May 2019

C-147 Registration Package for Fez Recycling Containment and Recycling Facility Area (100+ acres) Section 8, T25-S, R35-E, Lea County Volume 1

View to east from near the center of the 100+ acre area of interest in which will be the proposed containment and recycling facility. The freshwater frac pond is apparent on the horizon.

Prepared for:
COG Operating LLC
600 W. Illinois Ave
Midland, Texas 79707

Prepared by:
Mustang Extreme
And
R.T. Hicks Consultants, Ltd.
901 Rio Grande NW
Ste F-142
Albuquerque, New Mexico

R. T. HICKS CONSULTANTS, LTD.

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

May 9, 2019

Mr. Timothy Reed
COG Operating
600 W. Illinois Ave.
Midland, Texas 79707
Via E-Mail

RE: COG Operating LLC – Fez Containment and Recycling Facility

Dear Mr. Reed:

Hicks Consultants in conjunction with MustangExtreme Environmental Services LLC submits the attached registration. Volume 1 provides the C-147, the design drawings for the in-ground containment, the siting criteria demonstration, the design/construction plan, O&M plan and Closure Plan for the in-ground containment, and the geotechnical boring logs. Volume 2 contains the design information and associated plans and information for the Above-Ground Storage Tank Containments.

The package follows the order of Form 147 to allow for an easier review by OCD. Please note, as described below, this submission is a *registration* not a permit application. Because the containments meet all of the requirements of Rule 34, COG Operating may begin filling the containments with produced water after submission.

The following elements of the submission are germane to the OCD review prior to posting the registration on the OCD Website.

A. Engineering drawings stamped by a NM Registered Engineer are provided.
B. In compliance with 19.15.34.10 of the Rule, this submission is copied to Quail Ranch, LLC, who is the surface owner of the surface upon which the containment will be constructed.
C. Site specific information demonstrates compliance with siting criteria for the location.
D. Water well logs from the OSE database and the logs from the geotechnical borings are included as appendices at the end of the submission.
E. Photographs of the site and environs are attached to this cover letter to provide assistance in the OCD review

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

This submission refers to the following elements that some OCD reviewers have considered variances:

1. An equivalency demonstration written by experts for the proposed 40-mil HDPE secondary liner has been previously approved by OCD. We maintain that the language of the Rule is clear[1] and a variance is not required. The previously-submitted equivalency demonstration is lengthy and we can submit it under separate cover if requested by OCD.

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

2. OCD has approved the proposed Avian Protection Plan (Bird-X Mega Blaster Pro) for other containments. Thus, the plan meets the requirement of the rule that the "otherwise protective of wildlife, including migratory birds" and a variance is not required.
3. Using the proposed deer fence in lieu of a 4-strand barbed wire fence is not a variance. Because feral pigs, javelena and deer are present in the area, a fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule[2]. The specification for fencing provided in 19.15.34.12 D.2 contradicts D.1 because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. Thus, compliance with D.2 results in a violation of D.1. We maintain that compliance with D.1 is the critical component of the Rule and operators need not be required to submit a variance request in order to follow Best Management Practices and comply with the Rule.

If you have any questions or concerns regarding this registration or the attached C-147, please contact me or Bobbi Jo McKean (MustangExtreme). Thanks for letting us be part of this water conservation and recycling project.

Sincerely,
R.T. Hicks Consultants

Randall Hicks
Principal

Copy: MustangExtreme, Bobbi Jo McKean
Quail Ranch, LLC, JWood@concho.com

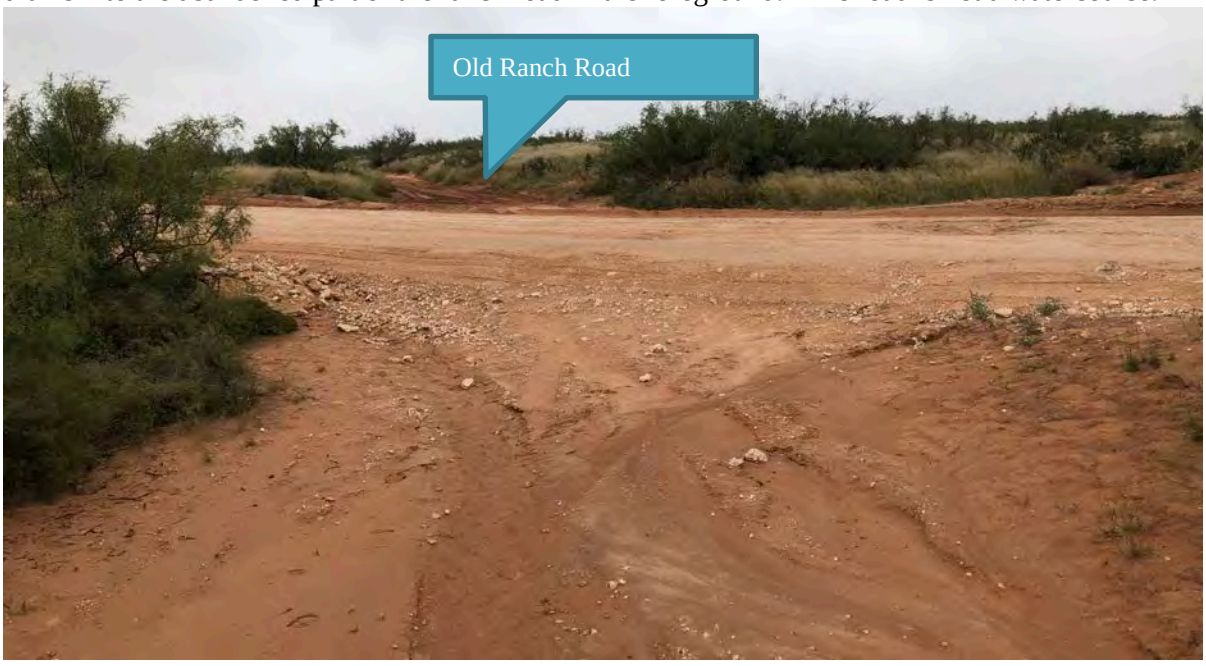
[2] The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair.

Site Photographs

Photograph of “East Windmill” located about 750 feet from the northwestern corner of the area of interest that will include the recycling facility and containment.

Measured water level in this temporarily abandoned windmill was 127.8 feet.

The oilfield road in the center of the photograph cuts across an old ranch road. The oilfield road now drains into the abandoned part of the ranch road in the foreground. This road is not a watercourse.



A buried crude pipeline is west of the fresh water frac pond (right side of photograph)

This view to the south from the east-west oilfield road show the nature of the vegetation in the area of interest that will house the recycling facility and containment.

About 10-feet of caliche is exposed in a quarry located about 1.5 miles northeast of the area of interest. Geotechnical borings at the site suggest that caliche below the surface in the area of interest is mixed with sand horizons and may not be suitable for harvest for construction of roads and pads.

C-147

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 April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: ☒ Recycling Facility ☒ Recycling Containment*****

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

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

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

1.

Operator: : COG Operating LLC, OGRID #:__229137_____

Address: ___600 W. Illinois Ave. Midland, Texas 79707_____

Facility or well name (include API# if associated with a well): ____Fez Containment_____

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

U/L or Qtr/Qtr ___A-B-C_ _____ Section ___8_____ Township __25S_____ Range ____35E_____ County: ____Lea_____

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

2.

☒ **Recycling Facility:**

Location of (if applicable): Latitude _32.151923_____ Longitude -103.383933___ NAD83

Proposed Use: ☒ Drilling* ☒ Completion* ☒ Production* ☒ Plugging *

The re-use of produced water may NOT be used until fresh water zones are cased and cemented

☐ Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***

☒ Fluid Storage

☐ Above ground tanks ☒ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type_____

☐ Activity permitted under 19.15.36 NMAC explain type:_____ ☐ Other explain _____

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

☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date:_____

3.

☒ **Recycling Containment:**

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

Center of Recycling Containment (if applicable) Latitude _32.150020_____ Longitude __--103.386423__ NAD83

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

☒ Lined ☐ Liner type: Thickness __Secondary 40_mil Primary 60- mil ☐ LLDPE ☒ HDPE ☐ PVC ☐ Other _____

☐ String-Reinforced

Liner Seams: ☒ Welded ☐ Factory ☐ Other Volume: _2,576,097_bbl Dimensions: L__1658_ x W 970__ x D_20' below levee 10'± (below grade)

☐ 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__Deer fence with barbed wire _____

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.

NO NEW VARIANCES ARE REQUESTED

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 FIGURES 1-2	☐ 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 FIGURE 3	☐ Yes ☒ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division FIGURE 4	☐ Yes ☒ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map FIGURE 5	☐ Yes ☒ No
Within a 100-year floodplain. FEMA map FIGURE 6	☐ 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 FIGURE 7	☐ 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 FIGURE 8	☐ 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. FIGURES 1 and 7 - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 500 feet of a wetland. FIGURE 9 - 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): Timothy Reed, PG

Title: Water Resource Analyst

Signature: Tim Reed

Date: 05/16/19

e-mail address TReed@concho.com

Telephone: 432.688.6634

11.

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

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

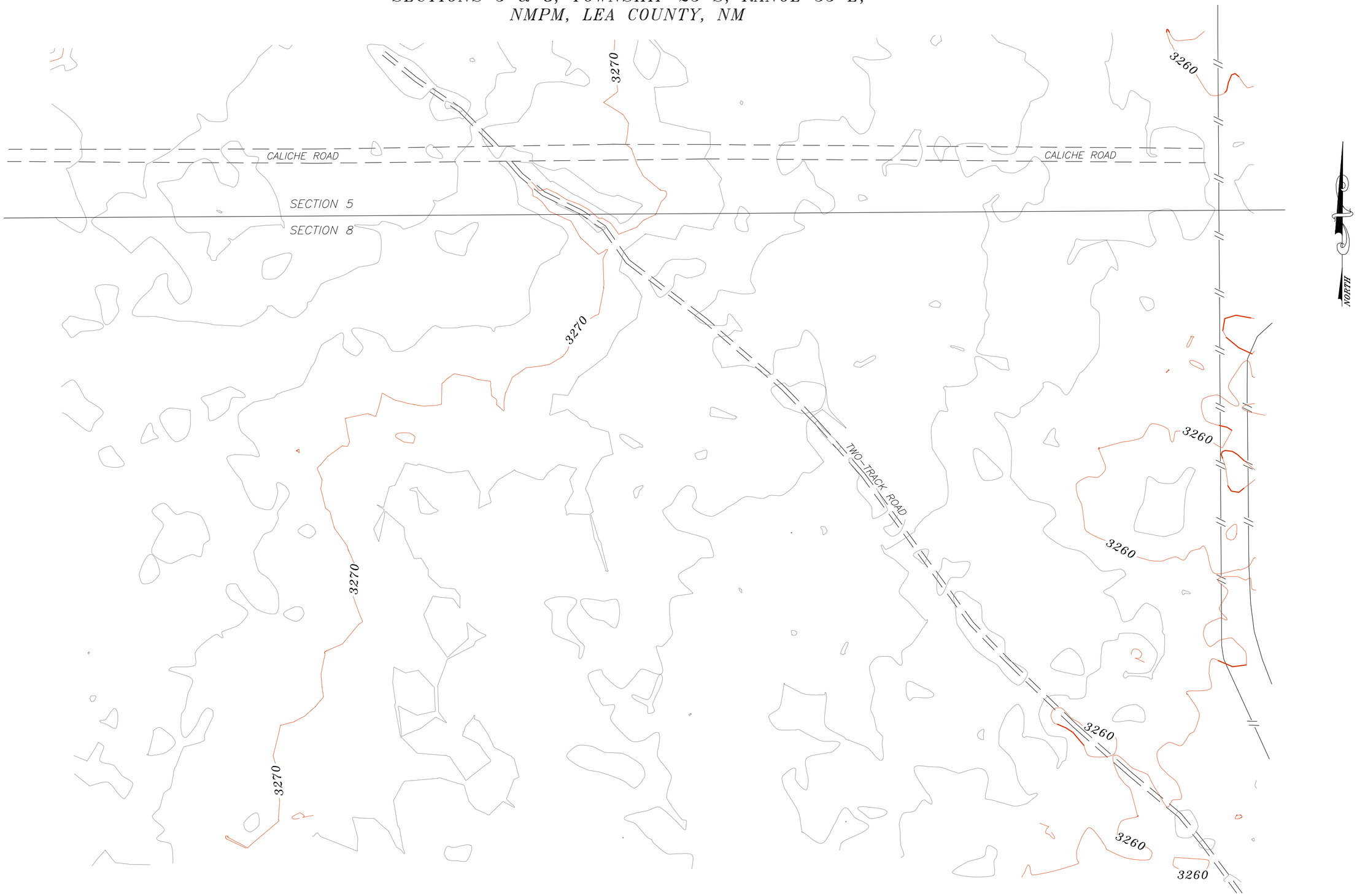
☐ OCD Conditions _____

☐ Additional OCD Conditions on Attachment

SURVEY FOR CONTAINMENT AND RECYCLING FACILITY

FEZ PROJECT TOPOGRAPHIC SURVEY

SECTIONS 5 & 8, TOWNSHIP 25 S, RANGE 35 E,
NMPM, LEA COUNTY, NM



LEGEND:

- *– ROAD AS NOTED*
- *– BURIED PIPELINE (APPROX. LOCATION)*
- *– MAJOR CONTOUR INTERVAL*
- *– MINOR CONTOUR INTERVAL*

NOTES:

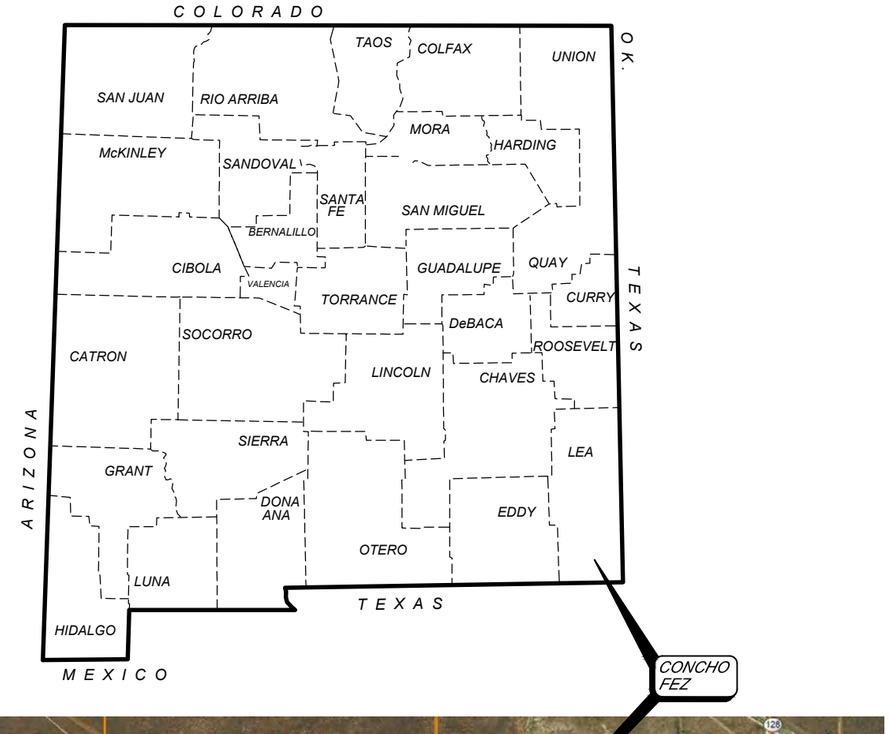
- *– THIS PLAT IS FOR REFERENCE & ORIENTATION PURPOSES ONLY AND NOT TO BE USED FOR DESIGN WORK.*
- *– THIS IS NOT A BOUNDARY SURVEY OR LAND DIVISION OF ANY KIND.*
- *– MINOR CONTOUR INTERVAL = 2 FEET*
  MAJOR CONTOUR INTERVAL = 10 FEET

150 0 150 300
SCALE: 1"=150'

HARCROW SURVEYING, LLC
2314 W. MAIN ST, ARTESIA, N.M. 88210
PH: (575) 746-2158 FAX: (575) 746-2158
c.harcrow@harcrowsurveying.com

SURVEY DATE: NOVEMEBER 9, 2018		TOPOGRAPHIC
DRAFTING DATE: NOVEMBER 29, 2018		PAGE: 1 OF 1
APPROVED BY: CH	DRAWN BY: SP	FILE: 18-MISC.

RECYCLING CONTAINMENT DESIGN DRAWINGS



COG OPERATING, LLC

FEZ PRODUCED WATER RECYCLING FACILITY
S8 T25S R35E
LEA COUNTY, NM

INDEX OF SHEETS

GENERAL NOTES

1. ALL BOUNDARY, TOPOGRAPHIC AND UTILITY INFORMATION SHOWN ARE BASED ON SURVEY INFORMATION FURNISHED BY HARCROW SURVEYING, LLC.
2. THE CONTRACTOR SHALL IDENTIFY AND LOCATE UTILITY LINES, MONITORING WELLS, SURVEY MONUMENTS, AND OTHER NEARBY STRUCTURES PRIOR TO PERFORMING WORK.
3. COORDINATE INFORMATION IS BASED ON STATE PLANE COORDINATES, NEW MEXICO EAST, NAD 83. THE CONTRACTOR SHALL IDENTIFY ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION.
4. ALL GEOMEMBRANES SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

3/31/2019

Magrym Consulting P.C.
1510 North Acres Drive
Lovington, NM 88260
(719) 332-8665
www.magrym.com
TBPE F-19848

R-X	DESCRIPTION	DATE	BY
	REVISIONS (OR CHANGE NOTICES)		

COG Operating, LLC
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701
(432) 683 7443
www.concho.com

Mustang Extreme Environmental Services
5049 Edwards Ranch Rd. Suite 200
Fort Worth, TX 76109
(817) 441-1235
www.mustangextreme.com

FEZ PRODUCED WATER RECYCLING FACILITY
S8 T25S R35E
LEA COUNTY, NM
COG OPERATING, LLC

COVER SHEET

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: COVER	SHEET: 1COVER

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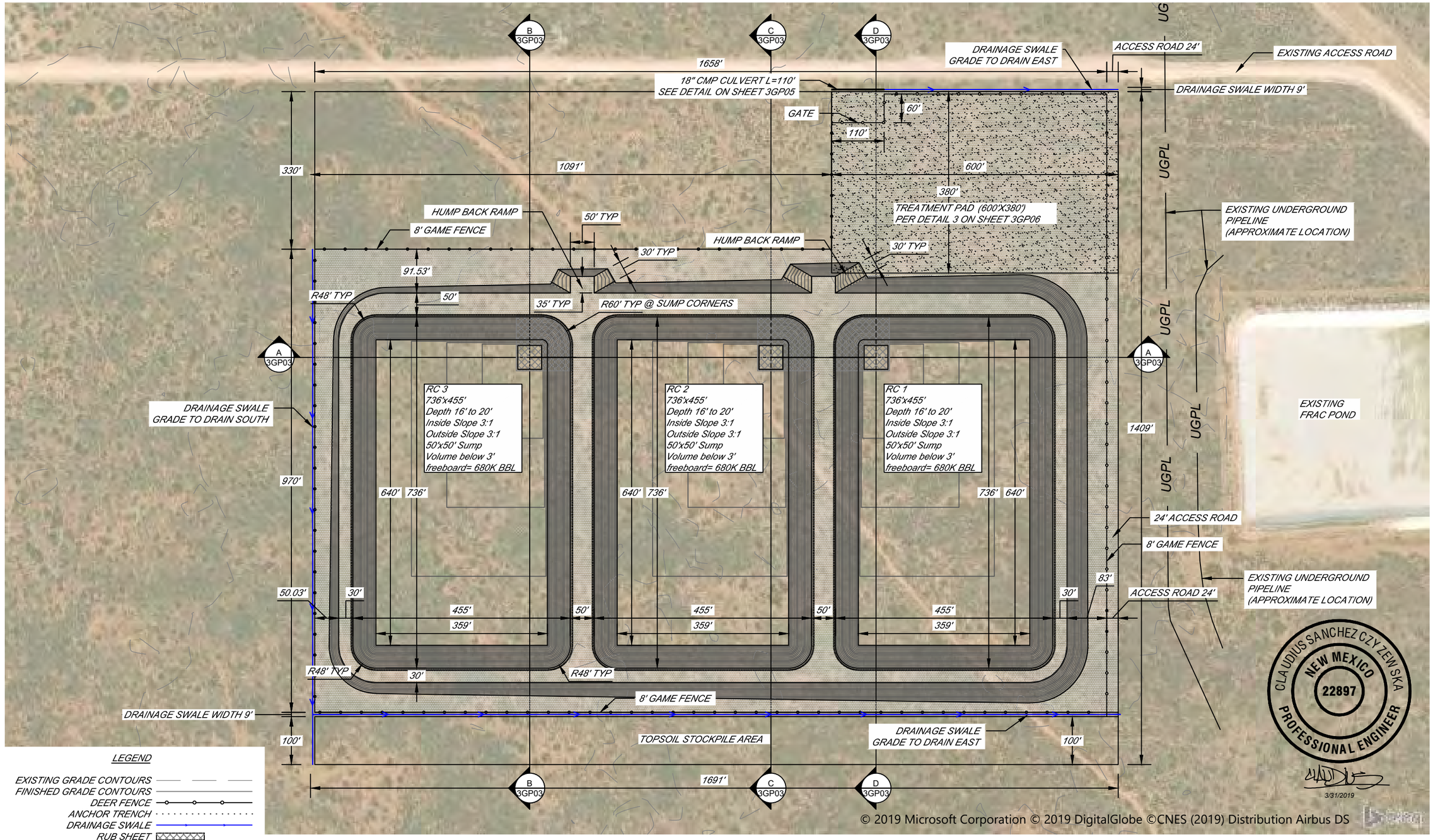

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www.magrym.com
TBPE F-19848

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FEZ PRODUCED WATER RECYCLING FACILITY
S8 T25S R35E
LEA COUNTY, NM
COG OPERATING, LLC

SITE PLAN

HORIZONTAL SCALE: 1"=200'	VERTICAL SCALE: NTS
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: HORIZONTAL LAYOUT	SHEET: 1HL01

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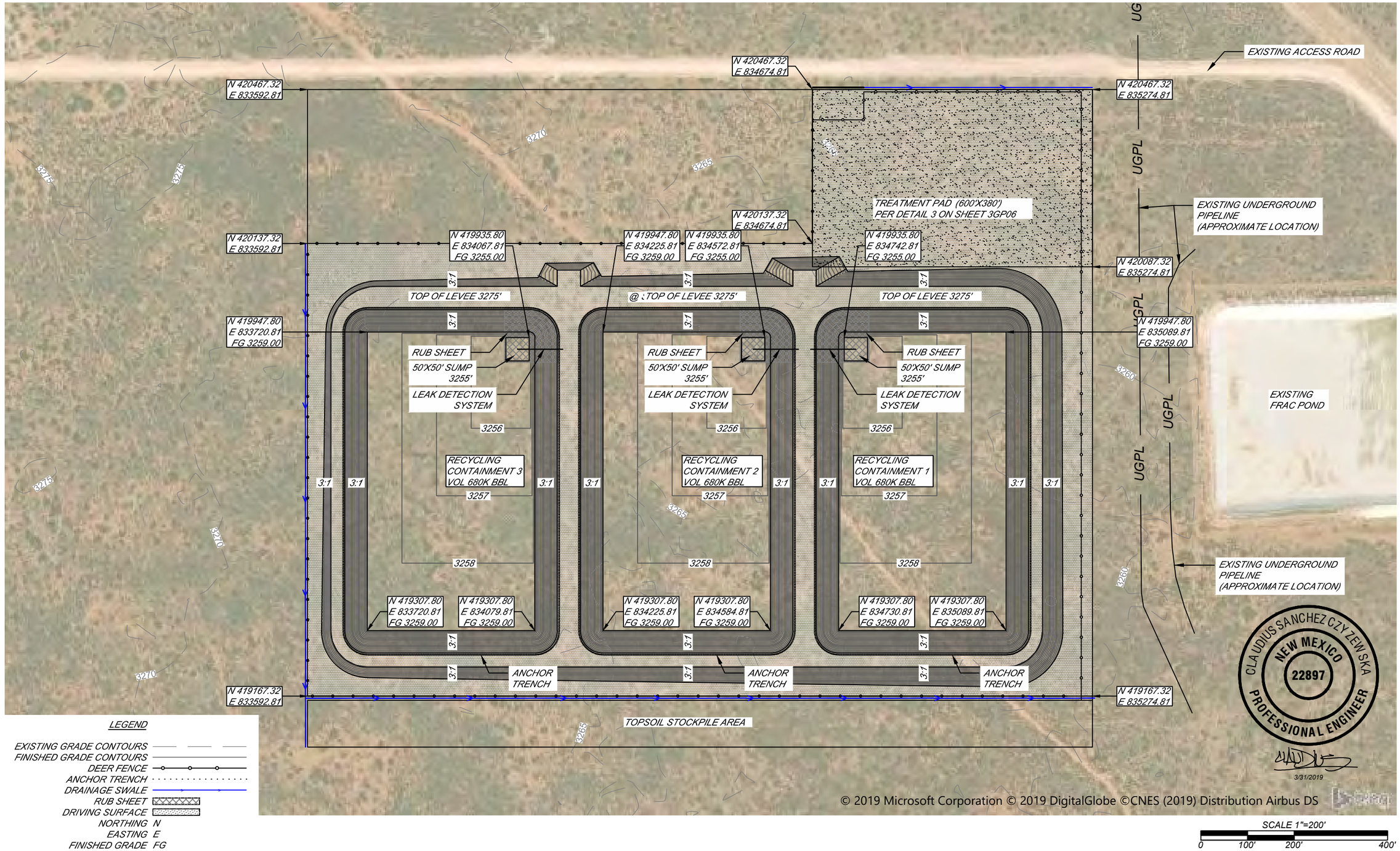

LEGEND

- EXISTING GRADE CONTOURS
- FINISHED GRADE CONTOURS
- DEER FENCE
- ANCHOR TRENCH
- DRAINAGE SWALE
- RUB SHEET
- DRIVING SURFACE
- NORTHING N
- EASTING E
- FINISHED GRADE FG

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FEZ PRODUCED WATER RECYCLING FACILITY
S8 T25S R35E
LEA COUNTY, NM
COG OPERATING, LLC

GRADING PLAN

HORIZONTAL SCALE: 1"=200'	VERTICAL SCALE: NTS
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: GRADING PLANS	SHEET: 3GP01

Drawing File: Z:\19-105 Mustang Concho Fez Redesign\04_CIVIL\CADD\Design\Drawings\19-105 Grading_4.dwg

SUMMARY OF QUANTITIES		
ITEM	UNIT	QTY
CLEARING AND GRUBBING	ACRE	51
ESTIMATED TOPSOIL (6 INCHES AVERAGE)	CUBIC YARD	35,000 (BANK)
ESTIMATED IMPORT FOR TREATMENT PAD	CUBIC YARD	8,500 (BANK)
ESTIMATED CUT (INCLUDING TOPSOIL)	CUBIC YARD	209,894 (BANK)
ESTIMATED FILL (ABOVE EXISTING GRADE)	CUBIC YARD	167,576 (BANK)
8' GAME FENCE	LINEAR FEET	5,880
DRAINAGE SWALE	LINEAR FEET	3,370
18" CMP CULVERT GAGE 16 2.75"X1.25 CORR	LINEAR FEET	110
60 MIL HDPE GEOMEMBRANE (TEXTURED)	SQUARE FEET	42,000
60 MIL HDPE GEOMEMBRANE (SMOOTH)	SQUARE FEET	1,036,000
200 MIL GEONET	SQUARE FEET	1,036,000
40 MIL HDPE GEOMEMBRANE	SQUARE FEET	1,036,000
10 OZ. GEOTEXTILE	SQUARE FEET	1,036,000
6" HDPE DR11 PIPE WITH PERFORATIONS IN SUMP	LINEAR FEET	345
DRAIN ROCK	CUBIC YARD	3
ANCHOR TRENCH	LINEAR FEET	6,882

STAGE-STORAGE					
RC3 ELEVATION (FT)	RC3 VOLUME (BBL)	RC2 ELEVATION (FT)	RC2 VOLUME (BBL)	RC1 ELEVATION (FT)	RC1 VOLUME (BBL)
3255	0	3255	0	3255	0
3256	2,122	3256	2,122	3256	2,122
3257	10,304	3257	10,304	3257	10,304
3258	28,603	3258	28,603	3258	28,603
3259	61,077	3259	61,077	3259	61,077
3260	102,526	3260	102,526	3260	102,526
3261	145,049	3261	145,049	3261	145,049
3262	188,656	3262	188,656	3262	188,656
3263	233,358	3263	233,358	3263	233,358
3264	279,163	3264	279,163	3264	279,163
3265	326,083	3265	326,083	3265	326,083
3266	374,126	3266	374,126	3266	374,126
3267	423,302	3267	423,302	3267	423,302
3268	473,622	3268	473,622	3268	473,622
3269	525,095	3269	525,095	3269	525,095
3270	577,731	3270	577,731	3270	577,731
3271	631,540	3271	631,540	3271	631,540
3272	686,531	3272	686,531	3272	686,531
3273	742,715	3273	742,715	3273	742,715
3274	800,101	3274	800,101	3274	800,101
3275	858,699	3275	858,699	3275	858,699

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER

3/31/2019

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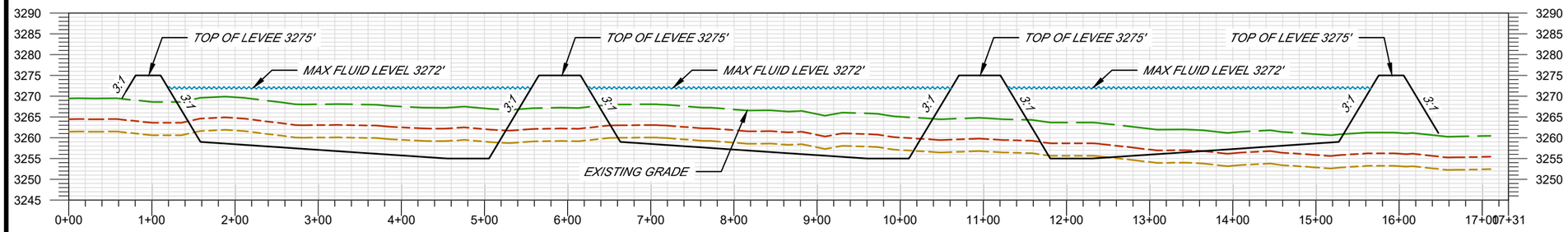
COG OPERATING, LLC

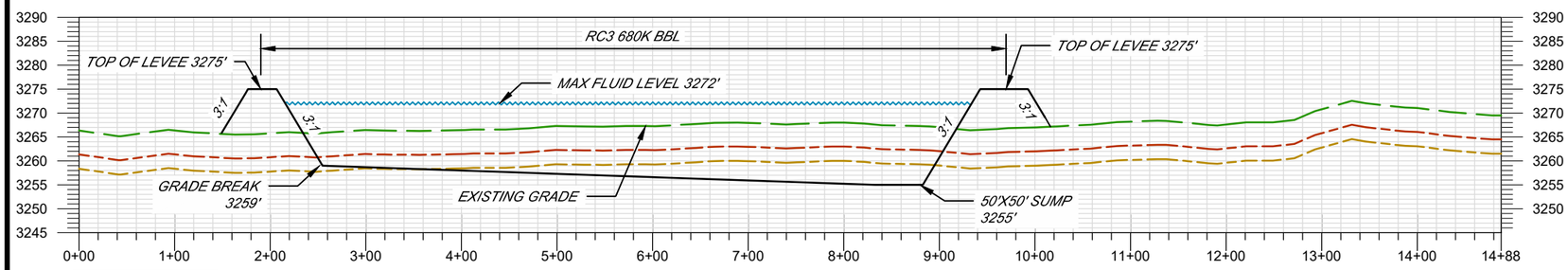
SUMMARY OF QUANTITIES

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: GRADING PLANS	SHEET: 3GP02

Drawing File: Z:\19-105 Mustang Concho Fez Redesign\04_CIVIL\CADD\Design\Drawings\19-105 Grading_4.dwg

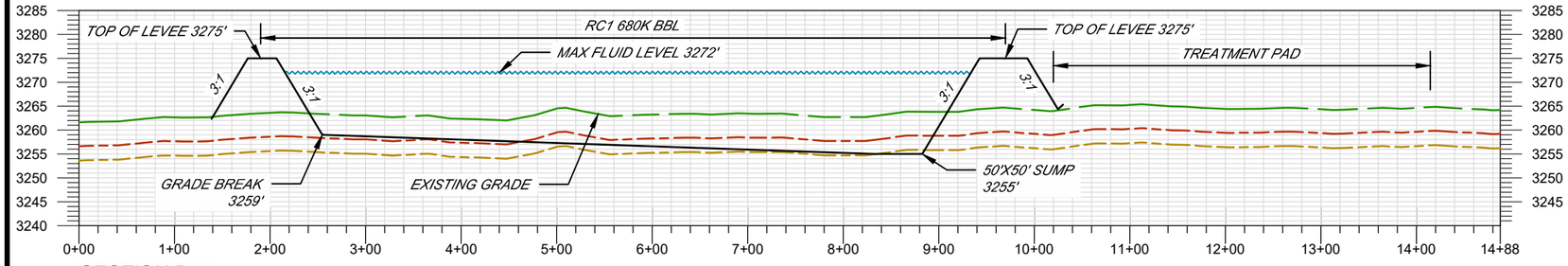


SECTION A

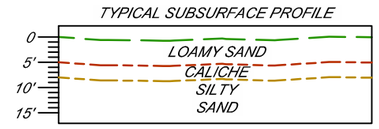


SECTION B

SECTION C



SECTION D



3/31/2019

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FEZ PRODUCED WATER RECYCLING FACILITY
S8 T25S R35E
LEA COUNTY, NM
COG OPERATING, LLC

CROSS SECTIONS

HORIZONTAL SCALE: 1"=150'	VERTICAL SCALE: 1" = 30'
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: GRADING PLANS	SHEET: 3GP03

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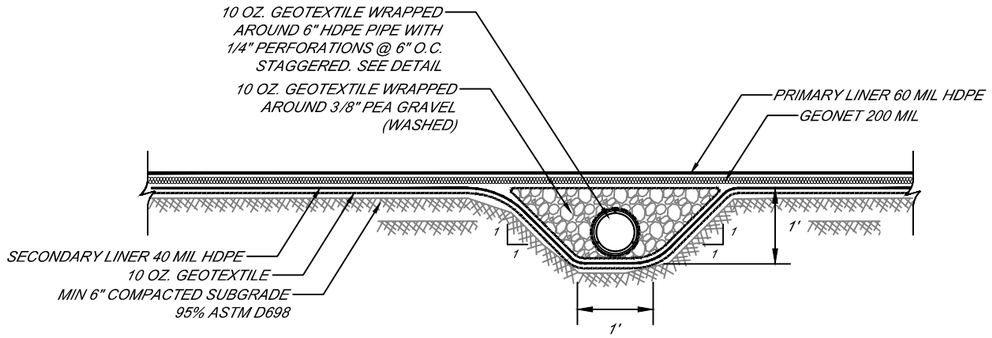
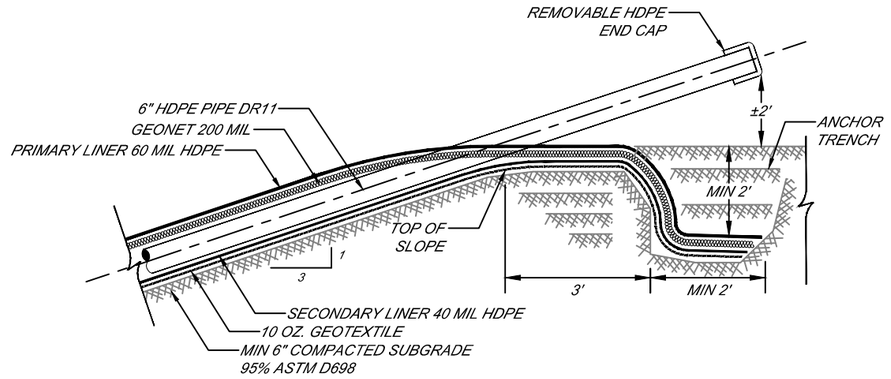
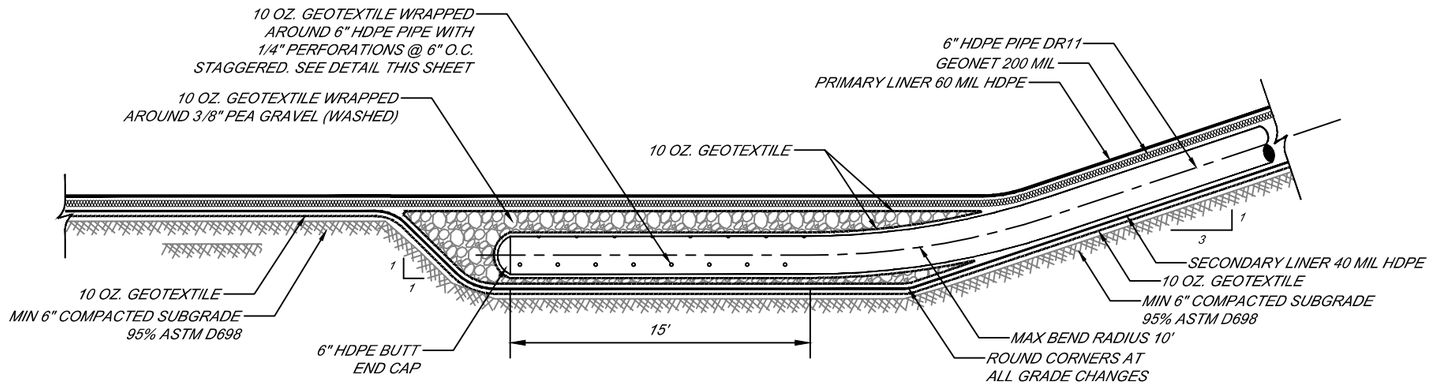


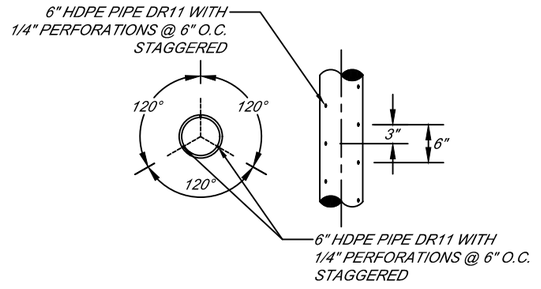
1 3GP04 **LEAK DETECTION SYSTEM SECTION A**
NOT TO SCALE



2 3GP04 **LEAK DETECTION SYSTEM PIPE RISER**
NOT TO SCALE



3 3GP04 **LEAK DETECTION SYSTEM SECTION B**
NOT TO SCALE



4 3GP04 **LEAK DETECTION SYSTEM PERFORATED PIPE**
NOT TO SCALE

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22897
PROFESSIONAL ENGINEER
3/31/2019

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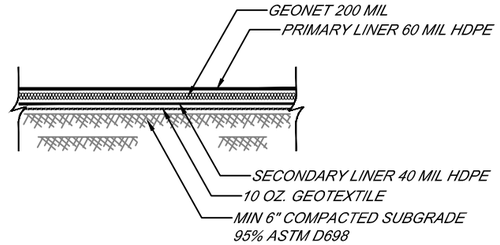
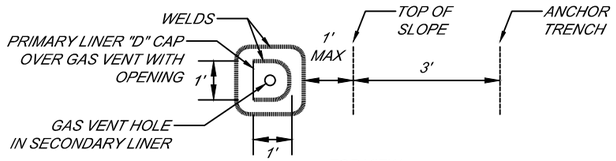
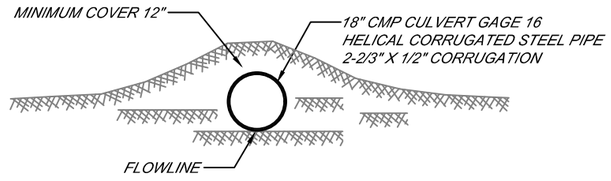


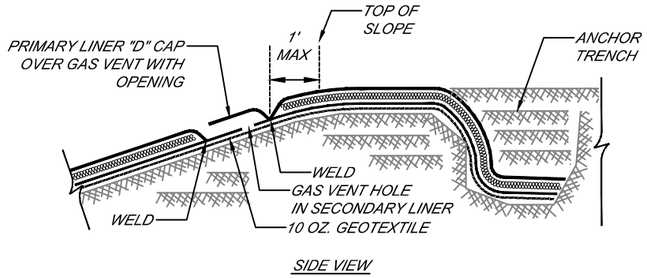
1 / 3GP05 **TYPICAL POND BOTTOM LINER**
NOT TO SCALE



TOP VIEW

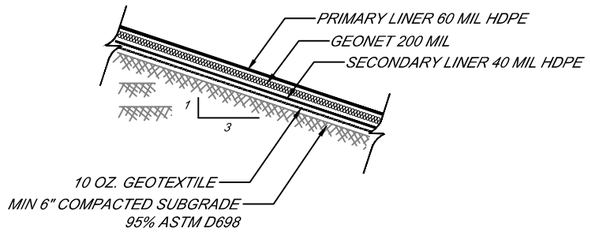


6 / 3GP05 **TYPICAL CULVERT DETAIL**
NOT TO SCALE



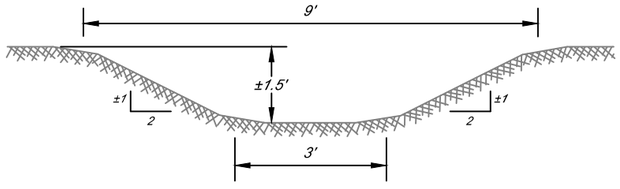
SIDE VIEW

NOTE:
GAS VENT SPACING SHALL BE INSTALLED
PER MANUFACTURER'S RECOMMENDATIONS



2 / 3GP05 **TYPICAL POND SLOPE LINER**
NOT TO SCALE

4 / 3GP05 **TYPICAL GAS VENT**
NOT TO SCALE



3 / 3GP05 **TYPICAL DRAINAGE SWALE**
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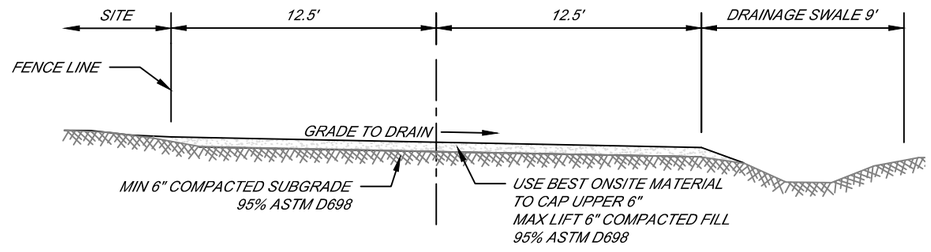

5 / 3GP05 **24' ROAD TYPICAL SECTION**
LOOKING NORTH
NOT TO SCALE

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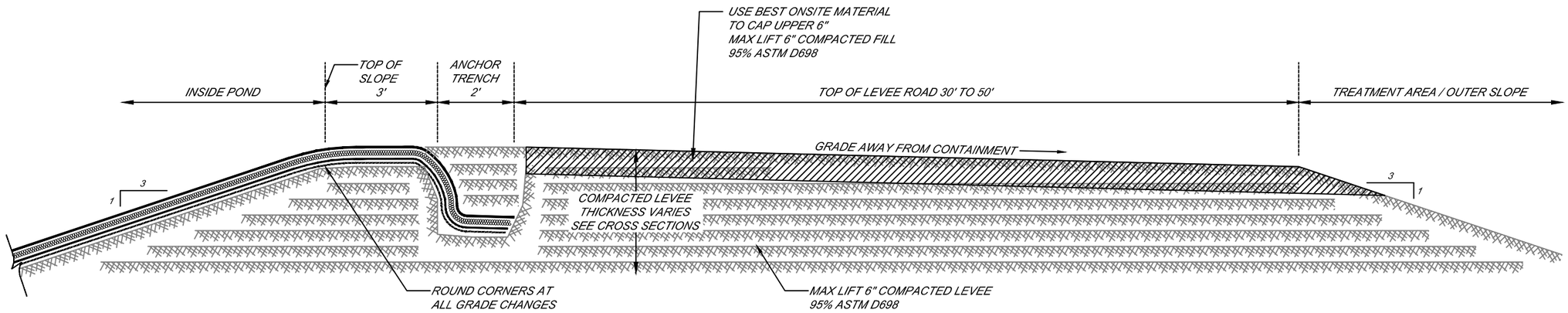
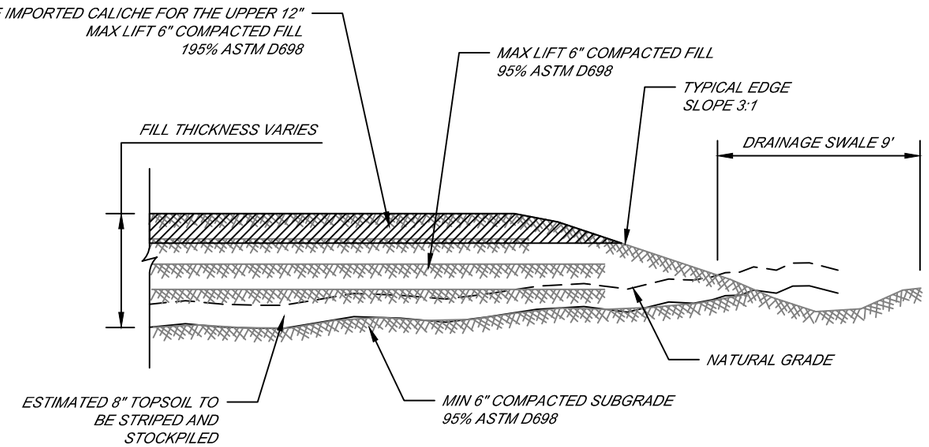


1 / 3GP06 TYPICAL LEVEE SECTION
NOT TO SCALE



2 / 3GP06 TYPICAL TREATMENT PAD SECTION
NOT TO SCALE

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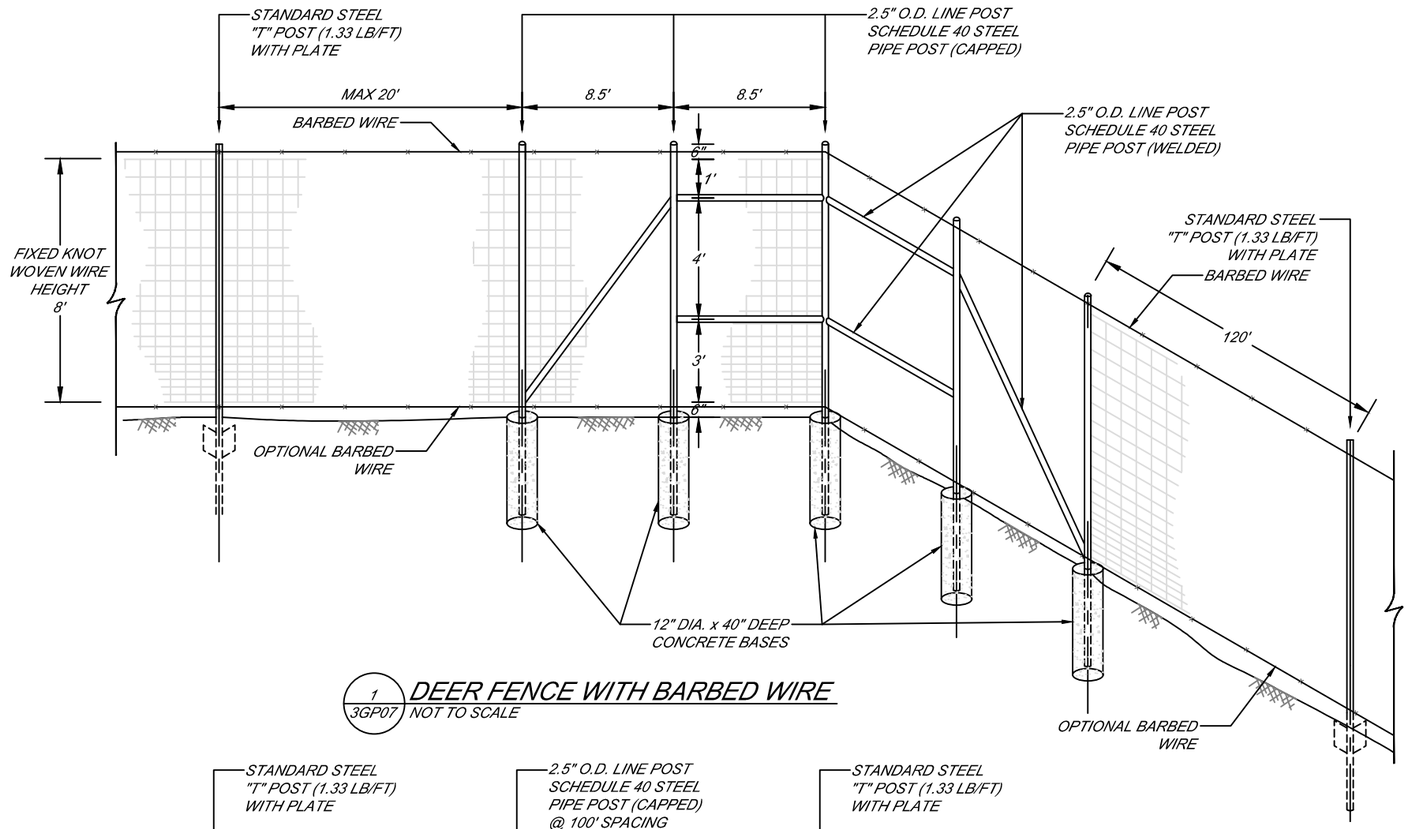
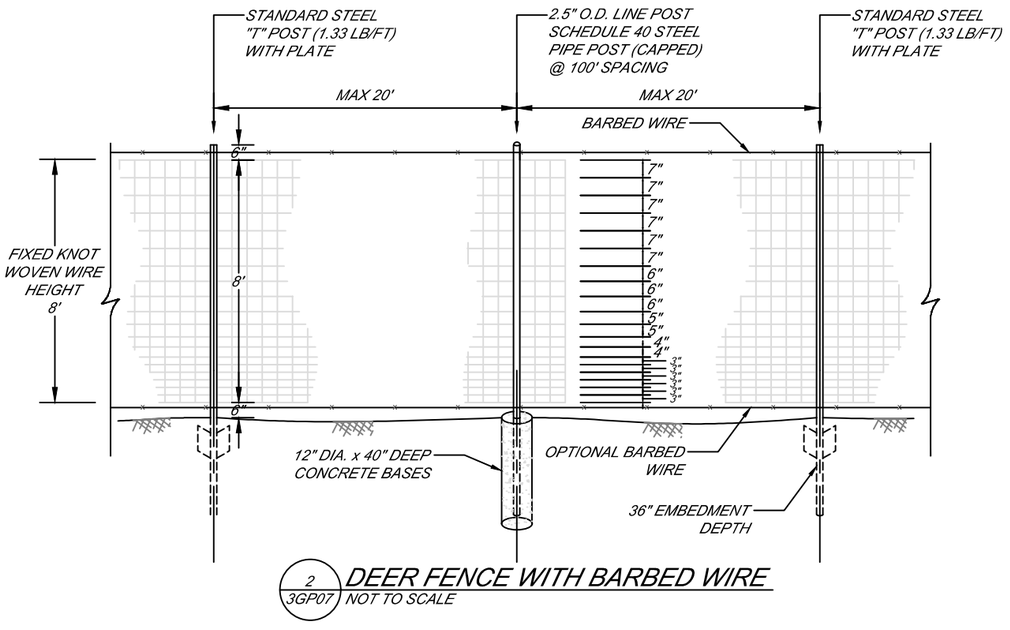


1 / 3GP07 DEER FENCE WITH BARBED WIRE
NOT TO SCALE



2 / 3GP07 DEER FENCE WITH BARBED WIRE
NOT TO SCALE

NOTES:

1. FOR WOVEN WIRE, TOP AND BOTTOM STRANDS SHALL BE 12½ GAUGE OR HEAVIER; INTERMEDIATE STRANDS SHALL BE 14½ GAUGE OR HEAVIER.
2. FOR BARBED WIRE, EACH LINE WIRE SHALL CONSIST OF 2 TWISTED STRANDS OF 12½ GAUGE WIRE OR HI-TENSILE STRENGTH WIRE OF 15½ GAUGE. THE BARBS SHALL BE EITHER 2-POINT BARBS ON APPROXIMATE 4 INCH CENTERS OR 4-POINT BARBS ON APPROXIMATE 5 INCH CENTERS.
3. ALL WIRE SHALL HAVE CLASS III GALVANIZATION.
4. STANDARD WOVEN WIRE FENCES MAY HAVE LINE POSTS SPACED UP TO 15 FEET APART. HI-TENSILE WOVEN WIRE FENCE MAY HAVE LINE POSTS SPACED UP TO 20 FEET APART. CLOSER SPACING IS REQUIRED WHERE NEEDED FOR INCLINES OR CHANGES IN TOPOGRAPHY.
5. CONCRETE FOOTINGS SHALL HAVE TOPS CROWNED.
6. TO PREVENT WIRE FROM SLIPPING ON STEEL POST, DOUBLE WRAP ALL WIRE AROUND STEEL POST OR WELD CHAIN LINK LOOPS.

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GENERAL SITING CRITERIA DEMONSTRATION AND SITE SPECIFIC GROUNDWATER DATA

8.
Siting Criteria for Recycling Containment

Instructions: The applicant must provide attachments that demonstrate compliance for each siting criteria below as part of the applica 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 FIGURES 1-2

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 FIGURE 3

Within the area overlying a subsurface mine.
- Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division FIGURE 4

Within an unstable area.
- Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map FIGURE 5

Within a 100-year floodplain. FEMA map FIGURE 6

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 FIGURE 7

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 FIGURE 8

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. FIGURES 1 and 7
- NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site

Within 500 feet of a wetland. FIGURE 9
- US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site

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 100 feet beneath the area of interest that will include the location of the recycling containment.

Figure 1 is a geologic/ topographic map (metric unit elevations) that shows:

1. The Fez Containment area identified by the blue rectangle. Within this 100+-acre area will be the proposed containment identified in the C-147. This portion of this submission will also provide a siting criteria demonstration for future AST containments and/or additional in-ground containments.
2. Water wells from the OSE database as a blue triangle inside colored circles that indicate well depth. 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. Additionally, the OSE database can include locations of proposed wells (i.e. permit applications). The permit data generally show "no date" and "DTW=0" as data. Figure 1 has screened the OSE data and eliminated permit information from Figure 1.
3. Water wells from the USGS database as large triangles color-coded to the formation from which the well draws water.
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. Note that C-02388 northwest of the containment area reports a depth to water of 165 feet. Hicks Consultants measured depth to water in this well on October 16, 2018 as 127.8 feet below top of casing (see photographs at the end of the transmittal letter)

Figure 2 is an area topographic map that shows:

1. The Fez Containment area identified by the blue rectangle with the estimated surface elevation noted.
2. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface.
3. Water wells measured by professionals and documented in published reports or by staff of Hicks Consultants (Misc) .
4. Isocontour lines displaying the elevation of the groundwater surface.

Geology

Quaternary Age eolian and piedmont deposits (Qe/Qp on Figures 1 and 2) are the dominant exposed material in the area (see Site Photographs). These deposits are generally a thin covering of the underlying Tertiary Ogallala Formation or, in some places, the redbeds of the Dockum Group. The Ogallala Formation (To) is locally exposed in the northeast quadrant of Figure 2. It consists primarily of sand with some clay, silt and gravel, generally capped by caliche. Caliche is exposed at a quarry site located about 1.5 miles northwest of the 100+ acre area of interest.

Based on information from Ground-Water Report 6 (GWR-6) *Geology and Ground-Water Conditions in Southern Lea County, New Mexico* by Alexander Nicholson and Alfred Clebsch

(1961), the top of the redbeds in the area of the Fez containment is about 3175 feet above sea level (see Plate 1 of GWR-6). Given the 3263-foot elevation of ground surface at the Fez site, the thickness of the Ogalalla should be about (3263-3175=) 88 feet. Figure 2 shows the Chinle/Dockum Formation (T(c) cu) exposed at the surface about 3 miles southeast of the Fez location, therefore the thickness of the Ogallala at that location is zero. Given the measured depth to water of 127.8 feet and the estimated depth to the base of the Ogallala of 88 feet, the Ogallala is probably unsaturated beneath the area of the containment.

Topographically, the area around the containment area slopes gently to the northeast toward Antelope Draw.

Groundwater Data

We relied upon the most recent data measured by the USGS and published data to create the water table elevation map shown in Figure 2. While the "Misc" well data (see Figure 1) are generally measured water levels, this dataset can contain errors (generally of location) that are not present in the USGS data. 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. Based upon our field survey and examination of Google Earth images, we are confident that the wells shown Figure 2 are located within ¼ mile of the plotted point.

For the potentiometric surface map (Figure 2), we honored all data that we know are accurate to the best of our knowledge. From the data presented, we conclude:

- The elevation of the groundwater surface beneath the area in which the Fez Containment will be constructed is about 3140 feet above mean sea level.
- The well nearest (northwest) of the proposed containment has a 2018 measured depth to water of 127.8 and groundwater elevation of 3151.2 feet
- The distance between the bottom of the containment and the potentiometric surface of the regional aquifer is approximately (3263-3140-25=) 98 feet.

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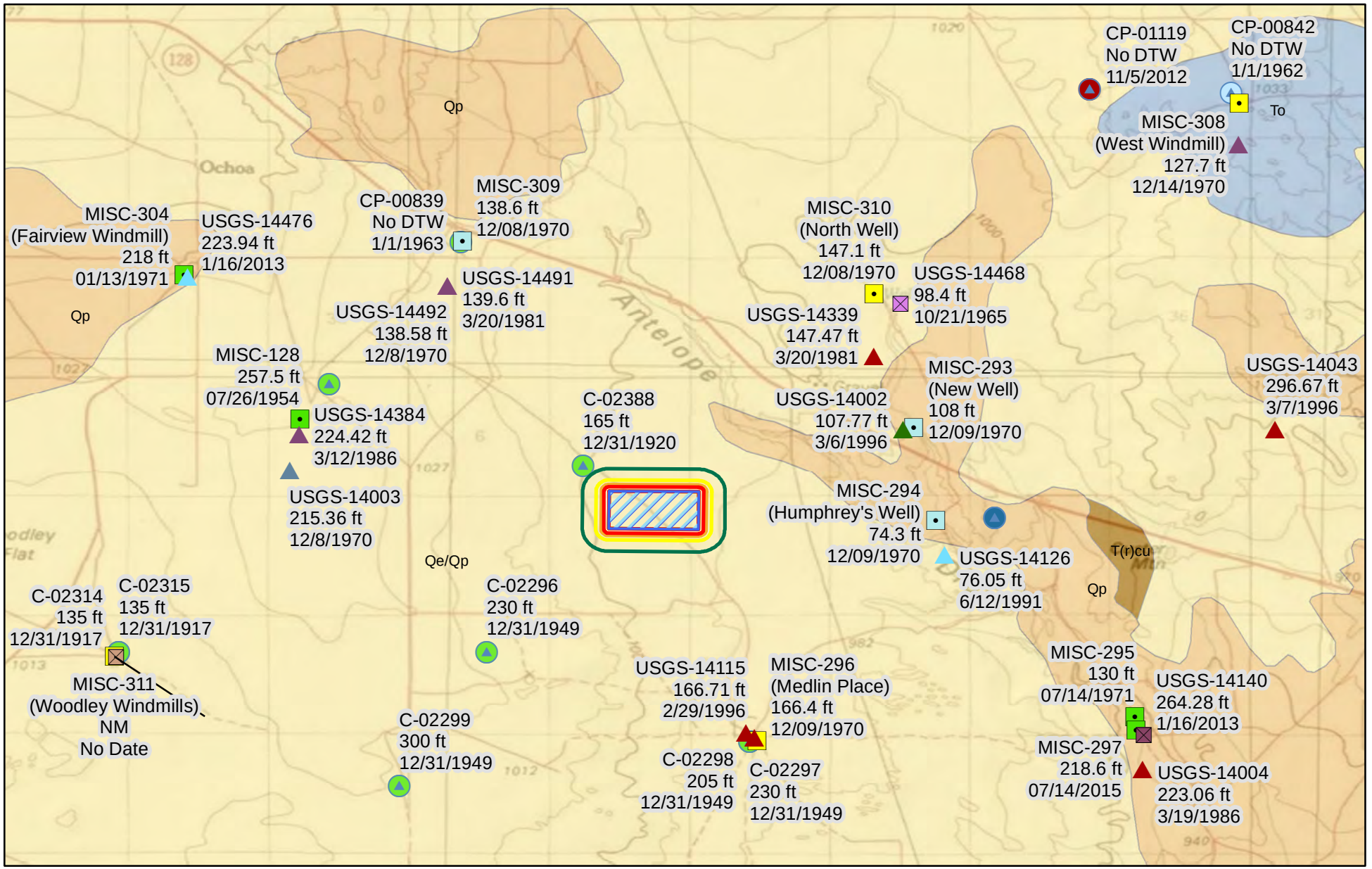

N W E S

0 0.5 1 Miles

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
	Fez Containment	November 2018

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Legend

Containment Area

Distance from Containment Area

- 200 ft
- 300 ft
- 500 ft
- 1000 ft

USGS Gauging Station (DTW, Date)

Aquifer Code, Well Status

- Alluvium/Bolsom
- Alluviu/Bolsom, Site was being pumped.
- Ogallala
- Ogallala, Site had been pumped recently.
- Chinle
- Chinle, Site was being pumped.
- Santa Rosa
- Not Defined

Misc. Water Wells (Well ID, DTW)

Well Depth (ft)

- No Data
- <= 150
- 151 - 350

OSE Water Wells (DTW, Date)

Well Depth (ft)

- <= 150
- 151 - 350
- 501 - 1000
- > 1000

NM Geology

Map Unit, Description

- Qe/Qp, Quaternary-Eolian Piedmont Deposits
- Qp, Quaternary-Piedmont Alluvial Deposits
- T(r)cu, Triassic-Upper Chinle Group
- To, Tertiary-Ogallala Formation

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
	Fez Containment	November 2018

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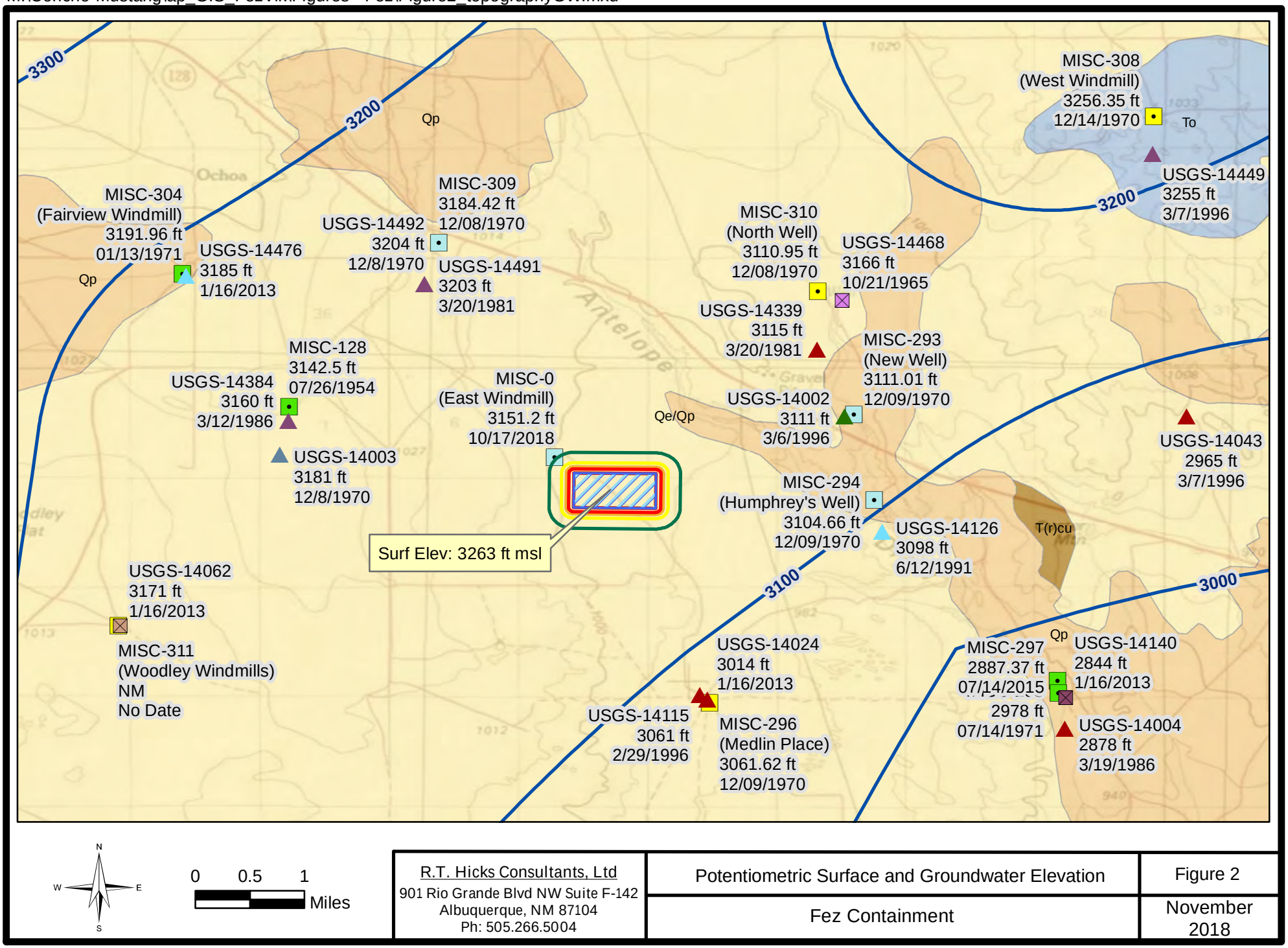

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Potentiometric Surface and Groundwater Elevation Fez Containment	Figure 2 November 2018

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Legend

Containment Area

Distance from Containment Area

- 200 ft
- 300 ft
- 500 ft
- 1000 ft

Potentiometric Surface (ft msl)

Isocontours

- Isocontour

USGS Gauging Station (GW Elev, Date)

Aquifer Code, Well Status

- Alluvium/Bolsom
- Alluviu/Bolsom, Site was being pumped.
- Ogallala
- Ogallala, Site had been pumped recently.
- Chinle
- Chinle, Site was being pumped.
- Santa Rosa
- Not Defined

Misc. Water Wells (GW Elev, Date)

Well Depth (ft)

- No Data
- <= 150
- 151 - 350

NM Geology

Map Unit, Description

- Qe/Qp, Quaternary-Eolian Piedmont Deposits
- Qp, Quaternary-Piedmont Alluvial Deposits
- T(r)cu, Triassic-Upper Chinle Group
- To, Tertiary-Ogallala Formation

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Potentiometric Surface and Groundwater Elevation	Figure 2 LEGEND
	Fez Containment	November 2018

Distance to Municipal Boundaries and Fresh Water Fields

Figure 3 demonstrates that the area of interest 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 11 miles to the east.
- The closest public well fields (2) belong to the City of Jal and one is within Jal and the second is about 7 miles southwest of Jal.

Distance to Subsurface Mines

Figure 4 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 about 2 miles south and 1/5 miles northwest of the area of interest..

Distance to High or Critical Karst Areas

Figure 5 shows the area of interest is not within mapped zone of high or critical with respect to BLM Karst areas.

- The proposed containment is located within a “low” potential karst area.
- The nearest “high” or “critical” potential karst area is located approximately 35 miles west of the site.
- No evidence of solution voids were observed near the site during the field inspection.
- No evidence of unstable ground was observed in the area.

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R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Municipalities and Well Fields	Figure 3
	Fez Containment	November 2018

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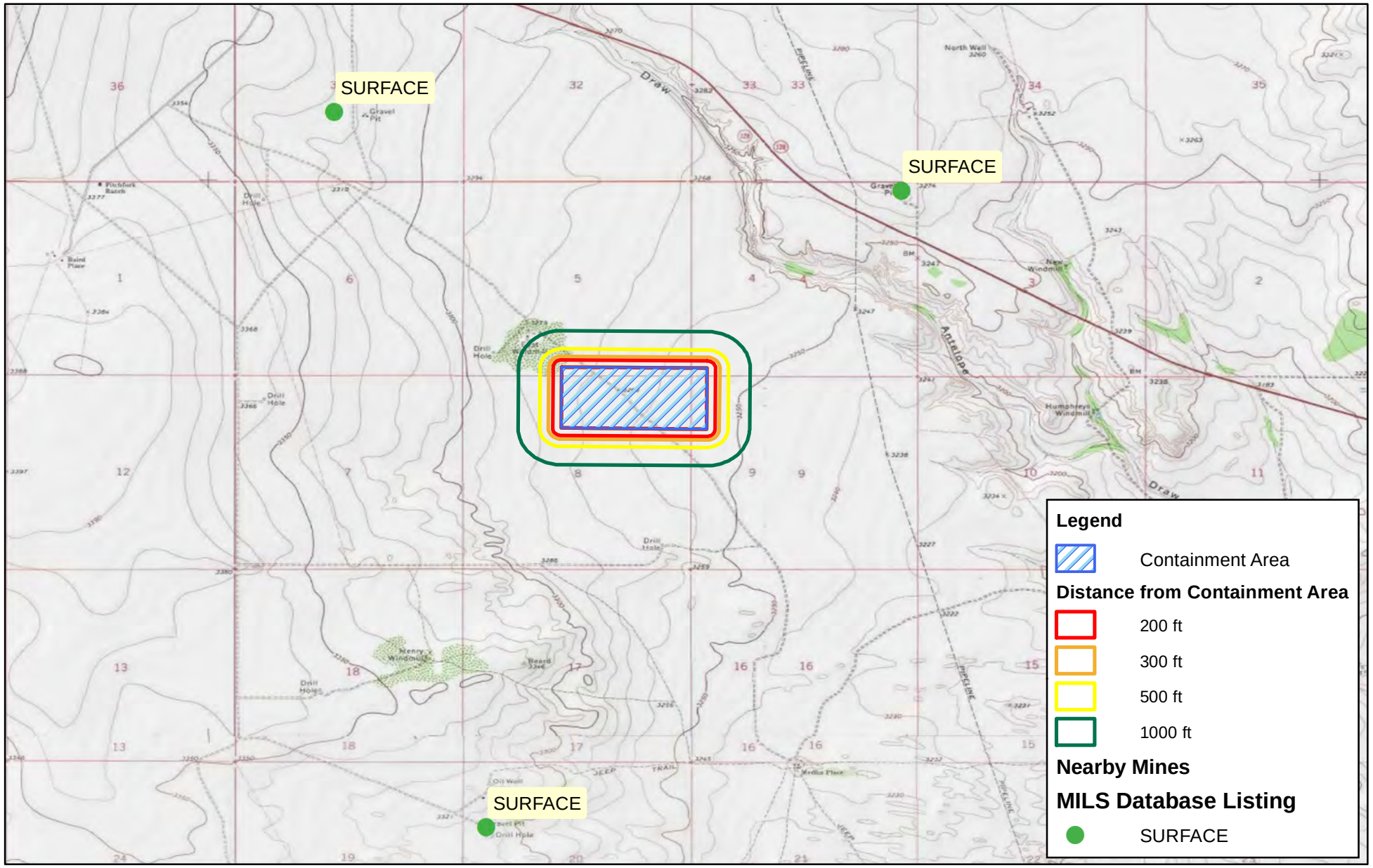

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Mines and Minerals	Figure 4
	Fez Containment	November 2018

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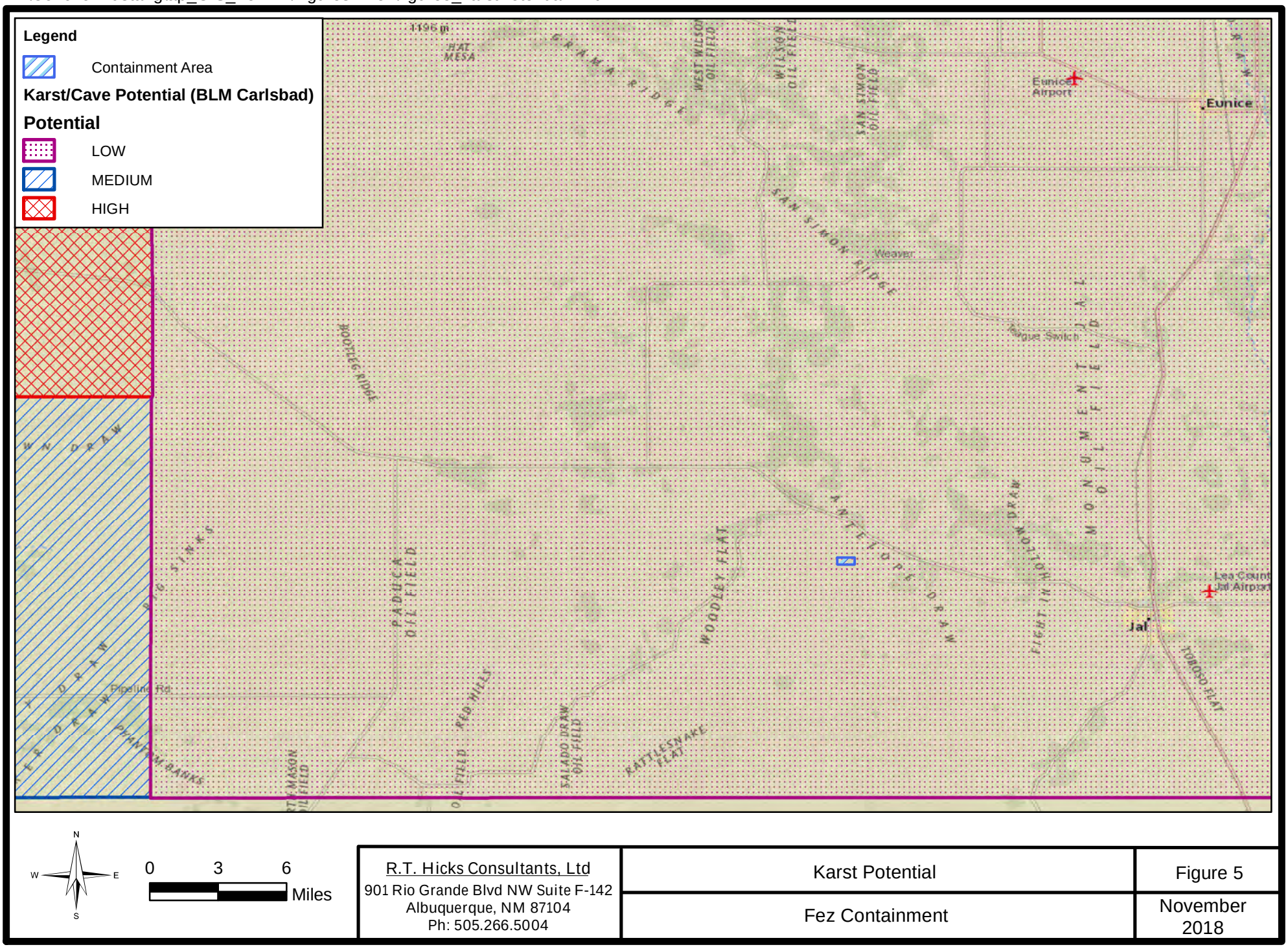


R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Karst Potential	Figure 5
	Fez Containment	November 2018

Distance to 100-Year Floodplain

Figure 6 demonstrates that the area of interest is within Zone D as designated by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

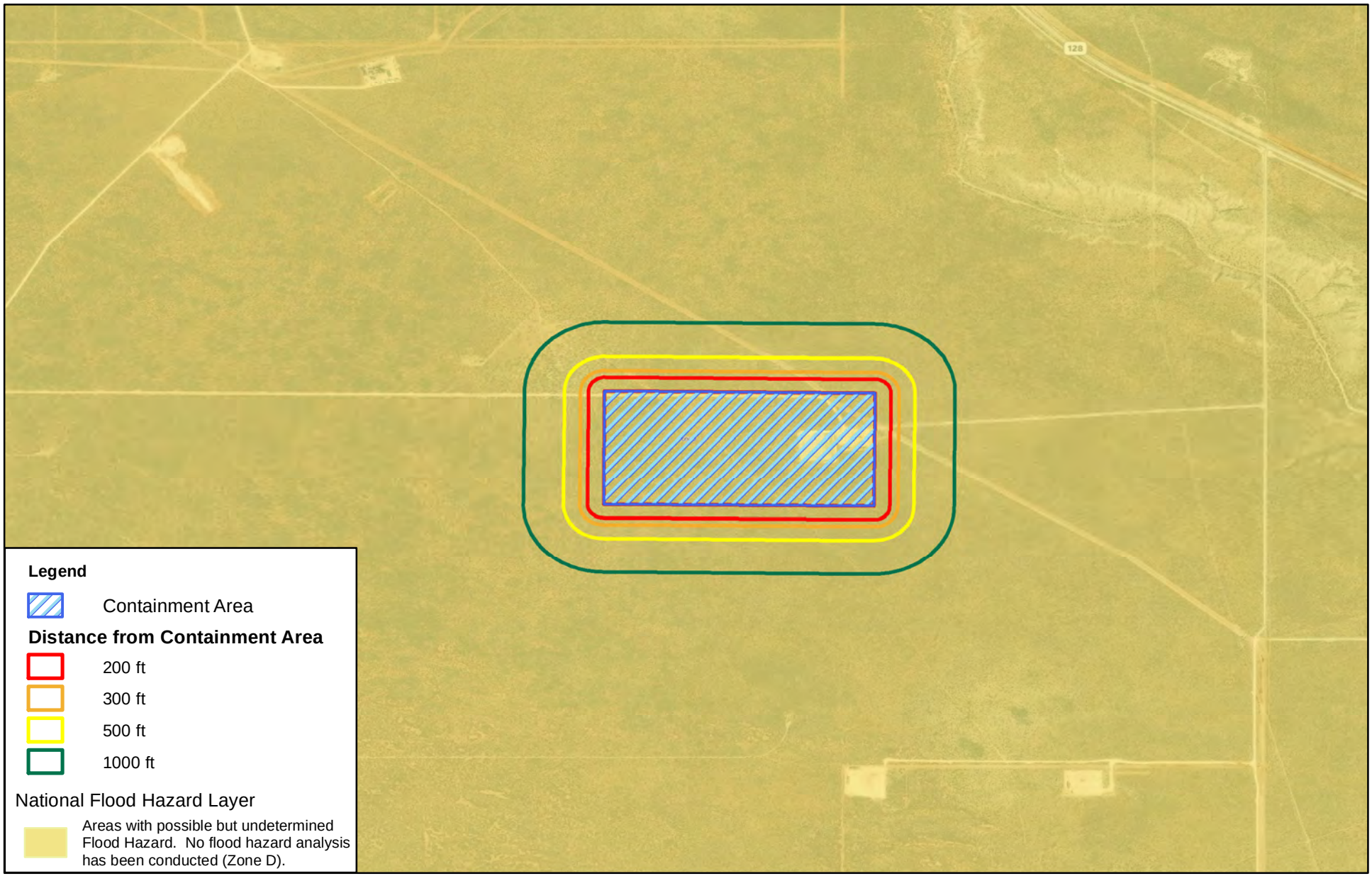
- FEMA describes the location as an area with possible but undetermined flood hazards. No flood hazard analysis has been conducted.
- Our field inspection and examination of the topography permits a conclusion that the location is not within any floodplain and has low risk for flooding.

Distance to Surface Water

Figure 7 and the site visit demonstrates that the area of interest is not within 300 feet of a continuously flowing watercourse or 200-feet of any other significant watercourse, lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark) or spring.

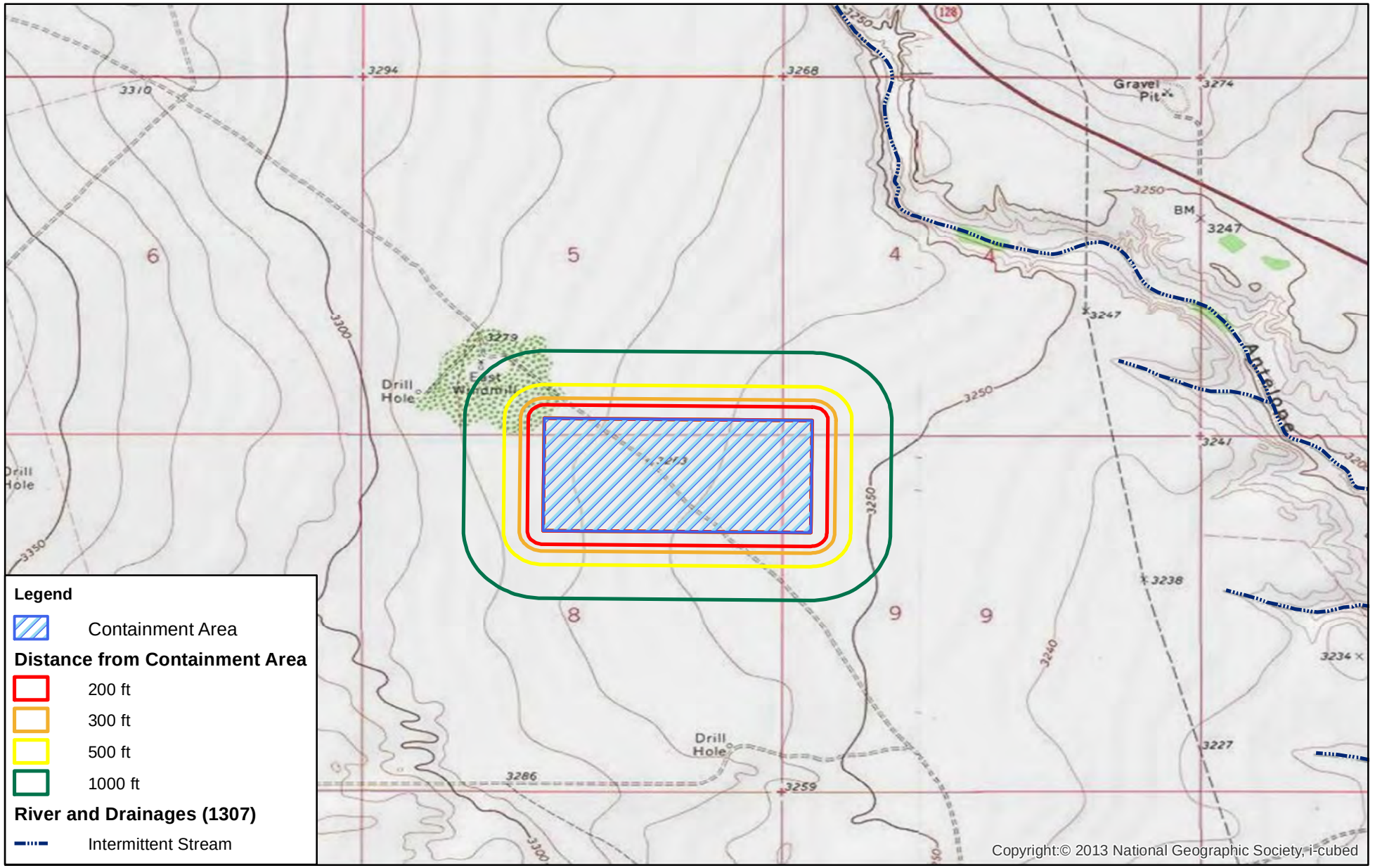
- The map depicts an "intermittent stream" (Antelope Wash) about ½ mile northeast of the Fez site.
- No continuously-flowing watercourses, significant watercourse or other water bodies, as defined by NMOCD Rules, exist within the prescribed setback criteria for the siting of a recycling containment.
- No springs were identified in Figure 7 or in the site visit.
- No playa lakes or lakebeds were identified by the site visit or databases.
- The area is characterized by low sand dunes that are stabilized by vegetation and lack of watercourses is typical of such geomorphology.

M:\Concho-Mustang\ap_GIS_FezVik\Figures - Fez\figure6_femaFlood.mxd



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	FEMA Flood Map	Figure 6
	Fez Containment	November 2018

M:\Concho-Mustang\ap_GIS_FezVik\Figures - Fez\figure7_SurfaceWater.mxd



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 7
	Fez Containment	November 2018

Distance to Permanent Residence or Structures

Figure 8 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
  - A fresh water frac pond in the eastern portion of the area of interest
  - A producing oil well, east of the fresh water frac pond within the area of interest
  - A corral associated with the "East Windmill" about 700 feet northwest of the area of interest
- No residences or other structures are in the area.

Distance to Non-Public Water Supply

Figures 1 and 7 demonstrates that the location is not within 500 horizontal feet of a spring or fresh water well used for domestic or stock watering purposes, in existence at the time of initial application.

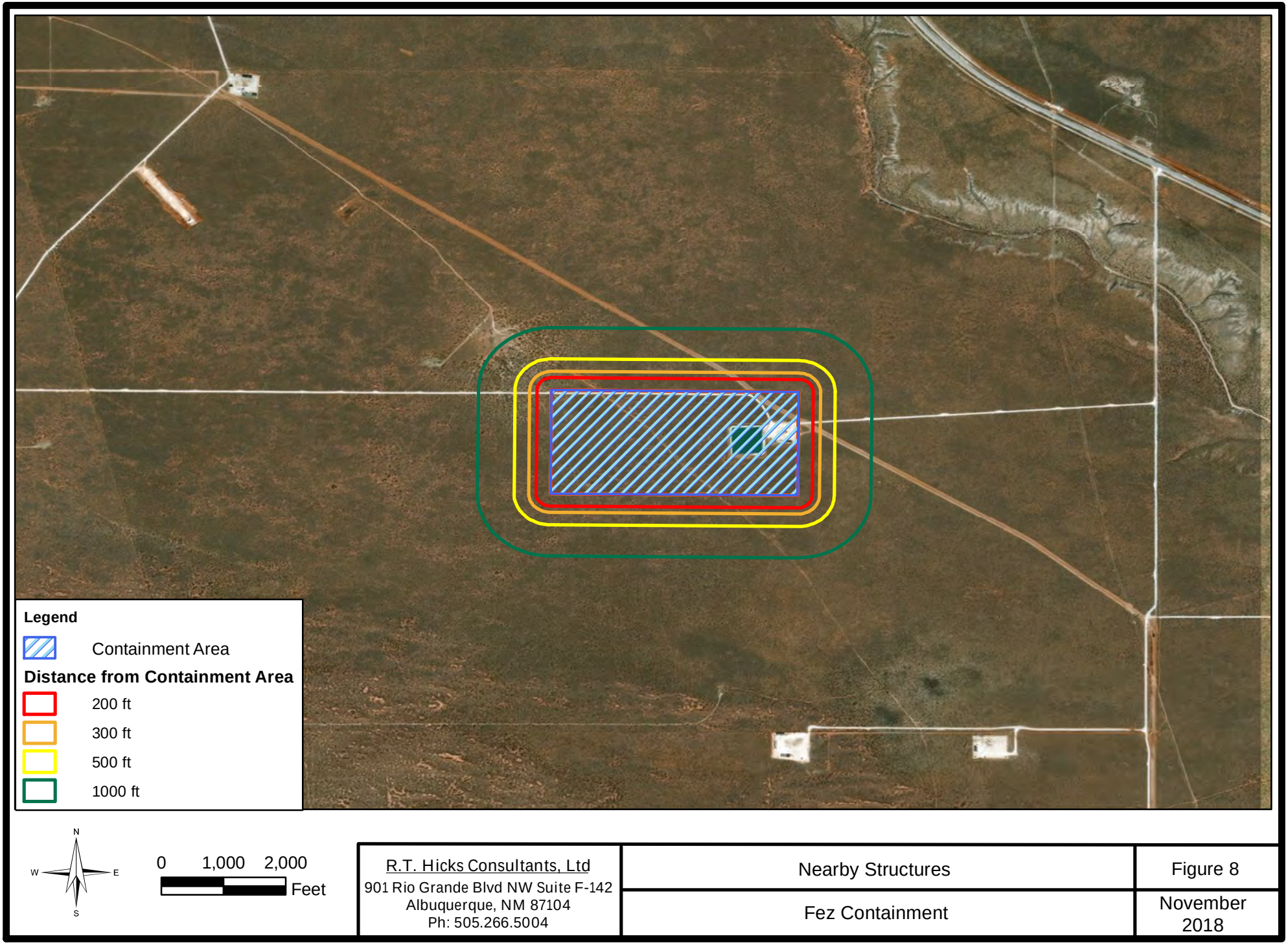
- Figure 1 shows the locations of all area water wells, active or plugged.
- The nearest water well is the East windmill, which is used for stock, located about 750 feet northwest of the area of interest
- There are no domestic water wells located within 1,000 feet of the area of interest.
- No springs were identified within the mapping area (see Figure 7)

Distance to Wetlands

Figure 9 demonstrates the location is not within 300 feet of wetlands.

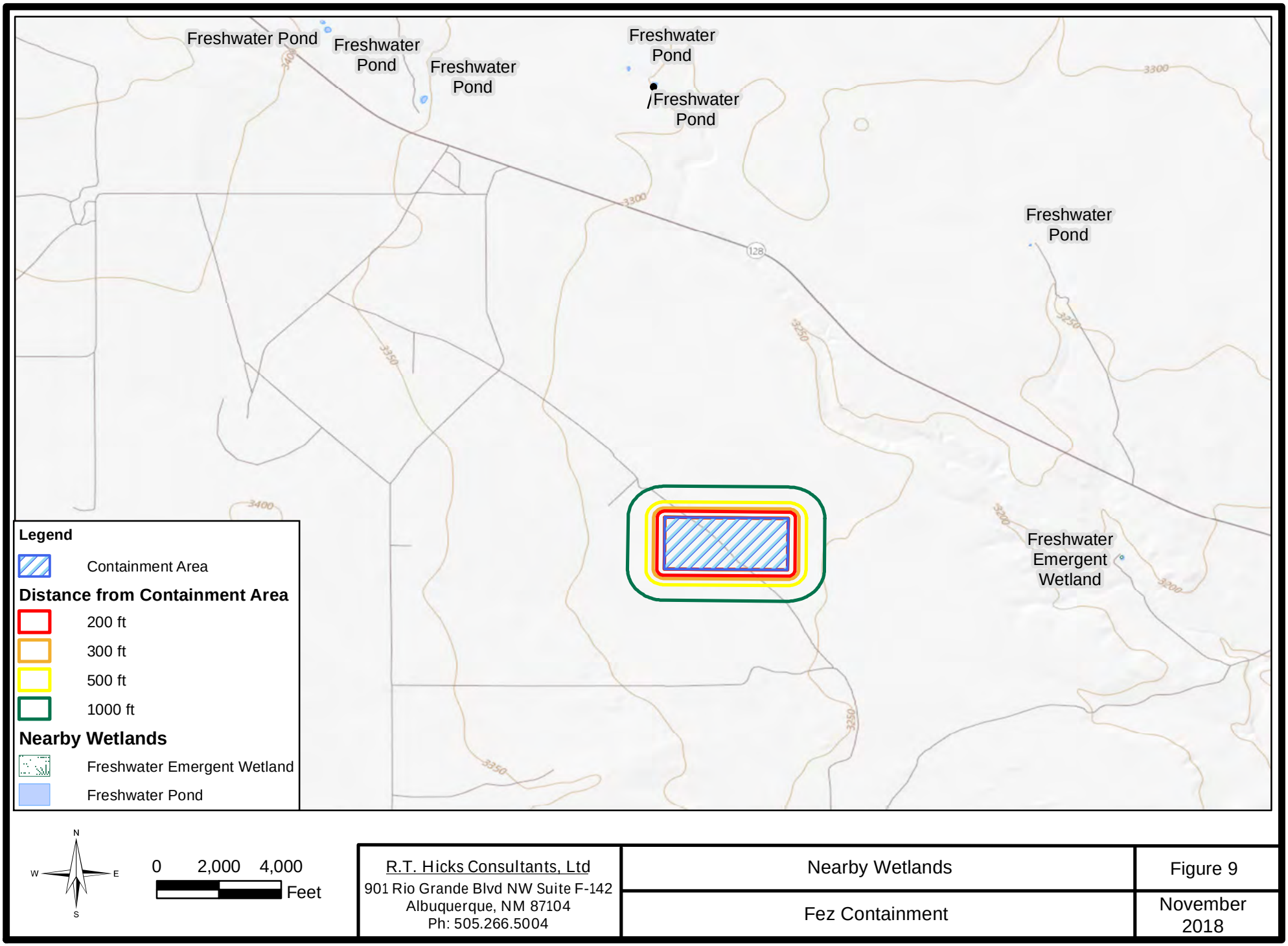
- The nearest designated wetland is a "freshwater emergent wetland" located approximately 1½ mile to the east. This is a stock tank associated Humphreys Windmill.
- Mapped wetlands north of Route 128 are also stock ponds associated with windmills or small dams in arroyos.
- Natural wetlands (freshwater ponds) are not observed in the area.

M:\Concho-Mustang\ap_GIS_FezVik\Figures - Fez\figure8_NearbyStructures.mxd



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Structures	Figure 8
	Fez Containment	November 2018

M:\Concho-Mustang\ap_GIS_FezVik\Figures - Fez\figure9_wetlands.mxd



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Wetlands	Figure 9
	Fez Containment	November 2018

DESIGN PLAN

OPERATION AND MAINTENANCE PLAN

CLOSURE PLAN

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)**

Applicable mandates in Rule 34 are underlined. This plan addresses construction of the earthen containments.

Magrym Consulting, P.C. is providing design drawings of the containment based upon a geotechnical evaluation. Stamped "as built" drawings showing all design elements will be submitted to OCD prior to storage of produced water.

Dike Protection and Structural Integrity

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 (a berm) and/or diversion ditch (between the levee and the soil stockpile) to prevent run-on of surface water.

Stockpile Topsoil

Where topsoil was present, prior to constructing containment, the operator stripped and stockpiled the topsoil for use as the final cover or fill at the time of closure.

Signage

The operator will place 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 operator will provide for a fence to enclose the recycling containment in a manner that deters unauthorized wildlife and human access. COG Operating will employ a game fence rather than a a four foot fence that has at least four strands evenly spaced in the interval between one foot and four feet above ground level. Because feral pigs, javelena and deer are present in the area, a chain link or game fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule[1]. The specification for fencing provided in 19.15.34.12 D.2 contradicts D.1 because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. Thus, compliance with D.2 results in a violation of D.1. Compliance with D.1 is the critical component of the Rule and operators need not submit a variance request in order to follow Best Management Practices and comply with the Rule. 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.

[1] The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair.

Netting and Protection of Wildlife

The perimeter game fence will be effective in excluding stock and most terrestrial wildlife. If requested by the surface owner, the game fence can include a fine mesh from the base to 1 foot above the ground to exclude the small reptiles (e.g. dune sagebrush lizard).

The recycling containment will be protective of wildlife, including migratory birds through the implementation of an Avian Protection Plan, routine inspections and the perimeter fence.

The avian protection plan includes the use of a Bird-X Mega Blaster Pro[2] as a primary hazing program for avian species. The device will be equipped with sounds suitable for the Permian Basin environment. In addition to this sonic device, staff will routinely inspect the containment for the presence of avian species and, if detected, will use a blank cartridge or shell in a handgun, starter pistol or shotgun as additional hazing. Decoys of birds of prey may be placed on the game fence and other roosts around the open water to provide additional hazing.

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

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.

The design drawings and stamped “as built” drawings for the containment will have the following design/construction specifications:

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)
c) top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance.
d) The containment floor design calls for a slope toward the sump.

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.

[2] https://bird-x.com/bird-products/electronic/sonic/mega-blaster-pro/

The primary (upper) liner is a geomembrane liner composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. It is 60-mil HDPE. The secondary liner is 40-mil HDPE and is equivalent to 30-mil LLDPEr. 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 toward the sump. This slope combined with the highly transmissive geonet drainage layer provide for rapid leak detection.

The liners and drainage material will be installed consistent with the Manufacturer'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 that 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 effectively protects the liner from excessive hydrostatic force or mechanical damage during filling.

The design shows that at any point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines do not penetrate the liner.

Pumping from the containment to hydraulic fracturing operations is the responsibility of stimulation contractors. Typically, 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.

Leak Detection and Fluid Removal System Installation
The leak detection system, contains the following design elements

a. The 200-mil HyperNet Geonet drainage material between the primary and secondary liner that is sufficiently permeable to allow the transport of fluids to the observation ports (See design drawings).
b. The containment floor is sloped towards the monitoring riser pipe to facilitate the earliest possible leak detection of the containment bottom. A pump may be placed in the 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 design drawings).

C-147 Supplemental Information: Operation and Maintenance Plan
Lined Earthen Containment

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 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, produced water is removed from the containment for E&P operations. At this time, 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 Monitoring, Inspection, and Reporting Plan; below), the operator will:

C-147 Supplemental Information: Operation and Maintenance Plan Lined Earthen Containment

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 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, and
- 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 produced water ceases and the produced water generated by nearby oil and gas wells is managed by an injection well(s).

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 produced water to the containment.
II. Accelerate re-use of the produced water for purposes approved by the Division.
III. Transfer 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.

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 produced water from the containment via electrical 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

C-147 Supplemental Information: Operation and Maintenance Plan Lined Earthen 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.

Example Inspection Log

Month **October**

Day	Weekly	Low Water	Activity	Monthly	Staff Gauge	Comments
1 - Wed						
2	x				8.75	Gate unlocked upon arrival - notified Jerry Smith, no birds in pit
3					10	
4					12	
5			x			Water transfer to frac - pipes are good
6			x			Water transfer to frac - pipes are good
7		x			2.5	No visible liner problems
8					3	
9	x				4	All OK - no oil on surface, no birds in pit
10					5	
11					5	
12					6	
13					7	
14					7.5	
15				x	8	No fluid in leak detection, outer berm and stormater diversion OK, H2S - no alarm,
16					9	
17					9	
18					9.5	
19	x				10	All OK
20					11	
21					12	
22			x			Water transfer to frac - no problems
23			x			Water transfer to frac - no problems
24		x			1.75	No visible liner problems
25					2.25	
26	x				3.75	High wind -liner is good, no birds
27					4.75	
28					5.5	
29					6.75	
30					7.75	
31					8.5	

Closure Plan – Lined Earthen Containments

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,

The surface owner will impose a closure design that conforms to their needs for the site. The operator understands that a variance will be submitted to OCD to allow for any alternative closure protocol.

Excavation and Removal Closure Plan – Protocols and Procedures

The containment is expected to hold 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 containment 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 containment contents and liners, soils beneath the containment 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.

APPENDIX OSE WELL LOGS And Geotechnical Boring Logs

New Mexico Office of the State Engineer
Point of Diversion Summary

Well Tag	POD Number	(quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) Q64	Q16	Q4	Sec	Twn	Rng	(NAD83 UTM in meters) X	Y
	C 02388			3	05	25S	35E	651467	3558832*

x

Driller License:		**Driller Company:**			
Driller Name:	W.E. BAIRD				
Drill Start Date:		**Drill Finish Date:**	12/31/1920	**Plug Date:**	
Log File Date:		**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	5 GPM
Casing Size:	6.00	**Depth Well:**	180 feet	**Depth Water:**	165 feet

x

***UTM location was derived from PLSS - see Help**

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-5		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.150387	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.386343	N/A	3265.15'	30.50'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	1,2,2 (4)		**Dark Red, Loamy Sand** *100% Sample Recovery*
		SPT	1,2,3 (5)		*100% Sample Recovery*
5		SPT	2,11,10 (21)		*100% Sample Recovery*
7		SPT	5,6,7 (13)		**Tan Lean Silt (Caliche)** *100% Sample Recovery*
		SPT	6,6,9 (15)	No.200 = 58% PI = NP; USCS = ML	**Reddish Tan Lean Silt** *100% Sample Recovery*
10					
		SPT	6,12,35 (47)		**Tan Silty Sand (Caliche)** *100% Sample Recovery*
15					
		SPT	8,14,25 (39)	No.200 = 20% PI = NP; USCS = SM	*100% Sample Recovery*
20					
		SPT	12,15,20 (35)		**Tan Silty Sand** *100% Sample Recovery*
25					

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-5		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.150387	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.386343	N/A	3265.15'	30.50'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	14,16,32 (48)	No.200 = 47%	**Tan Silty Sand** *100% Sample Recovery*
30		SPT	50/6"		*100% Sample Recovery*

Total Depth: 30' 6"

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-6		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.151403	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.38845	N/A	3265.15'	30.83'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	3/18"		**Dark Red, Loamy Sand** *100% Sample Recovery*
		SPT	1,2,2 (4)		*100% Sample Recovery*
5		SPT	5,15,25 (40)		*100% Sample Recovery*
		SPT	18,13,15 (28)	No.200 = 66% PI = NP; USCS = ML	**Tan Lean Silt (Caliche)** *100% Sample Recovery*
9		SPT	15,13,13 (26)		*100% Sample Recovery*
10		SPT	14,13,13 (26)		**Reddish Tan Silty Sand** *100% Sample Recovery*
15		SPT	10,12,12 (24)		*100% Sample Recovery*
20		SPT	50/6"		**Tan Silty Sand** *22% Sample Recovery*
25					

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-6		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.151403	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.38845	N/A	3265.15'	30.83'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	20,20,33 (53)		**Tan Silty Sand** *67% Sample Recovery*
30		SPT	14,22,50 (72)		*56% Sample Recovery*

Total Depth: 30' 10"

May 2019

C-147 Registration Package for Fez Recycling Containment and Recycling Facility Area (100+ acres) Section 8, T25-S, R35-E, Lea County

Volume 2 – Above-Ground Storage Tank Containments

Previously-Approved Variance Requests (2 RF 102-0)
Engineering Drawings and Liner Specifications
Design Plan
Master Assembly Manual for AST
Operation Plan
Closure Plan

View to east from near the center of the 100+ acre area of interest in which will be the proposed containment and recycling facility. The freshwater frac pond is apparent on the horizon.

Prepared for:
COG Operating LLC
600 W. Illinois Ave
Midland, Texas 79707

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

Appendix A Previously-Approved Variances

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Mr. Randall Hicks, PG
R.T. Hicks Consultants Ltd.
901 Rio Grande Boulevard
Suite F-142
Albuquerque, New Mexico 87104

March 31, 2015

RE: Technical Memorandum
LLDPE as Alternative Primary Liner System
Devon Energy / Hackberry Modular Impoundment

Dear Mr. Hicks:

At your request, I have investigated the suitability of application for two 30 mil LLDPE non-reinforced geomembranes as an alternative Primary liner in the Devon Energy /Hackberry Modular Impoundment. I have reviewed your C-147 Supplemental Information Report, Modular Tank Drawing, Design and Construction Plan as well as applicable correspondence. In consideration of the Primary lining system application (modular impoundment), size of the impoundment and depth, design details for modular tanks as well as estimated length of up to two years of service time, it is my professional opinion that two 30 mil LLDPE geomembranes will provide the requisite barrier against processed water loss. The two 30 mil LLDPE liners will function equal to or better than 60 mil HDPE, 30 mil PVC or 45 mil LLDPE as a primary liner system. The following are discussion points that will exhibit the attributes for using two 30 mil LLDPE geomembranes as the primary lining system:

The nature and formulation of LLDPE resin is very similar to HDPE. The major difference is that LLDPE is lower density, lower crystallinity (more flexible and less chemical resistant). However LLDPE will resist aging and degradation and remain intact for many years in exposed conditions. Although the lifetime of LLDPE in covered conditions (i.e., secondary liner) will be somewhat reduced with respect to HDPE, a secondary liner of LLDPE will outlast an exposed HDPE liner. In fact, according to the Geosynthetic Research Institute (GRI) study on lifetime prediction (GRI Paper No. 6), the half life of HDPE (GRI GM 13) exposed is > 36 years and the half-life of LLDPE (GRI GM 17) exposed is approximately 36 years (the Devon Energy Modular Impoundment life span is expected to be only 2 years maximum). It is understood that in order to ensure compliance of materials, 60 mil HDPE must meet or exceed GRI GM 13. Likewise, the primary or secondary liner must meet or exceed GRI GM 17 for non-reinforced LLDPE. Adhering to the minimum requirements of the GRI Specifications, two 30 mil LLDPE geomembranes when used as a primary liner system in the Devon Modular Impoundment will be equally as protective as a 60 mil HDPE liner.

Flexibility Requirements. 30 mil LLDPE geomembranes are less stiff and far more flexible than HDPE or 45 mil reinforced LLDPE and in this regard are preferred for installations in vertical wall tanks such as the Devon Modular Impoundment. LLDPE

provides a very flexible sheet that enables it to be fabricated into large panels, folded for shipping and installed on vertical walls transitioned to flat bottom. LLDPE will conform to the tank dimensions under hydrostatic loading.

Thermal Fusion Seaming Requirements. Thermal seaming and QC seam test requirements for geomembranes are product specific and usually prescribed by the sheet manufacturer. Both dual wedge and single wedge thermal fusion welding is commonly used on LLDPE and QC testing by air channel (ASTM D 5820) or High Pressure Air Lance (ASTM D 4437) is fully acceptable and recognized as industry standards. In this regard, there should be no exception or recommended practice for seaming and QC testing in the OCD rules. This would be fully covered in comprehensive specifications for both the Primary and Secondary geomembranes that would be reviewed by OCD.

Potential for Leakage through the Primary Liners. Leakage through geomembrane liners is directly a function of the height of liquid head above any hole or imperfection. The drainage media provides immediate drainage to a low point or outside the Modular Impoundment and thus no hydrostatic head or driving gradient is available to push leakage water through a hole. In this regard, secondary geomembrane materials can be (and usually are) much less robust in both thickness and polymer type.

Leakage through any Primary geomembrane is driven by size of hole and depth and will be detected by the increase of waste water in the drainage system and the volume being pumped out of the secondary containment. In this regard and for this variance, the Primary consists of 2 layers of 30 mil LLDPE geomembrane which will out perform a single layer of HDPE or LLDPE for potential leakage. Thus, if a leak occurs through the top layer, it will be effectively contained by the second layer. If required, location of holes in the Primary can be found by Electrical Leak Location Survey (ELLS) using a towed electrode (ASTM D 7007). Holes found can then be repaired and thus water seepage into the Secondary will be kept to a minimum. Dependent on OCR requirements for Action Leakage Rate (ALR), the leakage volumes may only be monitored. For example, a typical ALR is < 20 gpad whereas a rapid and large leak (RLL) may be > 100 gpad. Most states specify maximum ALR values for waste water impoundments usually in the range of 100 to 500 gpad. However, New Mexico does not specify any ALR for waste water impoundments (GRI Paper No. 15).

HDPE can not be prefabricated into large panels and thus 30 mil LLDPE offers the following for Primary Liner Modular Containment:

- Prefabrication in factory controlled conditions into very large panels (up to 35,000 sf) results in ease of installation, less or no thermal fusion field seams and less on site QC and CQA.

- Large prefabricated panels of 30 mil LLDPE will provide better control of thermal fusion welding in a factory environment that will improve the liner system integrity for the long term.

- The LLDPE geomembrane provides superior flexibility, lay flat characteristics and conformability which allows for more intimate contact with the underlying drainage media and tank walls.

- Two layers of the 30 mil LLDPE provide redundancy. Additionally, the bottom layer provides protection for the top layer during installation as well reduction in leakage due to pinholes (no driving head on the second 30 mil liner)

- Ease of installation of large prefabricated custom size panels results in a greater reduction of installation time and associated installation and QC costs.

- The LLDPE geomembrane is easily repaired using the same thermal fusion bonding method without the need for special surface grinding/preparation for extrusion welding used in repair of HDPE geomembranes.

In summary, it is my professional opinion that the double 30 mil LLDPE geomembranes will provide a Primary liner system that is equal to or better than a single 60 mil HDPE, 30 mil PVC or 45 mil reinforced LLDPE liner and will provide the requisite protection of fresh water, public health and the environment for many years and especially for the estimated two year life of the Devon Energy / Hackberry Modular Impoundment.

If you have any questions on the above technical memorandum or require further information, give me a call at 303-679-0285 or email geosynthetics@msn.com

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

References:

C-147 Supplemental Information
Devon Energy Modular Impoundment
Prepared by Hicks Consultants and Rockwater Energy Solutions

Title 19, Chapter 15, Part 34 NMAC (2015 Revision)

Geosynthetic Research Institute (GRI) Published Standards and Papers 2013

ASTM Standards 2013

Attachments:

R. K. Frobel C. V.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Mr. Randall Hicks, PG
R.T. Hicks Consultants Ltd.
901 Rio Grande Boulevard
Suite F-142
Albuquerque, New Mexico 87104

March 31, 2015

RE: Technical Memorandum
Slopes and Anchor Trench Variance
NMAC 19.15.34.12.A(2) & (3)
Devon Energy / Hackberry Modular Impoundment

Dear Mr. Hicks:

At your request, I have reviewed the suitability of application of two 30 mil LLDPE geomembranes as an alternative Primary liner system for the Devon Energy / Hackberry Modular Impoundment. In consideration of liners in traditional pits, the NMOCD rules require a maximum 2H:1V slope and anchorage at the top of slope in soil backfill anchor trench. I have also reviewed your C-147 Supplemental Information Report, Modular Tank Drawing, Design and Construction Plan as well as applicable correspondence. In consideration of the LLDPE Primary lining system application (Modular Impoundment), size of impoundments and depth, design details for modular tanks as well as the fact that this is an above ground storage tank (not constructed in an excavated or raised embankment pit), it is my professional opinion that the LLDPE geomembranes will provide the requisite barrier against potential produced water loss and will function within the vertical walls of the Modular Impoundment the same as or better than an in-ground pit with slopes. The following are discussion points that will exhibit the positive attributes of a Modular Impoundment System:

Side Slope

The design of soil side slope (inclination) is a geotechnical engineering design consideration. Liquid impoundments such as fresh water or process water containments are usually built within an excavation or with raised earthen embankments. For a liquid impoundment with an exposed liner system, the slope soils and construction dictate slope inclination and very detailed slope stability analysis may be required to determine if slope failure within the embankment will occur once loaded with impounded water. Slope failure may also occur during construction or when the impoundment is empty. A maximum slope is usually specified and is dependent on soil type and cohesive strength, saturated or unsaturated conditions, etc. Detailed analysis for slope stability can be found in “Designing with Geosynthetics” by R.M Koerner as well as many geotechnical books.

A modular impoundment, on the other hand, consists of a professionally designed steel tank ring with vertical walls. There is no slope to consider as the segmental steel sections are set vertically. Design of steel tanks as regards hydrostatic loading, wind loading,

seismic loads, etc. are thoroughly referenced with detailed procedures in the design code - American Petroleum Institute (API) 650-98 "Welded Steel Tanks for Oil Storage". There are no requirements for maximum slope inclination other than perhaps 90 degrees or vertical wall.

Anchor Trench

All earthen impoundments with a geomembrane lining system require some form of top of slope anchor, the most common of which is an excavated and backfilled anchor trench usually set back at least 3 ft from the top of slope. Again, there are detailed procedures for anchor trench design in "Designing with Geosynthetics" by R.M Koerner.

A Modular Impoundment requires mechanical anchoring of the geomembrane at the top of the vertical steel wall using standard liner clips that prevent the geomembrane or geomembrane layers from slipping down the side wall. There are no requirements for an "anchor trench" as this is not an in-ground impoundment.

In summary, it is my professional opinion that two 30 mil LLDPE geomembranes installed within the vertical walls of a Modular Impoundment will provide the requisite protection of fresh water, public health and the environment for many years and especially for the estimated two year life of the Devon Energy / Hackberry Modular Impoundment. In particular, there is no requirement for a maximum interior slope angle of 2H:1V due to the fact that this impoundment is a steel tank with vertical walls. Additionally, there is no requirement for an anchor trench as the geomembrane is attached to the top of the Modular Impoundment vertical walls with large steel clips.

If you have any questions on the above technical memorandum or require further information, give me a call at 303-679-0285 or email geosynthetics@msn.com

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

R.K. FROBEL & ASSOCIATES
Consulting Engineers

References:

C-147 Supplemental Information
Devon Energy / Hackberry Modular Impoundment Design and Construction Plan
Prepared by R. T. Hicks Consultants Ltd.

NMOCD Recycling Rule, Title 19, Chapter 15 – Produced Water, Drilling Fluids and Liquid Oil Field Waste – Section 19.15 Part 34 (2015)

American Petroleum Institute (API) 650-98 “Welded Steel Tanks for Oil Storage”

Koerner, R.M., 2005 “Designing With Geosynthetics” Prentice Hall Publishers

Attachments:

R. K. Frobel C.V.

Freeboard [NMAC 19.15.17.F(3)]

Statement Explaining Why the Applicant Seeks a Variance

The prescriptive mandates of the Rule that are the subject of this variance request are the following subsections of 19.15.17.11.F:

> **F.** Multi-well fluid management pits. An operator shall maintain and operate a multi-well fluid management pit in accordance with the following additional requirements.
> **(3)** The operator shall maintain at least three feet of freeboard for the pit.

With respect to lined earthen impoundments that may hold 25 acre feet of produced water, a 3-foot freeboard stipulation makes sense. For example, wave action and other factors could focus stress on the upper portion of the levee or the liner system in these large impoundments. The fully netted, 158-foot diameter steel tank (modular impoundment) does not share the same characteristics as these large earthen pits and we believe 3-feet of freeboard is not necessary. Moreover, meeting the 3-foot freeboard requirement significantly reduces the storage capacity of a single modular impoundment – negatively impacting the economics of using produced water in lieu of fresh water for E&P activities.

Demonstration That the Variance Will Provide Equal or Better Protection of Fresh Water, Public Health and the Environment

The attached letter from Mr. Frobel describes how the proposed 2-foot freeboard limit in the permit application for the modular impoundment provides the same protection afforded by the 3-foot freeboard mandate for a large earthen pit. The attached equations and supporting email from Mr. Jason Henderson, PE, shows that a 2-foot freeboard limit on the steel impoundment meets the manufacturer's design criteria.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Mr. Randall Hicks, PG
R.T. Hicks Consultants Ltd.
901 Rio Grande Boulevard
Suite F-142
Albuquerque, New Mexico 87104

November 20, 2014

RE: Technical Memorandum
Freeboard Variance
NMAC 19.15.17.F(3)
Devon Energy MWFM Modular Impoundment

Dear Mr. Hicks:

At your request, I have reviewed the suitability of application of 40 mil LLDPE geomembrane as an alternative Primary and Secondary liner for the Devon Energy Multi-Well Fluid Management (MWFM) Modular Impoundment. In consideration of liners in traditional pits, the NMOCD rules require a freeboard of at least 3.0 ft. I have also reviewed your C-144 Supplemental Information Report, Modular Tank Drawing, Design and Siting characteristics as well as applicable correspondence. In consideration of the LLDPE Primary and Secondary lining system application (Modular Impoundment), size of impoundments and depth, design details for modular tanks as well as the fact that this is an above ground storage tank (not constructed in an excavated or raised embankment pit), it is my professional opinion that the 40 mil LLDPE geomembranes will provide the requisite barrier against potential processed water loss and will function within the vertical walls of the Modular Impoundment with a 2.0 ft freeboard the same as or better than an in-ground pit with slopes and a 3.0 ft freeboard requirement. The following are discussion points a Modular Impoundment System:

Freeboard Requirements

Liquid impoundments such as fresh water or process water containments are usually built within an excavation or with raised earthen embankments. For a liquid impoundment with an exposed liner system, the slope soils and construction dictate slope inclination and very detailed slope stability analysis may be required to determine if slope failure within the embankment will occur once loaded with impounded water. Freeboard or the vertical height between the maximum water surface elevation and the top of slope is important for earthen impoundments. Specified freeboard requirements take into consideration high precipitation events and prevent wave run-up on slopes that result in over-topping and potential saturation of embankments. This is particularly important on large earthen impoundments. Detailed design considerations including freeboard requirements for lined earthen impoundments can be found in “Designing with Geosynthetics” by R.M Koerner as well as other publications on reservoir design.

A modular impoundment, on the other hand, consists of a professionally designed steel tank ring with vertical walls. There is no slope to consider as the segmental steel sections are set vertical. Design of steel tanks as regards hydrostatic loading, wind loading, seismic loads, etc. are thoroughly referenced with detailed procedures in the design code - American Petroleum Institute (API) 650-98 "Welded Steel Tanks for Oil Storage". There are requirements for operational freeboard to prevent over-topping but due to the relatively small surface area and fetch of cylindrical tanks, wave heights are much less than large earthen impoundments. Thus freeboard is usually within the range of 0.5 to 2 ft. I have reviewed the Tank Design Calculation Summary and as regards the structural stability of the tank walls, a freeboard of 0.5 ft was assumed. Thus the variance request of 2.0 ft for a Modular Impoundment is well within the Tank Design requirements.

In summary, it is my professional opinion that two 40 mil LLDPE geomembranes installed within the vertical walls of a Modular Impoundment will provide the requisite protection of fresh water, public health and the environment for many years and especially for the estimated two year life of the Devon Energy MWFM Modular Impoundment. In particular, the design freeboard of 2.0 ft will provide requisite storage volume and prevent overtopping due to wind and wave action, potential seismic events and high precipitation.

If you have any questions on the above technical memorandum or require further information, give me a call at 303-679-0285 or email geosynthetics@msn.com

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

References:

C-144 Supplemental Information
Devon Energy Modular Impoundment
Prepared by R. T. Hicks Consultants Ltd.

NMOCD Recycling Rule, Title 19, Chapter 15 – Produced Water, Drilling Fluids and Liquid Waste 2014 – Section 19.15

American Petroleum Institute (API) 650-98 "Welded Steel Tanks for Oil Storage"

Koerner, R.M., 2005 "Designing With Geosynthetics" Prentice Hall Publishers

Attachments:

R. K. Frobel C.V.

Appendix B

Certified Engineering Drawings

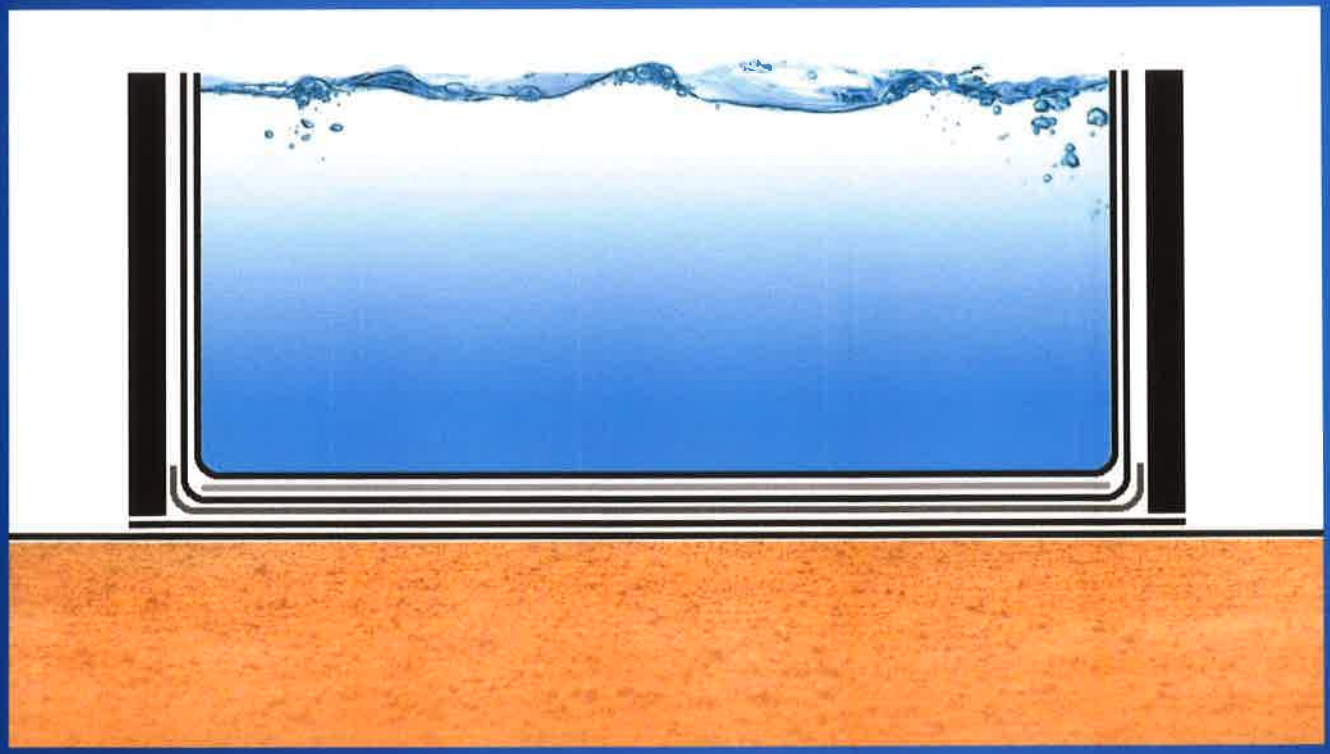
Select Tank Specifications

15 Panel Above-ground Storage Tank

Footprint: 157.0' diameter

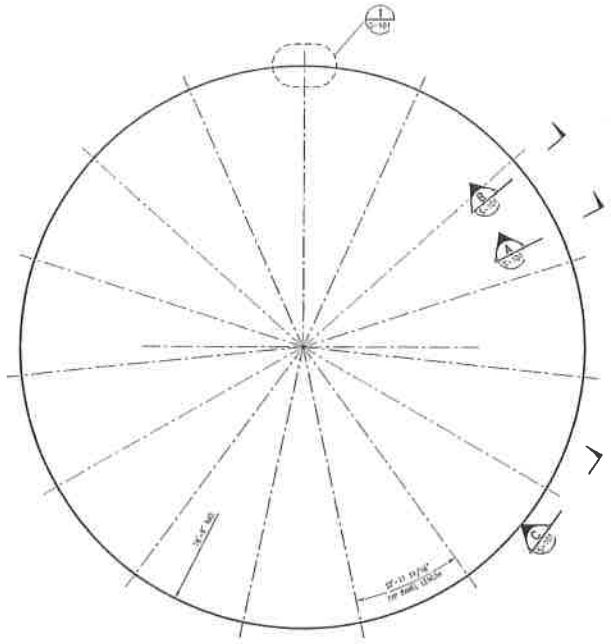
Capacity: 41,290 barrels

- 24"of freeboard for Produced Water totals 34,408 bbl storage

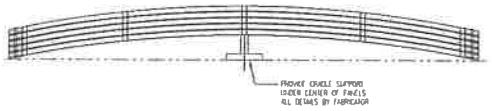


Tank Layers:

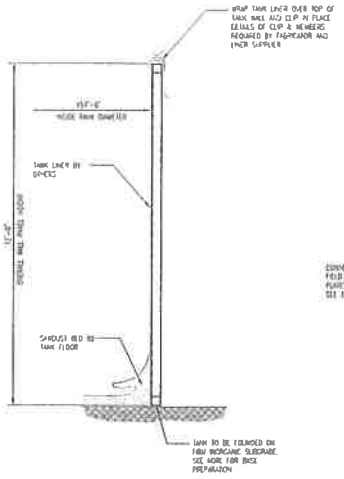
- Protective Net
- 30 mil Liner
- Leak Detection
- 30 mil Liner
- Geo Felt
- Geo Mesh
- 40 mil Containment



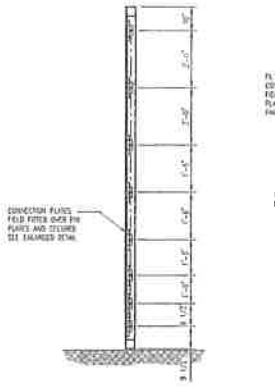
TANK LAYOUT PLAN
1/16"=1'-0"



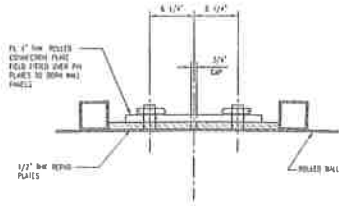
TRANSPORT AND STORAGE DETAILS
1/4"=1'-0"



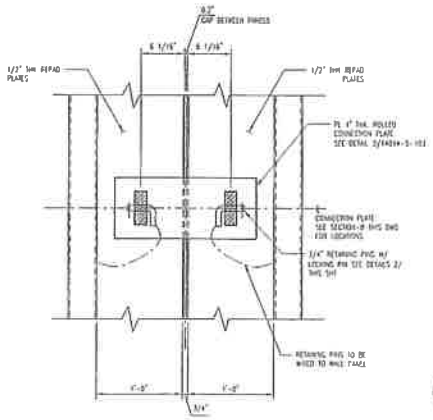
A S-101 TYPICAL TANK WALL SECTION
1/2"=1'-0"



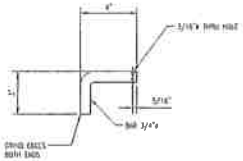
B S-101 SECTION AT WALL PANEL JOINT
1/2"=1'-0"



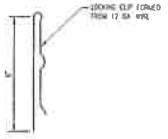
1 S-101 DETAIL AT WALL PANEL JOINT
1 1/2"=1'-0"



C S-101 ENLARGED SECTION AT WALL PANEL JOINT
1 1/2"=1'-0"



2 S-101 DETAIL RETAINING PIN
3"=1'-0"
16 REQUIRED PER PANEL



5 S-101 DETAIL LOCKING CLIP
3"=1'-0"
16 REQUIRED PER PANEL

2/14/14
COLORADO LICENSED
KIM GAZDIK
47107
PROFESSIONAL ENGINEER

NOTES:
1. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE STRUCTURE AND FOR THE SAFETY OF ALL PERSONAL DURING ASSEMBLY AND DISASSEMBLY. ALL WORK SHALL BE IN ACCORDANCE WITH OSHA.
2. THE CONTRACTOR SHALL ENSURE ALL THE PANELS ARE ACCURATELY SUPPORTED OR BRACED UNTIL THE ENTIRE STRUCTURE IS ASSEMBLED
3. ALL ROPSON GREASES SOFT OR WET SOIL DEBRIS OR OTHER DELETERIOUS MATERIALS SHALL BE REMOVED FROM THE TANK SITE
4. THE FINISHED GRADE ALONG THE PERIMETER OF THE TANK SHALL BE LEVEL AND TRUE TO PLANE. THE MAXIMUM ELEVATION DIFFERENCE ACROSS ANY TWO DIAMETRICAL POINTS SHALL BE LESS THAN 10".
5. THE MAXIMUM DEVIATION FROM PLANE OVER ANY 10'-0" OF CIRCUMFERENCE SHALL BE LESS THAN 1/4" AND LESS THAN 1/2" OVER ANY 20'-0" OF CIRCUMFERENCE
6. THE AREA SURROUNDING THE TANKS SHALL BE GRADED TO DIRECT SURFACE WATER AWAY FROM TANK.
7. THE EDGE OF ANY (EXCAVATED) SUMP SHALL BE A MINIMUM OF 3'-0" FROM THE EDGE OF THE TANK WALL.
8. THE PANELS SHALL BE ERECTED PLUMB. THE MAXIMUM OUT-OF-PLUMBNESS OF THE TOP OF THE PANEL RELATIVE TO THE BOTTOM SHALL BE LESS THAN 1".
9. THE MAXIMUM DEVIATION FROM THE THEORETICAL RADIUS SHALL BE LESS THAN 2" AT ANY POINT ALONG THE WALL.
10. THE LINER SHALL BE SECURELY FASTENED TO THE TOP OF EACH PANEL ACCORDANCE WITH THE LINER'S MANUFACTURER'S RECOMMENDATIONS. THE LINER SHALL BE INSTALLED WITH SUFFICIENT SLACK AT THE BASE OF THE PANEL TO PREVENT ANY TENSION IN THE LINER
11. THE VERTICAL LIFTING BARS SHALL ONLY BE USED TO LIFT THE PANELS INTO THE VERTICAL POSITION, THE LIFT MUST BE WITHIN 10" OF THE TOP RAIL PRIOR TO LIFTING THE PANEL
12. A MINIMUM 12" FREEBOARD SHALL BE PROVIDED WHEN TANK IS FILLED, FOR 8MAX FLUID DEPTH OF 11'

NOTES:
1. ALL PLATE, SHALL CONFORM TO ASTM A-36 SPECIFICATION
2. STRUCTURAL TUBING SHALL CONFORM TO ASTM A-500 GRADE B SPECIFICATION.
3. STRUCTURAL WELDING SHALL CONFORM TO AWS D1.1 STRUCTURAL WELDING SPECIFICATION

NO	ISSUED FOR CONSTRUCTION	DATE	BY	APP

PROJECT#: 14014

Behrent Engineering Company
"Where It Pays to Work"
Lakewood, CO 80401 Ph: 303.940.4960

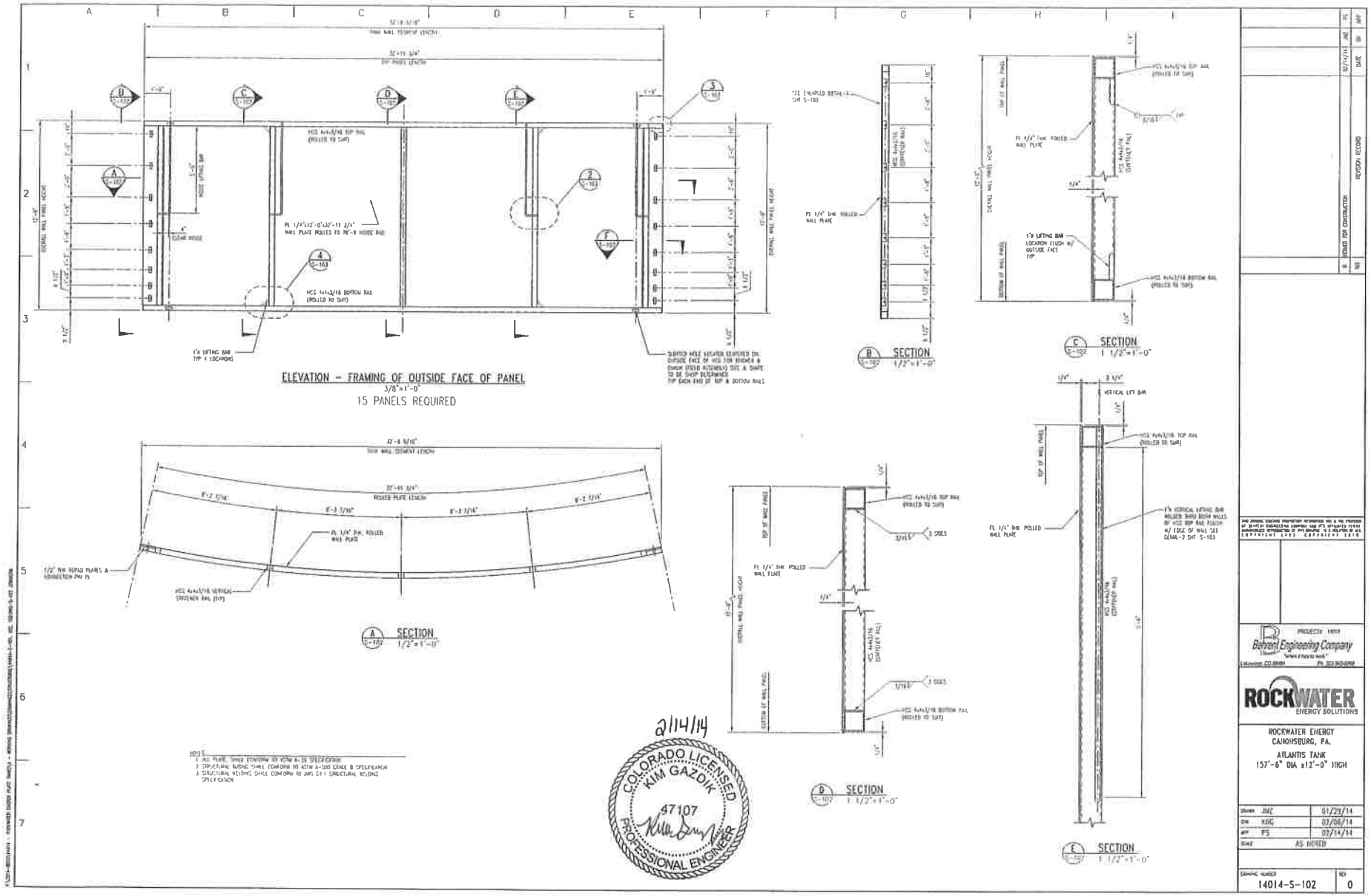
ROCKWATER ENERGY SOLUTIONS

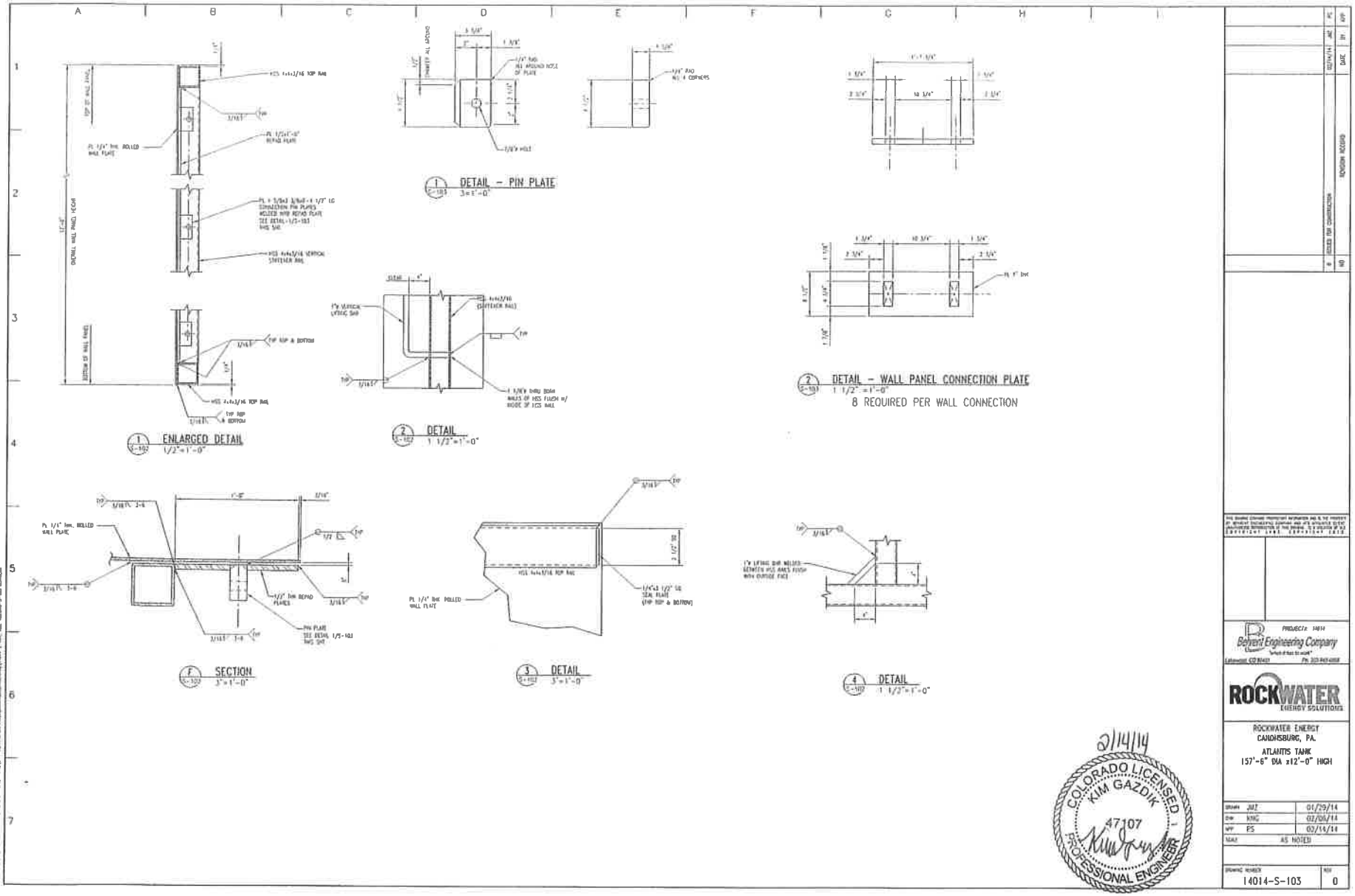
ROCKWATER ENERGY
CANONSBURG, PA.

ATLANTIS TANK
157'-6" DIA x12'-0" HIGH

DRAWN	JMZ	01/29/14
CHK	KMG	02/06/14
APP	PJS	02/14/14
SCALE	AS NOTED	

DRAWING NUMBER: 14014-S-101
REV: 0


ELEVATION – FRAMING OF OUTSIDE FACE OF PANEL
3/8"=1'-0"
15 PANELS REQUIRED
SECTION
1 1/2"=1'-0"
SECTION
1 1/2"=1'-0"
SECTION
1 1/2"=1'-0"
SECTION
1 1/2"=1'-0"
SECTION
1 1/2"=1'-0"
2/14/14
COLORADO LICENSED
KIM GAZDIK
47107
PROFESSIONAL ENGINEER
Behrent Engineering Company
ROCKWATER ENERGY SOLUTIONS
ROCKWATER ENERGY
CANONSBURG, PA.
ATLANTIS TANK
157'-6" DIA x 12'-0" HIGH
AS NOTED
14014-5-102
0


1 DETAIL – PIN PLATE
3/4"=1'-0"
2 DETAIL – WALL PANEL CONNECTION PLATE
1 1/2"=1'-0"
8 REQUIRED PER WALL CONNECTION
1 ENLARGED DETAIL
1/2"=1'-0"
2 DETAIL
1 1/2"=1'-0"
F SECTION
3"=1'-0"
3 DETAIL
3"=1'-0"
4 DETAIL
1 1/2"=1'-0"
2/14/14
COLORADO LICENSED
KIM GAZDIK
47107
PROFESSIONAL ENGINEER
ROCKWATER ENERGY SOLUTIONS
ROCKWATER ENERGY
CANONSBURG, PA.
ATLANTIS TANK
157'-6" DIA x12'-0" HIGH
DRAWN JMZ 01/29/14
CHK KMG 02/06/14
APP ES 02/14/14
SCALE AS NOTED
DRAWING NUMBER 14014-S-103
REV 0

Inland TARP & LINER

TECHNICAL DATA SHEET

Geomembrane 30mil LLDPE

Property	Test Method	Frequency (A)	Unit Metric	Solmax 130-2000
Thickness (min. avg.)	ASTM D 5199	Every roll	mm	0.75
Thickness (min.)	ASTM D 5199	Every roll	mm	0.68
Resin Density	ASTM D 1505	1/Batch	g/cc	<0.926
Melt Index-190/2.16(max)	ASTM D1238	1/Batch	g/10min	1.0
Sheet Density (C)	ASTM D1505	Every 2 rolls	g/cc	<0.939
Carbon Black Content (D)	ASTM D 4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	Every 6 rolls	Category	Cat. 1 / Cat. 2
Oxidative Induction Time (min. avg)	ASTM D3895	1/Batch	min	100
Tensile Properties (min. avg)(B)	ASTM D 6693	Every 2 rolls		
Strength as Break			kN/m	20
Elongation at Break			%	750
2% Modulus (max.)	ASTM D 5323	PerFormulation	kN/m	315
Tear Resistance (min. avg.)	ASTM D 1004	Every 6 rolls	N	70
Puncture Resistance (min. avg.)	ASTM D 4833	Every 6 rolls	N	200
Dimensional Stability	ASTM D 1204	Every 6 rolls	%	+/- 2
Multi-Axial Tensile (min.)	ASTM D 5617	PerFormulation	%	90
Oven Aging-% retained after 90 days	ASTM D 5721	PerFormulation		
STD OIT (min. avg.)	ASTM D 3895		%	35
HP OIT (min. avg.)	ASTM D 5885		%	60
UV Resistance-% retained after 1600 hr	GRI-GM-11	PerFormulation		
HP-OIT (min. avg.)	ASTM D 5885		%	35

Note;

(A) Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar)

(B) Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction

(C) Correlation table is available for ASTM D792 vs. ASTM D1505 Both methods give the same results.

(D) Correlation table is available for ASTM D1603 vs ASTM D4218 Both methods give the same results

*All values are nominal test results, except when specified as minimum of maximum

* The information contained herein is provided for reference purposes only and is not intended as warranty of guarantee Final determination of suitability for use contemplated is the sole responsibility of the user Solmax along with Inland Tarp & Liner assumes no liability in connection with the use of this information.

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SKAPS TRANSNET™ (TN)
HDPE GEOCOMPOSITE 220

SKAPS TRANSNET™ geocomposite consists of SKAPS GeoNet made from HDPE resin with non-woven polypropylene geotextile fabric heat bonded on both sides of the the geonet.

Property	Test Method	Unit	Required Value			Qualifier
			With 6 oz.	With 8 oz.	With 10 oz.	
Geonet						
Thickness	ASTM D 5199	mil.	220±20	220±20	220±20	Range
Carbon Black	ASTM D 4218	%	2 to 3	2 to 3	2 to 3	Range
Tensile Strength	ASTM D 5035	lb/in	45	45	45	Minimum
Melt Flow	ASTM D 1238[3]	g/10 min.	1	1	1	Minimum
Density	ASTM D 1505	g/cm^3	0.94	0.94	0.94	Minimum
Transmissivity[1]	ASTM D 4716	$m^2/sec.$	$2x10^{-3}$	$2x10^{-3}$	$2x10^{-3}$	MARV[2]
Composite						
Ply Adhesion (Minimum)	ASTM D7005	lb/in	0.5	0.5	0.5	MARV
Ply Adhesion (Average)	ASTM D7005	lb/in	1	1	1	MARV
Transmissivity[1]	ASTM D 4716	m^2/sec	$1x10^{-4}$	$1x10^{-4}$	$9x10^{-5}$	MARV
Geotextile						
Fabric Weight	ASTM D 5261	oz/yd^2	6	8	10	MARV
Grab Strength	ASTM D 4632	lbs	160	225	270	MARV
Grab Elongation	ASTM D 4632	%	50	50	50	MARV
Tear Strength	ASTM D 4533	lbs	65	90	100	MARV
Puncture Resistance	ASTM D 4833	lbs	95	130	165	MARV
CBR Puncture	ASTM D 6241	lbs	475	650	825	MARV
Water Flow Rate	ASTM D 4491	gpm/ft^2	125	100	75	MARV
Permittivity	ASTM D 4491	sec^{-1}	1.63	1.26	0.94	MARV
Permeability	ASTM D 4491	cm/sec	0.3	0.3	0.3	MARV
AOS	ASTM D 4751	US Sieve	70	80	100	MARV

Notes:
1. Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of 10000 psf between stainless steel plates after 15 minutes. Values may vary between individual labs.
2. MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
3. Condition 190/2.16

Inland TARP & LINER

Premium Quality - Built To Last

www.inlandtarp.com

Geotextile Product Description Sheet
8oz ONG Nonwoven Geotextile

8oz ONG is a needle-punched nonwoven geotextile made of 50% polypropylene and 50% polyester staple fibers, which are formed into a random network for dimensional stability.

PROPERTY	TEST METHOD	UNIT
Weight (Typical)	ASTM D 5261	oz/yd$_2$ (g/m$_2$)
Thickness	ASTM D 4491	mils (mm)
Grab Tensile	ASTM D 4632	lbs (kN)
Grab Elongation	ASTM D 4632	
Trapezoid Tear Strength	ASTM D 4533	lbs (kN)
CBR Puncture Resistance	ASTM D 6241	lbs (kN)
Permittivity*	ASTM D 4491	sec-1
AOS*	ASTM D 4751	US Sieve (mm)
UV Resistance	ASTM D 4355	%/hrs

Weight (Typical) ASTM D 5261 oz/yd$_2$ (g/m$_2$)	7.75 (220)
Thickness ASTM D 4491 mils (mm)	87 (2.21)
Grab Tensile ASTM D 4632 lbs (kN)	151 (0.673)
Grab Elongation ASTM D 4632	80%
Trapezoid Tear Strength ASTM D 4533 lbs (kN)	65 (0.287)
CBR Puncture Resistance ASTM D 6241 lbs (kN)	351 (1.56)
Permittivity* ASTM D 4491 sec-1	1.57
AOS* ASTM D 4751 US Sieve (mm)	140 (0.102)
UV Resistance ASTM D 4355 %/hrs	70/500

PACKAGING

Roll Dimensions (W x L) – ft 15 x 300
Square Yards Per Roll 500
Estimated Roll Weight - lbs 250

* At the time of manufacturing. Handling may change these properties.

U.S. Fabrication & Distribution Centers

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Fostoria, Ohio . . . 1600 North Main Street, Fostoria, OH 44830 • 888.377.5640 • Fax 419.436.6007
Odessa, Texas . . . 8784 W. Interstate 20, Odessa, TX 79763 • 432.272.9413

ATARFIL geomembranes

ISO 9001 ISO 14001 BUREAU VERITAS Certification

(1)

ATARFIL LTM-LTMT V1

Raw Material	Linear Low Density Polyethylene

ATARFIL LTM-LTMT is a **structured geomembrane** manufactured from maximum quality linear low density polyethylene LLDPE resins, duly contrasted, that comply with the most rigurous requirements established for their use.

ATARFIL LTM-LTMT contains 97,5% of pure polymer, and approximately 2,5% of Carbon Black, antioxidants and thermal stabilizers. The product does not contain plasticizers or fillers that can migrate over time.

The geomembrane **ATARFIL** LTM-LTMT is manufactured under rigurous quality controls.

Surface	TM Structured 1 side TMT Structured 2 sides	Colour	Black
		RAL Code	-

	Tested Property	Unit	Test Method	Value
Raw Material Identification	Density of Raw Material	g/cm³	ASTM D 792	0.915-0.926
	Density of Geomembrane	g/cm³	ASTM D 792	0.925-0.939
	Melt Flow Index	g/10 min	ASTM D 1238 (190°C/2,16 Kg)	< 1,0
	Carbon Black Content	%	ASTM D 4218	2,0 - 2,5
	Carbon Black Dispersion	-	ASTM D 5596	Note (2)
Durability	Oxidative Induction Time (OIT) Standard OIT High Pressure OIT	min	ASTM D3895 (200°C) ASTM D5885	≥ 100 ≥ 400
	Oven aging at 85°C HP O.I.T, % retained after 90 days	%	ASTM D 5721 ASTM D 5885	≥ 60
	UV Resistance. HP OIT, % retained after 1600 hrs	%	ASTM D 7238 ASTM D 5885	≥ 35

	Tested Property	Unit	Test Method	Value
Functional Properties	Low Temperature Brittleness (t°: -40°C)	-	ASTM D 746	No cracks
	Water Permeability	m^3/m^2-day	EN 14150	$< 1 \cdot 10^{-6}$
	Coefficient of Linear Thermal Expansion	1/K	ASTM D 696	$2,15 \cdot 10^{-4}$
	Water Absorption	%	ASTM D 570 (24h)	≤ 0,2
			ASTM D 570 (6 days)	≤ 1
	Asperity Height	mils	ASTM D 7466	≥ 35
	Friction Angle(3)	°	ISO 12957-1	≥ 29
	Spikes Density	spikes/ft²	-	7775

	Tested Property	Unit	Test Method	Value				
Strength Characteristics Quality of Final Product	Thickness	mils	ASTM D 5994	40	60	80	100	120
	Tolerance	%		-10				
	Mechanical Properties							
	Tensile strength at Break(1)	lb/in	ASTM D 6693 (Type IV), lo: 2.0 in	64 (60)	95 (90)	125 (120)	152 (150)	185 (180)
	Elongation at Break	%		≥ 250				
	Tear Resistance	lb	ASTM D 1004	≥ 21	≥ 32	≥ 43	≥ 53	≥ 64
	Puncture Resistance	lb	ASTM D 4833	≥ 42	≥ 64	≥ 85	≥ 112	≥ 128
	2% Modulus	lb/in	ASTM D 5323	≤ 2400	≤ 3600	≤ 4800	≤ 6000	≤ 7200
	Axi-Symmetric Break Resistance Strain	%	ASTM D 5617	≥ 30				
	Dimensional Stability	%	ASTM D 1204 (100°C, 1h)	± 1,5				

	Parameter	Units	40		60		80		100		120	
			LTM	LTMT	LTM	LTMT	LTM	LTMT	LTM	LTMT	LTM	LTMT
140717 PRESENTATION (Standard Sizes)	Roll width	ft	19.7		19.7		19.7		19.7		19.7	
	Roll Length	ft	864	570	669	495	504	432	405	384	339	333
	Surface	ft²	17,020.8	11,229	13,179.3	9,751.5	9,928.8	8,510.4	7,978.5	7,564.8	6,678.3	6,560.1

(1) Values indicated are MEDIUM, in brackets minimum values.
(2) Certificates belonging to the Environmental and Quality Integrated System of Atarfil.
(3) Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.
(4) Using a polypropylene geotextile of 1000gr

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Appendix C

Design/Construction Plan

General

In this plan, the portion of the Produced Water Re-use Rule that is addressed by certain text is underlined.

Examination of the engineering drawings in, the SOP, the text below and the history of solid performance of these ASTs demonstrates that Select Energy Services has designed and will construct the recycling containment to ensure the confinement of produced water, to prevent releases and to prevent overtopping due to wave action or rainfall. As the largest AST (BH 1800) is only 160 feet in diameter, wave action is not a meaningful consideration at 2-feet of freeboard.

This design and construction plan has been large abstracted from information from Select. However, this Design and Construction Plan provides additional protocols to cause the proposed recycling containments (ASTs) to conform to NMOCD Rules. Therefore***, if a conflict exists between the SOP of and this plan, Select Energy Services will adhere to the mandates of this plan.***

The Select Energy Services ASTs are constructed of 12-foot high steel panels and are netted to prevent ingress of migratory birds. At a minimum, a 4-foot, 4-strand barbed wire fence will surround the tank(s) to limit human egress.

The customer of Select Energy Services (the operator) shall post an upright sign no less than 12 inches by 24 inches with lettering not less than two inches in height in conspicuous places surrounding the containment. The operator shall post the sign in a manner and location such that a person can easily read the legend. The sign shall provide the following infom1ation: the operator's name, the location of the site by quarter-quarter or unit letter, section, township and range, and emergency telephone numbers.

Select Energy Services shall ensure that a recycling containment is screened, netted or otherwise protective of wildlife, including migratory birds. The operator shall on a monthly basis 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. A light duty bird net is proposed to cover the containments.

Site Preparation

Foundation for AST

Preparation of the soils on site is required to form a dependable base for the AST. Preparation of the tank pad is the sole responsibility of Select Energy Services' AST customer (oil and gas operating company). In general, prior to constructing the containment foundation, the operator will strip and stockpile the topsoil for use as the final cover or fill at the time of closure.

The Select Energy Services Field Operations Manager will check the status of soil preparation during the pre-project meeting on site. Select Energy Services personnel will also check the soil preparation. Select Energy Services soil preparation requirements are as follows:

1. Select Energy Services recommends a minimum soil compaction of 95% compaction.
2. Select Energy Services recommends soil compaction testing to be conducted via
   a. Standard Proctor Test (American Society for Testing and Materials {ASTM} Standard D698) or Modified Proctor Test (ASTM Standard D1557).
   b. A proof roll test may be used if observed and documented by qualified Select Energy Services personnel.
3. Grade AST footprint and 30 feet work area to 0.25 % or 3” feet drop per 100 feet, toward sump location.
4. Site should be graveled prior to tank installation, utilizing. Do not use crushed rock as sharp edges could puncture the tank liner. After completion of these steps the tank setup can be approved.

Thus, the AST (recycling 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 will be placed under the liner where needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.

Because Select Energy Services will not construct the containment in a levee, the following language of the Ruled does not apply:

> the inside grade is no steeper than two horizontal feet to one vertical foot (2H: 1 V) and the outside grade no steeper than three horizontal feet to one vertical foot (3H: IV). As the secondary liner covers the levee with the anchor trench outside of the containment, there is for inspection and maintenance of the anchor trench

Tank Layout on Foundation

- Check proposed AST site to confirm access for equipment and laydown area for AST materials and erection equipment.
- Check that the minimum distances to existing wells, power lines, etc. are met.
- Regardless of manufacturer, the minimum footprint should be a circle of at least 24’ greater than that the radius of the tank.
- Establish final location for the suction tube and stairs.
- For a pin tank, the pad should be graded and sloped 0.25% from high side of location to suction side of tank. This will allow for better drainage of tank.

AST Tank Setup Preparation

Mark the Foundation for Setup

1. Determine center of tank and mark with paint, then bury preferred non-abrasive item (tennis ball, sand bag, water bottle, etc.) This will be used to find the center of tank after liners have been placed.
2. Measure distance from tank center to existing oil/gas wells to check that the tank meets the minimum distance for the operator
3. Measure and paint a line to mark the circumference of tank for panel placement.
4. Mark the circumference of the liner laid out flat to ensure the liner is properly placed.
5. Determine where tank suction is to be placed (the low side of pad).
   a. For pin tanks, dig 8' wide x 8' long x 16" deep sump hole for the suction manifold to set in and taper the edges so there are no sharp corners of the excavation. Remove any sharp stones
   b. If multiple suction manifolds are required, the sumps should have a minimum of 8' of separation. Attention! In cold weather conditions, the sumps should be dug out as late as possible and should never be left unattended overnight. Barricade any sump pit with appropriate cones or tape if left open when crew is not present or active in the area.
6. When installing certain ASTs, a "Y Trench" can be used both for wind stabilization and for draining the tank.

The placement of sumps in the foundation and the AST design demonstrates that at a point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage and external discharge or suction lines shall not penetrate the liner.

Liner and Leak Detection Materials

The liner and geotextile specifications in show that all primary (upper) liners in a recycling containment shall be geomembrane liners composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. All primary liners shall be 45-mil LLDPE string reinforced (minimum). A variance has been approved by OCD to allow use a double-liner system that results in equivalent or better characteristics.

Secondary liners shall be 30-mil LLDPE string reinforced (minimum) or equivalent with a hydraulic conductivity no greater than 1 x 10-9 cm/sec.

Liner compatibility shall meet or exceed the EPA SW-846 method 9090A or subsequent relevant publications.

Install Secondary Liner, Leak Detection System and Secondary Containment

All tanks holding produced water will have a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions. The edges of all secondary liners

shall be anchored in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep.

The steps to install the secondary liner are:

1. The crew walks the entire tank base area to and pick up any sharp stones or other sharp debris that could damage the liner.
2. If necessary, lay out a geotextile to create a pad between the liner and the earth foundation. In some cases, the geotextile is "bundled" with the liner and will be rolled out together. After unrolling, pull the geotextile and liner to extend it fully using several crew members spaced along the edge.
3. Perform a visual inspection n of the liner – repair any defects as necessary.
4. Install a 30-mil or 40-mil LLDPE secondary liner per the manufacturer's specifications
5. Within and extending several feet from the footprint of the AST, place 200-mil geogrid or 10-oz geotextile and secure to the secondary liner. This geotextile material is permeable and will act as the drainage layer between the primary liner system and the secondary liner. Any leakage from the AST will be obvious as the fluid moves from beneath the AST
6. In the deepest section of the sump place a water sensor (conductivity probe) and a length of rigid tubing (1/2 inch or smaller diameter) above the secondary liner and below the geotextile. The sensor wire and tubing extends beyond the diameter of the tank to facilitate leak detection and fluid removal (see O&M plan).

Thus, the recycling containment will have a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet (or a suitable material pursuant to a variance) to facilitate drainage. The leak detection system shall consist 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 12-foot high tank walls effectively prevent run-on of surface water and qualify as a diversion to prevent run-on of surface water,

AST Tank Setup

Install Primary Liner

As with the secondary liner, Select Energy Services will minimize liner seams and orient them up and down, as much as possible, not across, a slope. Factory welded seams shall be used where possible. Select Energy Services will employ field seams in geosynthetic material that are thermally seamed. Prior to field seaming, Select Energy Services shall overlap liners four to six inches and minimize the number of field seams and corners and irregularly shaped areas. There shall be no horizontal seams within five feet of the AST bottom. Qualified personnel shall perform field welding and testing.

Installation set up consistent with the SOP continues:

A. Two 30-mil LLDPE string reinforced liners create the primary system aligned to the center of the tank and painted line for the tank walls. A preferred 30 feet area around tank allows the liner to be laid out flat so that fold back can be uniform.
B. Bundling of the liner with the drainage geotextile by the liner supplier is generally not used in New Mexico. If the liner is bundled with the geotextile, roll it out across the diameter of the tank over the geotextile material that extends beyond the AST diameter (described above). Be sure not to use padded vice grips to move liner unless located at edge of liner. Inspect liner and report any damage or bad seams, punctures due to handling, etc. to the Crew Leader
C. Secure liner from wind using sand bags
D. Fold the liner toward inside the painted tank edge line to allow stockpiling of sand and placement tank panel walls.

Tank Wall Erection

E. Stand the first tank panel in place and keep connected to the hoist mechanism until all the remaining panels have been connected. This will be done using a front-end loader equipped with an engineer-approved attachment specific for this task.
F. Monitor hoist and rigging mechanism of first panel closely to ensure it remains stable, especially during wind and while the other panels are attached.
G. Begin placing the remaining panels in place with the front-end loader and panel rigging frame
H. Personnel secured on man-lift then secure the panels in place with 4 pins each (for pin tanks) or with the connecting plates and lug busses, secured with chained cotter pins.
I. To protect the liner, distribute sand with shovels to form 1:1 sand bank against the inside bottom of each panel. Be sure the slope is uniform. Alternatively, roll up excess geo pad (geotextile) into minimum 6” diameter cylinders around the inside of the tank ring to help support the liner at the base of the tank wall as the tank is being filled.
J. Prior to lifting liner into place against inside panel, place metal covering plates over all panel gaps in plate type tank. For pin tanks, check that sand or rolled up geo pad is evenly placed at base of all walls.
K. Prior to covering sump with the geo pad or liner, confirm sump excavation has smooth sides and corners, and that no sharp stones are present.
L. When placing the final panel in the circle, attach this final panel only on left or right side but LEAVE OTHER PANEL SIDE OPEN at this time for access and egress points. (Must have an entry and exit point to the tank at all times.)

Liner Placement and Securing Top With Clips or Clamps

M. After 4 or 5 panels are set, and all liner protection as described above is in place, unfold the liner in sections, toward the base of each panel,.
N. Crew of 2 inside the tank wall unfolds and pulls the liner toward each panel. Working in small liner sections, this inside crew works with a crew of 2 on a man lift located outside and above each tank panel to pull the liner edge up and over the top of each panel. The man lift crew lifts the liner edge using ropes attached (by the inside crew) to padded vice grips that grip the liner. The man lift crew lifts a small liner section to the top of the panel and folds it over the top of the panel, being sure there is enough slack in the liner inside the panel wall.

O. Once a section of liner is positioned properly (with liner slack inside the tank) and over the top of each panel wall, the man lift crew secures the top of the liner with clips (pin tanks) or clamps. NOTE: A minimum of 5 clips (pin tanks) or 5 clamps or more are required at the top of each tank panel to secure the liner. Add additional clips and clamps as needed to secure liner.
P. Both inside and man lift crews continue this process, working around the tank, one or two panels at a time, until the entire liner is in place. NOTE: The crew must allow sufficient slack in the liner at the wall to allow for liner movement during filling and draining.

Stairs, Fill Tubes, and Suction Tubes

I. Install safety stair system, fill tubes, and suction tubes. Ensure that stair system and tubes are appropriately secured to the tank walls according to customer specifications.
II. Upon completion of the stair system installation, the stairs should be secured as per the operating company requirements.

Final Steps, Filling, and Inspection

- Close final panel and secure with pins or plates as needed.
- Trim liner and allow approximately 3’ of liner to hang over edge of tank.
- Secure liner with sufficient clips or clamps and be sure ratchet straps are applied to all tanks.
- Place straps to secure the cut edge of liner on outside of tank.
- Inspect all connections and equipment, confirming at least 5 liner clips or clamps (or more as needed) are in place on top of each panel.
- Have a minimum of 8 inches of water put in the high side of the tank to check for leaks and to hold liner in place.
- Fill tank and monitor.
- If tank remains on site for any period longer than 7 days perform periodic inspections of the tank to ensure everything is in proper working order.
- Every time a tank is fully emptied and refilled, an inspection must be performed.
- Visibly inspect all tank panels and stairs for cracking, dents, burrs on the inside of the panels, chipping paint on welds or sharp edges on panels.
- Look for any cracked or broken valves, damage on pipes and tubes, missing D-Rings, damage to chains or ratchets, and bent clips.
- Pay close attention to hinge plates for chipping paint and cracking.
- Water must NEVER go below 24 inches at the LOWEST level in the tank. (Mark this on the liner as a caution).

Appendix D
Select SOP

BEST MANAGEMENT PRACTICES FOR

ABOVE GROUND STORAGE TANKS

Select Energy Services
1820 N I-35
Gainesville TX 76240

BEST MANAGEMENT PRACTICE FOR ABOVE GROUND STORAGE TANKS

TABLE OF CONTENTS

Section 1.0 Introduction and Summary

1.1 Introduction and Purpose

Select Energy Services, LLC (and all its affiliated and subsidiary companies, hereinafter collectively referred to as "Select") is committed to providing its employees a safe working environment and avoiding injury to our contractors, customers, and neighbors. As part of our overall commitment to safety, Select seeks to prevent acts or conditions that could result in injury and/or illness to any employee, customer, contractor, neighbor, and/or the environment.

In an effort to prevent potentially harmful acts or conditions, Select has developed this ***Best Management Practice*** (BMP) that focuses on above ground storage tank (AST) systems including planning, set up, operations, and take down. This BMP will discuss steps to be taken to promote a safe process, as well as a list of potential hazards that should be identified and remediated prior to beginning this procedure.

1.2 Background

AST is the industry term for an above ground storage tank. At Select, AST's are used for a variety of field applications within the fluids management operations. AST's can be used in place of traditional tank farms and in-ground water impoundments, and are suitable for fresh water as well as production water. At Select, AST's are available in several standard sizes, ranging from 4,500 barrel (bbl) capacity to 62,000 bbl capacities. Select currently uses three basic styles of AST's. One is referred to as a "pin" tank that uses large diameter steel pins to attach tank panels together. The second type of AST is a "plate" tank. Steel panels of a plate tank are attached using steel plates. Lastly, the "bolt" tank that connects using one-inch diameter bolts.

1.3 Intended Use

This BMP will be part of training provided to all affected employees when they begin their employment with Select and any time the plan is changed. This BMP will also be reviewed with an employee if his/her responsibilities change under the plan. A written copy of this plan will remain in the regional Safety Office, and will be available for employee review.
The Vice-President of Health Safety and Environment, or his agents, may be contacted by any employee if he/she needs additional information about this BMP.

This BMP has been developed to assist affected employees with the operational steps that may be used to complete the task safely. **It must be noted, however, that the experience and background of a trained containment employee is essential to the success of any project or task**.

Nothing contained in this BMP is a substitute for each employee's individual judgment in any given situation. In the event that any employee believes that any task outlined in any BMP cannot be completed safely, then that employee should immediately halt the performance of such task and notify their direct supervisor.

This BMP may also be used to inform customers about Select's typical equipment and procedures for setting up an AST system. This BMP will be reviewed and revised on an ongoing basis to keep pace with best oilfield practices and applicable OSHA regulations.

1.4 Customer Environmental Health and Safety Programs

This BMP recognizes that oil and gas operating companies have developed their own health, safety, and environmental (HSE) programs that contractors who work at customer's sites like Select, must comply with. In addition to this BMP, Select personnel will strictly observe the policies and procedures of each operating company.

1.5 Summary

This BMP is divided into four separate phases, each organized in chronological order. First is the planning phase that includes a customer-Select meeting and close coordination to be sure Select complies with all of customer's

Health, safety, and environmental requirements and that **the site is ready for the AST setup**. This BMP then presents the specific tasks and safety requirements during the second phase - the AST setup phase. The third phase is the AST operation during which periodic checks of the tank are made per customer's requirements. The fourth phase addresses AST takedown during which all materials are removed from the site.

Section 2.0 Planning for AST Rig-Up

The planning phase for AST systems includes several important activities that can impact the safety and success of an AST project. Step by step procedures are presented below for each of the following activities during the planning phase of an AST project:

AST order information
Customer meeting
Site soil and pad preparation (by customer)
Pre-mobilization on-site meeting
Notifications
Job Safety Analysis(JHA)
AST material deliveries

2.1 AST Order Information

Select AST Manager/Account Representative will record general AST order information including the customer's site location information (911 Address, NOT only coordinates), specific tank requirements (size, number, liner type, candy canes, etc), desired schedule, customer's order reference number, and site specific customer contact information. The AST Manager/Account Representative provides this information, along with customer's contractual and safety requirements, to the appropriate personnel.

2.2 Customer Meeting

Prior to finalizing the delivery schedule, a meeting or conference call is held with Select and customer representatives including the customer's purchase agent and the customer's health, safety, and environmental (HSE) representative.

This meeting is best done in person, but must at least be covered in a phone call, followed up by a brief email confirming the AST order details, delivery schedule, and noting special conditions, safety requirements, **verification of pad preparation**, etc.

The following key topics will typically be discussed.

Select site specific staff/roles

Review AST intended use and customer safety requirements.

Review AST scope of work, what is normally included, what is not.

Permitting for AST (as needed)

Site access and truck route requirements

Time line for AST to be operational

Confirm AST size(s) to be used

AST layout on pad

NOTE: It is preferable to maintain a 30' clear work area around the perimeter of the tank to provide access for equipment. Regardless of manufacturer, the minimum footprint should be a circle with a radius of at least 24' greater that the radius of the tank.

Current site conditions, status/schedule for site preparation, and soil preparation requirements.

Responsibility for filling the tank, to a minimum of 2 feet deep, immediately after it is set up to protect from wind.

Responsibility for AST inspections during AST operation, any time tank is fully emptied, and the frequency of inspections.

Conditions that could result in standby time charges or additional charges, and what prior customer approvals are required.

Confirm customer is responsible for the used liner, residual solids left in the tank, and site reclamation.

Understand customer's OSHA Process Safety Management – Contractor safety and notification requirements for all activities on customer controlled sites.

Note any special PPE or safety requirements at site.

Notifications: Establish a list of notifications/communications that Select will be responsible for and timing for each. Select standard procedure is to notify owners of buried utilities in the AST site area using state-wide or Canadian Province "one-call" services at least one week in advance of AST setup. Identify any other notifications that Select will need to make (e.g. Truck routes, neighbors, etc). Also identify customer's procedures for notifying them if conditions arise that could impact scope, schedule, cost) and get email addresses as needed.

Other Topics

Any additional site preparation to be completed by customer prior to setup
Underground material needs to be taken into account for site preparation.
Other Activities: Discuss AST site activities that will be ongoing during the AST set up. Select personnel will be aware and courteous of simultaneous operations at all times. **However, Select prefers very limited, if any, simultaneous operations near AST during set-up phase.**

Follow Up

After customer meeting, Select will document any changes to the AST scope of work, as needed, for the specific AST site and customer requirements in a brief email.

2.3 Site Soil Preparation

Preparation of the soils on site is required to form a dependable base for the AST. **Preparation of the tank pad is solely the responsibility of the customer/operating company.** The key requirements are:

Select requires a minimum soil compaction of 95% compaction. Soil testing results shall be shared with Select. In order to meet industry standards, site preparation requirements must be deemed satisfactory by a Select representative.

Select recommends soil compaction testing to be conducted via Standard Proctor Test (American Society for Testing and Materials {ASTM} Standard D698) or Modified Proctor Test (ASTM Standard D1557).

Compaction test results must be provided to Select prior to the commencement of AST construction.

A proof roll test may be used if observed and documented by qualified Select personnel.

Grade AST footprint and 30 ft work area to 0.25 % or 3" drop per 100 feet, toward sump location.

Site shall be graveled and rolled prior to tank installation, utilizing gravel size 2B or smaller. (3/4" road grade preferred, or coarse sand with minimum thickness of 4 inches).

Do not use crushed rock as sharp edges could puncture the tank liner.

After completion of these steps the tank setup can be approved.

2.4 Pre-Mobilization Onsite Meeting

Select's AST team and customer will conduct a pre-mobilization onsite meeting that documents the customer requirements for the specific pad location and AST system.

2.5 Notifications

Even though the customer or their subcontractor may have already called for utility locates for the sump hole, the AST Manager/Assistant should call the local or state underground utility location service again at least one week in advance before construction/digging begins. Select AST Manager/Assistant should document the ticket or reference number provided by the one-call service.

The following web site has contacts for all the states and provinces.
http://www.call811.com/state-specific.aspx. The website link below is provided for smart phones:

Call 811 in United States

2.6 AST Material Deliveries

Once the delivery route and schedule are established and the pre-project onsite inspection is completed, the AST materials can be delivered. Notifications will be made as agreed to during the customer meeting. Select delivery personnel should unload all materials safely and taking care to avoid damage to liners, plates, and all other AST components. They will also stay out of the way of ongoing site activities, and notify the AST Manager/Assistant if site conditions are not suitable for delivery.

Section 3.0 AST Setup

The Crew Leader will fill out the "AST Post Inspection Checklist" during and after the set up of the AST system. The checklist can be found in iScout under forms.

3.1 Job Hazard Analysis (JHA)

A job hazard analysis must be completed on site prior to beginning work. The JHA will be completed following Select approved procedures. Customer's safety requirements will also be communicated during the JHA. All Select personnel, 3rd party contractors, and customer representatives are expected to participate and sign the JHA when the JHA is completed. Please refer to iScout for the digital JHA.

3.2 Check Soil Condition

Preparation of the tank pad is solely the responsibility of the customer. However, weather and rain/snow events can change the soil conditions quickly. Therefore, Select will check soil compaction prior to setting up the AST.

3.3 Tank Layout

- Check proposed AST site to confirm a 30' clear work area around the perimeter of the tank is possible to provide access for equipment and laydown area for AST materials and erection equipment.
- Check that the minimum distances to existing wells, power lines, etc. are met.
- Regardless of manufacturer, the minimum footprint should be a circle of at least 24'or greater than that of the radius of the tank.
- Establish final location for the suction tube(s) and stairs.

3.4 Equipment (Select provided)

All equipment is subject to daily inspection. (Check condition, rigging, oil, water, fuel and cleanliness.) Here is a list of the recommended equipment needed to set a tank. Actual equipment used will vary among region and specific projects.

- Two 40' and/or 60'extending straight boom man-lifts.
- 10,000 lb or greater capacity, rough terrain forklift (telehandler).
- 17,000 pound or greater excavator with bucket and thumb attachment.

- Skid steer

3.5 Hand Tools Recommended

All hand tools are subject to daily inspection.

- Two 16’ ladders
- Four 4 lb. sledgehammers
- 100’ or 200’ tape measure
- 1 case of marking paint – minimum
- Set of wrenches ¼” – 1 ½”
- Set of sockets ¼” – 1 ½”
- Two 36” pry bars
- 8’ rock bar (digging bar)
- Five safety harnesses with retractable tethers (Select owned)
- Five retractable lanyards
- 100’ of 3/8” rope
- Duct tape
- Covered hook bladed knife
- Three 40’ lifting straps (minimum of 5,000 lb capacity)
- Three 20’ 3/8” chains (must have visible certification tags)
- Two rolling head pry bars
- 150’ strap
- Two ½” impact guns
- Two sets of rigging chains
- Patch tape
- Rubbing alcohol
- Patch roller
- Leather gloves
- Wire brush or wheel with 4” angle grinder
- Generator
- Steel toed rubber boots
- Fire retardant clothing (FRs)

3.6 AST Tank Setup Steps

- There must be a Select company representative on site the day prior to setup in order to approve everything for setup.

Tank Layout

- Determine center of tank and mark with paint. Place a non-abrasive item on the center point; preferably a sandbag. This will be used to find the center of tank after liners have been placed.
- Measure and double check minimum distance from tank center to existing wells.
- Measure and paint a line to mark the circumference of tank for panel placement.
- Also mark the circumference of the liner laid out flat to ensure the liner is properly placed.

Suction Pit

- Determine where tank suction is to be placed.

- Dig at least 6’ wide x 6’ long x 24” deep sump hole for the suction tube to set in and taper the edges so there are no sharp corners of the excavation.
- Remove any sharp stones and add at least one layer of geotextile.
- If multiple suction manifolds are required, the sumps should have a minimum of 8’ of separation.

Attention!

Barricade any sump pit with appropriate cones, tape, equipment, and/or have a hole watch if left open.

- All tank set-ups will require the use of a Select approved underlayment and liner. Depending on situational factors, 10oz or 16oz geotextile and 30 mil or 40 mil liner will be used. Additionally, multiple layers of each may be installed in both freshwater and produced water situations.
- Check customer specifications and regulatory permit liner and containment requirements for ASTs that may hold produced water.
- The crew walks the entire tank base area to pick up any sharp stones or other sharp debris that could damage the liner.
- Lay out the geo pad prior to the liner.
- Perform a visual inspection of the liner – repair any defects as necessary.
- Place the liner and align to the center of the tank and painted line for the tank walls. The preferred 30 ft area around tank allows the liner to be laid out flat so that fold back can be uniform.
- Secure liner from wind using sand bags.
- Fold the liner toward inside the painted tank edge line to allow placement tank panel walls.

Tank Wall Erection

- Ensure all tank parts and pieces are accounted for.
- Crew Leader will complete a visual inspection of each panel as it is prepared to be placed.
- Stand the first tank panel in place and secure it with the excavator bucket with thumb attachment. Keep connected to the excavator until the last panel is being set.
- Monitor equipment and first panel closely to ensure they remain stable, especially during higher wind situations.
- Begin placing the remaining panels in place.

- Personnel secured on man lift or using a ladder (depending on customer policies) then secure the panels in place with 4 pins each (for pin tanks) or (for plate tanks) with the connecting plates and lug busses, secured with chained cotter pins. Bolt tanks are connected using 1" diameter bolts.

  ATTENTION: Proper hand and foot placement is crucial when connecting AST panels. Keep hands and feet a safe distance from pinch points. Discuss where these pinch points are located when reviewing the JHA. Proper ergonomics is required. Keep the joints in mid-range; i.e. palms are located between waist and shoulders. Create an awareness that never goes away and designate one individual to enforce the awareness when setting panels.

- Roll up excess geo pad into minimum 6" diameter cylinders around the inside of the tank ring to help support the liner at the base of the tank wall as the tank is being filled.
- Prior to lifting liner into place against inside panel, add geo strips over all panel gaps for plate and bolt type tanks.
- Prior to covering sump with the geo pad or liner, confirm sump excavation has smooth sides and corners, and that no sharp stones are present.

Liner Placement and Securing Top with Clamps

- After 4 or 5 panels are set, and all liner protection as described above is in place, unfold the liner in sections, toward the base of each panel, making sure the rolled up geo pad will provide padding at the base of the inside of each panel.
- Crew of 2 inside the tank wall unfolds and pulls the liner toward each panel (final connection of last panel will not be made until all liner to that point is pulled and secured to avoid confined space, all personnel must be out of tank before walls are closed) . Working in small liner sections, this inside crew works with a crew of 2 on a man lift located outside and above each tank panel to pull the liner edge up and over the top of each panel. The man lift crew lifts the liner edge using ropes/straps gently lowered and attached (by the inside crew). The man lift crew lifts a small liner section to the top of the panel and folds it over the top of the panel, being sure there is enough slack in the liner inside the panel wall.

  ATTENTION: Never place hands on the railing of the man basket that faces the AST panel. Proper hand placement would be the side or back rail.

- Once a section of liner is positioned properly (with liner slack inside the tank) and over the top of each panel wall, the man lift crew secures the top of the liner with clamps. (Tools in basket secured with tool lanyards) NOTE: A minimum of 5 clamps or more are required at the top of each tank panel to secure the liner. Add additional clamps as needed to secure liner.
- Both inside and man lift crews continue this process, working around the tank, one or two panels at a time, until the entire liner is in place.
- NOTE: The crew must allow sufficient slack in the liner at the wall to allow for liner movement during filling and draining.

Stairs, Fill Tubes, and Suction Tubes

- Install safety stair system, fill tubes, and suction tubes. Ensure that stair system and tubes are appropriately secured to the tank walls with 2" ratchet straps or 3/8" chains and ratchet binders.

Final Steps, Filling, and Inspection

- Close final panel and secure with pins, plates, or bolts as needed.
- Trim liner and allow approximately 3' of liner to hang over edge of tank.
- Secure liner with sufficient clamps and be sure a 2" seatbelt strap (supplied with liner) is installed around the cut

edge of liner on the outside of tank. Pull tight with a ratchet.

- Inspect all connections and equipment, confirming at least 5 liner clamps (or more as needed) are in place on top of each panel.
- Have a minimum of 24 inches of water put in the tank to hold liner in place.
- Fill tank and monitor.
- Perform periodic inspections of the tank to ensure everything is in proper working order.
- Every time a tank is fully emptied and refilled, an inspection must be performed.
- Visibly inspect all tank panels and stairs for cracking, dents, burrs on the inside of the panels, chipping paint on welds or sharp edges on panels.
- Look for any cracked or broken valves, damage on pipes and tubes, missing D-Rings, damage to chains or ratchets, and bent clips.
- Pay close attention to hinge plates for chipping paint and cracking.
- Water should not go below 12 inches at the LOWEST level in the tank. (Mark liner as a caution).

Section 4.0 AST Operation

4.1 Inspections and Monitoring

AST Operation Phase includes periodic AST monitoring, leak detection, and identifying potential hazards that may have developed, change on-site conditions or tank use. If the tank is drained, it should be secured from wind impacts and the liner inspected and re-positioned (to provide sufficient slack during filling) prior to refilling. Specifically, it may be necessary to rearrange the liner folds at the walls prior to refilling if the wind has shifted the liner folds when the tank was empty.

If changes are noted, they should be communicated to the Select AST Manager/Assistant Manager.

CAUTION – If conditions are observed that could indicate an imminent tank failure, clear the area immediately. Advise others in the vicinity to do so also and contact the customer to drain the tank.

4.2 Initial Leak Detection and Liner Repair

In the event of a leak in the tank due to a hole in the liner, the following steps should be followed.

- If there is a question that it is in fact a leak from the AST, a dye test or a pH balance test may need to be performed on both the water in the tank and on the ground using approved dye or a properly calibrated pH meter. Third party test results are recommended.
- If the leak is found to be coming from the tank, narrow down from which panel the leak is originating.
- Use a strap or rope to mark the point where the water is coming out of the tank.
- Determine if the water is coming out high or low on the tank.
- Locate the puncture or hole in the liner.
- Empty the tank to the point of damage in liner if necessary.
- Clean area of liner that needs to be repaired.
- Cut out piece of material (patch or tape) to overlay liner.
- Either weld the patch to the injured area in the liner or stick the tape (2 types – dry or underwater) over the leak.
- Make sure puncture is completely covered.
- Monitor as needed.

Section 5.0 AST Breakdown

The AST breakdown follows the reverse order of the setup steps presented in Section 3.0 above. The sump will be filled in with the same material taken out during excavation.

The customer is responsible for draining and disposing of all liquids and residual solids that have accumulated in the tank. Additionally, the customer is responsible for proper off site management or recycling of the liner and geo pad materials, and final grading and/or reclamation of AST site.

The Crew Leader will perform a visual inspection of AST panels and accessories for defects.

Attachment 1

SELECT ENERGY SERVICES

Above-Ground Storage Tank (AST) Reference Chart

Pin Style Panels

	Panels	D (ft)	R(ft)	Trim Line (R+18')	Top of Wall (R+13')	Total V (bbls)	2' FB (bbls)	bbls/in	bbls/ft	Liner Size	Geo Size
9600k 20.08' Width 12'4" Height 5040lbs	12	76.7'	38.35'	56.35'	51.35'	10151.32	8505.16	68.59	823.08	118' x 118'	98' x 98'
	13	83.09'	41.55'	59.55'	54.55'	11915.83	9983.24	80.51	966.12	124' x 124'	104' x 104'
	14	89.48'	44.74'	62.74'	57.74'	13819.07	11577.88	93.37	1120.44	130' x 130'	110' x 110'
24k 18.77' Width 12' 4" Height 5040lbs	20	119.5'	59.75'	77.75'	72.75'	24646.95	20649.72	166.53	1998.36	160' x 160'	140' x 140'
	22	131.45'	65.76'	83.76'	78.76'	29822.81	24986	201.5	2418	172' x 172'	152' x 152'
	23	137.43'	68.72'	86.72'	81.76'	32597.98	27312.24	220.26	2643.12	178' x 178'	158' x 158'
	24	143.4'	71.7'	89.7'	84.7'	35491.62	29736.44	239.81	2877.72	184' x 184'	164' x 164'
40k 17.46' Width 12' 4" Height 5040lbs	24	153'	76.5'	94.5'	89.5'	40402.69	33850.9	272.99	3275.88	193' x 193'	173' x 173'
	28	178'	89'	107'	102'	54316.00	45508.00	367.99	4415.93	218' x 218'	198' x 198'
	30	193'	96.5'	114.5'	109.5'	62000.00	50270.27	418.91	5027.02	233' x 233'	200' x 200'

Plate Style Panels

	Panels	D (ft)	R(ft)	Trim Line (R+18')	Top of Wall (R+13')	Total V (bbls)	2' FB (bbls)	bbls/in	bbls/ft	Liner Size	Geo Size
9k (T) 32.72' Width 12'2" Height 5480lbs	7	73'	36.5'	54.5'	49.5'	9056.00	7457	62.9	754.7	113' x 113'	93' x 93'
	8	84'	42'	60'	55'	11843.55	9869.62	82.2	986.96	124' x 124'	104' x 104'
18k (P) 32.72' Width 12' 2" Height 5310lbs	9	94.58'	47.29'	65.29'	60.29'	15014.88	12512.4	104.27	1251.24	135' x 135'	115' x 115'
	10	105'	52.5'	70.5'	65.5'	18427.0	15356.0	128	1535.6	145' x 145'	125' x 125'
	11	115.6'	57.8'	75.8'	70.8'	22430.0	18692.08	155.77	1869.21	156' x 156'	136' x 136'
26.5k-41k (A) 32.72' Width 12' 2" Height 6500lbs	12	126'	63'	81'	76'	26660.57	22216.8	185.14	2221.67	166' x 166'	146' x 146'
	13	136.62'	68.31'	86.31'	81.31'	31329.39	26107.83	217.57	2610.78	177' x 177'	157' x 157'
	14	147.13'	73.565'	91.565'	86.565'	36340.00	30283.33	252.36	3028.33	188' x 188'	168' x 168'
	15	157'	78.5'	96.5'	91.5'	41382.0	34485.0	287.40	3448.5	197' x 197'	177' x 177'
	16	168.15'	84.075'	102.075'	97.075'	47464.49	39553.74	329.61	3955.37	209' x 209'	189' x 189'
	18	188.6'	94.3'	112.3'	107.3'	59721.00	49774.00	415.08	4976.75	229' x 229'	209' x 209'

Appendix E

Operation Plan

General Specifications

In this plan, the portion of the Produce Water Re-use Rule that is addressed by certain text is underlined. If a conflict exists between any SOP of Select Energy Services and this plan, Select Energy Services will adhere to the mandates of this plan. The operator will maintain and operate the recycling containments and facility in accordance with the following plan to contain liquids and maintain the integrity of the liner to prevent contamination of fresh water and protect public health and the environment.

- The operator will use the treated produced water in the containments for drilling, completion (stimulation), producing or processing oil or gas or both. If other uses are planned, the operator will notify the OCD though the submission of a modified C-147.
- For all exploration and production operations that use produced water, the operator will conduct these activities in a manner consistent with hydrogen sulfide gas provisions in 19.15.11 NMAC or NORM provisions in 19.15.35 NMAC, as applicable.
- The operator will address all releases from the recycling and re-use of produced water in accordance with 19.15.29 NMAC.
- The operator will not discharge into or store any hazardous waste in the recycling containments but they may hold fluids such was freshwater, brackish water, recycled and treated water, water generated by oil or gas processing facilities, or other waters that are gathered for well drilling or completion. The recycling facility will not be used for the disposal of produced water. The operator will maintain the containments free of miscellaneous solid waste or debris.
- The operator will verify that no oil is on the surface of the contained fluid. If oil is observed, the oil shall be removed using an absorbent boom or other device and properly disposed at an approved facility. An absorbent boom or other device will be maintained on site.
- The operator will install and use a header and diverter described in the design/construction plan in order to prevent damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes during injection or withdrawal of liquids.
- Pursuant to an approved variance, the operator will maintain at least 2-feet of freeboard in each AST containment. For other containments, the operator will maintain at least 3-feet of freeboard. Under extenuating circumstances, which will be noted on the inspection log as described below, the operator may temporarily exceed the freeboard mandate.
- If the liner develops a leak or if any penetration of the liner occurs above the liquid's surface, then the operator will repair the damage or initiate replacement of the liner

within 48 hours of discovery or will seek a variance from the division district office within this time period.

- If visible inspection suggests that the liner developed a leak or if any penetration of the liner occurs below the liquid's surface, then the operator will remove all liquid above the damage or leak line within 48 hours of discovery. The operator will also notify the district division office within this same 48 hours of the discovery and repair the damage or replace the liner.
- In the event of a leak due to a hole in the liner, the following steps will be followed:
    1. If the source of the fluid is uncertain, comparative field tests may need to be performed on both the water in the containment and that which may have been released (e.g. pH, conductance, and chloride).
    2. If the fluid is found to be coming from the containment, determine the location from which the leak is originating.
    3. Mark the point where the water is coming out of the tank.
    4. Locate the puncture or hole in the liner.
    5. Empty the containment to the point of damage in liner.
    6. Clean area of liner that needs to be repaired.
    7. Cut out piece of material (patch or tape) to overlay liner.
    8. Either weld the patch to the injured area in the liner or apply tape over the rupture.
    9. Make sure rupture is completely covered.
    10. Monitor as needed.
- The operator will inspect and remove, as necessary, surface water run-on accumulated in the secondary containment.

Monitoring, Inspections, and Reporting

The containment will contain enough produced water to prevent any shifting of the liner. Weekly inspections shall occur when there is 1-foot depth or more of produced water in the containment. Monthly inspections shall occur when there is less than 1-foot depth of produced water in the containment, as well as when the ASTs are emptied and prior to refilling. An inspection log will be maintained by the operator and will be made available to the division upon request.
Inspection may include: freeboard monitoring, leak detection, identifying potential hazards that may have developed, change in site conditions or if the contents of the containment change from the initial use. The last pages of this Appendix contain the "Inspection Form" to be filled out during these routine inspections.

Monitoring and Inspection Checklist (routine weekly or monthly inspections):

- Visually inspect the liner. If a liner's integrity is compromised, or if any penetration of the liner occurs above or below the water surface, then the operator will notify the appropriate Division district office within 48 hours (phone or email).
- Inspect the system for injection or withdrawal of liquids from the ASTs and document that the design prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes is working appropriately.

- Inspect the water surface for visible oil.
- Measure the freeboard.
- Inspect the secondary containment berm around the ASTs to check for erosion and collection of surface water run-on.
- If H_2S is a documented potential issue with the containment, measure H_2S concentrations on the down-wind side of the facility when produced water is present.
- Inspect the secondary containment for evidence of damage and monitor for leakage.
- Examine Mega-X Bird Hazing equipment
- At least monthly, inspect AST-Containment for dead wildlife, including migratory birds. Operator shall report the discovery of a dead animal to the appropriate wildlife agency and to the district within 30 days of discovery. Further prevention measures may be required.

If observed conditions indicate a potential tank failure is imminent, the vicinity will be immediately cleared and the AST will be drained.

Recycling Facility

Form C-147 confirms financial assurance of the recycling facility. The operator of the facility is listed on form C-147.

- If the facility shares the same setting in regard to siting criteria, surface ownership, and location of the containments, registration will be submitted for both the containments and facility using one form C-147.
- The recycling facility serves many wells located on the same lease as the facility or on nearby leases.
- The operator of the facility will submit monthly reports to the division district detailing 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 and its disposition using form C-148.
- The facility operator will keep accurate records that identify the sources and disposition of all recycled water. These records shall be made available to the division by request.

Cessation of Operations

If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdraw, operation of the facility has ceased and the division district office will be notified. The division district may grant an extension not to exceed six months to determine the cessation of operations. The operator will remove all free fluids from the containments within 60 days from the date of operations cessation. An extension may be requested to allow no more than two months for the removal of fluid.

The operator will remove all fluids from the recycling facility within 60 days of cessation of operations. An extension not be exceed 2 months may be granted by the district division for the removal of fluids from the facility.

Concho Resources

Inspection Form

Date: _____

Fez Recycling AST-Containments and Facility

(weekly inspection when fluids are present, monthly otherwise)

Tank ID: _____

Fluid Level: _____ Tank contents: _____

Inspection Task	Results		Remarks, Observations, and/or Remedial Actions
Visible Oil on Surface	☐ None Observed	☐ Yes, Describe Action	
	An absorbent boom or similar device is located on site to remove visible oil from surface.		
At least 2 ft of freeboard	☐ Yes	☐ No, Measure Freeboard	
Evidence of surface water run-on	☐ None Observed	☐ Yes, Describe	
	Check for excessive erosion of perimeter berms.		
Birds or wildlife in Containment	☐ None Observed	☐ Yes, Describe	
	Within 30 days of discovery, report dead birds or wildlife to the appropriate agency (USFWS, NMDGF) and to NMOCD District II.		
General Damage to AST	☐ None Observed	☐ Yes, Describe	
Rupture of Liner	☐ None Observed	☐ Yes, Describe	
	If rupture is above fluid level, repair within 48 hours. If below fluid level, remove fluid above within 48 hours, notify NMOCD District II, and repair.		
Clips or clamps properly securing liner	☐ Yes	☐ No, Describe	
If low level, enough liner slack on panel wall	☐ Yes	☐ No, Describe	
Uneven gaps between panels	☐ None Observed	☐ Yes, Describe	
Signs of tank settlement	☐ None Observed	☐ Yes, Describe	

Concho Resources

Erosion of soil surrounding tank (10 ft radius)	☐ None Observed	☐ Yes, Describe	
Running water on the ground	☐ None Observed	☐ Yes, Describe	
Unusual ponding of fluid inside berm	☐ None Observed	☐ Yes, Describe	
	Field test (pH, Cl-, conductance, etc.) ponded fluid and compare to fluid in tank. If tank is determined as the source, locate and repair rupture within 48 hours. Notify NMOCD District II and repair.		
Rust or corrosion on panels, stairs, or hardware	☐ None Observed	☐ Yes, Describe	
Damage to any hardware	☐ None Observed	☐ Yes, Describe	

Additional Observations or Actions: _____

Inspected by: _____

Appendix F

Closure Plan

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

The operator will notify the division district (phone or email) before initiating closure of the containments and/or facility.

Closure Plan – Protocols and Procedures

1. Residual fluids in the containments will be sent to a division-approved facility.
2. The operator will remove all solid contents and transfer those materials to the following division-approved facility such as R360 Permit Number NM 01-0006
3. If possible, geomembrane textiles and liners that exhibit good integrity may be recycled for use as an underliner of tank batteries or other use as approved by OCD.
4. Disassemble the recycling containment infrastructure according to manufacturer's recommendations

Closure Sampling

After the disassembly of the containments and removal of the contents and liners, soils beneath the tanks will be in accordance to the Rule: a five-point (minimum) composite sample from beneath the liner to include any obviously stained or wet soils, or any other evidence of impact from the containments for laboratory analyses for the constituents listed in Table I of 19.15.34.14 NMAC. Additional sampling may be initiated at the discretion of the operator.

If a reportable release is documented by closure sampling, NMOCD will be notified and the operator will initiate activities in compliance with Rule 29.

Closure Documentation

Within 60 days of closure completion, the operator will submit a closure report (Form C-147) to the District Division, with necessary attachments to document all closure activities are complete, including sampling results and details regarding backfilling and capping as necessary.

In the closure report, the operator will 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 the closure plan.

Reclamation and Re-vegetation

The operator will reclaim the surface to safe and stable pre-existing conditions that blends with the surrounding undisturbed area. "Pre-existing conditions" may include a caliche well pad that existed prior to the construction of the recycling containment and that supports active oil and gas operations.

Areas not reclaimed as described herein due to their use in production or drilling operations will be stabilized and maintained to minimize dust and erosion.

For all areas disturbed by the closure process that will not be used for production operations or future drilling, the operator will

1. Replace topsoils and subsoils to their original relative positions
2. Grade so as to achieve erosion control, long-term stability and preservation of surface water flow patterns
3. Reseed in the first favorable growing season following closure

Federal, state trust land, or tribal lands may impose alternate reclamation and re-vegetation obligations that provide equal or better protection of fresh water, human health, and the environment. Re-vegetation and reclamation plans imposed by the surface owner will be outlined in communications with the OCD.

The operator will notify the division when the site meets the surface owner's requirements or exhibits a uniform vegetative cover 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.

The operator will notify the Division when reclamation and re-vegetation is complete.

May 2019
Resubmit Feb 2021

C-147 Registration Package for Fez Recycling Containment and Recycling Facility Area (100+ acres) Section 8, T25-S, R35-E, Lea County Volume 1

View to east from near the center of the 100+ acre area of interest in which will be the proposed containment and recycling facility. The freshwater frac pond is apparent on the horizon.

Prepared for:
COG Operating LLC
600 W. Illinois Ave
Midland, Texas 79707

Prepared by:
Mustang Extreme
And
R.T. Hicks Consultants, Ltd.
901 Rio Grande NW
Ste F-142
Albuquerque, New Mexico

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996

February 17, 2021

Mr. Mike Bratcher
NMOCD District II
811 S. First St.
Artesia, NM 88210
Via E-Mail

Ms. Victoria Venegas
NMOCD District II
811 S. First St.
Artesia, NM 88210
Via E-Mail

RE: COG Fez Containment, Lea County NM (no RF# assigned)
Registration per Rule 34

Dear Mr. Bratcher and Ms. Venegas:

On behalf of COG Operating LLC, Hicks Consultants is pleased to submit a modified C-147 registration form within the previously-submitted Volume 1 for the Fez Containments #1, #2, #3. Rule 34 requires no variances for this in-ground containment. Specifically,

- COG will install a 4-strand barbed wire fence over the existing game fence to comply with the specific language of the Rule if requested by the District Office,
- The 40-mil HDPE secondary liner is "equivalent with a hydraulic conductivity no greater than 1 x 10-9 cm/sec" and meets or exceeds the "EPA SW-846 method 9090A or subsequent relevant publications" and is therefore consistent with the criteria of the Rule,
- The Mega Blaster Pro Sonic Bird Repeller "is otherwise protective of wildlife, including migratory birds" and is therefore consistent with the criteria of the Rule,
- In compliance with 19.15.34.10, the corrected C-147 is copied to the surface owner,.

I affirm as a Professional Geologist with more than 30 years of experience with NMOCD permits, hearings, rulemaking, and field work in the Permian Basin of New Mexico, that the siting criteria demonstration is consistent with the Rule and the location meets the specified siting criteria.

The Design/Construction Plan, Operation and Maintenance Plan and Closure Plan are consistent with the Rule. Unless instructed by OCD, we will employ the analytical tests for closure listed in the Rule. Please contact me if you have any questions or concerns and we look forward to working with you. Your assignment of a 2RF-# will facilitate submission of the requisite C-148 form and a C-147 permit for the associated AST Containments (Volume 2).

Sincerely,
R.T. Hicks Consultants

Randall Hicks, PG
Principal

Copy: COG Operating, LLC
Quail Ranch, LLC, Jesse.Wood@conocophillips.com

R. T. HICKS CONSULTANTS, LTD.

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

May 9, 2019

Mr. Timothy Reed
COG Operating
600 W. Illinois Ave.
Midland, Texas 79707
Via E-Mail

RE: COG Operating LLC – Fez Containment and Recycling Facility

Dear Mr. Reed:

Hicks Consultants in conjunction with MustangExtreme Environmental Services LLC submits the attached registration. Volume 1 provides the C-147, the design drawings for the in-ground containment, the siting criteria demonstration, the design/construction plan, O&M plan and Closure Plan for the in-ground containment, and the geotechnical boring logs. Volume 2 contains the design information and associated plans and information for the Above-Ground Storage Tank Containments.

The package follows the order of Form 147 to allow for an easier review by OCD. Please note, as described below, this submission is a *registration* not a permit application. Because the containments meet all of the requirements of Rule 34, COG Operating may begin filling the containments with produced water after submission.

The following elements of the submission are germane to the OCD review prior to posting the registration on the OCD Website.

A. Engineering drawings stamped by a NM Registered Engineer are provided.
B. In compliance with 19.15.34.10 of the Rule, this submission is copied to Quail Ranch, LLC, who is the surface owner of the surface upon which the containment will be constructed.
C. Site specific information demonstrates compliance with siting criteria for the location.
D. Water well logs from the OSE database and the logs from the geotechnical borings are included as appendices at the end of the submission.
E. Photographs of the site and environs are attached to this cover letter to provide assistance in the OCD review

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

This submission refers to the following elements that some OCD reviewers have considered variances:

1. An equivalency demonstration written by experts for the proposed 40-mil HDPE secondary liner has been previously approved by OCD. We maintain that the language of the Rule is clear[1] and a variance is not required. The previously-submitted equivalency demonstration is lengthy and we can submit it under separate cover if requested by OCD.

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

2. OCD has approved the proposed Avian Protection Plan (Bird-X Mega Blaster Pro) for other containments. Thus, the plan meets the requirement of the rule that the "otherwise protective of wildlife, including migratory birds" and a variance is not required.
3. Using the proposed deer fence in lieu of a 4-strand barbed wire fence is not a variance. Because feral pigs, javelena and deer are present in the area, a fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule[2]. The specification for fencing provided in 19.15.34.12 D.2 contradicts D.1 because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. Thus, compliance with D.2 results in a violation of D.1. We maintain that compliance with D.1 is the critical component of the Rule and operators need not be required to submit a variance request in order to follow Best Management Practices and comply with the Rule.

If you have any questions or concerns regarding this registration or the attached C-147, please contact me or Bobbi Jo McKean (MustangExtreme). Thanks for letting us be part of this water conservation and recycling project.

Sincerely,
R.T. Hicks Consultants

Randall Hicks
Principal

Copy: MustangExtreme, Bobbi Jo McKean
Quail Ranch, LLC, JWood@concho.com

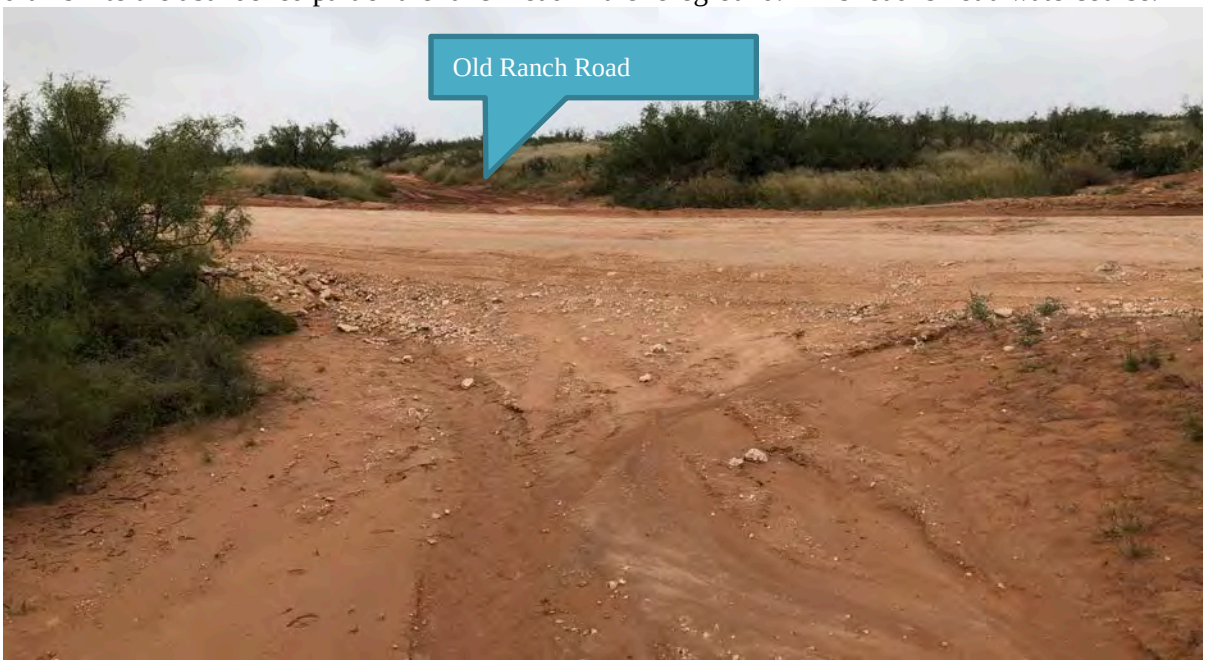
[2] The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair.

Site Photographs

Photograph of “East Windmill” located about 750 feet from the northwestern corner of the area of interest that will include the recycling facility and containment.

Measured water level in this temporarily abandoned windmill was 127.8 feet.

The oilfield road in the center of the photograph cuts across an old ranch road. The oilfield road now drains into the abandoned part of the ranch road in the foreground. This road is not a watercourse.



A buried crude pipeline is west of the fresh water frac pond (right side of photograph)

This view to the south from the east-west oilfield road show the nature of the vegetation in the area of interest that will house the recycling facility and containment.

About 10-feet of caliche is exposed in a quarry located about 1.5 miles northeast of the area of interest. Geotechnical borings at the site suggest that caliche below the surface in the area of interest is mixed with sand horizons and may not be suitable for harvest for construction of roads and pads.

C-147

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 April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: ☒ Recycling Facility ☒ Recycling Containment*

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

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

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

1.

Operator: : COG Operating LLC, OGRID #:__229137_____

Address: ___600 W. Illinois Ave. Midland, Texas 79707_____

Facility or well name (include API# if associated with a well): ____Fez Containment_____

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

U/L or Qtr/Qtr ___A-B-C_ _____ Section ___8_____ Township __25S_____ Range ____35E_____ County: ____Lea_____

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

2.

☒ **Recycling Facility:**

Location of (if applicable): Latitude _32.151923_____ Longitude -103.383933___ NAD83

Proposed Use: ☒ Drilling* ☒ Completion* ☒ Production* ☒ Plugging *

The re-use of produced water may NOT be used until fresh water zones are cased and cemented

☐ Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***

☒ Fluid Storage

☐ Above ground tanks ☒ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type_____

☐ Activity permitted under 19.15.36 NMAC explain type:_____ ☐ Other explain _____

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

☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date:_____

3.

☒ **Recycling Containment:** (#1, #2, #3)

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

Center of Recycling Containment (if applicable) Latitude _32.150020_____ Longitude __--103.386423__ NAD83 (Center #2)

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

☒ Lined ☐ Liner type: Thickness __Secondary 40_mil Primary 60- mil ☐ LLDPE ☒ HDPE ☐ PVC ☐ Other _____

☐ String-Reinforced

Liner Seams: ☒ Welded ☐ Factory ☐ Other Volume: _See Attachment Dimensions: See Attachment

☐ 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__Deer fence with barbed wire _____

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 FIGURES 1-2	☐ 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 FIGURE 3	☐ Yes ☒ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division FIGURE 4	☐ Yes ☒ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map FIGURE 5	☐ Yes ☒ No
Within a 100-year floodplain. FEMA map FIGURE 6	☐ 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 FIGURE 7	☐ 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 FIGURE 8	☐ 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. FIGURES 1 and 7 - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 500 feet of a wetland. FIGURE 9 - 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): Lauren Sloan Title: Water Resource Manager

Signature: Lauren Sloan Date: 2/18/21

e-mail address lauren.sloan@conocophillips.com Telephone: 432.685.2577

11.

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

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

☐ OCD Conditions _____

☐ Additional OCD Conditions on Attachment

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

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

Form C-147
Revised April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: ☒ Recycling Facility ☒ Recycling Containment*****

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

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

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

1.

Operator: : COG Operating LLC, OGRID #:__229137_____

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U/L or Qtr/Qtr ___A-B-C_ _____ Section ___8_____ Township __25S_____ Range ____35E_____ County: ____Lea_____

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

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☒ **Recycling Facility:**

Location of (if applicable): Latitude _32.151923_____ Longitude -103.383933___ NAD83

Proposed Use: ☒ Drilling* ☒ Completion* ☒ Production* ☒ Plugging *

The re-use of produced water may NOT be used until fresh water zones are cased and cemented

☐ Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***

☒ Fluid Storage

☐ Above ground tanks ☒ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type_____

☐ Activity permitted under 19.15.36 NMAC explain type:_____ ☐ Other explain _____

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

☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date:_____

3.

☒ **Recycling Containment:**

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

Center of Recycling Containment (if applicable) Latitude _32.150020_____ Longitude __--103.386423__ NAD83

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

☒ Lined ☐ Liner type: Thickness __Secondary 40_mil Primary 60- mil ☐ LLDPE ☒ HDPE ☐ PVC ☐ Other _____

☐ String-Reinforced

Liner Seams: ☒ Welded ☐ Factory ☐ Other Volume: _2,576,097_bbl Dimensions: L__1658_ x W 970__ x D_20' below levee 10'± (below grade)

☐ 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__Deer fence with barbed wire _____

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.

NO NEW VARIANCES ARE REQUESTED

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

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Within a 100-year floodplain. FEMA map FIGURE 6	☐ 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 FIGURE 7	☐ 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 FIGURE 8	☐ 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. FIGURES 1 and 7 - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 500 feet of a wetland. FIGURE 9 - 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.
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- ☒ 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): Timothy Reed, PG

Title: Water Resource Analyst

Signature: Tim Reed

Date: 05/16/19

e-mail address TReed@concho.com

Telephone: 432.688.6634

11.

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

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

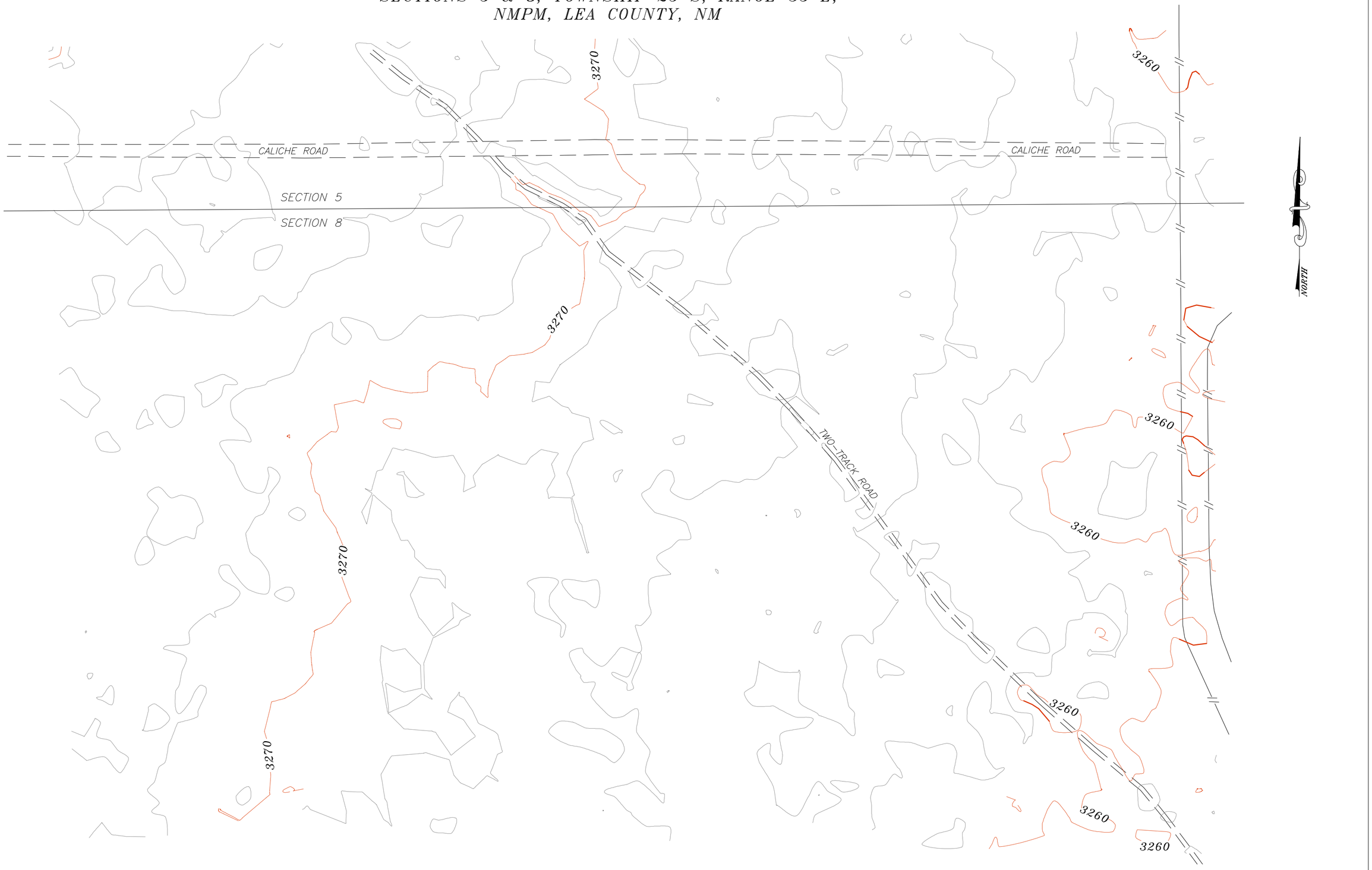
☐ OCD Conditions _____

☐ Additional OCD Conditions on Attachment

SURVEY FOR CONTAINMENT AND RECYCLING FACILITY

FEZ PROJECT TOPOGRAPHIC SURVEY

SECTIONS 5 & 8, TOWNSHIP 25 S, RANGE 35 E,
NMPM, LEA COUNTY, NM



LEGEND:

– ROAD AS NOTED
– BURIED PIPELINE (APPROX. LOCATION)
– MAJOR CONTOUR INTERVAL
– MINOR CONTOUR INTERVAL

NOTES:

– THIS PLAT IS FOR REFERENCE & ORIENTATION PURPOSES ONLY AND NOT TO BE USED FOR DESIGN WORK.

– THIS IS NOT A BOUNDARY SURVEY OR LAND DIVISION OF ANY KIND.

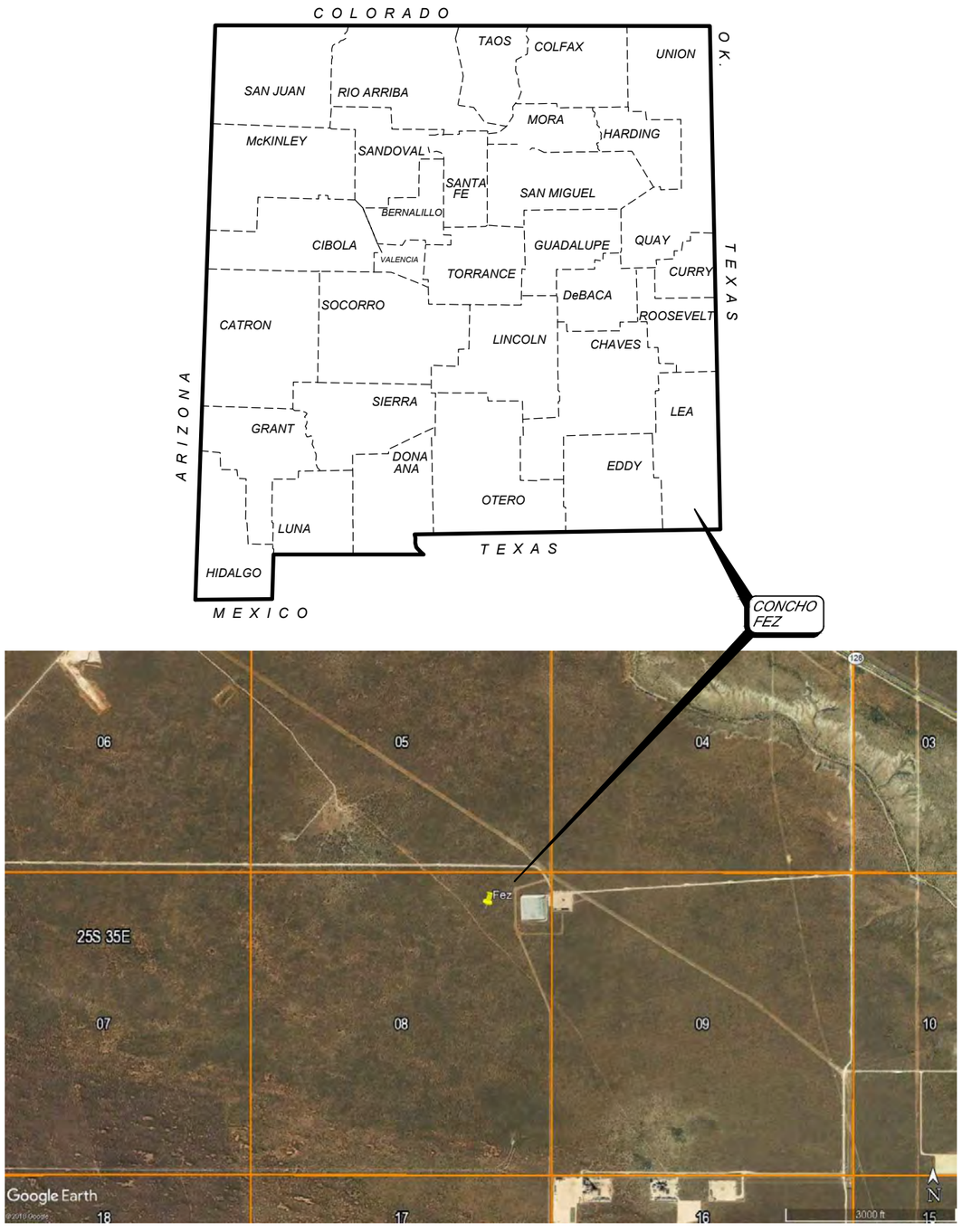
– MINOR CONTOUR INTERVAL = 2 FEET
MAJOR CONTOUR INTERVAL = 10 FEET

150 0 150 300
SCALE: 1"=150'

HARCROW SURVEYING, LLC
2314 W. MAIN ST, ARTESIA, N.M. 88210
PH: (575) 746-2158 FAX: (575) 746-2158
c.harcrow@harcrowsurveying.com

SURVEY DATE: NOVEMEBER 9, 2018		TOPOGRAPHIC
DRAFTING DATE: NOVEMBER 29, 2018		PAGE: 1 OF 1
APPROVED BY: CH	DRAWN BY: SP	FILE: 18-MISC.

RECYCLING CONTAINMENT DESIGN DRAWINGS



COG OPERATING, LLC

FEZ PRODUCED WATER RECYCLING FACILITY
S8 T25S R35E
LEA COUNTY, NM

INDEX OF SHEETS

GENERAL NOTES

1. ALL BOUNDARY, TOPOGRAPHIC AND UTILITY INFORMATION SHOWN ARE BASED ON SURVEY INFORMATION FURNISHED BY HARCROW SURVEYING, LLC.
2. THE CONTRACTOR SHALL IDENTIFY AND LOCATE UTILITY LINES, MONITORING WELLS, SURVEY MONUMENTS, AND OTHER NEARBY STRUCTURES PRIOR TO PERFORMING WORK.
3. COORDINATE INFORMATION IS BASED ON STATE PLANE COORDINATES, NEW MEXICO EAST, NAD 83. THE CONTRACTOR SHALL IDENTIFY ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION.
4. ALL GEOMEMBRANES SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER

3/31/2019

Magrym Consulting P.C.
1510 North Acres Drive
Lovington, NM 88260
(719) 332-8665
www.magrym.com
TBPE F-19848

R-X	DESCRIPTION	DATE	BY
	REVISIONS (OR CHANGE NOTICES)		

CONCHO
COG Operating, LLC
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701
(432) 683 7443
www.concho.com

Mustang Extreme Environmental Services
5049 Edwards Ranch Rd. Suite 200
Fort Worth, TX 76109
(817) 441-1235
www.mustangextreme.com

FEZ PRODUCED WATER RECYCLING FACILITY
S8 T25S R35E
LEA COUNTY, NM
COG OPERATING, LLC

COVER SHEET

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: COVER	SHEET: 1COVER

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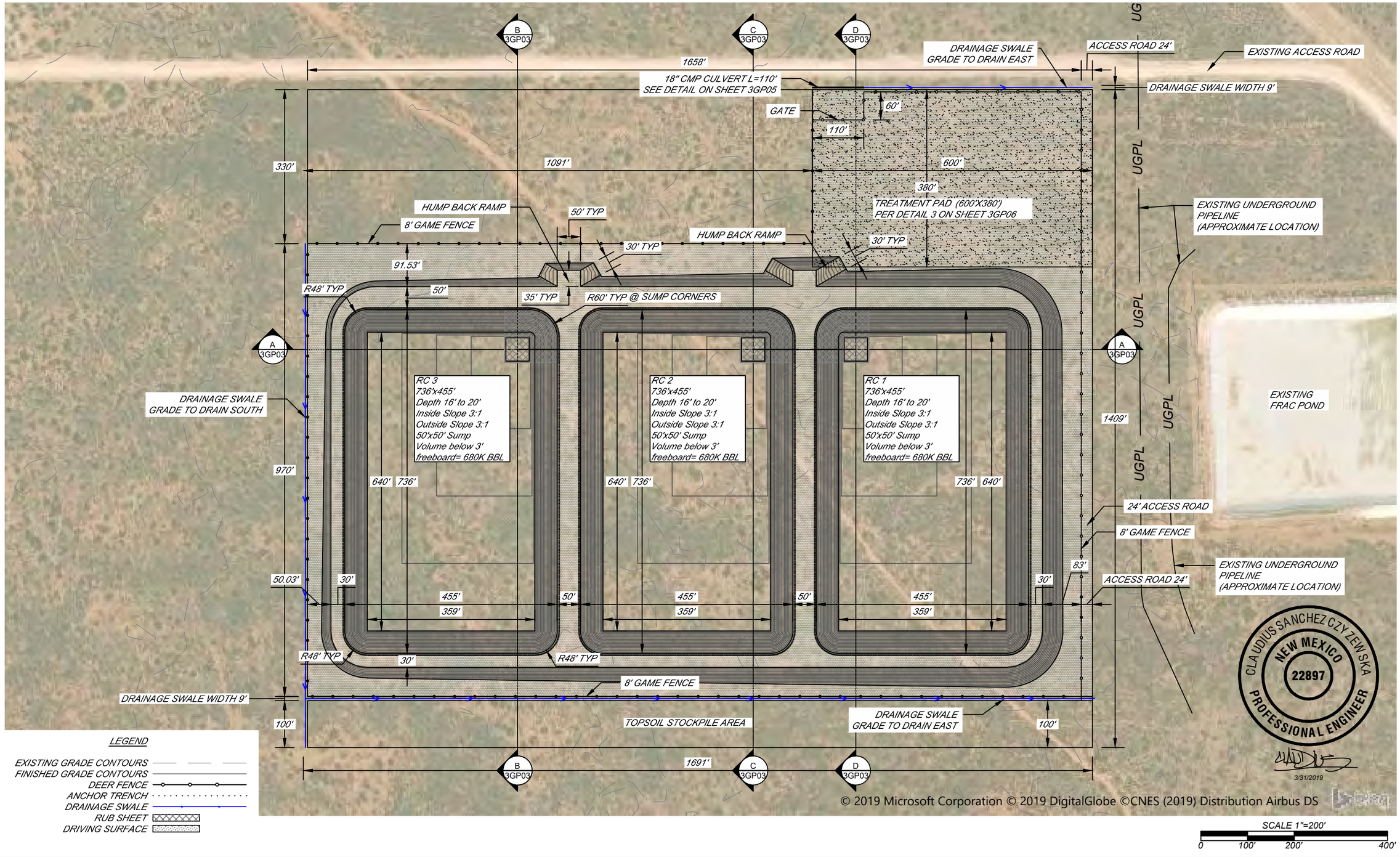

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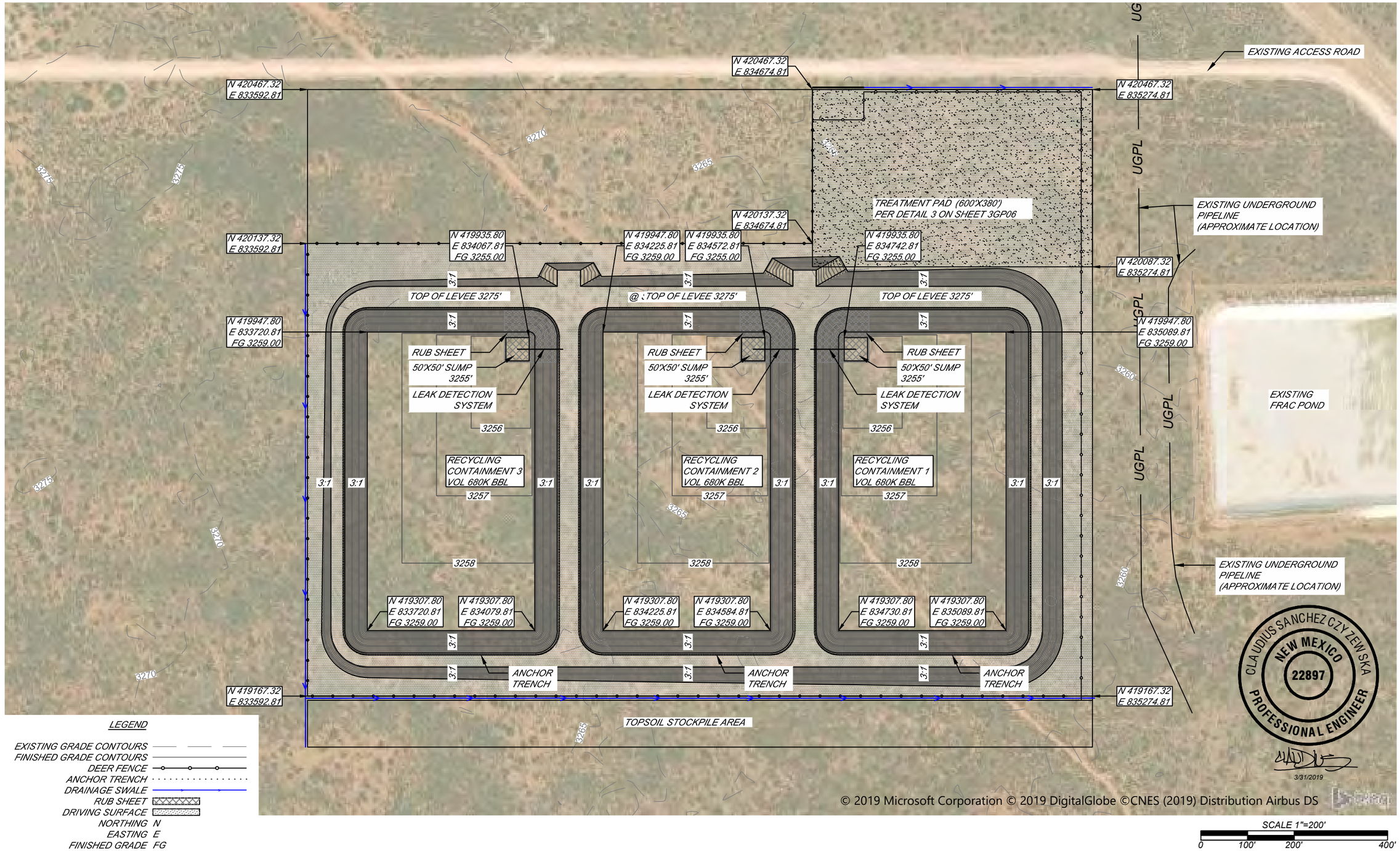
LEA COUNTY, NM
COG OPERATING, LLC

SITE PLAN

HORIZONTAL SCALE: 1"=200'	VERTICAL SCALE: NTS
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: HORIZONTAL LAYOUT	SHEET: 1HL01

Drawing File: Z:\19-105 Mustang Concho Fez Redesign\04_CIVIL\CADD\Design\Drawings\19-105 Grading_4.dwg



LEGEND

- EXISTING GRADE CONTOURS
- FINISHED GRADE CONTOURS
- DEER FENCE
- ANCHOR TRENCH
- DRAINAGE SWALE
- RUB SHEET
- DRIVING SURFACE
- NORTHING N
- EASTING E
- FINISHED GRADE FG

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GRADING PLAN

HORIZONTAL SCALE: 1"=200'	VERTICAL SCALE: NTS
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: GRADING PLANS	SHEET: 3GP01

Drawing File: Z:\19-105 Mustang Concho Fez Redesign\04_CIVIL\CADD\Design\Drawings\19-105 Grading_4.dwg

SUMMARY OF QUANTITIES		
ITEM	UNIT	QTY
CLEARING AND GRUBBING	ACRE	51
ESTIMATED TOPSOIL (6 INCHES AVERAGE)	CUBIC YARD	35,000 (BANK)
ESTIMATED IMPORT FOR TREATMENT PAD	CUBIC YARD	8,500 (BANK)
ESTIMATED CUT (INCLUDING TOPSOIL)	CUBIC YARD	209,894 (BANK)
ESTIMATED FILL (ABOVE EXISTING GRADE)	CUBIC YARD	167,576 (BANK)
8' GAME FENCE	LINEAR FEET	5,880
DRAINAGE SWALE	LINEAR FEET	3,370
18" CMP CULVERT GAGE 16 2.75"X1.25 CORR	LINEAR FEET	110
60 MIL HDPE GEOMEMBRANE (TEXTURED)	SQUARE FEET	42,000
60 MIL HDPE GEOMEMBRANE (SMOOTH)	SQUARE FEET	1,036,000
200 MIL GEONET	SQUARE FEET	1,036,000
40 MIL HDPE GEOMEMBRANE	SQUARE FEET	1,036,000
10 OZ. GEOTEXTILE	SQUARE FEET	1,036,000
6" HDPE DR11 PIPE WITH PERFORATIONS IN SUMP	LINEAR FEET	345
DRAIN ROCK	CUBIC YARD	3
ANCHOR TRENCH	LINEAR FEET	6,882

STAGE-STORAGE					
RC3 ELEVATION (FT)	RC3 VOLUME (BBL)	RC2 ELEVATION (FT)	RC2 VOLUME (BBL)	RC1 ELEVATION (FT)	RC1 VOLUME (BBL)
3255	0	3255	0	3255	0
3256	2,122	3256	2,122	3256	2,122
3257	10,304	3257	10,304	3257	10,304
3258	28,603	3258	28,603	3258	28,603
3259	61,077	3259	61,077	3259	61,077
3260	102,526	3260	102,526	3260	102,526
3261	145,049	3261	145,049	3261	145,049
3262	188,656	3262	188,656	3262	188,656
3263	233,358	3263	233,358	3263	233,358
3264	279,163	3264	279,163	3264	279,163
3265	326,083	3265	326,083	3265	326,083
3266	374,126	3266	374,126	3266	374,126
3267	423,302	3267	423,302	3267	423,302
3268	473,622	3268	473,622	3268	473,622
3269	525,095	3269	525,095	3269	525,095
3270	577,731	3270	577,731	3270	577,731
3271	631,540	3271	631,540	3271	631,540
3272	686,531	3272	686,531	3272	686,531
3273	742,715	3273	742,715	3273	742,715
3274	800,101	3274	800,101	3274	800,101
3275	858,699	3275	858,699	3275	858,699

CLAUDIUS SANCHEZ CZYZEWSKA
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22897
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3/31/2019

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SUBSET: GRADING PLANS	SHEET: 3GP02

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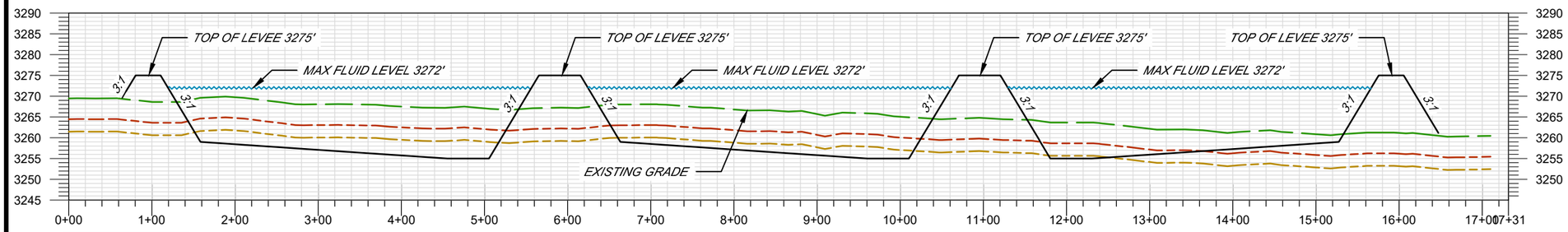

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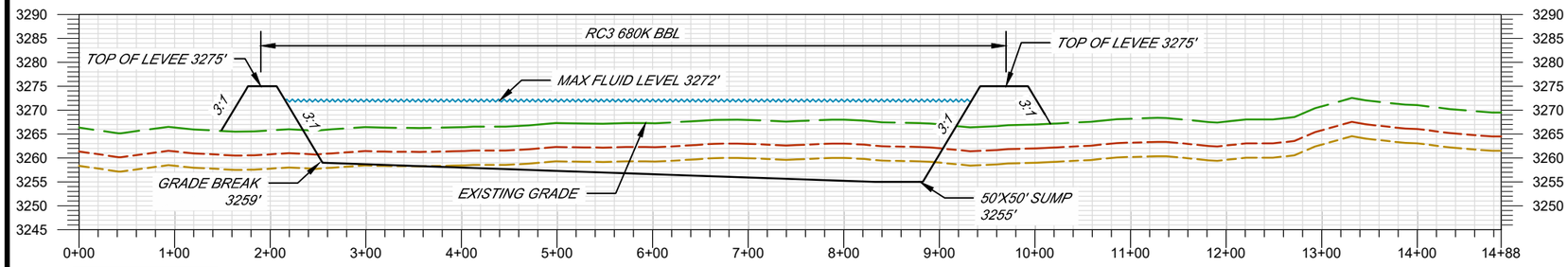

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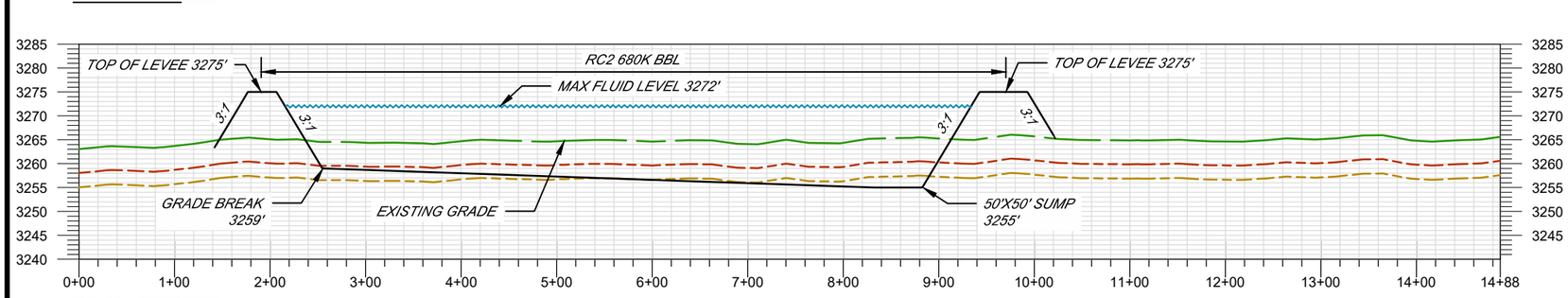

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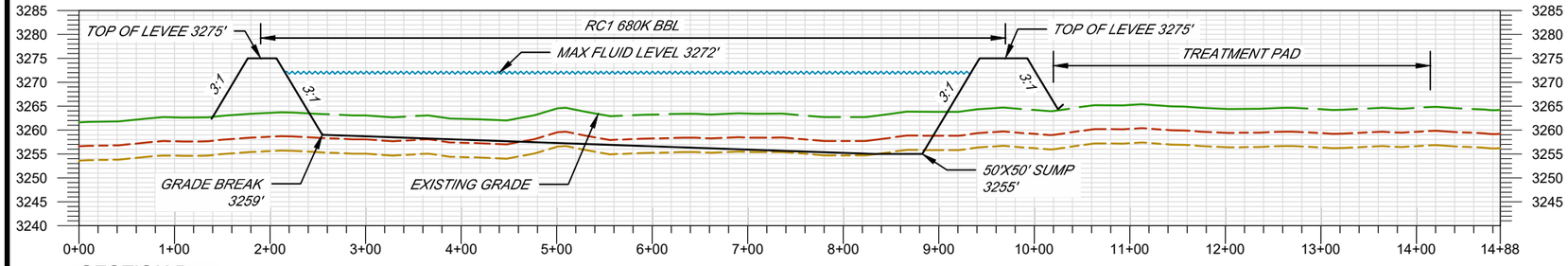

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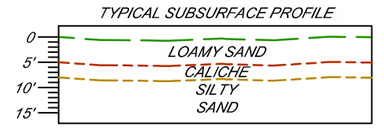

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CROSS SECTIONS

HORIZONTAL SCALE: 1"=150'	VERTICAL SCALE: 1" = 30'
PRINT DATE: 3/31/2019	DESIGNED BY: CSC
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SUBSET: GRADING PLANS	SHEET: 3GP03

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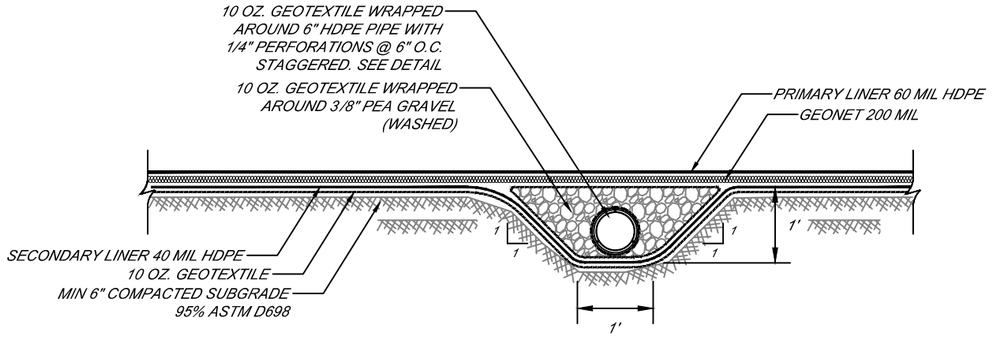

1 3GP04 **LEAK DETECTION SYSTEM SECTION A**
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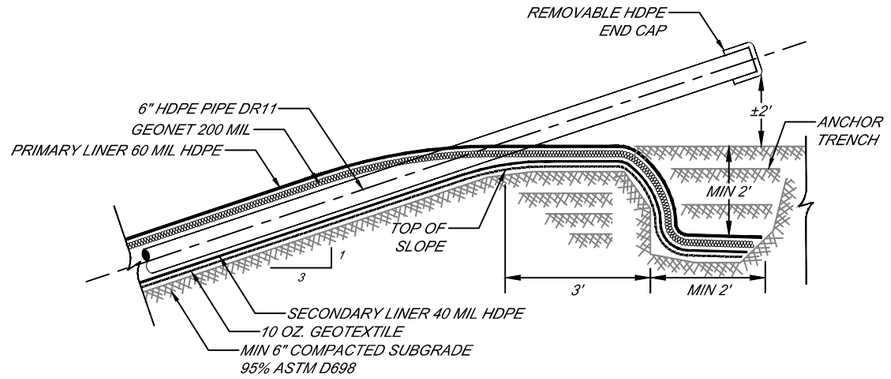
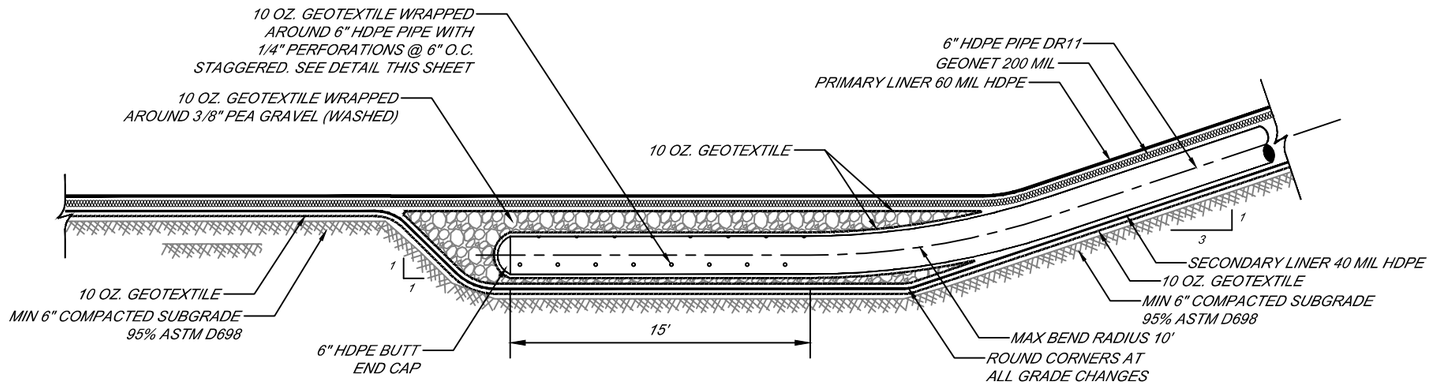


2 3GP04 **LEAK DETECTION SYSTEM PIPE RISER**
NOT TO SCALE



3 3GP04 **LEAK DETECTION SYSTEM SECTION B**
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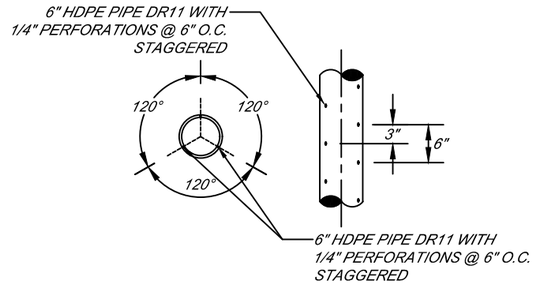

4 3GP04 **LEAK DETECTION SYSTEM PERFORATED PIPE**
NOT TO SCALE

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SUBSET: GRADING PLANS	SHEET: 3GP04

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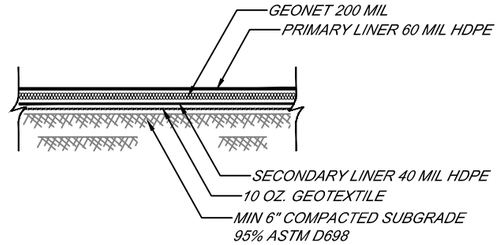
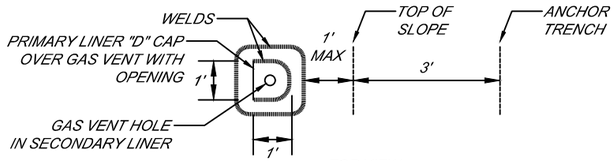
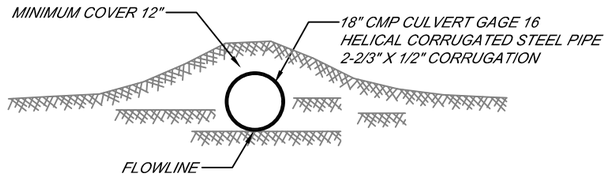


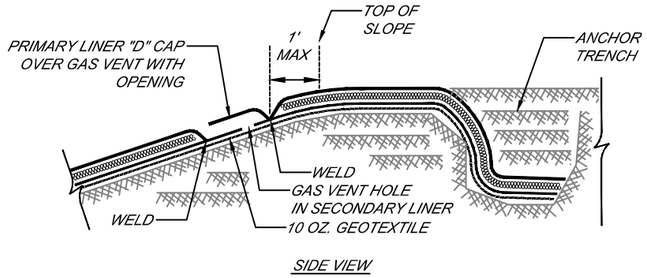
1 / 3GP05 **TYPICAL POND BOTTOM LINER**
NOT TO SCALE



TOP VIEW

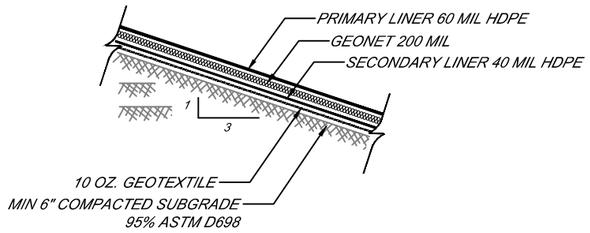


6 / 3GP05 **TYPICAL CULVERT DETAIL**
NOT TO SCALE



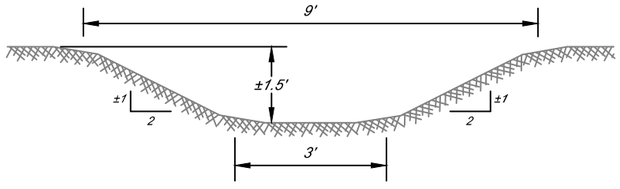
SIDE VIEW

NOTE:
GAS VENT SPACING SHALL BE INSTALLED
PER MANUFACTURER'S RECOMMENDATIONS

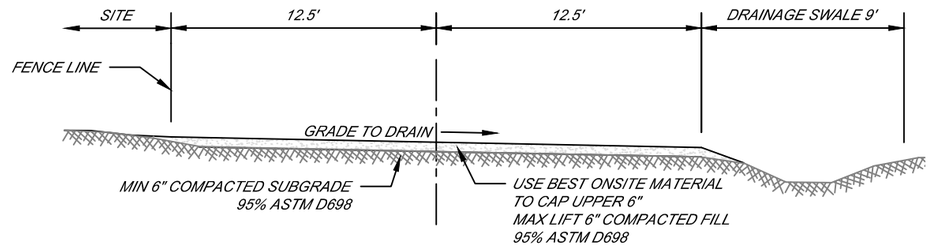


2 / 3GP05 **TYPICAL POND SLOPE LINER**
NOT TO SCALE

4 / 3GP05 **TYPICAL GAS VENT**
NOT TO SCALE



3 / 3GP05 **TYPICAL DRAINAGE SWALE**
NOT TO SCALE



5 / 3GP05 **24' ROAD TYPICAL SECTION**
LOOKING NORTH
NOT TO SCALE

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DETAILS

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PRINT DATE: 3/31/2019	DESIGNED BY: CSC
PROJECT NO. 19-105	CHECKED BY: EMH
SUBSET: GRADING PLANS	SHEET: 3GP05

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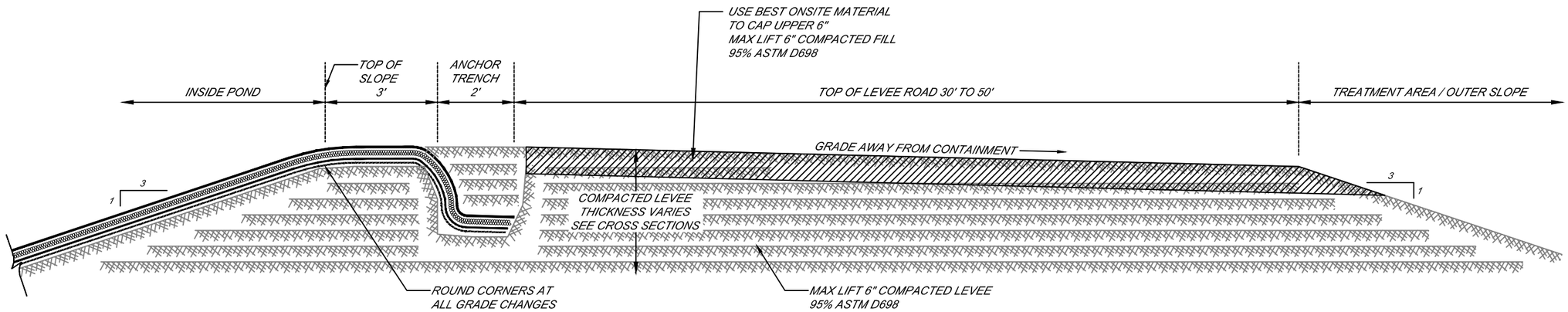

1 / 3GP06 TYPICAL LEVEE SECTION
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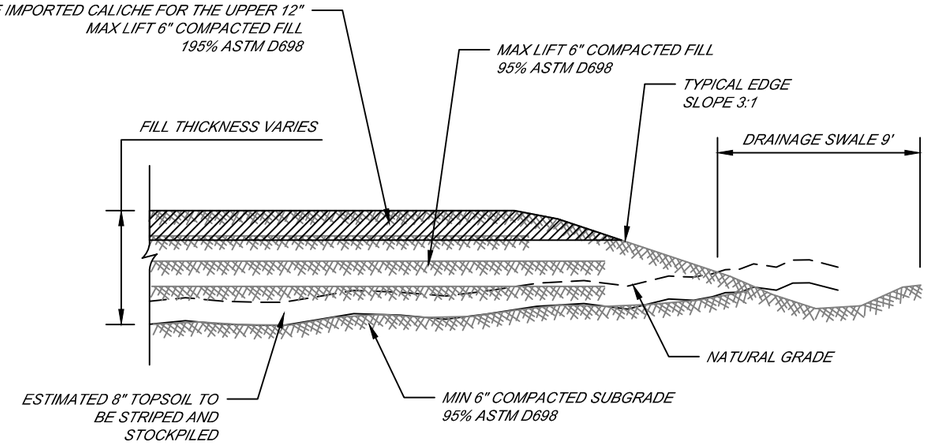

2 / 3GP06 TYPICAL TREATMENT PAD SECTION
NOT TO SCALE

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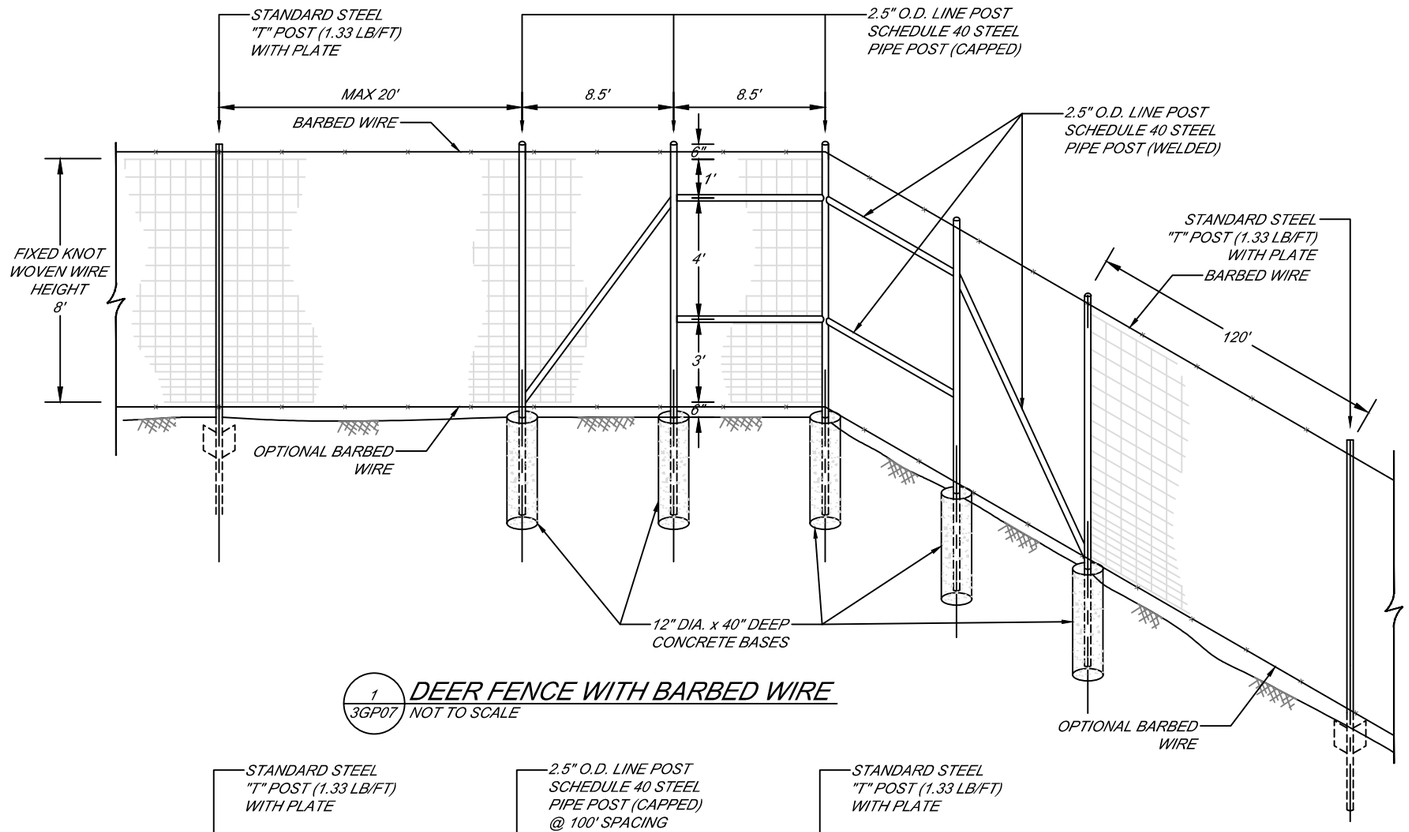
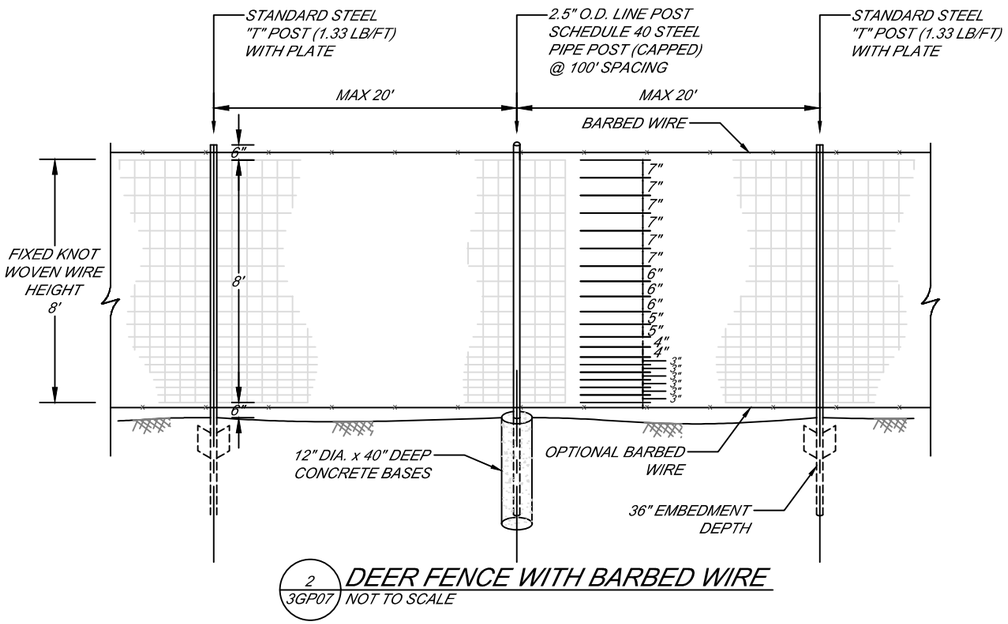


1 / 3GP07 DEER FENCE WITH BARBED WIRE
NOT TO SCALE



2 / 3GP07 DEER FENCE WITH BARBED WIRE
NOT TO SCALE

NOTES:

1. FOR WOVEN WIRE, TOP AND BOTTOM STRANDS SHALL BE 12½ GAUGE OR HEAVIER; INTERMEDIATE STRANDS SHALL BE 14½ GAUGE OR HEAVIER.
2. FOR BARBED WIRE, EACH LINE WIRE SHALL CONSIST OF 2 TWISTED STRANDS OF 12½ GAUGE WIRE OR HI-TENSILE STRENGTH WIRE OF 15½ GAUGE. THE BARBS SHALL BE EITHER 2-POINT BARBS ON APPROXIMATE 4 INCH CENTERS OR 4-POINT BARBS ON APPROXIMATE 5 INCH CENTERS.
3. ALL WIRE SHALL HAVE CLASS III GALVANIZATION.
4. STANDARD WOVEN WIRE FENCES MAY HAVE LINE POSTS SPACED UP TO 15 FEET APART. HI-TENSILE WOVEN WIRE FENCE MAY HAVE LINE POSTS SPACED UP TO 20 FEET APART. CLOSER SPACING IS REQUIRED WHERE NEEDED FOR INCLINES OR CHANGES IN TOPOGRAPHY.
5. CONCRETE FOOTINGS SHALL HAVE TOPS CROWNED.
6. TO PREVENT WIRE FROM SLIPPING ON STEEL POST, DOUBLE WRAP ALL WIRE AROUND STEEL POST OR WELD CHAIN LINK LOOPS.

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SUBSET: GRADING PLANS	SHEET: 3GP07

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GENERAL SITING CRITERIA DEMONSTRATION AND SITE SPECIFIC GROUNDWATER DATA

8.
Siting Criteria for Recycling Containment

Instructions: The applicant must provide attachments that demonstrate compliance for each siting criteria below as part of the applica 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 FIGURES 1-2

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 FIGURE 3

Within the area overlying a subsurface mine.
- Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division FIGURE 4

Within an unstable area.
- Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map FIGURE 5

Within a 100-year floodplain. FEMA map FIGURE 6

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 FIGURE 7

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 FIGURE 8

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. FIGURES 1 and 7
- NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site

Within 500 feet of a wetland. FIGURE 9
- US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site

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 100 feet beneath the area of interest that will include the location of the recycling containment.

Figure 1 is a geologic/ topographic map (metric unit elevations) that shows:

1. The Fez Containment area identified by the blue rectangle. Within this 100+-acre area will be the proposed containment identified in the C-147. This portion of this submission will also provide a siting criteria demonstration for future AST containments and/or additional in-ground containments.
2. Water wells from the OSE database as a blue triangle inside colored circles that indicate well depth. 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. Additionally, the OSE database can include locations of proposed wells (i.e. permit applications). The permit data generally show "no date" and "DTW=0" as data. Figure 1 has screened the OSE data and eliminated permit information from Figure 1.
3. Water wells from the USGS database as large triangles color-coded to the formation from which the well draws water.
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. Note that C-02388 northwest of the containment area reports a depth to water of 165 feet. Hicks Consultants measured depth to water in this well on October 16, 2018 as 127.8 feet below top of casing (see photographs at the end of the transmittal letter)

Figure 2 is an area topographic map that shows:

1. The Fez Containment area identified by the blue rectangle with the estimated surface elevation noted.
2. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface.
3. Water wells measured by professionals and documented in published reports or by staff of Hicks Consultants (Misc) .
4. Isocontour lines displaying the elevation of the groundwater surface.

Geology

Quaternary Age eolian and piedmont deposits (Qe/Qp on Figures 1 and 2) are the dominant exposed material in the area (see Site Photographs). These deposits are generally a thin covering of the underlying Tertiary Ogallala Formation or, in some places, the redbeds of the Dockum Group. The Ogallala Formation (To) is locally exposed in the northeast quadrant of Figure 2. It consists primarily of sand with some clay, silt and gravel, generally capped by caliche. Caliche is exposed at a quarry site located about 1.5 miles northwest of the 100+ acre area of interest.

Based on information from Ground-Water Report 6 (GWR-6) *Geology and Ground-Water Conditions in Southern Lea County, New Mexico* by Alexander Nicholson and Alfred Clebsch

(1961), the top of the redbeds in the area of the Fez containment is about 3175 feet above sea level (see Plate 1 of GWR-6). Given the 3263-foot elevation of ground surface at the Fez site, the thickness of the Ogalalla should be about (3263-3175=) 88 feet. Figure 2 shows the Chinle/Dockum Formation (T(c) cu) exposed at the surface about 3 miles southeast of the Fez location, therefore the thickness of the Ogallala at that location is zero. Given the measured depth to water of 127.8 feet and the estimated depth to the base of the Ogallala of 88 feet, the Ogallala is probably unsaturated beneath the area of the containment.

Topographically, the area around the containment area slopes gently to the northeast toward Antelope Draw.

Groundwater Data

We relied upon the most recent data measured by the USGS and published data to create the water table elevation map shown in Figure 2. While the "Misc" well data (see Figure 1) are generally measured water levels, this dataset can contain errors (generally of location) that are not present in the USGS data. 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. Based upon our field survey and examination of Google Earth images, we are confident that the wells shown Figure 2 are located within ¼ mile of the plotted point.

For the potentiometric surface map (Figure 2), we honored all data that we know are accurate to the best of our knowledge. From the data presented, we conclude:

- The elevation of the groundwater surface beneath the area in which the Fez Containment will be constructed is about 3140 feet above mean sea level.
- The well nearest (northwest) of the proposed containment has a 2018 measured depth to water of 127.8 and groundwater elevation of 3151.2 feet
- The distance between the bottom of the containment and the potentiometric surface of the regional aquifer is approximately (3263-3140-25=) 98 feet.

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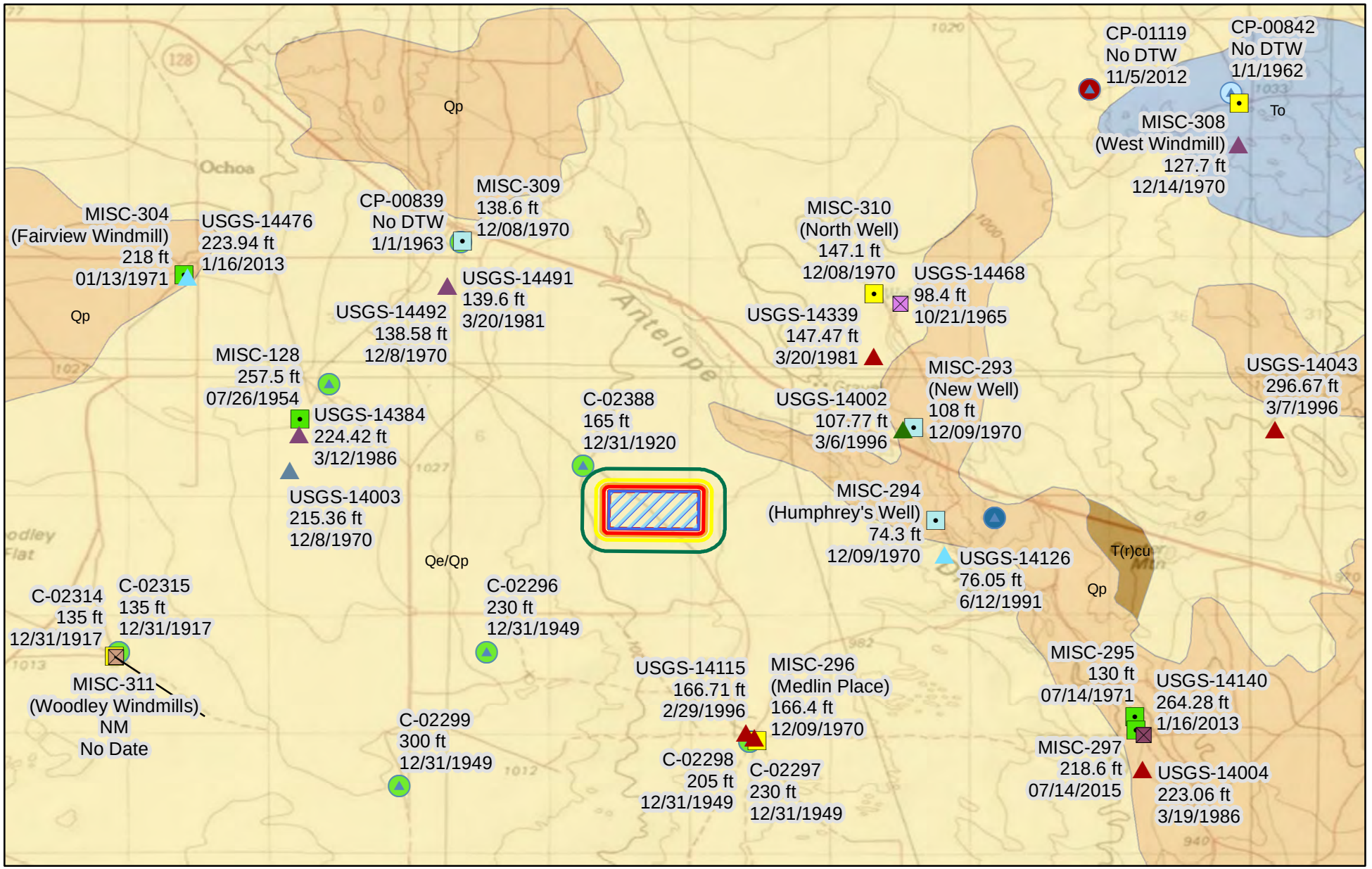

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Depth To Water and Geology	Figure 1
	Fez Containment	November 2018

M:\Concho-Mustang\ap_GIS_FezVik\Figures - Fez\figure1_Legend.mxd

Legend

Containment Area

Distance from Containment Area

- 200 ft
- 300 ft
- 500 ft
- 1000 ft

USGS Gauging Station (DTW, Date)

Aquifer Code, Well Status

- Alluvium/Bolsom
- Alluviu/Bolsom, Site was being pumped.
- Ogallala
- Ogallala, Site had been pumped recently.
- Chinle
- Chinle, Site was being pumped.
- Santa Rosa
- Not Defined

Misc. Water Wells (Well ID, DTW)

Well Depth (ft)

- No Data
- <= 150
- 151 - 350

OSE Water Wells (DTW, Date)

Well Depth (ft)

- <= 150
- 151 - 350
- 501 - 1000
- > 1000

NM Geology

Map Unit, Description

- Qe/Qp, Quaternary-Eolian Piedmont Deposits
- Qp, Quaternary-Piedmont Alluvial Deposits
- T(r)cu, Triassic-Upper Chinle Group
- To, Tertiary-Ogallala Formation

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
	Fez Containment	November 2018

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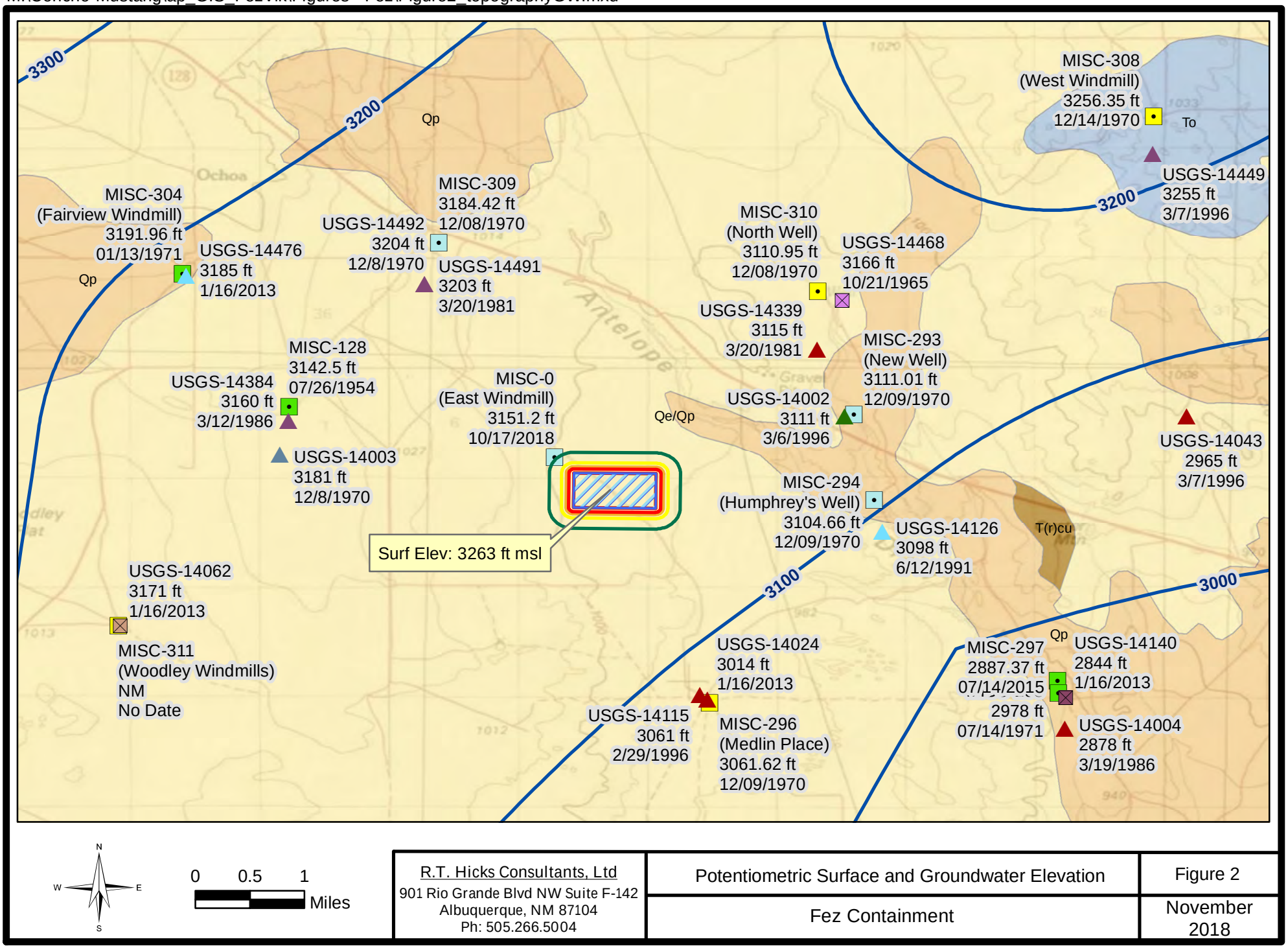

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Potentiometric Surface and Groundwater Elevation Fez Containment	Figure 2 November 2018

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Legend

Containment Area

Distance from Containment Area

- 200 ft
- 300 ft
- 500 ft
- 1000 ft

Potentiometric Surface (ft msl)

Isocontours

- Isocontour

USGS Gauging Station (GW Elev, Date)

Aquifer Code, Well Status

- Alluvium/Bolsom
- Alluviu/Bolsom, Site was being pumped.
- Ogallala
- Ogallala, Site had been pumped recently.
- Chinle
- Chinle, Site was being pumped.
- Santa Rosa
- Not Defined

Misc. Water Wells (GW Elev, Date)

Well Depth (ft)

- No Data
- <= 150
- 151 - 350

NM Geology

Map Unit, Description

- Qe/Qp, Quaternary-Eolian Piedmont Deposits
- Qp, Quaternary-Piedmont Alluvial Deposits
- T(r)cu, Triassic-Upper Chinle Group
- To, Tertiary-Ogallala Formation

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Potentiometric Surface and Groundwater Elevation	Figure 2 LEGEND
	Fez Containment	November 2018

Distance to Municipal Boundaries and Fresh Water Fields

Figure 3 demonstrates that the area of interest 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 11 miles to the east.
- The closest public well fields (2) belong to the City of Jal and one is within Jal and the second is about 7 miles southwest of Jal.

Distance to Subsurface Mines

Figure 4 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 about 2 miles south and 1/5 miles northwest of the area of interest..

Distance to High or Critical Karst Areas

Figure 5 shows the area of interest is not within mapped zone of high or critical with respect to BLM Karst areas.

- The proposed containment is located within a “low” potential karst area.
- The nearest “high” or “critical” potential karst area is located approximately 35 miles west of the site.
- No evidence of solution voids were observed near the site during the field inspection.
- No evidence of unstable ground was observed in the area.

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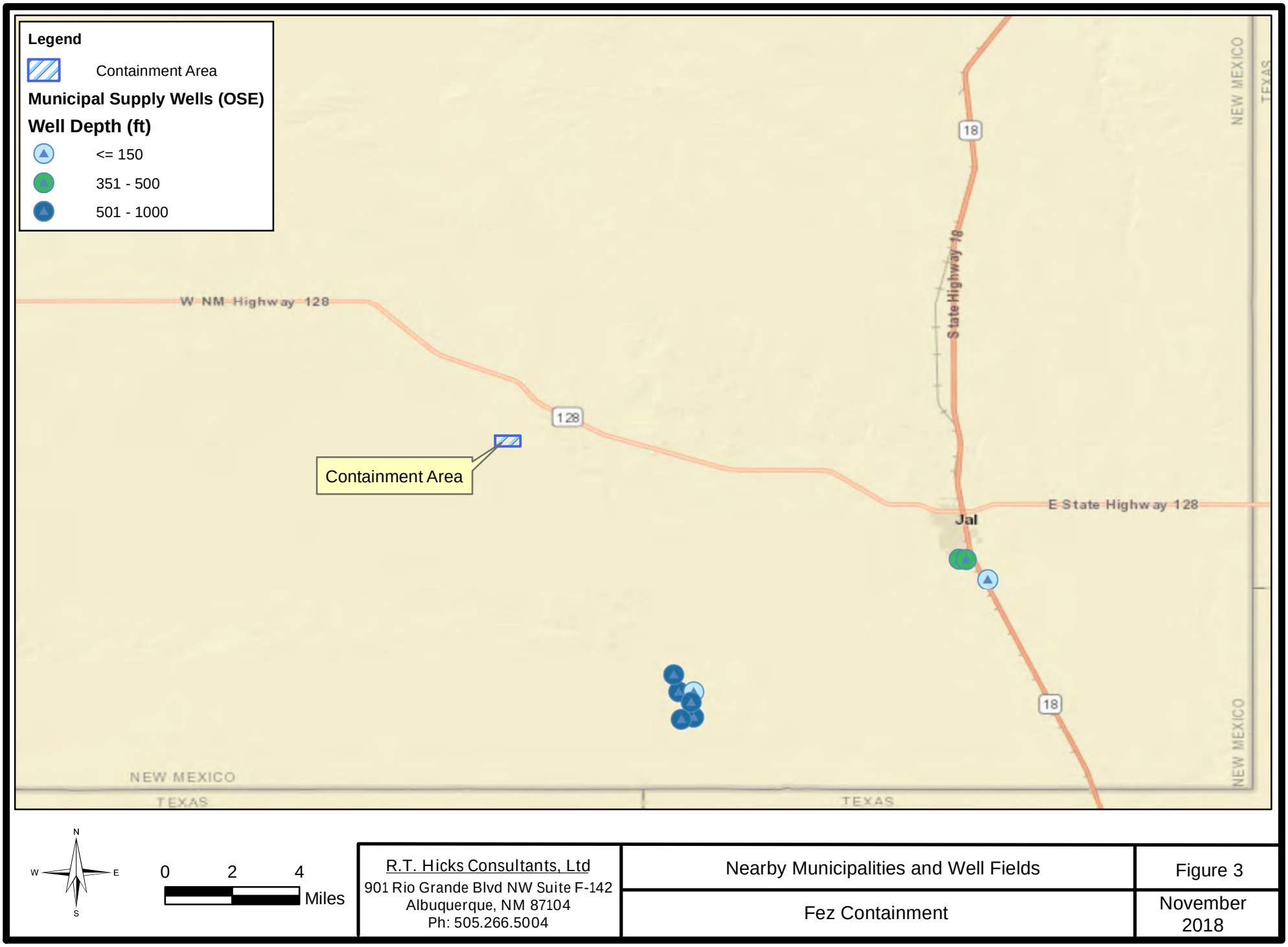

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Municipalities and Well Fields	Figure 3
	Fez Containment	November 2018

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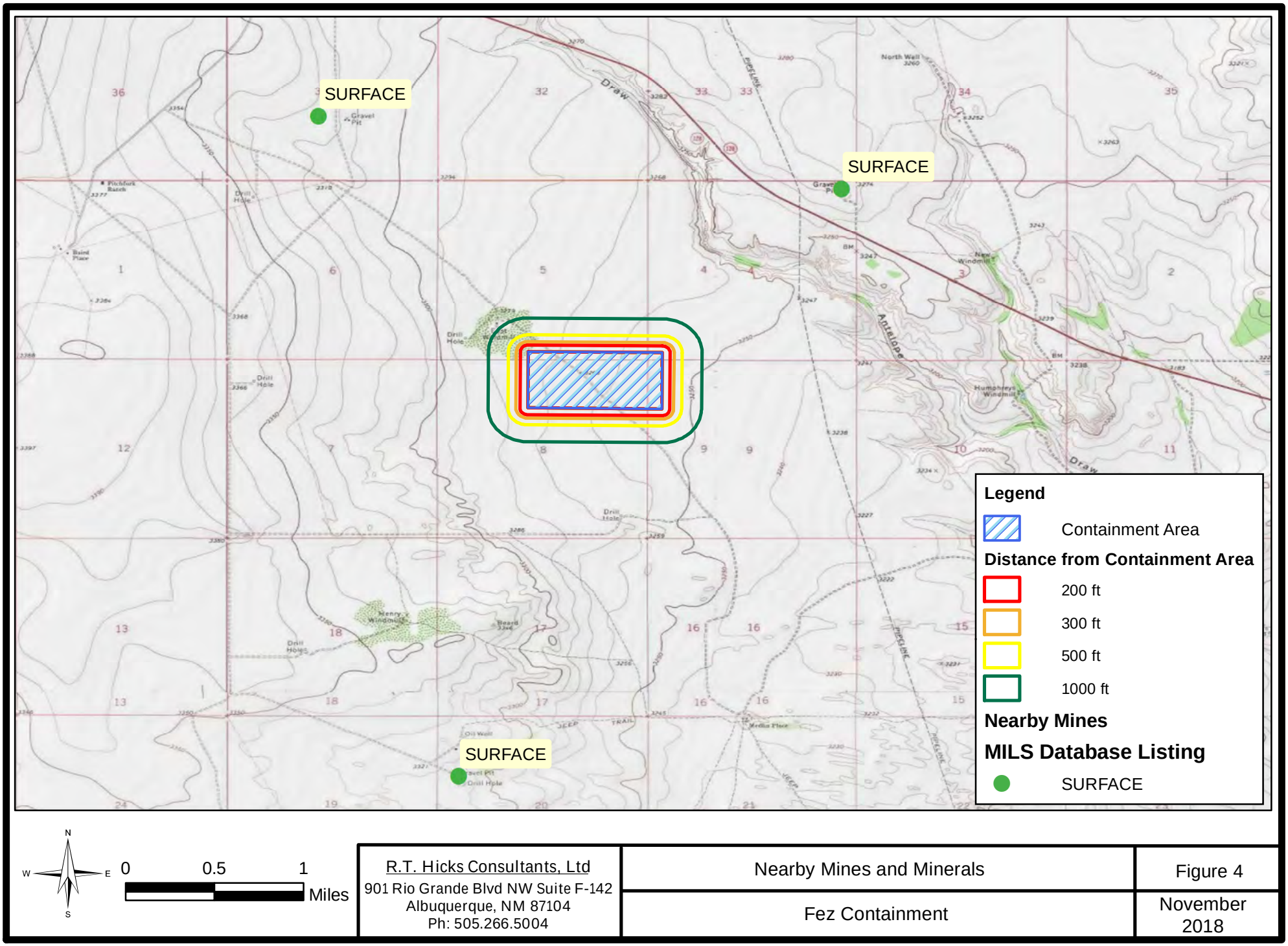

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Mines and Minerals	Figure 4
	Fez Containment	November 2018

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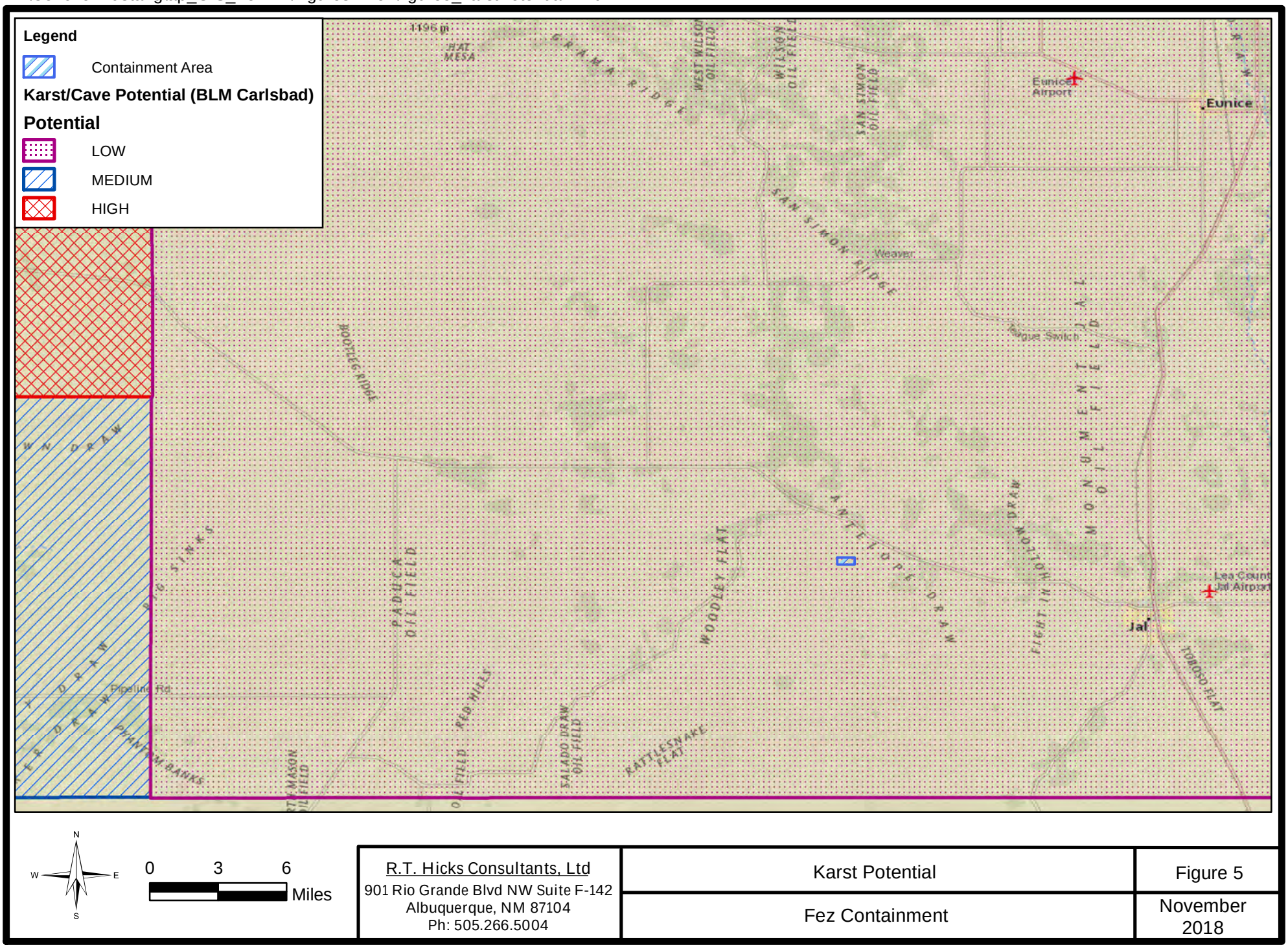

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Karst Potential	Figure 5
	Fez Containment	November 2018

Distance to 100-Year Floodplain

Figure 6 demonstrates that the area of interest is within Zone D as designated by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

- FEMA describes the location as an area 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.

Distance to Surface Water

Figure 7 and the site visit demonstrates that the area of interest is not within 300 feet of a continuously flowing watercourse or 200-feet of any other significant watercourse, lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark) or spring.

- The map depicts an "intermittent stream" (Antelope Wash) about ½ mile northeast of the Fez site.
- No continuously-flowing watercourses, significant watercourse or other water bodies, as defined by NMOCD Rules, exist within the prescribed setback criteria for the siting of a recycling containment.
- No springs were identified in Figure 7 or in the site visit.
- No playa lakes or lakebeds were identified by the site visit or databases.
- The area is characterized by low sand dunes that are stabilized by vegetation and lack of watercourses is typical of such geomorphology.

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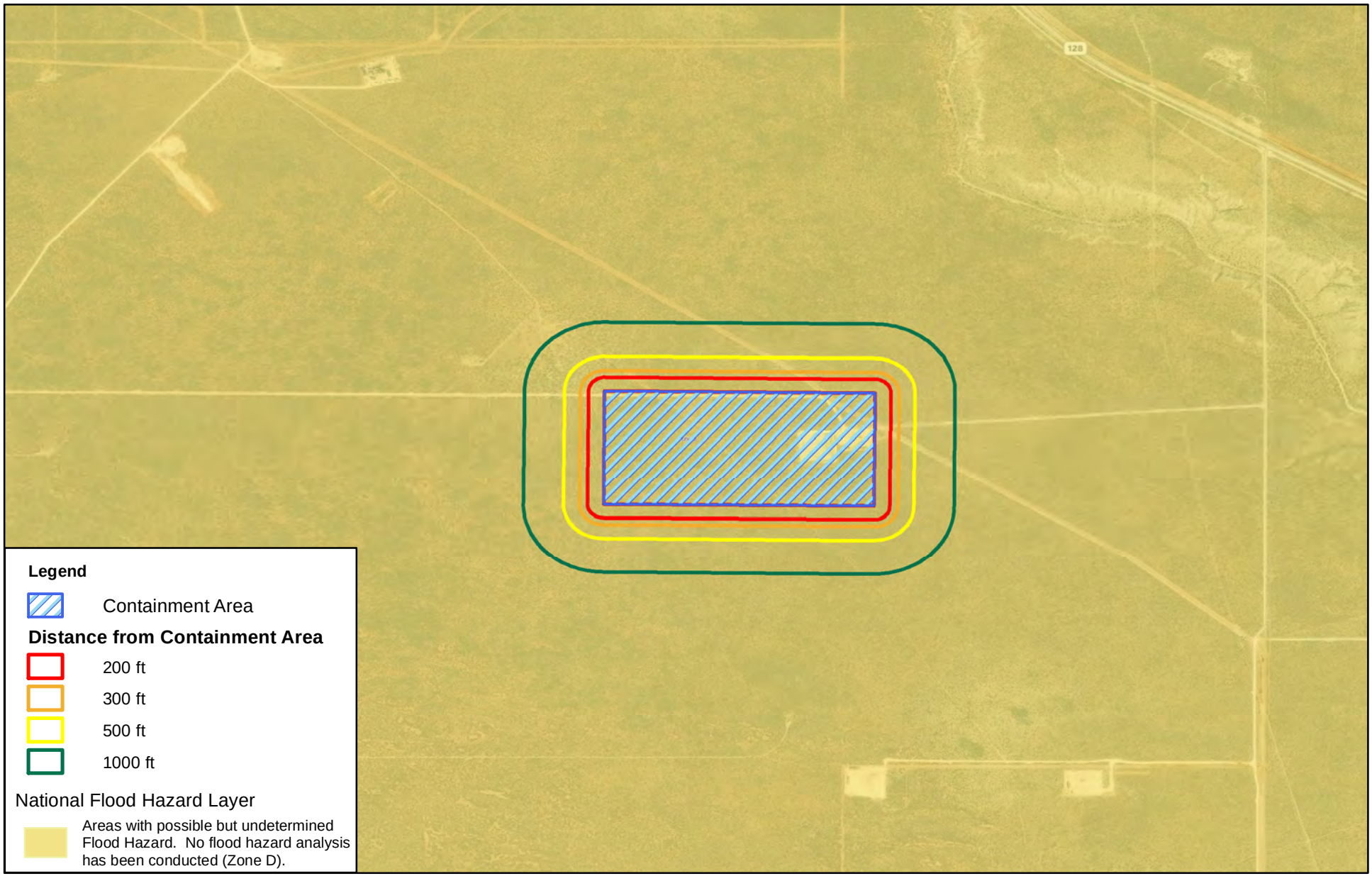

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	FEMA Flood Map	Figure 6
	Fez Containment	November 2018

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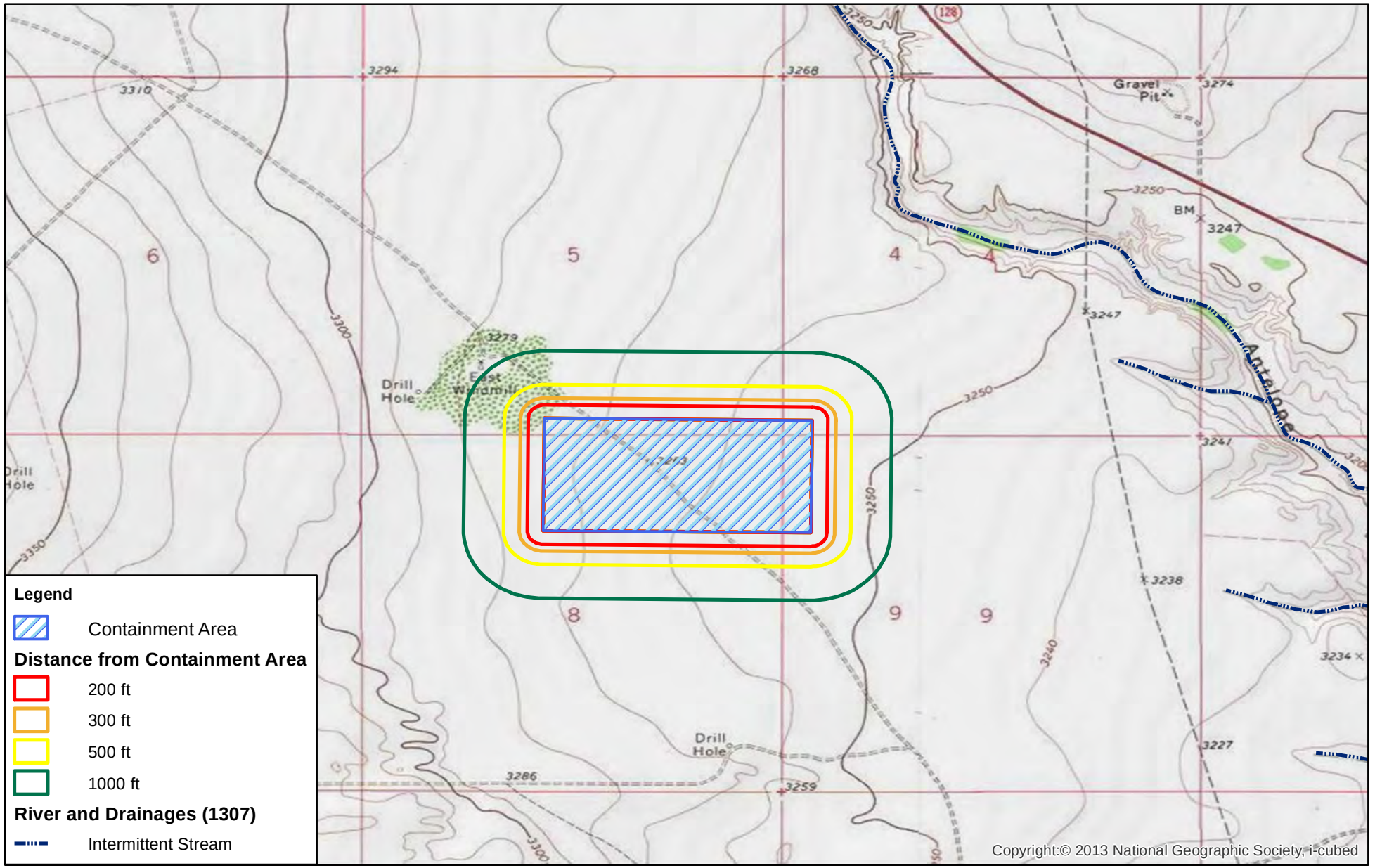

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Surface Water and Topography	Figure 7
	Fez Containment	November 2018

Distance to Permanent Residence or Structures

Figure 8 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
  - A fresh water frac pond in the eastern portion of the area of interest
  - A producing oil well, east of the fresh water frac pond within the area of interest
  - A corral associated with the "East Windmill" about 700 feet northwest of the area of interest
- No residences or other structures are in the area.

Distance to Non-Public Water Supply

Figures 1 and 7 demonstrates that the location is not within 500 horizontal feet of a spring or fresh water well used for domestic or stock watering purposes, in existence at the time of initial application.

- Figure 1 shows the locations of all area water wells, active or plugged.
- The nearest water well is the East windmill, which is used for stock, located about 750 feet northwest of the area of interest
- There are no domestic water wells located within 1,000 feet of the area of interest.
- No springs were identified within the mapping area (see Figure 7)

Distance to Wetlands

Figure 9 demonstrates the location is not within 300 feet of wetlands.

- The nearest designated wetland is a "freshwater emergent wetland" located approximately 1½ mile to the east. This is a stock tank associated Humphreys Windmill.
- Mapped wetlands north of Route 128 are also stock ponds associated with windmills or small dams in arroyos.
- Natural wetlands (freshwater ponds) are not observed in the area.

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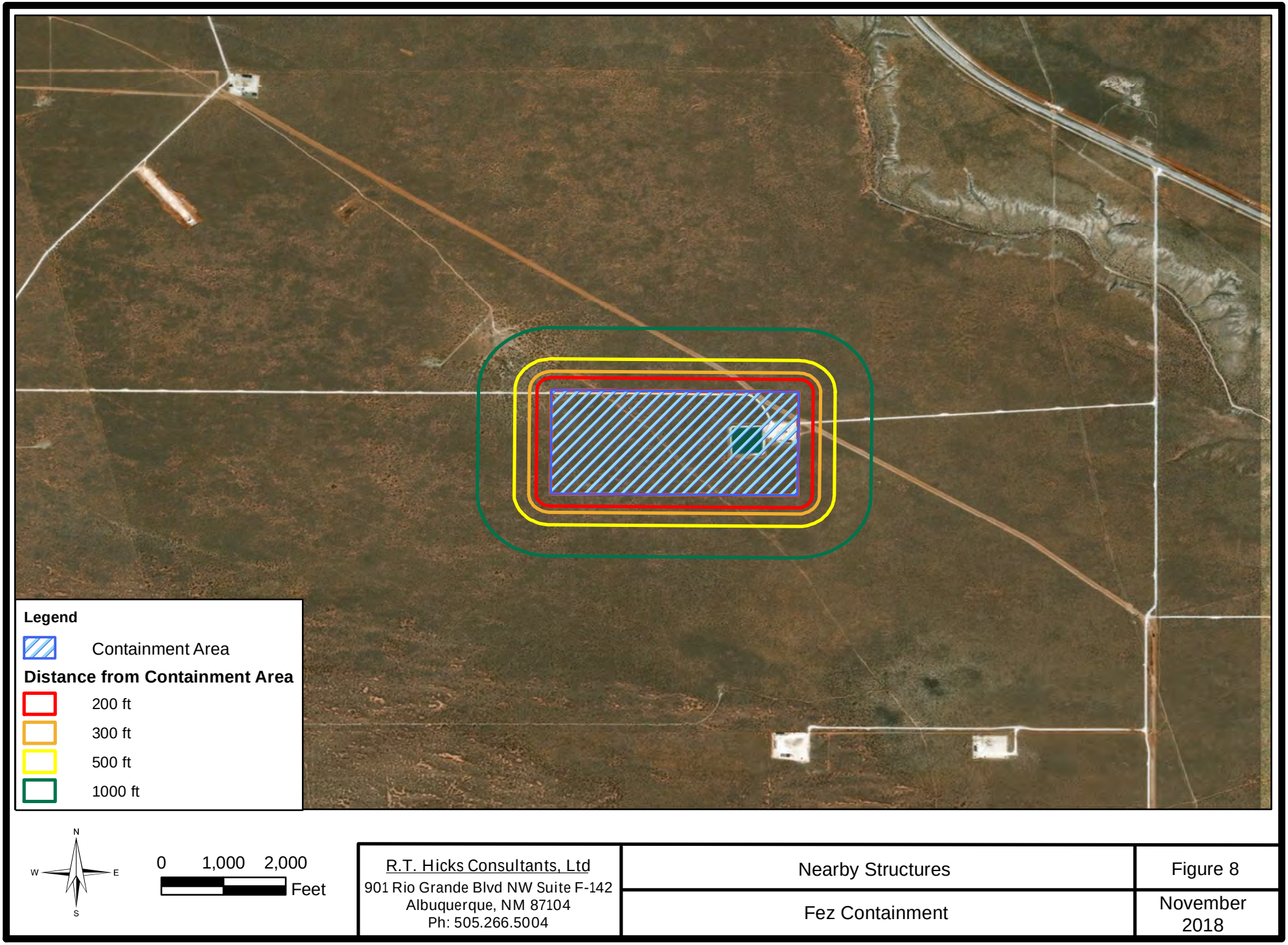

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Structures	Figure 8
	Fez Containment	November 2018

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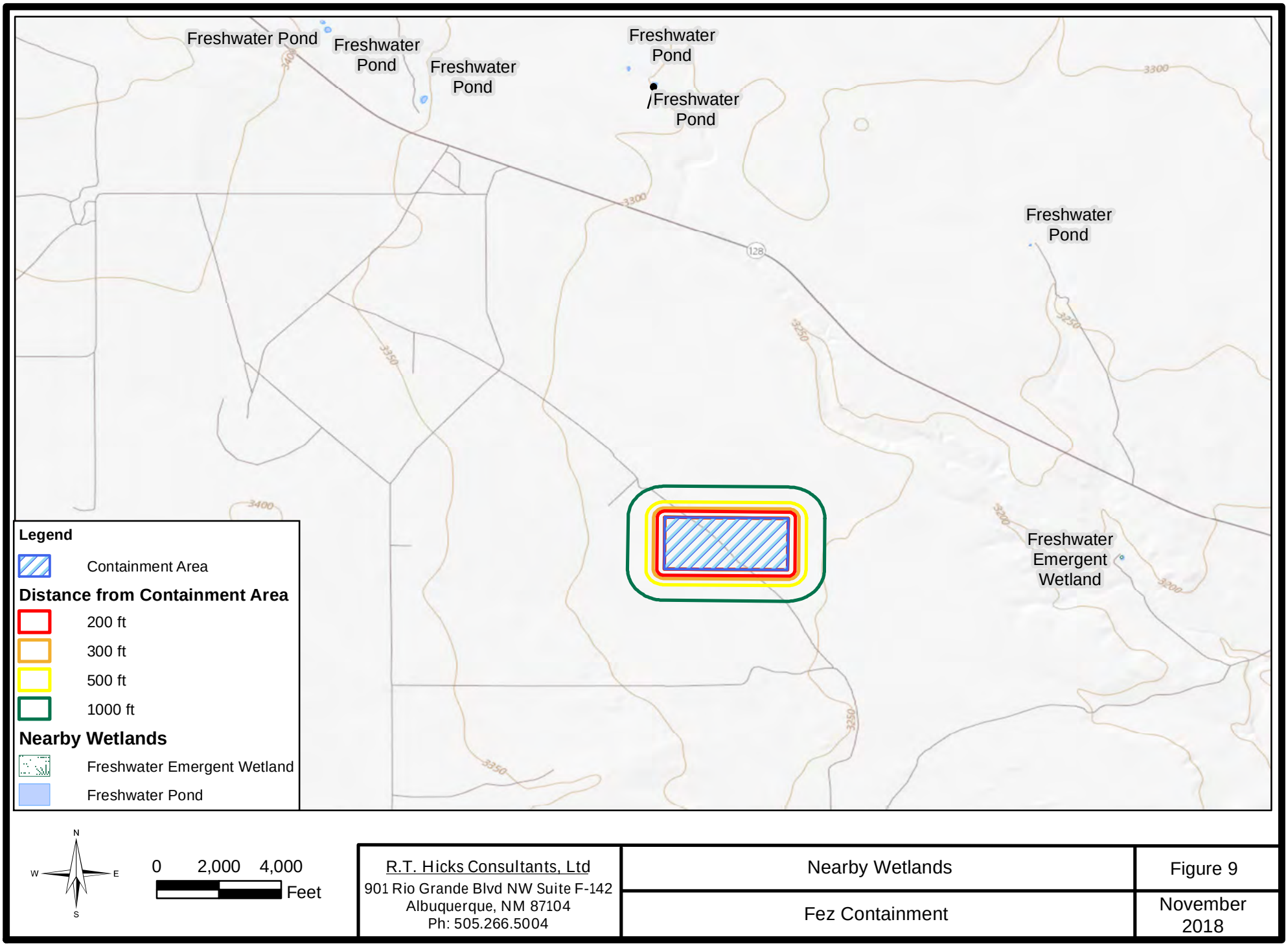

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Wetlands	Figure 9
	Fez Containment	November 2018

DESIGN PLAN

OPERATION AND MAINTENANCE PLAN

CLOSURE PLAN

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)**

Applicable mandates in Rule 34 are underlined. This plan addresses construction of the earthen containments.

Magrym Consulting, P.C. is providing design drawings of the containment based upon a geotechnical evaluation. Stamped "as built" drawings showing all design elements will be submitted to OCD prior to storage of produced water.

Dike Protection and Structural Integrity

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 (a berm) and/or diversion ditch (between the levee and the soil stockpile) to prevent run-on of surface water.

Stockpile Topsoil

Where topsoil was present, prior to constructing containment, the operator stripped and stockpiled the topsoil for use as the final cover or fill at the time of closure.

Signage

The operator will place 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 operator will provide for a fence to enclose the recycling containment in a manner that deters unauthorized wildlife and human access. COG Operating will employ a game fence rather than a a four foot fence that has at least four strands evenly spaced in the interval between one foot and four feet above ground level. Because feral pigs, javelena and deer are present in the area, a chain link or game fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule[1]. The specification for fencing provided in 19.15.34.12 D.2 contradicts D.1 because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. Thus, compliance with D.2 results in a violation of D.1. Compliance with D.1 is the critical component of the Rule and operators need not submit a variance request in order to follow Best Management Practices and comply with the Rule. 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.

[1] The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair.

Netting and Protection of Wildlife

The perimeter game fence will be effective in excluding stock and most terrestrial wildlife. If requested by the surface owner, the game fence can include a fine mesh from the base to 1 foot above the ground to exclude the small reptiles (e.g. dune sagebrush lizard).

The recycling containment will be protective of wildlife, including migratory birds through the implementation of an Avian Protection Plan, routine inspections and the perimeter fence.

The avian protection plan includes the use of a Bird-X Mega Blaster Pro[2] as a primary hazing program for avian species. The device will be equipped with sounds suitable for the Permian Basin environment. In addition to this sonic device, staff will routinely inspect the containment for the presence of avian species and, if detected, will use a blank cartridge or shell in a handgun, starter pistol or shotgun as additional hazing. Decoys of birds of prey may be placed on the game fence and other roosts around the open water to provide additional hazing.

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

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.

The design drawings and stamped “as built” drawings for the containment will have the following design/construction specifications:

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)
c) top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance.
d) The containment floor design calls for a slope toward the sump.

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.

[2] https://bird-x.com/bird-products/electronic/sonic/mega-blaster-pro/

The primary (upper) liner is a geomembrane liner composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. It is 60-mil HDPE. The secondary liner is 40-mil HDPE and is equivalent to 30-mil LLDPEr. 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 toward the sump. This slope combined with the highly transmissive geonet drainage layer provide for rapid leak detection.

The liners and drainage material will be installed consistent with the Manufacturer'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 that 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 effectively protects the liner from excessive hydrostatic force or mechanical damage during filling.

The design shows that at any point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines do not penetrate the liner.

Pumping from the containment to hydraulic fracturing operations is the responsibility of stimulation contractors. Typically, 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.

Leak Detection and Fluid Removal System Installation
The leak detection system, contains the following design elements

a. The 200-mil HyperNet Geonet drainage material between the primary and secondary liner that is sufficiently permeable to allow the transport of fluids to the observation ports (See design drawings).
b. The containment floor is sloped towards the monitoring riser pipe to facilitate the earliest possible leak detection of the containment bottom. A pump may be placed in the 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 design drawings).

C-147 Supplemental Information: Operation and Maintenance Plan
Lined Earthen Containment

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 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, produced water is removed from the containment for E&P operations. At this time, 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 Monitoring, Inspection, and Reporting Plan; below), the operator will:

C-147 Supplemental Information: Operation and Maintenance Plan
Lined Earthen Containment

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 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, and
- 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 produced water ceases and the produced water generated by nearby oil and gas wells is managed by an injection well(s).

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 produced water to the containment.
II. Accelerate re-use of the produced water for purposes approved by the Division.
III. Transfer 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.

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 produced water from the containment via electrical 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

C-147 Supplemental Information: Operation and Maintenance Plan
Lined Earthen 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.

Example Inspection Log

Month October

Day	Weekly	Low Water	Activity	Monthly	Staff Gauge	Comments
1 - Wed						
2	x				8.75	Gate unlocked upon arrival - notified Jerry Smith, no birds in pit
3					10	
4					12	
5			x			Water transfer to frac - pipes are good
6			x			Water transfer to frac - pipes are good
7		x			2.5	No visible liner problems
8					3	
9	x				4	All OK - no oil on surface, no birds in pit
10					5	
11					5	
12					6	
13					7	
14					7.5	
15				x	8	No fluid in leak detection, outer berm and stormater diversion OK, H2S - no alarm,
16					9	
17					9	
18					9.5	
19	x				10	All OK
20					11	
21					12	
22			x			Water transfer to frac - no problems
23			x			Water transfer to frac - no problems
24		x			1.75	No visible liner problems
25					2.25	
26	x				3.75	High wind -liner is good, no birds
27					4.75	
28					5.5	
29					6.75	
30					7.75	
31					8.5	

Closure Plan – Lined Earthen Containments

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,

The surface owner will impose a closure design that conforms to their needs for the site. The operator understands that a variance will be submitted to OCD to allow for any alternative closure protocol.

Excavation and Removal Closure Plan – Protocols and Procedures

The containment is expected to hold 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 containment 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 containment contents and liners, soils beneath the containment 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.

APPENDIX OSE WELL LOGS And Geotechnical Boring Logs

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Twn	Rng	X	Y
	C 02388			3	05	25S	35E	651467	3558832*

x

Driller License: **Driller Company:**

Driller Name: W.E. BAIRD

Drill Start Date: **Drill Finish Date:** 12/31/1920 **Plug Date:**

Log File Date: **PCW Rcv Date:** **Source:**

Pump Type: **Pipe Discharge Size:** **Estimated Yield:** 5 GPM

Casing Size: 6.00 **Depth Well:** 180 feet **Depth Water:** 165 feet

x

***UTM location was derived from PLSS - see Help**

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-5		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.150387	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.386343	N/A	3265.15'	30.50'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	1,2,2 (4)		**Dark Red, Loamy Sand** *100% Sample Recovery*
		SPT	1,2,3 (5)		*100% Sample Recovery*
5		SPT	2,11,10 (21)		*100% Sample Recovery*
7		SPT	5,6,7 (13)		**Tan Lean Silt (Caliche)** *100% Sample Recovery*
		SPT	6,6,9 (15)	No.200 = 58% PI = NP; USCS = ML	**Reddish Tan Lean Silt** *100% Sample Recovery*
10					
		SPT	6,12,35 (47)		**Tan Silty Sand (Caliche)** *100% Sample Recovery*
15					
		SPT	8,14,25 (39)	No.200 = 20% PI = NP; USCS = SM	*100% Sample Recovery*
20					
		SPT	12,15,20 (35)		**Tan Silty Sand** *100% Sample Recovery*
25					

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-5		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.150387	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.386343	N/A	3265.15'	30.50'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	14,16,32 (48)	No.200 = 47%	**Tan Silty Sand** *100% Sample Recovery*
30		SPT	50/6"		*100% Sample Recovery*

Total Depth: 30' 6"

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-6		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.151403	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.38845	N/A	3265.15'	30.83'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	3/18"		**Dark Red, Loamy Sand** *100% Sample Recovery*
		SPT	1,2,2 (4)		*100% Sample Recovery*
5		SPT	5,15,25 (40)		*100% Sample Recovery*
		SPT	18,13,15 (28)	No.200 = 66% PI = NP; USCS = ML	**Tan Lean Silt (Caliche)** *100% Sample Recovery*
9		SPT	15,13,13 (26)		*100% Sample Recovery*
10		SPT	14,13,13 (26)		**Reddish Tan Silty Sand** *100% Sample Recovery*
15		SPT	10,12,12 (24)		*100% Sample Recovery*
20		SPT	50/6"		**Tan Silty Sand** *22% Sample Recovery*
25					

Log Date: 11/29/2018

Client:		Project Number:	Project:	
RT Hicks/Mustang		18-130	Concho Fez	MAGRYM Consulting, P.C.
Boring No.:		Date Drilled:	Drilling Contractor:	Drill Rig Type
BH-6		11/8/2018	EnviroDrill	Hollow Stem Auger
Lat:	32.151403	Groundwater Depth:	Elevation:	Total Depth of boring:
Long:	-103.38845	N/A	3265.15'	30.83'

Depth (feet)	Graphic Log	Sample Type	blows/foot (n-value)	Tests	Material Description and Comments
		SPT	20,20,33 (53)		**Tan Silty Sand** *67% Sample Recovery*
30		SPT	14,22,50 (72)		*56% Sample Recovery*

Total Depth: 30' 10"

Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
https://www.emnrd.nm.gov/ocd/contact-us

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

CONDITIONS

Operator: COG OPERATING LLC 600 W Illinois Ave Midland, TX 79701	OGRID: 229137
	Action Number: 503737
	Action Type: [C-147] Water Recycle Long (C-147L)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	None	9/8/2025