March 2025

Rule 34 Registration: Volume 2
Radiohead RF & AST Containment
Section 29, T18S, R26E, Eddy County

- ***C-147***
- ***AST Design Sketch***
- ***Stamped Design Drawings***
- ***Design/Construction Plan***
- ***O&M and Closure Plans***
- ***AST Set-Up SOP***
- ***Variances and Equivalency Demonstrations***

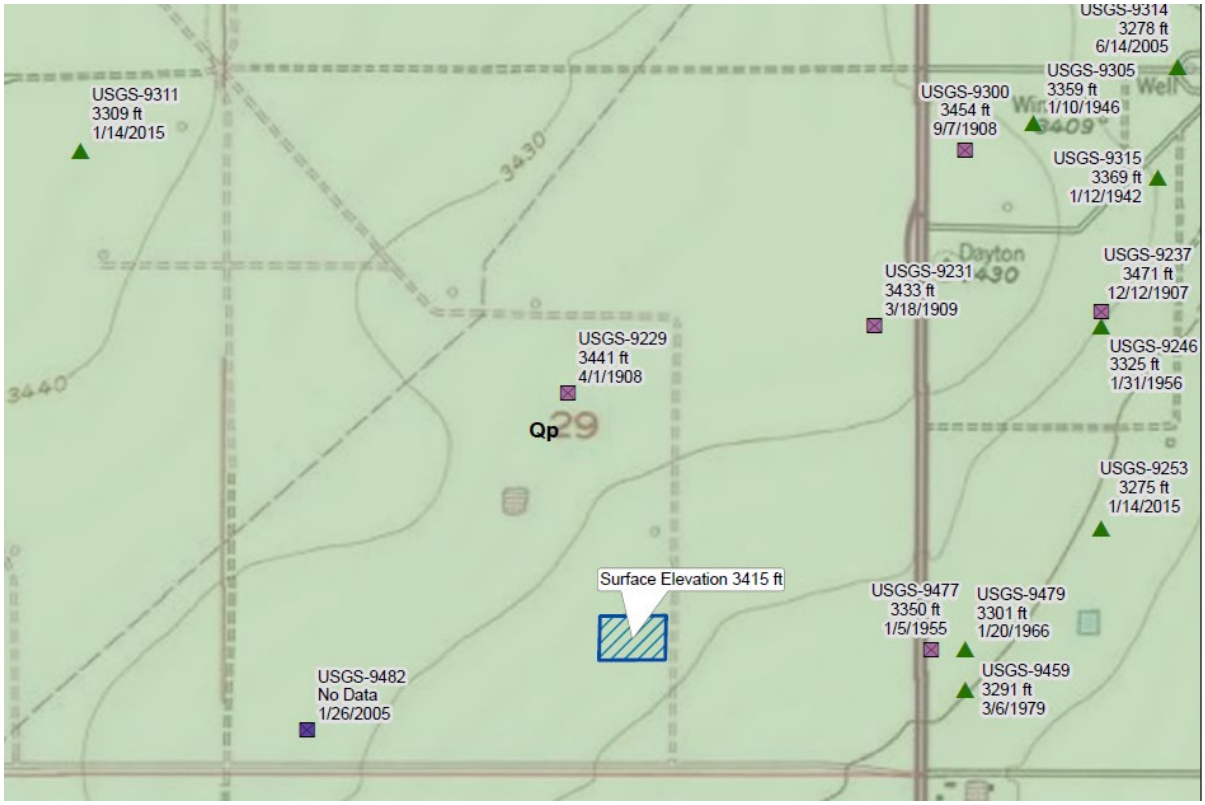


Plate 2 presents groundwater elevation data that are both excellent and interesting. As explained, recent USGS data demonstrate that depth to groundwater at the site is greater than 100 feet. Plate 2 includes data from deep artesian wells (Grayburg/San Andres) with elevations above ground surface.

Prepared for:
Spur Energy Partners, LLC
Houston, Texas

Prepared by:

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

Cascade Services, LLC
Midland, Texas

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: SPUR ENERGY PARTNERS LLC (For multiple operators attach page with information) OGRID #: 328947

Address: 9655 KATY FREEWAY, SUITE 500, HOUSTON, TEXAS 77024

Facility or well name (include API# if associated with a well): Radiohead Weezer AST

OCD Permit Number: 2RF-220 (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr O Section 29 Township 18S Range 26E County: Eddy

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

2.

☑ **Recycling Facility:**

Location of recycling facility (if applicable): Latitude 32.714426 Longitude -104.402749 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 32.714426 Longitude -104.402749 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: 40,000 bbl Dimensions: L_____ x W_____ x D_____

☐ 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 Safety gate with chain as described herein

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)**

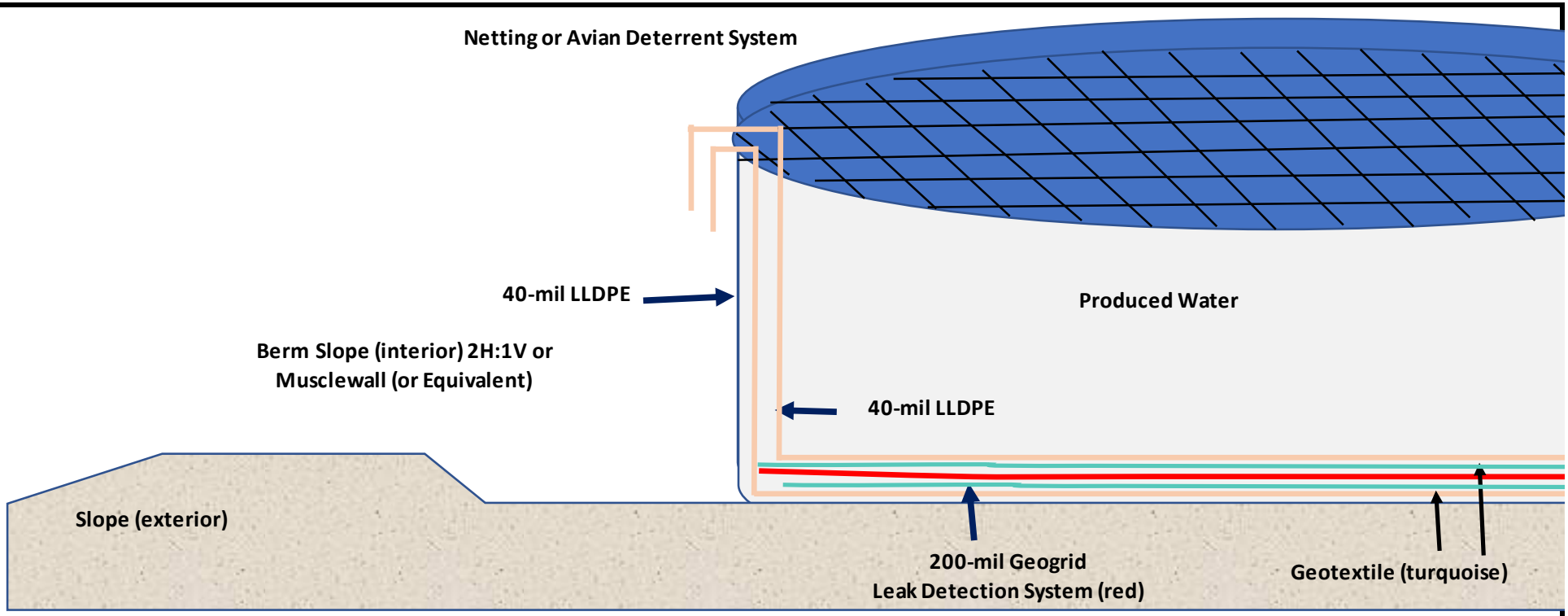
10.
Operator Application Certification:
I hereby certify that the information and attachments submitted with this application are true, accurate and complete to the best of my knowledge and belief.

Name (Print): Ryan Barber Title: Sr. Engineer, Drilling & Completions
Signature: Date: 3/20/25
e-mail address: rbarber@spurenergy.com Telephone: 832-544-9267

11.
OCD Representative Signature: Victoria Venegas **Approval Date:** 03/25/2025
Title: Environmental Specialist **OCD Permit Number:** 2RF-220

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

DESIGN SKETCH



Description of Typical 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 or pipe runs from the collection sump to top of AST via tube
- Every week, a portable self-priming peristaltic pump (or equivalent) connects to the leak detection system.
- The 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)

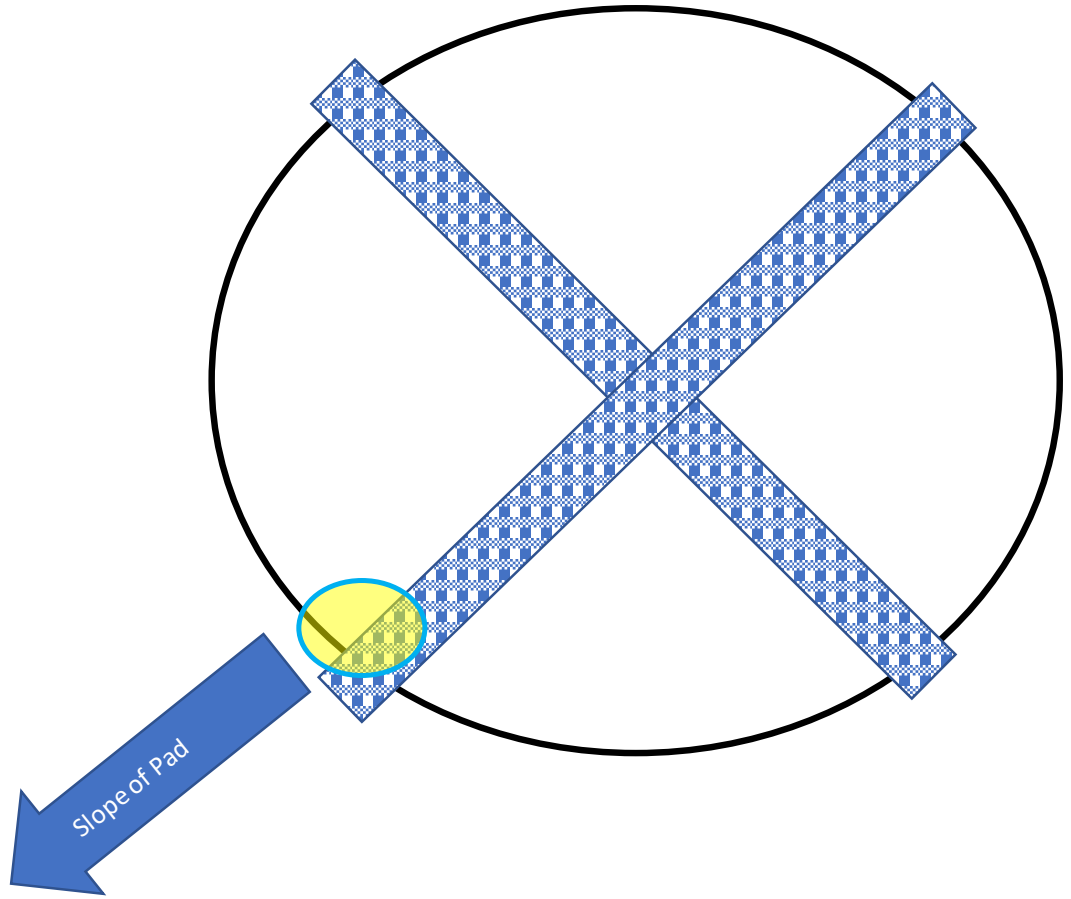
R.T. Hicks Consultants Albuquerque, NM	**Design Sketch**	**Plate 1**
	Spur Energy Partners - Radiohead AST	**March 2025**

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

Sump Location



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R.T. Hicks Consultants Albuquerque, NM	Layout of Geogrid Drainage Mat	Plate 2
	Spur Energy Partners - Radiohead AST	March 2025

STAMPED DESIGN DRAWINGS

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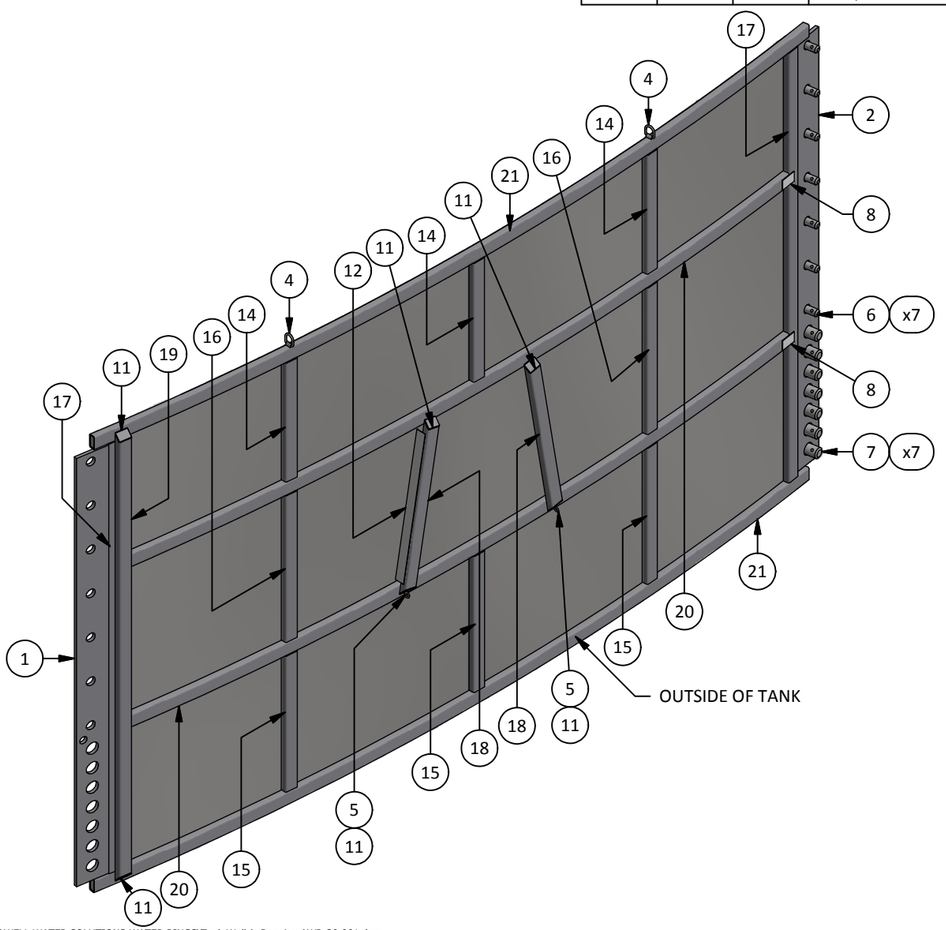
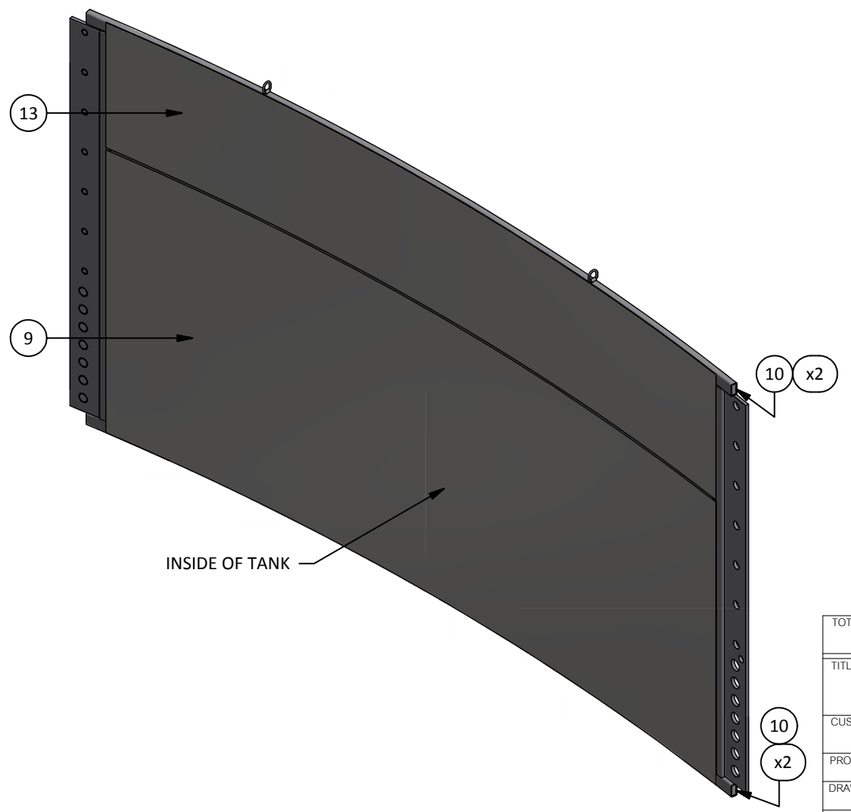
NOTES:
-THIS DRAWING REFLECTS ONE (1) ASSEMBLY
-TWENTY (20) PANELS REQUIRED FOR ENTIRE TANK ASSEMBLY
-INSULATE TANK WITH SPRAY FOAM
-TIN EXTERIOR OF TANK
-PAINT: FINIUM WYOMING BROWN

-**WELD PROCEDURE:** FT-1-1, FT-2-3

Parts List

CK	ITEM	QTY	DESCRIPTION	WIDTH	LENGTH	MATERIAL	CLENGTH (in)
	1	1	BAR, FLAT, 1"	10 in	131 1/2 in	A36	131.50 in
	2	1	BAR, FLAT, 1"	10 in	131 1/2 in	A36	131.50 in
	3	14	BAR, ROUND, 5/8" (LOCK PIN)		6 in	A36	84.00 in
	4	2	D-RING, WELD, 1/2" (MINIMUM 12,000 lbs BREAKING STRENGTH)			KULKONI, TYPE A, FORGED C1045	
	5	2	PAD EYE, #2			CROSBY, S-264, STOCK #1090786	
	6	7	PIN, Ø2"		4 1/2 in	1018, MINIMUM TENSILE STRENGTH 36KSI, HR OR CR ACCEPTABLE	31.50 in
	7	7	PIN, Ø3"		4 1/2 in	1018, MINIMUM TENSILE STRENGTH 36KSI, HR OR CR ACCEPTABLE	31.50 in
	8	2	PLATE, 3/16"	3 in	5 in	A36	10.00 in
	9	1	PLATE, 3/16"	96 in	240 in	A36	240.00 in
	10	4	SHEET, 10 GA	1 1/2 in	3 1/2 in	A1011	14.00 in
	11	6	SHEET, 10 GA	2 1/2 in	3 3/4 in	A1011	22.50 in
	12	2	SHEET, 10 GA	3 in	43 1/8 in	A1011	86.25 in
	13	1	SHEET, 10 GA	42 1/2 in	240 in	A1011	240.00 in
	14	3	TUBE, RECTANGULAR, 4" x 2" x 3/16"		36 1/2 in	A500B	109.50 in
	15	3	TUBE, RECTANGULAR, 4" x 2" x 3/16"		41 3/4 in	A500B	125.25 in
	16	2	TUBE, RECTANGULAR, 4" x 2" x 3/16"		45 in	A500B	90.00 in
	17	2	TUBE, RECTANGULAR, 4" x 2" x 3/16"		132 in	A500B	264.00 in
	18	2	TUBE, RECTANGULAR, 4" x 2" x 3/16" (MITER BOTH ENDS @ 45°)		50 in	A500B	100.00 in
	19	1	TUBE, RECTANGULAR, 4" x 2" x 3/16" (MITER BOTH ENDS @ 45°)		137 1/2 in	A500B	137.50 in
	20	2	TUBE, RECTANGULAR, 4" x 2" x 3/16" (ROLL TO 135'-3 3/8" I.D.)		236 7/8 in	A500B	473.75 in
	21	2	TUBE, RECTANGULAR, 4" x 2" x 3/16" (ROLL TO 135'-3 3/8" I.D.)		253 7/8 in	A500B	507.75 in





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NOTES:
-MASS IS CALCULATED WITH A WELD WEIGHT OF 7%
-THE ACTUAL WEIGHT WILL VARY FROM THE GIVEN WEIGHT BECAUSE OF THE WEIGHT OF SPRAY FOAM AND OUTSIDE SKINNING

REV	REVISION	DATE	BY
5	ADDED PAGE 6 FOR C.O.G. DIMENSIONS – IFC	2/5/2016	JDV
4	STANDARDIZE DRAWING TO MATCH ALL SIZES/REDLINES	4/1/2015	JDV
3	CUSTOMER REQUEST/CUT LENGTH	3/13/2015	JDV

TOTAL MASS DRY: 3,420 lbs		TOTAL MASS WET:	
TITLE: TANK PANEL 30,000 BBL			PROJECTION TYPE
CUSTOMER / LOCATION: WELL WATER SOLUTIONS			
PROJECT / JOB:			
DRAWING NUMBER: WR-30-901			
DESIGNER / DRAFTER: JDV	CUSTOMER APPROVAL:	DATE: 9/1/2011	JOB GROUP: T - TANKS
PROJ. MANAGER/ENGINEER: MC	CHECKER: JZL	SHEET SIZE: B	SHEET: 1 OF 7 / REV.: 5

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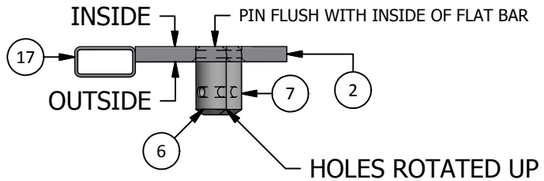

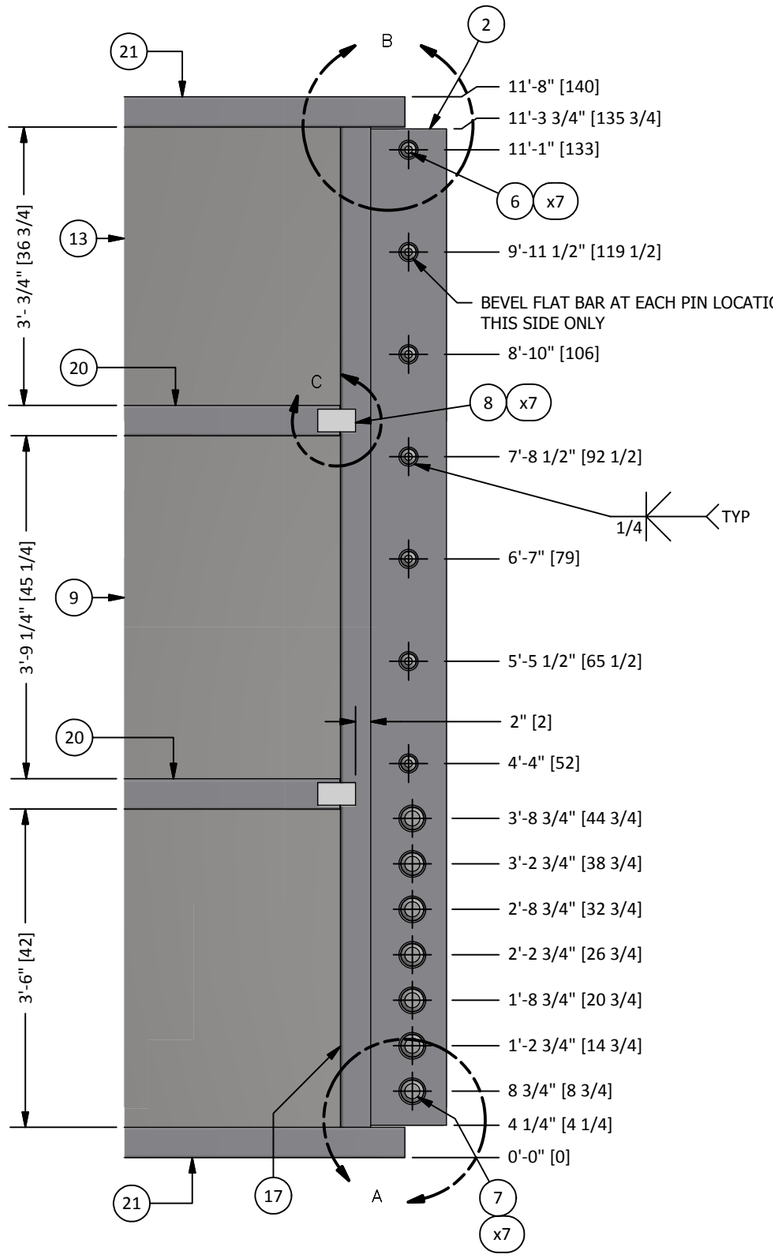

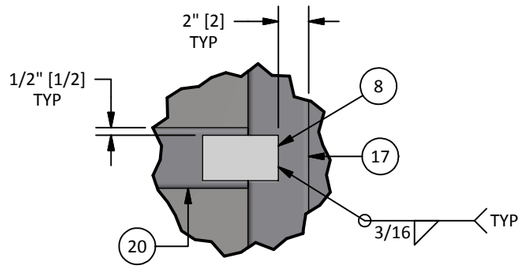

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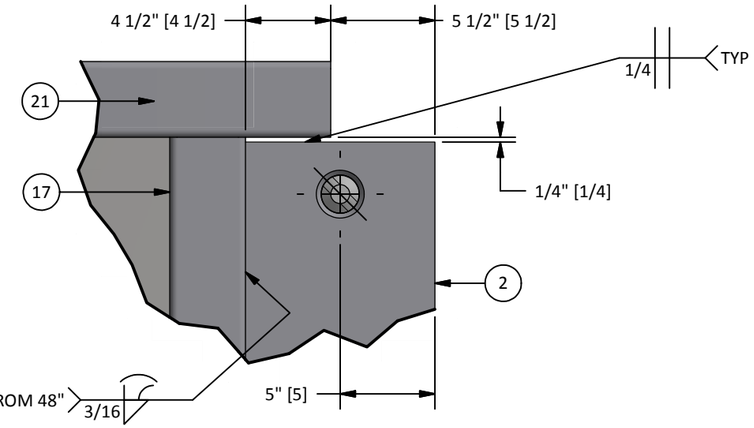

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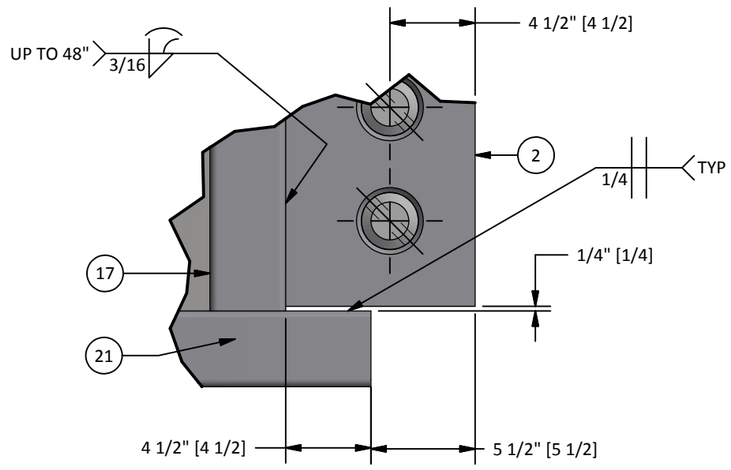

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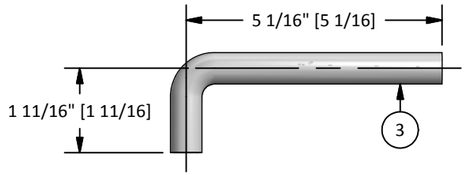

LOCK PIN DETAIL
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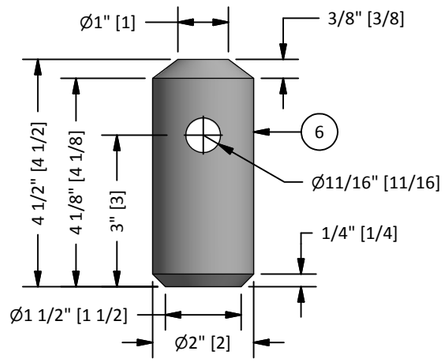

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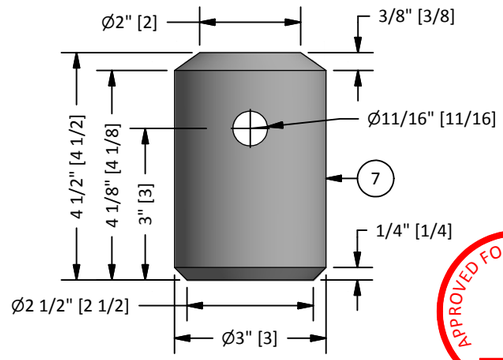

3" PIN DETAIL
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TOTAL MASS DRY: 3,420 lbs	TOTAL MASS WET:
TITLE: TANK PANEL 30,000 BBL	PROJECTION TYPE
CUSTOMER / LOCATION: WELL WATER SOLUTIONS	
PROJECT / JOB:	
DRAWING NUMBER: WR-30-901	
DESIGNER / DRAFTER: JDV	CUSTOMER APPROVAL:
DATE: 9/1/2011	JOB GROUP: T - TANKS
PROJ. MANAGER/ENGINEER: MC	CHECKER: JZL
SHEET SIZE: B	SHEET: 2 OF 7
REV.: 5	

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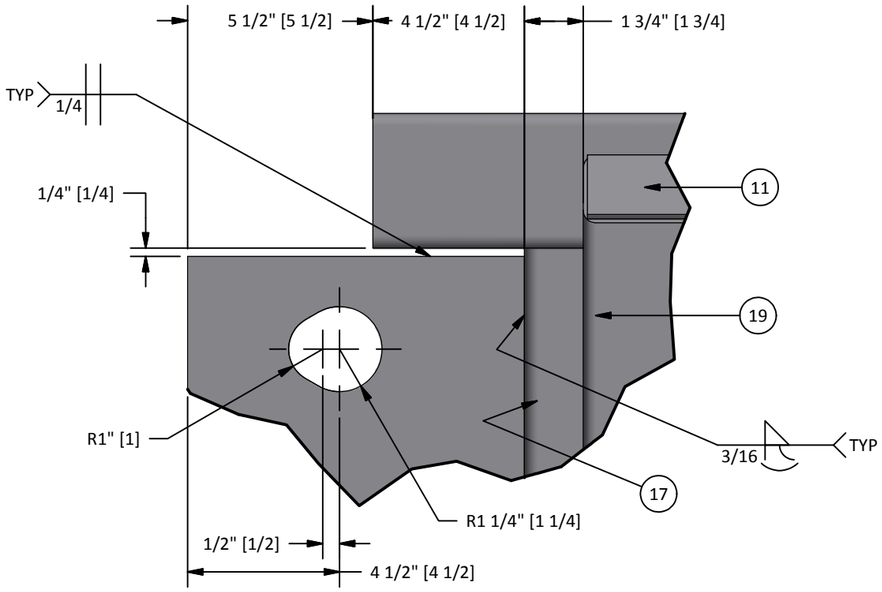

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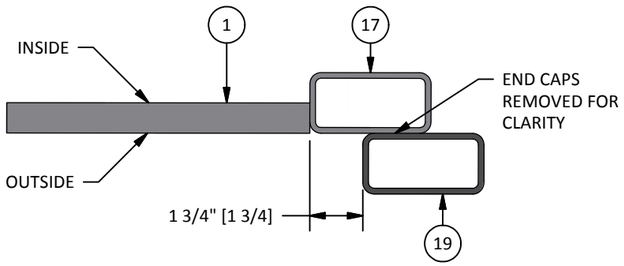

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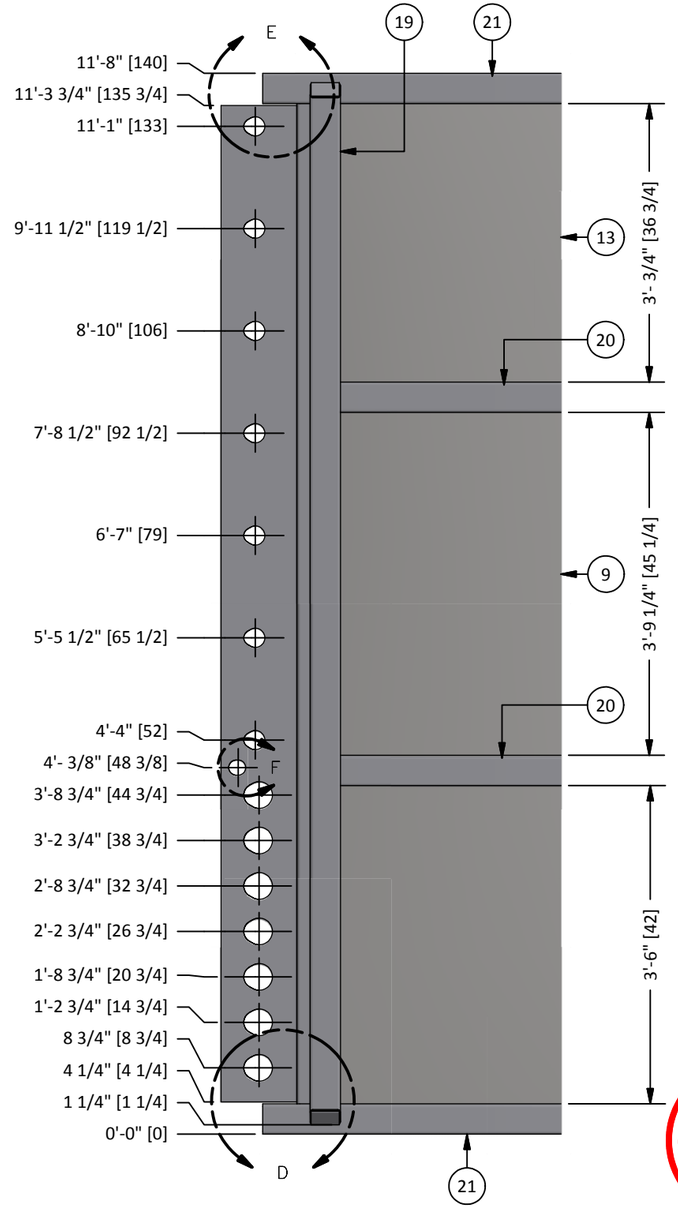

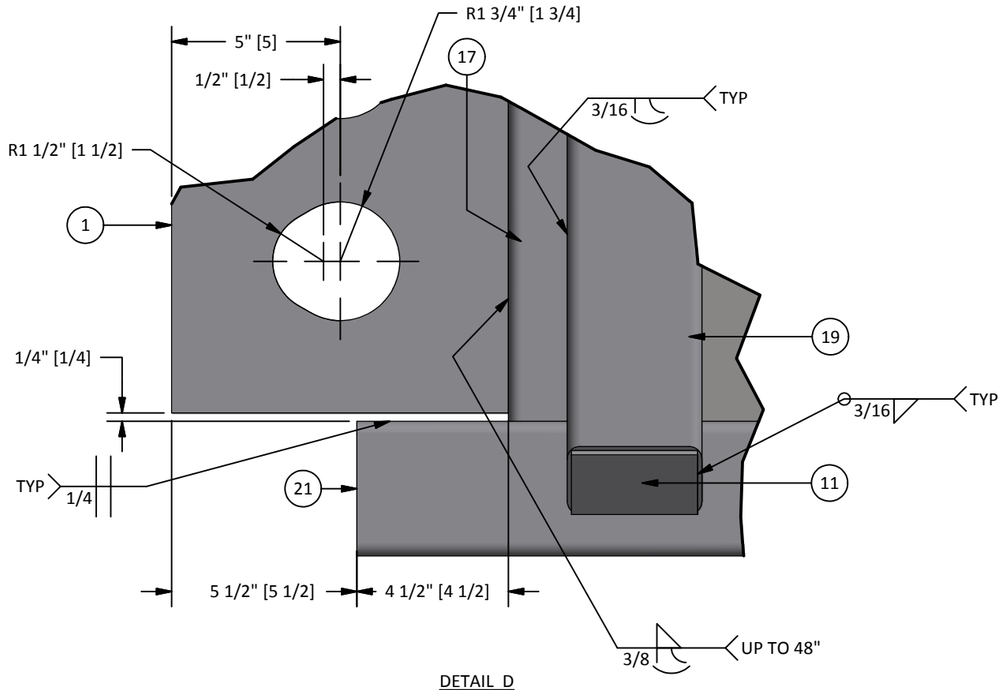

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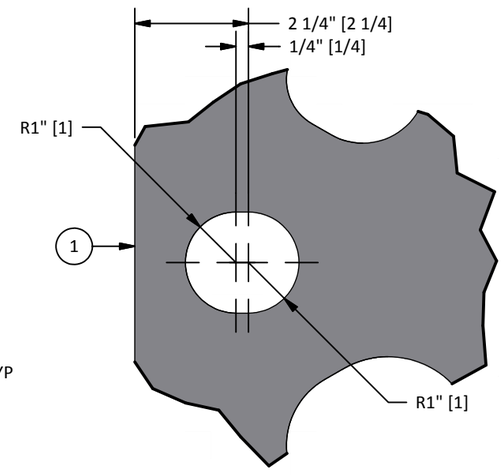

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TITLE: TANK PANEL 30,000 BBL	PROJECTION TYPE
CUSTOMER / LOCATION: WELL WATER SOLUTIONS	
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DRAWING NUMBER: WR-30-901	
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DATE: 9/1/2011	JOB GROUP: T - TANKS
PROJ. MANAGER/ENGINEER: MC	CHECKER: JZL
SHEET SIZE: B	SHEET: 3 OF 7
REV.: 5	

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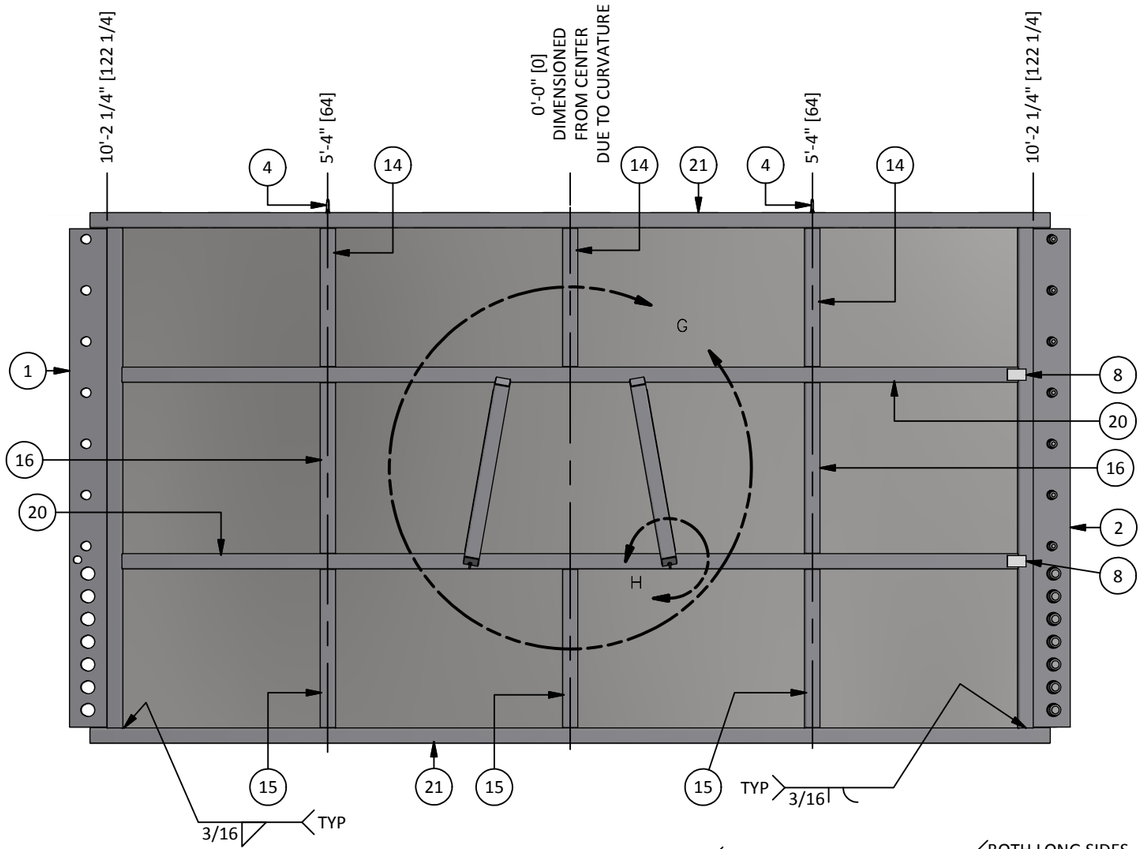

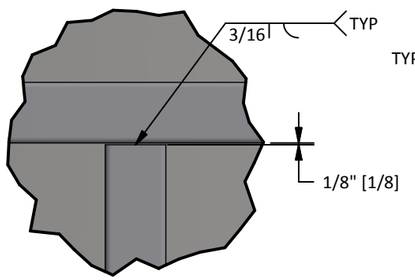

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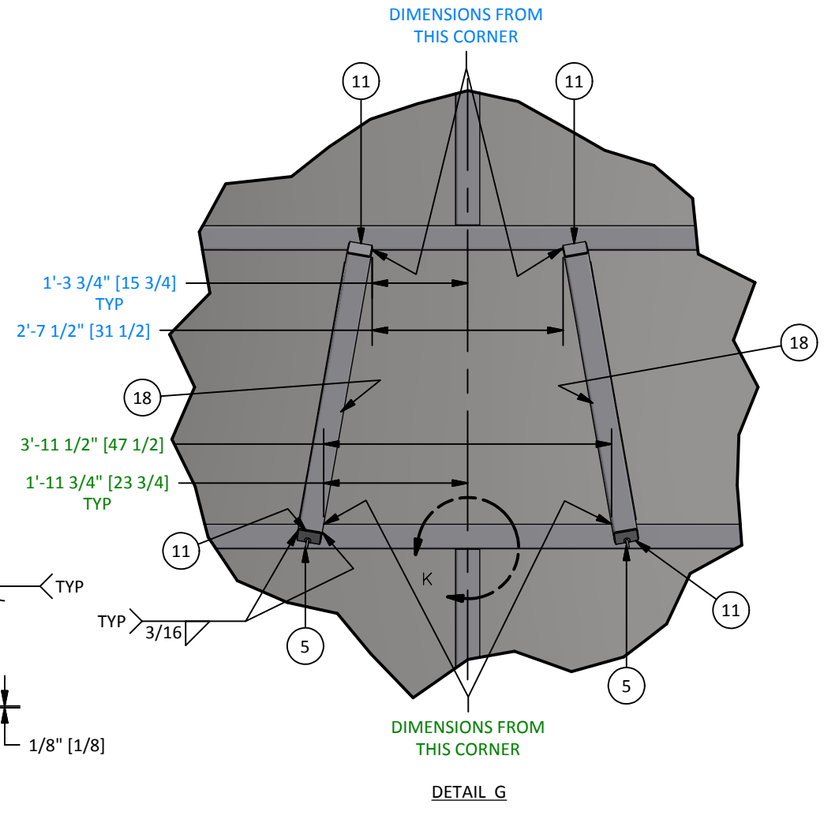

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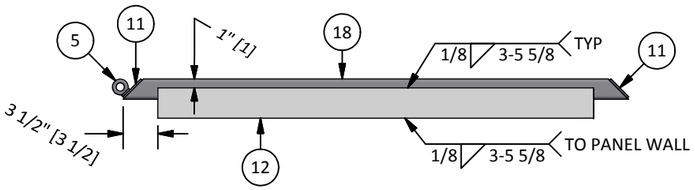

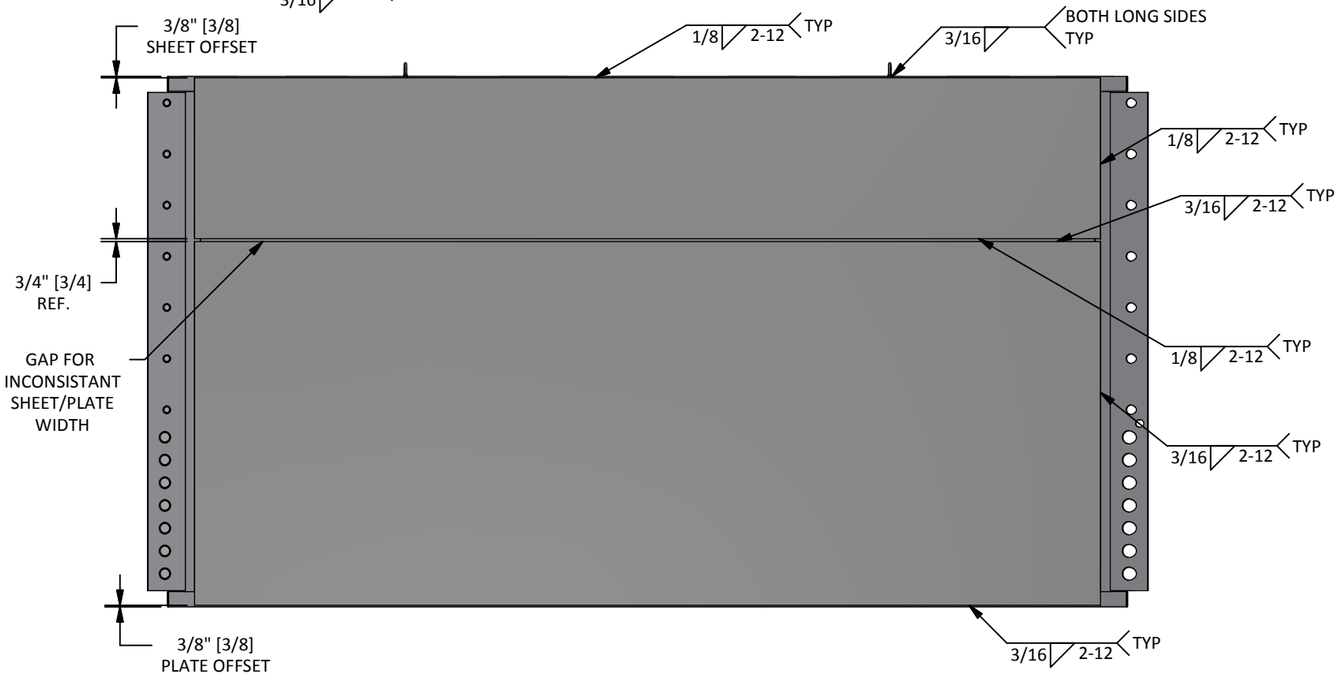

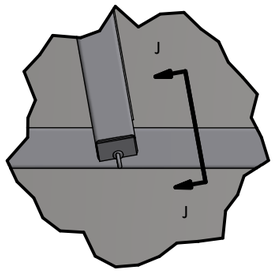

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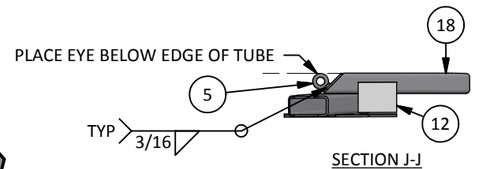

SECTION J-J

APPROVED FOR CONSTRUCTION

TOTAL MASS DRY: 3,420 lbs	TOTAL MASS WET:
TITLE: TANK PANEL 30,000 BBL	PROJECTION TYPE
CUSTOMER / LOCATION: WELL WATER SOLUTIONS	
PROJECT / JOB:	
DRAWING NUMBER: WR-30-901	
DESIGNER / DRAFTER: JDV	CUSTOMER APPROVAL:
DATE: 9/1/2011	JOB GROUP: T - TANKS
PROJ. MANAGER/ENGINEER: MC	CHECKER: JZL
SHEET SIZE: B	SHEET: 4 OF 7
REV.: 5	

FabTech
A Nalco Champion Company
4500 33 MILE ROAD
CASPER, WYOMING 82601
(307) 472-9746

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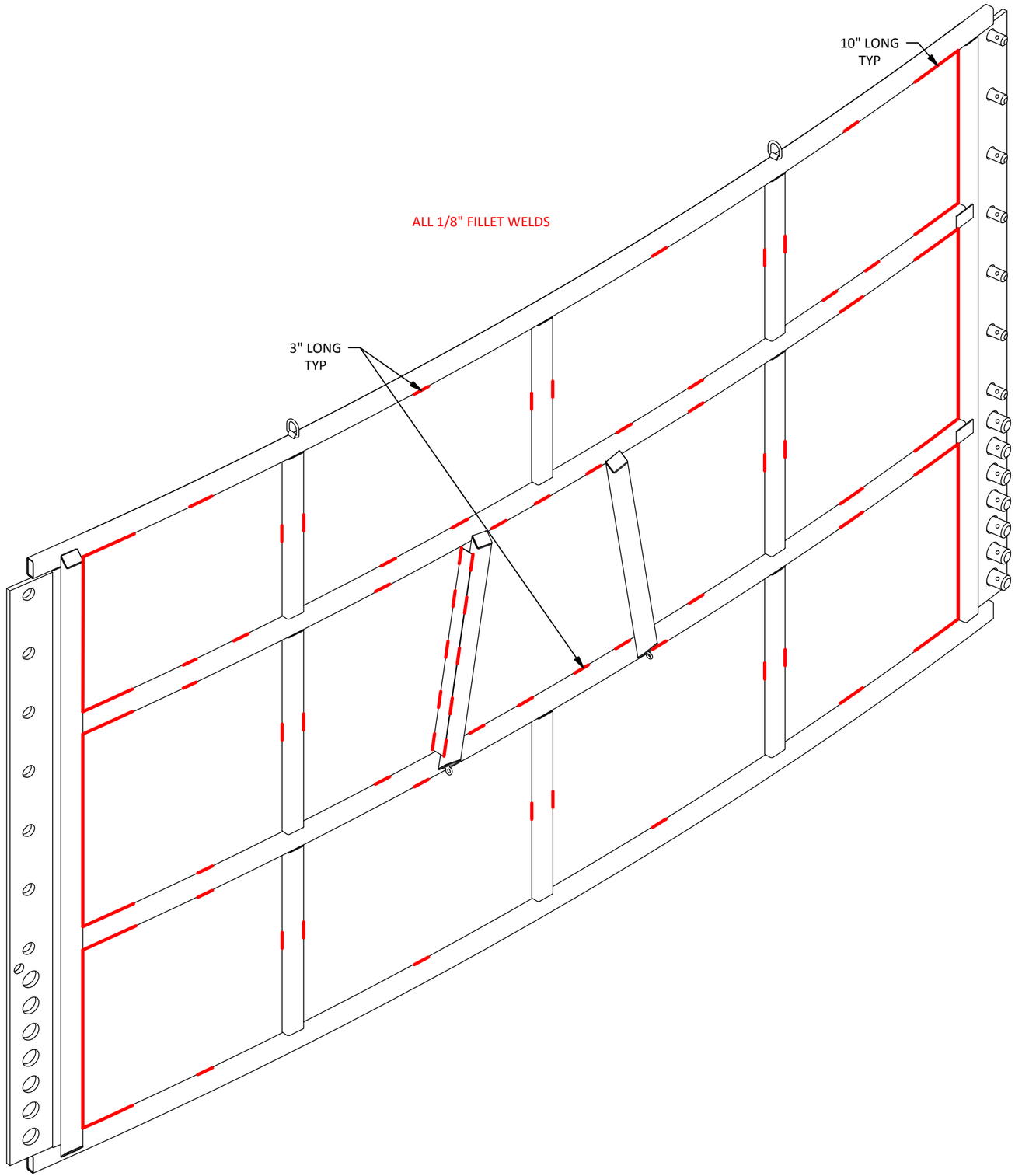

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TITLE: TANK PANEL 30,000 BBL	PROJECTION TYPE
CUSTOMER / LOCATION: WELL WATER SOLUTIONS	FabTech, A Nalco Champion Company, 4500 33 MILE ROAD CASPER, WYOMING 82601 (307) 472-9746
PROJECT / JOB:	
DRAWING NUMBER: WR-30-901	
DESIGNER / DRAFTER: JDV	CUSTOMER APPROVAL:
DATE: 9/1/2011	JOB GROUP: T - TANKS
PROJ. MANAGER/ENGINEER: MC	CHECKER: JZL
SHEET SIZE: B	SHEET: 5 OF 7
REV.: 5	

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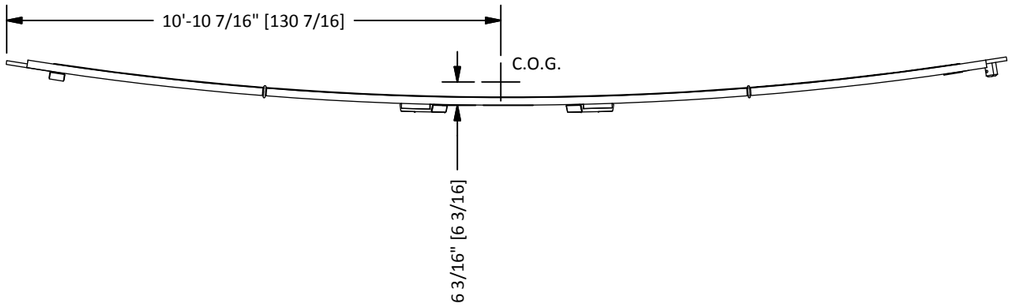

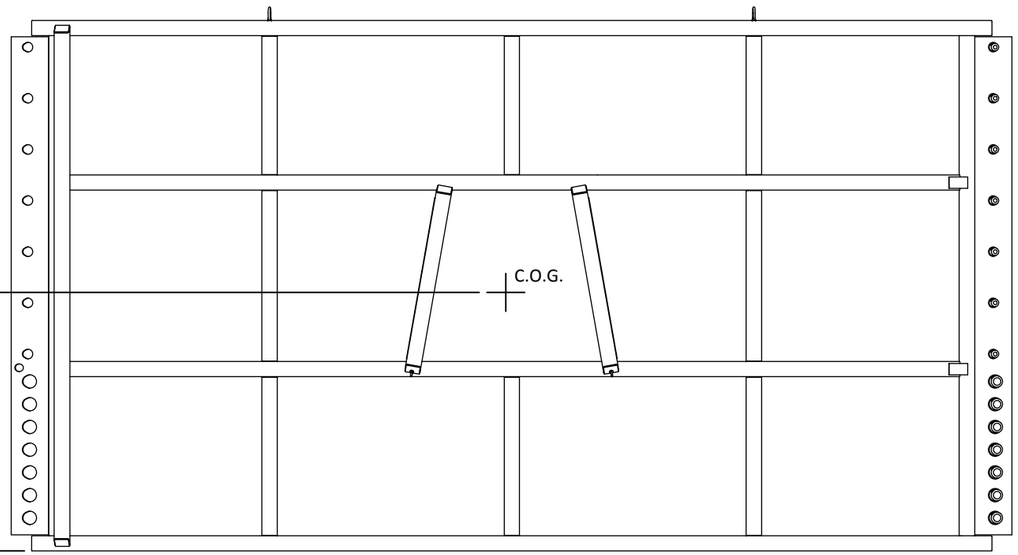

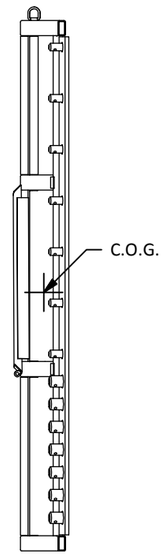

APPROVED FOR CONSTRUCTION

TOTAL MASS DRY: 3,420 lbs		TOTAL MASS WET:		
TITLE: TANK PANEL 30,000 BBL				PROJECTION TYPE
CUSTOMER / LOCATION: WELL WATER SOLUTIONS		FabTech A Nalco Champion Company, 4500 33 MILE ROAD CASPER, WYOMING 82601 (307) 472-9746		
PROJECT / JOB:				
DRAWING NUMBER: WR-30-901				
DESIGNER / DRAFTER: JDV	CUSTOMER APPROVAL:	DATE: 9/1/2011	JOB GROUP: T - TANKS	
PROJ. MANAGER/ENGINEER: MC	CHECKER: JZL	SHEET SIZE: B	SHEET: 6 OF 7	REV.: 5

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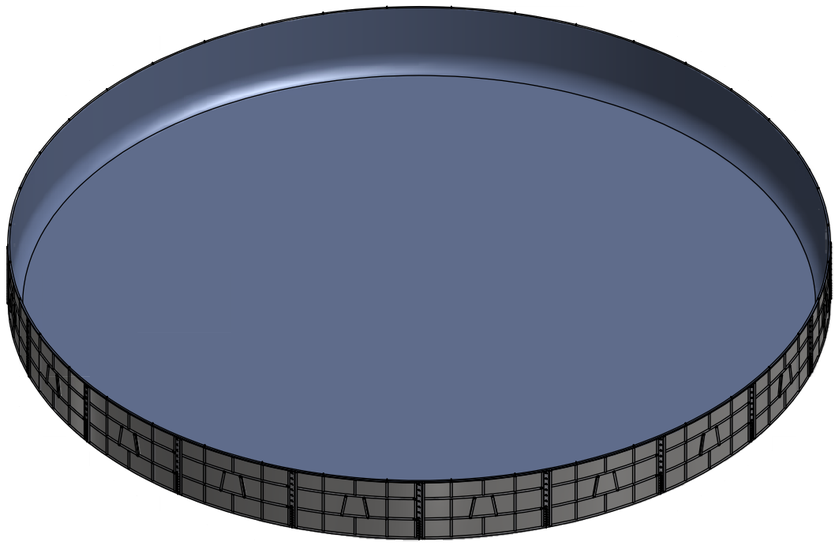
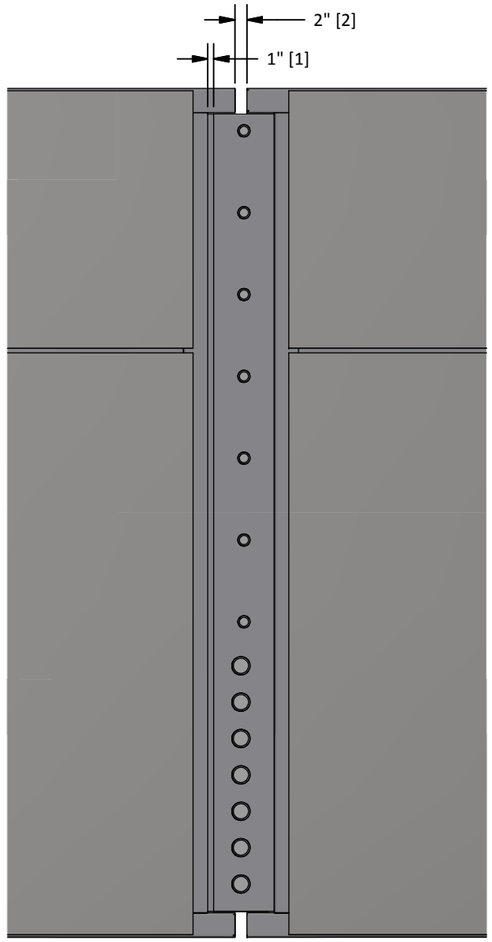
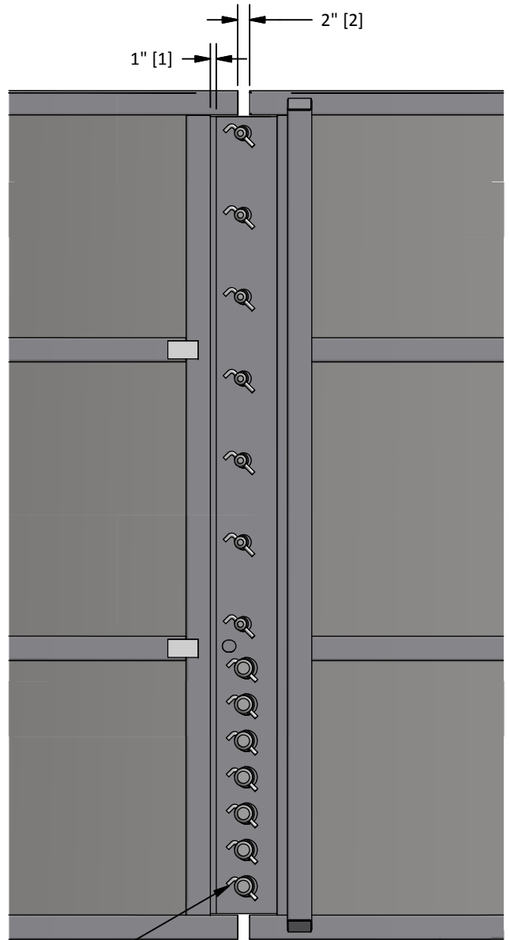
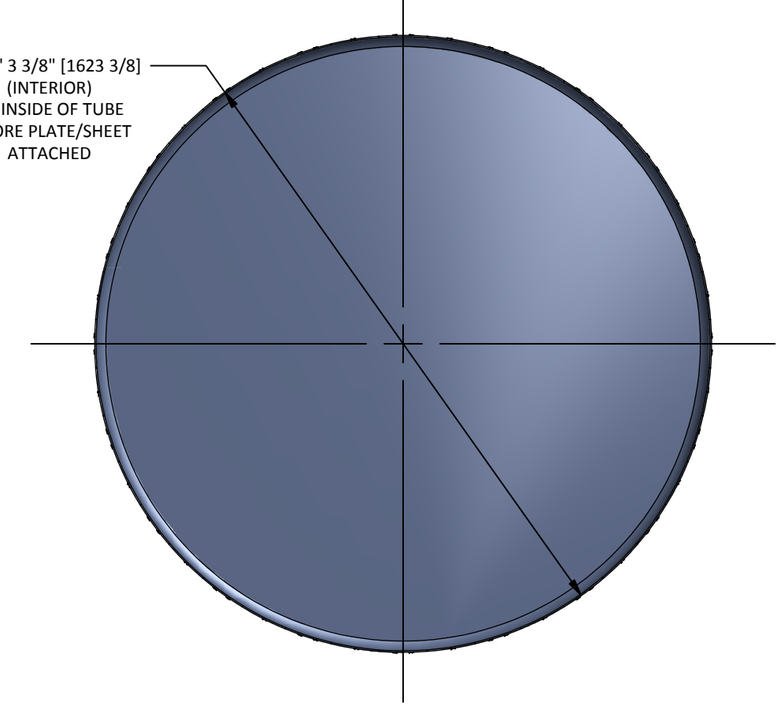




SEAM DETAIL
(INSIDE-OUT)



SEAM DETAIL
(OUTSIDE-IN)



APPROVED FOR CONSTRUCTION

TOTAL MASS DRY: 3,420 lbs		TOTAL MASS WET:	
TITLE: TANK PANEL 30,000 BBL			PROJECTION TYPE
CUSTOMER / LOCATION: WELL WATER SOLUTIONS		FabTech A Nalco Champion Company	
PROJECT / JOB:			
DRAWING NUMBER: WR-30-901		4500 33 MILE ROAD CASPER, WYOMING 82601 (307) 472-9740	
DESIGNER / DRAFTER: JDV	CUSTOMER APPROVAL:	DATE: 9/1/2011	JOB GROUP: T - TANKS
PROJ. MANAGER/ENGINEER: MC	CHECKER: JZL	SHEET SIZE: B	SHEET: 7 OF 7 / REV.: 5

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Inland TARP & LINER

Premium Quality - Built to Last

www.inlandtarp.com

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
(800) 346-7744 (509) 766-7024 Fax (509) 766-0414
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.

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SKAPS TRANSNET™

HDPE GEONET TN 220

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

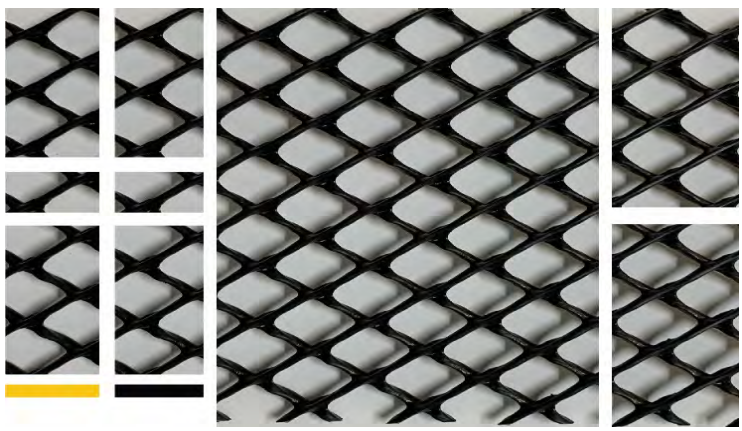
PROPERTY	TEST METHOD	UNIT	VALUE	QUALIFIER
Thickness	ASTM D 5199	mm	5.08	MAV(3)
Carbon Black	ASTM D 4218	%	2.0	MAV
Tensile Strength	ASTM D 7179	N/mm	7.87	MAV
Melt Flow	ASTM D 1238(2)	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	MAV
Transmissivity(1)	ASTM D 4716	m^2/sec	2.0×10^{-3}	MAV

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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571 Industrial Pkwy,Commerce, GA 30529
Ph: (706)-336-7000, Fax: (706)-336-7007, Email: contact@skaps.com
www.skaps.com

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4172 North Frontage Rd E Moses Lake, WA 98837
(800) 346-7744 (509) 766-7024 Fax (509) 766-0414
www.inlandtarp.com

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.
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DESIGN/CONSTRUCTION PLAN

Design and Construction Plan
Above Ground Tank (AST) Containments

General

Examination of the engineering drawings and the SOP for set-up (Appendix Engineering Drawings, Liner Specifications, 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. AST Containments will be enclosed by a 4-strand barbed wire fence. Thus, complies 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.

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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.

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*.

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.

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.

Liner and Leak Detection Materials

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.

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.

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

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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 presence of the secondary containment levee or pre-fabricated secondary containment meets the OCD Rule mandate that 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.

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

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

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geosynthetic material that are thermally seamed. Prior to field seaming, AST Containment contractor shall overlap liners four to six inches and minimize the number of field seams and corners and irregularly shaped areas. There shall be no horizontal seams within five feet of the AST Containment bottom. Qualified personnel shall perform field welding and testing.

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.

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.

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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.

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• 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.

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- 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

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- 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

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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.

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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.

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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.

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AST SET UP SOP

Above Ground Storage Tank - Standard Operating Procedure

1. Planning for an AST Project

Achieving the efficient deployment, installation and removal of an AST lies in our ability to effectively plan for each phase of the project. Engagement of the proper personnel from each company involved and discussing the essential planning categories as listed below will increase the opportunity to achieve an incident-free, desired result.

Essential Planning Steps:

- Request for Quote
- Pre-Order and Deployment Requirements
- Ground Preparation
- Pre-Assembly Requirements

Request for Quote

Discussing and obtaining the following details is essential in building accurate AST project pricing.

1. Total Fluid Storage (barrels. or gallons) and Free-board Requirements
2. Anticipated Install Date and Rental Duration
3. Location GPS Coordinates or Physical Address
4. Location Size, Adequacy or Restrictions
5. Type of Fluid Being Stored and Material Package Strategy (liner mil thickness, single or double lined)
6. Accessory(ies) Strategy (Fill Piping, Suction Piping/Drain, Bird Netting, Lid, Leak Detection)
7. On-Site Orientation(s), Specific Certification(s), and Training Required to Gain Clearance to Access Location
8. Initial Fill Strategy (source, availability of fluid, fill rate, turn-around time for trucks)
9. Site Access Restrictions

Pre-Order and Deployment Requirements

Once pricing has been submitted and accepted by the customer, a PO must be obtained from the customer prior to placing an order for the material package or accessories. Only thereafter should the project coordination be set into motion and scheduled.

Pre-Deployment Discussion:
A meeting with the customer should be held prior to the tank and/or crew deployment for installation or removal. The below should be used a guidance for the customer meeting prior to installation:

- AST Delivery and Installation Schedule
- Confirmation of Proper Ground Preparation
- Adequate Clearances Around the Tank for Crew and Equipment - 25' or greater around perimeter of tank
- Standard Equipment or Crane Installation Confirmation
- Strategy to pin the floor of the tank (fresh water, source type, fill rate, etc.)
- Customer roles/responsibilities/contact information including customer’s project manager, key on site staff, and EHS staff.
- Review AST intended use and customer safety requirements.
- Review AST accessories required (fill lines, suction, egress, etc.)
- Site access and truck route requirements
- Crew start and stop time requirements or limitations.
- Forecast rental duration.
- Confirm AST size to be deployed.
- 2' minimum fluid requirement in AST always
- Conditions that could result in standby time charges or additional charges, and what prior customer approvals are required.
- Rental Start Date Strategy
- Rental End Date Strategy
- AST component storage on-site while tank is in operation.

- Ground Preparation

Preparation of the soil and location is required to form a dependable base for the AST. This base is also imperative in achieving the proper operation of the AST once fluid is introduced - Proper seating of the liner on the floor of the tank; Adequate, ongoing suction of the stored fluid; Favorable draining/"bottoming-out" of the tank at the end of the project.

*Preparation of the soil and location is the sole responsibility of the customer. Ensuring proper slope and compaction prior to AST installation is the sole responsibility of the customer.

Location preparation requirements are as follows:

- Use laser level to grade pad to within one inch, up and down.
- Confirm that there is 25' of clearance around the parameter of the tank, based on the diameter of the specific AST being installed.
- Use center pin, tape measure and marking paint to mark the diameter of the tank on the pad as per measurement chart.
- Check area for sharp objects, rocks, or any other potential hazards to the liner.
- Speak with the consultant to determine where the suction will be located and mark out where the “Y” trench will be situated.
- The suction branch of the “Y” trench should be at least twelve inches (12”) deep with the depth tapering out to six at center and level at the two other points of the “Y” trench.
- Ensure the start of the suction trench is at least three feet from the edge of the tank and the ends of “Y” trench are 10 feet from the edge.

Soil preparation requirements are as follows:

- A minimum soil compaction of 95% compaction. Soil testing results are normally shared with the installation Supervisor or Field Operations Manager.

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

CALL BEFORE YOU DIG - 811

*It is the responsibility of the excavating company to ensure 811 - Call Before You Dig has been notified and proper clearances obtained prior to digging sump.

Installation Crew:

The installation crew may have basic equipment on-site to double check that location is graded to within one inch, up and down, however does not have access to compaction testing equipment or methods. It is good practice for the installation crew to check location grade and confirm compaction testing results prior to installing the AST.

*Inadequate ground preparation should be documented and discussed with the customer and project halted until ground preparation is complete per SOP.

- Pre-**A**ssembly Requirements

Prior to starting the assembly process, use the steps below as guidance to achieve an incident free, efficient installation of the tank, while meeting customer and SOP requirements:

1. Conduct Job Safety Analysis
2. All 3rd party personnel, sub-contractors, customers, end user representatives, and tank operators (if available) are encouraged to participate in JSA and/or pre-job meetings.
3. Inspect location/soil conditions and review compaction test results with customer.
4. If applicable, installation crew to check grade using a laser level - document slope in inches around parameter of tank.
5. Confirm a 30’ clear work area around the perimeter of the tank is possible to provide access for equipment and lay-down area for AST materials and installation equipment.
6. Check that the minimum distances to existing wells, power lines, etc. are met.
7. Establish final location for the suction tube and stairs.
8. Confirm trash bin is available to dispose of packaging, cut-off materials and installation garbage.
9. Confirm that fluid is available, per initial fill strategy, to seat the floor of the tank at the desired time.

Standard Equipment:

All equipment is subject to daily inspection. (Check condition, rigging, oil, water, fuel and cleanliness.) The below represents a list of the recommended, standard equipment required for assembly of the tank.

- Two (2) - 40’ extending straight boom man-lifts.
- One (1) - 12,000 lb. capacity extending boom, rough terrain powered telehandler.
- One (1) - 310 backhoe or comparable.

Hand and Power Tools:

- Two extension ladders
- One Push and one house broom
- One Paint wand
- One 24" pipe wrench
- One 36" pipe wrench
- Two 4 lb. sledgehammers
- 100’ and 300’ tape measure
- Set of wrenches ¼” – 1 ½”
- Set of deep impact sockets ¼” – 1 ½” (3/4" drive)
- Two 36” pry bars
- 8’ Dig/Frost Bar
- Two round nose shovels
- Four safety harnesses with retractable lanyards
- 300’ of 3/8” rope
- Self-retracting utility knife (one per Installer)
- One 3/4" drive impact
- Patch tape, Rubbing alcohol, Patch Roller
- Wire brush
- Crescent and channel lock wrench set
- Little Giant 2,000 lb. wagon

Rigging:

- Two tag lines
- Four 4" x 4" x 2' blocks
- Four-way chain sling
- Four 3/8" x 2' cable slings
- Four - 10' continuous loop slings (yellow)
- 2 - 1-1/4" shackles
- 4 - 3/4" shackles
- 1 - 10,000 lb. swivel
- 1 - 4" x 15' schedule 80 pipe with eyelets

Consumables:

- Three cans of orange marking paint
- PB Blaster or Lubricant
- Gorilla tape
- Zip ties

2. AST Installation Process

Laying Out the Tank:

1. Establish the center of the tank with a sandbag. This will be used to determine the tank's perimeter using model/size specific radius/diameter, using paint wand and marking paint. In addition, the center of the tank will be identifiable after the geo ground pad and liner have been rolled out as well.
2. Measure and paint perimeter circle for tank panels and measure where geo and liner(s) will begin and end including width.
3. Measure and paint where the sump or bottom drain is to be set.
4. Once layout is complete, confirm minimum distances are met for on-site hazards - existing wells, power lines, production equipment, etc.

Sump or Bottom Drain Excavation:

1. 811 must be called, with confirmation that all utilities have responded to the request before excavation commences.
2. Sump or bottom drain should be excavated on the low side of location, using a backhoe or excavator.
3. If multiple suctions are required, a minimum of 8' of separation should be placed in-between excavations.
4. Barricade any excavation with cones and tape if left unattended overnight.
5. Excavation will vary depending on what type of suction is to be installed (candy cane, bottom drain, etc.)

Geo Ground Pad and Liner Installation:

1. All sharp objects are to be removed from inside the tank layout (rocks, sticks, debris, roots, etc.)
2. Using a 12,000# telehandler, approved rigging and liner bar, unroll the geo ground pad, placing the edge of the roll on the designated geo ground pad line marked during the layout stage. Unroll from one end of the tank to the other using a spotter, to unroll over the center of the tank.
3. Per prefabricated design, unfold the geo ground pad in both directions and pull until centered on the tank floor.
4. Steps #2 and #3 should be repeated as to roll-out and unfold the primary liner, using the designated liner marked during the layout stage.
    - Follow double lined AST SOP for installation of multiple liners.
5. Perform a visual inspection of the liner. If defects are found, document, take photos and repair. Take post repair photos.
6. If a bird net is required set the bird net, stands, and cables on liner. Make sure stands have protective covering on base to ensure no damage to liner is done.
7. Starting at the sump and moving counterclockwise, fold the liner inward around perimeter. The liner edge should be pulled inside the painted tank wall no less than 2'.
8. Next, holding onto the inner most edge of the liner, fold the liner back over itself, toward the outside of the tank and around the entire perimeter (creating a pocket for fluid to be trapped, eliminating escape from the floor of the tank)

*It is critical that customer and regulatory requirements are met when storing flowback, production, waste or treated fluid

*Geo and/or liner should not be installed in winds of 15 mph or more

Sand or Geotextile Transition: Enough sand or geotextile should be placed in the ground to wall transition, around the inside perimeter of the AST to achieve a 1:1 transitional slope.

Standing Panels (Building Tank Walls):

1. Using a 12,000# telehandler and approved rigging, begin standing panels per AST engineering requirement or forecast wind direction (if applicable)
2. Once the first panel is stood, with cribbing blocks installed under each end, use a backhoe or excavator to hold and secure the panel, allowing the telehandler to safely disconnect from the panel without losing stability or securement. The equipment used should remain connected until enough panels are installed to safely stand on their own (varies per tank size and panel engineering)
3. Establish which direction the walls will be stood up and stand one panel at a time until the last seam is joined together, ensuring a 1:1 transitional slope of sand or geotextile is installed at each panel's interior base.

Note:

- Spotters should be used while connecting panel seams (ladder use, falling objects, moving equipment, etc.)
- Two taglines are to be used when transporting each panel from their stacked state to upright position/installation.
- Rigging should be inspected with each lift to ensure the safe handling of the suspended load.
- Pre-cut strips of 10 oz. geotextile should be installed on the inside of each seam to protect the liner from sharp edges.

Liner Placement and Clamp Installation:

1. Unfold the liner in sections, toward the base of each panel, ensuring that the transitional material is installed properly.
2. After liner is pulled toward the base of the panel, a two-man crew in a 40' straight boom on the outside of the tank works with the team members inside the tank to begin pulling the liner edge up and over the top of each panel. The man lift crew lifts the liner edge using ropes attached by the inside crew. The man boom crew lifts a small liner section to the top of the panel and folds it over the top of the panel, while the crew inside the tank ensures that there is enough slack in the liner inside the panel wall (typically 1' of slack).
3. Once a section of liner is positioned properly (with liner slack inside the tank) and over the top of each panel wall, the man lift crew secures the top of the liner with liner clamps.
    - NOTE: The number of clamps per panel is dependent on the panel length and specific engineering of the tank
4. Both inside and man lift crews continue this process, working around the tank, one or two panels at a time, until the entire liner is in place.
    - NOTE: The crew must allow sufficient slack in the liner at the wall to allow for liner movement during filling and draining.

Stairs, Fill Tubes, and Suction/Bottom Drain:

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

Bird Net Installation

1. Erect bird net stand(s) and run security cables through D-rings of each stand and secure cables to panel wall D-rings. Be sure cables are straight across the diameter of the tank.
2. Spread out bird net on liner floor. A 2-man crew in man boom will pull a section with tag line up to clamps to secure edge of net on top of panels. Continue pulling and securing bird net going around the tank. Continue to pull and secure until desired tautness is obtained.

Final Steps and Initial Fill:

1. Trim liner around perimeter of tank, allowing for 2' - 5' of liner to hang over edge of tank. Longer trim strategy includes the installation of a perimeter cable.
2. Inspect all connections and equipment.
3. Pump a minimum of 18" of FRESH or approved water onto the floor of the tank and monitor for leaks.
4. As soon as reasonably possible, complete the initial fill on the tank, monitoring for leaks.

Ongoing Inspection Guidance:

1. When the fluid levels are lowered, it is good practice to have the operating company perform an inspection on the exposed liner. Take photos if necessary and send to the installation crew.
2. As the tank is operated day-to-day, visibly inspect each panel.
3. Inspect the accessories, piping, valves and liner clamps installed.
4. Water must NEVER go below 24 inches at the LOWEST level in the tank. 2' water marks can be painted on the inside of the tank as a reminder to the operating company.
5. Do not leave liner exposed inside tank for long periods of time. The wind will cause the liner to rub on itself. This friction will create potential pinholes.
6. All water present on the ground around the tank should be inspected to ensure it is not coming from the tank. Water spots can be traced to identify growth, if visible fluid is not running from under the tank wall or down a panel.

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 (In-Ground 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.

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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.

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- 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

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

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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.

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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.

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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

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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.

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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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Sincerely Yours,

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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:

R. K. Frobel C.V.

32156 Castle Court / Suite 211 / Evergreen, CO 80439
Ph 303-679-0285 Fx 303-679-8955 geosynthetics@msn.com

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

32156 Castle Court / Suite 211 / Evergreen, CO 80439
Ph 303-679-0285 Fx 303-679-8955 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

ASTM Standards 2019

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RONALD K. FROBEL, MSCE, P.E.

CIVIL ENGINEERING
GEOSYNTHETICS
EXPERT WITNESS
FORENSICS

FIRM: R. K. FROBEL & ASSOCIATES
Consulting Civil / Geosynthetics Engineers

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)
Registered Professional Engineer – Civil (Colorado)
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:

R. K. Frobel & Associates - Consulting Engineers
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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March 2025

Rule 34 Registration: Volume 1
Radiohead RF & AST Containment
Section 29, T18S, R26E, Eddy County

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

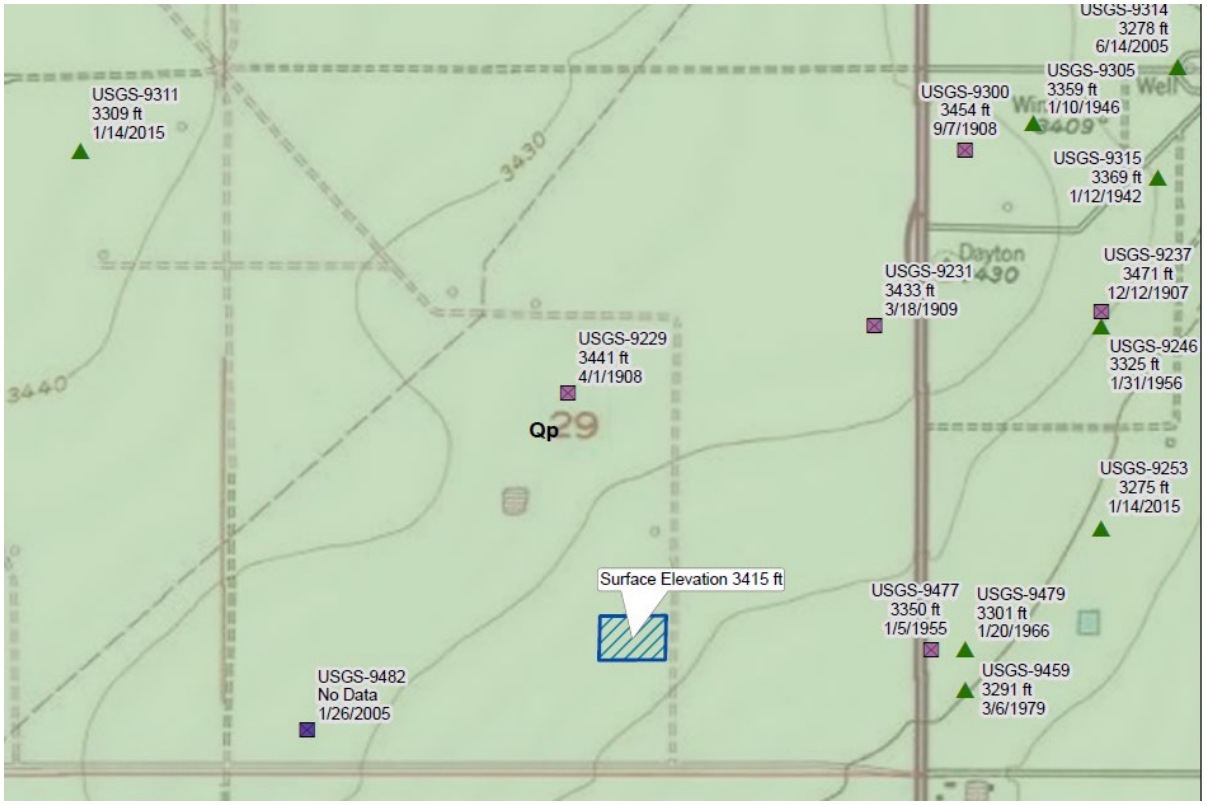

Plate 2 presents groundwater elevation data that are both excellent and interesting. As explained, recent USGS data demonstrate that depth to groundwater at the site is greater than 100 feet. Plate 2 includes data from deep artesian wells (Grayburg/San Andres) with elevations above ground surface.

Prepared for:
Spur Energy Partners, LLC
Houston, Texas

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 20, 2025

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: Spur Energy Partners, LLC, Radiohead Recycling Facility and AST Containment
Section 29, T18S, R26E, Eddy County

Dear Ms. Barr and Ms. Venegas:

On behalf of Spur Energy Partners LLC, R.T. Hicks Consultants is pleased to submit a C-147 permit for the referenced project. Spur anticipates that construction will commence as soon as possible. Produced water will flow into the containment immediately after approval of this permit. Spur will employ all recycled water for their wells; therefore closure of the AST containment is covered by their blanket bond.

Volume 1 of the C-147 package contains:

- Transmittal Letter
- Siting Criteria Demonstration with Plates and Appendices

Volume 2 is a permit that contains

- 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

Spur will transmit the registration package to OCD via the OCD.Online portal. In compliance with 19.15.34.10 of the Rule, Spur provided this package to the surface owner. 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.

Sincerely,
R.T. Hicks Consultants

Randall T. Hicks PG
Principal

Copy: Spur Energy Partners, LLC
Cascade Services

SITING CRITERIA DEMONSTRATION

Distance to Groundwater

Plates 1 & 2 and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 100 feet beneath the AST recycling containment.

Plate 1 is a topographic map that shows:

1. The project area of the Radiohead Reuse Facility is identified by the blue diagonally lined 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 or borings (i.e., permit applications) that were never drilled. To eliminate plotting of these permits on Plate 1, we queried the data so only wells with a "start date" are included. Depth to water data for the OSE wells do not necessarily represent static water levels and these can be misleading. Depth to water and the date of measurement are presented in the Plate 1.

Plate 2 is a topographic and geologic map that shows:

A. The Radiohead Containment area identified by the blue striped rectangle with a label listing the surface elevation of 3445.
B. Water wells measured by the USGS, the date of the measurement and the calculated elevation of the groundwater elevation surface.
C. MISC water wells measured by professionals and documented in published reports or by staff of Hicks Consultants are not present in Plate 2
D. Quaternary Piedmont (alluvial) deposits cover ancestral Pecos River sediments/terraces and underlying Permian bedrock over the area of Plate 2.

Hydrogeology and Groundwater Data

More than 100 feet of pediment deposits (Qp) and ancestral Pecos River alluvium cover all bedrock in Plate 2. Two aquifers exist near the project area and the Roswell Basin in general. The artesian aquifer are Permian bedrock, typically the San Andres Formation. However, as shown in Plate 2 and described below, wells also penetrate other Permian units, such as the Grayburg Formation. Artesian wells cannot be impacted by the containment and are not discussed further.

Three high-quality driller's logs in the OSE database exist near the project area. RA-8812, which is closest to the proposed AST was a re-entry of an older cased well and there is no reported lithology. Except for the three listed below no additional driller's logs are posted to the OSE database.

- RA-4136 was drilled in 1959 and reports the following data
  - A sand and gravel horizon from 120-155 is identified as the principal water bearing unit.
  - Static water level after drilling is 90 feet. This value may be deeper than true as the nearby USGS-9482 (see below) reports a static water depth of 75 feet in 1964.
  - The reported lithology is dominated by clay with a sand and gravel horizon from 100-110 feet. The upper sand and gravel unit is probably water bearing also.

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- RA-4160 was drilled in 1960 and provides a good driller's log that shows
  - A sand and gravel unit from 130-155 feed deep is the principal water bearing unit.
  - Static water after drilling is 100 feet.
  - Clay dominates the lithologic description from 0-90 feet and
  - Sand and gravel compose most of the log from 90-160 feet (total depth)
- RA-6029, drilled in 1975 shows
  - A sand and gravel unit from 140-180 feet deep is the principal water bearing unit.
  - Static water after drilling is 140 feet.
  - From surface to 120 feet deep the driller reports clay
  - Sand and gravel compose the remainder of the log from 120-183 (total depth)

The USGS data well database provides information about groundwater-bearing units. Only recent USGS data are in *Appendix USGS Data* and are discussed clockwise from north to south.

- USGS-9311 in the northwest quadrant of Plate 2 exhibits declining groundwater elevation from 2006 to 2019. Note the 2019 USGS data from the website provides the most recent value of 3307 – a 2-foot drop from 2015.
- USGS-9315 in the northeast corner of the map also displays a declining groundwater elevation over the period of record. We estimate a 5-foot decline from 2000-2005.
- USGS-9253 is north and east of the project location and is down gradient. From 2000 to 2013, elevation is steady at 3275.
- USGS-9482 shows "no data" for the 2005 measurement (the well was pumping). The 40 year period of record shows declining groundwater elevation from 3345 to 3324.

From these data we conclude:

1. Sand and gravel horizons below 100 feet provide the water to wells near the project area.
2. Groundwater elevations in the area have declined several feet since 2005.
3. Groundwater elevation beneath the Radiohead AST location is less than 3325- the most recent (2005) accurate elevation of USGS- 9482.
4. Thus, the minimum distance to groundwater at the Radiohead AST site is approximately (3415-3325=) 90 feet

Distance to Municipal Boundaries and Fresh Water Fields

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

- The closest municipality is Atoka, NM approximately 3 miles north of the Radiohead Containment.
- The closest public water system is associated with the Artesia Rual Water Cooperative, about 4 ½ miles north.

Distance to Subsurface Mines

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

- The closest caliche pit is almost 2 miles east-southeast.
- There are no subsurface mines in Plate 4

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Distance to High or Critical Karst Areas

Plate 5 shows the Radiohead site is not within a mapped zone of high or critical with respect to the 2025 BLM Karst map.

- The proposed containment is located within a "No Karst" area.
- The nearest "high" or "critical" potential karst area is located approximately 6.5 miles east of the proposed containment.

Distance to 100-Year Floodplain

Plate 6 demonstrate that the Radiohead containment 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 closest FEMA-mapped flood zone is the Rio Peñasco , about 2 miles west-northwest.

Distance to Surface Water

Plate 7 shows that the containment is not within 300 feet of a surface water body or a significant watercourse.

- Plate 7 shows the Rio Peñasco about 2 miles northwest.
- Our examination documented that there are no next order tributaries to these mapped features that lie within the 300 foot setback distance.
- The nearest surface water is mapped as a lake/pond is about 0.3 miles northeast. Examination of this feature on Google Earth suggests it is an abandoned and dry constructed stock tank.

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.

- The nearest structures are lease roads and production pads on all sides of the project area.
- The nearest residence is about ½ mile southeast.

Distance to Non-Public Water Supply

Plates 1 and 7 demonstrates that the Radiohead containment site is not within 500 horizontal feet of a spring or fresh water well used for domestic or stock watering purposes,.

- Plate 1 shows the locations of the nearest water wells, active or plugged.
- There are no domestic water wells located within 1,000 feet of the area of interest.
- No springs were identified within the mapping area (see Plate 8).

Distance to Wetlands

Plate 9 demonstrates the Radiohead location is not within 500 feet of any mapped wetlands identified in the USA Wetlands database.

- The nearest mapped wetland coincides with a lined fresh water frac pond, about 1 mile north.

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- The errant mapping of this wetland is typical of the USA Wetlands database in New Mexico. The US Fish and Wildlife Service who conducts the wetlands inventory employs areal imagery and ground surveys are not routine.
- In the FAQ section of the inventory is this:

> **Why is there a difference between mapped wetlands and ground conditions**?
>
> It is likely the base imagery date is different than the date of the imagery used for photointerpretation, and interim changes in the landscape since the wetland was mapped may result in mismatch when comparing newer imagery with ground conditions. The wetlands mapper defaults to ESRI base imagery. More information can be found on ESRI's imagery metadata webpage.
>
> Imagery can also be viewed in the ESRI map viewer to determine image dates for specific areas of interest.
>
> In addition, not all wetlands are wet throughout the year. Some wetlands may appear dry during certain times of the year while still supporting hydric soils and wetland plants characteristic of wetland areas.

Many wetlands in New Mexico mapped by the USFW Service database do not meet the NM OCD definition of a wetland. The Hicks Consultants team has more than 100 years of combined field experience in Eddy, Lea, and Chaves Counties and have rarely seen a mapped wetland with vegetation adapted for saturated soil conditions.

> "Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions in New Mexico. This definition does not include constructed wetlands used for wastewater treatment purposes.

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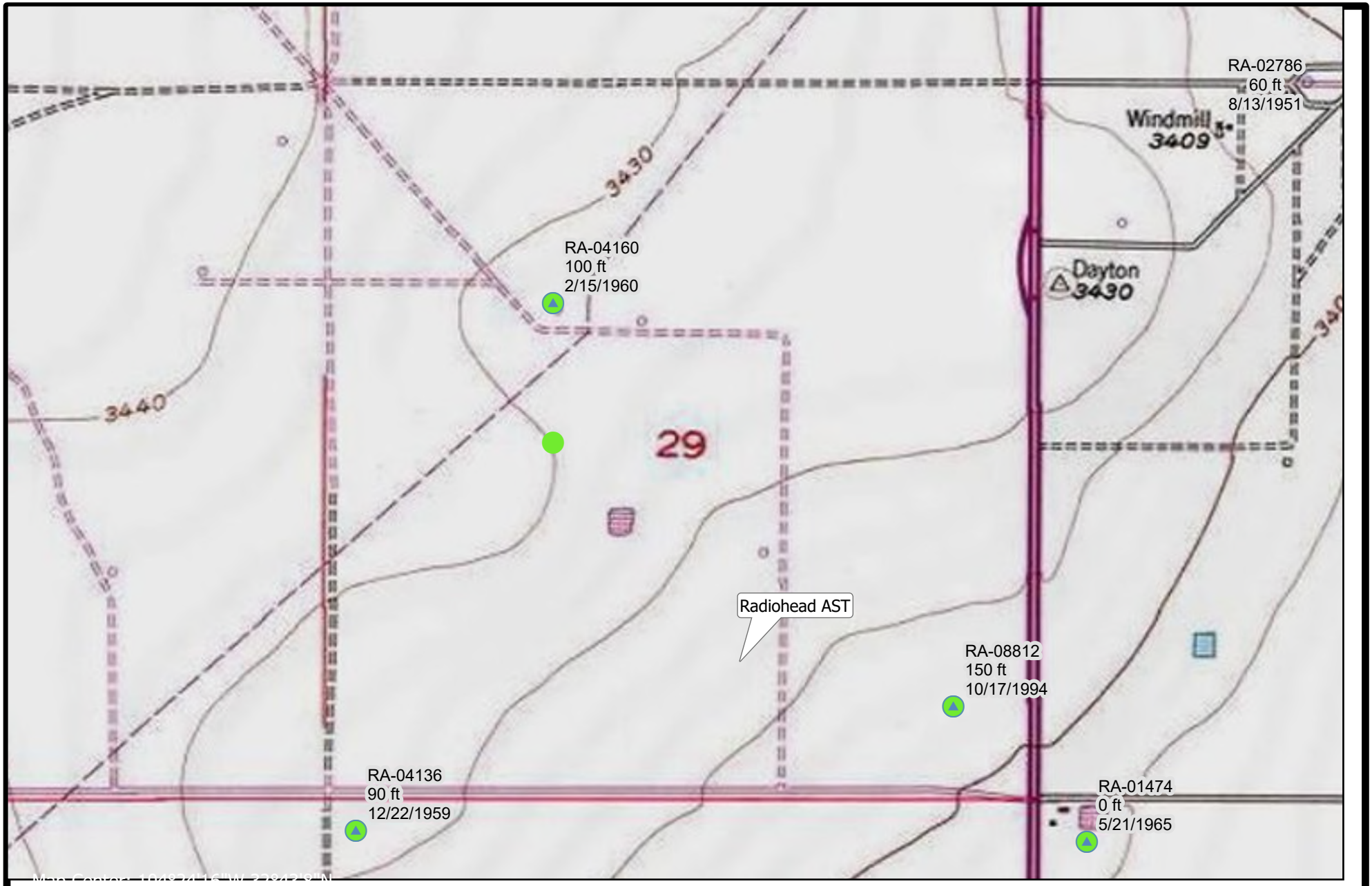
SITING CRITERIA DEMONSTRATION PLATES

P:\CascadeRadioheadAST\SpurRadioheadAST.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
	Spur Energy - Radiohead AST	March 2025

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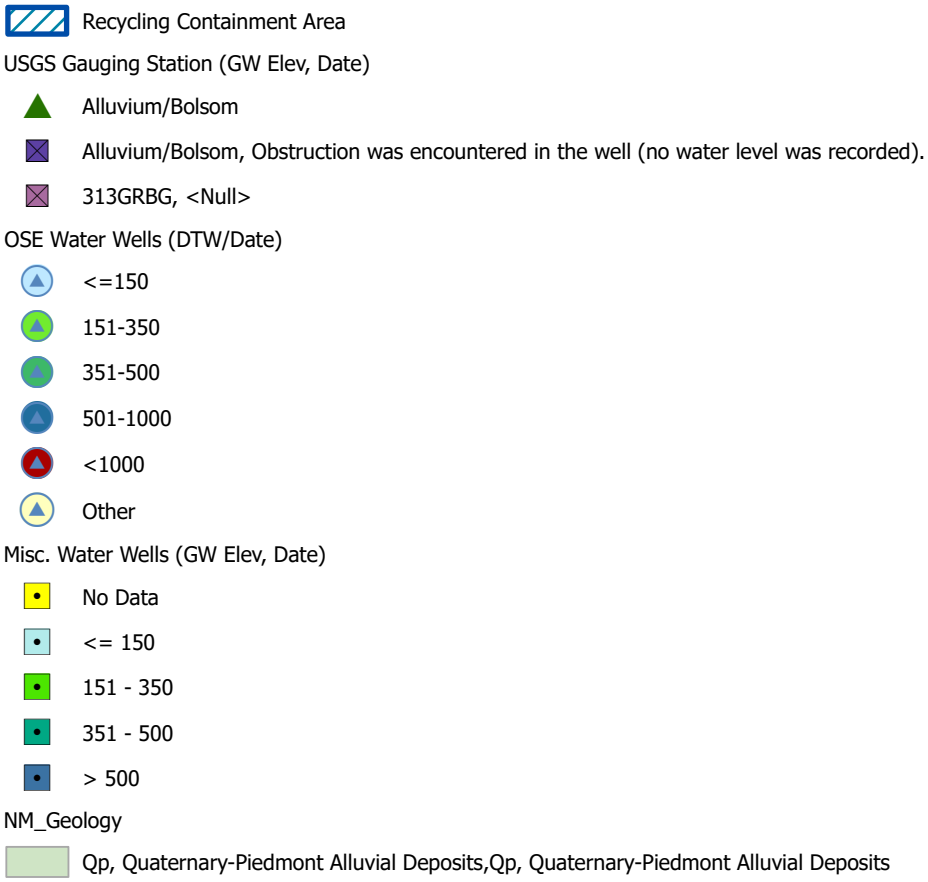

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Legend Plates 1&3	
	Spur Energy - Radiohead AST	March 2025

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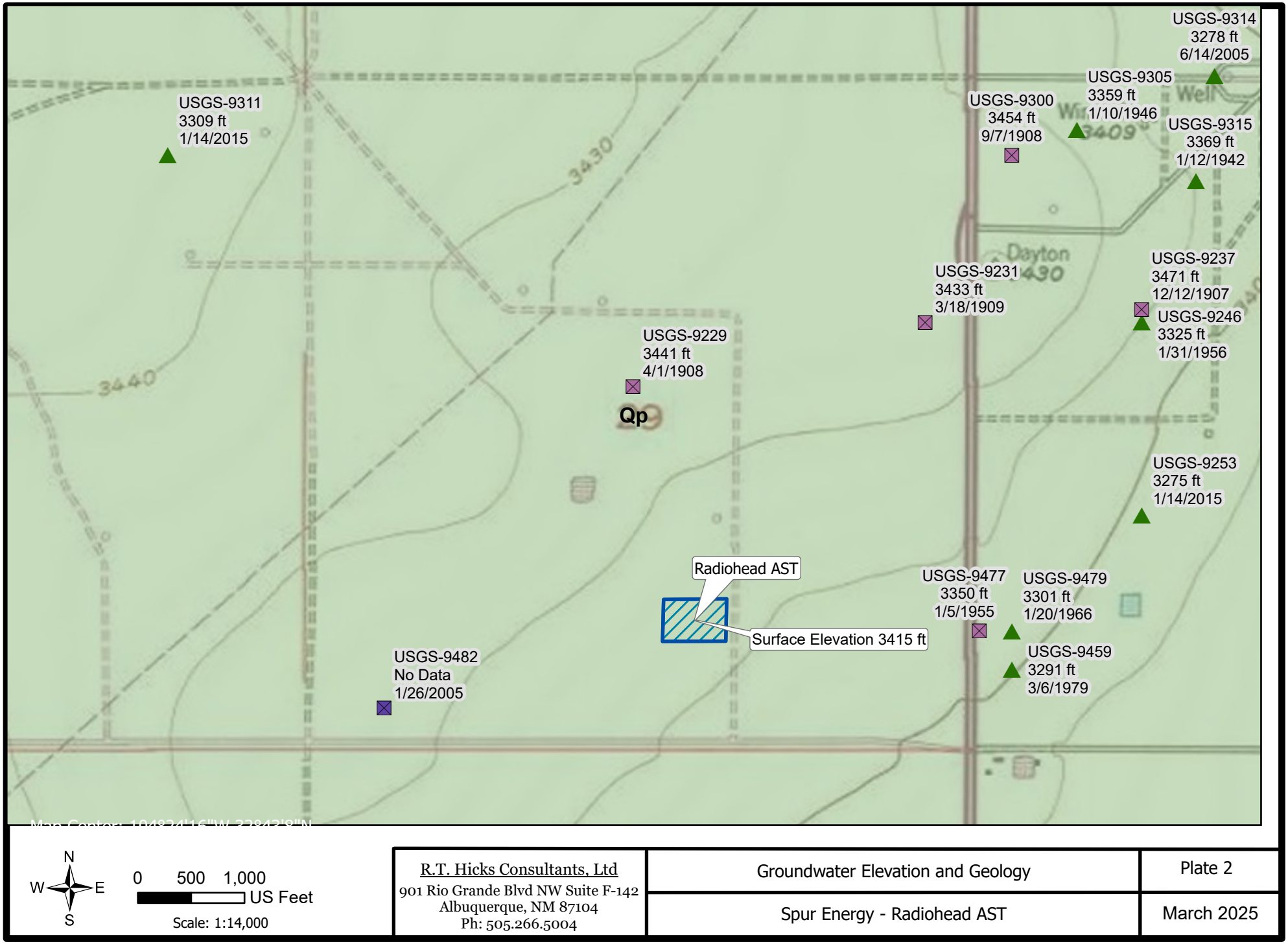

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Groundwater Elevation and Geology	Plate 2
	Spur Energy - Radiohead AST	March 2025

P:\CascadeRadioheadAST\SpurRadioheadAST.aprx

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Mapped Wetlands	Plate 9
	Spur Energy - Radiohead AST	March 2025

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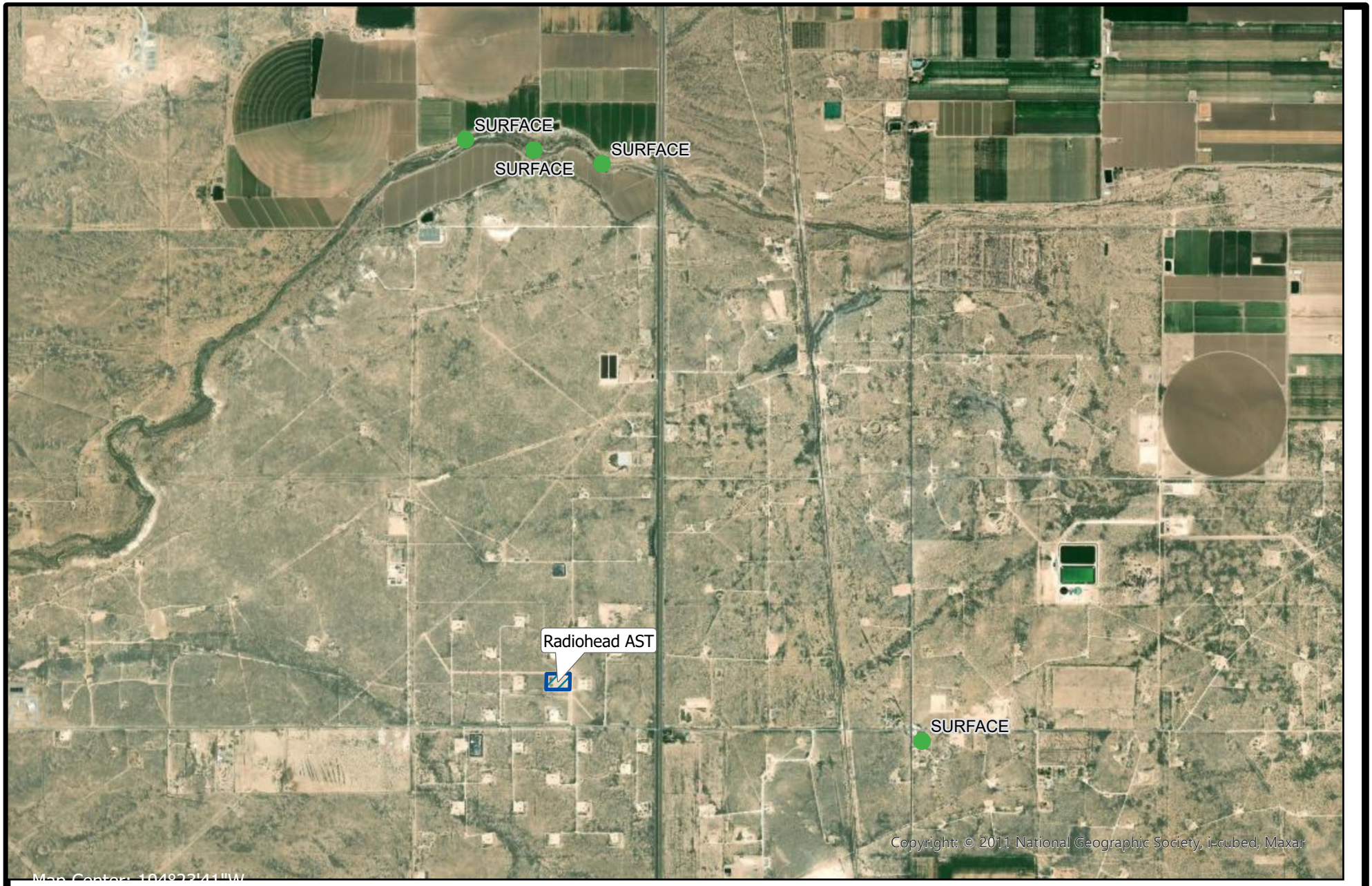

Map Center: 104°23'41"W

N
W E
S

0 2,000 4,000 US Feet

Scale: 1:40,000

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
	Spur Energy - Radiohead AST	March 2025

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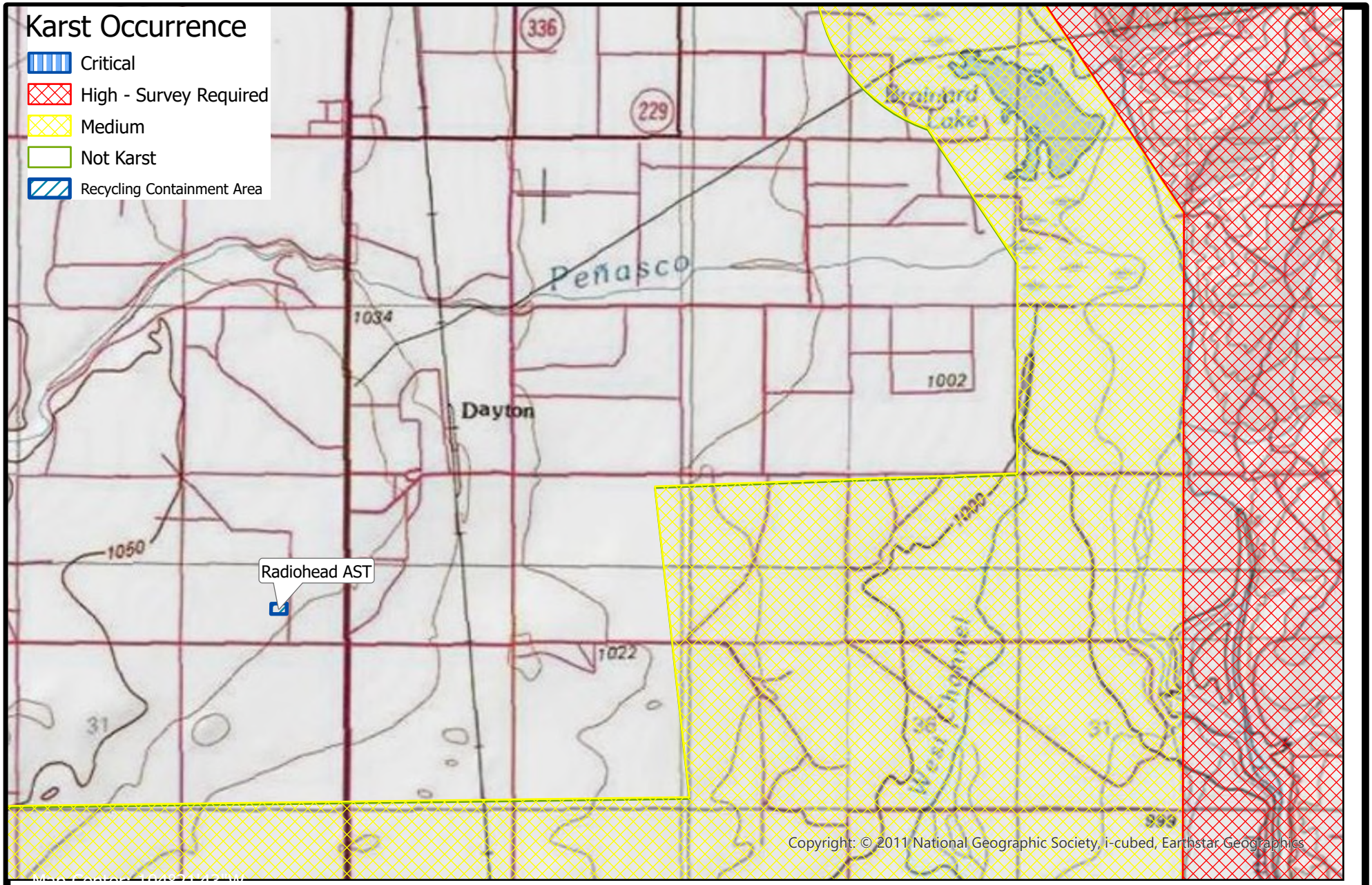

N
W E
S

0 3,000 6,000 US Feet

Scale: 1:60,000

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	BLM Mapped Karst Potential	Plate 5
	Spur Energy - Radiohead AST	March 2025

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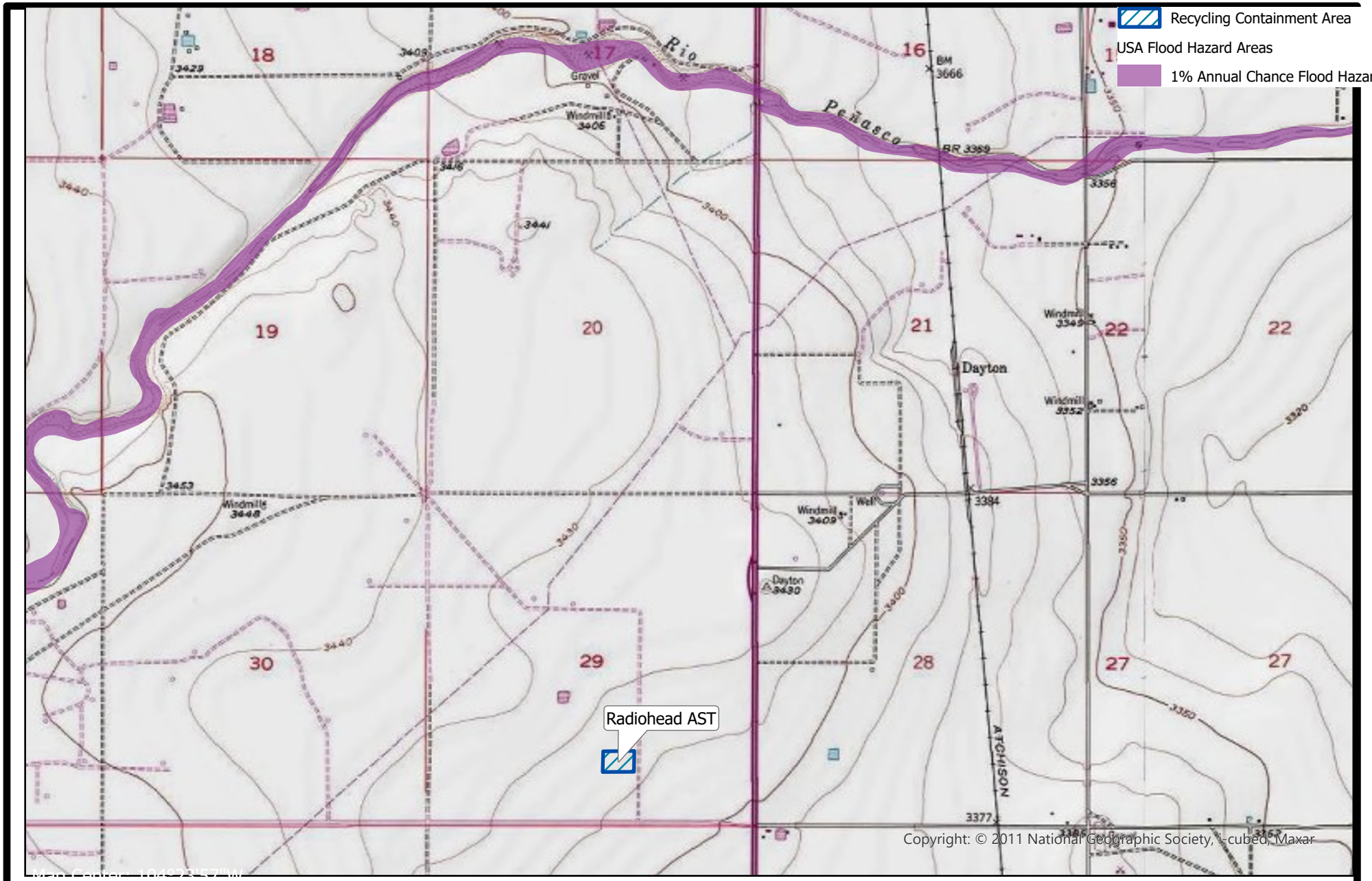

N
W E
S

0 1,500 3,000 US Feet

Scale: 1:30,000

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
	Spur Energy - Radiohead AST	March 2025

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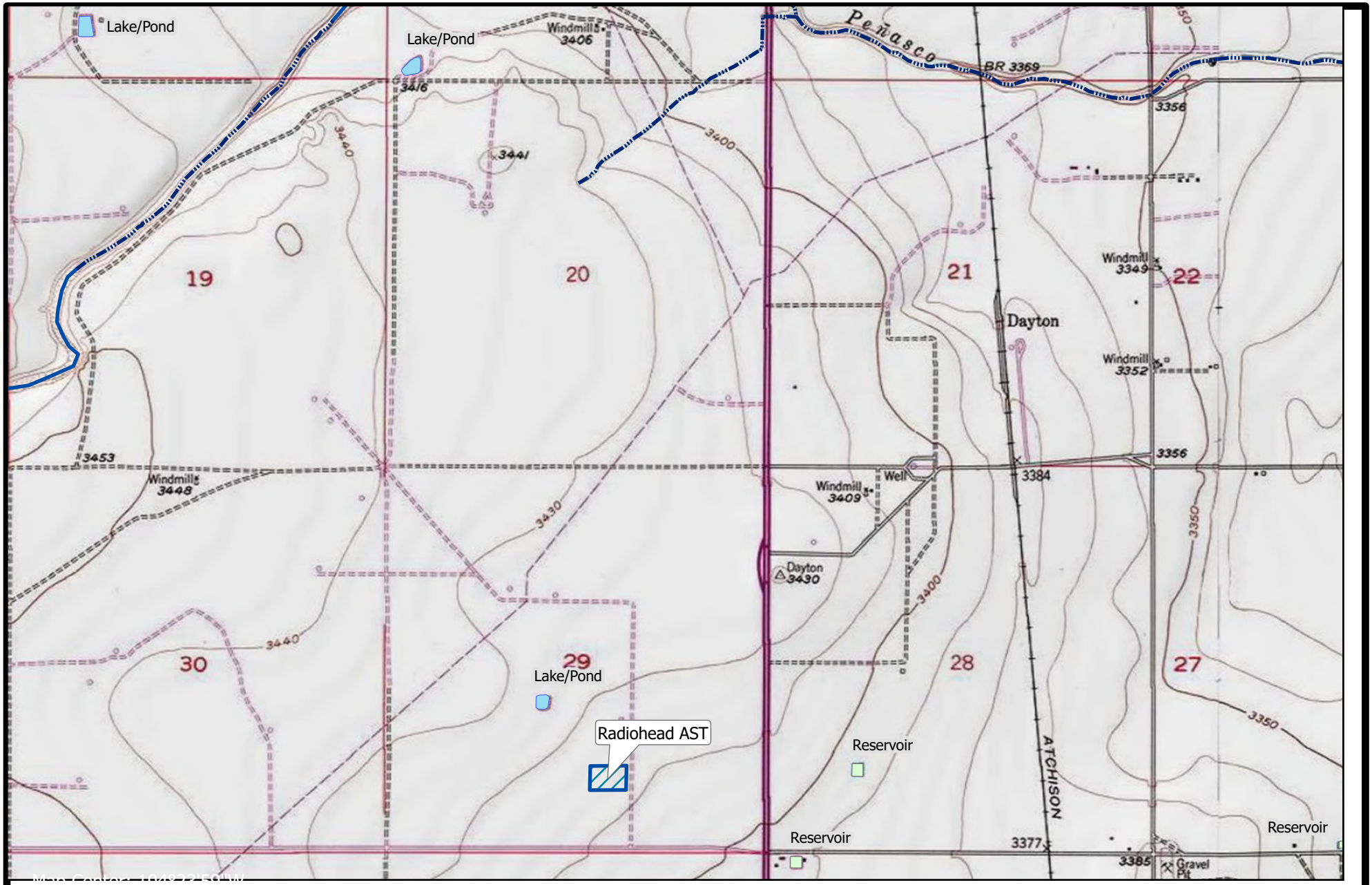

N
W E
S

0 1,250 2,500 US Feet

Scale: 1:26,000

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
	Spur Energy - Radiohead AST	March 2025

P:\CascadeRadioheadAST\SpurRadioheadAST.aprx

N
W E
S

0 300 600 US Feet

Scale: 1:6,000

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Nearest Structures	Plate 8
Spur Energy - Radiohead AST	March 2025

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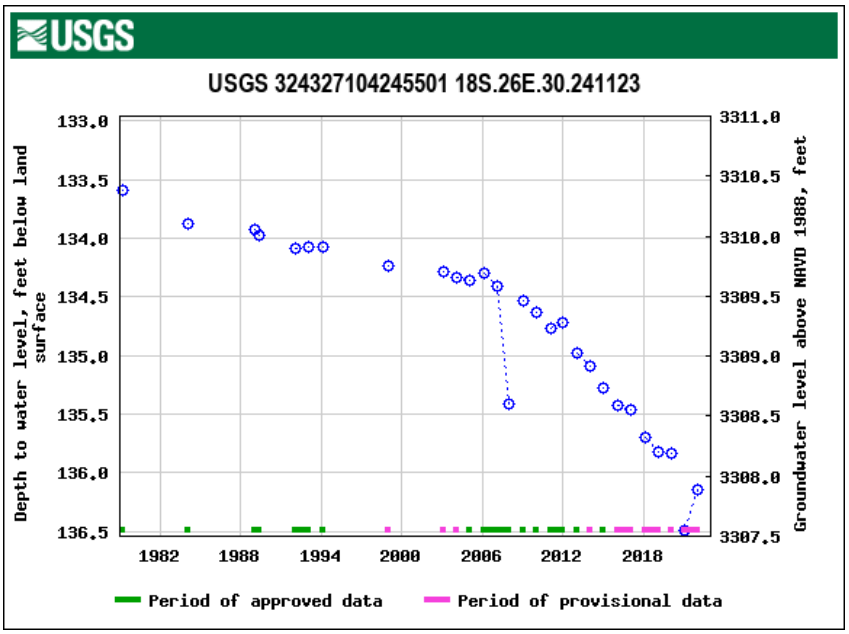
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Mapped Wetlands	Plate 9
	Spur Energy - Radiohead AST	March 2025

APPENDIX WELL LOGS & USGS DATA

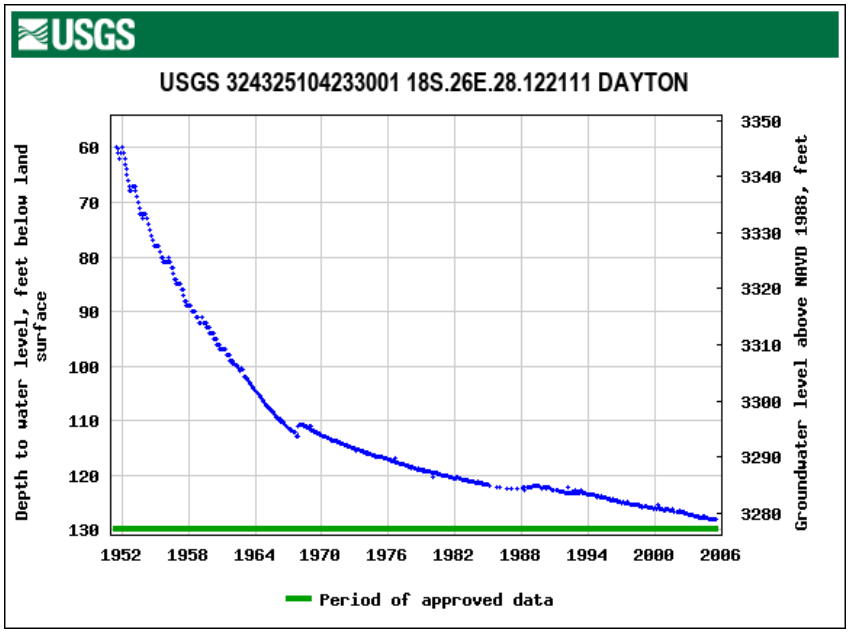
USGS 324327104245501 18S.26E.30.241123 AKA USGS-9311

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°43'27", Longitude 104°24'55"
NAD27
Land-surface elevation 3,444 feet above NAVD88
The depth of the well is 205 feet below land surface.
This well is completed in the Roswell Basin aquifer system (S400RSWLBS) national aquifer.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.



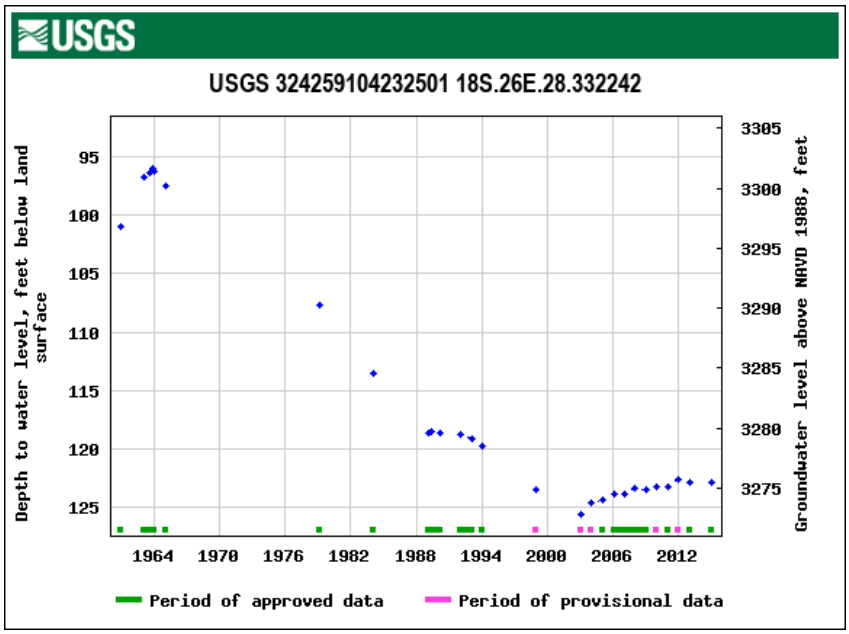
USGS 324325104233001 18S.26E.28.122111 DAYTON AKA USGS-9314

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°43'34", Longitude 104°23'22"
NAD83
Land-surface elevation 3,406 feet above NAVD88
The depth of the well is 250 feet below land surface.
This well is completed in the Roswell Basin aquifer system (S400RSWLBS) national aquifer.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.



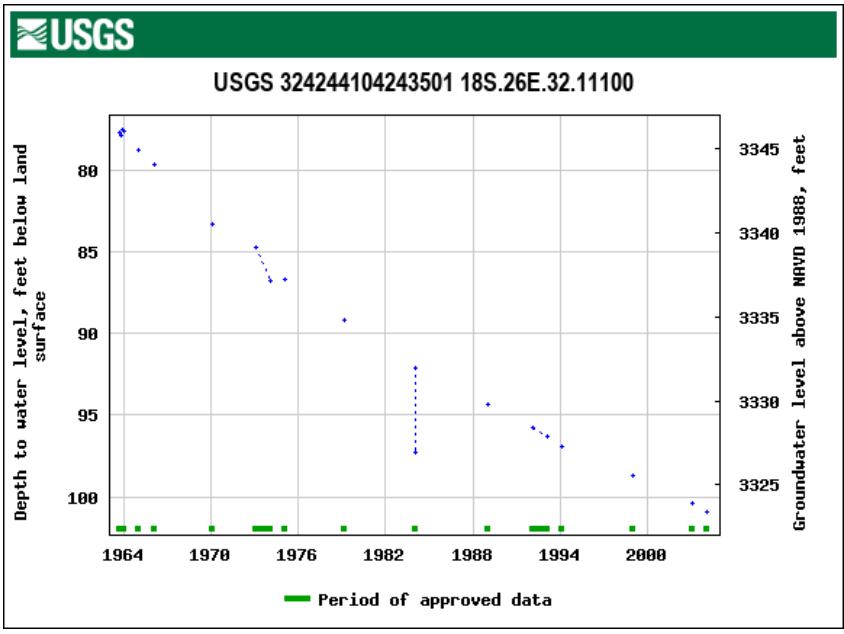
USGS 324259104232501 18S.26E.28.332242 AKA USGS-9253

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°42'59", Longitude 104°23'25" NAD27
Land-surface elevation 3,398 feet above NAVD88
The depth of the well is 170 feet below land surface.
This well is completed in the Roswell Basin aquifer system (S400RSWLBS) national aquifer.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.



USGS 324244104243501 18S.26E.32.11100 AKA USGS-9482

Hydrologic Unit Code 13060011
Latitude 32°42'44", Longitude 104°24'35" NAD27
Land-surface elevation 3,424 feet above NAVD88
The depth of the well is 152 feet below land surface.
This well is completed in the Roswell Basin aquifer system (S400RSWLBS) national aquifer.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.



Received by OCD: 3/20/2025 4:40:43 PM

Form WR-23 SANTA FE STATE ENGINEER OFFICE RA 4136

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

(Plat of 640 acres)

(A) Owner of well M. B. Kincaid
Street and Number Box 849 Standpipe Rd.
City Carlsbad State N. Mex.
Well was drilled under Permit No. RA-~~13~~ 4136 and is located in the
¼ NW ¼ NW ¼ of Section 32 Twp. 18S Rge. 26E
(B) Drilling Contractor Willard Beaty License No. WD62
Street and Number 1102 Merchant
City Artesia, State N. Mex.
Drilling was commenced December 19 19 59
Drilling was completed December 22 19 59

Elevation at top of casing in feet above sea level ____ Total depth of well 152
State whether well is shallow or artesian Shallow Depth to water upon completion 90

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	120	145	25	Sand & Gravel
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
6 5/8	17	10		152	152	None	120	152

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used
		8"			

Section 5 PLUGGING RECORD

Name of Plugging Contractor ____ License No. ____
Street and Number ____ City ____ State ____
Tons of Clay used ____ Tons of Roughage used ____ Type of roughage ____
Plugging method used ____ Date Plugged ____ 19 ____
Plugging approved by: ____ Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received STATE ENGINEER OFFICE DISTRICT II 1960 MAR -3 PM 1:42 pmh

769638

File No. RA-~~13~~ 4136 Use ~~St.~~ Dom. Location No. 18.26.32.110

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Received by OCD: 3/20/2025 4:40:43 PM

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	10	10		Cleache
10	50	40	Red	Clay
50	60	10	Red	Sand
60	90	30	Red	Clay
90	100	10	Blue	Clay
100	110	10		Sand & Gravel
110	120	10	Red	Clay
120	145	25		Sand & Gravel--Water
145	152	7	Red	Clay

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Willard Beaty

Well Driller

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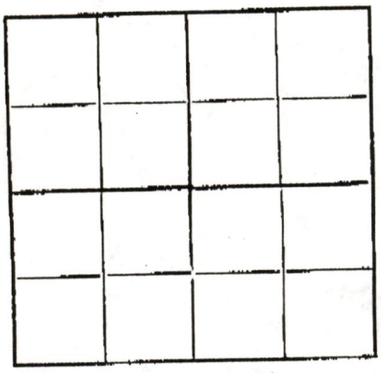
Form WR-23 FIELD ENGR. LOG

STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well Noble Drilling Co.

Street and Number Drawer 550

City Midland State Texas

Well was drilled under Permit No. RA4160 and is located in the NW ¼ SE ¼ NW ¼ of Section 29 Twp. 18S Rge. 26E

(B) Drilling Contractor Willard Beaty License No. WD 62

Street and Number 1102 Merchant

City Artesia State N. Mex.

Drilling was commenced February 12 19 60

Drilling was completed February 15 19 60

Elevation at top of casing in feet above sea level ..... Total depth of well 160

State whether well is shallow or artesian Shallow Depth to water upon completion 100

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	130	155	25	Sand & Gravel
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7"O.D.	17	10		160	160	None	130	160

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used
		8"			

Section 5 PLUGGING RECORD

Name of Plugging Contractor ..... License No. .....

Street and Number ..... City ..... State .....

Tons of Clay used ..... Tons of Roughage used ..... Type of roughage .....

Plugging method used ..... Date Plugged ..... 19 .....

Plugging approved by:

..... Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

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Date Received .....

769486

File No. AA-1144 Use D.D.W.D. Location No. 18.26.29.141

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Received by OCD: 3/20/2025 4:40:43 PM

RA - 4160

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	2	2	Brown	Top Soil
2	30	28	White	Gyp
30	60	30	Red	Clay
60	80	20	Gray	Clay Gyp
80	90	10	Red	Clay
90	100	10	Brown	Sand
100	120	20	Brown	Sand & Gravel
120	130	10	Red	Clay Sandy
130	155	25	Brown	Sand & Gravel
155	160	5	Red	Clay

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Well Driller

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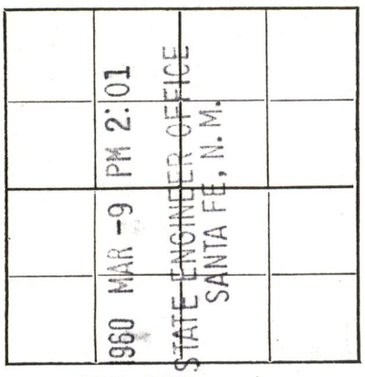
Received by OCD: 3/20/2025 4:40:43 PM

Form WR-23 SANTA FE STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well Noble Drilling Co.
Street and Number Drower 550
City Midland State Texas
Well was drilled under Permit No. RA4160 and is located in the
NW ¼ SE ¼ NW ¼ of Section 29 Twp. 18S Rge. 26E
(B) Drilling Contractor Willard Beaty License No. WD 62
Street and Number 1102 Merchant
City Artesia State N. Mex.
Drilling was commenced February 12 19 60
Drilling was completed February 15 19 60

Elevation at top of casing in feet above sea level ____ Total depth of well 160
State whether well is shallow or artesian Shallow Depth to water upon completion 100

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	130	155	25	Sand & Gravel
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7"O.D.	17	10		160	160	None	130	160

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used
		8"			

Section 5 PLUGGING RECORD

Name of Plugging Contractor ____ License No. ____
Street and Number ____ City ____ State ____
Tons of Clay used ____ Tons of Roughage used ____ Type of roughage ____
Plugging method used ____ Date Plugged ____ 19 ____
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received 1960 MAR -3 PM 1:42 STATE ENGINEER OFFICE DISTRICT II ROSWELL, N. MEX.

File No. RA-4160 Use O.W.D. Location No. 18.26.29.141

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Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	2	2	Brown	Top Soil
2	30	28	White	Gyp
30	60	30	Red	Clay
60	80	20	Gray	Clay Gyp
80	90	10	Red	Clay
90	100	10	Brown	Sand
100	120	20	Brown	Sand & Gravel
120	130	10	Red	Clay Sandy
130	155	25	Brown	Sand & Gravel
155	160	5	Red	Clay

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Willard Beaty

Well Driller

Received by OCD: 3/20/2025 4:40:43 PM

Revised June 1972

STATE ENGINEER OFFICE

SANTA FE

WELL RECORD

Section 1. GENERAL INFORMATION

'76 MAR 26 AM 9 38

STATE ENGINEER OFFICE
SANTA FE, N.M. 87501

(A) Owner of well Dave Y. Torres Owner's Well No. _____
Street or Post Office Address Rt. 1, Box 118
City and State Artesia, New Mexico 88210

Well was drilled under Permit No. RA-6029 and is located in the:

a. _____ ¼ _____ ¼ SW ¼ SW ¼ of Section 21 Township 18S Range 26E N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. 2 of Block No. 4 of the First addition West Dayton Subdivision, recorded in Eddy County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor Tidwell Drilling License No. WD-406

Address Box 17, Rt. 1 Artesia, New Mexico 88210

Drilling Began Nov. 15 Completed Nov. 25, 75 Type tools cable Size of hole 8 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 183 ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 140 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
140	180	40	sand & gravel	40

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
7	18	10	0	183.40		none	143	183

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by:

_____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad _____ FWL _____ FSL _____

File No. RA-6029 Use DOM. Location No. 18.26.21.33112

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Received by OCD: 3/20/2025 4:40:43 PM

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	14	14	brown top soil
14	20	6	white caliche
20	52	32	white clay
52	77	25	green clay
77	120	43	brown clay
120	183	63	brown gravel-strips of clay

Section 7. REMARKS AND ADDITIONAL INFORMATION

gravel packed

'76 APR 6 AM 8 34

STATE ENGINEER OFFICE
ROSWELL, N. M.

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Clyde Tidwell
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, ex Section 5, shall be answered as completely accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Released to Imaging: 3/25/2025 10:05:36 AM

Venegas, Victoria, EMNRD

From: Venegas, Victoria, EMNRD
Sent: Tuesday, March 25, 2025 9:57 AM
To: Sarah Chapman; 'BobbiJo Crain'
Subject: 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229]
Attachments: C-147 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229].pdf

2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229]

Good afternoon Ms. Chapman.
NMOCD has reviewed the recycling containment permit application and related documents, submitted by [328947] Spur Energy Partners LLC on 03/20/2025, Application ID 444460, for 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] in O-29-18S-26E, Eddy County, New Mexico. [328947] Spur Energy Partners LLC requested variances from 19.15.34 NMAC for 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229].

The following 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 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 40-mil non-reinforced LLDPE primary liner and a 30-mil non-reinforced LLDPE secondary liner or a liner system consisting of a 40-mil non-reinforced LLDPE primary liner and a 40-mil non-reinforced LLDPE secondary liner is approved. [328947] Spur Energy Partners LLC will notify the OCD through OCD Permitting of the installation of the liner system and provide the specifications of the liner system that has been installed.
- 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 will provide a mechanism to lock the gate when responsible personnel are not onsite.

The form C-147 and related documents for 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] are 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-220 - RADIOHEAD WEEZER AST [fVV2508355229] is approved for five years of operation from the date of permit application of 03/20/2025. 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] permit expires on 03/20/2030. If [328947] Spur Energy Partners LLC wishes to extend operations past five years, an annual extension request must be submitted using Form C-147 through OCD Permitting by 02/20/2030.
- 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] consists of one (1) AST containment with a fluid capacity of 40,000.00 barrels.

- [328947] Spur Energy Partners LLC shall construct, operate, maintain, close, and reclaim 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] in compliance with NMAC 19.15.34 NMAC.
- [328947] Spur Energy Partners LLC shall notify OCD, through OCD Permitting, when construction of 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] commences.
- [328947] Spur Energy Partners LLC shall notify NMOCD through OCD Permitting when recycling operations commence and cease at 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229].
- A minimum of 3-feet freeboard must be maintained at 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] 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-220 - RADIOHEAD WEEZER AST [fVV2508355229] are considered ceased and a notification of cessation of operations should be sent electronically to OCD Permitting. A request to extend the cessation of operations, 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-220 - RADIOHEAD WEEZER AST [fVV2508355229] 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.
- [328947] Spur Energy Partners 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.
- [328947] Spur Energy Partners 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 logs available for review by the division upon request according to 19.15.34.13.A.
- [328947] Spur Energy Partners 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-220 - RADIOHEAD WEEZER AST [fVV2508355229].

Please reference number 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] in all future communications.
Best regards,

Victoria Venegas ● Environmental Specialist Advanced
EMNRD - Oil Conservation Division
506 W. Texas Ave. Artesia, NM 88210
575.909.0269 | **Victoria.Venegas@emnrd.nm.gov**

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

General Information
Phone: (505) 629-6116

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

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

CONDITIONS

Operator: Spur Energy Partners LLC 9655 Katy Freeway Houston, TX 77024	OGRID: 328947
	Action Number: 444460
	Action Type: [C-147] Water Recycle Long (C-147L)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	•2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] is approved for five years of operation. 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] permit expires on 03/20/2030. If [328947] Spur Energy Partners LLC wishes to extend operations past five years, an annual extension request must be submitted using Form C-147 through OCD Permitting by 02/20/2030. • [328947] Spur Energy Partners LLC shall construct, operate, maintain, close, and reclaim 2RF-220 - RADIOHEAD WEEZER AST [fVV2508355229] in compliance with NMAC 19.15.34 NMAC. • [328947] Spur Energy Partners 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-220 - RADIOHEAD WEEZER AST [fVV2508355229].	3/25/2025