeep track and the proposed containment is shown as 300 feet on Figure 3, we would like OCD to consider the following

1. During construction staking of the containment, Devon will measure the distance between the toe of the levee and the road/drainage (which could be considered by some as the next order tributary) and adjust the construction as necessary to cause the containment to meet the 300-foot setback from the drainage. This action will be conducted out of an abundance of caution for compliance with the Rule.
2. In the absence of the two-track, we believe it unlikely that a defined bed and bank would exist in the drainage – as there is no evidence today that a bed and bank exists.
3. Although use of the two-track obscures clear evidence of a defined bed and bank, we do not believe this drainage meets the OCD definition of a "watercourse" and therefore is not the "next order tributary" as defined by OCD Rules.

Distance to Permanent Residence or Structures

Figure 4 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.
- A cattle gathering area with corrals is located about 2000 feet southeast of the proposed containment.

Distance to Non-Public Water Supply

Figures 1 and Figure 2 demonstrates 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.
- The nearest mapped water well is located approximately 2½ mile northwest (C-2295). Google Earth does not show this as an active well.
- There are no known domestic or stock 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 5 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 Jal, NM approximately 17 miles to the northeast.
- The closest public well field is located approximately 50 miles to the west and/or 50 miles north.

Distance to Wetlands

Figure 6 demonstrates the location is not within 300 feet of wetlands.

- The nearest designated wetlands are a "freshwater emergent wetland" located approximately 1 mile to the southeast

Distance to Subsurface Mines

Figure 7 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.

- The nearest mapped caliche pits are located approximately 2.5 miles to the west and 2.5 miles to the southeast.

Distance to High or Critical Karst Areas

Figure 8 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 22 miles west of the site.
- No evidence of solution voids were observed near the site during the field inspection.
- A professional geologist (Randall Hicks) conducted the field survey and concluded that the ground is stable.

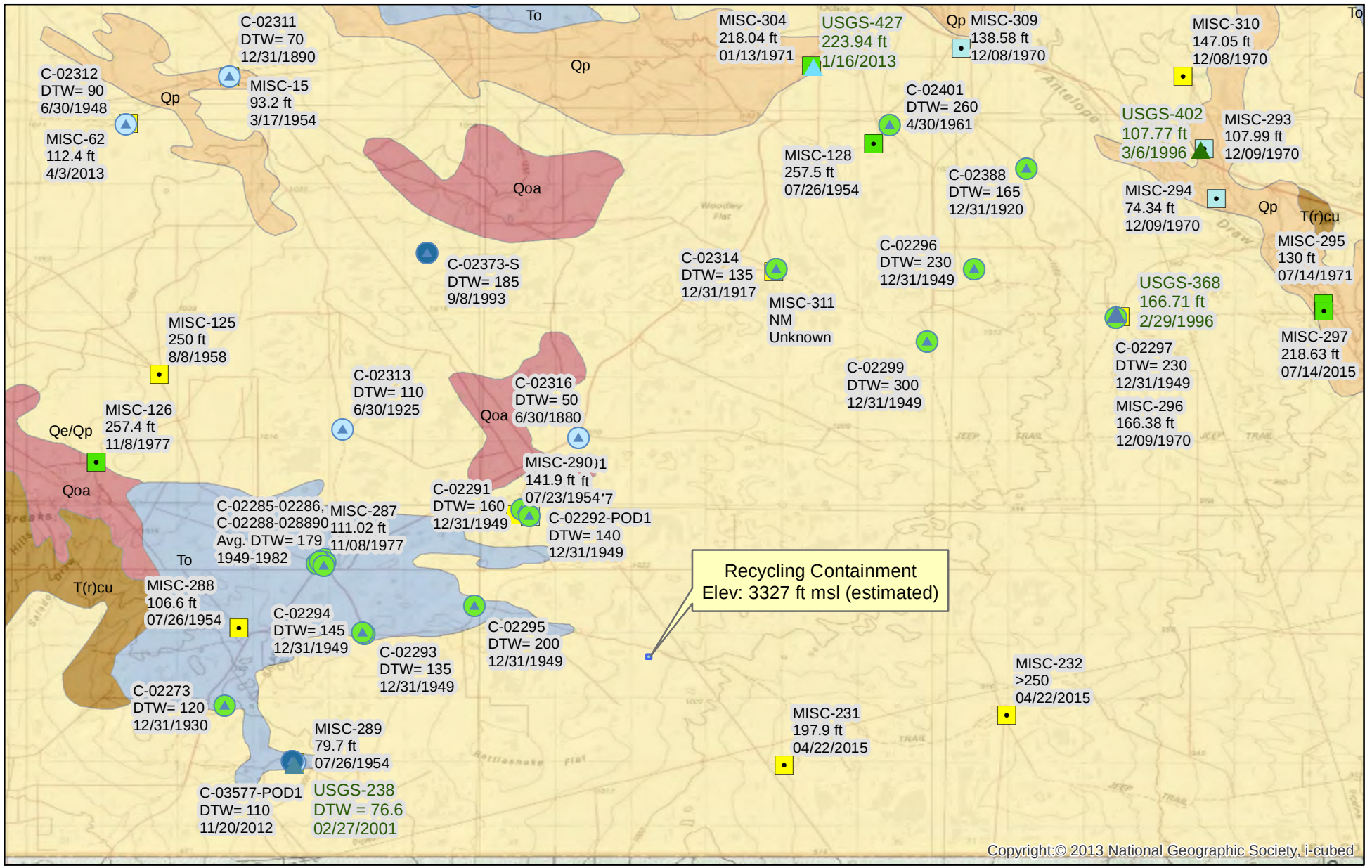
Distance to 100-Year Floodplain

Figure 9 demonstrates that the location is within Zone D as designated by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

- Zone D is described as areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted.
- 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.

Site Specific Information

R.T. Hicks Consultants, Ltd.
901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104



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901 Rio Grande Blvd NW Suite F-142
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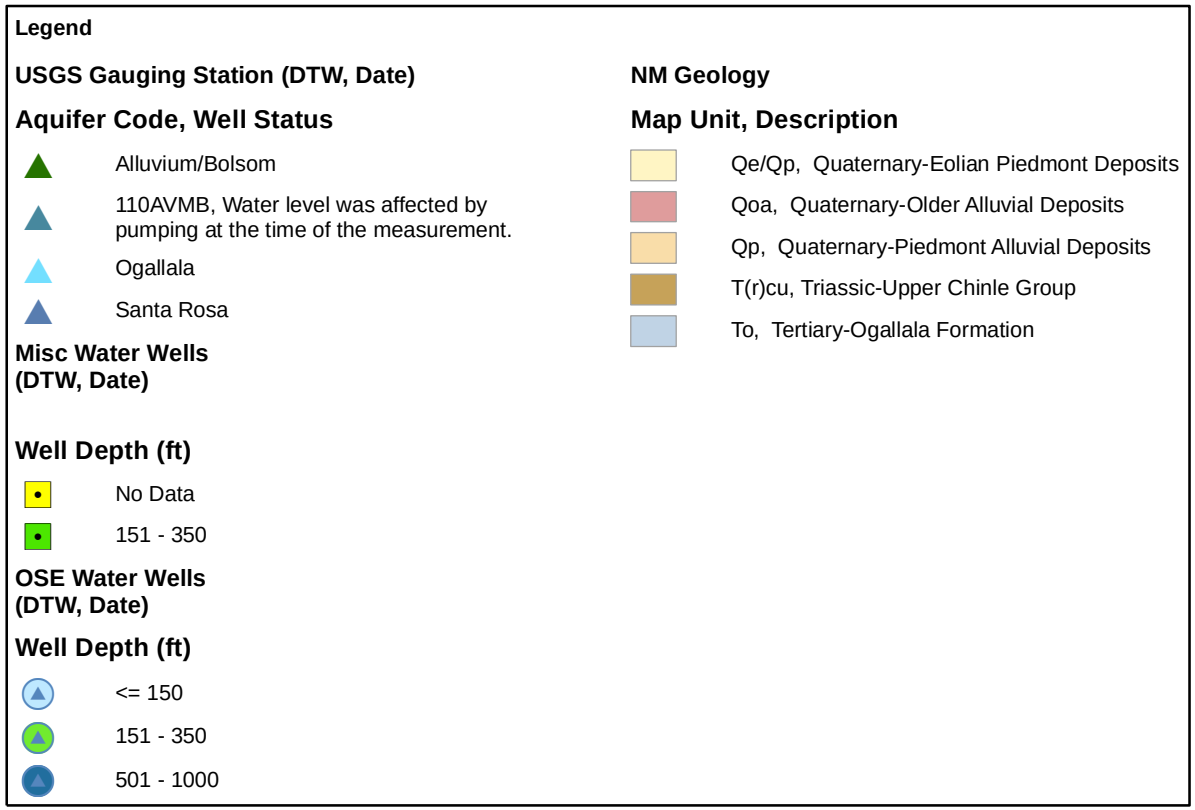
Depth To Water and Geology

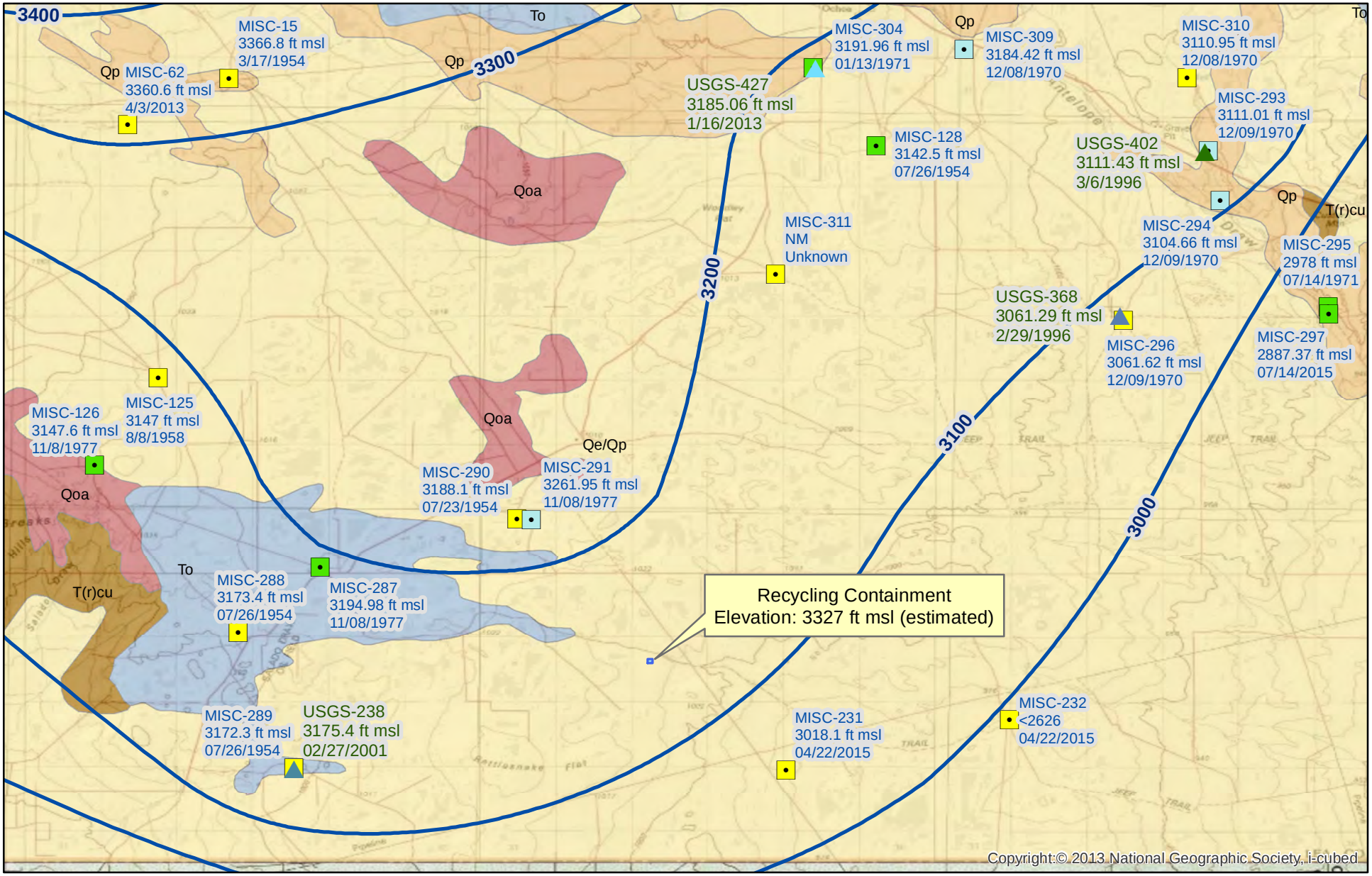
Figure 1

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Depth To Water and Geology	Figure 1 Legend
	Devon Energy Corporation Rattlesnake Recycling Containment	June 2015



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Potentiometric Surface and Groundwater Elevation at Nearby Water Wells

Figure 2

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015

Legend

Potentiometric Surface (ft msl)

Isocontour

USGS Gauging Station (GW Elev, Date)

Aquifer Code, Well Status

Alluvium/Bolsom

110AVMB, Water level was affected by pumping at the time of the measurement.

Ogallala

Santa Rosa

Misc. Water Wells (GW Elev, Date)

Total Depth (ft)

No Data

151 - 350

NM Geology

Map Unit, Description

Qe/Qp, Quaternary-Eolian Piedmont Deposits

Qoa, Quaternary-Older Alluvial Deposits

Qp, Quaternary-Piedmont Alluvial Deposits

T(r)cu, Triassic-Upper Chinle Group

To, Tertiary-Ogallala Formation

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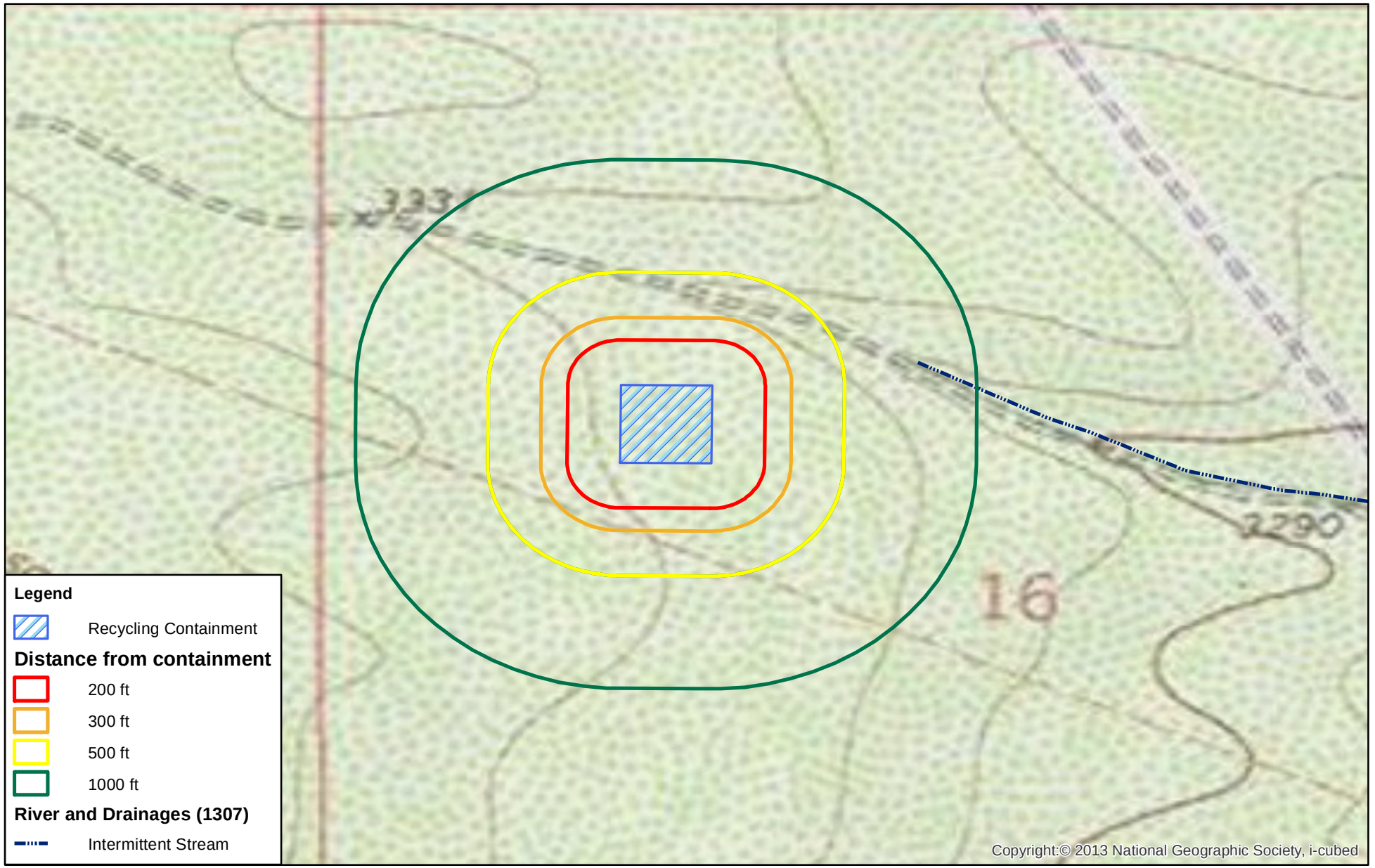
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Potentiometric Surface and Groundwater Elevation at Nearby Water Wells

Devon Energy Corporation
Rattlesnake Recycling Containment

Figure 2
Legend

June 2015



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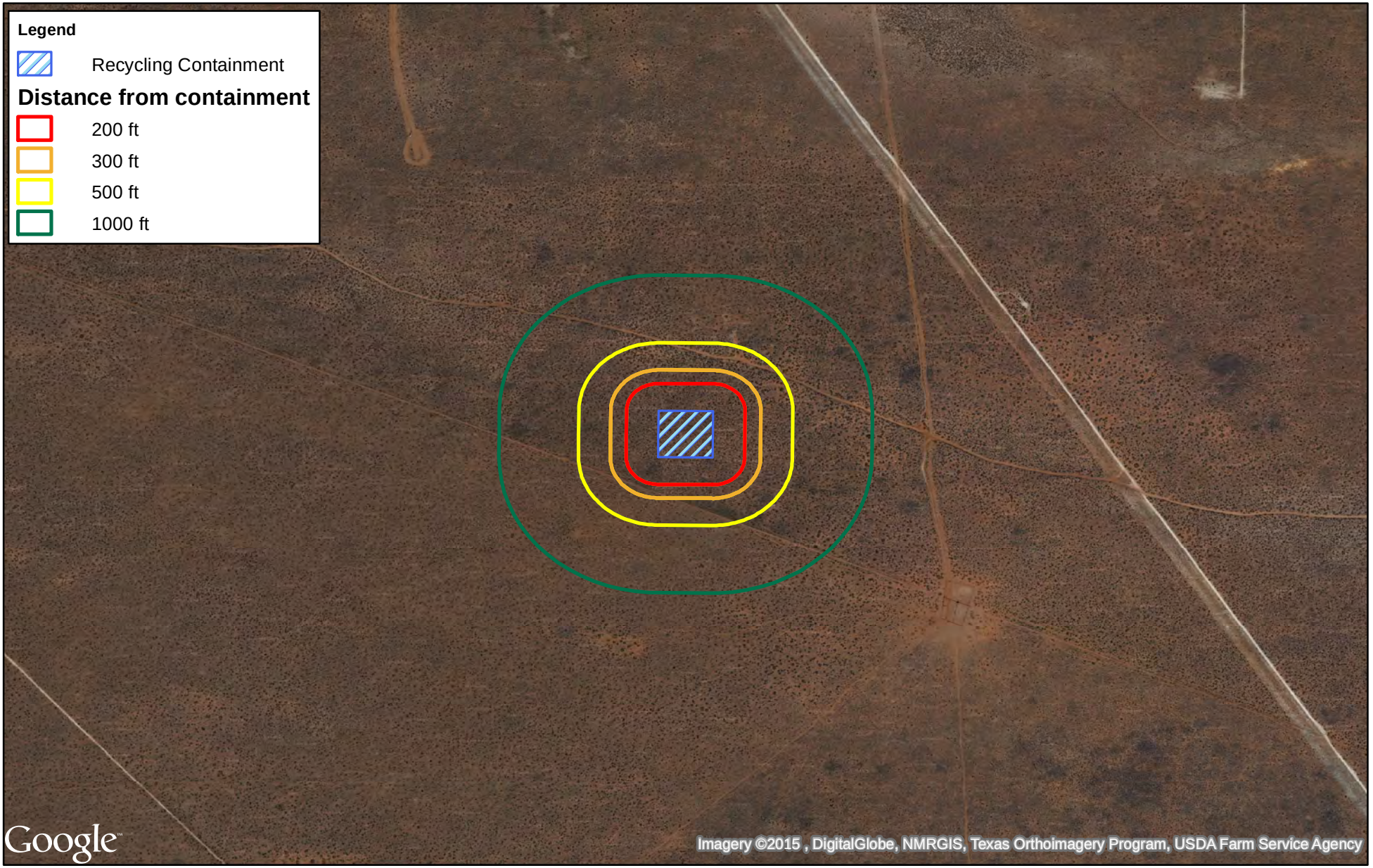
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Surface Water and Topography	Figure 3
	Devon Energy Corporation Rattlesnake Recycling Containment	June 2015



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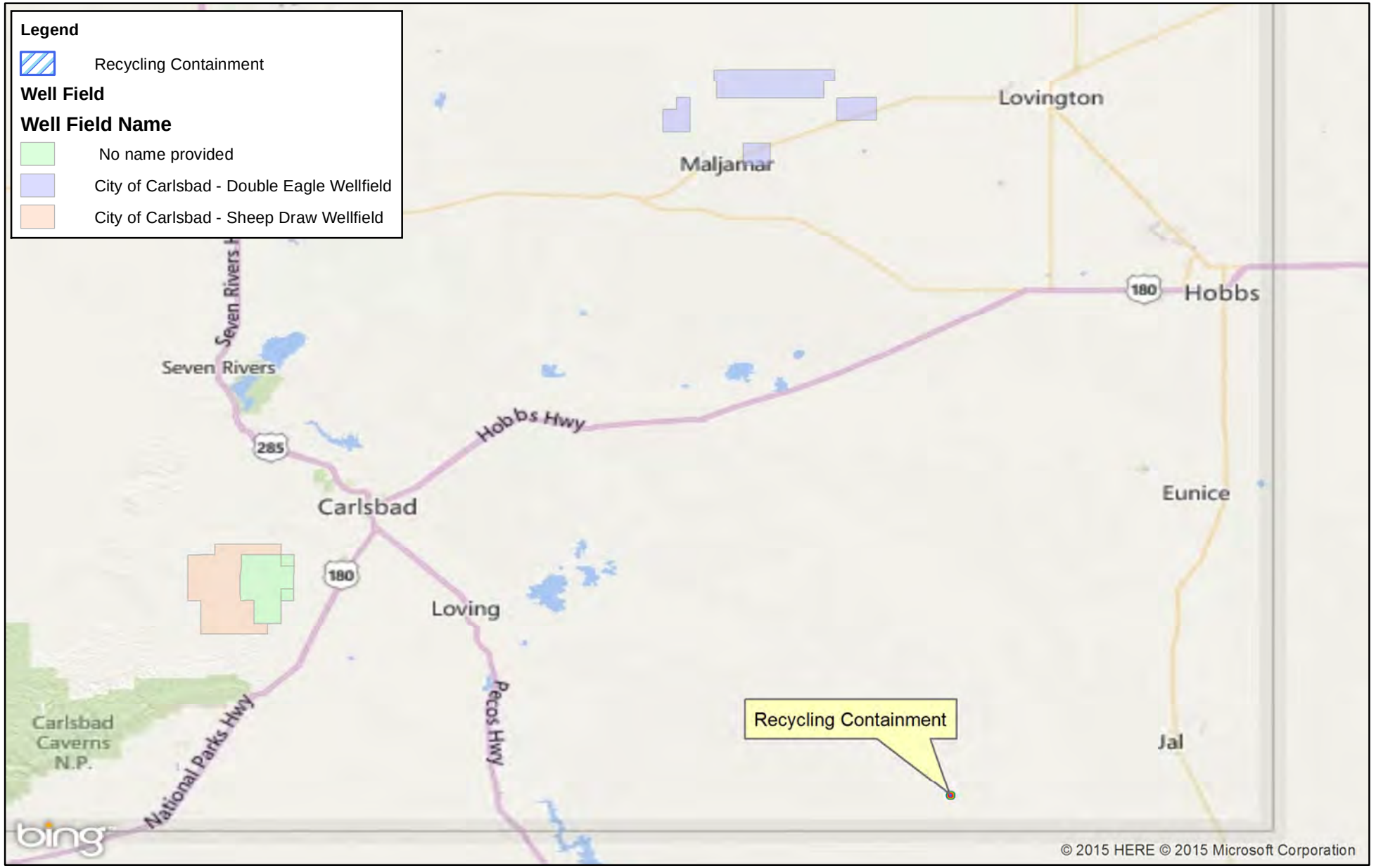
Nearby Structures

Figure 4

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015



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901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
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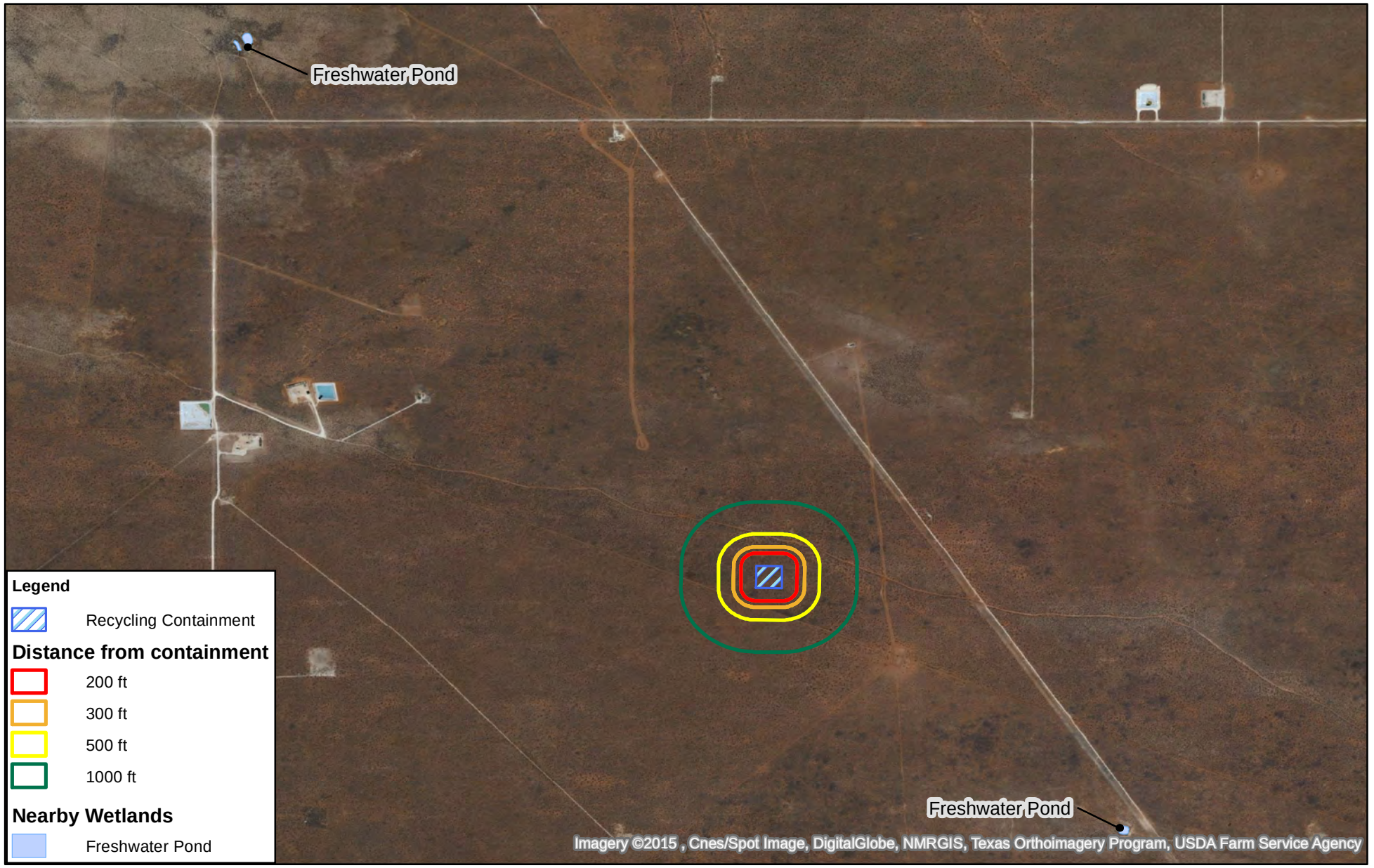
Nearby Municipalities and Well Fields

Figure 5

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015



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Nearby Wetlands

Figure 6

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015

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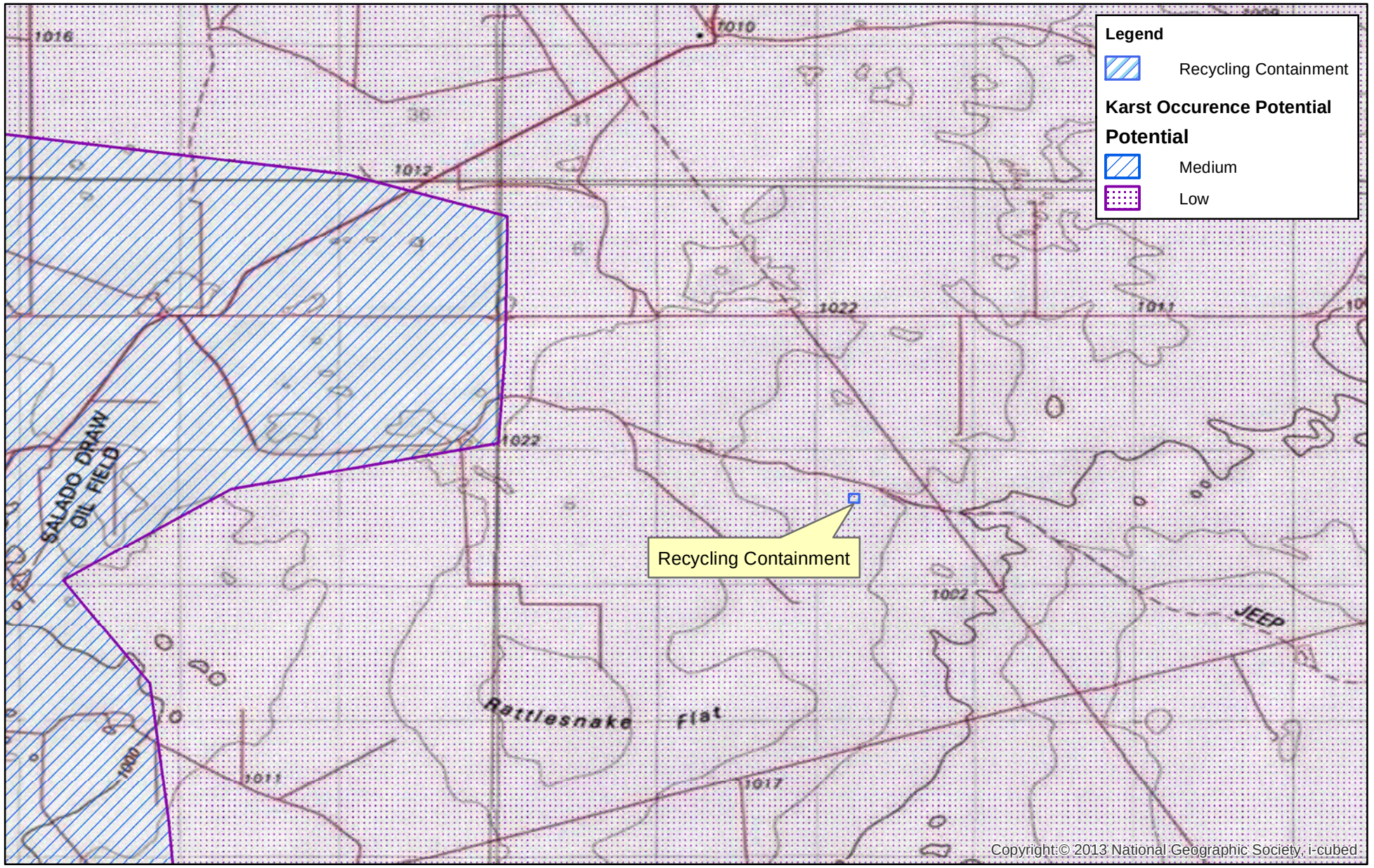
Nearby Mines and Minerals

Figure 7

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015



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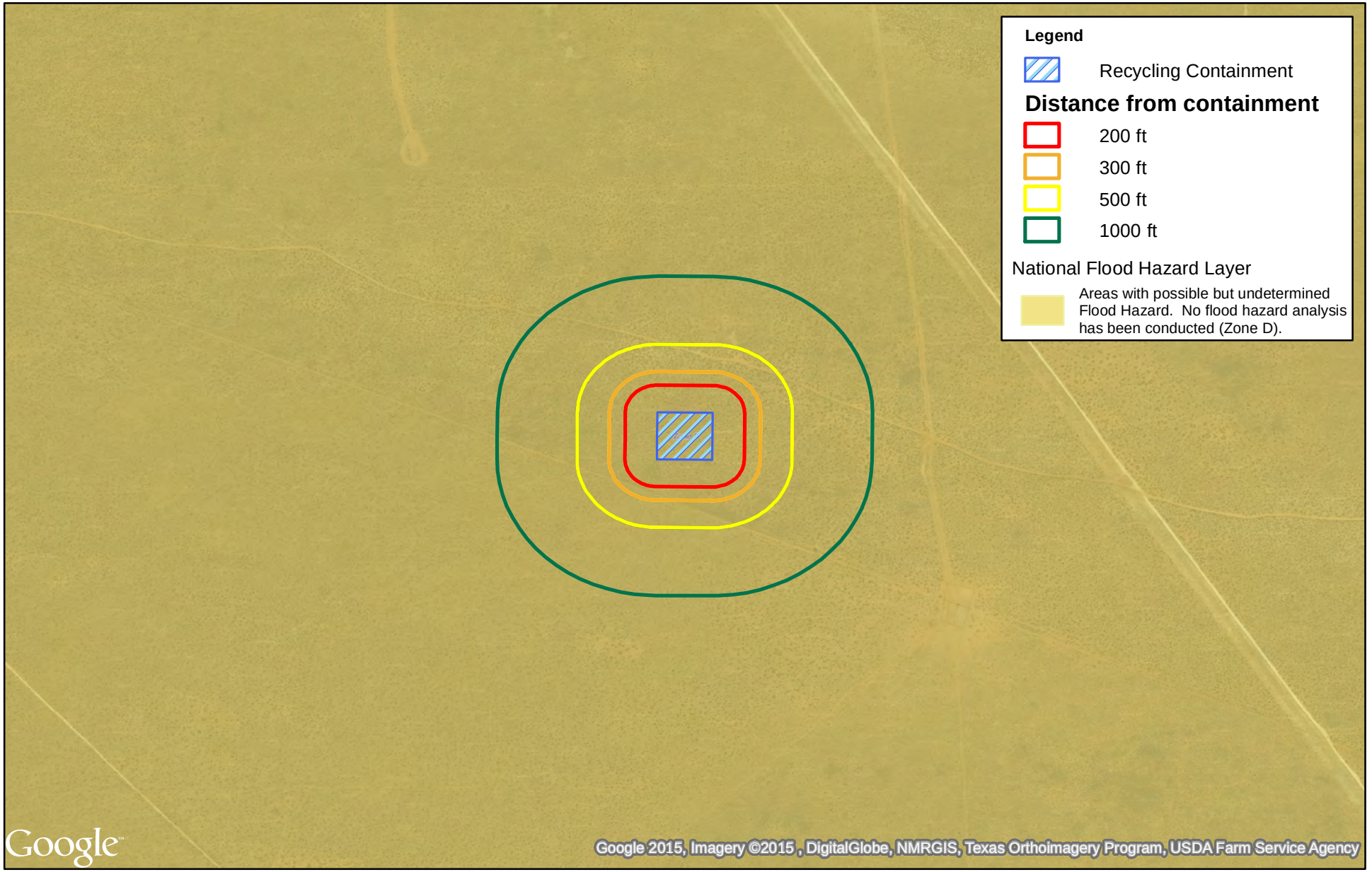
Karst Potential

Figure 8

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015



FEMA Source: https://hazards.fema.gov/gis/nfhl/services/public/NFHLWMS/MapServer/WMSServer

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901 Rio Grande Blvd NW Suite F-142
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FEMA Flood Map

Figure 9

Devon Energy Corporation
Rattlesnake Recycling Containment

June 2015

Site Inspection Photographs and Survey

R.T. Hicks Consultants, Ltd.
901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

View south from southeast corner of proposed Rattlesnake Containment showing stabilized sand dunes and nature of vegetation. Mapped watercourse lies 456 feet south (downhill)

View west of mapped watercourse south of Rattlesnake Containment. The mapped watercourse is also a mapped jeep trail on the USGS map; and this photograph shows vehicle tracks as well as pipelines. NMOCD Rules define watercourse: "(4) "Watercourse" means a river, creek, arroyo, canyon, draw or wash or other channel having definite banks and bed with visible evidence of the occasional flow of water." This jeep trail/mapped watercourse does not meet the definition of a watercourse.

View to southeast from northwest corner of Rattlsnake Containment. Low stabilized sand dunes characterize the site

Stabilized sand dunes occur throughout the proposed containment area.

View toward center of containment area from northeast corner.

View to the northeast from staked parking area for containment. Lease road lies about 50 feet east.

View north from road leading from mapped watercourse/jeep trail south to corral. The site of the Rattlesnake Containment is on the crest of the hill on the upper right quadrant of the photograph.

Pipeline excavation exposing a 10-15 foot thick caliche bed near the proposed containment.

DESCRIPTION

Being a 8.68 acre tract of land situated in Lea County, New Mexico, and being a portion of the SW ¼ of the NW ¼ of Section 16, Township 26 South, Range 34 East, New Mexico Prinicipal Meridian, and being more particularly described as follows:

COMMENCING at a found General Land Office brass cap for the west ¼ corner of said Section 16, from which a found General Land Office brass cap for the northwest corner of said Section 16 bears North 00 degree 28 minutes 13 seconds East, a distance of 2638.20 feet;

THENCE North 66 degrees 03 minutes 55 seconds East, across said SW ¼ of the NW ¼ of Section 16, a distance of 1087.72 feet to the southwest corner and POINT OF BEGINNING of the herein described tract;

THENCE North 00 degree 09 minutes 11 seconds West, a distance of 630.00 feet to the northwest corner of the herein described tract;

THENCE North 89 degrees 50 minutes 49 seconds East, a distance of 600.00 feet to the northeast corner of the herein described tract;

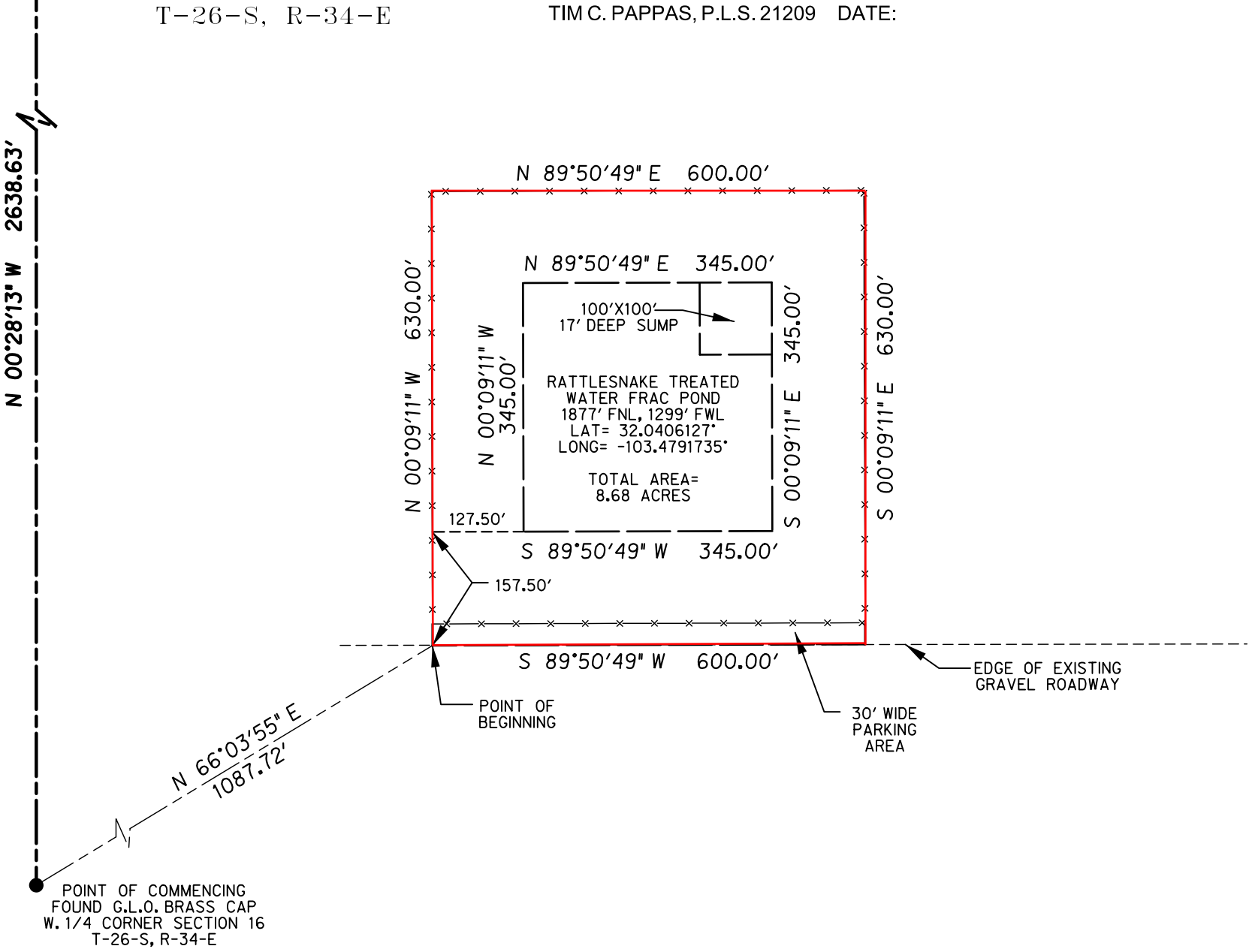
THENCE South 00 degree 09 minutes 11 seconds East, a distance of 630.00 feet to the southeast corner of the herein described tract;

THENCE South 89 degrees 50 minutes 49 seconds West, a distance of 600.00 feet to the POINT OF BEGINNING, and containing 8.68 acres of land, more or less.

CERTIFICATION

I, TIM C. PAPPAS, NEW MEXICO PROFESSIONAL LAND SURVEYOR NO. 21209, 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.

TIM C. PAPPAS, P.L.S. 21209 DATE:



0 100 200 300 400

SCALE: 1"=200'

NOTES:

THE BASIS OF BEARING IS THE NEW MEXICO COORDINATE SYSTEM OF 1983, EAST ZONE, AS DERIVED BY GPS MEASUREMENTS AND ADJUSTED WITH CORS STATIONS. DISTANCES SHOWN HEREON ARE SURFACE, BASED ON A COMBINED SCALE FACTOR OF 1.0001637 AS DERIVED FROM AN OPUS SOLUTION.

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

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

devon

DEVON ENERGY CORPORATION

RATTLESNAKE TREATED WATER FRAC POND

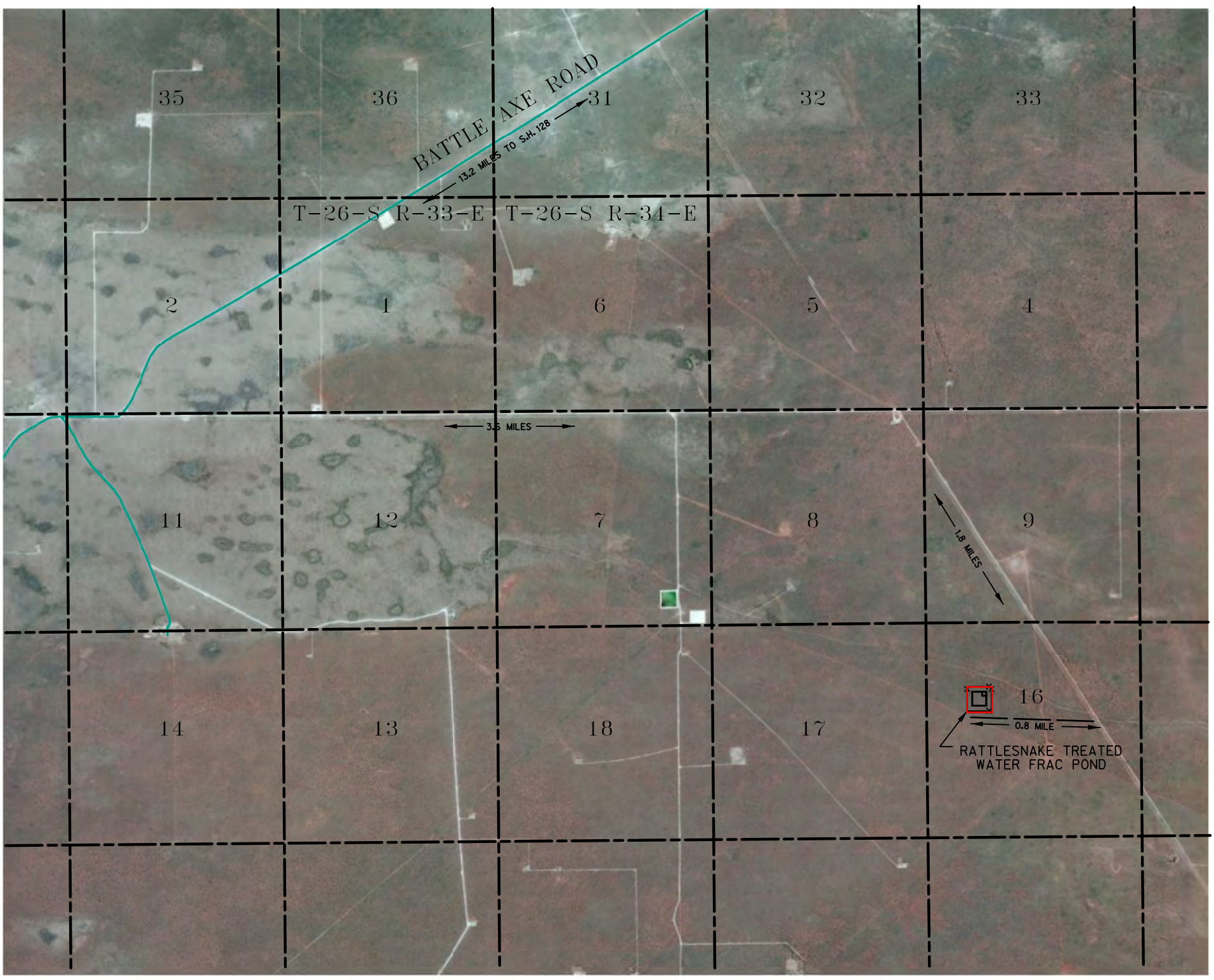
LOCATED IN
SECTION 16, T-26-S, R-34-E
N.M.P.M.

LEA COUNTY, NEW MEXICO

HALFF

DATED: 5/6/2015
BY: TIM C. PAPPAS

TBPLS FIRM NO. 10193998
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
4500 W Illinois Ave Ste 301 D~ Midland, TEXAS ~ 79703
SCALE: 1"=200' (432)-695-6110 AVO. 30915-W001



N

0 1500 3000 4500 6000

SCALE: 1"=3000'

DEVON ENERGY CORPORATION

RATTLESNAKE TREATED WATER FRAC POND

LOCATED IN
SECTION 16, T-26-S, R-34-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

DIRECTIONS TO LOCATION

FROM INTERSECTION OF S.H. 128 AND BATTLE AXE ROAD WEST OF JAL, TRAVEL SOUTHWEST ON BATTLE AXE ROAD FOR 13.2 MILES TO ROAD ON LEFT. TURN LEFT (TRAVEL DUE EAST) ON ROAD FOR 3.6 MILES TO A PIPELINE ROAD ON THE RIGHT. TURN RIGHT (TRAVEL SOUTHEAST) ON PIPELINE ROAD 1.8 MILES TO LEASE ROAD ON RIGHT. TURN RIGHT (TRAVEL WEST) ON LEASE ROAD 0.8 MILE TO SITE.

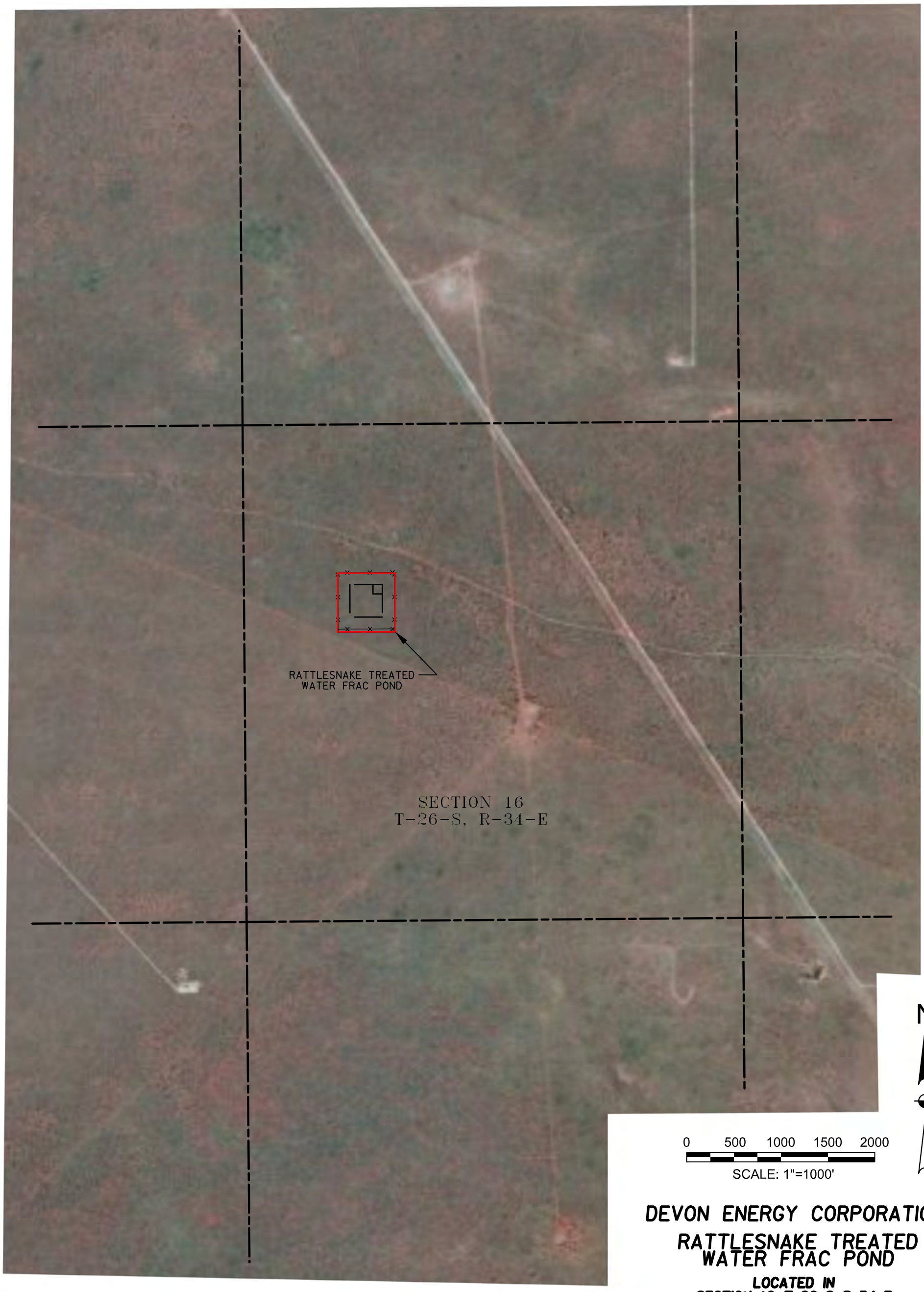
devon

HALFF

DATED: 5/6/2015
BY: TIM C. PAPPAS

TBPLS FIRM NO. 10193998
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
4500 W Illinois Ave Ste 301 D~ Midland, TEXAS ~ 79703
SCALE: 1"=200' (432)-695-6110 AVO. 30915-W001

5/6/2015 11:09:59 AM ah2758 HALFF I:\30000s\30915\WO01\CADD\Sheets\VEXH-30915-WO01-Sheet02.DGN



DEVON ENERGY CORPORATION

RATTLESNAKE TREATED WATER FRAC POND

LOCATED IN
SECTION 16, T-26-S, R-34-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

devon

HALFF

DATED: 5/6/2015
BY: TIM C. PAPPAS

TBPLS FIRM NO. 10193998
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
4500 W Illinois Ave Ste 301 D~ Midland, TEXAS ~ 79703
SCALE: 1"=200' (432)-695-6110 AVO. 30915-W001

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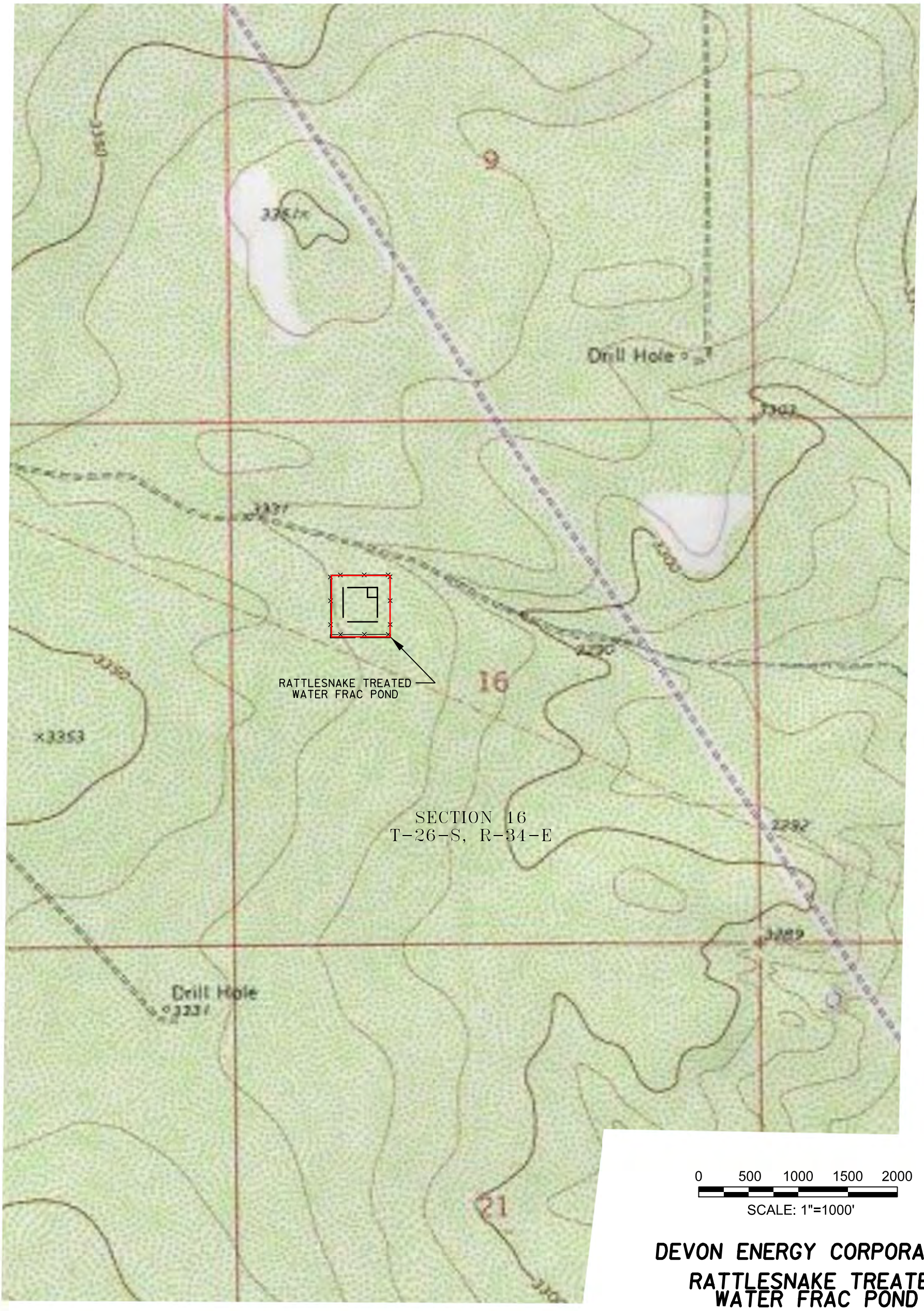

DEVON ENERGY CORPORATION

RATTLESNAKE TREATED WATER FRAC POND

LOCATED IN
SECTION 16, T-26-S, R-34-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

devon

HALFF

DATED: 5/6/2015
BY: TIM C. PAPPAS

TBPLS FIRM NO. 10193998
HALFF ASSOCIATES INC., ENGINEERS ~ SURVEYORS
4500 W Illinois Ave Ste 301 D~ Midland, TEXAS ~ 79703
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Appendix A

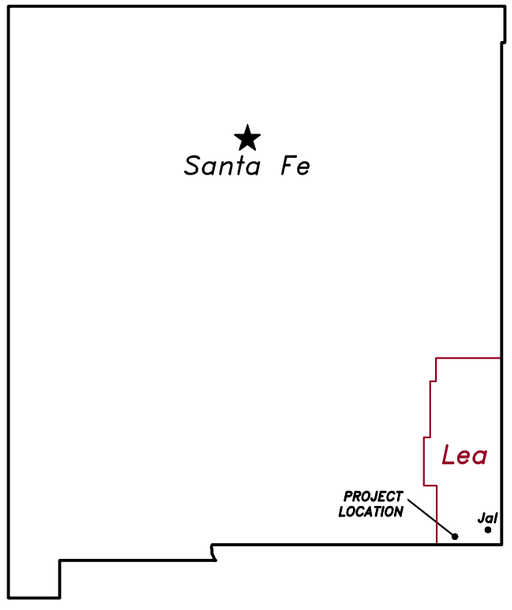
Engineering Drawings

RATTLESNAKE PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

JAL, NEW MEXICO 88252

JUNE 2015

Vicinity Map



INDEX OF DRAWINGS	
SHT #	SHEET TITLE
1	AERIAL PROJECT OVERVIEW
2	PROPOSED SITE PLAN
3	PROPOSED POND SECTION VIEWS
4	SUMP DETAILS
5	PROJECT DETAILS
6	PROJECT DETAILS

PMI

PROJECT NO. DEVO-9999

ISSUED FOR CONSTRUCTION

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 80'

ISSUED FOR CONSTRUCTION

RATTLESNAKE PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

JAL, NEW MEXICO 88252

SHEET TITLE: AERIAL PROJECT OVERVIEW

NO:	DATE:	DESCRIPTION:	BY:

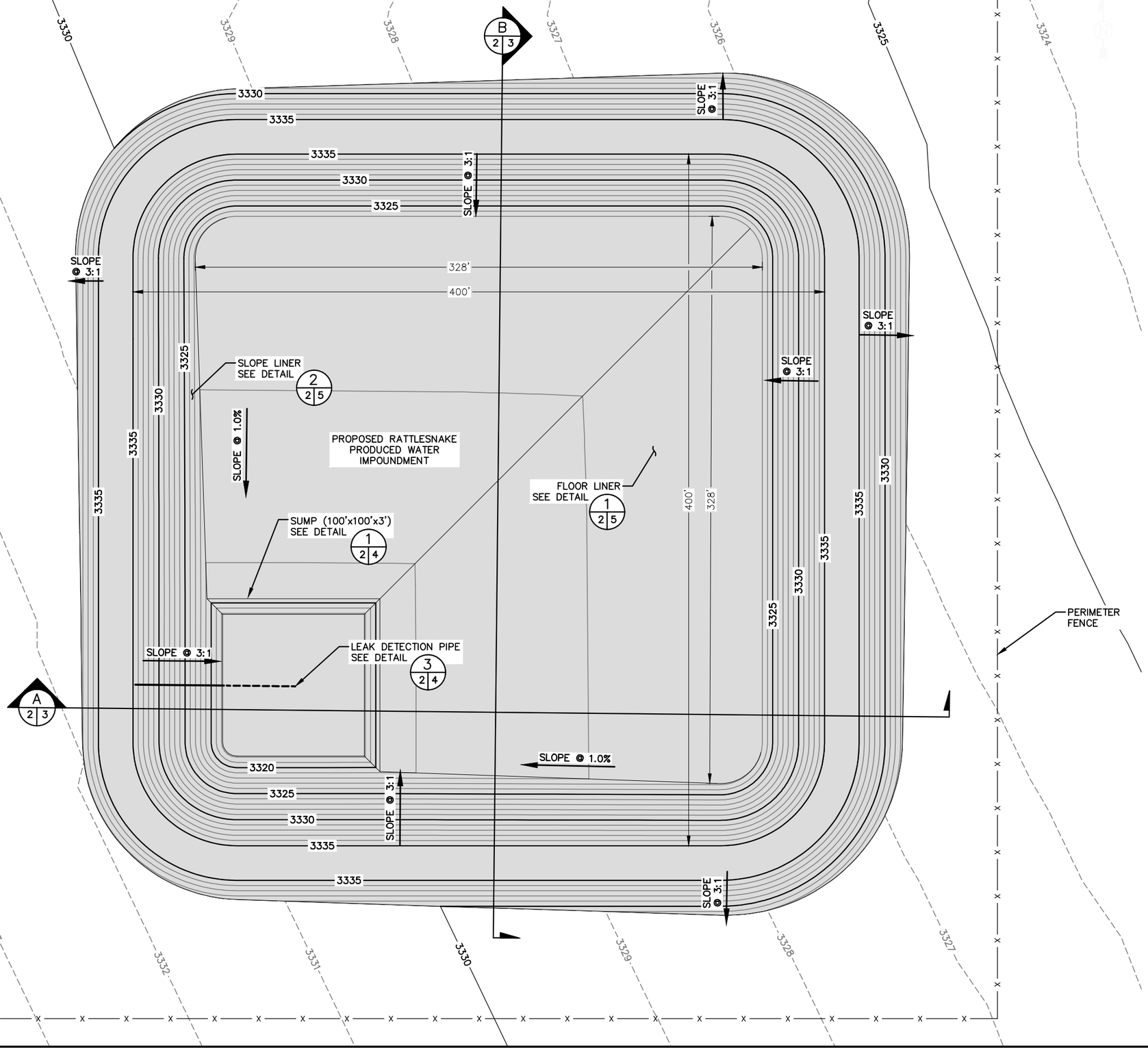
CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 South Shackleford Road
Little Rock, Arkansas 72205
PH: (501) 221-7122 FX: (501) 221-7775

DESIGNED BY: BW
DRAWN BY: JAB
CHECKED BY: BW
DATE: JUN. 10, 2015
SCALE: 1" = 80'

FILE: L:\DEVON ENERGY CORPORATION\DEVO-9999 RATTLESNAKE PRODUCED WATER IMPOUNDMENT\DRAWINGS\01-03 SITE PLAN.DWG

JOB NUMBER: DEVO-9999

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:	304,685 BBL
3' FREEBOARD CAPACITY:	224,396 BBL

2. BOTTOM OF SUMP ELEVATION IS 3317.79, OR 17.21 FEET FROM TOP OF LEVEE.

LEGEND:

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

SCALE

0 60'

ISSUED FOR CONSTRUCTION

RATTLESNAKE PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

JAL, NEW MEXICO 88252

SHEET TITLE: PROPOSED POND 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

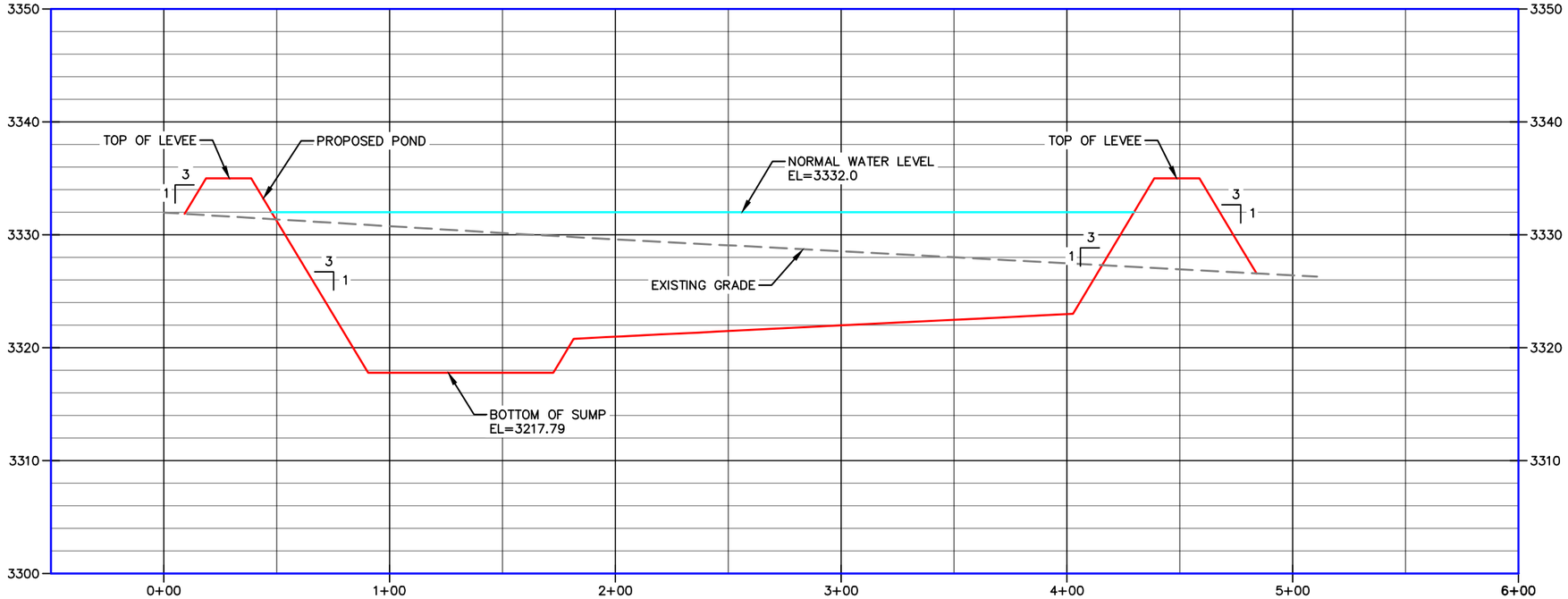
DESIGNED BY: BW
DRAWN BY: JAB
CHECKED BY: BW
DATE: JUN. 10, 2015
SCALE: 1" = 60'

JOB NUMBER: DEVO-9999

SHEET NO.: 2

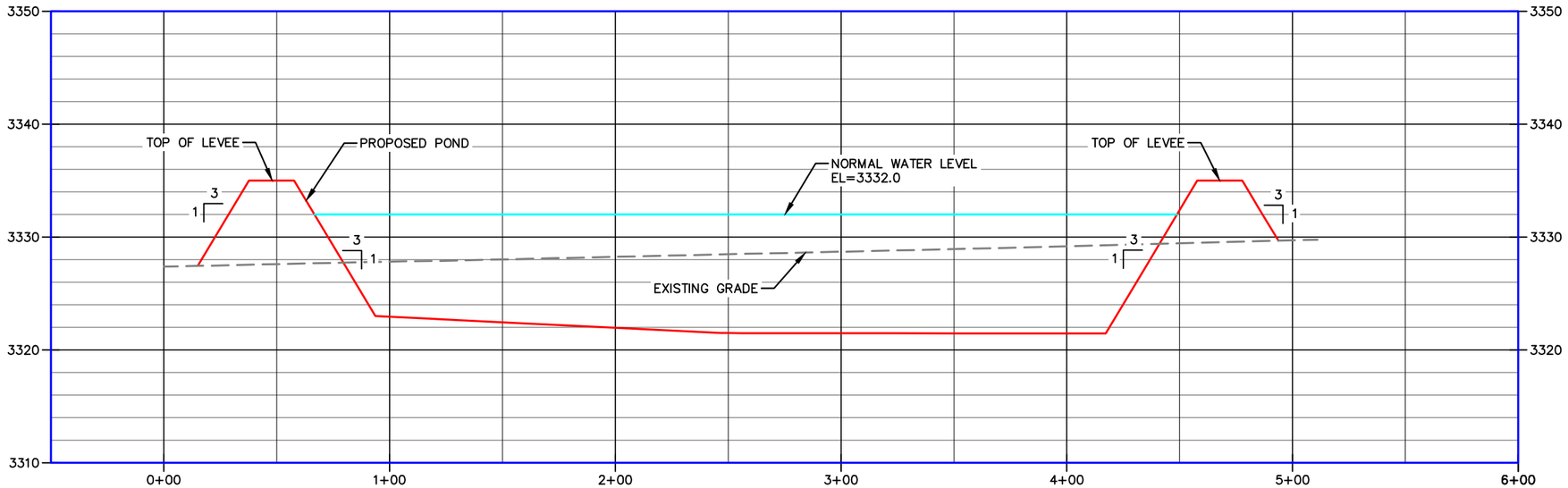
FILE: L:\DEVON ENERGY CORPORATION\DEVO-9999 RATTLESNAKE PRODUCED WATER IMPOUNDMENT\DRAWINGS\01-03 SITE PLAN.DWG

SCALE: 1" = 100' HOR.
1" = 20' VER.



WEST–EAST POND SECTION A 2 3

SCALE: 1" = 100' HOR.
1" = 20' VER.



NORTH–SOUTH POND SECTION B 2 3

ISSUED FOR CONSTRUCTION

RATTLESNAKE PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

JAL, NEW MEXICO 88252

SHEET TITLE: PROPOSED POND SECTIONS

REVISIONS:

NO:	DATE:	DESCRIPTION:	BY:

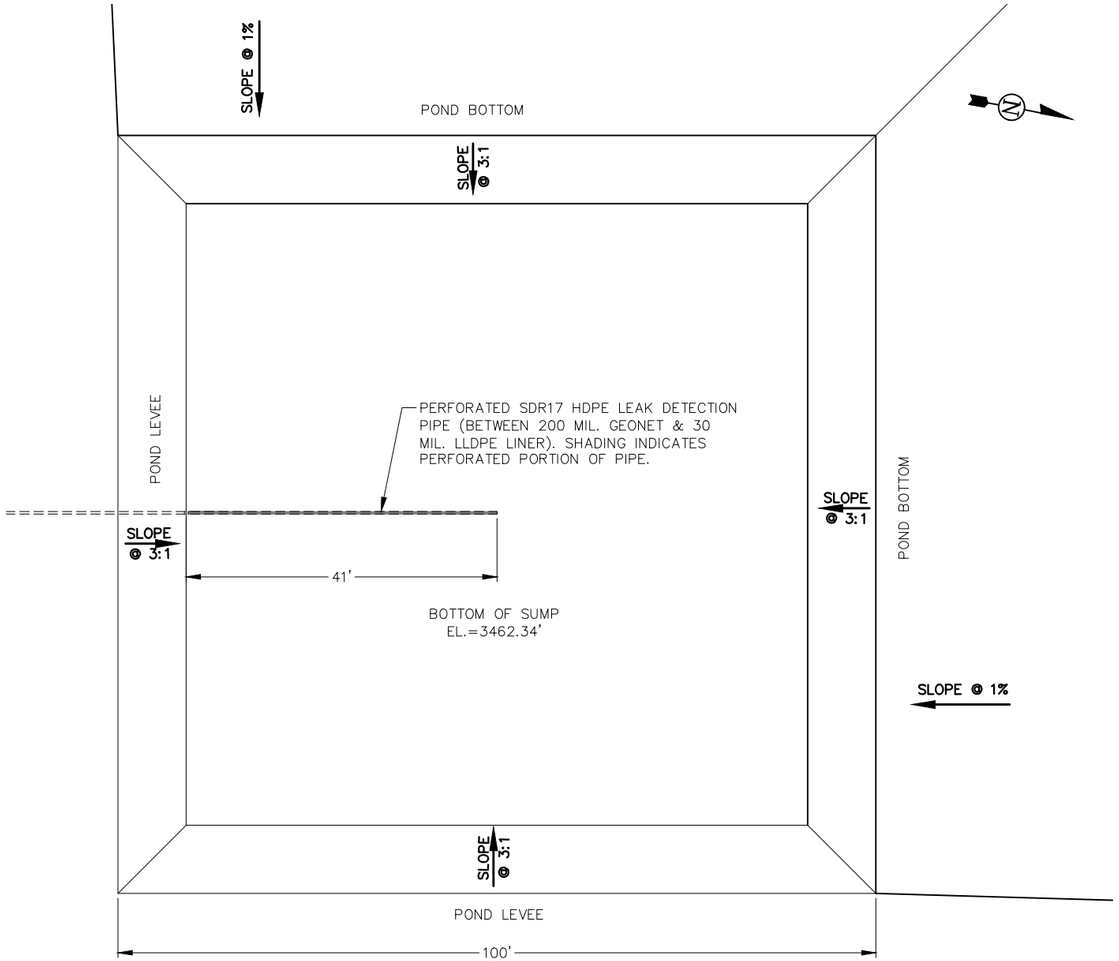
CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 South Shackleford Road
Little Rock, Arkansas 72205
PH: (501) 221-7122 FX: (501) 221-7775

DESIGNED BY: BW
DRAWN BY: JAB
CHECKED BY: BW
DATE: JUN. 10, 2015
SCALE: AS NOTED

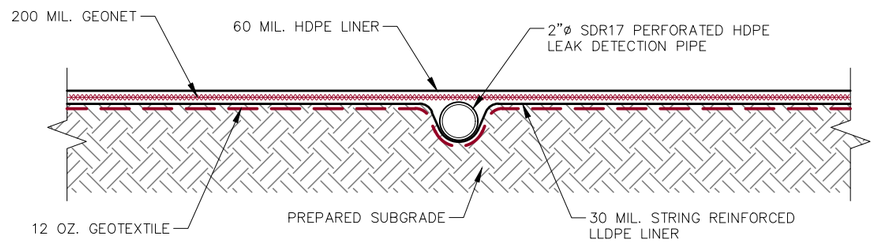
FILE: L:\DEVON ENERGY CORPORATION\DEVO-9999 RATTLESNAKE PRODUCED WATER IMPOUNDMENT\DRAWINGS\01-03 SITE PLAN.DWG

JOB NUMBER: DEVO-9999

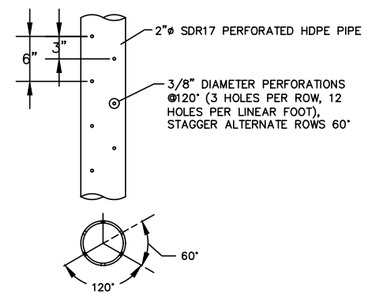
SHEET NO.: 3



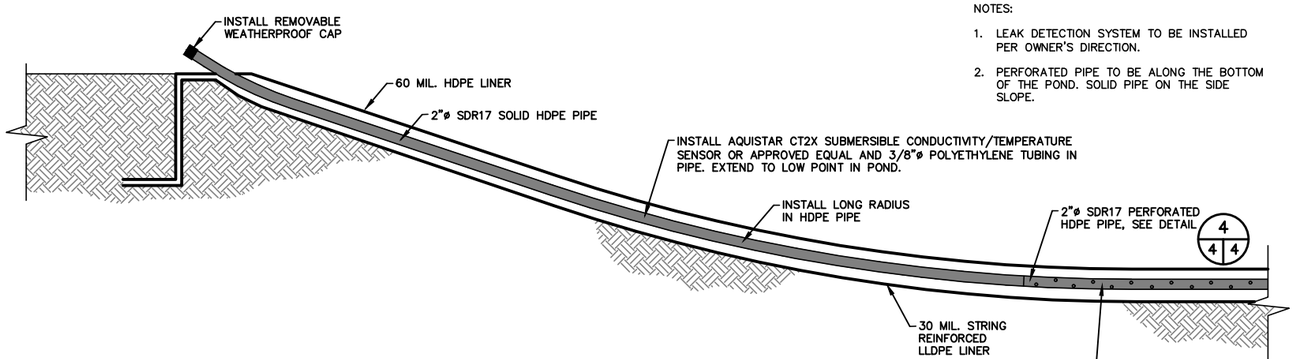
POND SUMP PLAN VIEW (1 / 2 | 4)
SCALE: NTS



LEAK DETECTION PIPE DETAIL (2 / 3 | 4)
SCALE: NTS



PERFORATED PIPE DETAIL (4 / 4 | 4)
SCALE: NTS



LEAK DETECTION/SAMPLING SYSTEM DETAIL (3 / 2 | 4)
SCALE: NTS

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.

RATTLESNAKE PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

JAL, NEW MEXICO 88252

SHEET TITLE: SUMP PLAN & DETAILS

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. 10, 2015
DRAWN BY:	JAB	SCALE:	AS NOTED
CHECKED BY:	BW		

FILE: L:\DEVON ENERGY CORPORATION\DEVO-9999 RATTLESNAKE PRODUCED WATER IMPOUNDMENT\DRAWINGS\04-06 PROJECT DETAILS.DWG

JOB NUMBER: DEVO-9999

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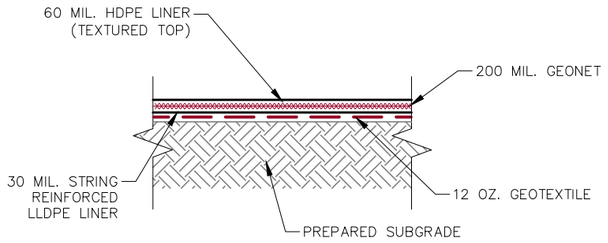
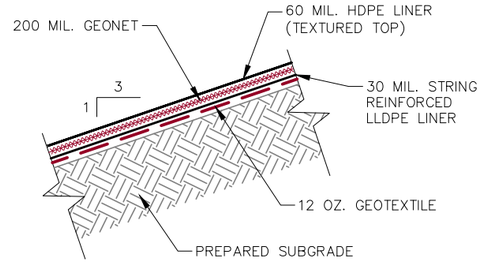


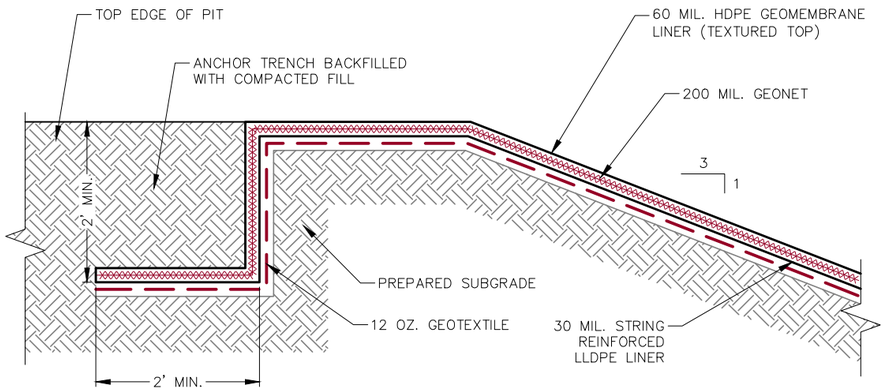
LINER SYSTEM FLOOR DETAIL 1/2|5
SCALE: NTS



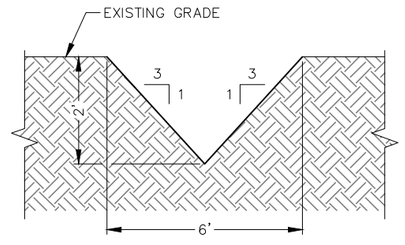
LINER SYSTEM SIDE SLOPE DETAIL 2/2|5
SCALE: NTS

GENERAL NOTES:

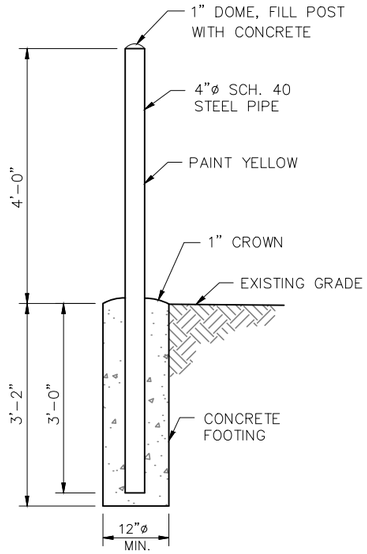
1. PREPARED SUBGRADE MEANS COMPACTED SMOOTH SUBGRADE FREE OF ROCK, ROOTS, WOOD DEBRIS, CONCRETE RUBBLE AND ANY SHARP OBJECTS THAT MIGHT PUNCTURE THE HDPE LINER.
2. IF SUBGRADE IS NOT FREE OF SHARP OBJECTS, THEN 16 OUNCE GEOTEXTILE MATERIAL SHALL BE INSTALLED UNDER ALL HDPE LINER.
3. ALL EMBANKMENT SLOPES 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.



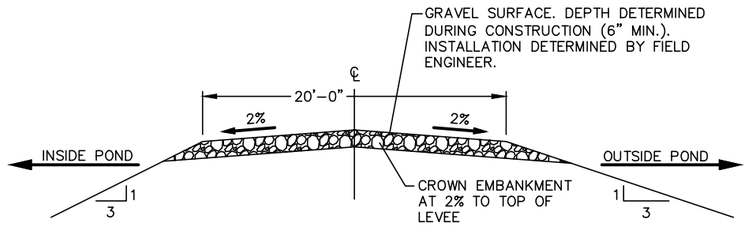
ANCHOR TRENCH DETAIL 3/2|5
SCALE: NTS



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

RATTLESNAKE PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION
JAL, NEW MEXICO 88252

SHEET TITLE: PROJECT DETAILS

NO:	DATE:	REVISIONS: 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. 10, 2015
DRAWN BY:	JAB	SCALE:	AS NOTED
CHECKED BY:	BW		

FILE: L:\DEVON ENERGY CORPORATION\DEVO-9999 RATTLESNAKE PRODUCED WATER IMPOUNDMENT\DRAWINGS\04-06 PROJECT DETAILS.DWG

JOB NUMBER: DEVO-9999

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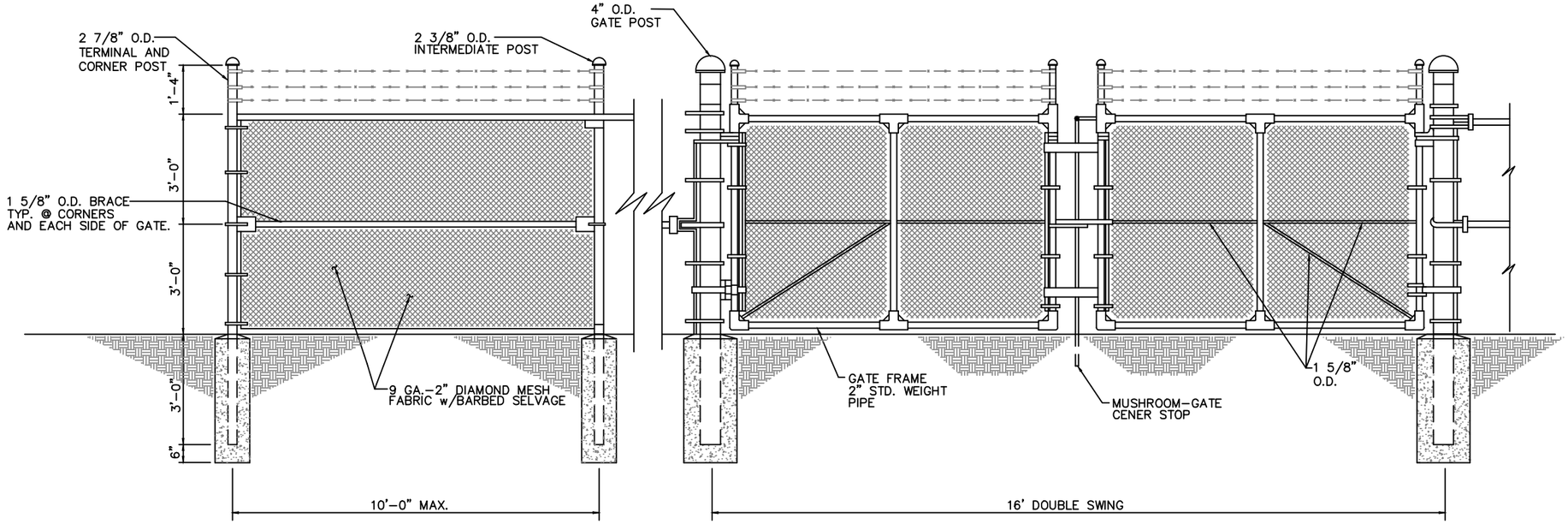

FENCE/DBL SWING GATE DETAIL

SCALE: NTS

1 / 2 6

RATTLESNAKE PRODUCED WATER IMPOUNDMENT
DEVON ENERGY CORPORATION

JAL, NEW MEXICO 88252

BY:

SHEET TITLE: PROJECT DETAILS

REVISIONS:

NO:	DATE:	DESCRIPTION:

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. 10, 2015
DRAWN BY:	JAB	
CHECKED BY:	BW	SCALE: AS NOTED

FILE: L:\DEVON ENERGY CORPORATION\DEVO-9999 RATTLESNAKE PRODUCED WATER IMPOUNDMENT\DRAWINGS\04-06 PROJECT DETAILS.DWG

JOB NUMBER:
DEVO-9999

SHEET NO.: 6

Appendix B

Design/Construction Plan

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

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.

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

Earthwork

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. 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.
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%

Appendix C

Operating and Maintenance Plan

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.

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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.

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 injection wells.

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.

Appendix D
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

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.

