

Volume 3

C-147 Permit Package for Hamon AST Containment

Section 17, T19S, R33E, Lea County

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



View east from USGS-15469, an abandoned well located about 450 feet west of the proposed Hamon project area. The area is a flat plain covered by eolian sand that is stabilized by vegetation.

Prepared for:
Legion Water Services, LLC
Denver, Colorado

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

May 23, 2024

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

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

RE: Legion Water Services LLC - Hamon Recycling Facility and Containment 1RF-519
Modification to add two (2) ASTs to this project
Section 7, T20S, R34E, Lea County

Dear Ms. Barr and Ms. Venegas:

On behalf of Legion Water Services, LLC, (Legion) R.T. Hicks Consultants Ltd. prepared this *modification/permit* for the above referenced project. The addition of the two 40,000 bbl. ASTs increase allowed storage of the RF from ~~750,129 bbl. to about 750,189 bbl.~~ The attached Volume 3 includes:

- This transmittal letter
- The closure cost estimate for the ASTs
- C-147 & Design Sketch
- Design/Construction Plan, O&M and Closure Plans
- Design Drawings & Set-Up SOP
- Variances and Equivalency Demonstrations

•1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] consists of two (2) inground containments of 750,129.00 bbl each and two (2) AST containments of 40,000.00 bbl each. The total fluid capacity of 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] is 1,580,258.00 BBL.
vv. 05/29/2024.

Volume 1 of the approved C-147 submission for RF-519 contains the Siting Criteria Demonstration and is not included herein. Volume 2 of the approved C-147 includes required information for the in-ground containments and is not included herein.

Legion will upload this modification/permit package to OCD via the OCD.Online portal. In compliance with 19.15.34.10 of the Rule, Legion provided the C-147 to the surface owner and proof of this notification will also be uploaded to the portal.

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: Legion Water Services
Cascade Services

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HAMMOND AST CONTAINMENTS

Financial Assurance Cost Estimate

Attached is the cost estimate for reclamation of the Hammond recycling in-ground

AST CONTAINMENTS

Total estimated cost for closure, reclamation, and restoration of the facility (AST, fencing, etc.) pursuant to Rule 34 is **\$65,000** based upon the work elements in the spreadsheet (below). We used the same estimate as previously approved AST Containments. As described in the transmittal letter, the AST Containment will lie on working pad for the In-ground containments and the cost for reclamation of this pad is included in the estimate above.

ITEM DESCRIPTION	UNITS	QTY	UNIT PRICE	TOTAL PRICE
Hamond ASTs Containment				
Removal of AST and Liner Disposal	1	2	\$30,000.00	\$60,000.00
Assess soil for impacts	1	2	\$2,500.00	\$5,000.00
Re-grade and Reclaim Site	1	2	0	\$0.00
Misc. disposal and removal of fencing and cattle guards	0	2	0	\$0.00
<u>Facility Decommission Site</u>				
<u>Subtotal:</u>				\$65,000.00

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

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

Form C-147
Revised April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: Recycling Facility Recycling Containment*
Type of action: Permit Registration
 Modification Extension
 Closure Other (explain) add two (2) ASTs to 1RF-519

* 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: Legion Water Services LLC OGRID #: 332392
Address: 1515 Wynkoop Street Suite 700 Denver, CO 80202
Facility or well name (include API# if associated with a well): Hamon Reuse Facility & AST CONTAINMENT #3 & #4
OCD Permit Number: 1RF-519 (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr: L Section: 7 Township: 20S Range: 34E County: Lea
Surface Owner: Federal State Private Tribal Trust or Indian Allotment

2.
 Recycling Facility:
Location of (if applicable): Latitude: 32.585223 Longitude: -103.607026 approximately (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: #3 & #4 AST Containments
 Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)
Center of Recycling Containment (if applicable) Latitude: 32.585223 Longitude: -103.607026 approx. (NAD83)
 For multiple or additional recycling containments, attach design and location information of each containment
 Lined Liner type: Thickness 60 mil pri. and 40 mil sec. See Attached Engineer Drawings LLDPE HDPE PVC Other
 String-Reinforced
Liner Seams: Welded Factory Other Volume: bb1 See Attachment Drawings and Plans Dimensions _____
 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 \$ See Estimate (work on these facilities cannot commence until bonding amounts are approved)

Attach closure cost estimate and documentation on how the closure cost was calculated - after transmittal letter.

5.

Fencing:

Four-foot height, four strands of barbed wire evenly spaced between one and four

feet Alternate. Please specify: See Variance

6.

Signs:

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

Signed in compliance with 19.15.16.8 NMAC

7.

Variances:

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

Check the below box only if a variance is requested:

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

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

8.

Siting Criteria for Recycling Containment

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

<u>General siting</u>	
<u>Ground water is less than 50 feet below the bottom of the Recycling Containment.</u> NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells Plates 1-2 Volume 1	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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 Plate 3	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division Plate 4	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map Plate 5	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within a 100-year floodplain. FEMA map Plate 6	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 Plate 7	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 Plate 8	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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. Plates 1 and 7 - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within 500 feet of a wetland. Plate 9 - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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): BRADEN HARRIS Title: LEGION WATER SERVICES

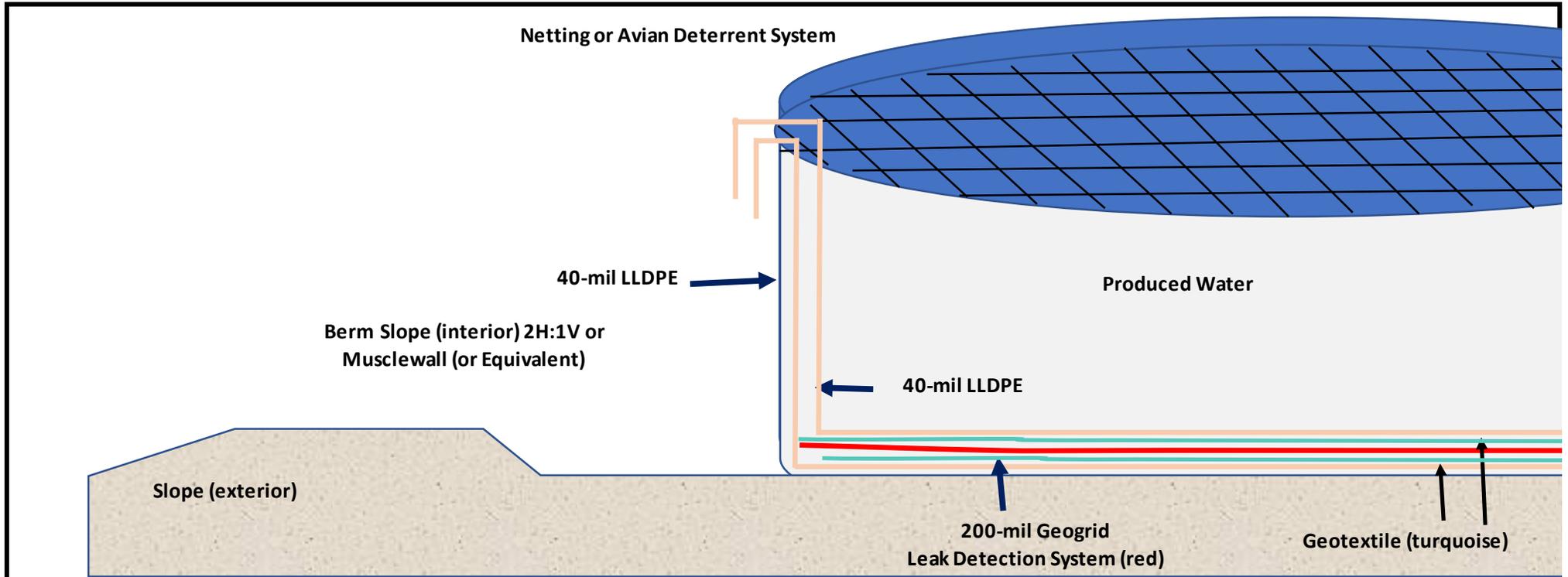
Signature:  Date: 4/30/24

e-mail address _____ Telephone: (406) 600-3310

11. OCD Representative Signature: Victoria Venegas Approval Date: 05/29/2024

Title: Environmental Specialist OCD Permit Number: 1RF-519

- OCD Conditions _____
- Additional OCD Conditions on Attachment _____



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
	Legion Water Services - Hamon AST	April 2024

Determine slope of pad and low point of AST

200 mil geogrid placed

above 8-oz geotextile and 30-mil secondary liner

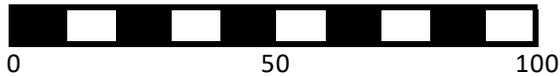
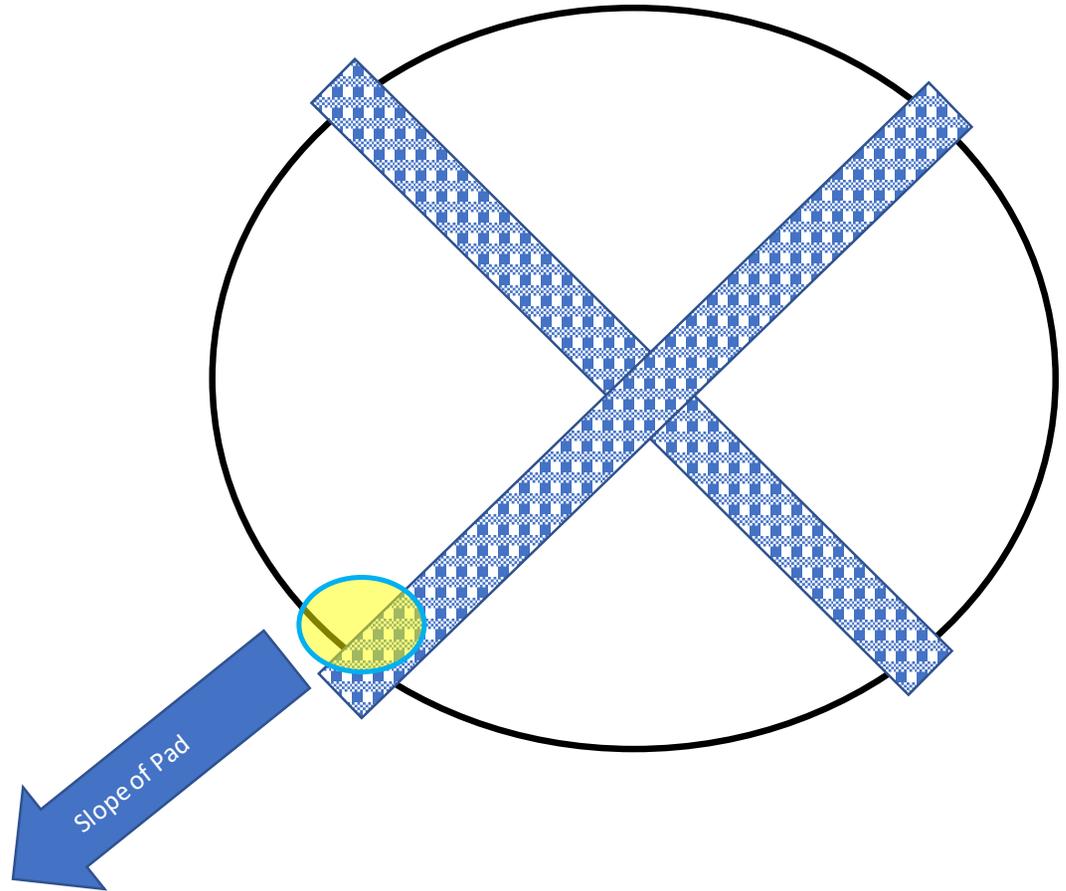
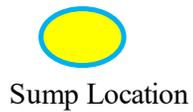
inside of AST after set up, before installation of primary liner

below two 40-mil primary liner system

geotextile is placed around the 200-mil geogrid drainage system

Sump at lowest point of the AST set up

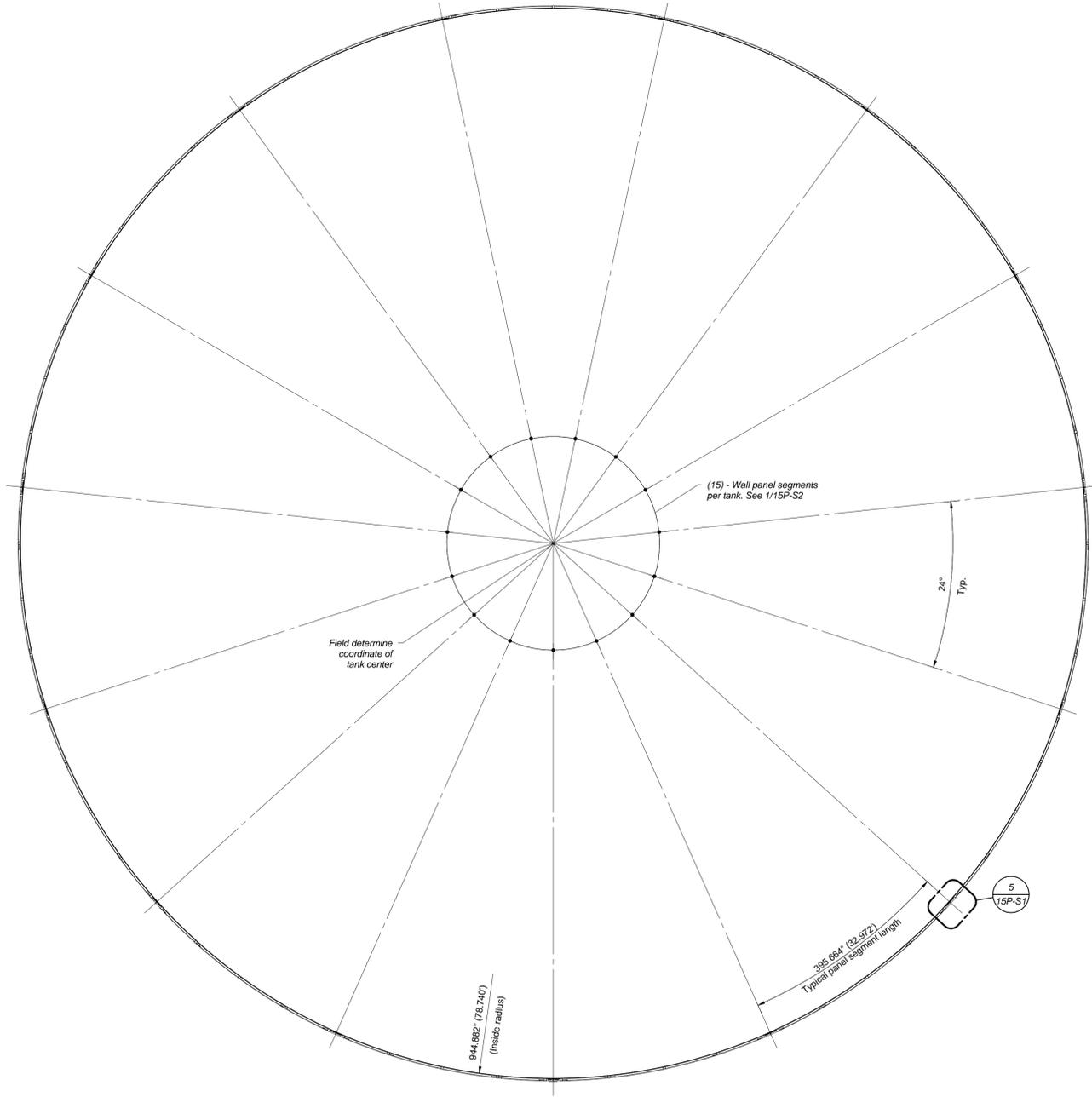
Leak detection riser pipe/hose installed per SOP



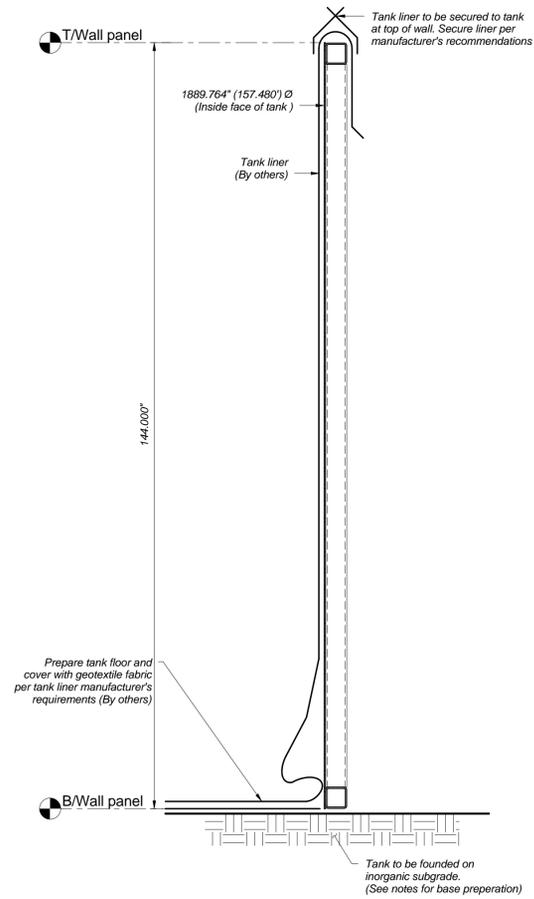
R.T. Hicks Consultants Albuquerque, NM	Layout of Geogrid Drainage Mat	Plate 2
	Legion Water Services - Hamon AST	April 2024

STAMPED DESIGN DRAWINGS

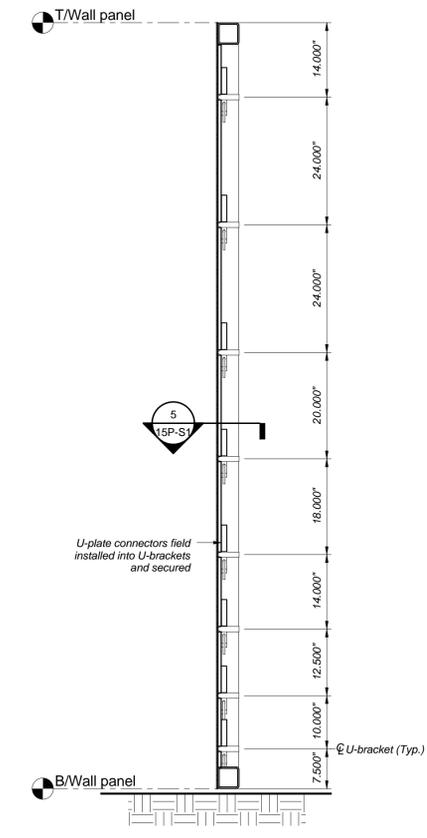
Hydrera Energy Modular Tanks 15P Water Tank (157.480' Dia.)



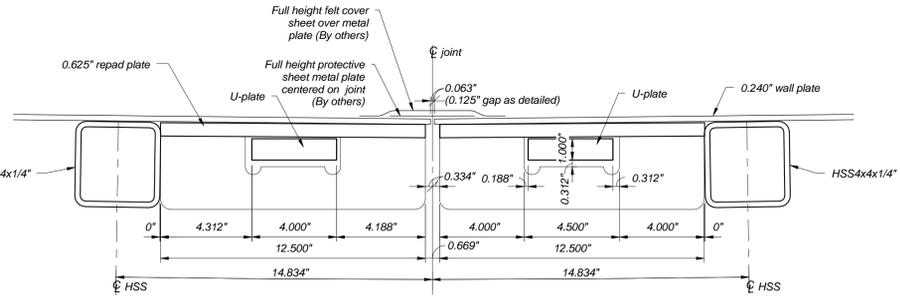
① Tank Layout Plan
SCALE: 3/32" = 1'-0"



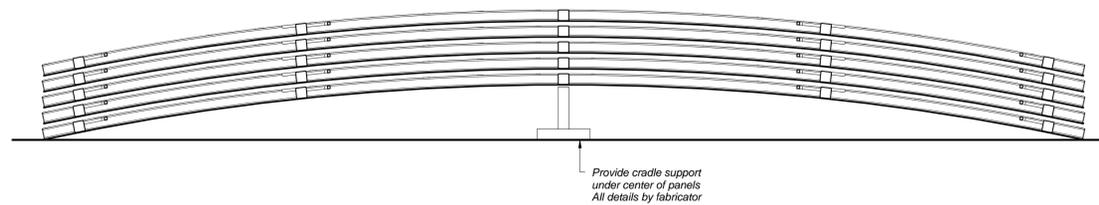
② Typical Tank Wall Section
SCALE: 3/4" = 1'-0"



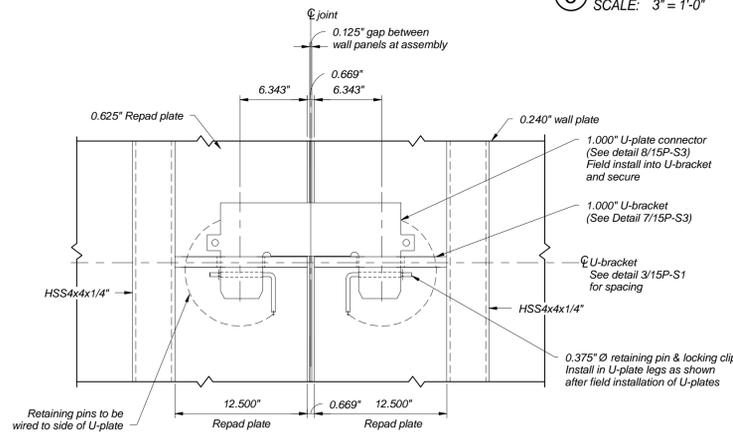
③ Wall Section at Panel Joint
SCALE: 3/4" = 1'-0"



⑤ Enlarged Plan Detail
SCALE: 3" = 1'-0"



④ Transport and Storage Detail
SCALE: N.T.S.



⑥ Enlarged Elevation
SCALE: 1 1/2" = 1'-0"

- Notes:
1. Contractor is responsible for means and methods of construction during tank erection and disassembly and for the safety of all personnel. All work shall be completed in strict accordance with all state and federal occupational safety and health administration requirements.
 2. Contractor is responsible for the stability of tank during assembly and disassembly and shall provide shoring as required until the tank is fully assembled or disassembled.
 3. The Contractor shall ensure all the panels are adequately supported or braced until the entire structure is assembled.
 4. All topsoil, organics, soft or wet soils, debris or other deleterious materials shall be removed from the tank site.
 5. The finished grades along the perimeter of the tank shall be level and true to plane. The maximum elevation difference across any two diametrical points shall be less than 9.000".
 6. The maximum deviation from plane over any 118.00' of circumference shall be less than 0.1875" and less than 0.500" over any 390.000" of circumference.
 7. The area surrounding the tanks shall be graded to direct surface water away from the tank.
 8. The edge of any (excavated) sump shall be a minimum of 36.000" from the edge of the tank wall.
 9. All wall panels shall be erected plumb. The maximum out-of-plumbness of the top of the panel relative to the bottom shall be less than 1.000".
 10. The maximum deviation from the theoretical radius shall be less than 2.000" at any point along the tank wall.
 11. The liner shall be securely fastened to the top of each panel in accordance with the liner's manufacturer's recommendations. The liner shall be installed with sufficient slack at the base of the panel to prevent any tension in the liner.
 12. The vertical lifting bar shall only be used to lift the panels into the vertical position. The lift rigging must be within 12.000" of the top rail prior to lifting the panel.

CERTIFIED BY: Troy A. Madlem, P.E.

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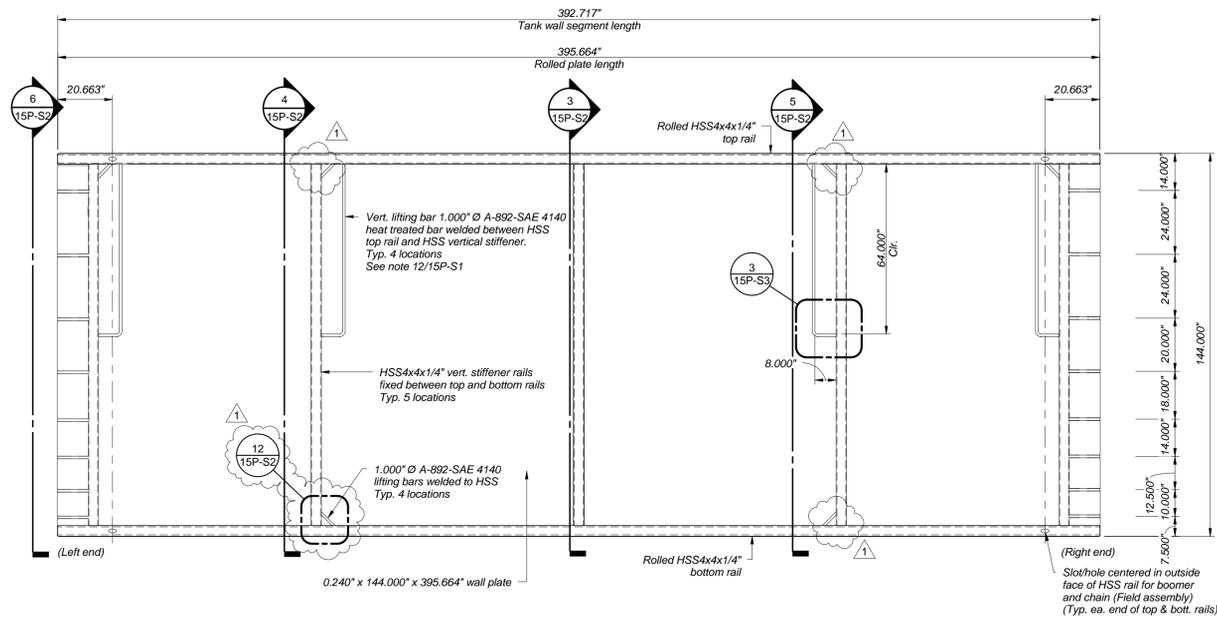
Revision:

Project: FEC
Designed: TCM
Checked: TAM
Scale: As indicated
Issue Date: 06/24/13

Tank Installation & Assembly

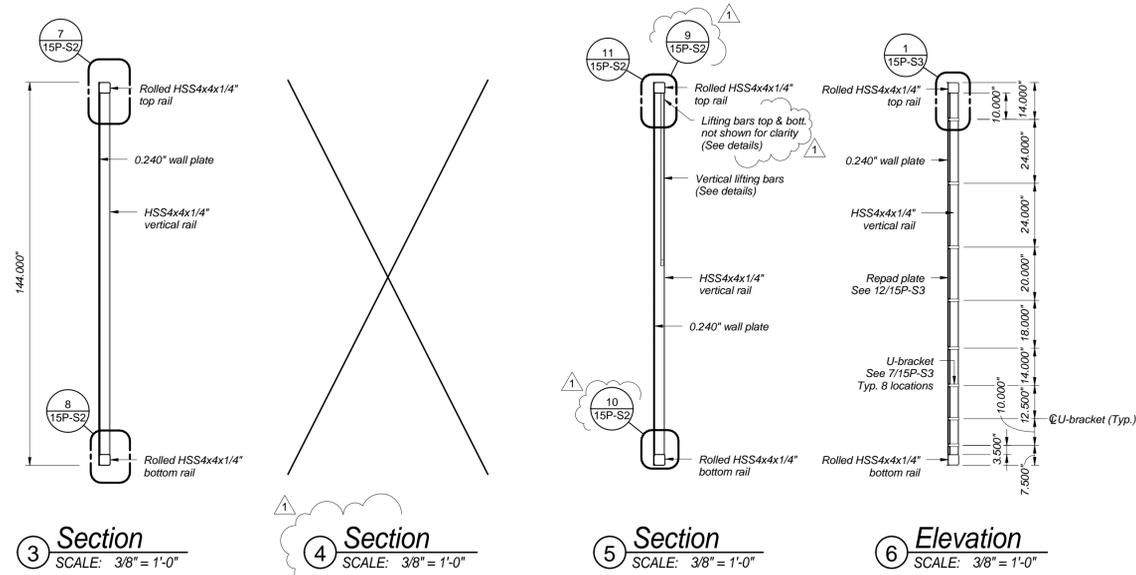
15P-S1

Hydrera Energy Modular Tanks 15P Water Tank (157.480' Dia.)



Note: Framing shown to outside face of panel.

1 Wall Panel elevation (15 total)
SCALE: 3/8" = 1'-0"

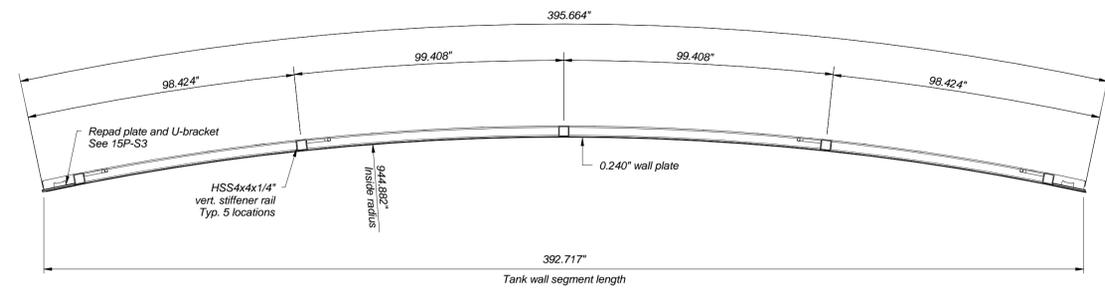


3 Section
SCALE: 3/8" = 1'-0"

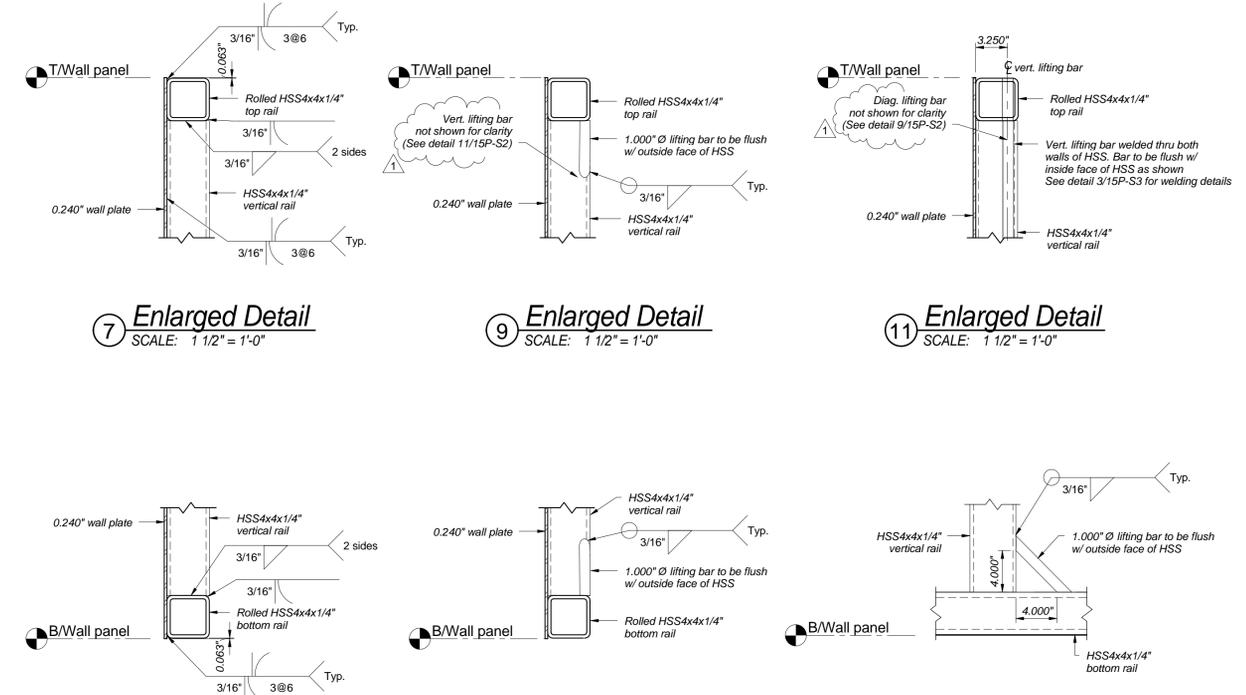
4 Section
SCALE: 3/8" = 1'-0"

5 Section
SCALE: 3/8" = 1'-0"

6 Elevation
SCALE: 3/8" = 1'-0"



2 Typical Plan Section
SCALE: 3/8" = 1'-0"



- General Notes:**
- Tank design based on a design liquid with specific gravity of 1.0.
 - All structural steel design, fabrication and erection shall comply with American Institute of Steel Construction (AISC) specification 303 and 360, latest editions.
 - All welding shall be performed in strict accordance with American Welding Society (AWS) D1.1, latest edition.
 - Structural steel materials shall comply with the following minimum requirements:
Wall plate.....ASTM A-572 w/ min. Fy = 44 ksi.
HSS tubing.....ASTM A-500, Gr. B w/ min. Fy = 46 ksi.
Repad plates.....ASTM A-572, Gr. 50 w/ min. Fy = 50 ksi.
U-plates.....ASTM A-514, Gr. B w/ min. Fy = 100 ksi.
U-brackets.....ASTM A-514, Gr. B w/ min. Fy = 100 ksi.
Lifting bars.....ASTM A-892-SAE 4140 w/ min. Fy = 135 ksi.
 - Fabrication of wall panels shall be of solid welded construction, as shown, using appropriate weld electrodes with minimum tensile strength equal to or greater than the yield strength of the strongest connected parts.



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Revision:	07/30/13
1	Revisions

Project:	FEC
Designed:	TCM
Drawn:	TAM
Checked:	TAM
Scale:	As indicated
Issue Date:	06/24/13

Framing Plan, Elevation,
Sections & details

15P-S2

Hydrera Energy Modular Tanks
15P Water Tank (157.480' Dia.)



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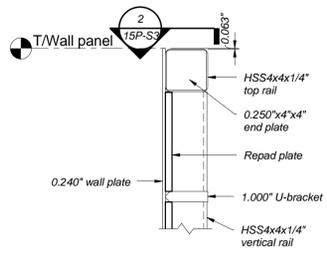
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Revision	Revisions	07/30/13
1	Revisions	

Project: Designated: FEC
Drawn: TCM
Checked: TAM
Scale: As indicated
Issue Date: 06/24/13

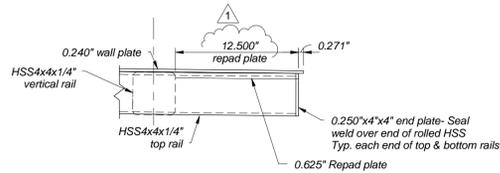
Framing Sections & Details

15P-S3

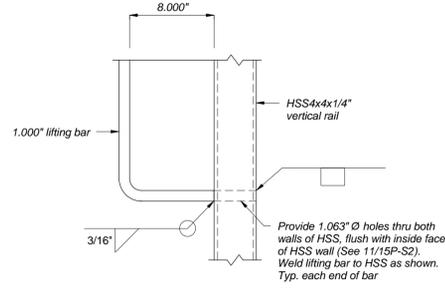


Note: Detail at bottom rail similar.

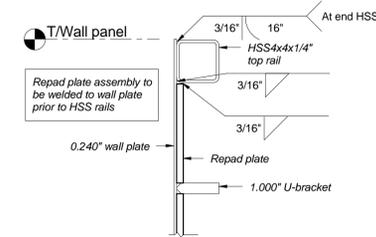
1 Enlarged Detail
SCALE: 1 1/2" = 1'-0"



2 Plan Detail
SCALE: 1 1/2" = 1'-0"

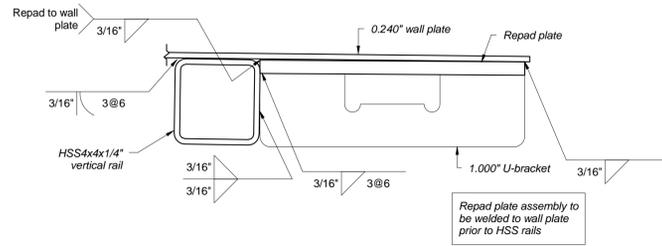


3 Enlarged Detail
SCALE: 1 1/2" = 1'-0"

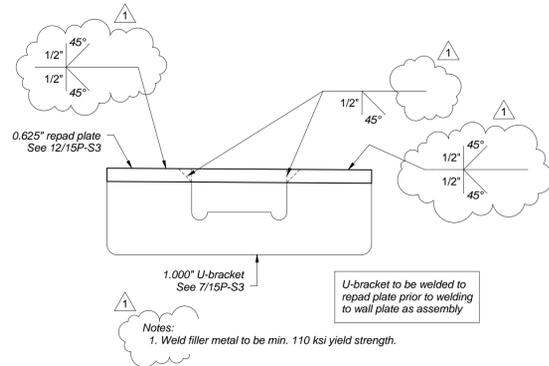


Note: Connection detail at bottom rail similar.

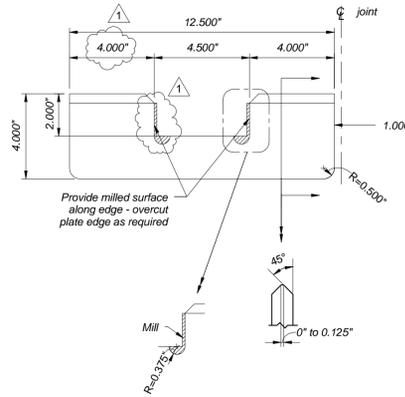
4 Panel Connection Welds - Section
SCALE: 1 1/2" = 1'-0"



5 Repad Connection
SCALE: 3" = 1'-0"

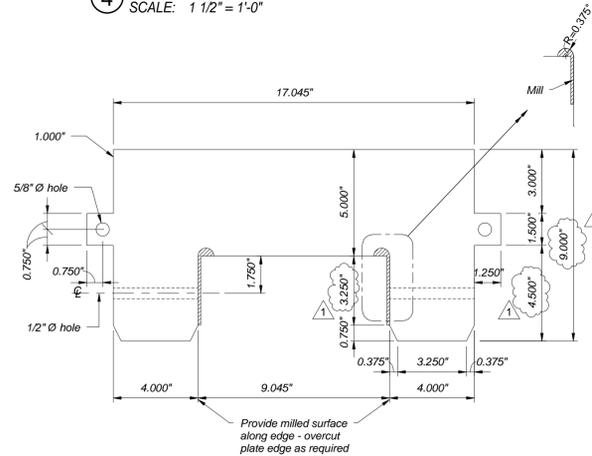


6 U-Bracket to Repad Connection
SCALE: 3" = 1'-0"



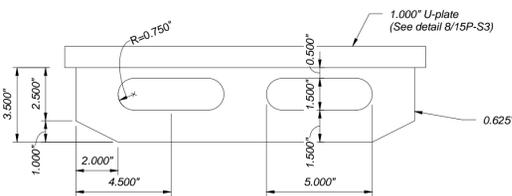
Note: U-bracket shall be ASTM A-514-B w/ min. Fy = 100 ksi.

7 U-Bracket
SCALE: 3" = 1'-0"



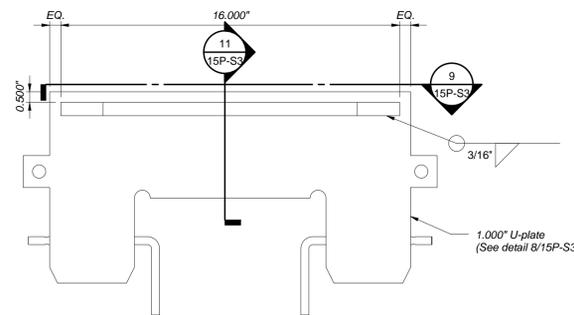
Note: U-plate shall be ASTM A-514-B w/ min. Fy = 100 ksi.

8 U-Plate
SCALE: 3" = 1'-0"

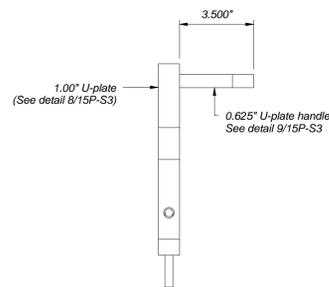


Note: U-plate handle shall be ASTM A-572, Gr. 50 w/ min Fy = 50 ksi.

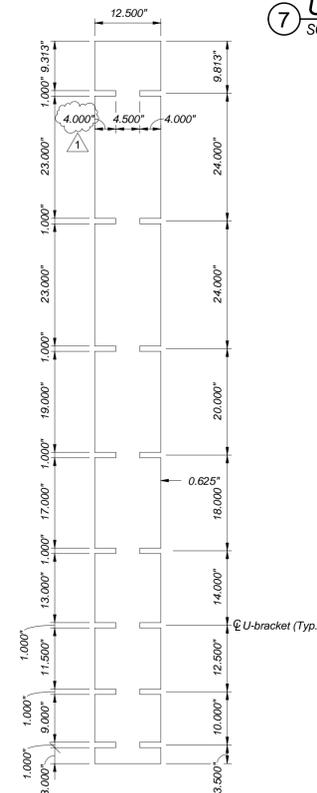
9 U-Plate Handle
SCALE: 3" = 1'-0"



10 U-Plate w/ Handle Assembly
SCALE: 3" = 1'-0"

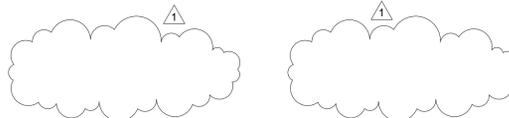


11 U-Plate Section
SCALE: 3" = 1'-0"



Notes:
1. Repad plate shall be ASTM A-572, Gr. 50 w/ min Fy = 50 ksi.

12 Repad Elevation
SCALE: 3/4" = 1'-0"





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/yd² (g/m²) 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/ft² (l/min/m²) 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.
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Made in U.S.A.

U.S. Fabrication & Distribution Centers

Moses Lake, Washington • 4172 North Frontage Road E, Moses Lake, WA 98837 • 800.346.7744 • Fax 509.766.0414

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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.

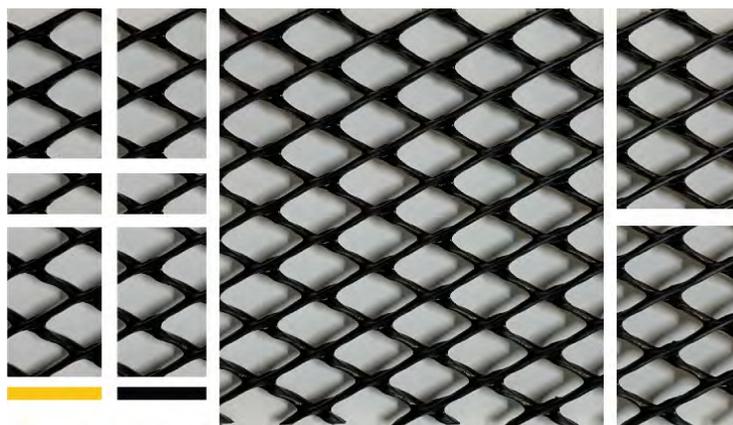
PROPERTY	TEST METHOD	UNIT	VALUE	QUALIFIER
Thickness	ASTM D 5199	mm	5.08	MAV ⁽³⁾
Carbon Black	ASTM D 4218	%	2.0	MAV
Tensile Strength	ASTM D 7179	N/mm	7.87	MAV
Melt Flow	ASTM D 1238 ⁽²⁾	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm ³	0.94	MAV
Transmissivity ⁽¹⁾	ASTM D 4716	m ² /sec	2.0 x 10 ⁻³	MAV

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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TECHNICAL DATA SHEET

Geomembrane 30mil LLDPE

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

Note;

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

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

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

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

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

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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.

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.

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.

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 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.

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.

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.

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.

Design and Construction Plan Above Ground Tank (AST) Containments

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.

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: 1V). 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.

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.

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

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.

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.

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 1×10^{-9} cm/sec. Liner compatibility shall meet or exceed the EPA SW-846 method 9090A or subsequent relevant publications.

Design and Construction Plan Above Ground Tank (AST) Containments

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.*

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).

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.

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

(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.

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 1×10^{-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.

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.

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

Design and Construction Plan Above Ground Tank (AST) Containments

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.

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.

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.

19.15.34.13 B

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

OPERATIONS AND MAINTENANCE PLAN

CLOSURE PLAN

Operations and Maintenance Plan Above Ground Tank Containment (AST)

General Specifications

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

The operator will maintain and operate the recycling containments and facility in accordance with the following plan to contain liquids and maintain the integrity of the liner to prevent contamination of fresh water and protect public health and the environment.

- The operator will use the treated produced water in the containments for drilling, completion (stimulation), producing or processing oil or gas or both. If other uses are planned, the operator will notify the OCD through the submission of a modified C-147.
- For all exploration and production operations that use produced water, the operator will conduct these activities in a manner consistent with hydrogen sulfide gas provisions in 19.15.11 NMAC or NORM provisions in 19.15.35 NMAC, as applicable.
- The operator will address all releases from the recycling and re-use of produced water in accordance with 19.15.29 NMAC.

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.

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.

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.

19.15.29.6

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

Operations and Maintenance Plan Above Ground Tank Containment (AST)

- The operator will not discharge into or store any hazardous waste in the recycling containments, but they may hold fluids such as freshwater, brackish water, recycled and treated water, water generated by oil or gas processing facilities, or other waters that are gathered for well drilling or completion. The recycling facility will not be used for the disposal of produced water. The operator will maintain the containments free of miscellaneous solid waste or debris.
 - The operator will verify that no oil is on the surface of the contained fluid. If oil is observed, the oil shall be removed using an absorbent boom or other device and properly disposed at an approved facility. An absorbent boom or other device will be maintained on site.
 - The operator will install and use a header and diverter described in the design/construction plan in order to prevent damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes during injection or withdrawal of liquids.
 - 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.
 - 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.
- 19.15.34.9 G
Recycling facilities may not be used for the disposal of produced water.

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.

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.

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

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.

(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.

Operations and Maintenance Plan Above Ground Tank Containment (AST)

- In the event of a leak due to a hole in the liner, the following steps will be followed:
 1. If the source of the fluid is uncertain, comparative field tests may need to be performed on both the water in the containment and that which may have been released (e.g. pH, conductance, and chloride).
 2. If the fluid is found to be coming from the containment, determine the location from which the leak is originating.
 3. Mark the point where the water is coming out of the tank.
 4. Locate the puncture or hole in the liner.
 5. Empty the containment to the point of damage in liner.
 6. Clean area of liner that needs to be repaired.
 7. Cut out piece of material (patch or tape) to overlay liner.
 8. Either weld the patch to the injured area in the liner or apply tape over the rupture.
 9. Make sure rupture is completely covered.
 10. Monitor as needed.

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

Monitoring, Inspections, and Reporting

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.

Weekly inspections consist of:

- Reading and recording the fluid height of staff gauges and freeboard
- Recording any evidence of visible oil on surface

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.

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

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.

Operations and Maintenance Plan Above Ground Tank Containment (AST)

- 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.

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.

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

19.15.34.12 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.

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.

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

Operations and Maintenance Plan Above Ground Tank Containment (AST)

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

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.

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

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.

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.

Closure Plan Above Ground Tank Containment (AST)

Closure Plan

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

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

Excavation and Removal Closure Plan – Protocols and Procedures

1. Residual fluids in the containments will be sent to disposal at a division-approved facility.
2. The operator will remove all solid contents and transfer those materials to the following division-approved facility:
 Disposal Facility Name: R360
 Permit Number NM 01-0006
3. If possible, geomembrane textiles and liners that exhibit good integrity may be recycled for use as an under liner of tank batteries or other use as approved by OCD.
4. Disassemble the recycling containment infrastructure according to manufacturer's recommendations
5. After the disassemble of the containments and removal of the contents and liners, soils beneath the tanks will be tested as follows
 - a. Collect a five-point (minimum) composite from beneath the liner to include any obviously stained or wet soils, or any other evidence of impact from the containments for laboratory analyses for the constituents listed in Table I of 19.15.34.14 NMAC.
 - b. If any concentration is higher than the parameters listed in Table I, additional delineation may be required, and closure activities will not proceed without Division approval.
 - c. If all constituents' concentrations are less than or equal to the parameters listed in Table I, then the operator will backfill the facility as necessary using non-waste containing, uncontaminated, earthen material and proceed to reclaim the surface to pre-existing conditions.

19.15.34.14 B

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

19.15.34.14 C

The operator shall test the soils beneath the containment for contamination with a five-point composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I below.

(1) If any contaminant concentration is higher than the parameters listed in Table I, the division may require additional delineation upon review of the results and the operator must receive approval before proceeding with closure.

(2) If all contaminant concentrations are less than or equal to the parameters listed in Table I, then the operator can proceed to backfill with non-waste containing, uncontaminated, earthen material.

Closure Plan Above Ground Tank Containment (AST)

Closure Documentation

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

In the closure report, the operator will certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in the closure plan.

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 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.

19.15.34.14 E

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

19.15.34.14 G

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

19.15.34.14 F

Reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds.

AST SET UP SOP

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 as 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-Assembly 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 1/4" – 1 1/2"
- Set of deep impact sockets 1/4" – 1 1/2" (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 suction 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.

May 2024

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

***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 1×10^{-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 1×10^{-9} cm/sec and meet or exceed EPA SW-846 method 9090A.

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

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Technical Memorandum: 40-mil LLDPE as Alternative Primary with 30-mil LLDPE as Alternative Secondary Liner System for Modular Steel AST Recycling Containment
NMAC 19.15.34.12 A (4)

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

The nature and formulation of LLDPE resin is very similar to HDPE. The major difference is that LLDPE is lower density, lower crystallinity (more flexible and less chemical resistant). However, LLDPE will resist aging and degradation and remain intact for many years in exposed conditions. The LLDPE resin is virtually the same for non-reinforced 30 or 40 mil LLDPE and string reinforced 30 or 45 mil LLDPE geomembranes and both will provide requisite containment and be equally protective for this application, enduring UV and chemical degradation in the produced water environment.

Flexibility Requirements. Non-reinforced LLDPE geomembranes are less stiff and far more flexible than string reinforced geomembranes as well as 60 mil HDPE and in this regard are preferred for installations in vertical wall tanks such as this proposed installation. LLDPE provides a very flexible sheet that enables it to be fabricated into large panels, folded for shipping and installed on vertical walls transitioned to flat bottom. Non-reinforced LLDPE sheet will conform better than a string reinforced LLDPE to the tank dimensions under hydrostatic loading and will exhibit less wrinkling and creasing during and after installation.

Thermal Fusion Seaming Requirements. Thermal seaming and QC seam test requirements for geomembranes are product specific and usually prescribed by the sheet manufacturer. Both dual wedge and single wedge thermal fusion welding is commonly used on LLDPE and QC testing by air channel (ASTM D 5820) or High Pressure Air Lance (ASTM D 4437) is fully acceptable and recognized as industry standards. In this regard, either non-reinforced LLDPE or string-reinforced LLDPE will be acceptable as far as QC and thermal fusion seaming methods are concerned.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

- Both types of LLDPE geomembrane are easily repaired using the same thermal fusion bonding method without the need for special surface grading 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

Attachments:

R. K. Frobel C.V.

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

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

NMAC 19.15.34.12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

(4) All primary (upper) liners in a recycling containment shall be geomembrane liners composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. *All primary liners shall be 30-mil flexible PVC, 45-mil LLDPE string reinforced or 60-mil HDPE liners. Secondary liners shall be 30-mil LLDPE string reinforced or equivalent with a hydraulic conductivity no greater than 1×10^{-9} cm/sec.* Liner compatibility shall meet or exceed the EPA SW-846 method 9090A or subsequent relevant publications.

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

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

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

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

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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

NMAC 19.15.34.12 A (4)

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

The nature and formulation of LLDPE resin is very similar to HDPE. The major difference is that LLDPE is lower density, lower crystallinity (more flexible and less chemical resistant). However, LLDPE will resist aging and degradation and remain intact for many years in exposed conditions. The LLDPE resin is virtually the same for non-reinforced 40 mil LLDPE and string reinforced 45 mil LLDPE geomembranes and both will provide requisite containment and be equally protective for this application.

Flexibility Requirements. Non-reinforced LLDPE geomembranes are less stiff and far more flexible than string reinforced geomembranes as well as 60 mil HDPE and in this regard are preferred for installations in vertical wall tanks such as this proposed installation. LLDPE provides a very flexible sheet that enables it to be fabricated into large panels, folded for shipping and installed on vertical walls transitioned to flat bottom. Non-reinforced LLDPE sheet will conform better than a string reinforced LLDPE to the tank dimensions under hydrostatic loading and will exhibit less wrinkling and creasing during and after installation.

Thermal Fusion Seaming Requirements. Thermal seaming and QC seam test requirements for geomembranes are product specific and usually prescribed by the sheet manufacturer. Both dual wedge and single wedge thermal fusion welding is commonly used on LLDPE and QC testing by air channel (ASTM D 5820) or High Pressure Air Lance (ASTM D 4437) is fully acceptable and recognized as industry standards. In this regard, either non-reinforced LLDPE or string-reinforced LLDPE will be acceptable as far as QC and thermal fusion seaming methods are concerned.

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

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

Leakage through any Primary geomembrane is driven by size of hole and depth and will be detected by the increase of water in the drainage system and the volume being pumped out of the secondary containment. In this regard and for this variance, the Primary consists of 40 mil LLDPE geomembrane which will perform equal to or better than a single layer of string reinforced LLDPE for potential leakage. Thus, if a leak occurs through the top layer, it will be effectively contained by the second layer of 40 mil LLDPE geomembrane. If required, location of holes in the Primary can be found by Electrical Leak Location Survey (ELLS) using a towed electrode (ASTM D 7007). Holes found can then be repaired and thus water seepage into the leakage collection and drainage system will be kept to a minimum. Dependent on OCR requirements for Action Leakage Rate (ALR), the leakage volumes may only be monitored. For example, a typical ALR is < 20 gpad whereas a rapid and large leak (RLL) may be > 100 gpad. Most states specify maximum ALR values for waste and process water impoundments usually in the range of 100 to 500 gpad. However, New Mexico does not specify an ALR for waste or process water impoundments (GRI Paper No. 15).

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

- Prefabrication in factory-controlled conditions into very large panels (up to 30,000 sf) results in ease of installation, less thermal fusion field seams and less on site QC and CQA. (It should be noted that HDPE cannot be prefabricated into panels and requires considerably more on-site welding and QC).
- Large prefabricated panels will provide better control of thermal fusion welding in a factory environment that will improve the liner system integrity for the long term. Ease of installation of large prefabricated custom size panels results in a greater reduction of installation time and associated installation and QC costs
- The Non-reinforced LLDPE geomembrane provides superior lay flat characteristics and conformability which allows for more intimate contact with the underlying soil, geonet, or geotextile and tank walls as well as overlying materials thus providing better flow characteristics for drainage of water. String reinforced LLDPE exhibits more wrinkling and when overlaid or in contact with a geonet drain, wrinkles tend to form pockets and dams affecting drainage of any leakage water to the exterior of the Modular AST Impoundment.
- Both types of LLDPE geomembrane are easily repaired using the same thermal fusion bonding method without the need for special surface grinding/preparation for extrusion welding as is typically used in repair of HDPE geomembranes.

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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 rife. The two layers of 40 mil non-reinforced LLDPE will provide the requisite protection of fresh water, public health and the environment for at least 5 years in the frack water environment.

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

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE



References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2018

ASTM Standards 2018

Attachments:

R. K. Frobel CV

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

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

Statement Explaining Why the Applicant Seeks a Variance

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

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT:

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

(2) A recycling containment shall have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. Geotextile is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity. *The operator shall construct the containment in a levee with an inside grade no steeper than two horizontal feet to one vertical foot (2H:1V). The levee shall have an outside grade no steeper than three horizontal feet to one vertical foot (3H:1V).* The top of the levee shall be wide enough to install an anchor trench and provide adequate room for inspection and maintenance.

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

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

With respect to storage of produced water for use in lieu of fresh water, Rule 34 is written for earthen, lined pits, not free-standing modular impoundments that employ liners as their primary fluid containment system. A modular impoundment consists of a professionally designed steel tank ring with vertical walls. There is no slope to consider as the segmental steel sections are set vertical.

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

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

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Technical Memorandum: Slope and Anchor Trench Variance for Above Ground Steel Modular Containments
NMAC 19.15.34.12 A (2), (3)

Side Slope

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

A modular impoundment, on the other hand, consists of a professionally designed steel tank ring with vertical walls. *There is no slope to consider as the segmental steel sections are set vertical.* Design of steel tanks, in regard to hydrostatic loading, wind loading, seismic loads, etc. are thoroughly referenced with detailed procedures in the design code - American Petroleum Institute (API) 650-98 "Welded Steel Tanks for Oil Storage". *There are no requirements for maximum slope inclination other than perhaps 90 degrees or vertical wall.*

Anchor Trench

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

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

In summary, based on the design and specifications of a modular steel impoundment, there is no requirement for a maximum interior slope angle of 2H:1V due to the fact that this impoundment is a steel tank with vertical walls. Additionally, there is no requirement for an anchor trench as the geomembrane is attached to the top of the Modular Impoundment vertical walls with large steel clips. This provides the requisite protection of fresh water, public health and the environment for many years.

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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

Sincerely Yours,

RK Frobel

Ronald K. Frobel, MSCE, PE



References:

NMAC 19 15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

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

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

Attachments:

R. K. Frobel C.V.

May 2024

***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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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



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

RONALD K. FROBEL, MSCE, P.E.

Page 2

**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.

RONALD K. FROBEL, MSCE, P.E.

Page 3

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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Additional VARIANCE FOR RECYCLING STORAGE CONTAINMENTS (Inground and AST)

- **Alternative Testing Methods**
- **Fencing ASTs**

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.

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.

Venegas, Victoria, EMNRD

From: Venegas, Victoria, EMNRD
Sent: Wednesday, May 29, 2024 2:22 PM
To: 'BobbiJo Crain'; sarah@avantnr.com
Subject: 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536]
Attachments: C-147 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] 05.29.2024.pdf

1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536]

Good afternoon Ms. Ferreyros,
 NMOCD has reviewed the recycling containment permit modification and related documents, request by [332392] Legion Water Services, LLC on May 23, 2024, Application ID 347439, for 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] in Unit Letter L, Section 07, Township 20S, Range 34E, Lea County, New Mexico. [332392] Legion Water Services, LLC requested a permit modification to add two (2) ATS to permit 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536].

The following variances, specific to the ASTs containments have been approved:

- The variance to 19.15.34.12.A.(2) NMAC for the no side-slope requirement for the AST containments 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 ASTs 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 is approved.
- The variance to 19.15.34.12.A.(4) NMAC for the installation on the AST containment of a 30-mil non-reinforced LLDPE secondary liner is approved.
- The variance to 19.15.34.14 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 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 requested modification to permit 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] is approved with the following conditions of approval:

- 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] consists of two (2) inground containments of 750,129.00 bbl each and two (2) AST containments of 40,000.00 bbl each. The total fluid capacity of 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] is 1,580,258.00 BBL.
- The updated closure cost estimated of 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] in the amount of \$1,111,743.32, meets the requirements of NMAC 19.15.34.15.A. The financial assurance should be mailed to:

EMNRD - Oil Conservation Division

Administration & Compliance Bureau
Attn: Bond Administrator
1220 S. St. Francis Drive | Santa Fe, NM 87505.

- [332392] Legion Water Services, LLC will operate 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] as originally permitted.
- [332392] Legion Water Services, LLC will comply with all conditions previously approved for the 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] permit.
- No changes to the operations procedures, maintenance, monitoring procedures, or closure procedures will be made aside from the requested modification.

Please let me know if you have any additional questions.
Regards,

Victoria Venegas • Environmental Specialist
Environmental Bureau
EMNRD - Oil Conservation Division
506 W. Texas Ave. Artesia, NM 88210
(575) 909-0269 | Victoria.Venegas@emnrd.nm.gov
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 1625 N. French Dr., Hobbs, NM 88240
 Phone:(575) 393-6161 Fax:(575) 393-0720
District II
 811 S. First St., Artesia, NM 88210
 Phone:(575) 748-1283 Fax:(575) 748-9720
District III
 1000 Rio Brazos Rd., Aztec, NM 87410
 Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
 1220 S. St Francis Dr., Santa Fe, NM 87505
 Phone:(505) 476-3470 Fax:(505) 476-3462

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

CONDITIONS

Action 347439

CONDITIONS

Operator: Legion Water Services, LLC 1515 Wynkoop Street Denver, CO 80202	OGRID: 332392
	Action Number: 347439
	Action Type: [C-147] Water Recycle Long (C-147L)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	The requested a permit modification to add two (2) ATS to permit 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] is approved. • [332392] Legion Water Services, LLC will operate 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] as originally permitted. • [332392] Legion Water Services, LLC will comply with all conditions previously approved for the 1RF-519 - HAMON REUSE FACILITY & IN-GROUND CONTAINMENT FACILITY ID [fVV2405337536] permit. • No changes to the operations procedures, maintenance, monitoring procedures, or closure procedures will be made aside from the requested modification.	5/29/2024