March 2024

Volume 2
C-147 Permit Package for
Oxy Lost Tank AST Containment
Section 36, T22S, R31E, Eddy County

- C-147 & Design Sketch
- Design/Construction Plan
- O&M and Closure Plans
- Mustang/Extreme Set-up SOP
- Variances and Equivalency Demonstrations

The Oxy Lost Tank AST is located southeast of the intersection of Red Road and Mills Ranch Road.

Prepared for:
Solaris Water Midstream LLC
Houston, TX 77024

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

C-147

State of New Mexico
Energy Minerals and Natural Resources
Department Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505
https://www.emnrd.nm.gov/ocd/ocd-e-permitting/

Form C-147
Revised October 11, 2022

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: Solaris Water Midstream LLC (For multiple operators attach page with information) OGRID #: 371643
Address: Solaris Water Midstream - 9551 Katy Fwy, Ste. 400, Houston, TX 77024
Facility or well name (include API# if associated with a well): Oxy Lost Tank AST
OCD Permit Number: 2RF-204 (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr A Section 36 Township 22S Range 31E County: Eddy
Surface Owner: ☐ Federal ☑ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.
☑ **Recycling Facility:**
Location of recycling facility (if applicable): Latitude 32.354419 Longitude -103.724204 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 32.354419 Longitude -103.724204 NAD83
☐ For multiple or additional recycling containments, attach design and location information of each containment
☑ Lined ☐ Liner type: Thickness 40 & 30 mil ☑ LLDPE ☐ HDPE ☐ PVC ☐ Other _____
☐ String-Reinforced
Liner Seams: ☑ Welded ☐ Factory ☐ Other _____ Volume: 60000 bbl Dimensions: L_____ x W_____ x D 12 Diameter = 180
☐ 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 See Variance

6.

Signs:

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

☐ Signed in compliance with 19.15.16.8 NMAC

7.

Variances:

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

Check the below box only if a variance is requested:

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

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

8.

Siting Criteria for Recycling Containment

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

General siting

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

9.

Recycling Facility and/or Containment Checklist:

Instructions: Each of the following items must be attached to the application. Indicate, by a check mark in the box, that the documents are attached.

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

10.

Operator Application Certification:

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

Name (Print): Drew Dixon Title: SVP- Land and Regulatory .

Signature: Drew Dixon Date: 03/15/2024 .

e-mail address drew.dixon@ariswater.com Telephone: 832-304-9028 .

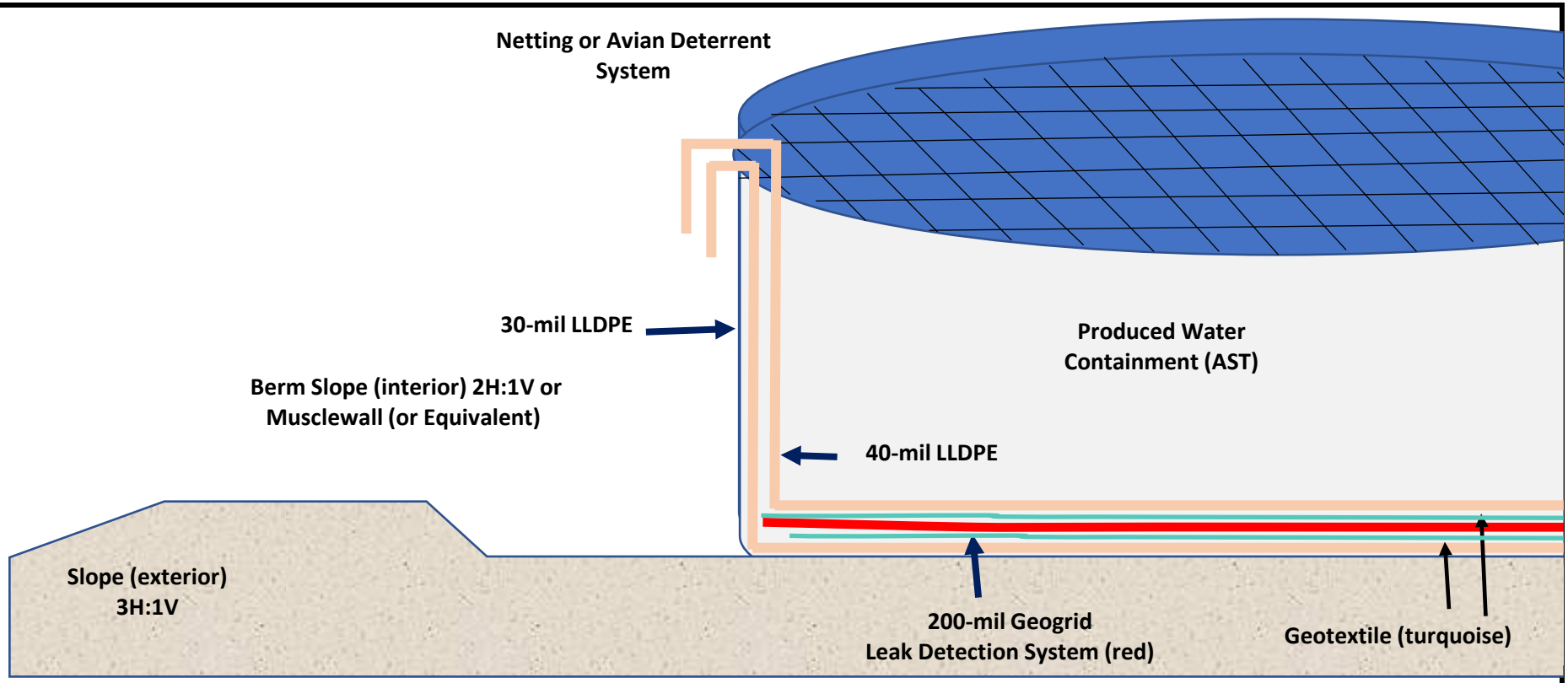
11.

OCD Representative Signature: Victoria Venegas **Approval Date:** 04/17/2024

Title: Environmental Specialist **OCD Permit Number:** **2RF-204**

☒ OCD Conditions

☒ Additional OCD Conditions on Attachment



Description of Leak Detection System

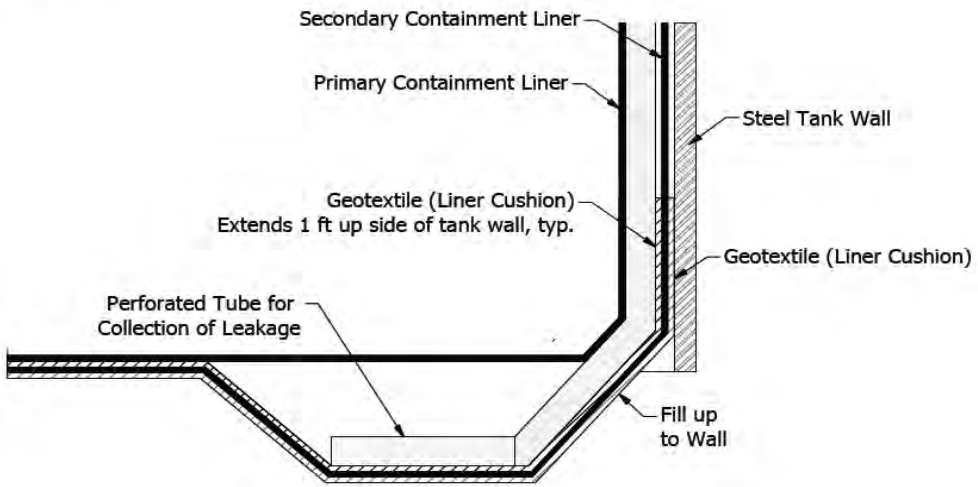
- 40-mil LLDPE comprise primary liner and 30-mil LLDPE comprise the secondary liner
- 200-mil geogrid drainage layer lies between the primary and secondary liner per Plate 2
- Geotextile between the geogrid and each liner
- > 3-inch deep sump excavated on down slope side of AST per Sump Design Drawing
- A small hose runs from the collection sump to top of AST via tube
- Every week, a portable self-priming peristaltic pump connects to the leak detection system.
- The self-priming pump discharge hose runs back into the AST, on top of the primary liner
- If fluid is detected, it is tested for conductance to determine the origin of the water (i.e. produced water or condensation)

R.T. Hicks Consultants Albuquerque, NM	**Design Sketch**	**Plate 1**
	Solaris Water Midstream - Oxy Lost Tank AST	**March 2024**

Determine slope of pad and low point of AST

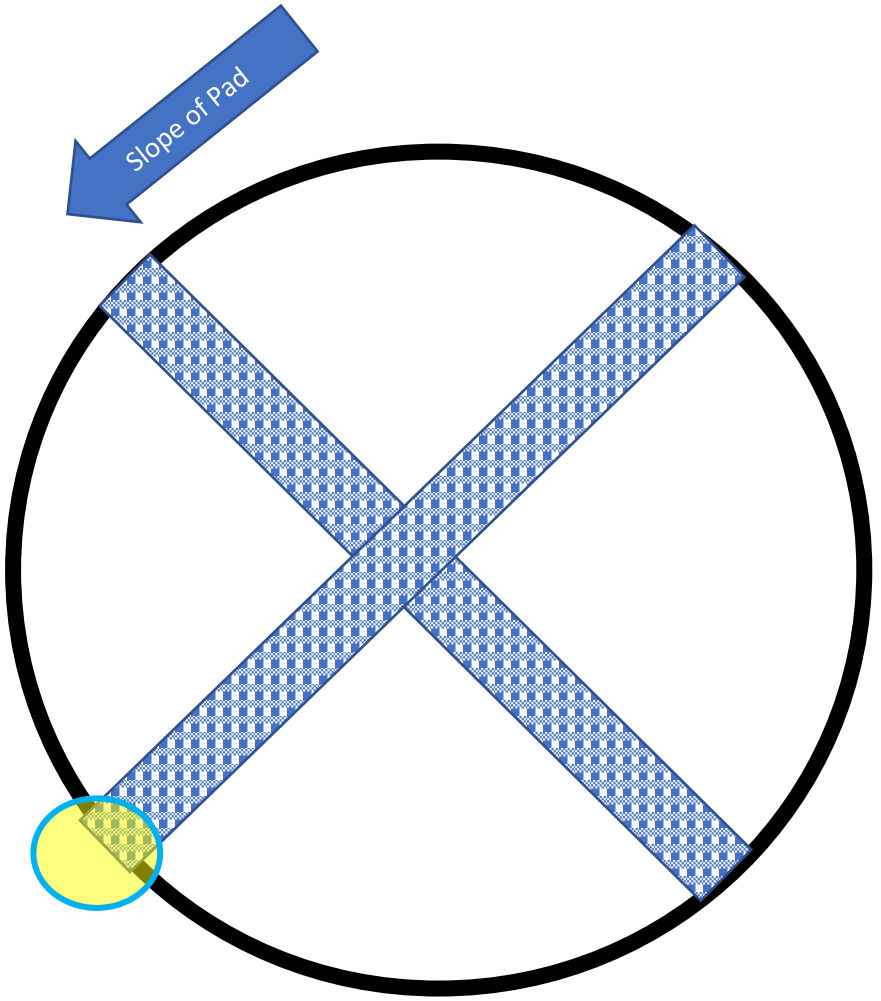
200 mil geogrid placed
above 8-oz geotextile and 30-mil secondary liner
inside of AST after set up, before installation of primary liner
below two 40-mil primary liner system
geotextile is placed around the 200-mil geogrid drainage system

Sump at lowest point of the AST set up
Leak detection riser pipe/hose installed per SOP



SECTION B
SUMP DETAIL

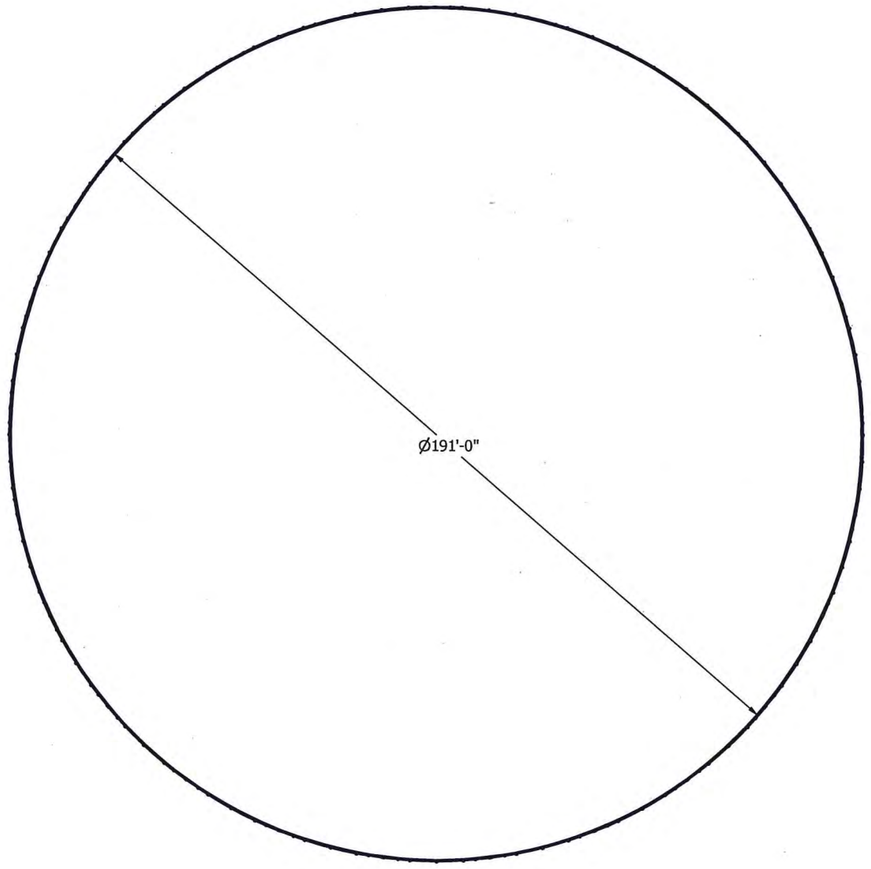
Sump Location

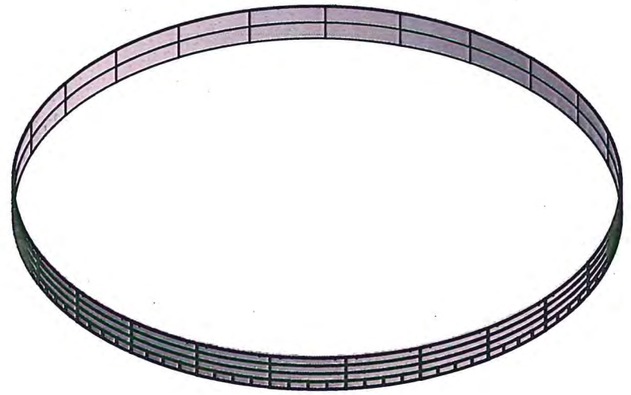


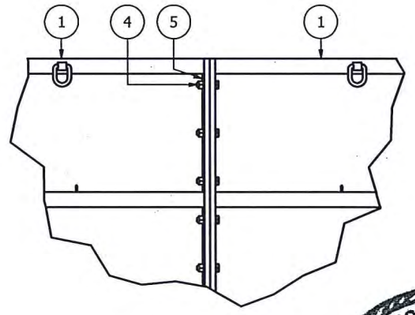
R.T. Hicks Consultants Albuquerque, NM	Layout of Geogrid Drainage Mat	Plate 2
	Solaris Water Midstream - Oxy Lost Tank AST	March 2024

APPENDIX

- STAMPED DESIGN DRAWINGS
- LINER SPECIFICATIONS
- MUSTANG/EXTREME AST SETUP SOP







DETAIL A
SCALE 1 / 25

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
CHARLES R. GOSS
NO. 40569-E

CR Goss
18 Dec 2013

Reviewer's notes:
1. This drawing set replaces set previously sealed on 27 MAR 2013
2. Empty corral cannot withstand high winds.

ITEM	QTY	PART NUMBER	DESCRIPTION	REV
6	120	4X4X4 LUMBER	4" x 4" x 48" Lumber (NOT SHOWN)	-
5	850	WASH-200-1-1/4	1-1/4" ASTM F436 Galvanized Structural Washer	-
4	425	NUT-200-1-1/4-7	1-1/4"-7 ASTM A563 Gr DH Galvanized Hex Nut	-
7	425	BOLT-1-1/4-4333	1-1/4"-7 x 5" ASTM A490 Structural Bolt	-
3	25	ETC-106	.063" X 8" X 168" RUBBER SHEET (NOT SHOWN)	-
2	5	MWC-SA-008A	60,000 BBL Corral Shipping Support	-
1	25	MWC-SA-002a	60,000 BBL CORRAL WALL SECTION	-

PARTS LIST

NEXT ASSY | USED ON
APPLICATION
THIRD ANGLE PROJECTION

INTERPRET DIMENSIONS AND TOLERANCES IAW ASME Y14.5-2009 UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES (MM)
FRACTIONAL ± 1/4(6.4)
X.XX = ±.25(6.4)
X.XXX = ±.125(3.2)
X.XXXX = ±.060(1.5)
ANGULAR ± 1°
125

MATERIAL
THICKNESS NA | WEIGHT N/A

DRAWN BY mspeciale | DATE 7/12/2012
CHECKED BY dbodenshatz | DATE 11/23/2012
APPROVED mspeciale | DATE 11/23/2012

ETC
Environmental Tank & Container
JOHNSTOWN, PA
855-382-8265
www.etctank.com

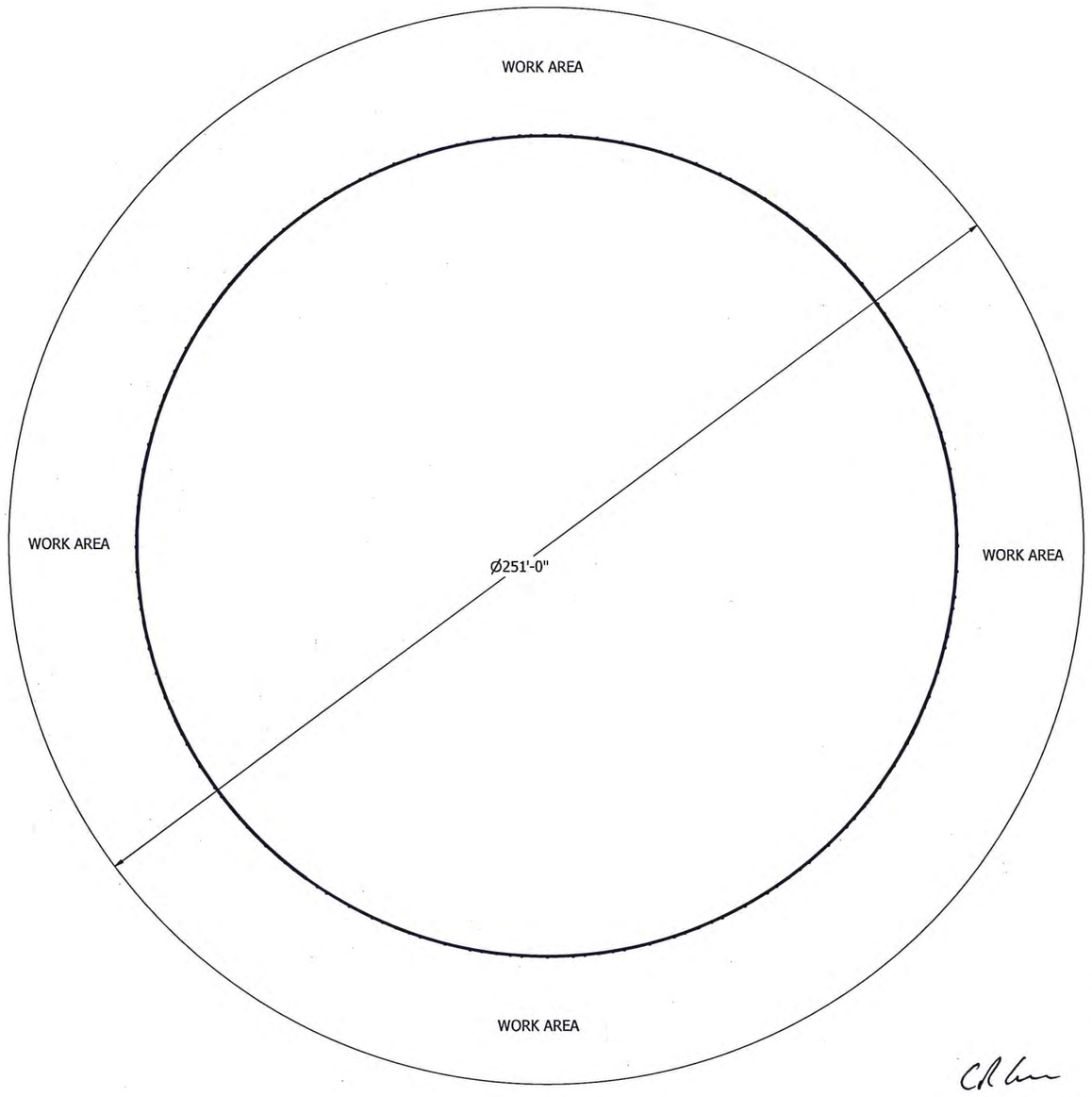
TITLE: 60,000 BBL MOBILE WATER CORRAL, BOLT-UP DESIGN

SIZE C | PRT. NO. MWC-A-002a | REV -
SCALE DO NOT SCALE | DWG. NO. MWC-A-002a | SHEET 1 OF 2

LOCATION: C:_Vault\ETCVault_Corrals\MWC-A-002a.iam

NOTES:

1. MINIMUM OF 30 FEET OF WORK AREA AROUND CORRAL
2. OVER ALL SITE MUST BE LEVEL TO +/- .50 INCH
3. RING AREA WHERE CORRAL PANELS WILL BE SETUP MUST BE LEVEL TO +/- .25 INCH
4. SOIL COMPACTION MUST MEET ASTM D-698A, 90% OR GREATER
5. BUILD A 12" X 12" SAND INSIDE CORNER RELIEF BEFORE INSTALLING LINER
6. MUST USE 1"-1/4"-7 X 4" GRADE A490 STRUCTURAL BOLTS
7. PANELS MUST HAVE ALL CONNECTING BOLTS TIGHTENED AND LINER FULLY SECURED BEFORE ADDING WATER
8. ALLOW FOR 6 INCHES OF FREEBOARD FROM TOP OF CORRAL



COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
CHARLES R. GOSS
ENGINEER
NO. 40569-E

18 Dec 2013

NEXT ASSY	USED ON
APPLICATION	
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FRACTIONAL ± 1/4(6.4)
XXX = ±.25(6.4)
XXX = ±.125(3.2)
XXXXX = ±.060(1.5)
ANGULAR ± 1°
125

DRAWN BY	mspeciale
DATE	7/12/2012
CHECKED BY	dbodenshatz
DATE	11/23/2012
APPROVED	mspeciale
DATE	11/23/2012
MATERIAL	
THICKNESS	NA
WEIGHT	N/A

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TITLE: 60,000 BBL MOBILE WATER CORRAL, BOLT-UP DESIGN

SIZE	PRT. NO.	REV
C	MWC-A-002a	-

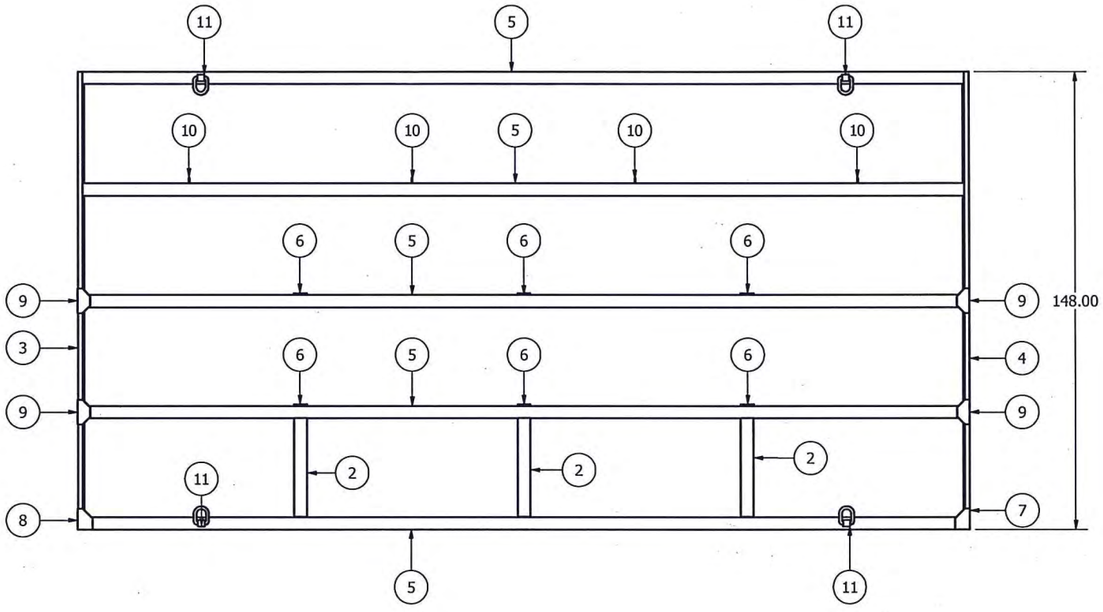
SCALE	DWG. NO.	SHEET
DO NOT SCALE	MWC-A-002a	2 OF 2

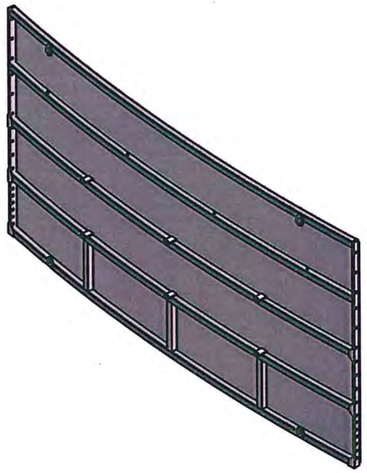
LOCATION: C:_Vault\ETCVault_Corrals\MWC-A-002a.iam

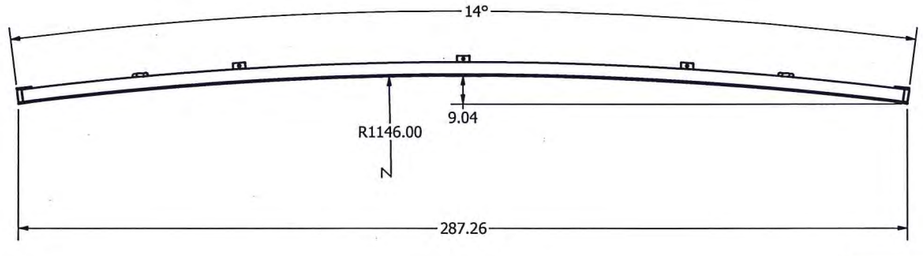
NOTES:

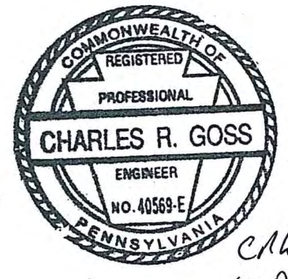
1. BLAST TO A 1 1/2 - 2 mil PROFILE
2. PAINT WITH CARBOLINE 8845, 3 - 5 mils THICK

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE	10/1/2012	MJS









18 Dec 2013

ITEM	QTY	PART NUMBER	DESCRIPTION	REV	STOCK NUM	UNIT QTY
PARTS LIST						
12	1	ETC-109	.062" X 4" X 288" RUBBER SHEET	-	NA	NA
11	4	ETC-079	Weld-on Lifting Ring	-	NA	NA
10	4	ETC-040	D-RING	-	NA	NA
9	4	MWC-323	PLATE, 1/2"	-		1
8	1	MWC-322	PLATE, 1/2"	-		1
7	1	MWC-321	PLATE, 1/2"	-		1
6	6	MWC-019	PLATE, 1/2"	-	010558	23.43 lbs
5	5	MWC-017a	TUBE, 4" X 4" X .25"	-	030227	120 ft
4	1	MWC-211R	1.50" X 4.00" FLAT BAR	-	020172	12.33 ft
3	1	MWC-211L	1.50" X 4.00" FLAT BAR	-	020172	12.33 ft
2	3	MWC-004	TUBE, 4" X 4" X .25"	-	030068	8 ft
1	2	MWC-001a	PLATE	-	010013	5880.72 lbs

NEXT ASSY | USED ON

APPLICATION

THIRD ANGLE PROJECTION

INTERPRET DIMENSIONS AND TOLERANCES IAW ASME Y14.5-2009 UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES (MM)
FRACTIONAL ± 1/4(6.4)
X.XX = ±.25(6.4)
X.XXX = ±.125(3.2)
X.XXXX = ±.060(1.5)
ANGULAR ± 1°
125

MATERIAL: Welded Steel Mild
THICKNESS: NA | WEIGHT: N/A

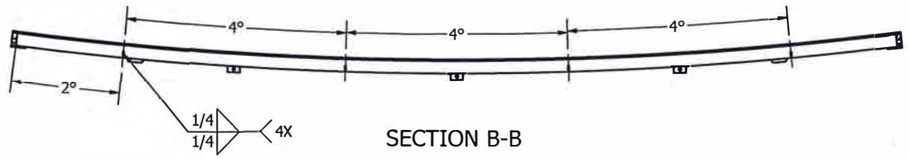
DRAWN BY: mspeciale — DATE: 4/11/2012
CHECKED BY: dbodenshatz — DATE: 8/31/2012
APPROVED: mspeciale — DATE: 8/31/2012

ETC
Environmental Tank & Container
JOHNSTOWN, PA
855-382-8265
www.etctank.com

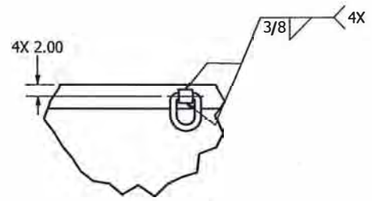
TITLE: 60,000 BBL CORRAL WALL SECTION

SIZE: C | PRT. NO.: MWC-SA-002a | REV: -
SCALE: DO NOT SCALE | DWG. NO.: MWC-SA-002a | SHEET 1 OF 2

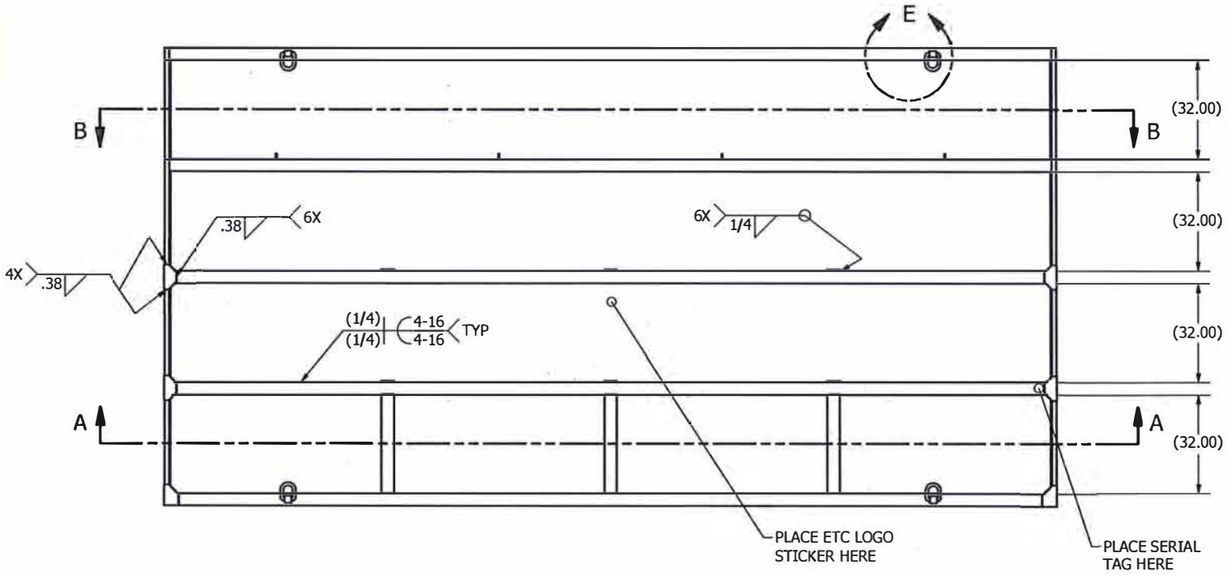
LOCATION: C:_Vault\ETCVault_Corrals\MWC-SA-002a.iam

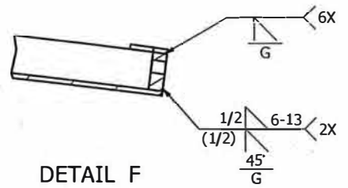


SECTION B-B

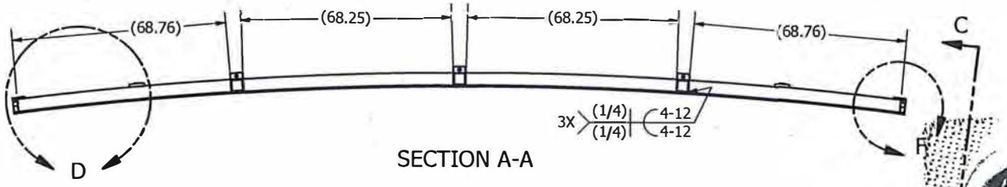


DETAIL E

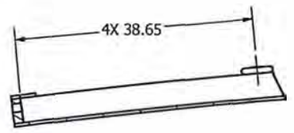




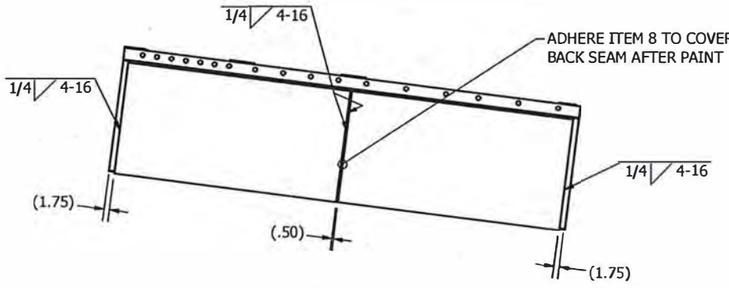
DETAIL F



SECTION A-A



DETAIL D



VIEW C-C

COMMONWEALTH OF
REGISTERED
PROFESSIONAL
CHARLES R. GOSS
ENGINEER
NO. 40569-E
PENNSYLVANIA

18 Dec 2013

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X.XXX = ±.125(3.2)
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ANGULAR ± 1°
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MATERIAL: Welded Steel Mild
THICKNESS: NA | WEIGHT: N/A

DRAWN BY	mspeciale
DATE	4/11/2012
CHECKED BY	dbodenshatz
DATE	8/31/2012
APPROVED	mspeciale
DATE	8/31/2012

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Environmental Tank & Container
JOHNSTOWN, PA
855-382-8265
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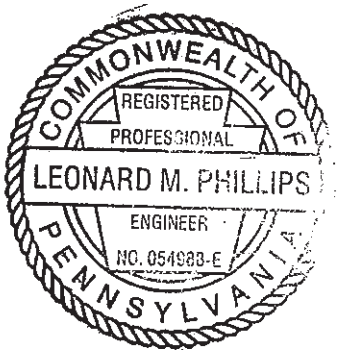
TITLE: 60,000 BBL CORRAL WALL SECTION

SIZE: C | PRT. NO.: MWC-SA-002a | REV: -
SCALE: DO NOT SCALE | DWG. NO.: MWC-SA-002a | SHEET 2 OF 2
LOCATION: C:_Vault\ETCVault_Corrals\MWC-SA-002a.iam

Date	:	3/18/2014
Document ID	:	14006H
Revision	:	0
Project	:	Evaluation of existing design
Tank #(s)	:	60,000 bbl Corral
Diameter	:	191'-0"
Shell height	:	12' - 4 "
Roof type	:	Open Top
Client	:	ETC
Location	:	Pittsburgh, Pa
PO#	:	



Standard Properties

1. Gross Tank Geometry

$D := 191 \cdot ft + 0 \cdot in$ Tank diameter

$H_s := 12 \cdot ft + 4 \cdot in$ Shell height

2. Product Variables

$DLL := 12 \cdot ft + 4 \cdot in$ Design liquid level.

$V_{nom} := \frac{\pi}{4} \cdot D^2 \cdot H_s$ $V_{nom} = 62939 \cdot bbl$ Nominal volume

$PSG := 1.2$ Maximum product specific gravity [assumed for heavy brine]

3. Design Parameters

$T_{max} := 200 \cdot F$ Maximum design temperature

$T_{min} := 5 \cdot F$ Minimum design temperature

$P_{int} := 0 \cdot psi$ Design internal pressure

$P_{ext} := 0 \cdot psi$ Design external pressure (vacuum)

4. Environmental Variables

A. Temperature Variables

$DMT := 5 \cdot F$ Design metal temperature

B. Wind Variables

$V_{wind} := 90 \cdot mph$ Design wind speed [3-second gust]

$I_{wind} := 1.0$ Wind importance factor

Exposure category (Default = C)

$K_{zt} := 1.0$ Topographic factor (1.0 minimum)

Check windbuckling in corroded condition?

Can windgirders for tanks with a diameter greater than 200 feet be designed using D = 200 ft ?

5. Shell Design

A. Shell Parameters

$JE_s := 1.00$ Shell joint efficiency

Does the client allow shell design using the variable-design-point method for tanks less than 200 feet in diameter?

$h_s := \begin{pmatrix} 6 \\ 6 \end{pmatrix} \cdot ft + \begin{pmatrix} 0 \\ 4 \end{pmatrix} \cdot in$ Height of each shell course.

$t_s := \begin{pmatrix} 0.5 \\ 0.5 \end{pmatrix} \cdot in$ Actual thickness of each shell course

$CA_s := \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$ Corrosion allowance on the shell

Shell Material 1	Shell Material 2	Shell Material 3

SR1	SR2	SR3	SR4	SR5	SR6	SR7	SR8

Shell Material Properties

Shell material	Group number	Design stress	Hydrotest stress	Appendix M factor
$SM = \begin{pmatrix} "A36" \\ "A36" \end{pmatrix}$	$GRP = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$	$SD = \begin{pmatrix} 23200 \\ 23200 \end{pmatrix} psi$	$ST = \begin{pmatrix} 24900 \\ 24900 \end{pmatrix} \cdot psi$	$RF = \begin{pmatrix} 1.000 \\ 1.000 \end{pmatrix}$

B. Shell Thickness Check (API 650)

Shell Thickness

$t_{smin} = \begin{pmatrix} 0.3168 \\ 0.3125 \end{pmatrix} \cdot in$ Minimum required steel plate thickness required by API 650

$\frac{t_{smin}}{t_s} = \blacksquare \cdot \%$

5. Shell Design

C. Shell Wind Buckling Check

Shell Buckling

$\frac{H_{tr} - h_{twg}}{H_1} = 17.02\cdot\%$ Wind buckling check.
If value exceed 100%, intermediate windgirders are required.

D. Splice Bolt Check

$n_{bolt} := 17$ Bolts per splice connection

$d_b := 1.25\cdot in$ Diameter of bolts

$P_{des} := 150\cdot kip$ Design strength in tension for A490 bolt

$\Phi_{pry} := 2.0$ Increase in bolt force due to prying action [conservative estimate]

$P_{head} := \gamma_w \cdot PSG \cdot DLL = 923.82\cdot psf$ Head pressure at base of shell

$P_{ave} := \frac{1}{2}\cdot P_{head} = 461.91\cdot psf$ Average pressure on shell

$P_{fb} := \frac{1}{2}\cdot P_{ave}\cdot DLL\cdot D = 544.05\cdot kip$ Force in each splice plate from circumferential hydrostatic forces

$P_b := \frac{P_{fb}}{n_{bolt}} = 32.00\cdot kip$ Average pure tensile force in bolt

E. Panel Information

$n_{pl} := 20$ Panels per ring

$w_{tb} := 4\cdot in$ Square tubing width

$t_{tb} := 0.25\cdot in$ Tubing thickness

$n_{tb} := 5$ Number of tubes per panel

$F_{ytb} := 46\cdot ksi$ Yield strength of tubing [A500 Grade B]

$FU_{tb} := 58\cdot ksi$ Ultimate strength of tubing [A500 Grade B]

F. Safety Factor - Bolts

$$SF_{ba} := \frac{P_{des}}{\Phi_{pry} \cdot P_b} = 2.3$$

Safety factor for bolt in pure tension compared to allowable tensile strength for the bolts

G. Safety Factor - Panels

$$SF_{pa} := \frac{FA_{comp}}{\sigma_{hoop}} = 4.1$$

Safety factor for hoop stress in panel compared to composite allowable stress of plate and tubing

$$SF_{py} := \frac{FY_{comp}}{\sigma_{hoop}} = 6.5$$

Safety factor for hoop stress in panel compared to composite yield stress of plate and tubing

$$SF_{pu} := \frac{FU_{comp}}{\sigma_{hoop}} = 9.9$$

Safety factor for hoop stress in panel compared to composite ultimate stress of plate and tubing

Inland TARP & LINER

Premium Quality - Built to Last

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Geotextile Product Description Sheet
GT-110
Nonwoven Geotextile

GT-110 is a needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. SKAPS GT-110 resists ultraviolet deterioration, rotting, biological degradation, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. SKAPS GT-110 conforms to the physical property values listed below:

PROPERTY	TEST METHOD	UNIT	M.A.R.V. (Minimum Average Roll Value)
Weight (Typical)	ASTM D 5261	oz/yd^2 (g/m^2)	10.0 (339)
Grab Tensile	ASTM D 4632	lbs (kN)	250 (1.11)
Grab Elongation	ASTM D 4632	%	50
Trapezoid Tear Strength	ASTM D 4533	lbs (kN)	100 (0.444)
CBR Puncture Resistance	ASTM D 6241	lbs (kN)	700 (3.11)
Permittivity*	ASTM D 4491	sec^{-1}	1.2
Water Flow*	ASTM D 4491	gpm/ft^2 ($l/min/m^2$)	80 (3251)
AOS*	ASTM D 4751	US Sieve (mm)	100 (0.150)
UV Resistance	ASTM D 4355	%/hrs	70/500

PACKAGING

Roll Dimensions (W x L) – ft. 12.5 x 360 / 15 x 300
Square Yards Per Roll 500
Estimated Roll Weight – lbs. 320

* At the time of manufacturing. Handling may change these properties.
This information is provided for reference purposes only and is not intended as a warranty or guarantee. SKAPS assumes no liability in connection with the use of this information.

Made in U.S.A.

Inland TARP & LINER
4172 North Frontage Rd E Moses Lake, WA 98837
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www.inlandtarp.com

TECHNICAL DATA SHEET
Geomembrane 40mil LLDPE

Property	Test Method	Frequency (A)	Unit Metric		Solmax 140-7000
Thickness (Nominal +/- 10%) (E)	ASTM D 5199	Every roll	mm		1.00
Resin Density	ASTM D 1505	1/Batch	g/cc		<0.926
Melt Index-190/2.16(max)	ASTM D 1238	1/Batch	g/10min		1.0
Sheet Density (C)	ASTM D 1505	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		23
Elongation at Break			%		800
2% Modulus (max.)	ASTM D 5323	PerFormulation	kN/m		420
Tear Resistance (min. avg.)	ASTM D 1004	Every 6 rolls	N		85
Puncture Resistance (min. avg.)	ASTM D 4833	Every 6 rolls	N		215
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.
(E) The minimum average thickness is +/- 10% of the nominal value.

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

SKAPS TRANSNET™

HDPE GEONET TN 220

SKAPS TRANSNET™ geonet consists of SKAPS Geonet made from HDPE resin.

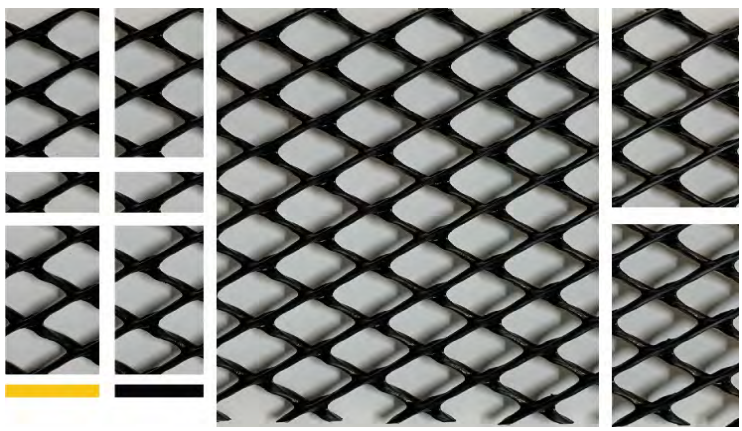
PROPERTY	TEST METHOD	UNIT	VALUE	QUALIFIER
Thickness	ASTM D 5199	mm	5.08	MAV(3)
Carbon Black	ASTM D 4218	%	2.0	MAV
Tensile Strength	ASTM D 7179	N/mm	7.87	MAV
Melt Flow	ASTM D 1238(2)	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	MAV
Transmissivity(1)	ASTM D 4716	m^2/sec	2.0×10^{-3}	MAV

Notes:

(1) Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.1 and a confining pressure of 479 kPa between steel plates after 15 minutes. Values may vary with individual labs.

(2) Condition 190/2.16

(3) Minimum average value



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Ph: (706)-336-7000, Fax: (706)-336-7007, Email: contact@skaps.com
www.skaps.com

	Extreme Plastics Plus		
EXTREME PLASTICS PLUS	EPP – Tank in a Tank Rig-Up	Rev: 05	Pg. 1 of 6

Policy Template

APPROVALS

*All approvals are maintained and controlled By **OPERATIONS MANAGEMENT***

*Please refer to the **SOP MANUAL** for the current controlled revision and approval records.*

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Jeff Anderson	**INITIAL RELEASE**	05	2018-07-03

Draft and Archived/Obsolete revisions are not to be used.

Table of Contents

1. PURPOSE

This procedure is being implemented to standardize the process for installing Epic 360 Tanks and to ensure the quality from a standardized plan.

2. SCOPE

This procedure applies to the installations of Tank in a Tank Epic Tanks

3. DEFINITIONS

- Epic 360 Tank – Above ground tank used for water containment. Permanent or temporary structure used in industrial processes where large volumes of water are needed.

4. RESPONSIBILITIES

- SOP process owner –On-Site Epic Supervisor designated by management
- Supervising Crew Leader – Ensure that SOP is strictly followed as the source for correct assembly and installation of Epic Tanks and managing their crew in a safe and productive manner. Also responsible for making sure all rigging is done in the correct manor within the capabilities of the equipment.
- Crew – Labor portion of the assembly/installation process
    - Crew Size to be a Minimum of five (5) persons consisting of at least one (1) certified Telehandler Operator, one (1) certified Skid Loader Operator, one (1) certified Welder (liner), and Spotter with a Crew Leader.

5. REQUIREMENTS

- Overall site must be level to ±0.50”
- Soil compaction must meet ASTM D-698A, 90% or greater.
- Final grade must be a smooth compacted surface, utilizing 1” of smaller crushed aggregate.

6. POLICY

Procedure for installing Epic 360 Tanks.

6.1 Prepare Surface Area

- Assure that all site / ground requirements are met and signed off on by EPP personnel prior to operations.
- Once level, find the center of tank location and mark ground with paint. Determine radius of secondary tank and mark ground for footprint of the tank.
- Obtain textile and appropriate liner, as determined by customer or internal specifications.

6.2 Ground Cover Installation

- Determine whether any special conditions exist for tank installation.

- Apply textile to the entire footprint of the tank, including secondary tank if applicable. Re-mark the painted footprint on top of the textile to serve as a guide for the wall panel placement.
- Apply liner material over the textile extending it 15 feet past the edge of the tank footprint utilizing a Skid Loader with Spreader Bar and Z-Arm attachments (Caution full rolls of liner can weight up to 4,000 lb. NO butt seams permitted on tank liners.
- Trial welds to be performed and peel and sheer tested prior to seaming step panel liner together.
- All welded seams to be Air Channel tested.
- QAQC documentation to be provided at project completion upon request.
- Fold the primary tank liners liner back toward the center of the tank footprint allowing sufficient space to place the wall panels.
- Secondary tank liner will be maneuvered during primary tank install to reduce/ eliminate any traffic on it.

6.3 Primary Tank Wall Assembly

- Panels weight up to 8,600 lbs. each. A 10,000 lb Telehandler or greater should be used when handling and installing these panels. Use **Extreme Caution** when performing this process. Panels create large amounts of risk if not properly handled and/or secured. All lifting needs performed with Certified Leg Slings and will adhere to the minimum angles referenced in Chain Length Angle Chart.
- Hold a safety meeting to determine who the signal person will be. The designated signal person will be the **ONLY** person to give direction to the Telehandler operator. However, anyone can give the **STOP** signal.
- Transporting tank panels from designated onsite storage location to be done using rated and certified lift chains, attach two (2) hooks to the top of the wall panel and attach two (2) hooks to the bottom of the wall panel at D-Rings. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Using rated and certified lift chains, attach two (2) hooks to the top of the wall panel. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Attach tag lines to the bottom of the wall panel to assist in guiding the panel during installation.
- Equipment operator will place the wall panel in its designated location. While still supported by chains and the telehandler, a Skid loader with J-Hook attachment will be hooked to panel for support.
- Once the second wall panel is in place, bolt the panels together utilizing 1-1/4”–7x5” Grade A490 Structural Bolts tightened to a minimum of 800 ft-lbs of torque utilizing air or electric impact wrenches as needed.
- Install the first three (3) wall panels following the same process.
- Be sure to leave the J-Hook in place until all but the last 3 panel are installed.

- Repeat this setting and bolting processes until the entire circumference is complete for the remaining panels.
- 1

6.4 Primary Tank Liner Installation

- Utilize Ladders for Ingress and Egress of tank, making sure to follow 3 points of contact safety protocol.
- Transition foam is placed around bottom inside perimeter of tank.
- Attach pull line to the edge of the liner and pull line over top of the wall panels utilizing a telehandler.
- Secure liner to the top of the wall panels using the (3) clamps per panel. While clamping, inspect the liner to ensure it is not in a "stressed" condition and be sure to leave enough slack so that the liner can conform to the walls once the tank is filled with water.
- Trim any excess liner material from the outer edge of the tank wall.

6.5 Secondary Tank Wall Assembly

- Panels weight up to 8,600 lbs. each. A 10,000 lb Telehandler or greater should be used when handling and installing these panels. Use **Extreme Caution** when performing this process. Panels create large amounts of risk if not properly handled and/or secured. All lifting needs performed with Certified Leg Slings and will adhear to the minimum angles referenced in Chain Length Angle Chart.
- Hold a safety meeting to determine who the signal person will be. The designated signal person will be the **ONLY** person to give direction to the Telehandler operator. However, anyone can give the **STOP** signal.
- Transporting tank panels from designated onsite storage location to be done using rated and certified lift chains, attach two (2) hooks to the top of the wall panel and attach two (2) hooks to the bottom of the wall panel at D-Rings. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Using rated and certified lift chains, attach two (2) hooks to the top of the wall panel. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Attach tag lines to the bottom of the wall panel to assist in guiding the panel during installation.
- Equipment operator will place the wall panel in its designated location. While still supported by chains and the telehandler, a Skid loader with J-Hook attachment will be hooked to panel for support.
- Once the second wall panel is in place, bolt the panels together utilizing 1-1/4"–7x5" Grade A490 Structural Bolts tightened to a minimum of 800 ft-lbs of torque utilizing air or electric impact wrenches as needed.
- Install the first three (3) wall panels following the same process.

- Be sure to leave the J-Hook in place until all but the last 3 panel are installed.
- Repeat this setting and bolting processes until the entire circumference is complete for the remaining panels.

6.6 Secondary Tank Liner Installation

- Utilize Ladders for Ingress and Egress of tank, making sure to follow 3 points of contact safety protocol.
- Transition foam is placed around bottom inside perimeter of tank.
- Attach pull line to the edge of the liner and pull line over top of the wall panels utilizing a telehandler.
- Secure liner to the top of the wall panels using the (3) clamps per panel. While clamping, inspect the liner to ensure it is not in a "stressed" condition and be sure to leave enough slack so that the liner can conform to the walls once the tank is filled with water.
- Trim any excess liner material from the outer edge of the tank wall. All work at height to be performed from a man-lift.

6.7 Installation of Tank Accessories

- Utilizing a Telehandler all required tubing need hung and anchored to mounting tabs on tank panels.
- Utilizing a Telehandler all required steps and observation decks need anchored to mounting tabs on tank panels.

6.8 Final Inspection

- A final walk around needs completed with Supervising Crew Leader and customer representative to ensure that it was built to the customer specifications.

7. APPLICABLE REFERENCES

- Chain Length Angle Chart

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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.

DESIGN/CONSTRUCTION PLAN

Design and Construction Plan
Above Ground Tank (AST) Containments

General

Examination of the engineering drawings, the SOP for set-up, plus the history of solid performance of these AST Containments demonstrates that the AST Containment is designed and will be assembled to ensure the confinement of produced water, to prevent releases and to prevent overtopping due to wave action or rainfall. As the AST Containments are generally less than 190 feet in diameter, wave action is not a meaningful consideration.

19.15.34.12 A
(1) The operator shall design and construct a recycling containment to ensure the confinement of produced water, to prevent releases and to prevent overtopping due to wave action or rainfall.

These AST Containments are constructed of 12-foot high steel panels and are netted or employ the Mega Blaster Pro avian deterrent system to prevent ingress of migratory birds. Unless OCD denies the requested variance for fencing, AST Containments will be enclosed by a 4-strand barbed wire fence to comply with the Rule to fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair.

19.15.34.12 D
(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. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

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 information: the operator's name, the location of the site by quarter-quarter or unit letter, section, township and range, and emergency telephone numbers.

19.15.34.12 C
Signs. 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 a conspicuous place on the fence 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 information: the operator's name, the location of the site by quarter-quarter or unit letter, section, township and range, and emergency telephone numbers.

Site Preparation

Foundation for AST Containment

Preparation of the soils on site is required to form a dependable base for the AST Containment in accordance with the SOP. If the location of the AST Containment is on an existing pad, the operator has stripped and stockpiled the topsoil for use as the final cover or fill at the time of closure. If the pad is new construction, the operator will strip and stockpile the soil for reclamation upon cessation of site activities.

19.15.34.12 B
Stockpiling of topsoil. Prior to constructing containment, the operator shall strip and stockpile the topsoil for use as the final cover or fill at the time of closure.

The foundation soils may be roller compacted smooth and free of loose aggregate over ½ inch. If required byby the AST Set Up protocol, compaction characteristics must meet or exceed 95% of Standard Proctor Density in accordance with ASTM D 698.

19.15.34.12 A
(2) A recycling containment shall 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 is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity. The operator shall construct the containment in a levee with an inside grade no steeper than two horizontal feet to one vertical foot (2H:1V). The levee shall have an outside grade no steeper than three horizontal feet to one vertical foot (3H:1V). The top of the levee shall be wide enough to install an anchor trench and provide adequate room for inspection and maintenance.

Examination of the SOP shows that the AST Containment contractor will conform to the following mandates of the Rule:

- the AST Containment will have a properly constructed compacted earth foundation and interior slopes (vertical steel) 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.
- If the AST Containment is within a levee, the inside grade is no steeper than two horizontal feet to one vertical foot (2H: 1V) and the outside grade no steeper than three horizontal feet to one vertical foot (3H: IV). The vertical steel walls of the AST Containment are the *subject of a requested variance*.

19.15.34.12 A
(6) At a point of discharge into or suction from the recycling containment, the operator shall insure that the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines shall not penetrate the liner.

The Operator will ensure 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

19.15.34.12 A
(4) 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 30-mil flexible PVC, 45-mil LLDPE string reinforced or 60-mil HDPE liners. Secondary liners shall be 30-mil LLDPE string reinforced 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.

The liner and geotextile specifications 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 *an equivalent liner [to that stated in Rule 34] approved by OCD pursuant to a variance.* The liner system is presented in an earlier section of this submission.

All secondary liners shall be *an equivalent liner [to that stated in Rule 34] or approved by OCD pursuant to a*

variance. The liner system is presented in an earlier section of this submission.

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

The AST Containment will have a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet to facilitate drainage.

Install Secondary Liner, Leak Detection System and Secondary Containment

All AST containments 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 rule states that 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 lack of an anchor trench with an AST Containment is also the subject of requested variance.*

19.15.34.12 A
(3) Each recycling containment shall incorporate, at a minimum, a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions. The edges of all liners shall be anchored in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep.

The AST Containment Contractor will cause the recycling containment will have a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet 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 (see attached design sketch).

19.15.34.12 A
(7) The operator of a recycling containment shall place a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet or two feet of compacted soil with a saturated hydraulic conductivity of 1 x 10-5 cm/sec or greater 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 steel walls of the AST effectively prevent run-on of surface water into the AST. The steel walls provide an excellent diversion of run-on into the AST, thereby complying with the Rule.

19.15.34.12 A
(8) The operator of a recycling containment shall design the containment to prevent run-on of surface water. The containment shall be surrounded by a berm, ditch or other diversion to prevent run-on of surface water.

AST Containment Setup

As with the secondary liner, AST Containment contractor 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. AST Containment contractor will employ field seams in geosynthetic material that are thermally seamed. Prior to field seaming, AST Containment contractor shall

19.15.34.12 A
(5) The operator of a recycling containment shall minimize liner seams and orient them up and down, not across, a slope of the levee. Factory welded seams shall be used where possible. The operator shall ensure field seams in geosynthetic material are thermally seamed. Prior to field seaming, the operator shall overlap liners four to six inches. The operator shall minimize the number of field seams and corners and irregularly shaped areas. There shall be no horizontal seams within five feet of the slope's toe. Qualified personnel shall perform field welding and testing.

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 Containment bottom. Qualified personnel shall perform field welding and testing.

Fluid Injection/Withdrawal Flow Diverter

The injection or withdrawal of fluids from the containment shall be accomplished through a header, diverter or other hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.

19.15.34.13 B
(3) The injection or withdrawal of fluids from the containment shall be accomplished through a header, diverter or other hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.

Operations and Maintenance Plan

Closure Plan

Operations and Maintenance Plan
Above Ground Tank Containment (AST)

General Specifications

This plan provides additional protocols to cause the proposed recycling containments (AST Containments) to conform to NMOCD Rules.

19.15.34.10 B
Recycling containments may hold produced water for use in connection with drilling, completion, producing or processing oil or gas or both.
19.15.34.8 A
(6) All releases from the recycling and re-use of produced water shall be handled in accordance with 19.15.29 NMAC.

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.

19.15.34.10 B
Recycling containments may hold produced water for use in connection with drilling, completion, producing or processing oil or gas or both. Such fluids may include fresh water, brackish water, recycled and treated water, fluids added to water to facilitate well drilling or completion, water produced with oil and gas, flowback from operations, water generated by an oil or gas processing facility or other waters that are gathered for well drilling or completion but may not include any hazardous waste.

- 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.

19.15.34.8 A
(5) All operations in which produced water is used shall be conducted 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.

19.15.29.6
To prohibit releases and require persons who operate or control the release or the location of the release to report the unauthorized release of oil, gases, produced water, condensate or oil field waste including regulated NORM or other oil field related chemicals, contaminants or mixtures of those chemicals or contaminants that occur during drilling, producing, storing, disposing, injecting, transporting, servicing or processing and to establish procedures for reporting, site assessment, remediation, closure, variance and enforcement.

Operations and Maintenance Plan
Above Ground Tank Containment (AST)

- 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.

19.15.34.9 G
Recycling facilities may not be used for the disposal of produced water.

- 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.

19.15.34.13 B
(1) The operator shall remove any visible layer of oil from the surface of the recycling containment
(7) The operator shall install, or maintain on site, an oil absorbent boom or other device to contain an unanticipated release.

- 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.

19.15.34.13 B
(3) The injection or withdrawal of fluids from the containment shall be accomplished through a header, diverter or other hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.

- The operator shall maintain at least three feet of freeboard at each containment.

19.15.34.13 B
(2) The operator shall maintain at least three feet of freeboard at each containment.

- 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.

19.5.34.13 B
(4) If the containment's primary liner is compromised above the fluid's surface, the operator shall 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.

- 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.

(5) If the primary liner is compromised below the fluid's surface, the operator shall 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.

- 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.

19.15.29.8 B.
Requirements. For all releases regardless of volume, the responsible party shall comply with 19.15.29.8 NMAC and shall remediate the release. For major and minor releases, the responsible party shall also comply with 19.15.29.9, 19.15.29.10, 19.15.29.11, 19.15.29.12 and 19.15.29.13 NMAC.

The operator will inspect and remove, as necessary, surface water run-on accumulated in the secondary containment

19.15.34.13
(6) The containment shall be operated to prevent the collection of surface water run-on.

Monitoring, Inspections, and Reporting

An inspection log will be maintained by the operator and will be made available to the division upon request. Inspection will 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.

19.15.34.13 A.
The operator shall 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 and freeboard
- Recording any evidence of visible oil on surface

- Visually inspecting the containments exposed liners
- Checking the leak detection system for any evidence of a loss of integrity of the primary liner
- Inspect any diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.
- Inspect the leak detection system for evidence of damage or malfunction and monitor for leakage.

- Inspect netting (may not be used if Mega Blaster Pro avian deterrent is used) for damage or 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.

19.15.34.12 E
Netting. The operator 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.

Additional monitoring to identify hazards that may have developed, changes in site conditions, tank use, and to enable early detection of structural issues such as uneven tank panel settlement, soil settlement, liner damage, insufficient liner slack or leaks. If changes are noted the AST contractor should be notified

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

Monthly, the operator will:

- 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.
- Record sources and disposition of all recycled water.

19.15.34.9 E
The operator of a recycling facility shall 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.

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

19.15.34.13 C
A recycling containment shall be deemed to have ceased operations if less than 20% of the total fluid capacity is used every six

notified. The division district may grant an extension not to exceed six months to determine the cessation of operations.

months following the first withdrawal of produced water for use. The operator must 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 operator will remove all fluids from the recycling facility within 60 days of cessation of operations. An extension, not to exceed 2 months, may be granted by the district division for the removal of fluids from the facility.

19.15.34.14 A
Once the operator has ceased operations, the operator shall 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 division district office may grant an extension for the removal of all fluids not to exceed two months.

The breakdown of the containments follows the reverse order of the setup steps presented in the set-up manual.

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.

Excavation and Removal Closure Plan – Protocols and Procedures

1. Residual fluids in the containments will be sent to disposal at a division-approved facility.
2. The operator will remove all solid contents and transfer those materials to the following division-approved facility:
   Disposal Facility Name: R360
   Permit Number NM 01-0006
3. If possible, geomembrane textiles and liners that exhibit good integrity may be recycled for use as an under liner of tank batteries or other use as approved by OCD.
4. Disassemble the recycling containment infrastructure according to manufacturer's recommendations
5. After the disassemble of the containments and removal of the contents and liners, soils beneath the tanks will be tested as follows
   a. Collect a five-point (minimum) composite 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.
   b. If any concentration is higher than the parameters listed in Table I, additional delineation may be required, and closure activities will not proceed without Division approval.
   c. If all constituents' concentrations are less than or equal to the parameters listed in Table I, then the operator will backfill the facility as necessary using non-waste containing, uncontaminated, earthen material and proceed to reclaim the surface to pre-existing conditions.

19.15.34.14 B
The operator shall close a recycling containment by first removing all fluids, contents and synthetic liners and transferring these materials to a division approved facility.

19.15.34.14 C
The operator shall test the soils beneath the containment for contamination with a five-point composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I below.
(1) If any contaminant concentration is higher than the parameters listed in Table I, the division may require additional delineation upon review of the results and the operator must receive approval before proceeding with closure.
(2) If all contaminant concentrations are less than or equal to the parameters listed in Table I, then the operator can proceed to backfill with non-waste containing, uncontaminated, earthen material.

Closure Plan
Above Ground Tank Containment (AST)

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.

19.15.34.14 D
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.

Reclamation and Revegetation

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 revegetation obligations that provide equal or better protection of fresh water, human health, and the environment. Revegetation 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.

19.15.34.14 E
Once the operator has closed the recycling containment, the operator shall reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area. Topsoils and subsoils shall be replaced to their original relative positions and contoured so as to achieve erosion control, long-term stability and preservation of surface water flow patterns. The disturbed area shall then be reseeded in the first favorable growing season following closure of a recycling containment. The operator shall substantially restore the impacted surface area to the condition that existed prior to the construction of the recycling containment.

19.15.34.14 G
The re-vegetation and reclamation obligations imposed by federal, state trust land or tribal agencies on lands managed by those agencies shall supersede these provisions and govern the obligations of any operator subject to those provisions, provided that the other requirements provide equal or better protection of fresh water, human health and the environment.

19.15.34.14 F
Reclamation of all disturbed areas no longer in use shall be considered complete when 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.

AST SET UP SOP

Policy Template

APPROVALS

*All approvals are maintained and controlled By **OPERATIONS MANAGEMENT***

*Please refer to the **SOP MANUAL** for the current controlled revision and approval records.*

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Jeff Anderson	**INITIAL RELEASE**	05	2018-07-03

Draft and Archived/Obsolete revisions are not to be used.

Table of Contents

1. PURPOSE

This procedure is being implemented to standardize the process for installing Epic 360 Tanks and to ensure the quality from a standardized plan.

2. SCOPE

This procedure applies to the installations of Tank in a Tank Epic Tanks

3. DEFINITIONS

- Epic 360 Tank – Above ground tank used for water containment. Permanent or temporary structure used in industrial processes where large volumes of water are needed.

4. RESPONSIBILITIES

- SOP process owner –On-Site Epic Supervisor designated by management
- Supervising Crew Leader – Ensure that SOP is strictly followed as the source for correct assembly and installation of Epic Tanks and managing their crew in a safe and productive manner. Also responsible for making sure all rigging is done in the correct manor within the capabilities of the equipment.
- Crew – Labor portion of the assembly/installation process
    - Crew Size to be a Minimum of five (5) persons consisting of at least one (1) certified Telehandler Operator, one (1) certified Skid Loader Operator, one (1) certified Welder (liner), and Spotter with a Crew Leader.

5. REQUIREMENTS

- Overall site must be level to ±0.50”
- Soil compaction must meet ASTM D-698A, 90% or greater.
- Final grade must be a smooth compacted surface, utilizing 1” of smaller crushed aggregate.

6. POLICY

Procedure for installing Epic 360 Tanks.

6.1 Prepare Surface Area

- Assure that all site / ground requirements are met and signed off on by EPP personnel prior to operations.
- Once level, find the center of tank location and mark ground with paint. Determine radius of secondary tank and mark ground for footprint of the tank.
- Obtain textile and appropriate liner, as determined by customer or internal specifications.

6.2 Ground Cover Installation

- Determine whether any special conditions exist for tank installation.

- Apply textile to the entire footprint of the tank, including secondary tank if applicable. Re-mark the painted footprint on top of the textile to serve as a guide for the wall panel placement.
- Apply liner material over the textile extending it 15 feet past the edge of the tank footprint utilizing a Skid Loader with Spreader Bar and Z-Arm attachments (Caution full rolls of liner can weight up to 4,000 lb. NO butt seams permitted on tank liners.
- Trial welds to be performed and peel and sheer tested prior to seaming step panel liner together.
- All welded seams to be Air Channel tested.
- QAQC documentation to be provided at project completion upon request.
- Fold the primary tank liners liner back toward the center of the tank footprint allowing sufficient space to place the wall panels.
- Secondary tank liner will be maneuvered during primary tank install to reduce/ eliminate any traffic on it.

6.3 Primary Tank Wall Assembly

- Panels weight up to 8,600 lbs. each. A 10,000 lb Telehandler or greater should be used when handling and installing these panels. Use **Extreme Caution** when performing this process. Panels create large amounts of risk if not properly handled and/or secured. All lifting needs performed with Certified Leg Slings and will adhere to the minimum angles referenced in Chain Length Angle Chart.
- Hold a safety meeting to determine who the signal person will be. The designated signal person will be the **ONLY** person to give direction to the Telehandler operator. However, anyone can give the **STOP** signal.
- Transporting tank panels from designated onsite storage location to be done using rated and certified lift chains, attach two (2) hooks to the top of the wall panel and attach two (2) hooks to the bottom of the wall panel at D-Rings. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Using rated and certified lift chains, attach two (2) hooks to the top of the wall panel. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Attach tag lines to the bottom of the wall panel to assist in guiding the panel during installation.
- Equipment operator will place the wall panel in its designated location. While still supported by chains and the telehandler, a Skid loader with J-Hook attachment will be hooked to panel for support.
- Once the second wall panel is in place, bolt the panels together utilizing 1-1/4”–7x5” Grade A490 Structural Bolts tightened to a minimum of 800 ft-lbs of torque utilizing air or electric impact wrenches as needed.
- Install the first three (3) wall panels following the same process.
- Be sure to leave the J-Hook in place until all but the last 3 panel are installed.

- Repeat this setting and bolting processes until the entire circumference is complete for the remaining panels.
- 1

6.4 Primary Tank Liner Installation

- Utilize Ladders for Ingress and Egress of tank, making sure to follow 3 points of contact safety protocol.
- Transition foam is placed around bottom inside perimeter of tank.
- Attach pull line to the edge of the liner and pull line over top of the wall panels utilizing a telehandler.
- Secure liner to the top of the wall panels using the (3) clamps per panel. While clamping, inspect the liner to ensure it is not in a "stressed" condition and be sure to leave enough slack so that the liner can conform to the walls once the tank is filled with water.
- Trim any excess liner material from the outer edge of the tank wall.

6.5 Secondary Tank Wall Assembly

- Panels weight up to 8,600 lbs. each. A 10,000 lb Telehandler or greater should be used when handling and installing these panels. Use **Extreme Caution** when performing this process. Panels create large amounts of risk if not properly handled and/or secured. All lifting needs performed with Certified Leg Slings and will adhear to the minimum angles referenced in Chain Length Angle Chart.
- Hold a safety meeting to determine who the signal person will be. The designated signal person will be the **ONLY** person to give direction to the Telehandler operator. However, anyone can give the **STOP** signal.
- Transporting tank panels from designated onsite storage location to be done using rated and certified lift chains, attach two (2) hooks to the top of the wall panel and attach two (2) hooks to the bottom of the wall panel at D-Rings. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Using rated and certified lift chains, attach two (2) hooks to the top of the wall panel. Verify that certified lift chains are adjusted to the proper length to achieve an angle greater than 30° between the plain between the D-Rings and the lift chains.
- Attach tag lines to the bottom of the wall panel to assist in guiding the panel during installation.
- Equipment operator will place the wall panel in its designated location. While still supported by chains and the telehandler, a Skid loader with J-Hook attachment will be hooked to panel for support.
- Once the second wall panel is in place, bolt the panels together utilizing 1-1/4"–7x5" Grade A490 Structural Bolts tightened to a minimum of 800 ft-lbs of torque utilizing air or electric impact wrenches as needed.
- Install the first three (3) wall panels following the same process.

- Be sure to leave the J-Hook in place until all but the last 3 panel are installed.
- Repeat this setting and bolting processes until the entire circumference is complete for the remaining panels.

6.6 Secondary Tank Liner Installation

- Utilize Ladders for Ingress and Egress of tank, making sure to follow 3 points of contact safety protocol.
- Transition foam is placed around bottom inside perimeter of tank.
- Attach pull line to the edge of the liner and pull line over top of the wall panels utilizing a telehandler.
- Secure liner to the top of the wall panels using the (3) clamps per panel. While clamping, inspect the liner to ensure it is not in a "stressed" condition and be sure to leave enough slack so that the liner can conform to the walls once the tank is filled with water.
- Trim any excess liner material from the outer edge of the tank wall. All work at height to be performed from a man-lift.

6.7 Installation of Tank Accessories

- Utilizing a Telehandler all required tubing need hung and anchored to mounting tabs on tank panels.
- Utilizing a Telehandler all required steps and observation decks need anchored to mounting tabs on tank panels.

6.8 Final Inspection

- A final walk around needs completed with Supervising Crew Leader and customer representative to ensure that it was built to the customer specifications.

7. APPLICABLE REFERENCES

- Chain Length Angle Chart

Variances and/or Equivalency Demonstrations for Above Ground Steel Tank Modular Recycling Storage Containments (AST) Primary and Secondary Liners

Additional VARIANCE FOR RECYCLING STORAGE CONTAINMENTS (Inground and AST)

- **Alternative Testing Methods**
- **Fencing AST Containments**

Request for OCD Approval of Alternative Test Methods to Analyze Concentrations of TPH and Chloride

The prescriptive mandates of the Rule that are the subject of this request are the following subsections of NMAC 19.15.17.13 [emphasis added], 19.15.34.14 and 19.15.29. 12 D

> **19.15.17.13 CLOSURE AND SITE RECLAMATION REQUIREMENTS:**
> **D.(5)** The operator shall collect, at a minimum, a five point composite of the contents of the temporary pit or drying pad/tank associated with a closed-loop system to demonstrate that, after the waste is solidified or stabilized with soil or other non-waste material at a ratio of no more than 3:1 soil or other non-waste material to waste, the concentration of any contaminant in the stabilized waste is not higher than the parameters listed in Table II of 19.15.17.13 NMAC.

The referenced Table II, which is reproduced in part below, notes the Method with asterisk signifying: "*Or other test methods approved by the division".

Table II
Closure Criteria for Burial Trenches and Waste Left in Place in Temporary Pits

Depth below bottom of pit to groundwater less than 10,000 mg/l TDS	Constituent	Method*	Limit**
25-50 feet	Chloride	EPA Method 300.0	20,000 mg/kg
	TPH	EPA SW-846 Method 418.1	100 mg/kg

> **19.15.34.14 CLOSURE AND SITE RECLAMATION REQUIREMENTS FOR RECYCLING CONTAINMENTS:**
> **C.** The operator shall test the soils beneath the containment for contamination with a five-point composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I below.
> **(1)** If any contaminant concentration is higher than the parameters listed in Table I, the division may require additional delineation upon review of the results and the operator must receive approval before proceeding with closure.

The referenced Table I, which is reproduced in part below, notes the Method with asterisk signifying: "*Or other test methods approved by the division".

Table I
Closure Criteria for Recycling Containments

Depth below bottom of containment to groundwater less than 10,000 mg/l TDS	Constituent	Method*	Limit**
51 feet - 100 feet	Chloride	EPA 300.0	10,000 mg/kg
	TPH (GRO+DRO+MRO)	EPA SW-846 Method 8015M	2,500 mg/kg

After sampling solids of more than 50 drilling pits in the Permian Basin, we have observed and reported to OCD on numerous occasions significant problems with non-petroleum drilling additives (e.g. starch) interfering with the laboratory method 418.1. It is not surprising that in many instances we found no correlation between the laboratory results using 418.1 and the results using Method 8015.

We request approval of Method 8015 (GRO + DRO + MRO) for Method 418.1.

> **19.15.29.12 D. CLOSURE REQUIREMENTS.** The responsible party must take the following action for any major or minor release containing liquids.
> **(1)** The responsible party must test the remediated areas for contamination with representative five-point composite samples from the walls and base, and individual grab samples from any wet or discolored areas. The samples must be analyzed for the constituents listed in Table I of 19.15.29.12 NMAC or constituents from other applicable remediation standards.

The referenced Table I, is reproduced in part below.

Table I
Closure Criteria for Soils Impacted by a Release

Minimum depth below any point within the horizontal boundary of the release to ground water less than 10,000 mg/l TDS	Constituent	Method*	Limit**
≤ 50 feet	Chloride***	EPA 300.0 or SM4500 Cl B	600 mg/kg
	TPH (GRO+DRO+MRO)	EPA SW-846 Method 8015M	100 mg/kg
	BTEX	EPA SW-846 Method 8021B or 8260B	50 mg/kg
	Benzene	EPA SW-846 Method 8021B or 8260B	10 mg/kg

We request approval of EPA 300.0 or SM4500 for the analysis of chloride.

Demonstration that OCD Approval Will Provide Equal or Better Protection of Fresh Water, Public Health and the Environment

The purpose of TPH analyses in the Pit Rule is to measure total petroleum hydrocarbons not all non-polar compounds, such as starch or cellulose that can interfere with Method 418.1. While Method 418.1 may provide some useful data for transportation of crude oil or condensate spills to disposal, the addition of non-polar organic materials in drilling fluids, especially for horizontal wells, renders Method 418.1 highly problematic to determine compliance with the Rule. Using Method 8015 for TPH (GRO+DRO+MRO) provides a better measurement of what we believe the Commission intended operators to measure.

In hearings before the Oil Conservation Commission technical arguments were presented regarding the use of SM4500 in lieu of EPA 300.00 for chloride analysis for Rule 29. The Division and the Commission agreed that these two methods provide equal or better protection of fresh water, public health and the environment.

Statement Explaining Why the Applicant Seeks a Variance

The prescriptive mandates of the Rule that are the subject of this variance request are presented below with emphasis **added**:

> D. Fencing.
> (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. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
> (2) Recycling containments shall be fenced with a four foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level.
> E. Netting. The operator 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**.**

The subject AST employs netting or sonic bird hazing (Mega Bird X with bird calls specific to the Permian Basin). These methods effectively protect avian species such as waterfowl and bats. OCD and BLM have approved both methods per Rule 34 and by BLM Rules respectively.

The steel structure of the AST is 11-feet high, which obviously encloses the containment "in a manner that deters…[terrestrial] wildlife." Thus, the steel structure meets the mandate of the Rule for enclosure. Thus, netting and the steel structure meet the mandate of Rule 34 for deterring/protecting avian and terrestrial wildlife.

Because AST Containments have a steel stairway between ground surface and the open top, the operator proposes the following deterrent to unauthorized human access:

1. Install gate (e.g. https://www.saferack.com/saferack-yellowgate-adjustable-safety-swing-gates/) or chain across the stairway
2. Place an appropriate sign on the gate or chain to help deter unauthorized human access to the open top of the containment
3. Provide for a mechanism to lock the gate when responsible personnel are not onsite.

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

We believe the proposed protocol provides equal protection of Public Health as a 4-strand barbed wire fence.

40-mil Non-reinforced LLDPE Liner as Alternate Primary and 30-mil Non-reinforced LLDPE as Secondary Liner for Above Ground Steel Tank Modular Recycling Storage Containments

STATEMENT EXPLAINING WHY THE APPLICANT SEEKS A VARIANCE FOR 40 MIL NON-REINFORCED LLDPE GEOMEMBRANE AS AN ALTERNATIVE PRIMARY AND 30 MIL NON-REINFORCED AS ALTERNATIVE SECONDARY LINER FOR MODULAR STEEL AST CONTAINMENT

The prescriptive mandates of the Rule that are the subject of this variance request are the following subsections of 19.15.34.12

NMAC 19.15.34.12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

(4) 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 30-mil flexible PVC, 45-mil LLDPE string reinforced or 60-mil HDPE liners. Secondary liners shall be 30-mil LLDPE string reinforced 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.*

The applicant proposes one layer of 40-mil LLDPE non-reinforced as a primary liner and a secondary liner comprised of one layer of 30-mil LLDPE non-reinforced material

Rule 34 did not consider Above Ground Steel Storage Tanks that employ liners as a primary and secondary containment method.

This material is more readily available than the prescribed liners in the Rule and provides superior flexibility and conformity characteristics. Due to the vertical steel walls, 60-mil HDPE, 45 or 30-mil LLDPE string reinforced liners and 30-mil PCV liners are not sufficiently flexible for use in these modular containments.

All liners will have a hydraulic conductivity no greater than 1 x 10 -9 cm/sec and meet or exceed EPA SW-846 method 9090A.

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

The following technical documents provide supportive data to demonstrate that this liner system *(with integrated leak detection system)* provides equal or better protection of fresh water, public health and the environment by providing the requisite containment and protection. Attached is a technical comparison of the proposed material is compared to what is advised through Rule 34. A second memorandum provides clarification that the engineering requirements for site preparation, which ensures functionality of the liner system, is crosscutting to varied locations/sites within the Permian Basin. Liner specifications are also included in submission.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Technical Memorandum: 40-mil LLDPE as Alternative Primary with 30-mil LLDPE as Alternative Secondary Liner System for Modular Steel AST Recycling Containment

NMAC 19.15.34.12 A (4)

In consideration of the liner application for modular AST impoundments, size and depth of the AST, design details for modular tanks as well as estimated length of at least five years of service time, it is my professional opinion that a 40 mil LLDPE (non-reinforced) and a 30 mil LLDPE (non-reinforced) geomembrane system will provide the requisite barrier against produced water loss as an alternative primary and secondary liner system. *The two proposed liners, 40 mil LLDPE as Primary liner and 30 mil LLDPE Secondary liner, will function equal to or better than 45 mil String Reinforced LLDPE, 30 mil PVC, or 60 mil HDPE liners as a primary liner and 30 mil LLDPE string reinforced as a secondary liner system. Additionally, this two-layer system with integrated leak detection system, will provide requisite protection for the environment that is equal to or better than the above primary and secondary liner systems referenced in OCD rule 34.* The following are discussion points that will exhibit the attributes of a 40 mil/30 mil LLDPE 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. The LLDPE resin is virtually the same for non-reinforced 30 or 40 mil LLDPE and string reinforced 30 or 45 mil LLDPE geomembranes and both will provide requisite containment and be equally protective for this application, enduring UV and chemical degradation in the produced water environment.

Flexibility Requirements. Non-reinforced LLDPE geomembranes are less stiff and far more flexible than string reinforced geomembranes as well as 60 mil HDPE and in this regard are preferred for installations in vertical wall tanks such as this proposed installation. 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. Non-reinforced LLDPE sheet will conform better than a string reinforced LLDPE to the tank dimensions under hydrostatic loading and will exhibit less wrinkling and creasing during and after installation.

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, either non-reinforced LLDPE or string-reinforced LLDPE will be acceptable as far as QC and thermal fusion seaming methods are concerned.

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Potential for Leakage through the Primary and Secondary Liners. Leakage through geomembrane liners is directly a function of the height of liquid head above any hole or imperfection. The geonet drainage media between the primary and secondary LLDPE geomembranes at the base of the AST in this application provides immediate drainage to a low point or outside the Modular AST Impoundment and thus no hydrostatic head or driving gradient is available to push leakage water through a hole in the Secondary LLDPE liner .

Leakage through any Primary geomembrane is driven by size of hole and depth and will be detected by the increase of 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 40 mil LLDPE geomembrane which will perform equal to or better than a single layer of string reinforced LLDPE for potential leakage. Thus, if a leak occurs through the top layer, it will be effectively contained by the second layer of 30 mil LLDPE geomembrane. 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 leakage collection and drainage system 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 and process water impoundments usually in the range of 100 to 500 gpad. However, New Mexico does not specify an ALR for waste or process water impoundments (GRI Paper No. 15).

LLDPE (and string reinforced LLDPE) can be prefabricated into large panels and thus both types offer the following for Containment:

- Prefabrication in factory-controlled conditions into very large panels (up to 30,000 sf) results in ease of installation, less thermal fusion field seams and less on site QC and CQA. (It should be noted that HDPE cannot be prefabricated into panels and requires considerably more on-site welding and QC).

- Large prefabricated panels will provide better control of thermal fusion welding in a factory environment that will improve the liner system integrity for the long term. Ease of installation of large prefabricated custom size panels results in a greater reduction of installation time and associated installation and QC costs

- The Non-reinforced LLDPE geomembrane provides superior lay flat characteristics and conformability which allows for more intimate contact with the underlying soil, geonet, or geotextile and tank walls as well as overlying materials thus providing better flow characteristics for drainage of water. String reinforced LLDPE exhibits more wrinkling and when overlaid or in contact with a geonet drain, wrinkles tend to form pockets and dams affecting drainage of any leakage water to the exterior of the Modular AST Impoundment.

- Both types of LLDPE geomembrane are easily repaired using the same thermal fusion bonding method without the need for special surface grinding preparation for extrusion welding as is typically used in repair of HDPE geomembranes. However, string reinforced LLDPE requires that all cut edges with exposed scrim must be encapsulated with extrusion bead. No encapsulation is required on non-reinforced LLDPE.

In summary, it is my professional opinion that the liner system of 40 mil non-reinforced LLDPE geomembrane as Primary liner and 30 mil non reinforced LLDPE Secondary liner, with integrated leak detection system, will provide protection that is equal to or better than 45 mil string reinforced LLDPE, 30 mil PVC, 60 mil HDPE (primary liner) and 35 mil LLDPEr (secondary liner) and meets requirements as defined by the rule as an alternative liner system (resistance to UV and chemical exposure and required hydraulic conductivity). Additionally, this liner system will provide a superior installation in the AST environment and function better than liners referenced in the OCD rule and will provide the requisite protection of fresh water, public health and the environment for at least 5 years in the produced water recycling environment.

If you have any questions on the above technical memorandum or require further information, give me a call at 720-289-0300 or email geosynthetics@msn.com

Sincerely Yours,

RK Frobel

Ronald K. Frobel, MSCE, PE

COLORADO REGISTERED RONALD KENNETH FROBEL 15742 PROFESSIONAL ENGINEER

References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2018

ASTM Standards 2018

Attachments:

R. K. Frobel C.V.

STATEMENT EXPLAINING WHY THE APPLICANT SEEKS A VARIANCE FOR 40 MIL NON-REINFORCED LLDPE GEOMEMBRANE AS AN ALTERNATIVE PRIMARY AND SECONDARY LINER FOR MODULAR STEEL AST CONTAINMENT

The prescriptive mandates of the Rule that are the subject of this variance request are the following subsections of 19.15.34.12

NMAC 19.15.34.12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

(4) 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 30-mil flexible PVC, 45-mil LLDPE string reinforced or 60-mil HDPE liners. Secondary liners shall be 30-mil LLDPE string reinforced 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.

The applicant proposes one layer of 40-mil LLDPE as a primary liner and a secondary liner comprised of one layer of 40-mil LLDPE material.

Rule 34 did not consider Above Ground Steel Storage Tanks that employ liners as a primary and secondary containment method.

This material is more readily available than the prescribed liners in the Rule and provides superior flexibility and conformity characteristics. Due to the vertical steel walls, 60-mil HDPE, 45 or 30-mil LLDPE string reinforced liners and 30-mil PCV liners are not sufficiently flexible for use in these modular containments.

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

The following technical documents provide supportive data to demonstrate equal or better protection of fresh water, public health and the environment by providing the requisite containment and protection. Technical comparison of the proposed material is compared to what is advised through Rule 34 is discussed. A second memorandum provides clarification that the engineering requirements for site preparation, which ensures functionality of the liner system, is crosscutting to varied locations within the Permian Basin. Stamped plans from design engineer confirm applicability of this liner system to this specific site.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Technical Memorandum: 40-mil LLDPE as Alternative Primary/Secondary Liner System for Modular Steel AST Recycling Containment

NMAC 19.15.34.12 A (4)

In consideration of the Primary lining application (modular AST impoundment), size of the AST and depth, design details for modular tanks as well as estimated length of up to five years of service time, it is my professional opinion that a 40 mil LLDPE geomembrane will provide the requisite barrier against processed water loss. It should be noted that the 40 mil LLDPE exceeds the OCD mandate for a Secondary lining system. *The two proposed 40 mil LLDPE liners will function equal to or better than 45 mil String Reinforced LLDPE, 30 mil PVC, or 60 mil HDPE liners as a primary liner and 30 mil LLDPE string reinforced as a secondary liner system. Additionally, the 40 mil LLDPE in a two-layer system will provide requisite protection for the environment that is equal to or better than the above primary and secondary liner systems referenced in OCD rule 34.* The following are discussion points that will exhibit the attributes of a 40 mil LLDPE 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. The LLDPE resin is virtually the same for non-reinforced 40 mil LLDPE and string reinforced 45 mil LLDPE geomembranes and both will provide requisite containment and be equally protective for this application.

Flexibility Requirements. Non-reinforced LLDPE geomembranes are less stiff and far more flexible than string reinforced geomembranes as well as 60 mil HDPE and in this regard are preferred for installations in vertical wall tanks such as this proposed installation. 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. Non-reinforced LLDPE sheet will conform better than a string reinforced LLDPE to the tank dimensions under hydrostatic loading and will exhibit less wrinkling and creasing during and after installation.

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, either non-reinforced LLDPE or string-reinforced LLDPE will be acceptable as far as QC and thermal fusion seaming methods are concerned.

Potential for Leakage through the Primary and Secondary Liners. Leakage through geomembrane liners is directly a function of the height of liquid head above any hole or imperfection. The geonet drainage media between the primary and secondary LLDPE

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geomembranes at the base of the AST in this application provides immediate drainage to a low point or outside the Modular AST Impoundment and thus no hydrostatic head or driving gradient is available to push leakage water through a hole in the Secondary LLDPE liner .

Leakage through any Primary geomembrane is driven by size of hole and depth and will be detected by the increase of 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 40 mil LLDPE geomembrane which will perform equal to or better than a single layer of string reinforced LLDPE for potential leakage. Thus, if a leak occurs through the top layer, it will be effectively contained by the second layer of 40 mil LLDPE geomembrane. 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 leakage collection and drainage system 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 and process water impoundments usually in the range of 100 to 500 gpad. However, New Mexico does not specify an ALR for waste or process water impoundments (GRI Paper No. 15).

Both non-reinforced LLDPE and string reinforced LLDPE can be prefabricated into large panels and thus both types offer the following for Containment:

- Prefabrication in factory-controlled conditions into very large panels (up to 30,000 sf) results in ease of installation, less thermal fusion field seams and less on site QC and CQA. (It should be noted that HDPE cannot be prefabricated into panels and requires considerably more on-site welding and QC).

- Large prefabricated panels will provide better control of thermal fusion welding in a factory environment that will improve the liner system integrity for the long term. Ease of installation of large prefabricated custom size panels results in a greater reduction of installation time and associated installation and QC costs

- The Non-reinforced LLDPE geomembrane provides superior lay flat characteristics and conformability which allows for more intimate contact with the underlying soil, geonet, or geotextile and tank walls as well as overlying materials thus providing better flow characteristics for drainage of water. String reinforced LLDPE exhibits more wrinkling and when overlaid or in contact with a geonet drain, wrinkles tend to form pockets and dams affecting drainage of any leakage water to the exterior of the Modular AST Impoundment.

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

However, string reinforced LLDPE requires that all cut edges with exposed scrim must be encapsulated with extrusion bead. No encapsulation is required on non-reinforced LLDPE.

In summary, it is my professional opinion that the two layers of 40 mil non-reinforced LLDPE geomembranes will provide a Primary/Secondary liner system that is equal to or better than 45 mil string reinforced LLDPE, 30 mil PVC, 60 mil HDPE (primary liner) and 35 mil LLDPEr (secondary liner). Additionally, the two layers of 40 mil LLDPE will provide a superior installation and function better than liners referenced in the OCD rule. The two layers of 40 mil non- reinforced LLDPE will provide the requisite protection of fresh water, public health and the environment for at least 5 years in the frack water environment.

If you have any questions on the above technical memorandum or require further information, give me a call at 720-289-0300 or email geosynthetics@msn.com

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2018

ASTM Standards 2018

Attachments:

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Slope and Anchor Variance Request for Above Ground Steel Tank Modular Recycling Storage Containments

STATEMENT EXPLAINING WHY THE APPLICANT SEEKS A VARIANCE FOR SLOPE AND ANCHOR FOR MODULAR STEEL AST CONTAINMENT

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 NMAC 19.15.34.12.

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT:

A. An operator shall design and construct a recycling containment in accordance with the following specifications.

(2) A recycling containment shall 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 is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity. *The operator shall construct the containment in a levee with an inside grade no steeper than two horizontal feet to one vertical foot (2H:1V). The levee shall have an outside grade no steeper than three horizontal feet to one vertical foot (3H:1V).* The top of the levee shall be wide enough to install an anchor trench and provide adequate room for inspection and maintenance.

(3) Each recycling containment shall incorporate, at a minimum, a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions. *The edges of all liners shall be anchored in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep*.

The applicant requests a variance to prescribed slope and anchor in the setting of above ground modular steel containments.

With respect to storage of produced water for use in lieu of fresh water, Rule 34 is written for earthen, lined pits, not free-standing modular impoundments that employ liners as their primary fluid containment system. A modular impoundment 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.

There is no anchor trench as envisioned by the Rule, liners are anchored to the top of the steel walls with clips, no anchor trench is required.

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

The following technical memorandum provides supportive data to demonstrate equal or better protection of fresh water, public health and the environment by providing the requisite containment and protection.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Technical Memorandum: Slope and Anchor Trench Variance for Above Ground Steel Modular Containments

NMAC 19.15.34.12 A (2), (3)

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 vertical.* Design of steel tanks, in regard to 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. These are detailed in the Tank Installation Manual. *There are no requirements for an "anchor trench" as this is not an in-ground impoundment.*

In summary, based on the design and specifications of a modular steel impoundment, 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. This provides the requisite protection of fresh water, public health and the environment for many years.

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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:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

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

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

Attachments:

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January 2020

Applicability of Variances for Modular AST Containments in the Permian Basin of New Mexico

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Technical Memorandum: Applicability of Variances for Modular AST Containments in the Permian Basin of New Mexico

NMAC 19.15.34.12 A (2)

I have reviewed the most recent historical variances for AST Containments in the document titled "Variances for C-147 Registration Packages Permian Basin of New Mexico" (January 2020) and examined the applicable design drawings and permits for the following modular AST containments located in the Permian Basin of New Mexico.

- C-147 Registration Package for Myox Above Ground Storage Tank Section 32, T25S, R28E, Eddy County (January 20, 2020)
- 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
- Hackberry 16 Recycling Containments and Recycling Facility Section 16, T19S, R31E, Eddy County

Locations of the modular containments range from west of the Pecos River to slightly west of Jal, NM. All locations exhibit different surface and subsurface geology, different topography and are of various sizes and volumes. *However, in regard to structural integrity of the base soils that support the AST and in particular the geomembrane containment system, the specification requirements are the same*. The foundation soils must be roller compacted smooth and free of loose aggregate over ½ inch. Compaction characteristics must meet or exceed 95% of Standard Proctor Density in accordance with ASTM D 698. This specification requirement is specific and causes the general or earthworks contractor to meet this standard regardless of the site- specific geology or topography. Provided that the design drawings and associated specifications call out the minimum requirements for subsoils compaction (i.e., 95% Standard Proctor Density – ASTM D 698), the design engineer or owners representative will carry out soils testing on the foundation materials to provide certainty to the AST containment owner that the earthworks contractor has met these obligations.

Thus, provided that the contractor meets the minimum specified requirements for foundation soils preparation and density, the location, geology or depth to groundwater will make no difference in regard to geomembrane liner equivalency as demonstrated by the AST variances presented in this volume and are considered valid for meeting NMOCD Rule 34 requirements for all locations within the Permian Basin of New Mexico.

If you have any questions on the above technical memorandum or require further information, give me a call at 720-289-0300 or email geosynthetics@msn.com

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Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

ASTM Standards 2019

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FIRM: R. K. FROBEL & ASSOCIATES
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TITLE: Principal and Owner

PROFESSIONAL AFFILIATIONS:

American Society for Testing and Materials (ASTM) -
Founding member of Committee D 35 on Geosynthetics
Chairman ASTM D35 Subcommittee on Geomembranes 1985-2000
ASTM Award of Merit Recipient/ASTM Fellow - 1992
ASTM D18 Soil and Rock - Special Service Award - 2000
Transportation Research Board (TRB) of The National Academies
Appointed Member A2K07 Geosynthetics 2000 - 2003
National Society of Professional Engineers (NSPE) - Member
American Society of Civil Engineers (ASCE) - Member
Colorado Section - ASCE - Member
International Society of Soil Mechanics and Foundation Engineers
(ISSMFE) - Member
International Geosynthetics Society (IGS) - Member
North American Geosynthetics Society (NAGS) - Member
International Standards Organization (ISO) - Member TC 221
Team Leader - USA Delegation Geosynthetics 1985 - 2001
European Committee for Standardization (CEN) - USA Observer
EPA Advisory Committee on Geosynthetics (Past Member)
Association of State Dam Safety Officials (ASDSO) – Member
U. S. Committee on Irrigation and Drainage (USCID) - Member
Technical Advisory Committee - Geosynthetics Magazine
Editorial Board - Geotextiles and Geomembranes Journal
Fabricated Geomembrane Institute (FGI) – Board of Directors
Co-Chairman International Conference on Geomembranes
Co-Chairman ASTM Symposium on Impermeable Barriers
U.S. Naval Reserve Officer (Inactive)
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Mine Safety Health Administration (MSHA) Certified

ACADEMIC BACKGROUND:

University of Arizona: M.S. - Civil Engineering - 1975
University of Arizona: B. S. - Civil Engineering – 1969
Wentworth Institute of Technology: A.S. Architecture – 1966

PROFESSIONAL EXPERIENCE:

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Evergreen, Colorado, Principal and Owner, 1988 - Present

Chemie Linz AG and Polyfelt Ges.m.b.H., Linz, Austria
U. S. Technical Manager Geosynthetics, 1985 - 1988

U.S. Bureau of Reclamation, Engineering and Research Center
Denver, Colorado, Technical Specialist in Construction Materials Research and Application, 1978 - 1985

Water Resources Research Center (WRRC), University of Arizona
Tucson, AZ, Associate Research Engineer, 1975 - 1978

Engineering Experiment Station, University of Arizona
Tucson, AZ, Research Assistant, 1974 - 1975

United States Navy, Commissioned Naval Officer, 1970 - 1973

REPRESENTATIVE EXPERIENCE:

R.K. Frobel & Associates: Civil engineering firm specializing in the fields of geotechnical, geo-environmental and geosynthetics. Expertise is provided to full service civil/geotechnical engineering firms, federal agencies, municipalities or owners on a direct contract, joint venture or sub-consultant basis. Responsibilities are primarily devoted to specialized technical assistance in design and application for foreign and domestic projects such as the following:
Forensics investigations into geotechnical and geosynthetics failures; providing expert report and testimony on failure analysis; providing design and peer review on landfill lining and cover system design, mine waste reclamation, water treatment facilities, hydro-technical canal, dam, reservoir and mining projects, floating reservoir covers; oil and gas waste containment; design of manufacturers technical literature and manuals; development and presentation of technical seminars; new product development and testing; MQA/CQA program design and implementation.

Polyfelt Ges.m.b.H., Linz, Austria and Denver Colorado: As U.S. technical manager, primary responsibilities included technical development for the Polyfelt line of geosynthetics for the U.S. civil engineering market as well as worldwide applications.

U.S. Bureau of Reclamation, Denver, Colorado: As technical specialist, responsibilities included directing laboratory research, design and development investigations into geosynthetics and construction materials for use on large western water projects such as dams, canals, power plants and other civil structures. Included were material research, selection and testing, specification writing, large scale pilot test programs, MQA/CQA program design and supervision of site installations. Prime author or contributor to several USBR technical publications incorporating geosynthetics.

University of Arizona, Tucson, Arizona: As research engineer at the Water Resources Research Center, responsibilities included research, design and development of engineering materials and methods for use in construction of major water projects including potable water reservoirs, canals and distribution systems. Prime author or contributor to several WRRC technical publications.

Northeast Utilities, Hartford, Connecticut: As field engineer for construction at Northeast Utilities, responsibilities included liason for many construction projects including additions to power plants, construction of substations, erection of fuel oil pipelines and fuel oil storage tanks. Responsibilities also included detailed review, inspection and reporting on numerous construction projects.

U.S. Navy: Commissioned Naval Officer – Nuclear Program

PUBLICATIONS: Over 85 published articles, papers and books.

CONTACT DETAILS:

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Consulting Civil/Geosynthetics Engineers
PO Box 2633
Evergreen, Colorado 80439 USA
Phone 720-289-0300
Email: geosynthetics@msn.com

March 2024

Volume 1
C-147 Permit Package for
Oxy Lost Tank AST Containment
Section 36, T22S, R31E, Eddy County

- ***Transmittal Letter***
- ***Siting Criteria Demonstration with Plates & Appendices***

Placement of liner for secondary containment of OXY Lost Tank AST Containment on the existing OXY USA pad.

Prepared for:
Solaris Water Midstream LLC And OXY USA Inc.
Houston, TX 77024 Houston, TX

Prepared by:
R.T. Hicks Consultants, Ltd.
901 Rio Grande NW 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

March 18, 2024

Ms. Leigh Barr
EMNRD - Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, NM 87505
Via E-Mail

Ms. Victoria Venegas
NMOCD - District 2
811 S. First St.
Artesia, NM 88210
Via E-Mail

RE: Solaris Water Midstream, LLC, Oxy Lost Tank. Recycling Facility and AST Permit
Section 36, T22S, R31E, Lea County

Dear Ms. Barr and Ms. Venegas:

On behalf Solaris Water Midstream, LLC (Solaris), R.T. Hicks Consultants prepared a C-147 *permit application and registration* for the above-referenced project. Set up of the AST formally at the MYOX location (2RF-1610) has commenced. The hydraulic stimulation schedule calls for produced water to flow into the containments in early-mid April. The initial use is for the sole use of OXY USA on wells owner/operated by OXY USA.

As a contractor to OXY, Solaris is providing the AST, water treatment and this submission. Part of the agreement calls upon Solaris to construct, operate, maintain, provide some reports on use to OCD, and close the AST containment. Thus, the C-147 lists Solaris in Box 10 of the C-147 form.

Volume 1 of the package contains:

- This letter
- Closure Cost Estimate
- Siting criteria demonstration for both containments

Volume 2 includes:

- C-147 Form & AST Design Sketch
- Stamped Design Drawings and Specifications
- Plans for Design/Construction, O&M, and Closure
- AST Set Up SOP
- Variances for AST Storage Containments

Solaris will upload the registration package to OCD via the OCD.Online portal. In compliance with 19.15.34.10 of the Rule, Solaris provided this package to the State Land Office, the surface owner's representative. If you have any questions or concerns regarding this permit or the attached C-147, please contact me. As always, we appreciate your work ethic and diligence, and we apologize for the short notice.

Sincerely,
R.T. Hicks Consultants

Randall T. Hicks PG
Principal

Copy: Solaris Water Midstream, LLC

R. T. HICKS CONSULTANTS, LTD.
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996

OXY LOST TANK ABOVE-GROUND STORAGE TANK

Financial Assurance Cost Estimate

Total estimated cost for closure, reclamation, and restoration of the facility (AST, fencing, etc.) pursuant to Rule 34 is **$32,500** based upon the work elements in the spreadsheet (below). As described in the transmittal letter, the AST Containment will lie on an existing working pad associated with OXY USA E&P operations and reclamation of the working pad is the responsibility of OXY USA. Items shown with "0" units are costs recommended for certain agencies (e.g. BLM) but are not required in a closure cost estimate for compliance with Rule 34. Solaris generated this estimate with input from Hicks Consultants and is equivalent to contractor bids for other AST containments. Inflation has not caused a material increase of closure estimates for ASTs.

ITEM NO.	ITEM DESCRIPTION	UNITS	QTY	UNIT PRICE	Rule 34 TOTAL PRICE
	Keg Shell AST Containment				
1	Site Containment	0	1	$1,000.00	$0.00
2	Removal of AST and Liner Disposal	1	1	$30,000.00	$30,000.00
3	Removal of Weir Tanks	0	5	$500.00	$0.00
4	Removal of Chemical Trailer	0	1	$50.00	$0.00
5	Removal of Filter Pods	0	1	$200.00	$0.00
6	Removal of pumps, generators, light towers	0	4	$200.00	$0.00
8	Clean Pumps, piping, and equipment	0	1	$1,500.00	$0.00
9	Remove Pumps, piping, and equipment	0	3	$1,500.00	$0.00
11	Assess soil for impacts	1	1	$2,500.00	$2,500.00
12	Re-grade and Reclaim Site	1	1	$	$
,13	Misc. disposal and removal of fencing and cattle guards	0	1	$	$
	Facility Decommission Site Subtotal:				**$32,500.00**

SITING CRITERIA DEMONSTRATION

Distance to Groundwater

Plate 1, Plate 2, and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the locations is greater than 100 feet beneath the area of interest that will include the location of the Solaris Water Midstream Oxy Lost Tank AST Containment (the Site)

Plate 1 is a topographic map that shows:

1. The site is identified by the blue stippled polygon.
2. Water wells from the OSE database as a blue triangle inside a colored circle. 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). In this case. the permit data generally show "no date" and "DTW=0". On Plate 1, the OSE data has been screened with permit data being eliminated. We provide no depth to water data for the OSE wells as these data do not represent static water levels and are often misleading.

Plate 2 is a topographic and geologic map that shows:

1. The site is identified by the blue stippled polygon. Ground elevation is about 3525 feet.
2. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface.
3. Water wells, which are documented in the public databases or identified by Hicks Consultants field inspection/measurement or other published reports as colored squares (Misc. well database).
4. The geologic unit beneath the facilities site is Quaternary Older Alluvium overlying reworked Ogallala Formation materials explained below (Qoa/To).

Hydrogeology

The location is within the Mescalero Plains between the Pecos River floodplain to the west and the southern High Plains that are east of the Mescalero Escarpment. The material in the Mescalero Plains is derived from erosion and redeposition of Ogallala materials by the Pecos River and its tributary drainages. In the Mescalero Plains, this reworked material is sometimes referred to as Ogallala formation although the original bedding no longer exists. The area is mapped as surface Quaternary eolian and piedmont deposits (Qe/Qp). The Permian Quartermaster Formation (Pqm) crops out in the northwest corner of Plate 2 and the Permian Rustler Formation is exposed in on the western margin where the water well data obscure the underlying geology. The Triassic Chinle Formation is not shown on Plate 2 but is exposed about 19 miles southeast of the site, about 2 miles north of the Texas state line.
Information on specific nearby wells employed to create Plate 2 are presented below and additional data are in Appendix Well Logs and USGS Data.

- USGS-14211 is about 3.6 miles southeast of the site at a corral complex and shows a 2013 (pumping) groundwater elevation of 3161. Historical data from this Santa Rosa Sandstone completion (see Appendix Well Logs and USGS Data) indicate groundwater elevation is constant from 1981-1996 at about 3210. After 1996, the pumping level of 1/16/2013 is the next measurement and is 50 feet lower.

- USGS-14435 plots near USGS-14211 but the mapped location is incorrect. There is no evidence of a well at or near the mapped location. We hypothesize that this well lies within the corral complex, probably adjacent to the mapped intermittent lake (see Plate 7) This well is a shallow Chinle sandstone well as the groundwater elevation is more than 250 feet lower than well USGS-14211
- USGS 9816 is 3.9 miles northwest of the site. This well is at the same location as USGS-9815 and MISC-146 – and they may be the same well. Our examination of Google Earth Images suggests only one well would exist at this location. Like the two wells described above, the USGS indicates the wells are completed in the Santa Rosa Sandstone.

These data suggest that the uppermost water bearing unit beneath the Oxy Lost Tank AST is the Chinle Formation.

We examined the documentation of three dry borings from the NM OSE database. These are described briefly below and presented in Appendix Well Logs.

- C-4663 POD 1 is a dry boring drilled with air rotary to a depth of 110 feet. The log describes red sandy clay from 17-40 feet that is underlain by sandstone and red clay. This is typical of the upper Chinle Formation
- C-4740 is another 110 foot dry boring by the same driller that shows the same lithology: Quaternary alluvial cover from surface to 17 feet underlain by upper Chinle Formation. All dry cuttings.
- C-3152 is also known as SNL-15 – a WIPP monitoring well to evaluate the Culebra Dolomite Member of the Rustler Formation. The geology of the boring is presented in the Appendix with comments regarding observation of groundwater in the air-rotary boring after sitting overnight. Above the Rustler Formation (above 624 feet), the Sandia National Laboratory crew did not see evidence of water accumulation in the boring in the mornings. While we fully agree with Dr. Powers of SNL that the top of the Chinle Formation lies at a depth of about 40 feet., we suggest that the thickness of the Quartermaster Formation (aka Dewey Lake Formation) is about 250-300 feet rather than the 530± feet described in the geologic log. If our hypothesis is correct, the Santa Rosa Sandstone would be at a depth of (40+250 =) 290 feet. Indeed, the SNL-15 log describes a red sandstone from 260 feet to 380 feet that might be the Santa Rosa Sandstone.

In our opinion, the lithologic information described above support a conclusion that the Chinle Formation and its basal unit, the Santa Rosa Sandstone, is the uppermost water bearing unit beneath the Oxy Lost Tank AST.

Groundwater Data

Plate 2 relies upon the most recent groundwater data from the USGS database, data from our MISC database that includes measurements by Hicks Consultants and other professionals and selected data from dry borings in the OSE database. Most water level data from the OSE database rely upon observed water levels by drillers during the completion of the water well and are often incorrect.

We believe our interpretation of groundwater elevation shown in Plate 2 is accurate. The data to support a conclusion that groundwater is more than 50 feet below land surface at the site are:

1. Dry cuttings at C-4663 document dry cuttings extend to an elevation of 4665 beneath the side. Because this boring is at the same elevation as the site and only 3500 feet east, we estimate the regional dip would place the same strata observed in the boring at an elevation of 3460 beneath the site. Thus the minimum distance to groundwater of (3525-3440=) 85 feet
2. Groundwater elevation data on Plate 2 suggest the depth to groundwater beneath the site is (3525 – 3360=) 165 feet

We contend that the depth to groundwater beneath the site exceeds 100 feet.

Distance to Municipal Boundaries and Fresh Water Fields

Plate 3 demonstrates that the Oxy Lost Tank AST site 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 municipalities are Loving and Malaga, approximately 22 miles to the west.
- The closest public wells in the OSE database are more than 30 miles to the east
- A WIPP water supply well is mapped by the NMED database about 4.25 miles northwest.

Distance to Subsurface Mines

Plate 4 and our reconnaissance of the site demonstrate that the nearest mines are caliche pits. This site is not within an area overlying a subsurface mine.

- The closest caliche pit is located 1.8 miles southwest.
- The closest subsurface mine tunnels are about 8 miles southwest.
- WIPP is listed as an underground mine, but no tunnels exist outside of the WIPP facility boundary

Distance to High or Critical Karst Areas

Plate 5 shows the Oxy Lost Tank AST is not within mapped zone of high or critical Karst with respect to BLM mapped areas.

- The proposed facility is located within a “low” potential karst area.
- The nearest “high” or “critical” potential karst area is slightly more than 7 miles west of the site.

Distance to 100-Year Floodplain

Plate 6 demonstrates that the Lost Tank AST 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.
- The nearest mapped flood hazard areas are more than 13 miles to the west.

Distance to Surface Water

Plate 7 shows the closest surface water bodies are:

- A Lake/Pond more than 2 miles north of the site. A small intermittent stream flows into this lake.
- The next closest Lake/Pond is 4 miles to the southeast and is the same lake adjacent to wells USGS-14435 and USGS-14211 discussed in an earlier section of this submission.

Distance to Permanent Residence or Structures

Plate 8 and the site visit demonstrates that the location is not within 1000 feet of an occupied permanent residence, school, hospital, institution, church, or other structure in existence at the time of initial application.

- There are no structures within 1000 feet of the site.
- Oil field infrastructure is present around the site.

Distance to Non-Public Water Supply

Plates 1, 7 and 8 demonstrate that the Oxy Lost Tank AST 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.

- Plate 1 shows the locations of all area water wells and borings in the OSE database. No water supply wells lie within the area mapped in Plate 1.
- The nearest dry boring in the OSE database is slightly less than 1 mile to the east.
- The nearest WIPP monitoring well is about 1.3 miles to the west.
- No springs were identified within the mapping area (see Plate 7)

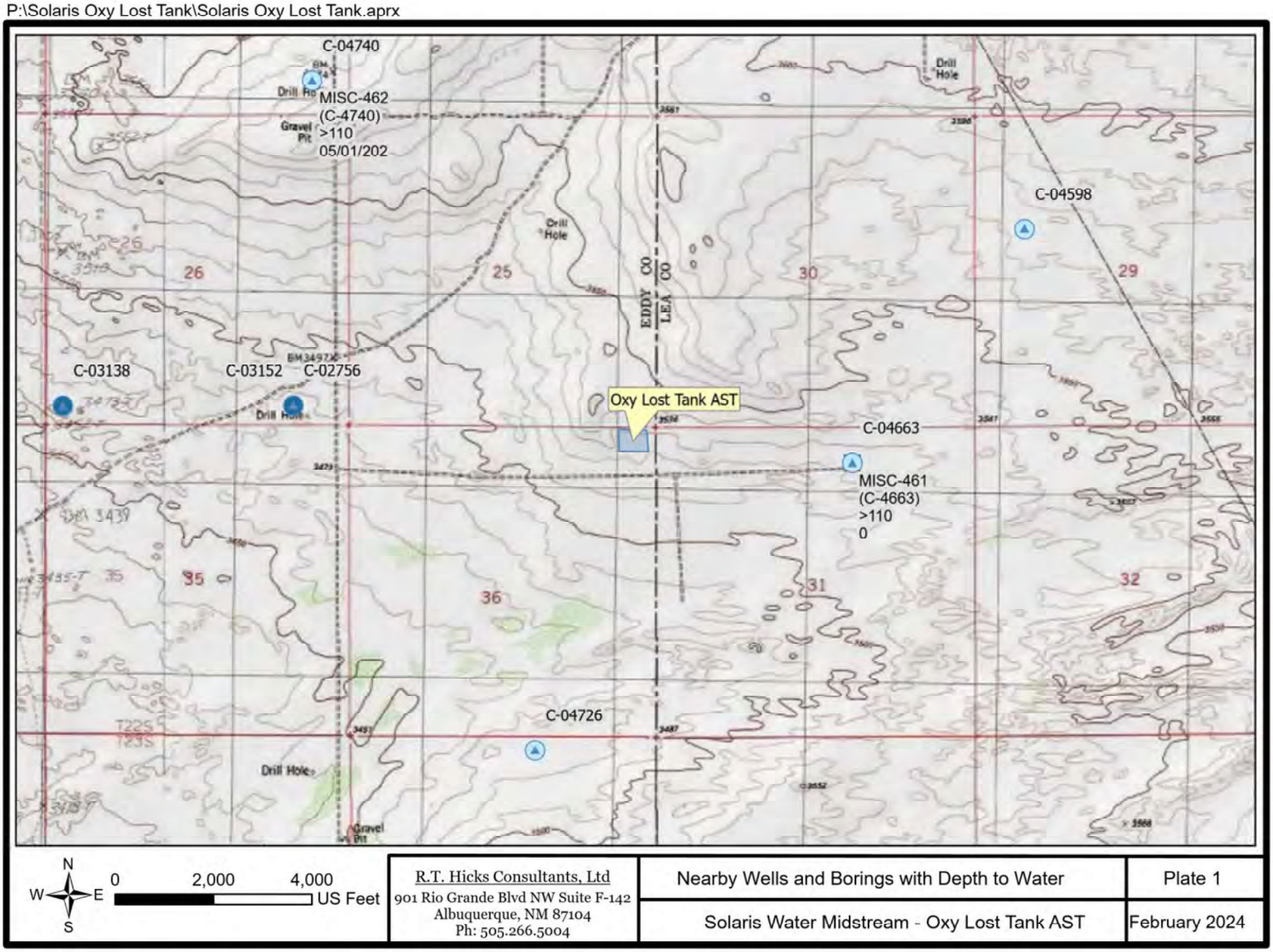
Distance to Wetlands

Plate 9 demonstrates the site is not within 500 feet of mapped wetlands using the New Mexico database.

- The nearest mapped wetlands in the NM Database are 1.7 miles north and south of the site.
    - The mapped wetland to the south is now a production pad and
    - The mapped wetland to the north is called Red Tank and lies within a natural depression
- The USA wetlands database, which relies upon aerial imagery rather than more detailed investigations, identified several frac ponds and are not displayed on Plate 9.

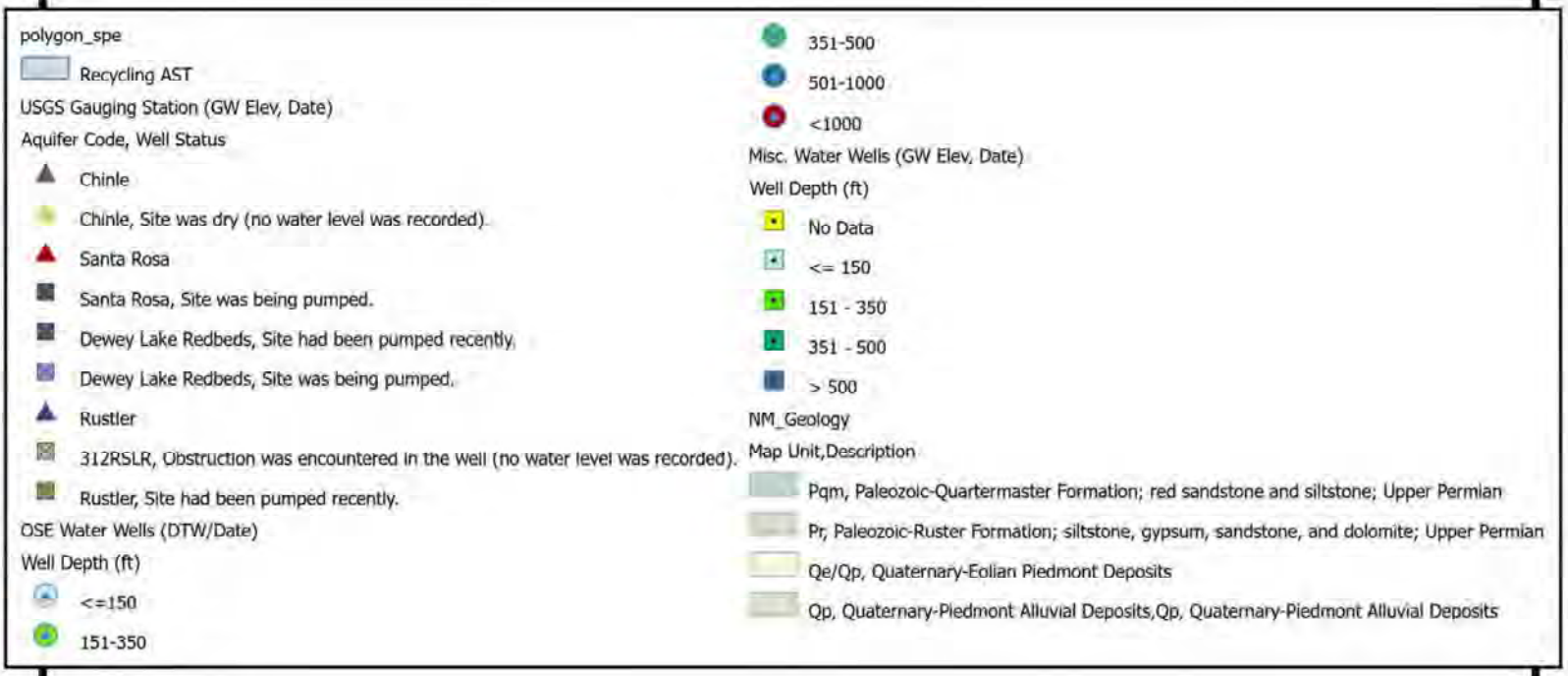
PLATES

P:\Solaris Oxy Lost Tank\Solaris Oxy Lost Tank.aprx



	R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Wells and Borings with Depth to Water	Plate 1
		Solaris Water Midstream - Oxy Lost Tank AST	February 2024

P:\Solaris Oxy Lost Tank\Solaris Oxy Lost Tank.aprx



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Plates 1 & 2 Legend	
	Solaris Water Midstream - Oxy Lost Tank	March 2024

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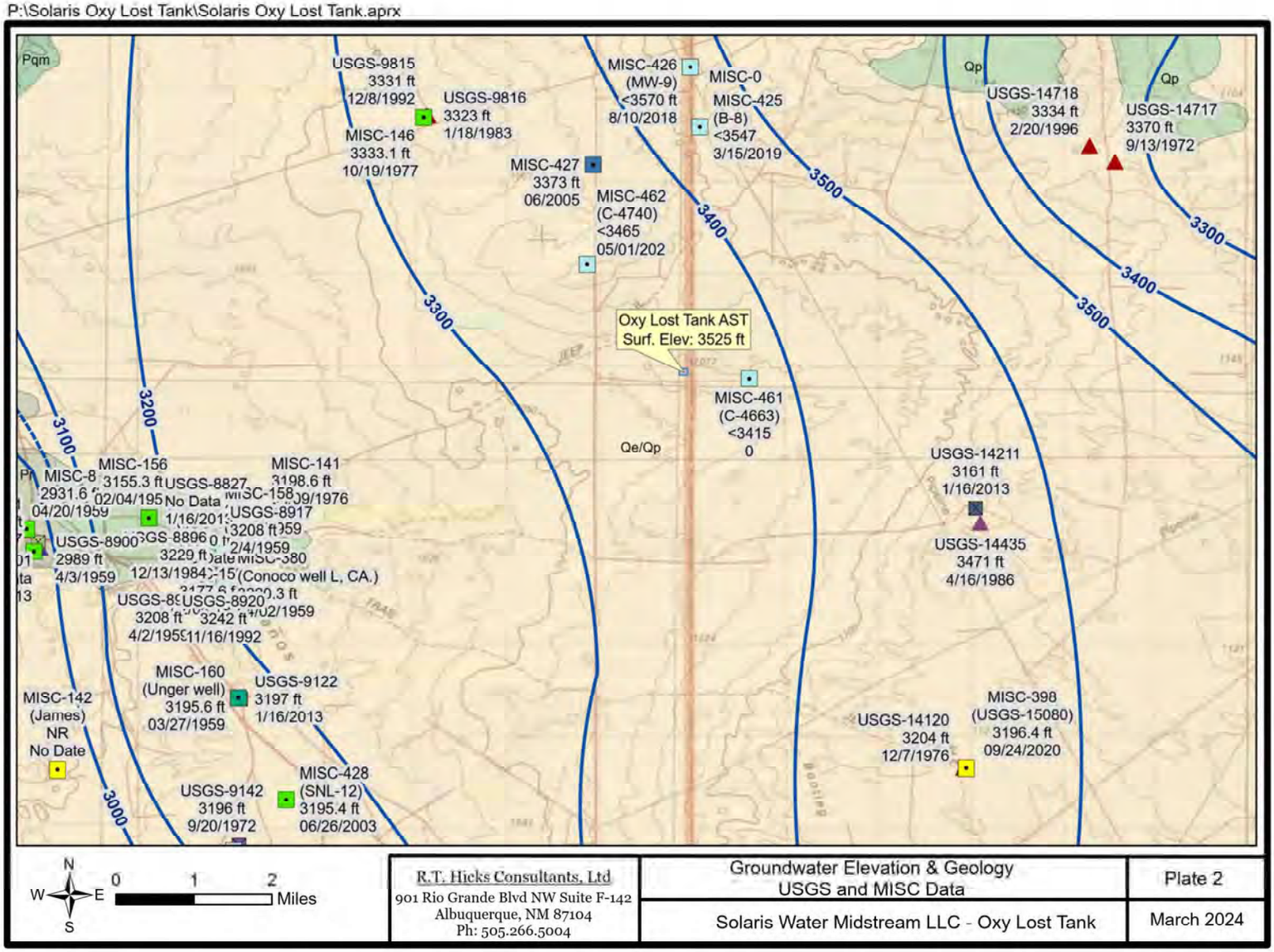

	R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Groundwater Elevation & Geology USGS and MISC Data	Plate 2
		Solaris Water Midstream LLC - Oxy Lost Tank	March 2024

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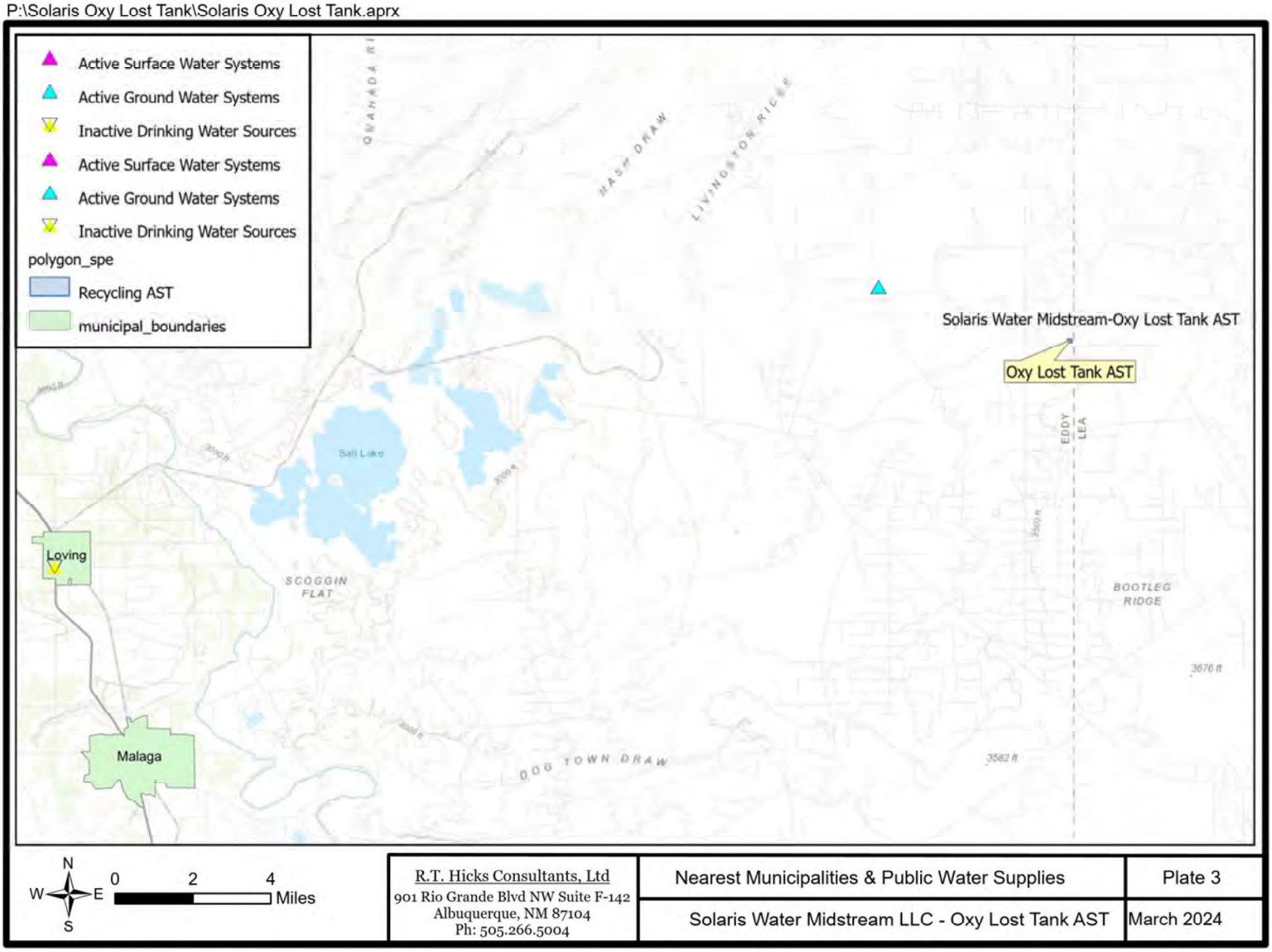

	R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearest Municipalities & Public Water Supplies	Plate 3
		Solaris Water Midstream LLC - Oxy Lost Tank AST	March 2024

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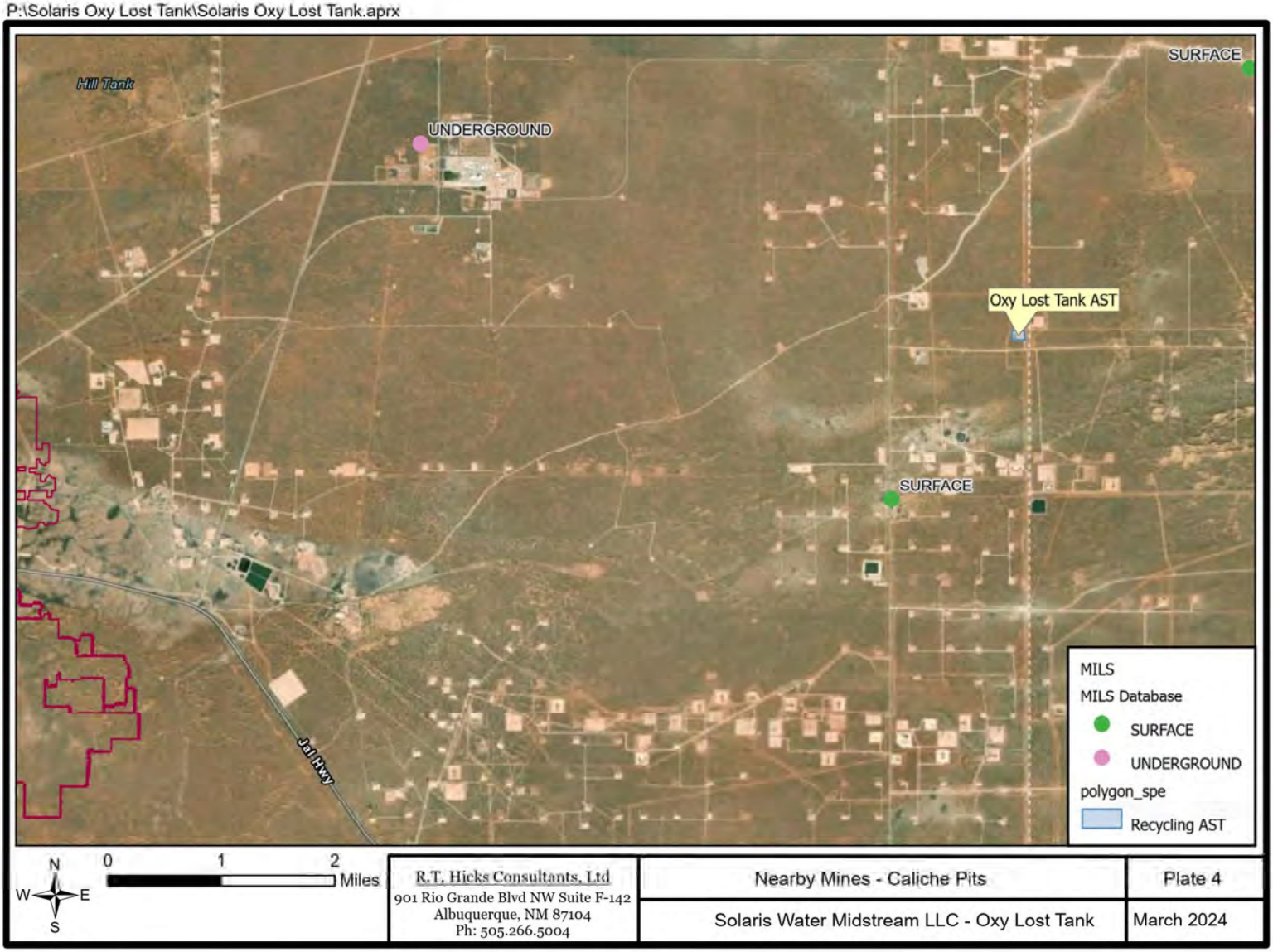

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Mines - Caliche Pits	Plate 4
	Solaris Water Midstream LLC - Oxy Lost Tank	March 2024

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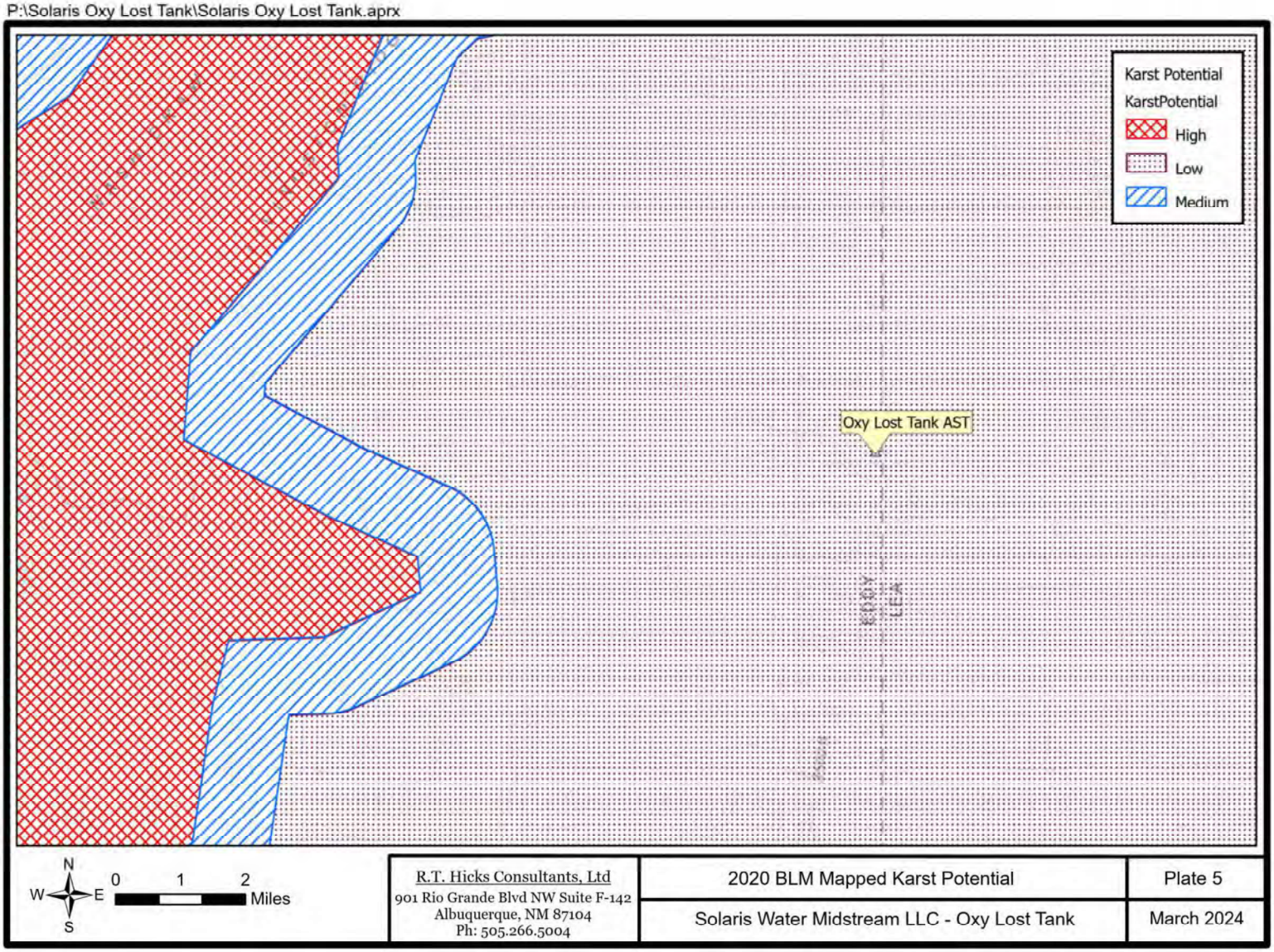

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	2020 BLM Mapped Karst Potential	Plate 5
	Solaris Water Midstream LLC - Oxy Lost Tank	March 2024

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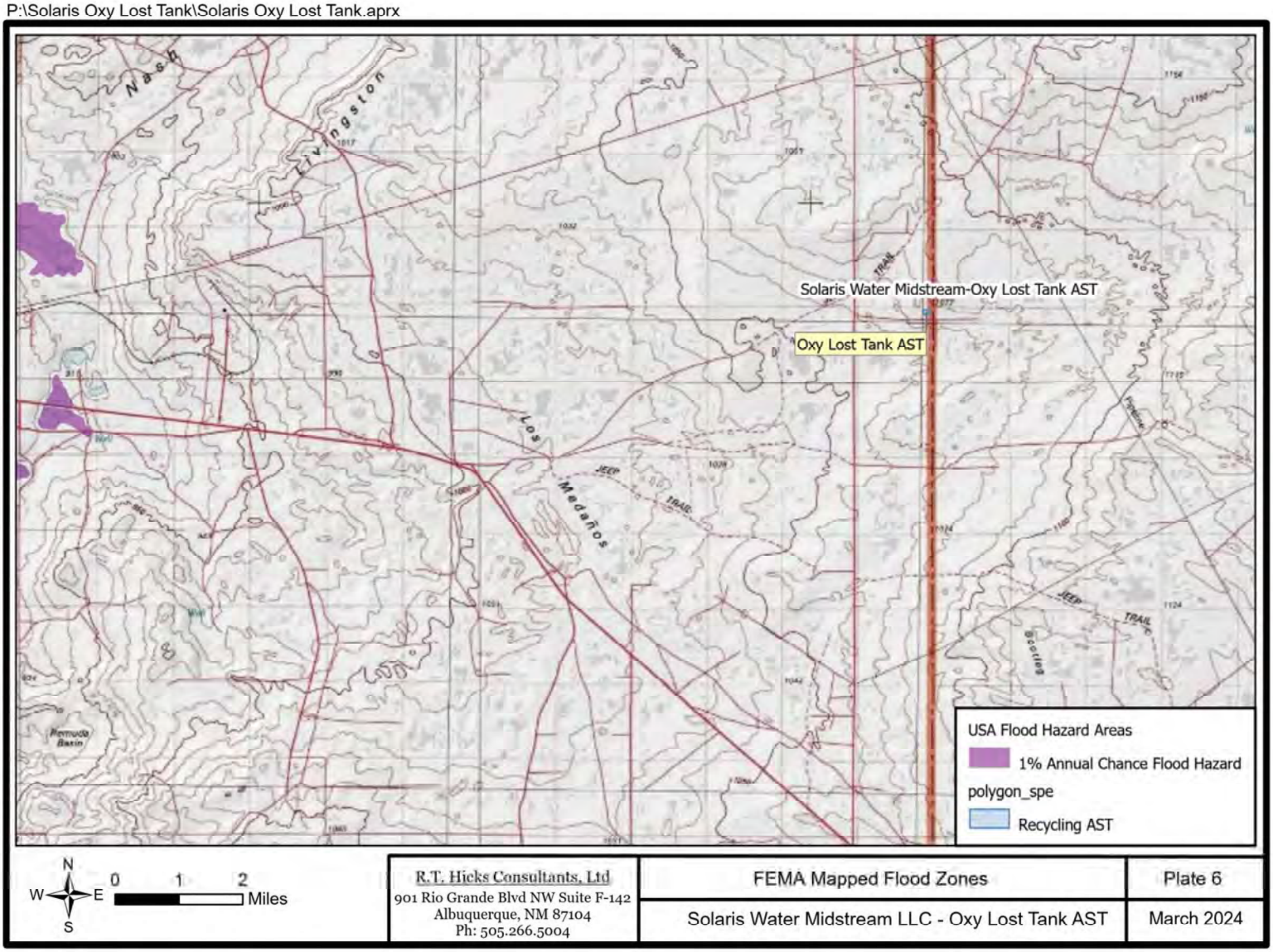

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	FEMA Mapped Flood Zones	Plate 6
	Solaris Water Midstream LLC - Oxy Lost Tank AST	March 2024

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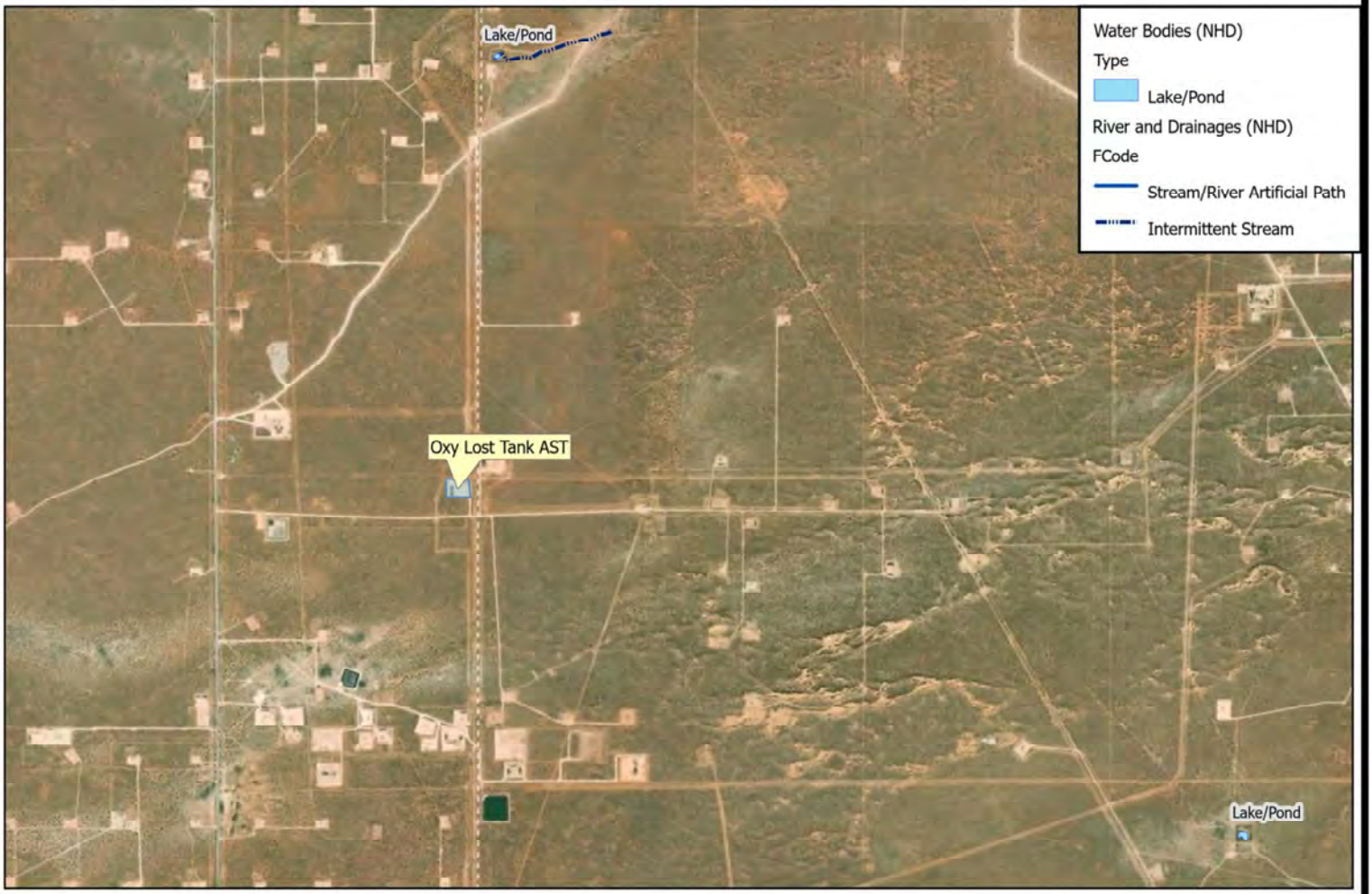
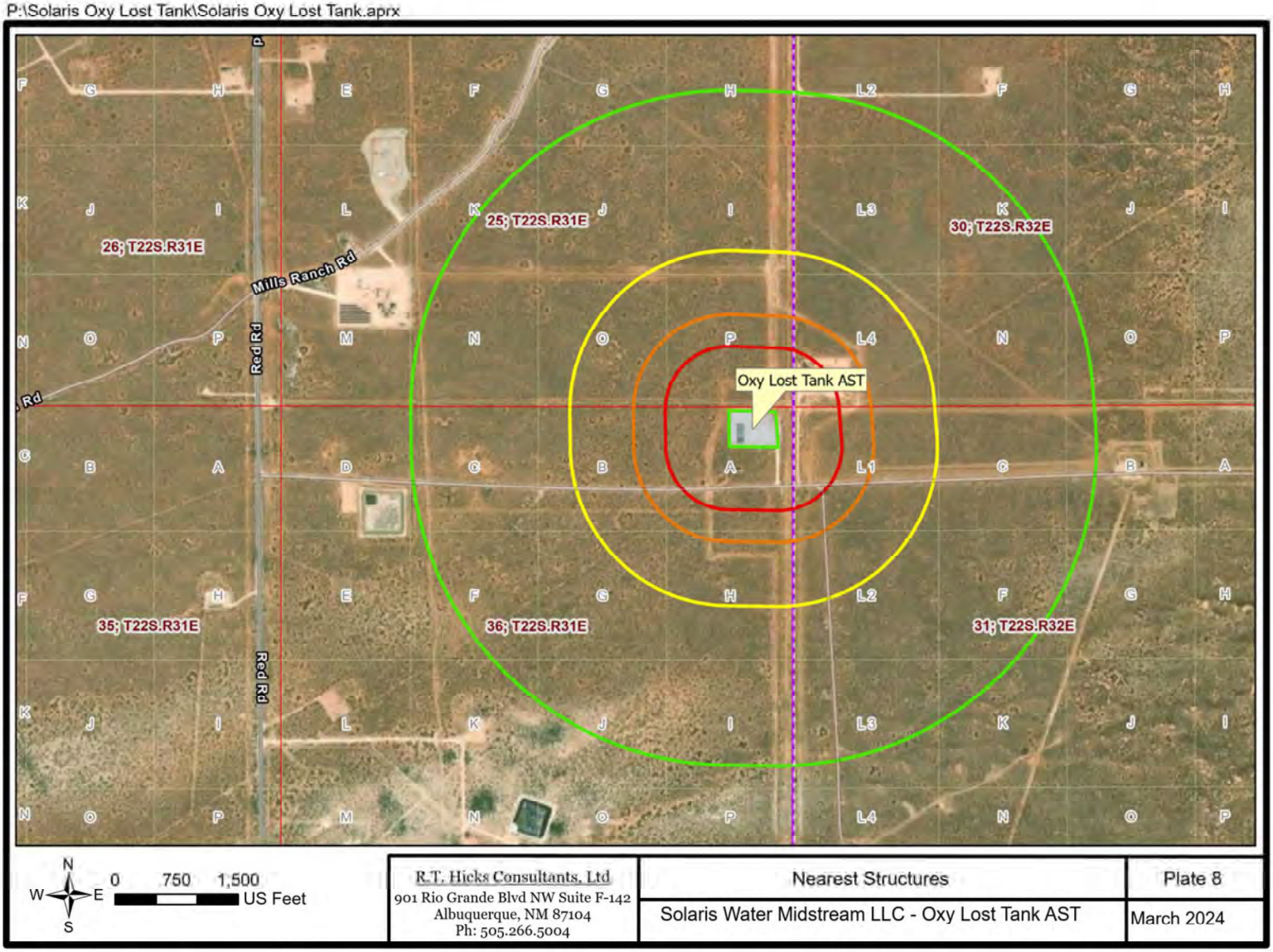


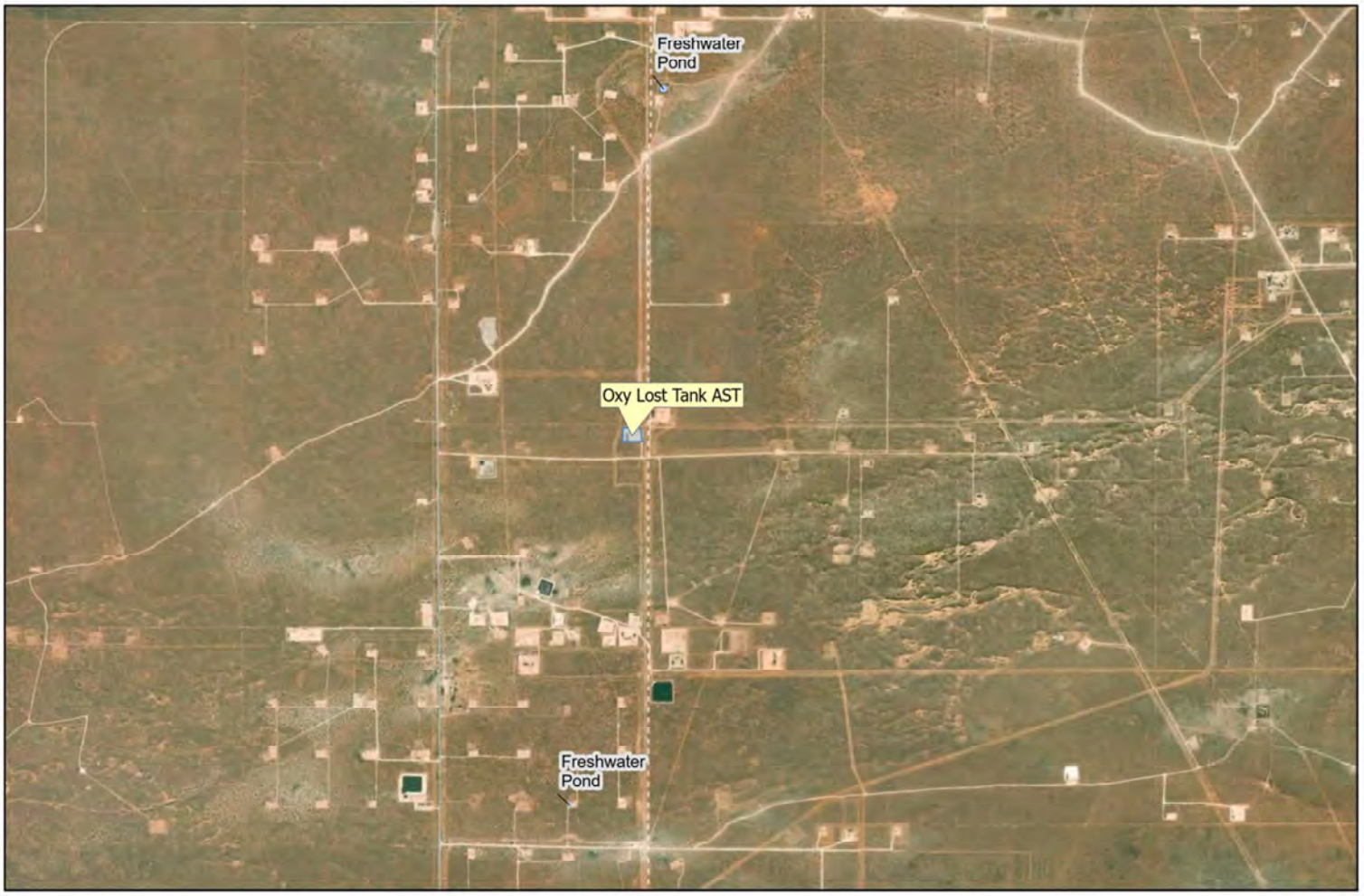
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Mapped Surface Water	Plate 7
	Solaris Water Midstream LLC - Oxy Lost Tank	March 2024

P:\Solaris Oxy Lost Tank\Solaris Oxy Lost Tank.aprx



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearest Structures	Plate 8
	Solaris Water Midstream LLC - Oxy Lost Tank AST	March 2024

P:\Solaris Oxy Lost Tank\Solaris Oxy Lost Tank.aprx



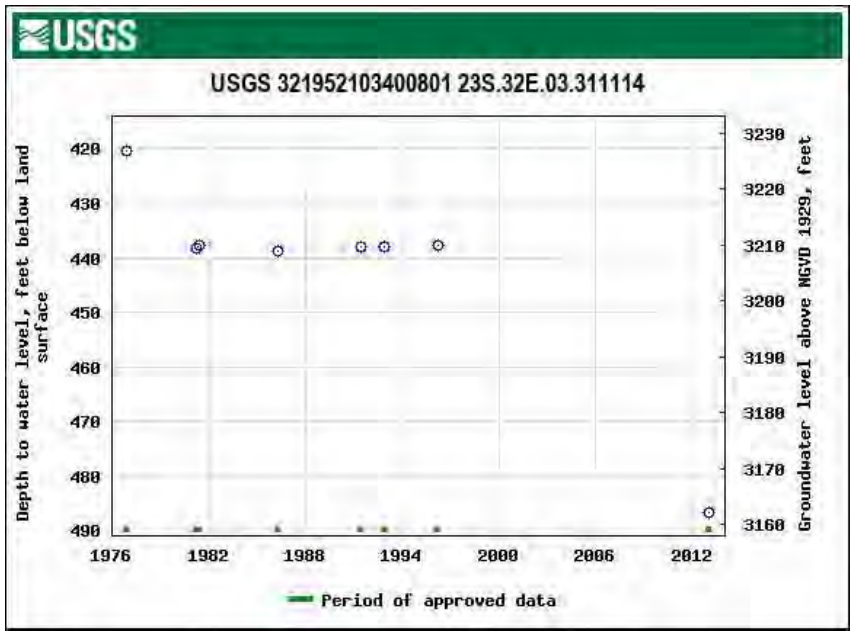
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Mapped NM Wetlands	Plate 9
	Solaris Water Midstream LLC - Oxy Lost Tank AST	March 2024

WELL LOGS AND USGS DATA

USGS 321952103400801 23S.32E.03.311114 AKA USGS 14211

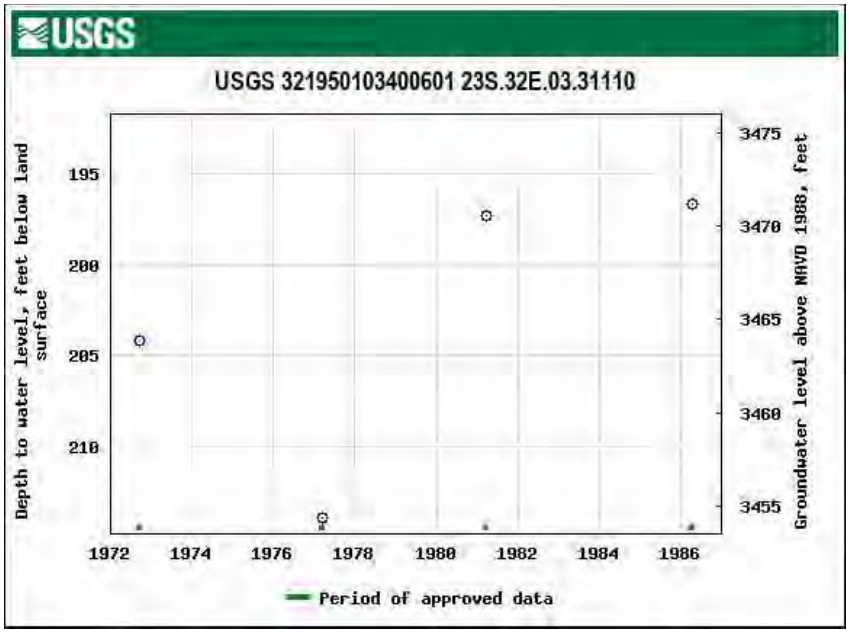
Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°19'59.2",
Longitude 103°40'12.6" NAD83
Land-surface elevation 3,648.00 feet above NGVD29
The depth of the well is 630 feet below land surface.
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Santa Rosa Sandstone (231SNRS) local aquifer.

Topographic map indicated measured elevation of ground surface at the well is 3641. Perhaps the standpipe where USGS obtained the measurement is 7 feet above ground surface.



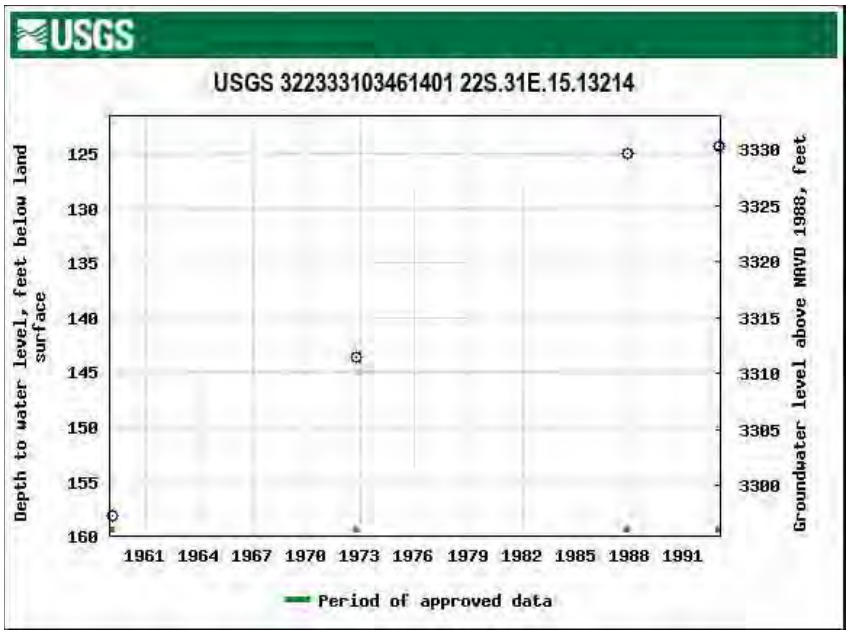
USGS 321950103400601 23S.32E.03.31110 AKA USGS 14435

Hydrologic Unit Code 13060011
Latitude 32°19'50", Longitude 103°40'06" NAD27
Land-surface elevation 3,668 feet above NAVD88
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Chinle Formation (231CHNL) local aquifer.



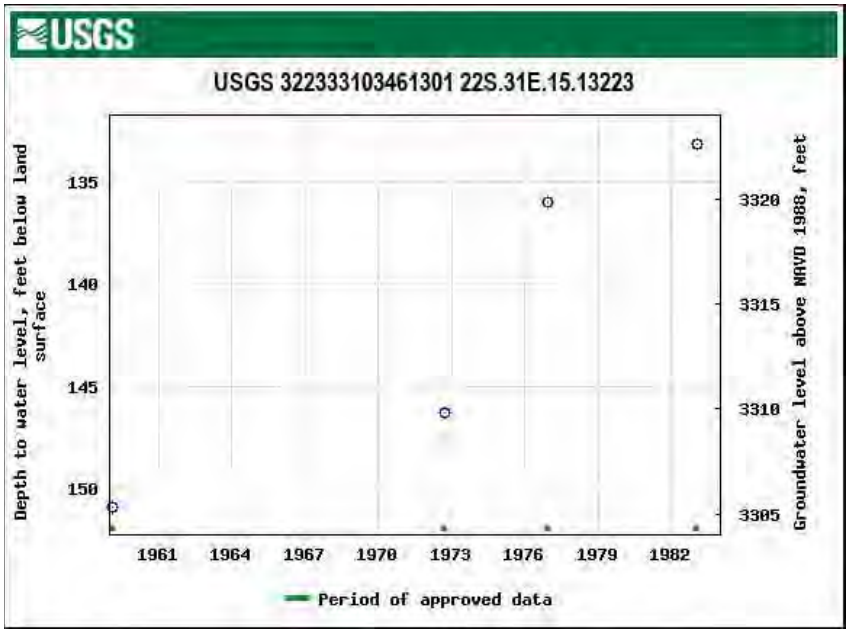
USGS 322333103461401 22S.31E.15.13214 AKA USGS 9815

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°23'40", Longitude 103°46'16" NAD27
Land-surface elevation 3,455 feet above NAVD88
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Santa Rosa Sandstone (231SNRS) local aquifer.



USGS 322333103461301 22S.31E.15.13223 AKA USGS- 9816

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°23'40", Longitude 103°46'15" NAD27
Land-surface elevation 3,456 feet above NAVD88
The depth of the well is 170 feet below land surface.
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Santa Rosa Sandstone (231SNRS) local aquifer.



WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NO. (WELL NO.)	WELL TAG ID NO.	OSE FILE NO(S).
C-04663 POD 1		C-04663

WELL OWNER NAME(S)	PHONE (OPTIONAL)
OXY US INC	

WELL OWNER MAILING ADDRESS	CITY	STATE	ZIP
PO BOX 4294	HOUSTON	TX	77210

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	21	12.43	N
	LONGITUDE	-103	42	43.74	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND
* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS – PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE

PROXIMITY 31

2. DRILLING & CASING INFORMATION

LICENSE NO.	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD-1184	RUSSELL SOUTHERLAND	WEST TEXAS WATER WELL SERVICE

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
09/01/2022	09/01/2022	110		

COMPLETED WELL IS: ☐ ARTESIAN ☑ DRY HOLE ☐ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): N/A

DRILLING FLUID: ☑ AIR ☐ MUD ADDITIVES – SPECIFY:

DRILLING METHOD: ☑ ROTARY ☐ HAMMER ☐ CABLE TOOL ☐ OTHER – SPECIFY:

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE (add coupling diameter)	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
			NO CASING IN HOLE				

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
			N/A		

OSE DII SEP 20 2022 PM 1:31

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 04/30/19)

FILE NO. C-04663	POD NO. 1	TRN NO. 732427
LOCATION 22S.32E.31.3.1.2	WELL TAG ID NO. —	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	10		RED SAND	Y ✔ N	
10	14		CALICHIE	Y ✔ N	
14	17		RED SAND	Y ✔ N	
17	40		RED SANDY CLAY	Y ✔ N	
40	90		SANDSTONE	Y ✔ N	
90	97		RED CLAY	Y ✔ N	
97	100		SANDSTONE	Y ✔ N	
100	110		RED CLAY WITH SANDSTONE	Y ✔ N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

☐ PUMP ☐ AIR LIFT ☐ BAILER ☑ OTHER – SPECIFY: DRY HOLE

TOTAL ESTIMATED WELL YIELD (gpm): 0.00

5. TEST; RIG SUPERVISION

WELL TEST — TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

MISCELLANEOUS INFORMATION:

OSE DII SEP 20 2022 PM1:31

PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE:

RUSSELL SOUTHERLAND

6. SIGNATURE

BY SIGNING BELOW, I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED WELL. I ALSO CERTIFY THAT THE WELL TAG, IF REQUIRED, HAS BEEN INSTALLED AND THAT THIS WELL RECORD WILL ALSO BE FILED WITH THE PERMIT HOLDER WITHIN 30 DAYS AFTER THE COMPLETION OF WELL DRILLING.

Russell Southerland RUSSELL SOUTHERLAND Russell Southerland — 09/01/2022

SIGNATURE OF DRILLER / PRINT SIGNEE NAME — DATE

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 04/30/2019)

FILE NO. C-04663	POD NO. 1	TRN NO. 732427	
LOCATION 225.32E.31.3.1.2		WELL TAG ID NO. —	PAGE 2 OF 2

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NO. (WELL NO.)	WELL TAG ID NO.	OSE FILE NO(S).
C-4740-POD1		C-04740

WELL OWNER NAME(S)	PHONE (OPTIONAL)
OXY USA INC	575-390-2828

WELL OWNER MAILING ADDRESS	CITY	STATE	ZIP
PO BOX 4294	HOUSTON	TX	77210

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	22	17.04	N
	LONGITUDE	-103	44	31.956	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND
* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS – PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE

FEDERAL 23 CTB

2. DRILLING & CASING INFORMATION

LICENSE NO.	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD-1184	RUSSELL SOUTHERLAND	WEST TEXAS WATER WELL SERVICE

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
5/1/2023	5/1/2023	110		

COMPLETED WELL IS: ☐ ARTESIAN ☑ DRY HOLE ☐ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): N/A

DRILLING FLUID: ☑ AIR ☐ MUD ADDITIVES – SPECIFY:

DRILLING METHOD: ☑ ROTARY ☐ HAMMER ☐ CABLE TOOL ☐ OTHER – SPECIFY:

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE (add coupling diameter)	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
			NO CASING IN HOLE				

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
			N/A		

OSE DII JUN 12 2023 PM 1:52

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 04/30/19)

FILE NO. C-4740	POD NO. 1	TRN NO. 746173	
LOCATION 22S.31E.23 3 4 4		WELL TAG ID NO. NA	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	8		RED SAND	Y ✔ N	
8	10		CALICHE MIX	Y ✔ N	
10	18		RED SAND (CALICHE MIX)	Y ✔ N	
18	21		RED SHALE SAND	Y ✔ N	
21	30		RED SHALE	Y ✔ N	
30	32		SANDSTONE	Y ✔ N	
32	40		SANDSTONE RED CLAY	Y ✔ N	
40	60		RED CLAY/ SANDSTONE	Y ✔ N	
60	72		RED CLAY	Y ✔ N	
72	80		SANDSTONE	Y ✔ N	
80	82		SANDSTONE	Y ✔ N	
82	100		RED SANDY CLAY	Y ✔ N	
100	110		RED SANDY CLAY	Y ✔ N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

☐ PUMP ☐ AIR LIFT ☐ BAILER ☑ OTHER – SPECIFY: DRY HOLE

TOTAL ESTIMATED WELL YIELD (gpm): 0.00

5. TEST; RIG SUPERVISION

WELL TEST — TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

MISCELLANEOUS INFORMATION:

PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE:

RUSSELL SOUTHERLAND

6. SIGNATURE

BY SIGNING BELOW, I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED WELL. I ALSO CERTIFY THAT THE WELL TAG, IF REQUIRED, HAS BEEN INSTALLED AND THAT THIS WELL RECORD WILL ALSO BE FILED WITH THE PERMIT HOLDER WITHIN 30 DAYS AFTER THE COMPLETION OF WELL DRILLING.

Russell Southerland — RUSSELL SOUTHERLAND — 09/15/2022

SIGNATURE OF DRILLER / PRINT SIGNEE NAME — DATE

RECEIVED JUN 12 2023 PM 2:32

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 04/30/2019)

FILE NO. C-4740	POD NO. 1	TRN NO. 746173	
LOCATION 225.31E.23 3 4 4		WELL TAG ID NO. NA	PAGE 2 OF 2

3.0 PRELIMINARY HYDROLOGICAL DATA FOR SNL-15

SNL-15 was drilled specifically to monitor water levels from the Culebra Dolomite Member of the Rustler Formation and to serve as a location for observations during pumping tests.

3.1 Checks for Shallow Groundwater Above the Rustler Formation

The hole was drilled with compressed air, and there were no indications of water inflow or accumulation above the Rustler during drilling.

3.2 Initial Results From the Magenta Dolomite

The Magenta was drilled with compressed air, and there were no indications of water inflow or accumulation from the Magenta during drilling.

3.3 Initial Results From the Culebra Dolomite

The Culebra was drilled with compressed air, and there were no indications of water inflow or accumulation from the Culebra during drilling.

On June 7, 2005, the FRP casing was placed in the hole, and the well was completed for Culebra monitoring.

After the well was completed, there was no well development.

On June 23, 2005, SNL placed a miniTroll in SNL-15 to monitor water-level changes as the well recovered after completion and to prepare for slug tests that were carried out early in 2006.

WRES began monthly water-level monitoring of the Culebra on April 11, 2006; the initial depth to water was 692.65 ft below the top of casing (US DOE, 2007).

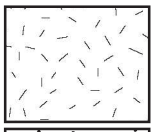
Appendix C
Geologic Logs

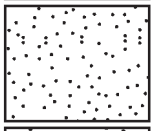
Note: The original field descriptions and graphic logs were prepared at differing scales, and the graphic logs for publication were generally produced at 10 or 20 vertical ft per inch, as indicated in the header for the log.

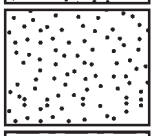
The field descriptions were related to depth based on drilling information and core recovery as best determined in the field. Core and sample footages are marked accordingly and can vary somewhat from depths determined for stratigraphic units based on geophysical logs (see Table 2-1 of text). Core depth markings have not been revised to reflect later geophysical log data. Depths used for completing the well are based on geophysical logs.

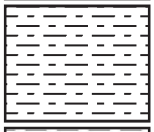
Explanation of Symbols Used in Lithologic Logs (Appendix C)

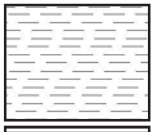
Lithology

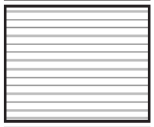

Construction fill

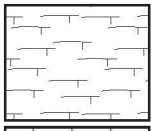

Fine sand or sandstone

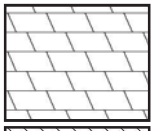

Medium or coarse sand or sandstone

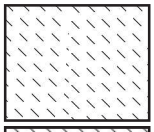

Siltstone

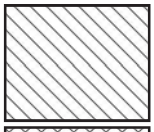

Claystone

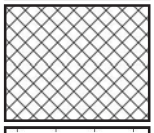

Organic-rich, claystone

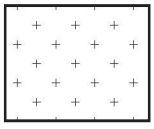

Carbonate (pedogenic calcrete)


Dolomite


Gypsum


Anhydrite


Polyhalite


Halite

Features


Cross-cutting strata


Ripples


Bioturbation

Stylolite


Wavy bedding


Stromatolites, algal bedding


Vertical gypsum crystals


Gypsum nodules


Clasts, may show lithology as fill pattern


Brecciated, fractures

Fracture, f_g for gypsum-filled, f_h for halite-filled

Erosional boundary

Sharp lithologic contact

Gradational lithologic contacts

hz Hard-drilling zone

sl Slickensides

ns No cuttings sample

Symbols may be combined; not all symbols may be used

Basic Data Report for Drillhole SNL-15 (C-3152)
DOE/WIPP-05-3325

CORE LOG Sheet 1 of 7

Hole ID: SNL-15

Location: SE 1/4 of SE 1/4, section 26, T23S, R31E, Eddy Co, NM

Drill Date: 6/1/2005

Drill Crew: West Texas Water Well Service

Drill Method: Rotary with air

Hole Diameter: initial 7.875 inches

Hole Depth:

Hole Orient: vertical downward

Drill Make/Model: Gardner-Denver 1500

Barrel Specs: 6.75 in o.d., 4 in. core

Drill Fluid: air

Core Preserv: box as is

Logged by: Dennis W. Powers, Ph.D., consulting geologist

Date: 6/1-2/2005

Scale: 1" = 20 ft

UTM (NAD27)	Northing	Easting	Elevation (amsl)
Survey Coordinate: (m)	3580336.30 m	618352.94 m	3477.94 ft

Comments: Described lithology from ground level to 900 ft on the basis of collected cuttings. Cored interval described on p.7. Cuttings were generally collected at 10 ft intervals

Run Number	Depth (ft)	% Recovered	RQD	Profile (Rock Type)	Description Contacts are placed midway between samples	Remarks
N/A	0	N/A	N/A		0-5': Dune sand; weak red (2.5YR4/2); f-vf, subround to round grains; <1% dark opaque grains; friable	Drilled to 39.5 ft; set 40 ft of steel casing with o.d. of 8.625 inches and cemented to surface
		C-1			10': Calcareous sandstone (Mescalero caliche), white; f-vf, subround grains; few dark opaque grains; moderate induration; with calcareous sandstone (Gatuña Formation); red (2.5YR5/6); vf-f, subround; few dark opaque grains; some MnO_2 stains; moderate to strong induration.	
		C-2			20': Gatuña as above.	
	20	C-3			30': Calcareous sandstone (Gatuña); pink (5YR7/3); med-vf; subround to rounded grains; ~1% dark opaque grains; MnO_2 stains; strong induration.	
		C-4			40': Siltstone, argillaceous (Santa Rosa Formation); yellowish red (5YR6/6); with some probably mica; non-calcareous; moderate induration	Begin drilling from 39.5 ft with air on 6/2/05.
	40	C-5			50': generally as above; reddish-brown (5YR5/6); slightly more indurated	
		C-6			60': as above	
	60	C-7			70': Sandstone, silty; light reddish-brown (5YR6/4); v.f-f; well indurated; fine laminae (0.125 inch); few mica grains	
		C-8			80': as above, more mica and coarser grains: med to vf.	
	80	C-9			90': Siltstone, argillaceous; reddish-brown (5YR4/4); moderate induration, some possible mica; slightly calcareous; upper Dewey Lake Formation	
		C-10			100': Siltstone, argillaceous; reddish-brown (2.5YR4/4); moderate induration	
	100	C-11				

Hole ID: SNL-15 CORE LOG (cont. sheet) Sheet 2 of 7

Logged by: Dennis W. Powers, Ph.D. Date: 6/2/05

Run Number	Depth (ft)	% Recovered	RQD	Profile (Rock Type)	Description	Remarks
N/A	100	N/A	N/A		110': Siltstone, argillaceous and sandy; reddish-brown (2.5YR4/4); moderate induration	
		C-12				
	120	C-13			120': similar to above, with some hard sandstone chips of similar color; f-vf sand grains; well indurated	
		C-14			130': similar to 110'.	
	140	C-15			140': Siltstone, argillaceous; reddish brown (2.5YR4/4); moderate induration	
		C-16			150': similar to above	
	160	C-17			160': similar to 120'.	
		C-18			170': similar to 120', more sand than at 160'.	
	180	C-19			180': similar to 110'	
		C-20			190': similar to 110'	
	200	C-21			200': similar to 170'	
		C-22			210': similar to 110', trace of fibrous gypsum	
	220	C-23			220': similar to 210'	
		C-24			230': simlar to 110', no trace of gypsum	
	240	C-25			240': similar to 120', mixed sandstone and siltstone	
		C-26			250': Siltstone, reddish-brown (2.5YR5/4); poorly indurated, trace gypsum	
		C-27			260': Sandstone, weak red (2.5YR5/2); vf; well indurated, may be cemented with sulfate; platy	
	260					

Hole ID: SNL-15 CORE LOG (cont. sheet) Sheet 3 of 7

Logged by: Dennis W. Powers, Ph.D. Date: 6/2-3/05

Run Number	Depth (ft)	% Recovered	RQD	Profile (Rock Type)	Description	Remarks
N/A	260	N/A	N/A			
		C-28			270': similar to 260'; fibrous gypsum common	
	280	C-29			280': similar to above, little gypsum	
		C-30			290': similar to above, more gypsum.	
	300	C-31			300': similar to above, less gypsum	
		C-32			310': similar to above, more gypsum	
	320	C-33			320': similar to above; little gypsum	
		C-34			330': similar to above, slightly more red (2.5YR5/4; reddish brown); small (<0.05 inch) greenish reduction spots becoming more common	End drilling @ 330' 6/2/05; begin drilling @ 330' 6/3/05; air
	340	C-35			340': similar to 320'; small greenish reduction spots common	
		C-36			350': as above	
	360	C-37			360': as above	
		C-38			370': as above	
	380	C-39			380': Siltstone, little sand; reddish brown (2.5YR5/4); common plates of fibrous gypsum	
		C-40			390': similar to 370'	
	400	C-41			400': as above	
		C-42			410': as above	
	420	C-43			420': as above	

Hole ID: SNL-15 CORE LOG (cont. sheet) Sheet 4 of 7

Logged by: Dennis W. Powers, Ph.D. Date: 6/3/05

Run Number	Depth (ft)	% Recovered	RQD	Profile (Rock Type)	Description	Remarks
N/A	420	N/A	N/A			
		C-44			430': Siltstone, sandy; reddish brown (2.5YR5/4); vf sand; small greenish-gray reduction spots (generally < 0.25 inch) common; well indurated; fibrous gypsum common	
	440	C-45			440': similar to above, little gypsum	
		C-46			450': similar to above	
	460	C-47			460': similar to above, more gypsum	
		C-48			470': similar to above, little or no gypsum	
	480	C-49			480': similar to above	
		C-50			490': similar to above, some gypsum	
	500	C-51			500': similar to above, little or no gypsum	
		C-52			510': similar to above, some gypsum	
	520	C-53			520': similar to above; reduction spots generally larger	
		C-54			530': Siltstone; reddish brown (2.5YR5/4); some reduction spots, little or no gypsum; moderate induration	
	540	C-55			540': similar to above	
		C-56			550': Siltstone, sandy; similar to 500'; little gypsum	
	560	C-57			560': Siltstone, similar to 530'	
		C-58			570': similar to above; trace gypsum	
		C-59			580': Siltstone, sandy; similar to 530'	
	580					

Hole ID: SNL-15 CORE LOG (cont. sheet) Sheet 5 of 7

Logged by: Dennis W. Powers, Ph.D. Date: 6/3-4/05

Run Number	Depth (ft)	% Recovered	RQD	Profile (Rock Type)	Description	Remarks
N/A	580	N/A	N/A			
		C-60			590': Siltstone, sandy; reddish brown (2.5YR5/4); vf sand; small greenish-gray reduction spots (generally < 0.25 inch); moderate induration; trace fibrous gypsum	
	600	C-61			600': Siltstone, slightly sandy; reddish brown (2.5YR5/6); few reduction spots; little gypsum	
		C-62			610': similar to 590'	
	620	C-63			620': similar to 590'	
					approximate base Dewey Lake Formation approximate top Rustler Formation	
		C-64 C-65			627': Anhydrite, white to light gray, fine crystalline 630': similar to above, little or no gypsum	
	640	ns				
		C-66			650': similar to above	End drilling @ 650' on 6/3/05 Begin drilling @ 650' on 6/4/05
	660	C-67			660': Halite, clear; with some mixed anhydrite as above	
		C-68			670': Siltstone, sandy; weak red (2.5YR5/2)	
	680	C-69			680': Halite and weak red siltstone, mixed	
		C-70			690': Siltstone; gray (2.5YRN/6); minor clear halite	
	700	C-71			700': similar to above; no halite	
		C-72			710': Dolomite, weak red (2.5YR5/2)	
	720	C-73			720': similar to above	
		C-74			730': Anhydrite, gray	
		C-75			740': similar to above	
	740					

approximate Forty-niner Member extent

~Magenta Dolomite Member

~Tamarisk Member

Hole ID: SNL-15 CORE LOG (cont. sheet) Sheet 6 of 7

Logged by: Dennis W. Powers, Ph.D. Date: 6/4/05

Run Number	Depth (ft)	% Recovered	RQD	Profile (Rock Type)	Description	Remarks
N/A	740	N/A	N/A			
		C-76			750': Anhydrite, gray, fine to medium crystalline	
	760	C-77			760': similar to above	
		C-78			770': similar to above	
	780	C-79			780': similar to above	
		C-80			790': Anhydrite, white to light gray, fine crystalline	
	800	ns				
		ns				
	820	ns				
		C-81			830': Anhydrite, gray (may be from above)	
	840	C-82			840': Siltstone, reddish brown (2.5YR5/4); with clear halite	
		C-83			850': similar to above	
	860	ns				
		C-84			870': similar to above	
	880	C-85			880': similar to above; with gray siltstone	
		C-86			890': Anhydrite, gray	
		C-87			900': similar to above	End drilling @ 900' on 6/4/05
	900					

approximate Tamarisk Member extent

Basic Data Report for Drillhole SNL-15 (C-3152)
DOE/WIPP-05-3325

Hole ID: SNL-15 CORE LOG (cont. sheet) Sheet 7 of 7

Logged by: Dennis W. Powers, Ph.D. Date: 6/5/05

Run Number	Depth (ft)	% Recovered	RQD	Profile (Rock Type)	Description	Remarks
1	900	cut 27'; recovered 27.4'	~8' in segments <4"; RQD = 70.8		Anhydrite and gypsum, dark gray, generally f-m crystalline, with clear gypsum in pores and sulfate needles grown into space before gypsum crystallized. Thin beds to laminae; purplish from 904.2-904.6'	Begin coring @ 900' on 6/5/05
					904.9' Base of Tamarisk Member Top of Culebra Dolomite Member	
	910				Dolomite, light gray (5Y7/2) to pale yellow (5Y8/3); bedded, some wavy thin laminae; large (to ~2") anhydrite and gypsum nodules scattered throughout. Tiny (<1/16") vugs filled with silt (dolomite?) from ~934', become slightly larger from ~925.5'; filling is darker in some vugs, brown from 925.6-922.5'; not present above 919'. Sub-vertical, irregular to somewhat planar, fractures with halite fill (apertures ~0.01-0.03 inches) at 1-3 inch horizontal spacing; some bedding plane halite. Wavy laminae 910.1-910.5', 910.8-912.3'. Sandy dolomite 921.2-921.3'. Erosion surface(?) at ~923' above laminar zone	
	920					
2	930	cut 23'; recovered 24.1'	~8.5' in segments <4"; RQD = 64.7		935.4' Base of Culebra Dolomite Member Top of Los Medaños Member	
					935.4-938.7': Claystone, silty, gray (5Y5/1) at base to dark gray (5Y4/1) at top; gypsum 938.3' and 936'. Thin bedded and thin laminae, ~horizontal. Gypsum and halite(?) in narrow fractures 936.5-937'; slickensides to ~50° from horizontal. 938.7-951.5': Halite, clear, gray to slightly orange, f-vc (up to 1.5"), with variable amounts of silty claystone (5YR5/4; reddish-brown) in interstices and as irregular beds and zones; halite is displacive in mud, with mainly more irregular boundaries and some incorporative growth. Sulfatic 943.3-945.5', polyhalite(?) 943.3-943.7'.	
	940					
	950					End coring @ 951.5' on 6/5/05
	960					
	970					
	980					

SITE PHOTOGRAHS

Venegas, Victoria, EMNRD

From: Venegas, Victoria, EMNRD
Sent: Wednesday, April 17, 2024 2:36 PM
To: 'Chad Gallagher'; Drew Dixon
Cc: 'Helen Gebhard'
Subject: 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924]
Attachments: C-147 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] 04.17.2024.pdf

2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924]

Good afternoon Mr. Gallagher.

NMOCD has reviewed the recycling containment permit application and related documents, submitted by [371643] SOLARIS WATER MIDSTREAM, LLC on March 21, 2024, Application ID: 325490, for 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] in Unit Letter A, Section 36, Township 22S, Range 31E, Eddy County, New Mexico.

[371643] SOLARIS WATER MIDSTREAM, LLC requested variances from 19.15.34 NMAC for 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924].

The following general variances have been approved:

- The variance to 19.15.34.14 NMAC Table I for the use of alternate analytical method 8015/8015M for total petroleum hydrocarbons (TPH) is approved.
- The variance to 19.15.34.14 NMAC Table I for the use of alternate analytical method EPA 300.0 or SM4500 for the analysis of chloride is approved.
- The variance to 19.15.34.12.A.(2) NMAC for the no side-slope requirement for the AST containment with vertical walls is approved.
- The variance to 19.15.34.12.A.(3) NMAC for the liners to be anchored to the top of the AST steel walls with clips and no anchor trenches is approved.
- The variance to 19.15.34.12.A.(4) NMAC for the installation on the AST containment of a 30-mil non-reinforced LLDPE secondary liner is approved.
- The variance to 19.15.34.12.A.(4) NMAC for the installation on the AST containment of a 40-mil non-reinforced LLDPE primary liner is approved.
- The variance to NMAC 19.15.34.12.D to install a gate or chain across the stairway between the ground surface and the open-top of the AST containment is approved. The operator shall place an appropriate sign on the gate or chain to prevent unauthorized human access to the open top of the containment and provide a mechanism to lock the gate when responsible personnel is not onsite.
- The variance from 19.15.34.13.E NMAC for the installation of an audible bird deterrence system is approved.

The form C-147 and related documents for 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] is approved with the following conditions of approval:

- The purpose of this permit is for oil and gas activities regulated under the NMAC 19.15.34.3 STATUTORY AUTHORITY: 19.15.34 NMAC is adopted pursuant to the Oil and Gas Act, Paragraph (15) of Section 70-2-12(B) NMSA 1978, which authorizes the division to regulate the disposition of water produced or used in connection with the drilling for or producing of oil and gas or both and Paragraph (21) of Section 70-2-12(B) NMSA 1978 which authorizes the regulation of the disposition of nondomestic wastes from the exploration, development, production or storage of crude oil or natural gas.

- 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] is approved for five years of operation from the date of permit application of March 21, 2024.
- 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] permit expires on March 21, 2029. If [371643] SOLARIS WATER MIDSTREAM, LLC wishes to extend operations past five years, an annual permit extension request must be submitted using an OCD form C-147 through OCD Permitting by February 21, 2029.
- 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] consists of one (1) above ground tanks containment (AST) of 60,000.00 BBL. The total fluid capacity of 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] is 60,000.00 BBL.
- The total closure cost estimated of 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] in the amount of $32,500.00, meets the requirements of NMAC 19.15.34.15.A. The financial assurance should be mailed to Oil Conservation Division; Administration and Compliance Bureau; 1220 South St Frances Drive; Santa Fe, NM 87505.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall construct, operate, maintain, close, and reclaim 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] in compliance with NMAC 19.15.34 NMAC.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall notify OCD, through OCD Permitting, when construction of 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] commences.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall notify NMOCD through OCD Permitting when recycling operations commence and cease at 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924].
- A minimum of 3-feet freeboard must be maintained at 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] at all times during operations.
- If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdrawal, operations of the 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] is considered ceased and a notification of cessation of operations should be sent electronically to OCD Permitting. A request to extend the cessation of operation, not to exceed six months, may be submitted using a C-147 form through OCD Permitting. If after that 6-month extension period, the 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] is not utilized at a minimum of 20% fluid capacity, no additional extensions would be granted, and the operator would be directed to remove all fluids and proceed with the closure requirements.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall submit monthly reports of recycling and reuse of produced water, drilling fluids, and liquid oil field waste on OCD form C-148 via OCD Permitting even if there is zero activity.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall 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 according to 19.15.34.13.A.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall comply with 19.15.29 NMAC Releases in the event of any release of produced water or other oil field waste at 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924].

Please reference number 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] in all future communications.
Regards,

Victoria Venegas ● Environmental Specialist
Environmental Bureau
EMNRD - Oil Conservation Division
506 W. Texas Ave. Artesia, NM 88210
(575) 909-0269 | Victoria.Venegas@emnrd.nm.gov
https://www.emnrd.nm.gov/ocd/

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

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

CONDITIONS

Action 325490

CONDITIONS

Operator: SOLARIS WATER MIDSTREAM, LLC 9651 Katy Fwy Houston, TX 77024	OGRID: 371643
	Action Number: 325490
	Action Type: [C-147] Water Recycle Long (C-147L)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	• [371643] SOLARIS WATER MIDSTREAM, LLC shall construct, operate, maintain, close, and reclaim 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] in compliance with NMAC 19.15.34 NMAC.• 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] is approved for five years of operation from the date of permit application of March 21, 2024. • 2RF-204 - OXY LOST TANK AST FACILITY ID [fVV2410848924] permit expires on March 21, 2029. If [371643] SOLARIS WATER MIDSTREAM, LLC wishes to extend operations past five years, an annual permit extension request must be submitted using an OCD form C-147 through OCD Permitting by February 21, 2029.	4/17/2024