

March 2022

# **C-147 Permit Package for Scout Recycling Facility and AST Containment Section 6 T25S R28E, Eddy County**

***Volume 1  
Transmittal Letter  
C-147 Form  
Operations and Closure Plans  
Siting Criteria Demonstration Text and Figures  
Appendix Well Logs  
Appendix Site Photos***



Sunset at Higby Hole along the fastest and smoothest route between the Scout AST location and Carlsbad.

**Prepared for:**  
**ConocoPhillips Company**  
600 West Illinois Avenue  
Midland, Texas

**Prepared by:**  
**R.T. Hicks Consultants, Ltd.**  
901 Rio Grande NW Suite F-142  
Albuquerque, New Mexico 87104

## R. T. HICKS CONSULTANTS, LTD.

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

March 11, 2022

Mr. Mike Bratcher  
NMOCD - District 2, Supervisor  
811 S. First St.  
Artesia, NM 88210  
Via E-Mail

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

RE: ConocoPhillips Company 60,000 bbl. Scout AST Containment Permit  
Section 6 T25S R28E, Eddy County  
C-147 and Siting Criteria Demonstration

Dear Mr. Bratcher and Ms. Venegas:

On behalf ConocoPhillips Company, R.T. Hicks Consultants is pleased submit a permit for the above-referenced project. The current schedule calls for commencing to fill the AST Containment on or about March 27. Please note that the siting criteria demonstration:

- evaluates the recycling area that includes the proposed AST Containment and the treatment/recycling facility
- A conductor pipe boring for the nearby Scout 602H well provides excellent data demonstrating the depth to groundwater exceeds 100 feet in the area
- The explanation of how groundwater behaves in the area west of the Pecos and south of Malaga allows one to conclude that sufficient groundwater for a water supply well may not exist beneath the site

ConocoPhillips will transmit Volumes 1 and 2 of the permit application to OCD via the OCD.Online portal.

Volume 1 contains:

- The C-147 Form
- Our demonstration that the location meets all siting criteria in the Rule and the location meets the specified setback criteria,
- TO BE CONDUCTED ON TUESDAY MARCH 8 Documentation of our foot survey to check that all setback criteria are met,
- Operation and Maintenance Plan and Closure Plan that are consistent with the Rule and previously approved by OCD.

March 11, 2022

Page 2

Volume 2 contains information specific to the design and construction of the proposed AST and variance requests to cause the AST to conform to Rule 34. Specifically:

- Engineering drawings for the proposed 60,000 bbl. AST Containment are fully consistent with plans previously approved by OCD (please see the note from WWS following this transmittal letter),
- The Design/Construction Plan verbatim from the approved previously
- The manual for AST set up from Well Water Services
- Variances for AST Storage Containments – all of which have been approved by OCD previously,

In compliance with 19.15.34.10 of the Rule, this submission is copied to the owner of the surface upon which the containments will be constructed.

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

A handwritten signature in black ink, appearing to read "Randall T. Hicks".

Randall T. Hicks PG  
Principal

Copy: ConocoPhillips Company  
[Jeff.Walla@dvn.com](mailto:Jeff.Walla@dvn.com), Devon Energy (Surface Owner)

**r@rthicksconsult.com**

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**Subject:** RE: WWS - Permit Package

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**From:** sean wwstanks.com <sean@wwstanks.com>

**Sent:** Tuesday, February 15, 2022 4:06 PM

**To:** lindsey wwstanks.com <lindsey@wwstanks.com>; r@rthicksconsult.com

**Subject:** Re: WWS - Permit Package

In reference to the panel drawing, our original engineering design was for the 40,000 BBL curve but after further analysis the engineers approve the existing curve design to actually be used up to 60,000 BBL since the radius of the panels is such a slight difference at that point. Also upon further analysis that same panel could also be used up to 80,000 BBLs but with an additional pad panel added to bottom.

Please let me know if there is anything else you need.

**Sean Lovelace**

**President**

**307-267-1878**

**[www.wwstanks.com](http://www.wwstanks.com)**



C-147

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

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

Form C-147
Revised April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: [X] Recycling Facility [X] Recycling Containment\*
Type of action: [X] Permit [ ] Registration
[ ] Modification [ ] Extension
[ ] Closure [ ] Other (explain)

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

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

1. Operator: ConocoPhillips Company (For multiple operators attach page with information) OGRID #: 217817
Address: 600 W. Illinois Ave. Midland, Texas 79707
Facility or well name (include API# if associated with a well): Scout AST Containment and Recycling Facility
OCD Permit Number: (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr H Section 6 Township 25S Range 28E County: Eddy
Surface Owner: [ ] Federal [ ] State [X] Private [ ] Tribal Trust or Indian Allotment

2. [ ] Recycling Facility:
Location of recycling facility (if applicable): Latitude 32.161240 Longitude -104.119368 Approx NAD83
Proposed Use: [X] Drilling\* [X] Completion\* [X] Production\* [X] 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.
[X] Fluid Storage
[X] Above ground tanks [X] 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. [X] Recycling Containment:
[ ] Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)
Center of Recycling Containment (if applicable): Latitude 32.161240 Longitude -104.119368 NAD83
[ ] For multiple or additional recycling containments, attach design and location information of each containment
[ ] Lined [ ] Liner type: Thickness See Drawings mil [X] LLDPE [ ] HDPE [ ] PVC [ ] Other
[ ] String-Reinforced
Liner Seams: [X] Welded [ ] Factory [ ] Other Volume: 60,000 bbl Dimensions: L x W x D
[ ] Recycling Containment Closure Completion Date:

4.

**Bonding:**

Covered under bonding pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC (These containments are limited to only the wells owned or operated by the owners of the containment.)

Bonding in accordance with 19.15.34.15(A)(1). Amount of bond \$ \_\_\_\_\_ (work on these facilities cannot commence until bonding amounts are approved)

Attach closure cost estimate and documentation on how the closure cost was calculated.

5.

**Fencing:**

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

Alternate. Please specify \_\_\_\_\_

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.*

<b>General siting</b>	
<b>Ground water is less than 50 feet below the bottom of the Recycling Containment.</b> NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells <b>FIGURE 2</b>	<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. <b>FIGURE 3</b> - Written confirmation or verification from the municipality; written approval obtained from the municipality	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA
Within the area overlying a subsurface mine. <b>FIGURE 4</b> - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within an unstable area. <b>FIGURE 5</b> - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within a 100-year floodplain. FEMA map <b>FIGURE 6</b>	<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). <b>FIGURE 7</b> - Topographic map; visual inspection (certification) of the proposed site	<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 <b>FIGURE 8</b>	<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. <b>FIGURES 1 AND 7</b> - 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. <b>FIGURE 9</b> - 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): MARK HOLLY Title: SUPERINTENDENT - DELAWARE BRAN  
 Signature: [Handwritten Signature] Date: 3/14/2022  
 e-mail address: MARK.HOLLY@CONOCOPHILLIPS.COM Telephone: (432) 312-0423

11.

OCD Representative Signature: \_\_\_\_\_ Approval Date: \_\_\_\_\_

Title: \_\_\_\_\_ OCD Permit Number: \_\_\_\_\_

- OCD Conditions \_\_\_\_\_
- Additional OCD Conditions on Attachment \_\_\_\_\_

## OPERATIONS AND CLOSURE PLANS

## 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.
- 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

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

(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.

19.15.34.8 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.

19.15.34.9 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.

## Operations and Maintenance Plan Above Ground Tank Containment (AST)

- jets or impact from installation and removal of hoses or pipes during injection or withdrawal of liquids.
- Pursuant to a requested variance, the operator will maintain at least 2-feet of freeboard in each AST containment. Under extenuating circumstances, which will be noted on the inspection log as described below, the operator may temporarily exceed the freeboard mandate.
  - If the liner develops a leak or if any penetration of the liner occurs above the liquid's surface, then the operator will repair the damage or initiate replacement of the liner within 48 hours of discovery or will seek a variance from the division district office within this time period.
  - If visible inspection suggests that the liner developed a leak or if any penetration of the liner occurs below the liquid's surface, then the operator will remove all liquid above the damage or leak line within 48 hours of discovery. The operator will also notify the district division office within this same 48 hours of the discovery and repair the damage or replace the liner.
  - In the event of a leak due to a hole in the liner, the following steps will be followed:
    1. If the source of the fluid is uncertain, comparative field tests may need to be performed on both the water in the containment and that which may have been released (e.g. pH, conductance, and chloride).
    2. If the fluid is found to be coming from the containment, determine the location from which the leak is originating.
    3. Mark the point where the water is coming out of the tank.
    4. Locate the puncture or hole in the liner.
    5. Empty the containment to the point of damage in liner.
    6. Clean area of liner that needs to be repaired.
    7. Cut out piece of material (patch or tape) to overlay liner.

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)

8. Either weld the patch to the injured area in the liner or apply tape over the rupture.
9. Make sure rupture is completely covered.
10. Monitor as needed.

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

### *Monitoring, Inspections, and Reporting*

The containment will contain enough produced water to prevent any shifting of the liner. Weekly inspections shall occur when there is 1-foot depth or more of produced water in the containment. Monthly inspections shall occur when there is less than 1-foot depth of produced water in the containment, as well as when the ASTs are emptied and prior to refilling. An inspection log will be maintained by the operator and will be made available to the division upon request. Inspection 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. An "Inspection Form" meeting the requirements according to NMAC 19.15.34 is to be filled out during these routine inspections. The form also provides a list of observations that will enable early detection of uneven tank panel settlement, soil settlement, liner damage, insufficient liner slack, or leaks. The form is reproduced at the end of this section.

Weekly inspections consist of:

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

## Operations and Maintenance Plan Above Ground Tank Containment (AST)

- 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 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.

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.

19.15.34.13 C

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

# Inspection Form

Date: \_\_\_\_\_

#   h   #   - o   **AST Containment**

Tank ID: \_\_\_\_\_

Weekly inspection/Fluid level must be maintained > 1 foot

Fluid Level: \_\_\_\_\_

Tank contents: \_\_\_\_\_

Inspection Task#	Results		Remarks, Observations, and/or Remedial Actions
Visible Oil on Surface	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe Action	
<i>An absorbent boom or similar device is located on site to remove visible oil from surface.</i>			
At least 2 ft of freeboard	<input type="checkbox"/> Yes	<input type="checkbox"/> No, Measure Freeboard	
Evidence of surface water run-on	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
<i>Check for excessive erosion of perimeter berms.</i>			
Birds or wildlife in net or screen	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
<i>Within 30 days of discovery (immediately if federally protected species, report dead birds or wildlife to the appropriate agency (USFWS, NMDGF) and to NMOCD district division office.</i>			
Damage to netting or screen	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
Rupture of Liner	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
<i>If rupture is above fluid level, repair within 48 hours. If below fluid level, remove fluid above within 48 hours, notify NMOCD district division office, and repair. Immediately notify BLM of any leak</i>			
Clips or clamps properly securing liner	<input type="checkbox"/> Yes	<input type="checkbox"/> No, Describe	
If low level, enough liner slack on panel wall	<input type="checkbox"/> Yes	<input type="checkbox"/> No, Describe	
Uneven gaps between panels	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
Signs of tank settlement	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	

O AST Containment

Erosion of soil surrounding tank (10 ft radius)	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
Running water on the ground	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
Unusual ponding of fluid inside berm	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
<i>Field test (pH, Cl-, conductance, etc.) ponded fluid and compare to fluid in tank. If tank is determined as the source, locate and repair rupture within 48 hours. Notify NMOCD district division office and repair. Immediately notify BLM.</i>			
Rust or corrosion on panels, stairs, or hardware	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	
Damage to any hardware	<input type="checkbox"/> None Observed	<input type="checkbox"/> Yes, Describe	

Additional Observations or Actions:

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Inspected by: \_\_\_\_\_

## 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 Re-vegetation*

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

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

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

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

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

The operator will notify the division when the site meets the surface owner's requirements or exhibits a uniform vegetative cover that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds. The operator will notify the Division when reclamation and re-vegetation is complete.

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

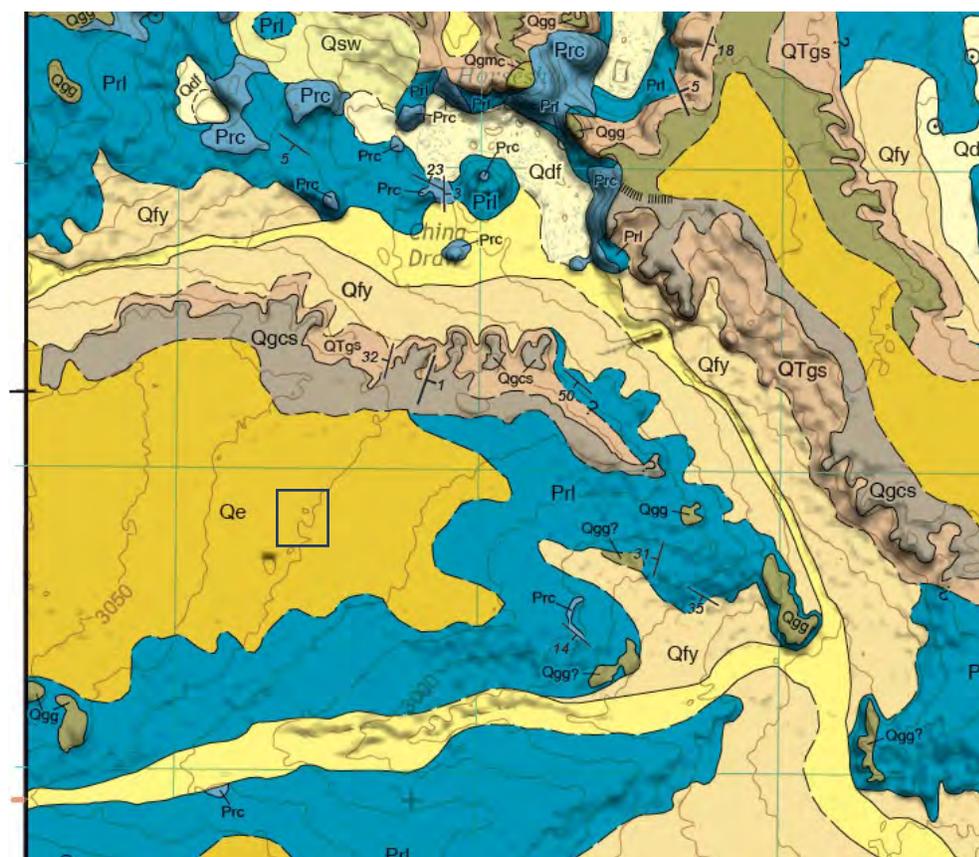
Reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels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

# SITING CRITERIA DEMONSTRATION

SITING CRITERIA (19.15.34.10 NMAC)  
SOLARIS WATER MIDSTREAM, SCOUT AST CONTAINMENT

## Geology

The site for the Scout AST Recycling Containment is located approximately 5 miles southwest of Malaga, New Mexico. Willow Lake is 3 miles to the northeast. According to the State of New Mexico Geologic Map<sup>1</sup>, Permian Age Rustler Formation (Pr) is exposed at the location of the proposed Scout AST containment and throughout most of the mapped area displayed in Figure 2. Older Alluvium (Qoa), is exposed in the eastern and eastern third of Figure 1, in the lower portion of China Draw. Quaternary Alluvium (Qa) is present in the northwest and southwest portions of Figure 2. The figure below shows the surface geology in more detail as it is reproduced from the Geologic Map of the Malaga 7.5-minute quadrangle.



The map shows the Scout location on Quaternary Eolian (Qa) deposits, which are described as a relatively thin veneer over bedrock, as presented below from the Malaga Geologic Map report:

Qe – Eolian deposits – Slope-blanketing windblown very pale brown silts and fine sands variably reworked by slopewash transport. Deposits are loose and poorly exposed. No evidence of notable soil development was observed. A sediment color of 10YR 7/3 was measured. Deposits are 0 to perhaps 2 m thick.

North of the location, the conglomeratic facies of the Gatuña borders China Draw. The bedrock underlying the aeolian cover is probably the Los Medaños Member of the Rustler Formation

<sup>1</sup> <https://geoinfo.nmt.edu/publications/maps/geologic/state/home.cfm>

SITING CRITERIA (19.15.34.10 NMAC)  
SOLARIS WATER MIDSTREAM, SCOUT AST CONTAINMENT

(Prl), which is exposed south of the Scout location. The description of the Los Medaños provided in the legend of the 7.5-minute quadrangle is reproduced in part below:

*Los Medaños Member of the Rustler Formation—Interlayered mudstones, sandstones, and gypsum. Reddish yellow, laminated to thinly bedded, poorly indurated silty mudstones dominate. Pale red, very thinly bedded, moderately indurated, sparry calcite-cemented coarse-grained siltstones/very fine-grained sandstones and laminated to thinly bedded, nodular or crystalline, moderately indurated gypsum beds are both rare and approximately subequal in abundance. Gypsum also occurs as irregular masses up to 60 cm in diameter. Trace thin laminae of waxy claystones are the least common lithology. Colors of 5YR 6/6-7/6 (mudstones, claystones) and 2.5YR 7/2-7/1 (siltstones/very fine-grained sandstones) were measured. Unit is generally poorly exposed and often identified by abundant reddish muds with trace irregular gypsum masses in colluvial/residuum slopes.*

Our field inspection on March 8, 2022 verified the eolian cover at the location and poorly exposed Los Medanos Member along the lease road between the drainage to the south of the location and the proposed AST location.

### Distance to Groundwater

Figures 1 and 2, the associated legends, a dry borehole that is 120 feet in depth, along with the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 50 feet beneath the AST containment.

Figure 1 is topographic map that shows:

1. The Scout AST containment identified by the blue square.
2. Water wells from the OSE database as a triangle inside colored circles that indicate well depth (C representing the Carlsbad Basin). OSE wells are often miss-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range.
3. Water wells from the USGS database as large triangles color-coded to the formation from which the well draws water.
4. Water wells, which are not documented in the public databases but were identified by field inspection or other published reports as colored squares (MISC).
5. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

Figure 2 is a geologic/topographic map showing:

1. The Scout Recycling Facility and AST Containment area identified by the blue stippled polygon with the surface elevation noted.
2. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface.
3. Water wells measured by professionals and documented in published reports or by staff of Hicks Consultants (Misc.).
4. Watercourses mapped by the USGS.
5. Contour lines representing the groundwater surface elevation from water supply wells.

The water supply wells that provide the data for our interpretation of the elevation of the groundwater surface lie within the floodplain of mapped drainages. Below is a summary of

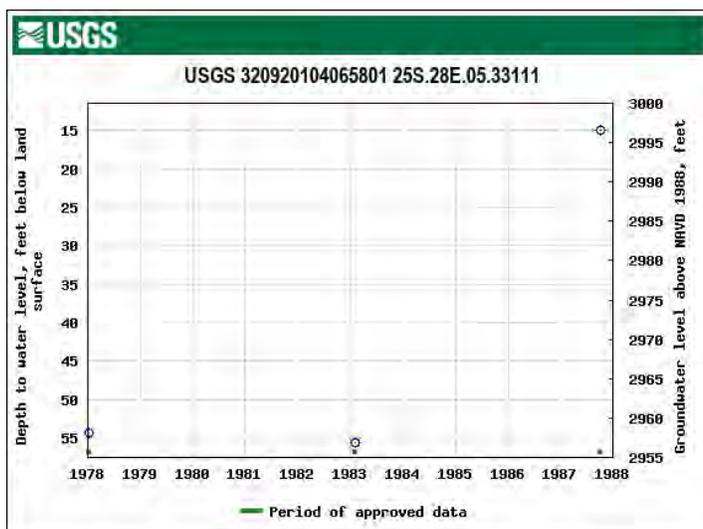
SITING CRITERIA (19.15.34.10 NMAC)  
SOLARIS WATER MIDSTREAM, SCOUT AST CONTAINMENT

observations of various wells presented in Figure 2. Data from the USGS database is reproduced in italics adjacent to the hydrographs.

### USGS 320920104065801 25S.28E.05.33111 AKA USGS 9422 & USGS-9419

*Eddy County, New Mexico  
Hydrologic Unit Code 13060011  
Latitude 32°09'20", Longitude 104°06'58" NAD27  
Land-surface elevation 3,012 feet above NAVD88  
This well is completed in the Other aquifers  
(N9999OTHER) national aquifer.  
This well is completed in the Rustler Formation  
(312RSLR) local aquifer*

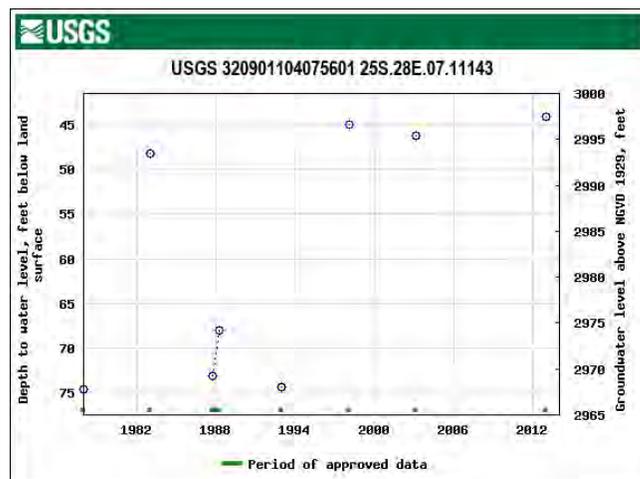
USGS-9422 and USGS-9419, which are due south of the Scout location, are the same windmill we visited in 2014 when we found the well was abandoned and not accessible. The one data point for USGS-9419 shows a depth to water of 59.53 in 1948, which is consistent with early data from USGS-9422. The 40-foot rise of the water level in 1987 is possible, but not probable and we suggest the water level data in 1988 is anomalous.



### USGS 320901104075601 25S.28E.07.11143 AKA USGS-9654

*Eddy County, New Mexico  
Hydrologic Unit Code 13060011  
Latitude 32°08'59.3", Longitude 104°08'03.0" NAD83  
Land-surface elevation 3,042.00 feet above NGVD29  
The depth of the well is 133 feet below land surface.  
This well is completed in the Other aquifers (N9999OTHER)  
national aquifer.  
This well is completed in the Rustler Formation (312RSLR)  
local aquifer.*

USGS 9654 and Misc-169 appear to be the same well located about 1.25 miles southwest of the Scout AST site (see Figure 1. We measured a depth to water in this well in 2014 of 46.1 feet. We suggest that the four depth measurements of 75 feet do not represent static conditions or are measurements from another well. We conclude the groundwater elevation in this well is static and are about 2995 feet as indicated in the graph and by our 2014 measurement.

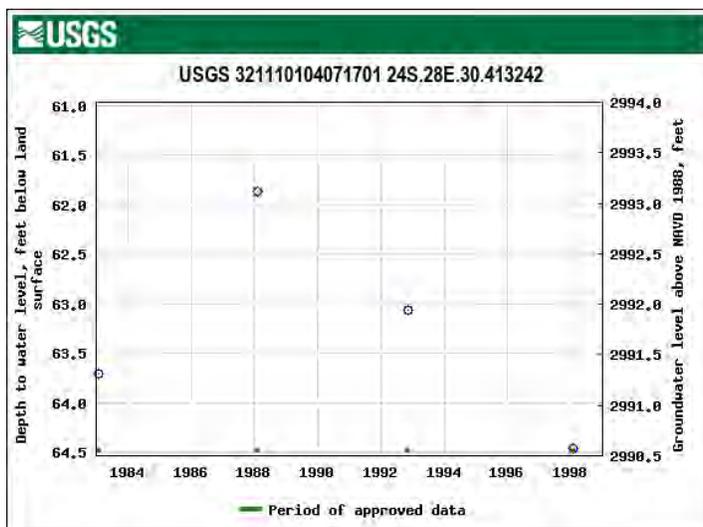


SITING CRITERIA (19.15.34.10 NMAC)  
 SOLARIS WATER MIDSTREAM, SCOUT AST CONTAINMENT

**USGS 321110104071701 24S.28E.30.413242 AKA USGS 9576**

*Eddy County, New Mexico  
 Hydrologic Unit Code 13060011  
 Latitude 32°11'10", Longitude 104°07'17" NAD27  
 Land-surface elevation 3,055 feet above NAVD88  
 The depth of the well is 201 feet below land surface.  
 This well is completed in the Other aquifers (N9999OTHER) national aquifer.  
 This well is completed in the Castile Formation (312CSTL) local aquifer*

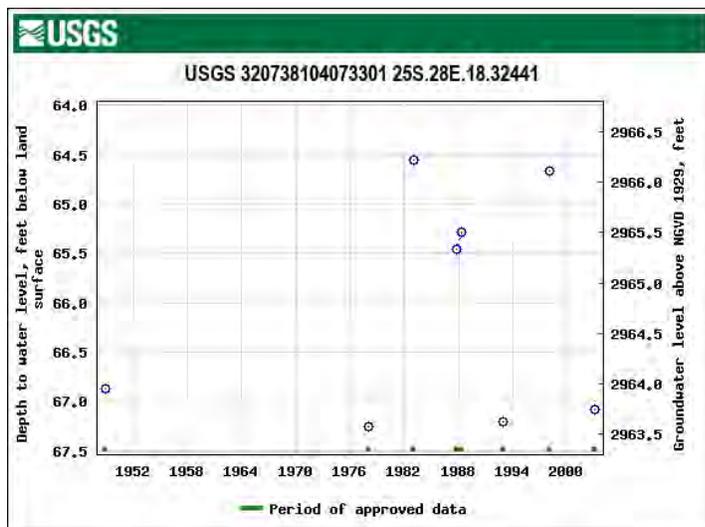
This well is relatively near the small drainage north of China Draw about 1.5 miles due north of the Scout site. USGS-9576 and Misc-168 are the same well. We measured a depth to water of 71.6 feet this well in 2014. The 10-foot variation over a 30-year period of record is insignificant.



**USGS 320738104073301 25S.28E.18.32441 AKA USGS-9565**

*Eddy County, New Mexico  
 Hydrologic Unit Code 13060011  
 Latitude 32°07'37.3", Longitude 104°07'38.5" NAD83  
 Land-surface elevation 3,030.80 feet above NGVD29  
 This well is completed in the Other aquifers (N9999OTHER) national aquifer.  
 This well is completed in the Rustler Formation (312RSLR) local aquifer*

USGS-9565 is the same well as Misc-170, which lies about 2 miles south of the Scout location. Hicks Consultants gauged in 2014 (68.1 feet). The 4-foot variation of measurements over the 60+ years of record is insignificant. This well is not in a USGS mapped drainage, but is within a tributary to a mapped drainage.



The USGS and Misc databases provide sufficient information to develop a reasonable potentiometric surface map, which is Figure 2. The groundwater elevations are based upon data from water supply wells, most of which lie within or near floodplains of mapped drainages. As described above, nearby wells north of the Scout AST location show stable groundwater levels

SITING CRITERIA (19.15.34.10 NMAC)  
SOLARIS WATER MIDSTREAM, SCOUT AST CONTAINMENT

and nearby wells in the unnamed drainage south of the AST location suggest a rising groundwater level. USGS-9565, which is also south of the AST location but not within a drainage, exhibits a stable water level over the 60+ year period of record.

Data from the exploratory boring for the EKG Containment of ConocoPhillips (Misc-400 about 2 miles north of the Scout site) and Misc-432, the conductor pipe auger boring for the Scout 602H well (1700 feet north of Scout AST) do not exactly fit this groundwater elevation map.

The dust-dry boring Misc-400 demonstrates that groundwater lies below an elevation of 2974 feet ASL. The potentiometric surface map suggests the groundwater elevation based upon wells within the drainages is about 2980. This 6-foot difference is not meaningful, but this boring was not deep enough to encounter groundwater and provide such data. The data from the 120-foot deep Scout 602H conductor pipe boring shows the groundwater elevation is less than 2930 feet ASL and the elevation based upon wells in/near the drainages predicts a groundwater elevation 2975. Another data point is the well log from C-1721, which is located about 2.5 miles northwest of the Scout AST location (see Figure 2). This 170-foot cable-tool boring is not in or near a mapped drainage and is described as dry. A cable-tool rig is an excellent drilling method to identify water-bearing horizons.

These data suggest that groundwater elevations beneath drainages is higher than groundwater elevation on bedrock hills between drainages or distant from mapped drainages. This makes sense as the drainages provide recharge to groundwater.

The data and analysis permit these conclusions with a high degree of scientific certainty:

- the groundwater elevation beneath the Scout AST site is lower than about 2930 feet ASL.
- The surface elevation of the Scout AST site is about 3040. Thus, water depth to groundwater beneath the Scout AST location is greater than  $(3040-2930=)$  110 feet.
- Given the location of the Scout AST on a bedrock hill and about ½ mile distant from drainages, no groundwater may exist beneath the site.

### **Distance to Municipal Boundaries and Fresh Water Fields**

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

- The closest municipality is Malaga, NM approximately 4.5 miles to the northeast.
- The closest public water supply well is C-00259 and is located 10.5 miles to the northwest.
- The closest freshwater field is the City of Carlsbad's Sheep Draw well field, which is located 15.5 miles to the northwest.

### **Distance to Subsurface Mines**

Figure 4 and our general reconnaissance of the area demonstrate:

- This location is not within an area overlying a subsurface mine.
- The nearest mapped surface mine is approximately 9 miles to the west of the site.

SITING CRITERIA (19.15.34.10 NMAC)  
SOLARIS WATER MIDSTREAM, SCOUT AST CONTAINMENT**Distance to High or Critical Karst Areas and Unstable Ground**

Figure 5 and our reconnaissance of the area demonstrate that the area lies within a zone mapped as medium karst potential by the BLM.

- The site is underlain by the Rustler Formation Los Medaños Member, which does not often form large caverns or unstable ground.
- We observed no evidence of unstable ground or karst features.

**Distance to 100-Year Floodplain**

Figure 6 demonstrates that the location is not located in a 100-year floodplain.

- The nearest 100-year floodplain is located approximately ½ mile to the north.

**Distance to Surface Water**

Figure 7 demonstrates the proximity of the site to a continuously flowing watercourse, lakebed, sinkhole, playa lake (measured from the ordinary high-water mark), or spring.

- The nearest mapped surface water are two mapped watercourses. China Draw is about 0.6 miles to the north and an unnamed drainage is about 0.4 miles to the south.
- Horseshoe and Mexican Lakes are approximately 1.0 and 1.4 miles to the northeast respectively.
- We saw no significant watercourses within the Rule 34 setback distance or near the site..

**Distance to Permanent Residence or Structures**

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

- No occupied permanent residences, schools, hospitals, institutions, churches, or other structures are located within 1000 feet of the site.

**Distance to Non-Public Water Supply**

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

- Figure 1 shows the locations of all area water wells, active or plugged.
- The nearest well is USGS-9576/Misc-168, which is located .54 miles southwest of the site.
- There are no known domestic water wells located within 1,000 feet of the proposed pits.
- No springs were identified within the mapping area (see Figure 7)

**Distance to Wetlands**

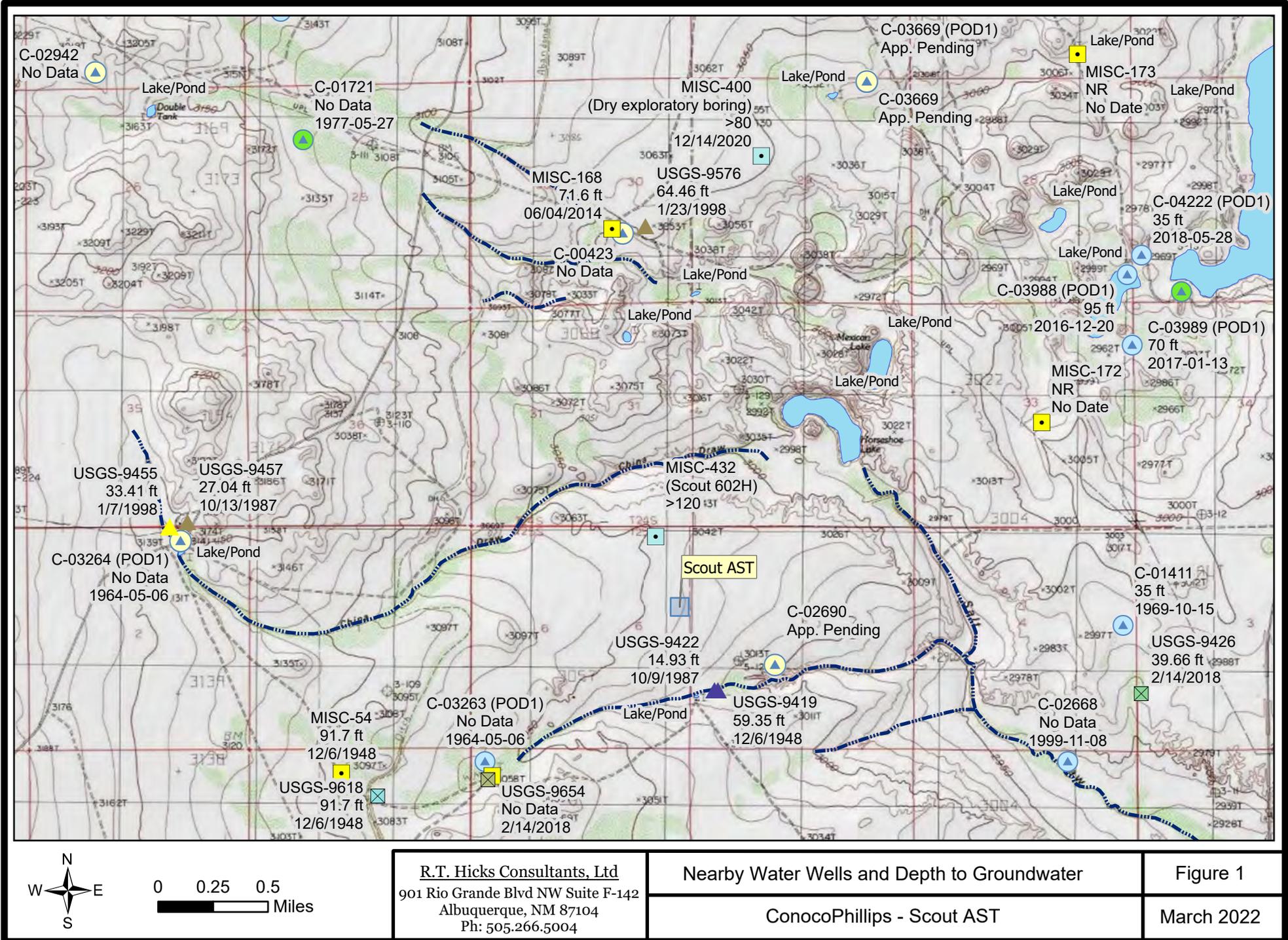
Figure 9 demonstrates the location is within 300 feet of wetlands.

- The nearest designated wetland is a “freshwater pond” wetland. It is approximately 1 mile southwest of the site.

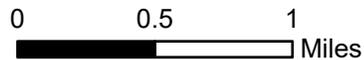
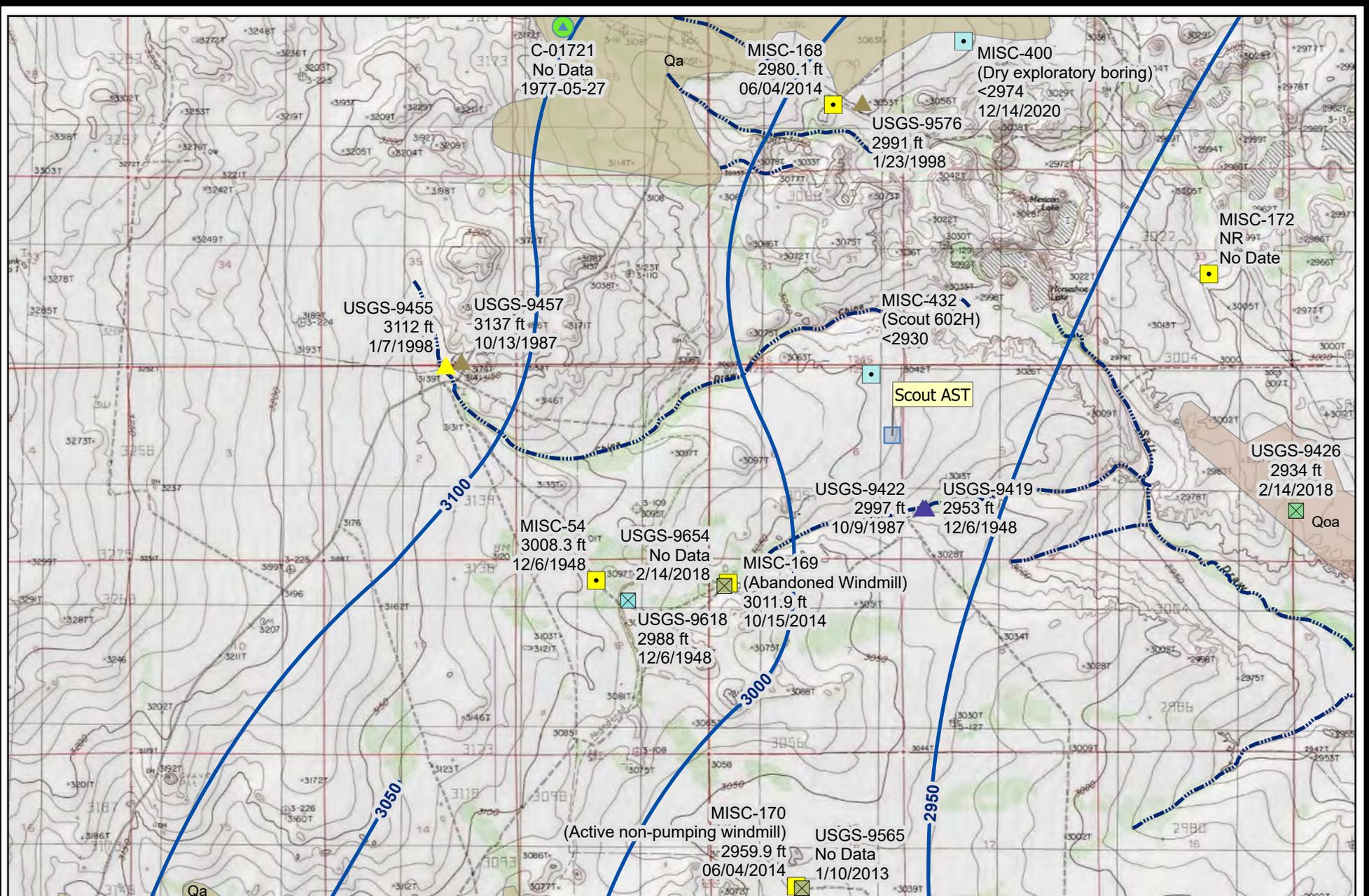
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## SITING CRITERIA DEMONSTRATION FIGURES

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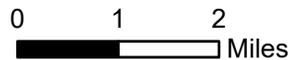
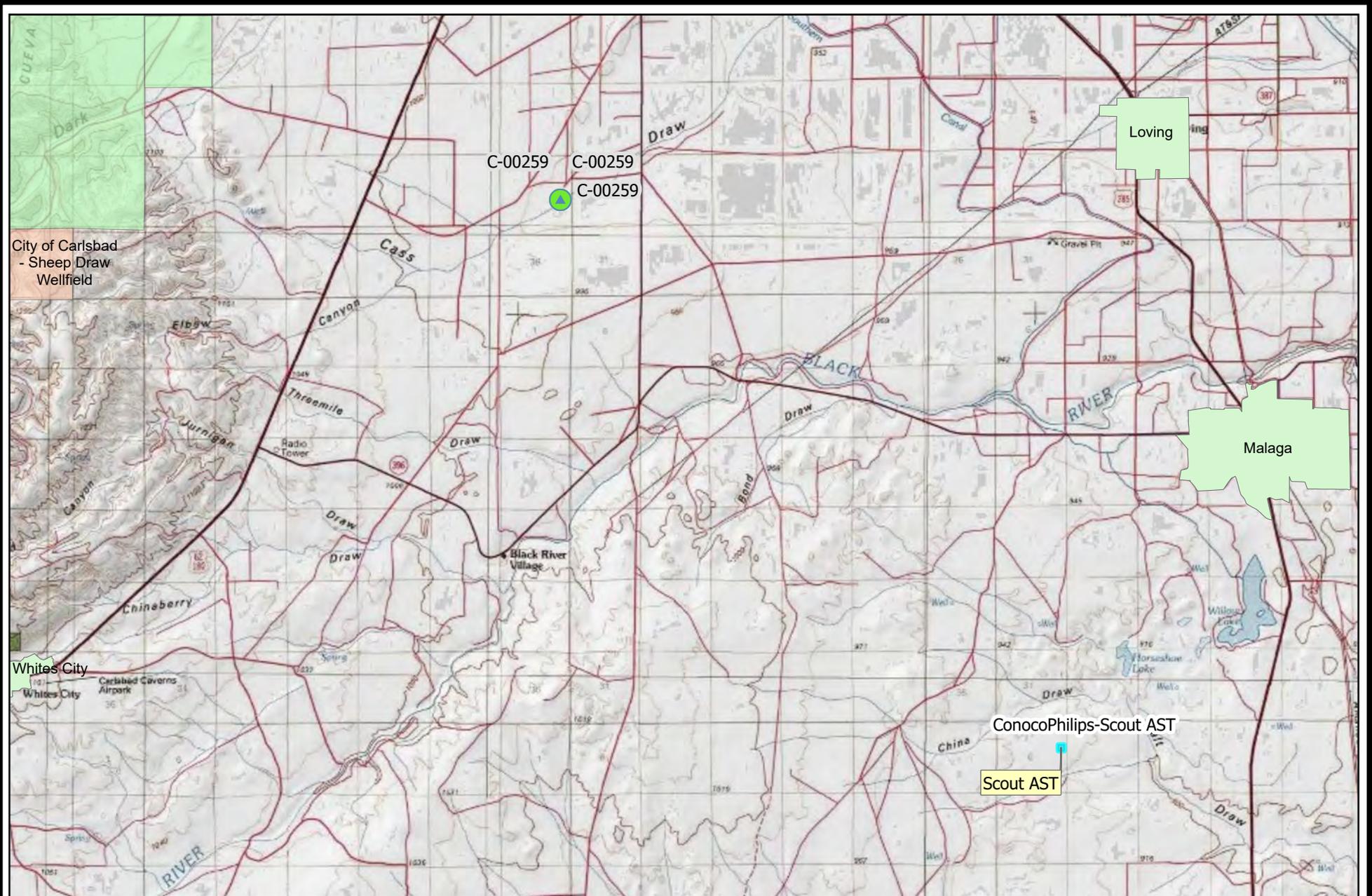


R.T. Hicks Consultants, Ltd  
 901 Rio Grande Blvd NW Suite F-142  
 Albuquerque, NM 87104  
 Ph: 505.266.5004

Groundwater Elevation and Geology  
 ConocoPhillips - Scout AST

Figure 2  
 March 2022

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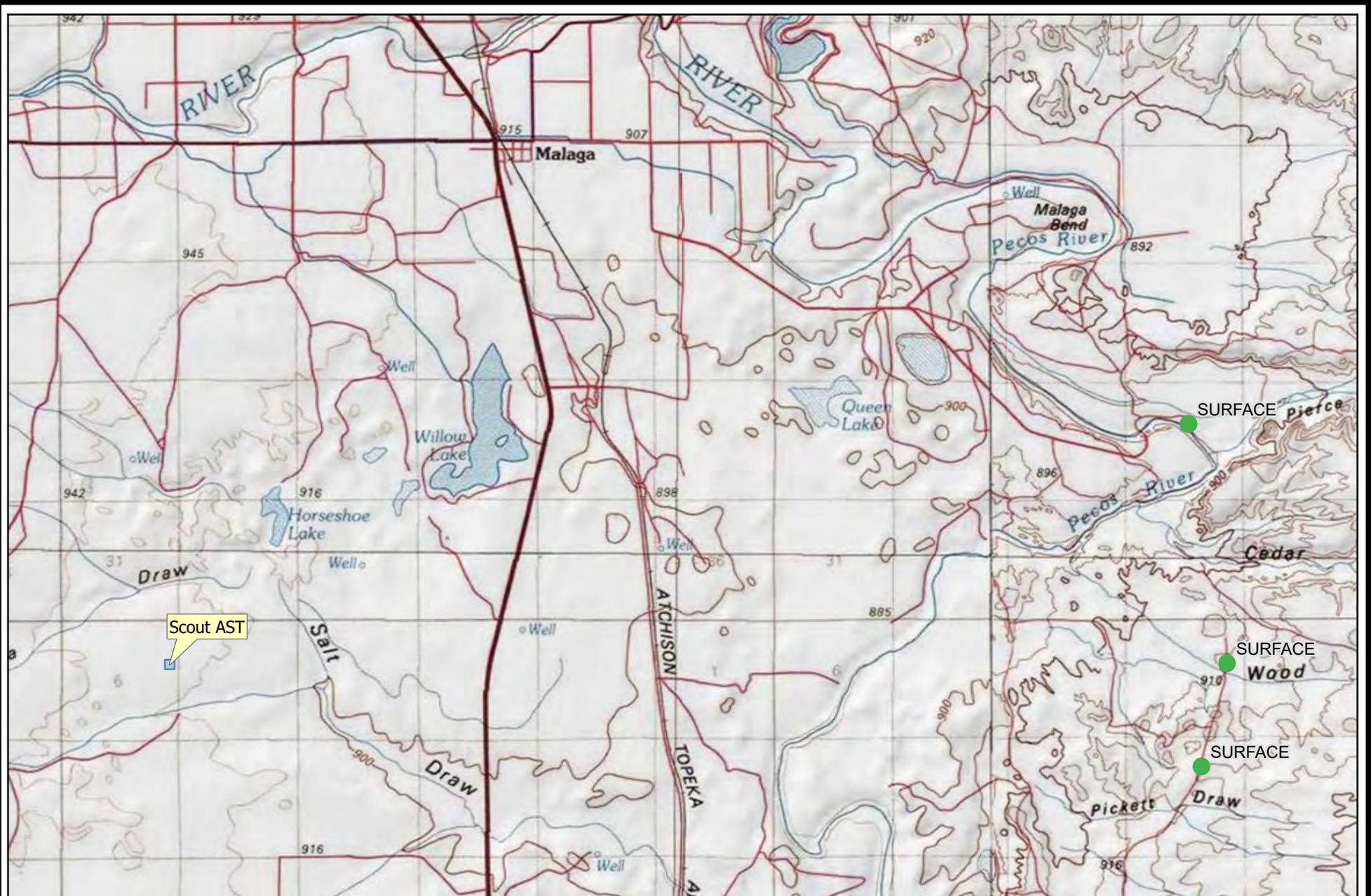


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Nearby Municipalities and Public Water Supplies  
 ConocoPhillips - Scout AST

Figure 3  
 March 2022

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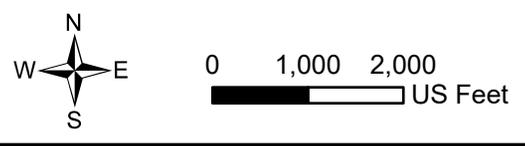
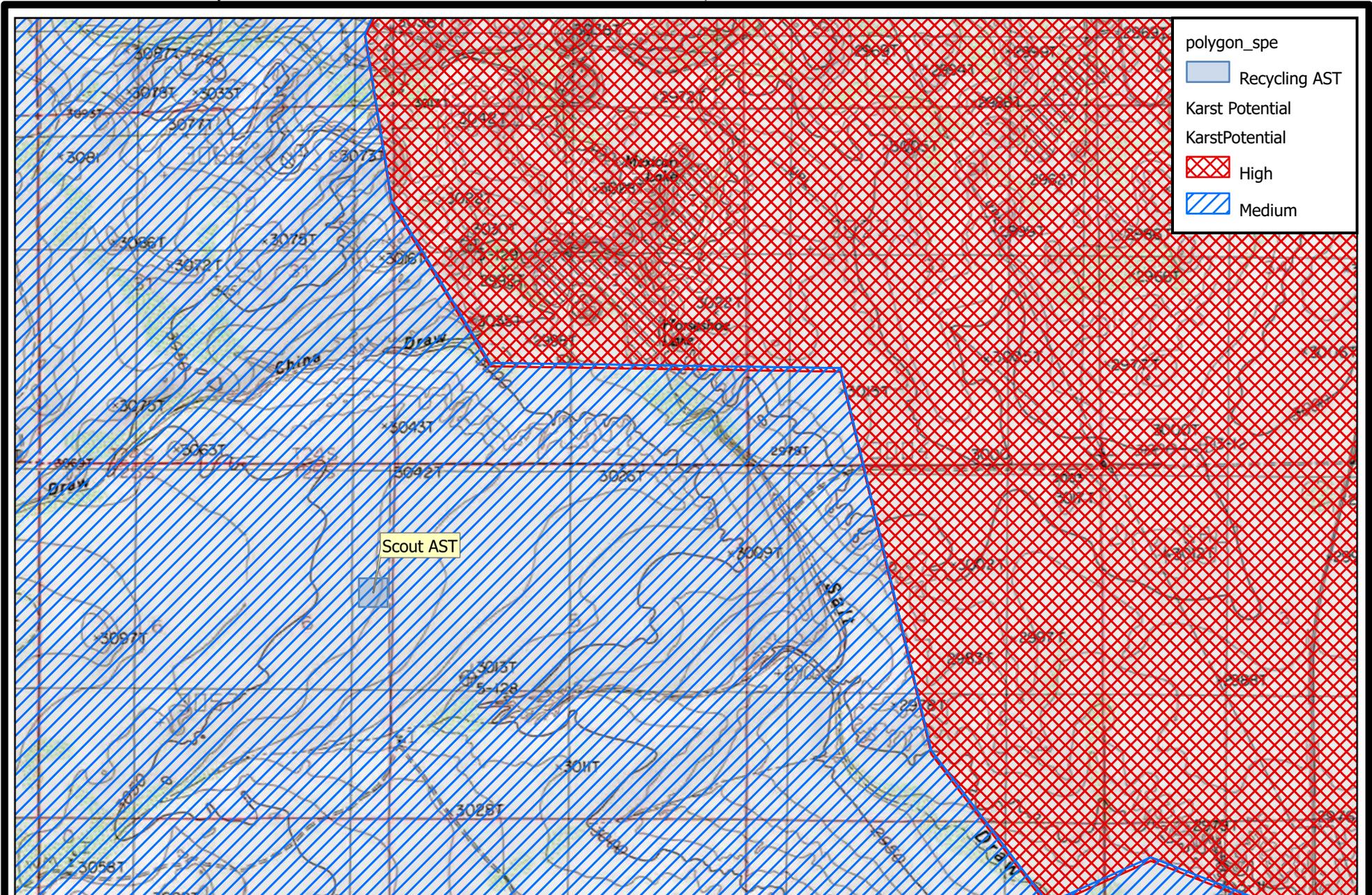
0 0.5 1  
Miles

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Nearby Mines
ConocoPhillips - Scout AST

Figure 4
March 2022

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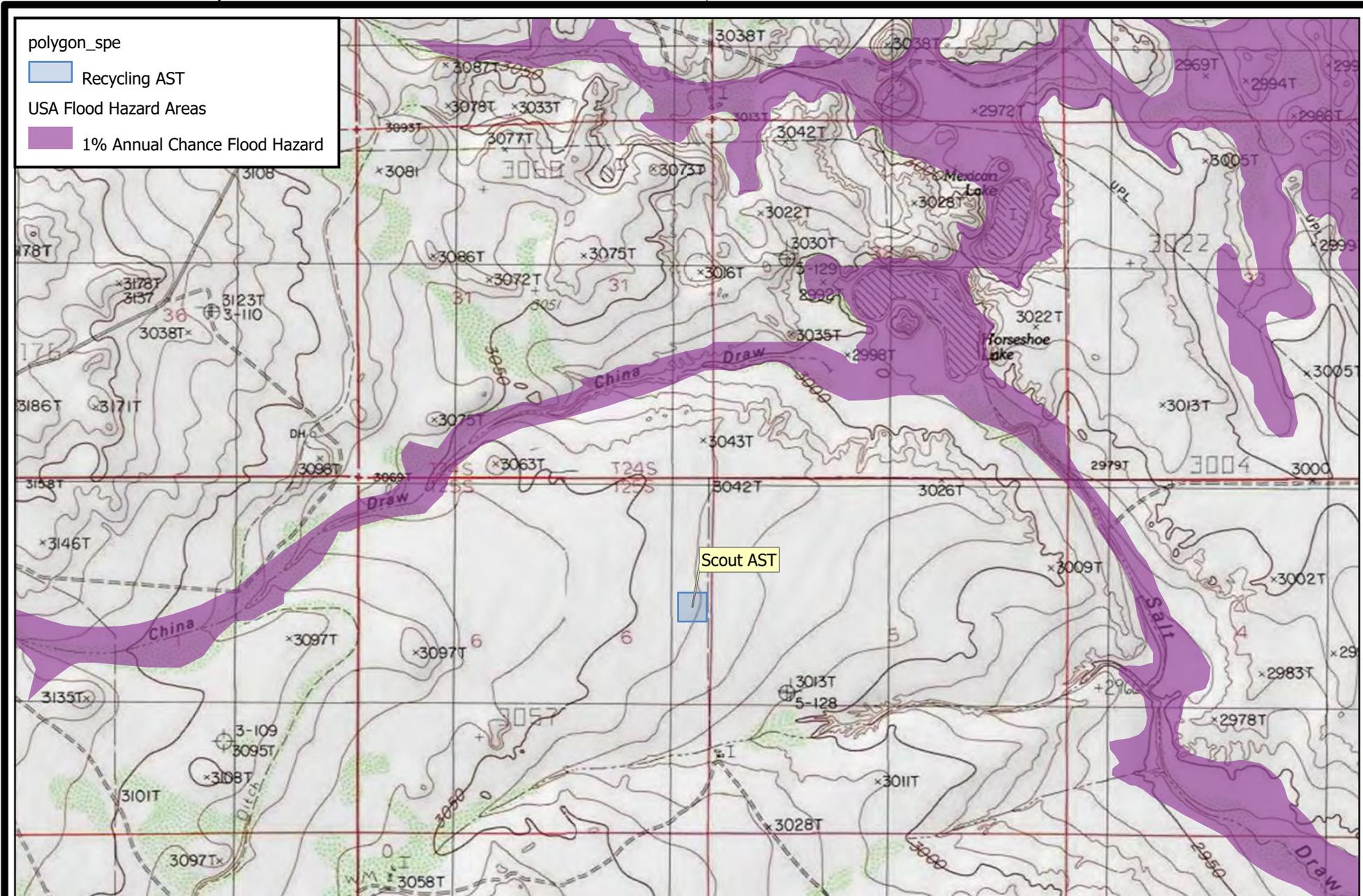


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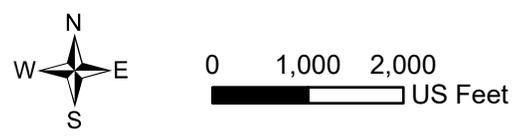
BLM Mapped Karst Potential  
 ConocoPhillips - Scout AST

Figure 5  
 March 2022

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- polygon\_spe  
 Recycling AST  
 USA Flood Hazard Areas  
 1% Annual Chance Flood Hazard

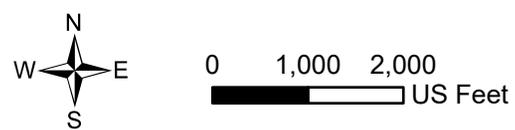
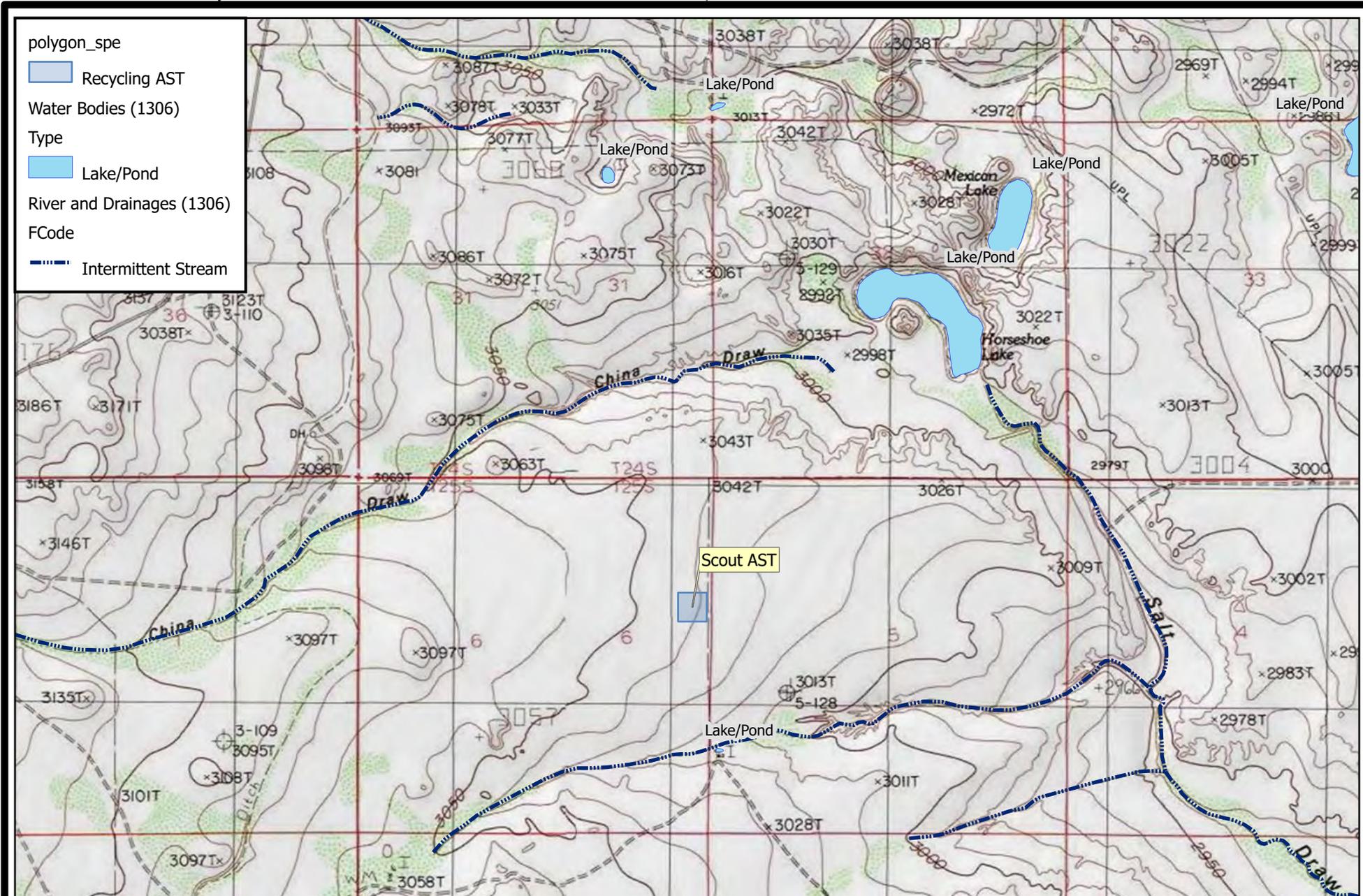


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Mapped Flood Hazards  
 ConocoPhillips - Scout AST

Figure 6  
 March 2022

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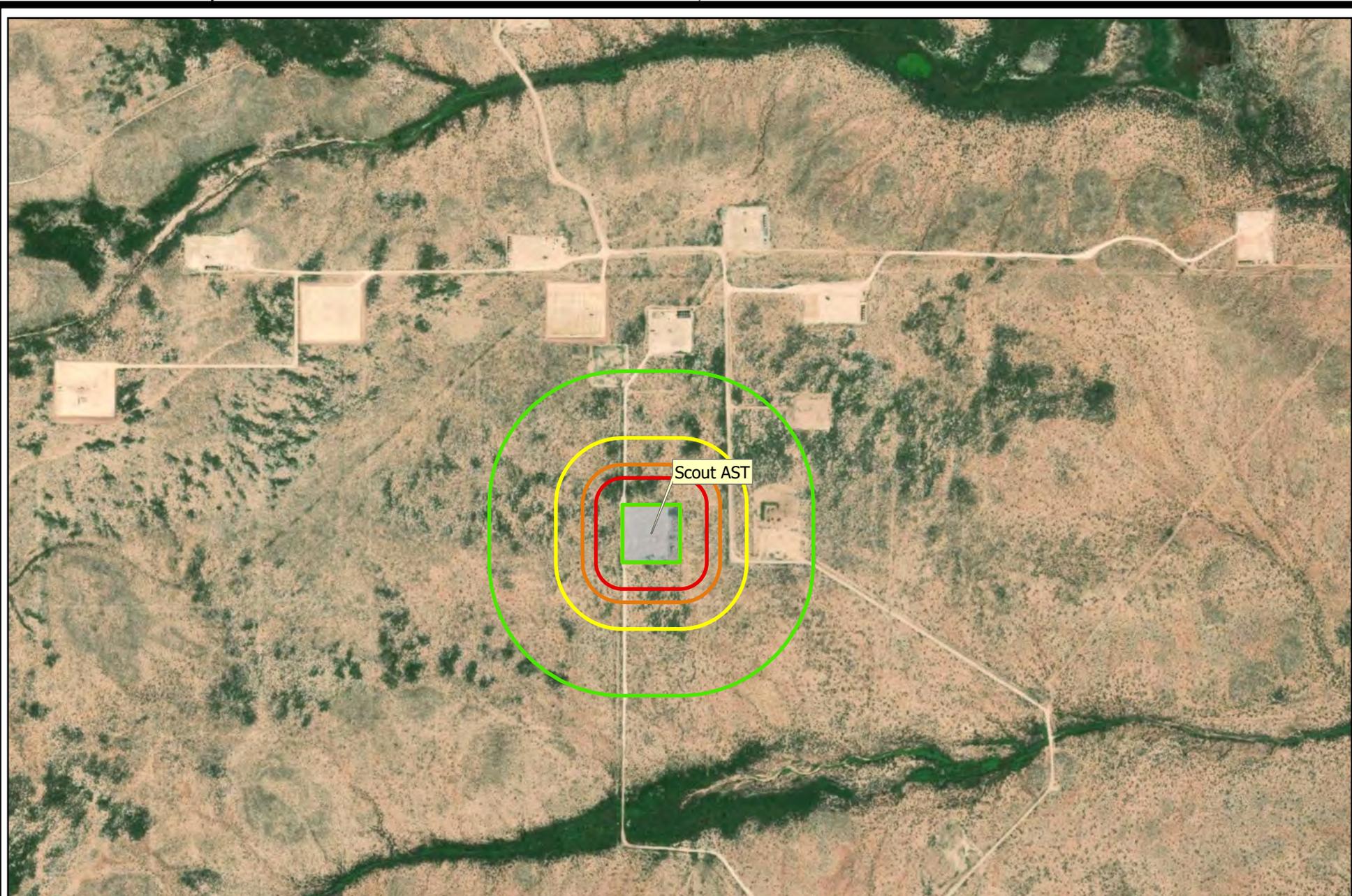


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Mapped Surface Water  
 ConocoPhillips - Scout AST

Figure 7  
 March 2022

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0 500 1,000  
Feet

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Nearby Structures  
Red=200' Orange=300' Yellow=500' Green=1000'

ConocoPhillips - Scout AST

Figure 8

March 2022

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0 1,000 2,000  
US Feet

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Albuquerque, NM 87104  
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Mapped New Mexico Wetlands  
ConocoPhillips - Scout AST

Figure 9  
March 2022

## APPENDIX WELL LOGS

<b>District I</b> 1625 N. French Dr., Hobbs, NM 88240 Phone:(575) 393-6161 Fax:(575) 393-0720 <b>District II</b> 811 S. First St., Artesia, NM 88210 Phone:(575) 748-1283 Fax:(575) 748-9720 <b>District III</b> 1000 Rio Brazos Rd., Aztec, NM 87410 Phone:(505) 334-6178 Fax:(505) 334-6170 <b>District IV</b> 1220 S. St Francis Dr., Santa Fe, NM 87505 Phone:(505) 476-3470 Fax:(505) 476-3462	<b>State of New Mexico</b> <b>Energy, Minerals and Natural Resources</b> <b>Oil Conservation Division</b> <b>1220 S. St Francis Dr.</b> <b>Santa Fe, NM 87505</b>	Form C-103 August 1, 2011 Permit 302110 WELL API NUMBER 30-015-46956 5. Indicate Type of Lease S 6. State Oil & Gas Lease No. 7. Lease Name or Unit Agreement Name SCOUT STATE COM																				
<b>SUNDRY NOTICES AND REPORTS ON WELLS</b> (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)																						
1. Type of Well: G		8. Well Number 602H																				
2. Name of Operator COG OPERATING LLC		9. OGRID Number 229137																				
3. Address of Operator 600 W Illinois Ave, Midland, TX 79701		10. Pool name or Wildcat																				
4. Well Location Unit Letter <u>1</u> : <u>280</u> feet from the <u>N</u> line and feet <u>906</u> from the <u>E</u> line Section <u>6</u> Township <u>25S</u> Range <u>28E</u> NMPM _____ County <u>Eddy</u>																						
11. Elevation (Show whether DR, KB, BT, GR, etc.) 3050 GR																						
Pit or Below-grade Tank Application <input type="checkbox"/> or Closure <input type="checkbox"/> Pit Type _____ Depth to Groundwater _____ Distance from nearest fresh water well _____ Distance from nearest surface water _____ Pit Liner Thickness: _____ mil Below-Grade Tank: Volume _____ bbls; Construction Material _____																						
12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data <table style="width:100%; border: none;"> <tr> <td colspan="2" style="text-align: center;">NOTICE OF INTENTION TO:</td> <td colspan="2" style="text-align: center;">SUBSEQUENT REPORT OF:</td> </tr> <tr> <td>PERFORM REMEDIAL WORK <input type="checkbox"/></td> <td>PLUG AND ABANDON <input type="checkbox"/></td> <td>REMEDIAL WORK <input type="checkbox"/></td> <td>ALTER CASING <input type="checkbox"/></td> </tr> <tr> <td>TEMPORARILY ABANDON <input type="checkbox"/></td> <td>CHANGE OF PLANS <input type="checkbox"/></td> <td>COMMENCE DRILLING OPNS. <input type="checkbox"/></td> <td>PLUG AND ABANDON <input type="checkbox"/></td> </tr> <tr> <td>PULL OR ALTER CASING <input type="checkbox"/></td> <td>MULTIPLE COMPL <input type="checkbox"/></td> <td>CASING/CEMENT JOB <input type="checkbox"/></td> <td></td> </tr> <tr> <td colspan="2">Other: _____</td> <td colspan="2">Other: <b>Spud</b> <input checked="" type="checkbox"/></td> </tr> </table>			NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:		PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTER CASING <input type="checkbox"/>	TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE OF PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>		Other: _____		Other: <b>Spud</b> <input checked="" type="checkbox"/>	
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Other: _____		Other: <b>Spud</b> <input checked="" type="checkbox"/>																				
13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work.) SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.  <b>9/24/2021</b> Spudded well.  SPUD WELL.																						
I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines <input type="checkbox"/> , a general permit <input type="checkbox"/> or an (attached) alternative OCD-approved plan <input type="checkbox"/> .																						
SIGNATURE	<u>Electronically Signed</u>	TITLE	<u>Supervisor Delaware Regulatory</u>	DATE	<u>10/11/2021</u>																	
Type or print name	<u>Robyn Russell</u>	E-mail address	<u>robyn.m.russell@conocophillips.com</u>	Telephone No.	<u>432-685-4385</u>																	
<b>For State Use Only:</b>																						
APPROVED BY:	<u>Kurt Simmons</u>	TITLE	<u>Petroleum Specialist - A</u>	DATE	<u>10/12/2021</u>																	

**Solaris-EKG Containment** TEST HOLE-December 10, 2020  
 Air Rotary Rig  
 32.190845, -104.112875

Kristin Pope (RT Hicks)  
 Jason Maley (Vision Resources)

depth (ft BGS)	Moisture	Description	Time	Penetration ft/min	
0-24	dry	Tan, fine sand, well-sorted	0820	3.0	
24-47	dry	Brown, very fine sand, well-sorted	0828	1.5	
47-60	dry	Pink-tan, very fine sand; 15% red clay bits	0844	0.4	33
60-65	dry	Red-brown, med.-fine sand; Air pocket @60	0917	1.7	
65-78	dry	Red-brown, med.-fine sand; 10% brown silt/clay bits	0920	1.2	
78-80	dry	Red, fine sand, well-sorted	0931	1.0	
80	dry	Total Depth	0933		

Bottom of pond south of hole is 7.75 ft LOWER than drilling surface.  
 e is 328 ft north of pond.

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

464250

(A) Owner of well William Disher DIESCHER Owner's Well No. C 1721
Street or Post Office Address Box 447
City and State Loving New Mexico 88256

Well was drilled under Permit No. C 1721 and is located in the:

- a. 1/4 1/4 1/4 NW 1/4 of Section 25 Township 24 S Range 27E N.M.P.M.
b. Tract No. of Map No. of the
c. Lot No. of Block No. EDDY of the
Subdivision, recorded in County.
d. X= feet, Y= feet, N.M. Coordinate System Zone in the Grant.

(B) Drilling Contractor Jack Ingram License No. WD-591

Address RT. 1 Box 280 Carlsbad N. Mex.

Drilling Began 1/2/77 Completed 5/27/77 Type tools Cable Tool Size of hole 7" in.

Elevation of land surface or at well is ft. Total depth of well 170' ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well NONE ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Table with 4 columns: Depth in Feet (From/To), Thickness in Feet, Description of Water-Bearing Formation, Estimated Yield (gallons per minute). Row 1: 0 to 170, 170, NONE.

Section 3. RECORD OF CASING

Table with 8 columns: Diameter (inches), Pounds per foot, Threads per in., Depth in Feet (Top/Bottom), Length (feet), Type of Shoe, Perforations (From/To). Row 1: NONE.

Section 4. RECORD OF MUDDING AND CEMENTING

Table with 6 columns: Depth in Feet (From/To), Hole Diameter, Sacks of Mud, Cubic Feet of Cement, Method of Placement. Row 1: NONE.

Section 5. PLUGGING RECORD

Plugging Contractor
Address
Plugging Method
Date Well Plugged
Plugging approved by:
State Engineer Representative

Table with 4 columns: No., Depth in Feet (Top/Bottom), Cubic Feet of Cement. Rows 1-4.

FOR USE OF STATE ENGINEER ONLY

Date Received
Quad FWL FSL
File No. C-1721 Use STOCK Location No. 24.27.25.14233



Form WR-23

STATE ENGINEER OFFICE

### WELL RECORD

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

Section 1

463/03  
1977/6


(A) Owner of well JIMMIE COOKSEY  
 Street and Number ORLA, TEXAS  
 City ORLA State TEXAS  
 Well was drilled under Permit No. C-1411 and is located in the  
SE 1/4 SE 1/4 NE 1/4 of Section 4 Twp. 25S Rge. 28E  
 (B) Drilling Contractor Quince L. White License No. WB 439  
 Street and Number 708 N.3rd.  
 City JAL State N.M.  
 Drilling was commenced 10-7 1969  
 Drilling was completed 10-15 1969

(Plat of 640 acres)

Elevation at top of casing in feet above sea level \_\_\_\_\_ Total depth of well 68' 5"  
 State whether well is shallow or artesian shallow Depth to water upon completion 35'

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation
	From	To		
1				
2	52	68	16	gray water sand and small gravel
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth		Feet	Type Shoe	Perforations	
			Top	Bottom			From	To
5" I.D.	20	WELD.	1	70'5"	70'5"	none	40'	70'

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet		Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used
From	To				
					NONE

Section 5 PLUGGING RECORD NONE

Name of Plugging Contractor \_\_\_\_\_ License No. \_\_\_\_\_  
 Street and Number \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_  
 Tons of Clay used \_\_\_\_\_ Tons of Roughage used \_\_\_\_\_ Type of roughage \_\_\_\_\_  
 Plugging method used \_\_\_\_\_ Date Plugged \_\_\_\_\_ 19 \_\_\_\_\_  
 Plugging approved by: \_\_\_\_\_ Cement Plugs were placed as follows:

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

Basin Supervisor \_\_\_\_\_

**FOR USE OF STATE ENGINEER ONLY**

Date Received \_\_\_\_\_

11:08 AM OCT 20 1969

File No. C-1411 Use SK Location No. 25-28.4-2444





# WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

STATE ENGINEER OFFICE  
ROSWELL, NEW MEXICO

2020 FEB 21 PM 2:09

1. GENERAL AND WELL LOCATION	OSE POD NO. (WELL NO.) C-1411		WELL TAG ID NO. 2237E		OSE FILE NO(S).		
	WELL OWNER NAME(S) Joy Cooksey				PHONE (OPTIONAL)		
	WELL OWNER MAILING ADDRESS Box 45				CITY Carlsbad	STATE NM	ZIP 88220
	WELL LOCATION (FROM GPS)	DEGREES LATITUDE 32	MINUTES 9	SECONDS 19.7	N	* ACCURACY REQUIRED: ONE TENTH OF A SECOND	
	LONGITUDE 104	5	2.5	W	* DATUM REQUIRED: WGS 84		
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS - PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE Well is a few miles west of Hywy 285 at mile marker 11.							

2. DRILLING & CASING INFORMATION	LICENSE NO. WD-1348	NAME OF LICENSED DRILLER Clinton E Taylor			NAME OF WELL DRILLING COMPANY Taylor Water Well Service			
	DRILLING STARTED 2/9/2020	DRILLING ENDED 2/20/2020	DEPTH OF COMPLETED WELL (FT) 90	BORE HOLE DEPTH (FT) 92	DEPTH WATER FIRST ENCOUNTERED (FT) 50			
	COMPLETED WELL IS: <input type="checkbox"/> ARTESIAN <input type="checkbox"/> DRY HOLE <input checked="" type="checkbox"/> SHALLOW (UNCONFINED)				STATIC WATER LEVEL IN COMPLETED WELL (FT) 40			
	DRILLING FLUID: <input checked="" type="checkbox"/> AIR <input type="checkbox"/> MUD ADDITIVES - SPECIFY:							
	DRILLING METHOD: <input checked="" type="checkbox"/> ROTARY <input type="checkbox"/> HAMMER <input type="checkbox"/> CABLE TOOL <input type="checkbox"/> OTHER - SPECIFY:							
	DEPTH (feet bgl)		BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE (add coupling diameter)	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
	FROM	TO						
	+3	20	9 7/8	PVC	Spline 6 1/2"	5	.327	
	20	52	9 7/8	PVC	Spline 6 1/2"	5	.327	
	52	92	7 7/8	PVC	Spline 6 1/2"	5	.327	.327

3. ANNULAR MATERIAL	DEPTH (feet bgl)		BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
	FROM	TO				
	0	20	9 7/8	20% Solids Bentonite Grout	4 Sacks	Tremie
	20	90	70	3/8" Pea Gravel	3 Yards	Dump

FOR OSE INTERNAL USE		WR-20 WELL RECORD & LOG (Version 04/30/19)			
FILE NO.	C-1411	POD NO.	2	TRN NO.	666178
LOCATION	Line 25.28.04.424			WELL TAG ID NO.	2237E
					PAGE 1 OF 2



M



# WELL RECORD & LOG

**OFFICE OF THE STATE ENGINEER**  
[www.ose.state.nm.us](http://www.ose.state.nm.us)

1. GENERAL AND WELL LOCATION	OSE POD NUMBER (WELL NUMBER) <b>C-3988</b>			OSE FILE NUMBER(S)		
	WELL OWNER NAME(S) <b>Rustler Hills II LTD</b>			PHONE (OPTIONAL)		
	WELL OWNER MAILING ADDRESS <b>706 West Riverside Drive</b>			CITY <b>Carlsbad</b>	STATE <b>NM</b>	ZIP <b>88220</b>
	WELL LOCATION (FROM GPS)	DEGREES	MINUTES	SECONDS	* ACCURACY REQUIRED: ONE TENTH OF A SECOND * DATUM REQUIRED: WGS 84	
		LATITUDE	<b>32</b>	<b>10</b>		
	LONGITUDE	<b>104</b>	<b>5</b>	<b>4.2 W</b>		
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS - PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE						

2. DRILLING & CASING INFORMATION	LICENSE NUMBER <b>1690</b>	NAME OF LICENSED DRILLER <b>Jason Maley</b>			NAME OF WELL DRILLING COMPANY <b>Vision Resour</b>			
	DRILLING STARTED <b>12-5-16</b>	DRILLING ENDED <b>12-20-16</b>	DEPTH OF COMPLETED WELL (FT) <b>110</b>	BORE HOLE DEPTH (FT) <b>120</b>	DEPTH WATER FIRST ENCOUNTERED (FT) <b>95</b>			
	COMPLETED WELL IS: <input type="checkbox"/> ARTESIAN <input type="checkbox"/> DRY HOLE <input checked="" type="checkbox"/> SHALLOW (UNCONFINED)				STATIC WATER LEVEL IN COMPLETED WELL (FT) <b>10</b>			
	DRILLING FLUID: <input checked="" type="checkbox"/> AIR <input type="checkbox"/> MUD ADDITIVES - SPECIFY:							
	DRILLING METHOD: <input type="checkbox"/> ROTARY <input type="checkbox"/> HAMMER <input type="checkbox"/> CABLE TOOL <input type="checkbox"/> OTHER - SPECIFY:							
	DEPTH (feet bgl)		BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
	FROM	TO						
	<b>1 1/2</b>	<b>90</b>	<b>12 1/4</b>	<b>PVC Blank SDR17</b>	<b>Spline</b>	<b>8"</b>	<b>SDR17</b>	
	<b>90</b>	<b>110</b>	<b>12 1/4</b>	<b>PVC Screen SDR17</b>	<b>Spline</b>	<b>8"</b>	<b>SDR17</b>	<b>.035</b>

3. ANNULAR MATERIAL	DEPTH (feet bgl)		BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
	FROM	TO				
	<b>0</b>	<b>30</b>	<b>12 1/4</b>	<b>Neat Cement grout</b>	<b>13.5</b>	<b>Pump</b>
	<b>30</b>	<b>110</b>	<b>12 1/4</b>	<b>3/8 pea gravel</b>	<b>36</b>	<b>Tag Line</b>

FOR OSE INTERNAL USE		WR-20 WELL RECORD & LOG (Version 10/29/15)	
FILE NUMBER	<b>C-3988</b>	POD NUMBER	<b>245.28E.28.444</b>
LOCATION	<b>Exp1</b>	TRN NUMBER	<b>598141</b>
			PAGE 1 OF 2



## APPENDIX SITE PHOTOGRAPHS

**SCOUT AST SITE PHOTOS**



SP-1 View to north showing plugged well marker for Devon 6 Fee 2H. The Scout AST location is this former production pad.



SP-2 View southeast from northwest quadrant of former production pad. Construction of a pad for the AST is not required.

**SCOUT AST SITE PHOTOS**



SP-3 The Scout 602H is one of these two recently-drilled wells. The Scout AST location is not visible as it is hidden by the wellhead on the left.



SP-4 This windmill is USGS-9422 and USG-9419 and is discussed in the text. The Scout AST location is on the horizon and is framed by the windmill scaffold (green circle).

March 2022

# **Volume 2**

## **C-147 Registration Package for Scout AST Containment**

### **Section 6 T25S R28E Eddy County**

**Design/Construction Plan  
Engineering Drawings and Liner Specifications  
Well Water Services Manual  
Variances for AST Storage Containments  
Applicability of Engineering Variances to Variety of  
Site Conditions in Permian Basin**



*Aerial view showing in-ground containments designed by Magrym Consulting and permitted by Hicks Consultants. Also shown are two 60,000 bbl above-ground storage tank containments permitted by Hicks Consultants. Photograph by permission from Magrym Consulting.*

**Prepared for:  
ConocoPhillips  
Midland, Texas**

**Prepared by:  
R.T. Hicks Consultants, Ltd.  
901 Rio Grande NW, Ste F-142  
Albuquerque, New Mexico 87104**

## Box 9

### DESIGN AND CONSTRUCTION PLAN

9.  
**Recycling Facility and/or Containment Checklist:**  
*Instructions: Each of the following items must be attached to the application. Indicate, by a check mark in the box, that the documents are attached.*

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

## 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  $1 \times 10^{-9}$  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  $1 \times 10^{-5}$  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.

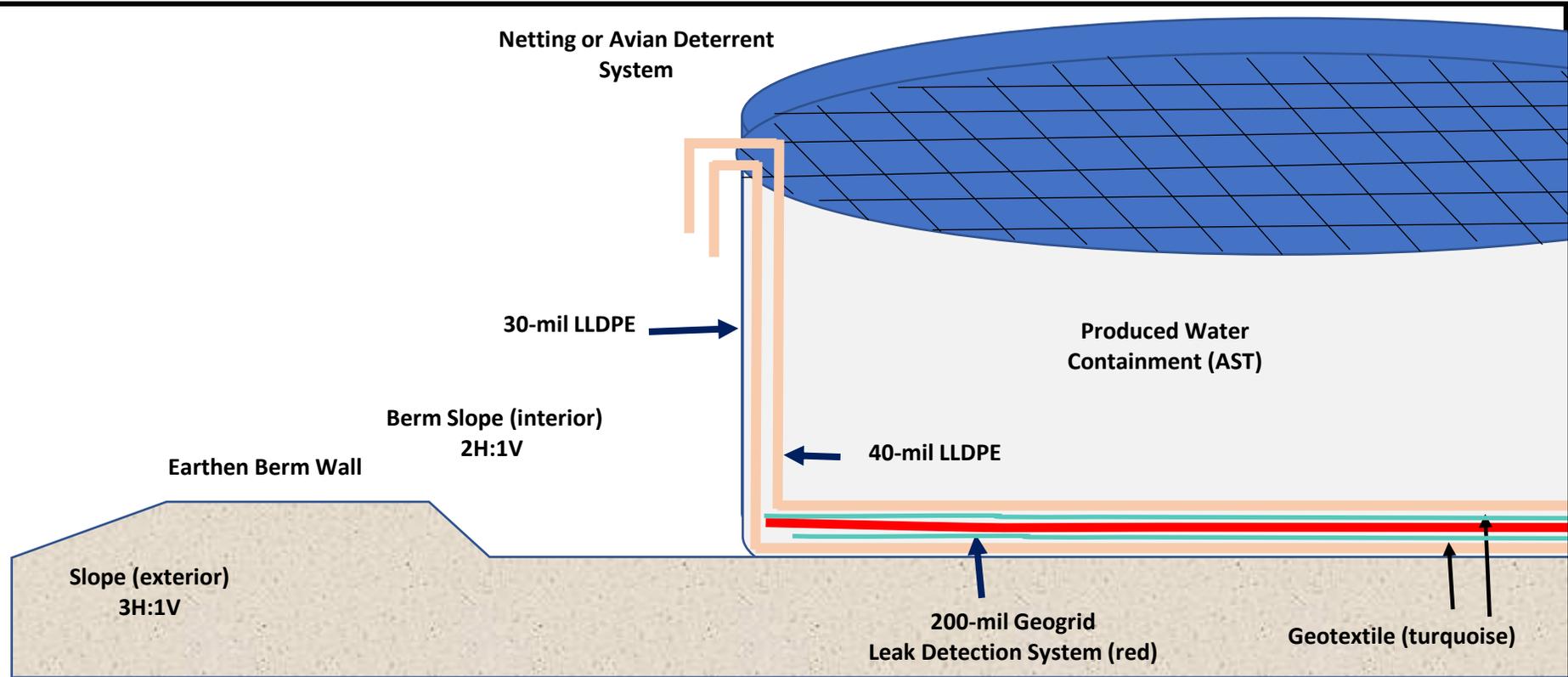
### *Fluid Injection/Withdrawal Flow Diverter*

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.



**Description of Leak Detection System**

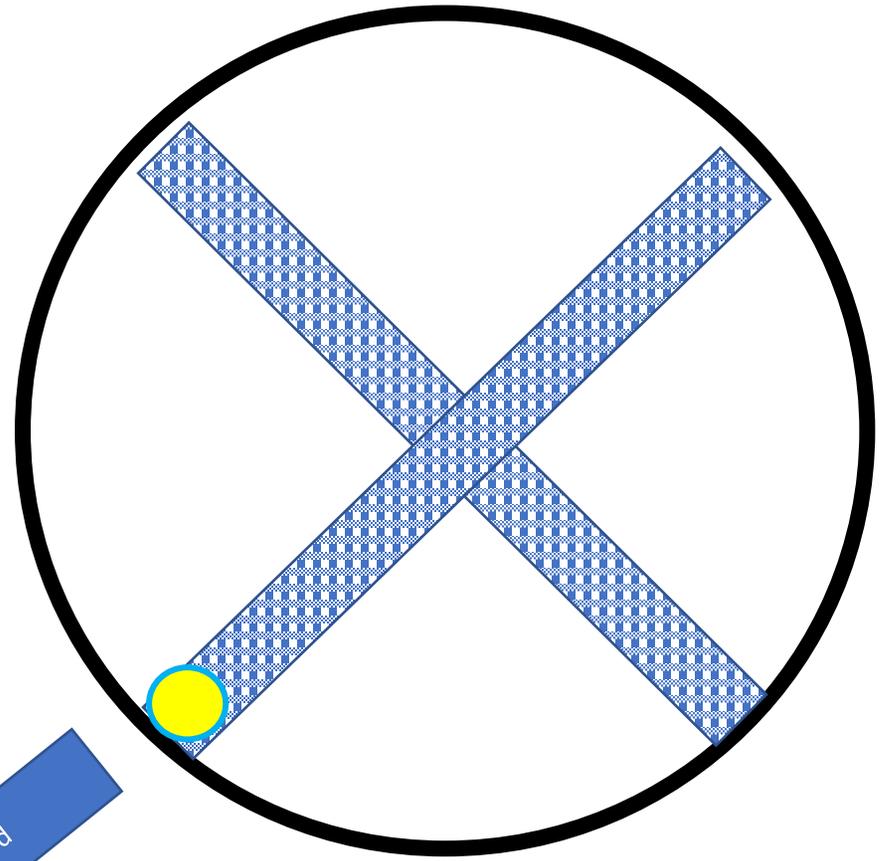
- 40-mil LLDPE comprise primary liner and 30-mil LLDPE comprise the secondary liner
- 200-mil geogrid drainage layer lies between the primary and secondary liner per Plate 2
- Geotextile between the geogrid and each liner
- > 3-inch deep sump excavated on down slope side of AST per Sump Design Drawing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

R.T. Hicks Consultants Albuquerque, NM	Design Sketch	Plate 1
	Well Water Solutions	May-21

Use laser level to 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 install of primary liner
  - below 40-mil primary liner
- 8-oz geotextile is placed
  - over the 30-mil LLDPE liner inside the steel AST ring
  - under the 40-mil primary liner inside the AST

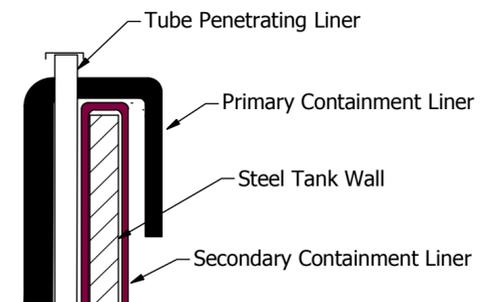
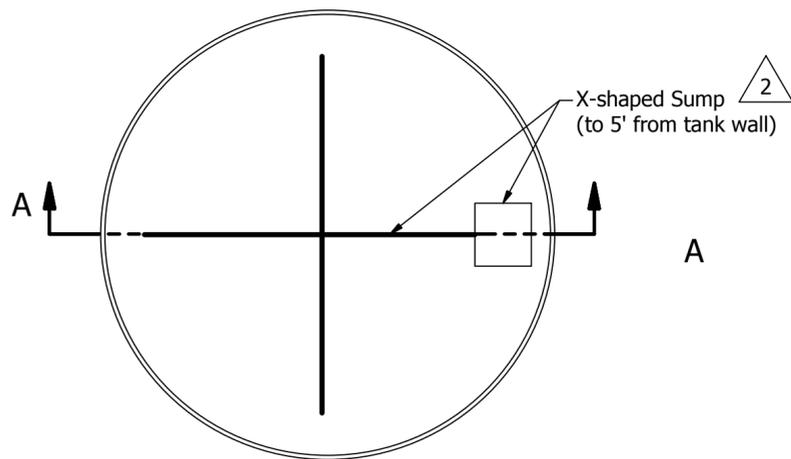
Sump at lowest point of the AST set up



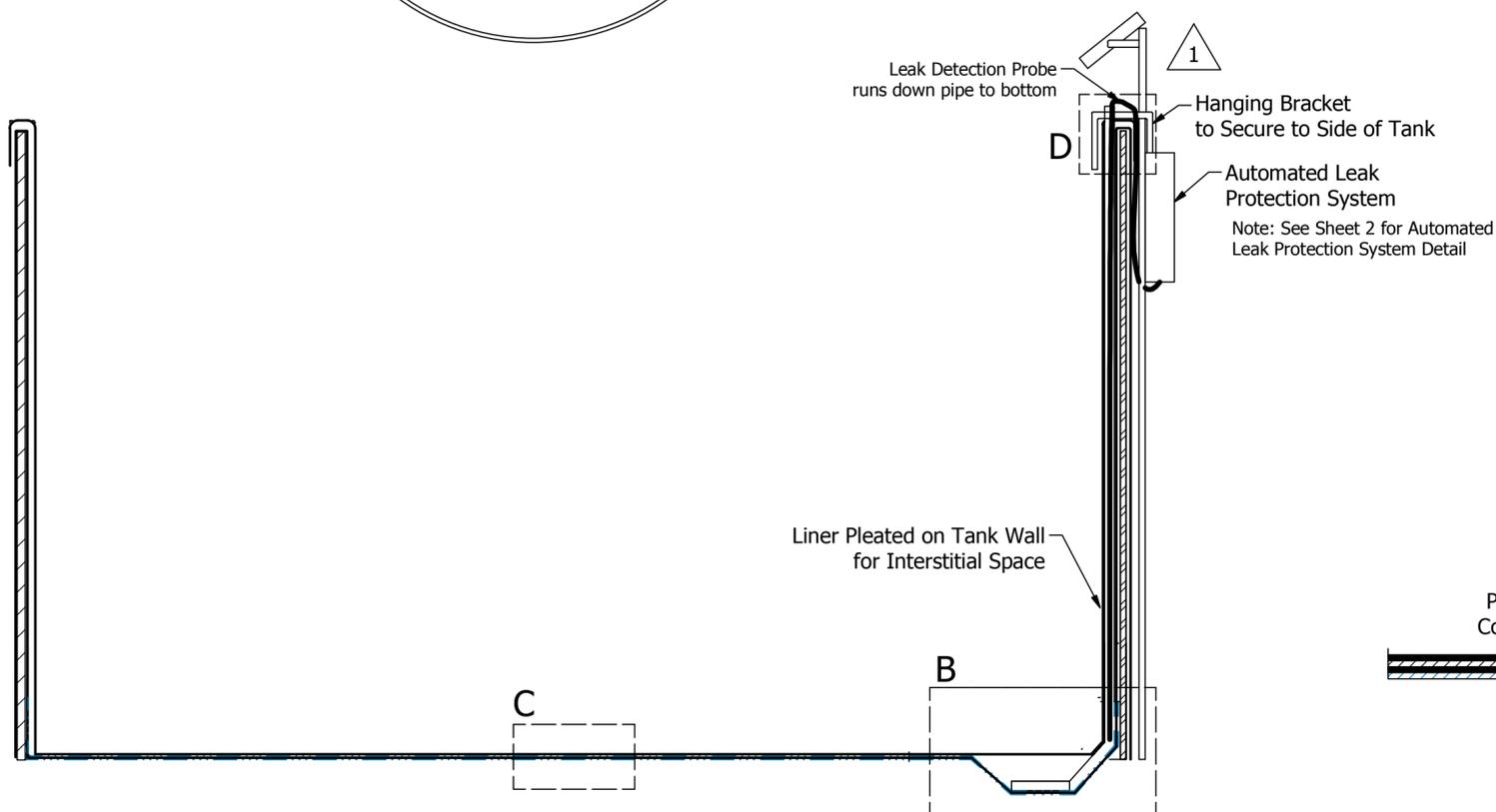
<b>R.T. Hicks Consultants</b> <b>Albuquerque, NM</b>	<b>Layout of Geogrid Drainage Mat</b>	<b>Plate 1</b>
	<b>WWS - North Olympus AST</b>	<b>June 2021</b>

**C 147 – BOX 3**  
**RECYCLING CONTAINMENT DESIGN DRAWINGS**  
**SET UP SOP**  
**LINER SPECIFICATIONS**

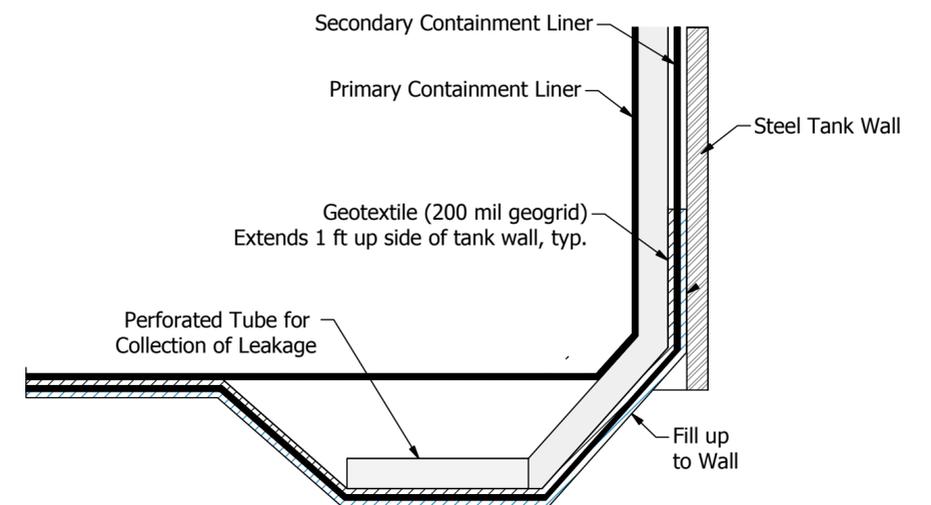
# WWS DOUBLE-LINED FRAC WATER TANK SYSTEM



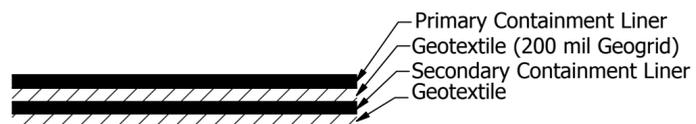
**SECTION D  
TUBE DETAIL**  
(Automated Leak Detection System Removed for Clarity)



**VIEW A-A  
TANK DETAIL**



**SECTION B  
SUMP DETAIL**



**SECTION C  
LINER DETAIL**

**LUCID**  
DRAFTING & DESIGN LLC  
sarah@luciddrafting.com 307.752.7388

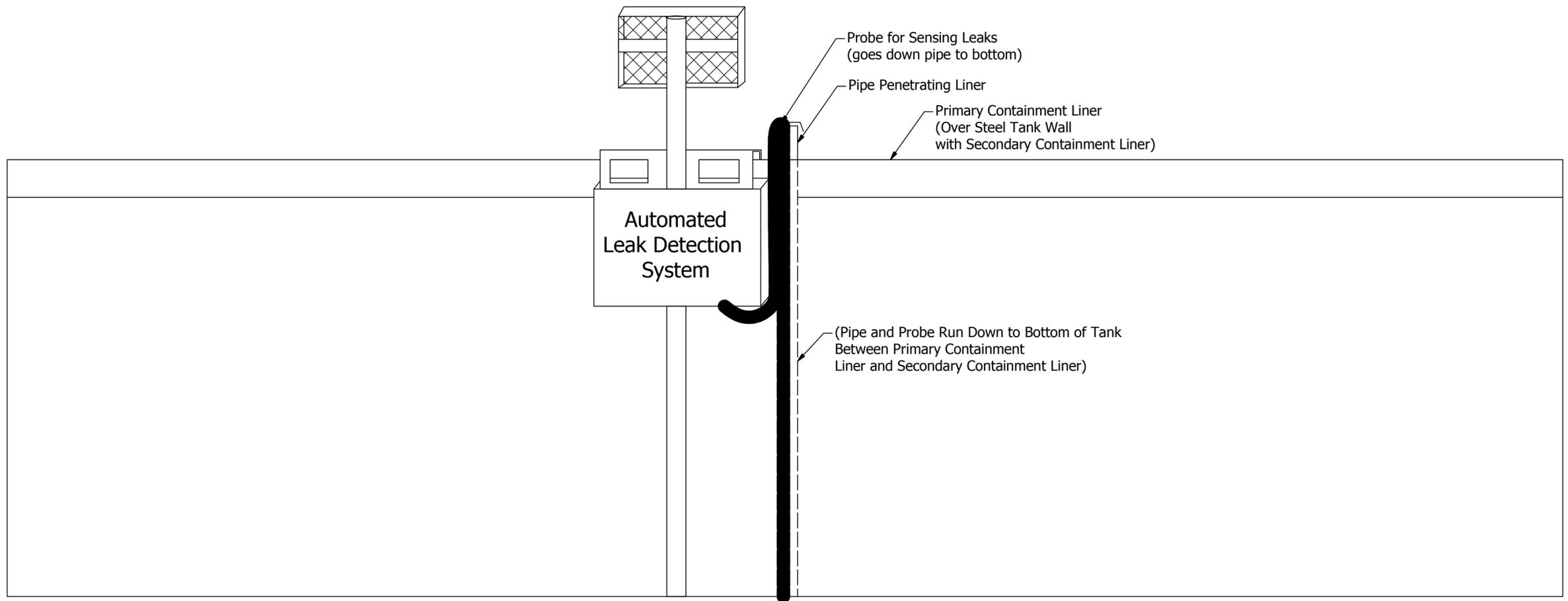
REVISION HISTORY				
REV	DESCRIPTION	DATE	BY	
0	INITIAL DWG	10/29/2015	SES	
1	ADDED LEAK DETECTION SYSTEM	11/6/2015	SES	
2	REVISED SUMP	11/6/2015	SES	
3	ADDED GEOTEXTILE UNDER AND BETWEEN LINERS	11/24/15	SES	

TITLE Double-Lined Frac Tank System	
CUSTOMER	
PROJECT/JOB WWS Double-Lined Tank System	
APPROVAL	
DRAFTER SES	DATE 10/28/2015
THIS DOCUMENT IS THE PROPERTY OF WWS AND MAY NOT BE REPRODUCED OR DISTRIBUTED TO THIRD PARTIES WITHOUT THE PRIOR CONSENT OF WWS.	

**WELL WATER SOLUTIONS**  
AND RENTALS, INC.

SIZE C	DWG NO LDD15-WWS-02	REV 3
SHEET 1 OF 2		

### 1 AUTOMATED LEAK DETECTION SYSTEM



TITLE				
Double-Lined Frac Tank System				
CUSTOMER				
PROJECT/JOB WWS Double-Lined Tank System				
APPROVAL		SIZE	DWG NO	REV
DRAFTER SES	DATE 10/28/2015	C	LDD15-WWS-02	3
THIS DOCUMENT IS THE PROPERTY OF WWS AND MAY NOT BE REPRODUCED OR DISTRIBUTED TO THIRD PARTIES WITHOUT THE PRIOR CONSENT OF WWS.		SHEET 2 OF 2		

2020



**Well Water Solutions and Rentals Inc.**

## **STANDARD OPERATING PROCEDURE (SOP)**

WELL WATER SOLUTIONS AND RENTALS INC | 1150 Coyote Bar Nunn, WY 82601

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## Section 1.01 Introduction

### 1) About

Well Water Solutions and Rentals Inc. aka (WWS), is the original pioneer of the portable Above Ground Storage Tank industry. The above ground storage tanks or AST's have become an integral part in saving cost in the oil and gas and industrial industries. WWS has been supplying and servicing these portable tanks for longer than any other company in the USA. We have focused our time and experience on providing the best tank products at the highest safety standards. We continue to learn and adapt every-day in our industry to make sure our employees are safe and our customers are happy.

**Standard Operating Procedures** or (SOPs) are a staple for safety and quality here at WWS. Our SOP for our above ground storage tank (AST) systems including planning, rig up, operations, and rig down. This SOP will discuss steps to be taken to promote the safest process, as well as list the potential hazards that should be identified and reviewed during our JSA prior to beginning the work process.

### 2) Background

WWS has over 170 AST's that are used for a variety of oil field and industrial applications within the fluid management operations. AST's can be used in place of traditional 500 BBL trailer tank farms and in-ground water impoundments, and are suitable for fresh water as well as production water. WWS tanks have standard sizes, ranging from 6,000 barrel (bbl) capacity to 60,000 bbl capacities. Through intensive design criteria WWS secured a patented design on the strongest possible design for an AST tank. We analyzed many methods to secure the panels together and all other methods failed our criteria. We have also set a standard in the industry for safe movement of the panels with our patented adaptor plate for a quick attach telehandler. We were able to successfully submit engineering documentation to the Oshkosh Corporation, which owns JLG and they have stamped and approved our adaptor plate.

### 3) SOP Purpose

WWS will extensively review this SOP with all new hire employees to assure proper understanding of all procedures. This SOP will also be reviewed with an employee if his/her responsibilities change under the plan. An electronic copy of this plan will be available at all WWS regional offices.

Training our employees to follow our SOP is the first step to a safe and successful work environment. We also need all our employees to treat everyone with respect and follow the lead of their supervisor to make sure every day is safe.

**STOP WORK** authority and who has the power to use it is another tool we use to help everyone stay involved in the safety process. We highly encourage all employees to feel comfortable in raising awareness of any unsafe situation happening or providing suggestions to help make any task safer as well. This helps everyone grow to be a stronger team.

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

#### 4) EH&S Programs

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

#### 5) Summary

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

### Section 1.02      **AST Planning and Preparations**

#### 1) Planning

Proper planning and documentation will help assure a successful AST rig up and rig down. The following steps can be utilized to fully, safely, and accurately perform the tank rig up or rig down:

- AST Order Information
- Customer Meeting
- Soil Conditions and Pad Preparation (Completed by Customer)
- Pre-Mobilization and On-site Meeting
- Notifications
- Job Safety Analysis (JSA)
- AST material requirements for delivery

#### 2) Required AST Order Information

WWS Manager or Field Supervisor will record general AST order information including the following:

- Site location directions and coordinates
- Customer Contact Name, Phone, and Email
- Emergency Medical Contacts
- Special Safety Requirements
- Tank Utilization Dates
- Tank size and Accessories
- Special piping requests

#### 3) Site Meeting or Scheduling Call

Prior to finalizing the delivery schedule, a meeting or conference call is held with WWS and our customers required personnel to make sure all parties are coordinating well and have the same and accurate information.

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

## KEY MEETING TOPICS:

- Introduce all WWS key personnel to our customer's key personnel
- Review what tanks are needed and what use they will be needing them for
- Review AST scope of work, what is normally included, what is not
- Confirm AST size(s) to be used
- Assure a 20' working space around each tank for safe working area
- Permitting for AST (as needed)
- Current site conditions and soil preparation requirements
- Site access and truck route requirements, and any weather-related issues that could affect them
- Time line for rig up and rig down of the AST
- Detailed drawings of the location layout for tank and piping placement
- Details on "Fresh Water" source to fill the tank on the day of the set up
- Assure a minimum of 24" of water the day of the setup to quickly and safely complete the job
- Identify what other charges could be incurred by the customer and result in standby time or additional charges
- Confirm customer is responsible for the used liner, residual solids left in the tank, removal of all radioactive NORM materials, and site reclamation
- Review any and all additional safety requirements the customer may have
- WWS to follow up with an email to review all changes made

#### 4) Site Soil Preparation

Preparation of the soils on site is required to form a dependable base for the AST.

Preparation of the tank pad is solely the responsibility of the customer/operating company.

WWS Soil Requirements are:

- Minimum soil compaction of 95% compaction
- Soil testing results shall be shared with WWS if requested
- Site must be cleared and free of debris such as sticks, sharp rocks, and trash etc.
- WWS recommends soil compaction testing to be conducted via Standard Proctor Test (American Society for Testing and Materials {ASTM} Standard D698) or Modified Proctor Test (ASTM Standard D1557)
- Compaction test results must be provided to WWS prior to the commencement of AST construction upon request
- Proof roll testing maybe be used if there is doubt of site compaction standards
- Grade of the inner AST area to be a maximum of .25% or 3" drop per 100' towards sump location
- Site shall be graveled and rolled prior to tank installation, utilizing gravel size 2B or smaller. (3/4" road grade preferred, or coarse sand with minimum thickness of 4 inches)
- \*Do Not Use\* crushed rock as sharp edges could puncture the tank liner

Completions of all these steps will assure a smooth, safe, and seamless tank set up.

#### 5) Pre-Mobilization Onsite Meeting

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

## 6) CALL BEFORE YOU DIG "811"

Even though the customer or their subcontractor may have already called for utility locates for the sump hole, the WWS field supervisor should call the local or state underground utility location service again at least 3 days in advance before construction/digging begins. The ticket or reference number provided by the one-call service will then be documented.

The following web site has contacts for all the states and provinces.

<http://www.call811.com/state-specific.aspx>.

Call **811** in United States

## 7) AST Material Deliveries

Once the delivery route and schedule are established and the pre-project onsite inspection is completed, the AST materials can be delivered. Updates and notifications will be made as agreed to during the customer meeting. WWS delivery personnel will use a spotter for the equipment driver and should unload all materials safely taking extra care to avoid damage to liners, plates, and all other AST components. Should any problem arise during the scope of operations the WWS field supervisor will notify to correct customer contact to remedy the issue.

## Section 1.03 WWS AST Pre Rig Up Requirements

### 1) Loading Requirements

WWS will have the field supervisor complete a "**Dispatch Load In Load Out Sheet**" before and after the set-up and rig down of the AST system. This sheet will identify all the needed parts and accessories to complete the AST Rig Up. During Rig Down the "Dispatch load in load out sheet" is also filled out to ensure all parts and accessories are accounted for and in good working condition. In the event parts or accessories are missing and/or damaged the customer will assume full responsibility and be billed back for the parts and accessories.

### 2) Job Safety Analysis (JSA)

A job safety analysis (JSA) must be completed on-site prior to the beginning of any work. The JSA will be completed according to WWS protocol and safety programs. Customer's safety requirements will also be communicated during the JSA. All personnel, third party contractors, and customer representatives are expected to participate and sign the JSA when the JSA is completed.

### 3) Check Soil Conditions

**Preparation of the tank pad is solely the responsibility of the customer.**

However, bad weather such as wind, rain, and snow events can change the soil conditions quickly. If soil conditions change the WWS field supervisor will notify the proper customer contact.

### 4) Proper Tank Positioning

- Check proposed AST site to confirm that a 20' clear work area around the perimeter of the tank is possible to provide access for equipment and laydown area for AST materials and erection equipment

- Check that the minimum setback distances to existing wells, power lines, etc. are met
- Mark out the tank location using WWS marking equipment
- Establish and mark out final location for the fill and suction tube(s) and stairs

## 5) Equipment (WWS provided)

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

- One 40' and/or 60' extending straight or z boom man-lift
- 10,000 lb. or greater capacity, rough terrain forklift (JGL 10-43A is preferred telehandler)
- Backhoe or small excavator with bucket
- Skid steer

## 6) Hand Tools Recommended

All hand tools are subject to daily inspection.

- Two 16' ladders
- Four 4 lb. sledgehammers
- 100' or 200' tape measure
- 1 case of marking paint – minimum
- Set of wrenches ¼" – 1 ½"
- Set of sockets ¼" – 1 ½"
- One small pry bar
- 8' rock bar (digging bar)
- Five safety harnesses with retractable tethers
- Five retractable lanyards
- Duct tape
- Covered hook bladed knife
- Three 40' lifting straps (minimum of 5,000 lb capacity)
- Three 20' 3/8" chains (must have visible certification tags)
- Two rolling head pry bars
- Two ½" impact guns
- Two sets of rigging chains
- Patch tape
- Rubbing alcohol
- Patch roller
- Leather gloves
- Wire brush or wheel with 4" angle grinder
- Generator
- Steel toed rubber boots
- All personnel must have Fire retardant clothing (FRs) Safety Hard Hats, Safety Glasses, crush resistant gloves and any safety requirements from customer

## Section 1.04 AST Tank Rig Up Procedure

WWS Field Supervisor will double check all paper work and location prior to setup to assure everything is correct and ready to set the AST.

## 1) Tank Layout

- Determine center of tank and mark with paint. Place a non-abrasive item on the center point; preferably a sandbag. This will be used to find the center of tank after liners have been placed
- Measure and double check minimum distance from tank center to existing wells or other set backs
- Measure and paint a line to mark the circumference of tank for panel placement using WWS special design marking tool
- Also mark 15' outside the tank circumference as this will show where the liner should reach once fully stretched flat. This will assure enough liner is present to go over tank walls once placed

## 2) Initial Tank Erection Process

- Determine where suction pipe is to be located in the tank
- Dig at least 4' wide x 6' long x 16" deep sump hole for over the wall suction pipe to set into and taper the edges so there are no sharp corners of the excavation. Or dig 3' wide x 12' long x 10" deep sump hole for undermount suction pipe
- Remove any sharp stones and debris for the digging process
- If multiple suction manifolds are required, the sumps should have a minimum of 15' of separation

### **Attention:**

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

- All tank set-ups will utilize a standard 10oz geotextile that will be laid on the grounds surface to act as a padded protector for the liner
- A Standard LLDPE 30 mil or 40 mil liner will then be used as the primary containment, but may also be used as a secondary containment within the tank upon request.
- Check customer specifications and regulatory permitting to assure proper liner and containment requirements are met for ASTs
- Organized crew inspection walks for the entire tank base area will be performed to pick up any sharp stones or other sharp debris that could damage the liner
- The geotextile pad can now be deployed out fully at this point. It should reach beyond the tank circumference paint lines by 1'-4'
- Once geotextile is completed the liner can be fully deployed. Crews will double check that the liner will reach to the 15' marks beyond the tank circumference
- Crews will then perform a visual inspection of the liner and repair any defects as necessary
- Fold the liner towards the middle of the tank until tank circumference paint line is fully exposed

## 3) Secondary Containment Liners and Installation

- If tank system requires a secondary liner and leak detection system this will be installed on top of the first liner
- WWS Field Supervisor will direct the installation of the various parts and layers of the secondary containment system

- For example, a 220-mil geo grid mesh (Reference Section 1.16 for Spec) or other suitable approved spacer material can be installed between the top and bottom liner layers to provide a separation for to water flow. Installation of inspection pipes into to the designed low points of the tank will later be used for leak inspections
- Install any other customer required components for the leak inspections if needed
- Unroll top liner over geo grid to completed the secondary containment system
- Follow the same setup guidelines for a one liner system for the two-liner system, and make sure to complete the components installation fully once the first liner is clamped.

#### 4) Tank Wall Erection

- Field Supervisor will complete a visual inspection of each panel as it is prepared to be placed
- The first tank panel will be placed and secured using the backhoe bucket
- Once backhoe fully secures the panel the telehandler can then get the next panel. Crews will continuously provide operators with spotters during all operations
- If higher winds exist crews are cautioned to pay special close attention to all operations
- Crews will repeat the panel placement process until entire tank is erected
- Personnel secured on man lift or using a ladder (depending on customer policies) then secure the panels in place with 14 retainer pins per panel.

#### ATTENTION:

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

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

#### 5) Proper Liner Placement and Clamping

- After 3 or more panels are set, and all liner protections are complete, crews inside the tank can begin to hand liner up to crews outside the tank that are in the manlift
- Crew of 2 inside the tank wall unfolds and pulls the liner toward each panel (final connection of last panel will not be made until all liner to that point is pulled and secured to avoid confined space, all personnel must be out of tank before walls are closed)
- The inside crew of 2 works with the manlift crew of 2 located outside to pull the liner up and over the top of each panel. The man lift crew lifts the liner using ropes/straps gently lowered and attached (by the inside crew). The man lift crew lifts a small liner section to

the top of the panel and folds it over the top of the panel, being sure there is enough slack in the liner inside the panel wall

- Proper slack or excess liner on the vertical wall can be tested by the inside crew. The crew will pin the liner to the bottom of the wall with their boot and pull liner at chest level outwards away from the wall. There should be about 3' from wall to liner when being pulled. This is the appropriate amount of slack. If crew ever has doubt that the liner slack may not be enough WWS's experience has proven more slack the better, so just give it a little more slack if needed

NOTE: The crew must allow sufficient slack in the liner at the wall to allow for liner movement during filling and draining.

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

- Once a section of liner is positioned properly (with liner slack inside the tank) and over the top of each panel wall, the man lift crew secures the top of the liner with clamps. (Tools in basket secured with tool lanyards) NOTE: Each clamp is notched where D-rings on the top of each panel are located. This notch acts as an added safety retainer once clamps are fully tightened. Each panel will receive 2 liner clamps
- Crews will continue to clamp until they have reached the final panel. Crews will leave this small area of liner down until all internal piping is completed

## 6) Installing Tank Accessories

- Install safety stair system, fill piping, and suction piping. Ensure that stair system and piping are appropriately secured to the tank walls with ratchet straps or chains
- Assemble all interior piping and assure any connections or sharp points are fully wrapped in geo material for protection

## 7) AST Completion Steps

- Close final panel and secure with pins
- Lift liner and secure at the closure point to finish clamping process
- Trim liner and allow approximately 2' of liner to hang over edge of tank.
- Begin to fill the tank with water and monitor filling process
- Inspect all connections and equipment, confirming at least 2 liner clamps are in place on top of each panel
- Have a minimum of 24 inches of water put in the tank to hold liner in place
- Fill tank and monitor
- Perform periodic inspections of the tank to ensure everything is in proper working order
- Every time a tank is fully emptied and refilled, an inspection must be performed
- Water should NEVER go below 12 inches at the LOWEST level in the tank. (Mark liner as a caution).

NOTE: Filling process may begin as early as ¾ of the tank wall panels are set. Only fresh water can be used if filling while personnel is in the tank. Reasons for early filling is to assist with windy days as the water weight help to hold liner in place. It is recommended no personnel be in the tank with more than 6" of water.

## Section 1.05 AST In Use Operations

### 1) Inspections and Monitoring

weekly

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

If changes are noted, they should be communicated to the WWS Manager/Field Supervisor.

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

### 2) Initial Leak Detection and Liner Repair

Notify BLM and NMOCD if leak reaches the ground

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

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

## Section 1.06 WWS AST Rig Down Procedure

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

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

**Customer is responsible for any removal of radioactive NORM materials before WWS crews can rig down any tank.**

Section 1.07 WWS AST Engineering Stamps



June 30, 2015

Well Water Solutions and Rental, Inc.  
2130 W. 40<sup>th</sup>  
Casper, WY 82604  
Attn: Sean Lovelace

Re: Portable Frac Tank Certification – Pinned Seams

Dear Mr. Lovelace:

Per your request our office has performed a structural analysis of the portable frac tanks as well as the associated accessories. This analysis was performed to determine that the tanks meet the required strength criteria under operating conditions according to the AISC Manual of Steel Construction.

The tanks range in diameter from approximately 81 to 190 feet and are 11 feet, 8 inches in height and are designed to store water. They are constructed of individual steel reinforced panels that are connected together with a patent pending steel pin system.

The following tanks sizes were included in the analysis:

- ⊕ 10,000 BBL – Approximately 81'Ø
- ⊕ 20,000 BBL – Approximately 108'Ø
- ⊕ 30,000 BBL – Approximately 135'Ø
- ⊕ 40,000 BBL – Approximately 156'Ø
- ⊕ 50,000 BBL – Approximately 176'Ø
- ⊕ 55,000 BBL – Approximately 183'Ø
- ⊕ 60,000 BBL – Approximately 190'Ø

The tanks are constructed of the following materials:

- ⊕ Tank Panels – ASTM A36, 36 ksi Steel Plate
- ⊕ Horizontal & Vertical Framing – ASTM A500, Grade B, 46 ksi Structural Steel Tubing
- ⊕ Connecting Pins - ASTM A36, 36 ksi Steel Round Bar



1964 East 1<sup>st</sup> Street  
Casper, WY 82601

PHONE (307) 265-3900  
FAX (307) 265-3559  
WEB SITE <http://www.pillarse.com>

June 30, 2015

Page 2 of 2

Our office has determined that the portable frac tanks, as described herein, are capable of supporting the operating load conditions in conformance with the AISC Manual of Steel Construction.

Calculations of this analysis can be provided upon request.

If you have any questions or require additional information please contact our office.

Sincerely,

Bryan Prosinski, P.E., S.E.  
Pillar Structural Engineering



WWS AST Engineering Specs

Section 1.08

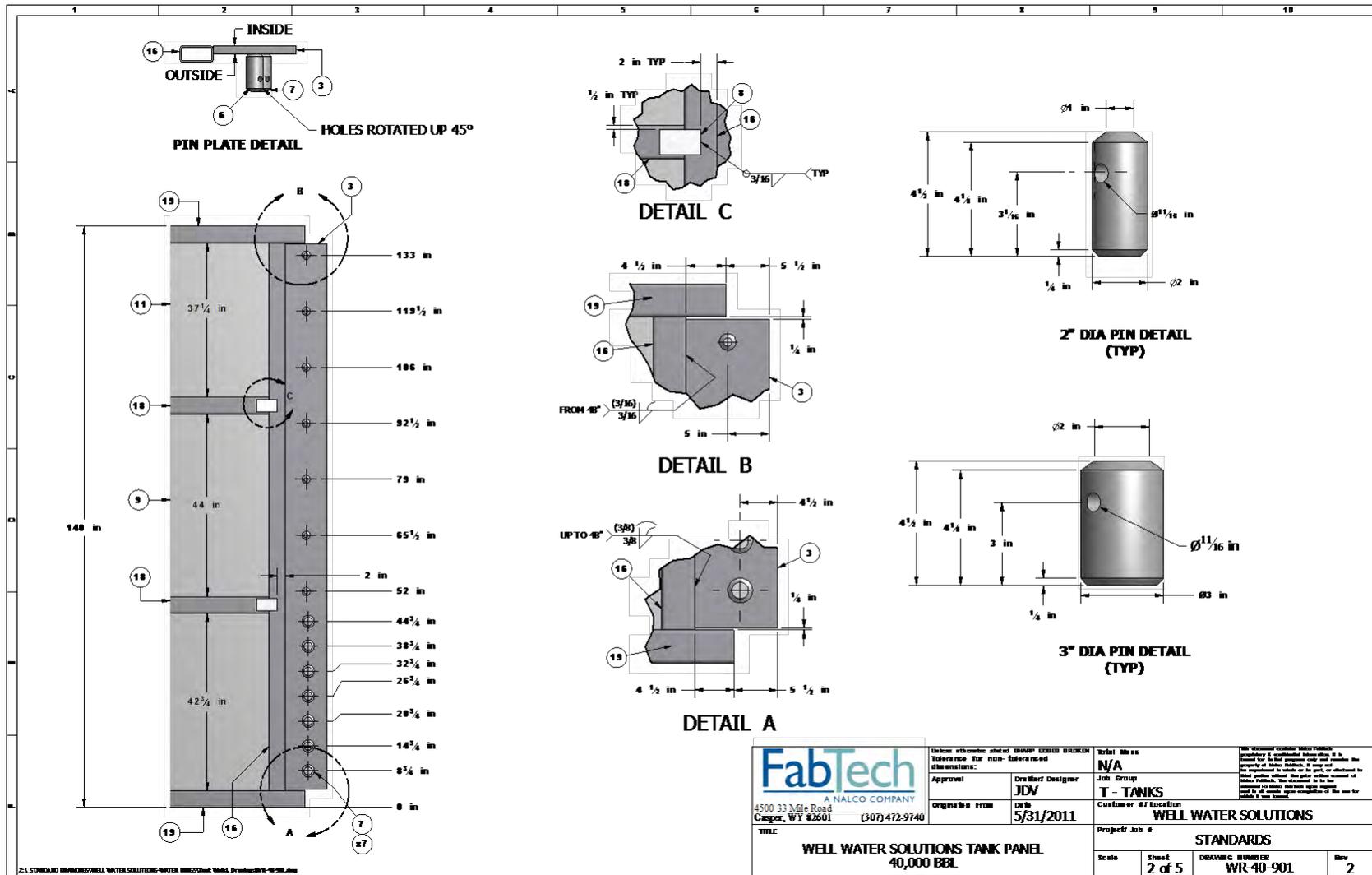
CK	ITEM	QTY	DESCRIPTION	WIDTH	LENGTH	MATERIAL	CLLENGTH (in)	WEIGHT
	1	14	BAR, ROUND, 5/8" (LOCK PIN)		6 1/2 in	A36	6.50	
	2	2	D-RING, 1/2" B38, WORKING LOAD 4000 lbs			A29/ A29M - 91 1045(C-1045), MODIFIED TO WELD DOWN		2
	3	2	FBAR, 1"	10 in	131 1/2 in	A36	131.50	373
	4	2	FBAR, 10GA	3 in	43 1/8 in	A36	86.25	99
	5	2	PAD EYE, #2			CROSBY GROUP, S-264		0
	6	7	PM, 2" DIA		4 1/2 in	KUSTOM KONCEPTS, A1018	31.50	3
	7	7	PM, 3" DIA		4 1/2 in	KUSTOM KONCEPTS, A1018	31.50	8
	8	2	PLATE, 3/16"	3 in	5 in	A36	10.00	2
	9	1	PLATE, 3/16"	96 in	240 in	A36	240.00	156
	10	6	SHEET, 10GA	2 1/2 in	3 3/4 in	A36	22.50	3
	11	1	SHEET, 10GA	42 1/2 in	240 in	A36	240.00	50
	12	2	TUBE, 4" x 2" x 3/16" (MITER BOTH ENDS)		52 in	A500B CLEAN COAT	104.00	55
	13	3	TUBE, 4" x 2" x 3/16"		37 1/4 in	A500B CLEAN COAT	74.50	43
	14	3	TUBE, 4" x 2" x 3/16"		42 3/4 in	A500B CLEAN COAT	128.25	74
	15	2	TUBE, 4" x 2" x 3/16"		44 in	A500B CLEAN COAT	88.00	50
	16	2	TUBE, 4" x 2" x 3/16"		132 in	A500B CLEAN COAT	264.00	151
	17	1	TUBE, 4" x 2" x 3/16" (MITER BOTH ENDS)		137 1/2 in	A500B CLEAN COAT	137.50	78
	18	2	TUBE, 4" x 2" x 3/16", (ROLL TO 155'-6 7/8" LD.)		236 3/8 in	A500B CLEAN COAT	472.75	271
	19	2	TUBE, 4" x 2" x 3/16", (ROLL TO 155'-6 7/8" LD.)		253 7/8 in	A500B CLEAN COAT	507.75	291

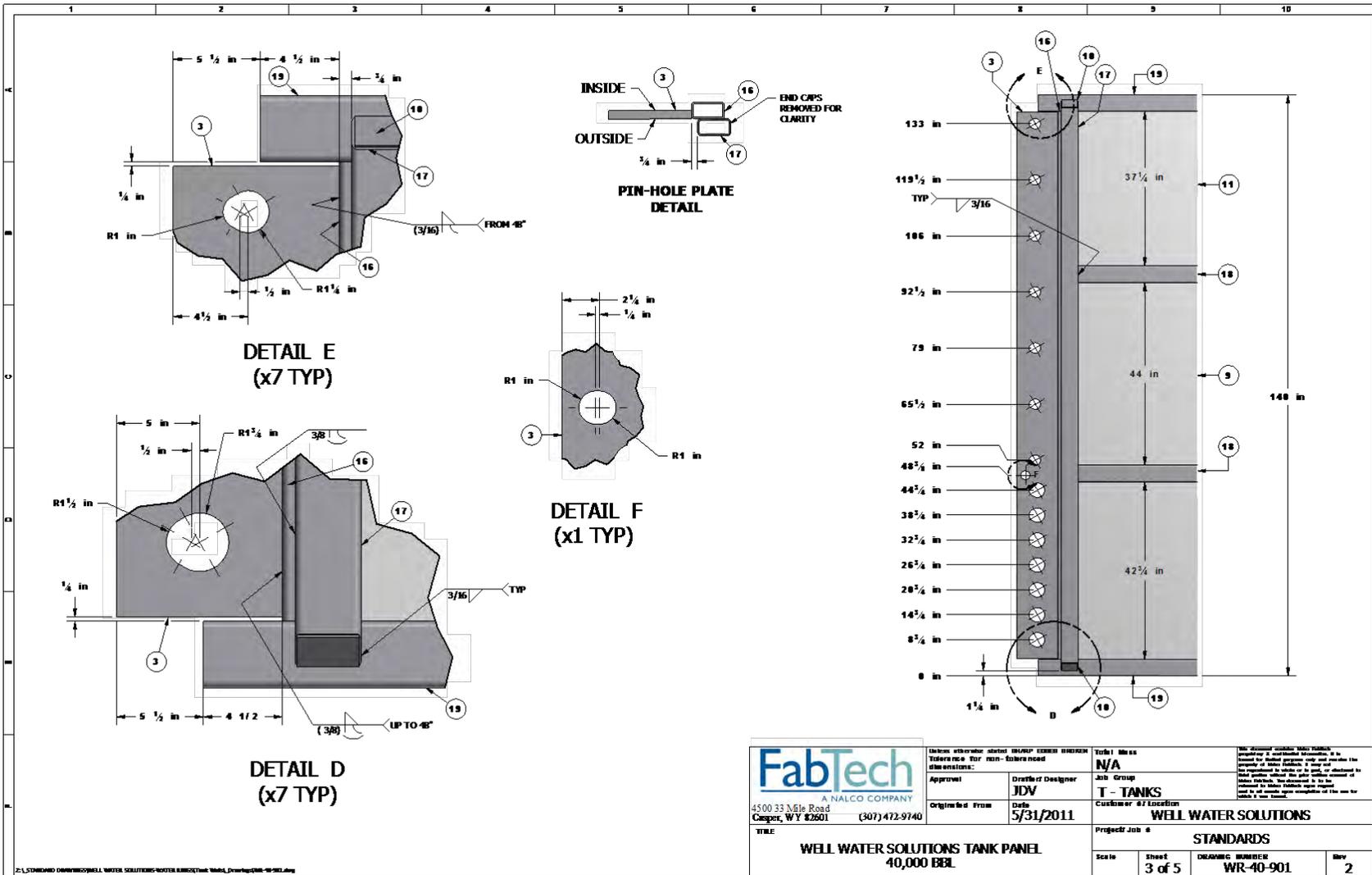
**NOTES:**  
 -THIS DRAWING REFLECTS ONE (1) ASSEMBLY  
 -TWENTY THREE (23) PANELS REQUIRED FOR ENTIRE TANK ASSEMBLY

REV	REVISION	DATE	BY
2	STANDARDIZE NOTATIONS	1/17/2012	JDV
1	ADDED ITEMS 7, 8, & 16	12/09/11	DSG
0	FOR CONSTRUCTION REF(11050-901) CHANGED HEIGHT AND LOCATION OF PMS REF(11078-40-901)	9/1/2011	CJD

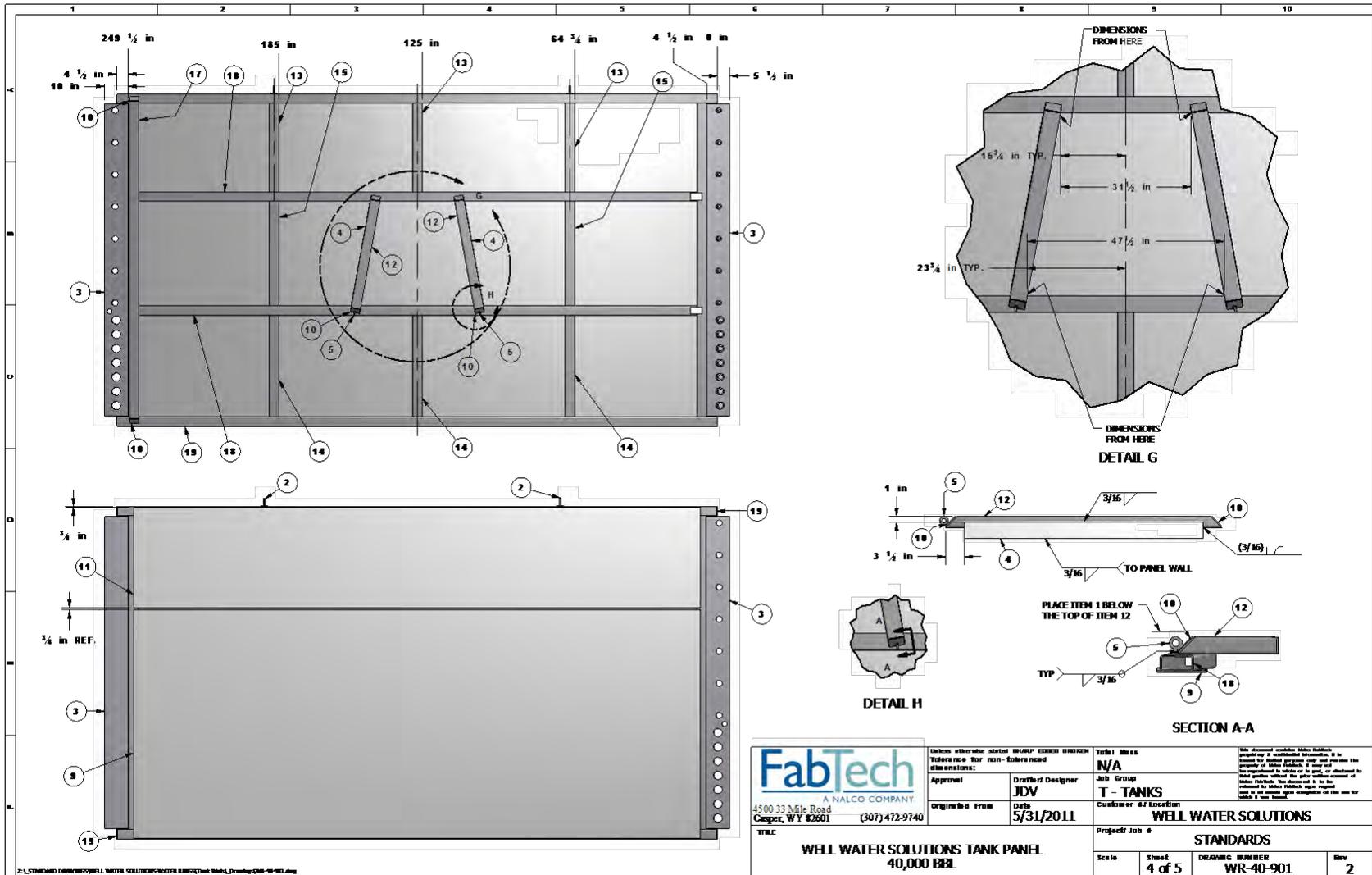
<b>FabTech</b> A NALCO COMPANY 4500 33 Mile Road Casper, WY 82601 (307)472-9740		Unless otherwise stated DIMENSIONS SHOWN TOLERANCES FOR NON-SHAPE-CAST DIMENSIONS: APPROVAL: _____ DRAFTSMAN: JDV DATE: 5/31/2011	Title: N/A Job Group: T - TANKS Customer / Location: WELL WATER SOLUTIONS Project Job #: _____ Scale: 1 of 5 DRAWING NUMBER: WR-40-901 REV: 2
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<b>FabTech</b> A NALCO COMPANY 4500 33 Mile Road Casper, WY 82601 (307) 472-9740	Unless otherwise stated, FABRIC, FINISH, DIMENSIONS, TOLERANCES FOR NON-INDICATED DIMENSIONS: Approval: _____ Designer/Designer: <b>JDW</b> Date: <b>5/31/2011</b>		Total Mass: <b>N/A</b> Job Group: <b>T - TANKS</b> Customer #7 Location: <b>WELL WATER SOLUTIONS</b>		The customer hereby warrants that the drawings and specifications are for the use of the customer and are not to be used for any other purpose without the written consent of FabTech. The drawings are to be used for the manufacture of the item for which they were prepared.
	TITLE: <b>WELL WATER SOLUTIONS TANK PANEL 40,000 EBL</b>		Project Job #: <b>STANDARDS</b>		
Scale: <b>2 of 5</b>		DRAWING NUMBER: <b>WR-40-901</b>		Rev: <b>2</b>	



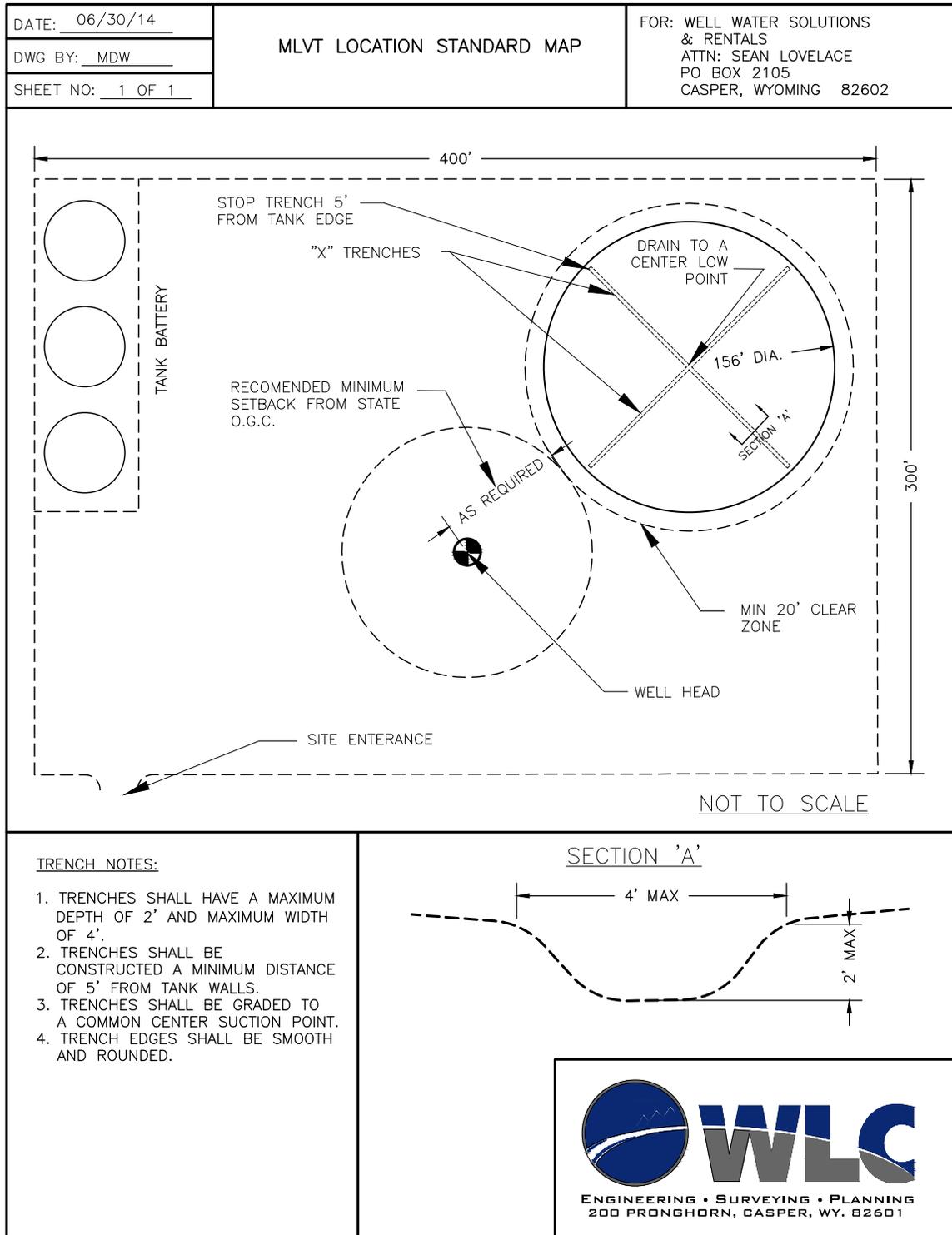
<b>FabTech</b> A NALCO COMPANY 4500 33 Mile Road Casper, WY 82601 (307) 472-9740	Unless otherwise stated, ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN INCHES. DIMENSIONS ARE SHOWN UNLESS OTHERWISE NOTED.	Title Block <b>N/A</b>	See "GENERAL NOTES" for additional information.
	Approval:	Drafted/Designer: <b>JDV</b>	Job Group: <b>T - TANKS</b>
Originated From:	Date: <b>5/31/2011</b>	Customer #/Location: <b>WELL WATER SOLUTIONS</b>	See "GENERAL NOTES" for additional information.
TITLE: <b>WELL WATER SOLUTIONS TANK PANEL 40,000 EBR.</b>		Project/Job #: <b>STANDARDS</b>	
		Scale:	Sheet: <b>3 of 5</b>
		DRAWING NUMBER: <b>WR-40-901</b>	Rev: <b>2</b>



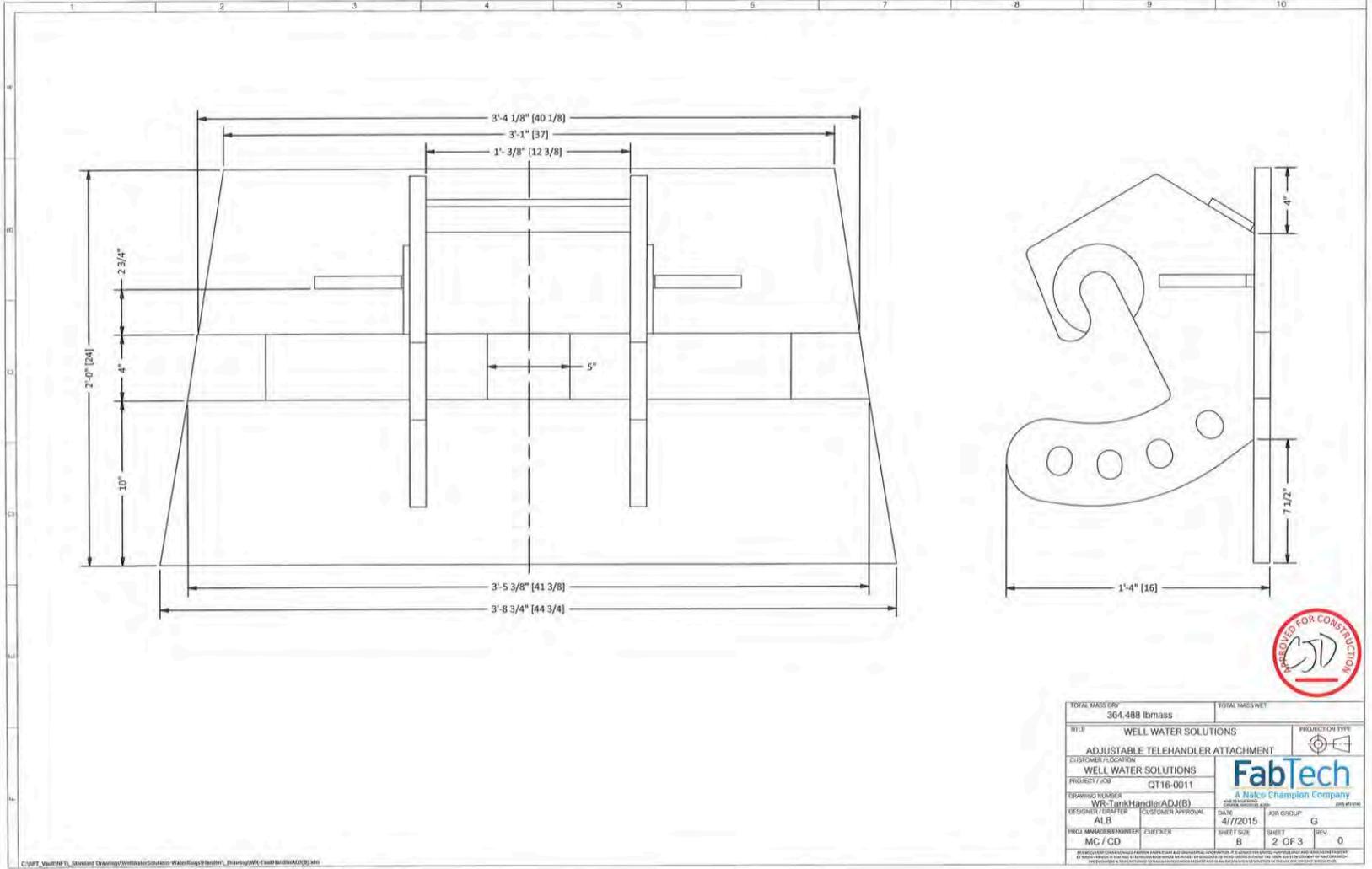
<p><b>FabTech</b> A NALCO COMPANY</p> <p>4500 33 Mile Road Casper, WY 82601 (307)472-9740</p>	<p>Unless otherwise stated, SHARP CORNER DIMENSIONS ARE FOR THE MINIMUM DIMENSIONS.</p>	<p>Title: <b>N/A</b></p>	<p>See standard material specifications for material specifications and standards for material specifications. It is the responsibility of the customer to provide the material specifications for the material to be used in the project. The customer is responsible for providing the material specifications for the material to be used in the project. The customer is responsible for providing the material specifications for the material to be used in the project.</p>
	<p>Approval: <b>JDV</b></p>	<p>Draftsman/Designer: <b>JDV</b></p>	
<p>Originated From:</p>	<p>Date: <b>5/31/2011</b></p>	<p>Customer / Location: <b>WELL WATER SOLUTIONS</b></p>	<p>Project Job #:</p>
<p>TITLE: <b>WELL WATER SOLUTIONS TANK PANEL 40,000 BEB</b></p>		<p>STANDARDS</p>	
<p>Scale:</p>	<p>Sheet: <b>4 of 5</b></p>	<p>DRAWING NUMBER: <b>WR-40-901</b></p>	<p>Rev: <b>2</b></p>



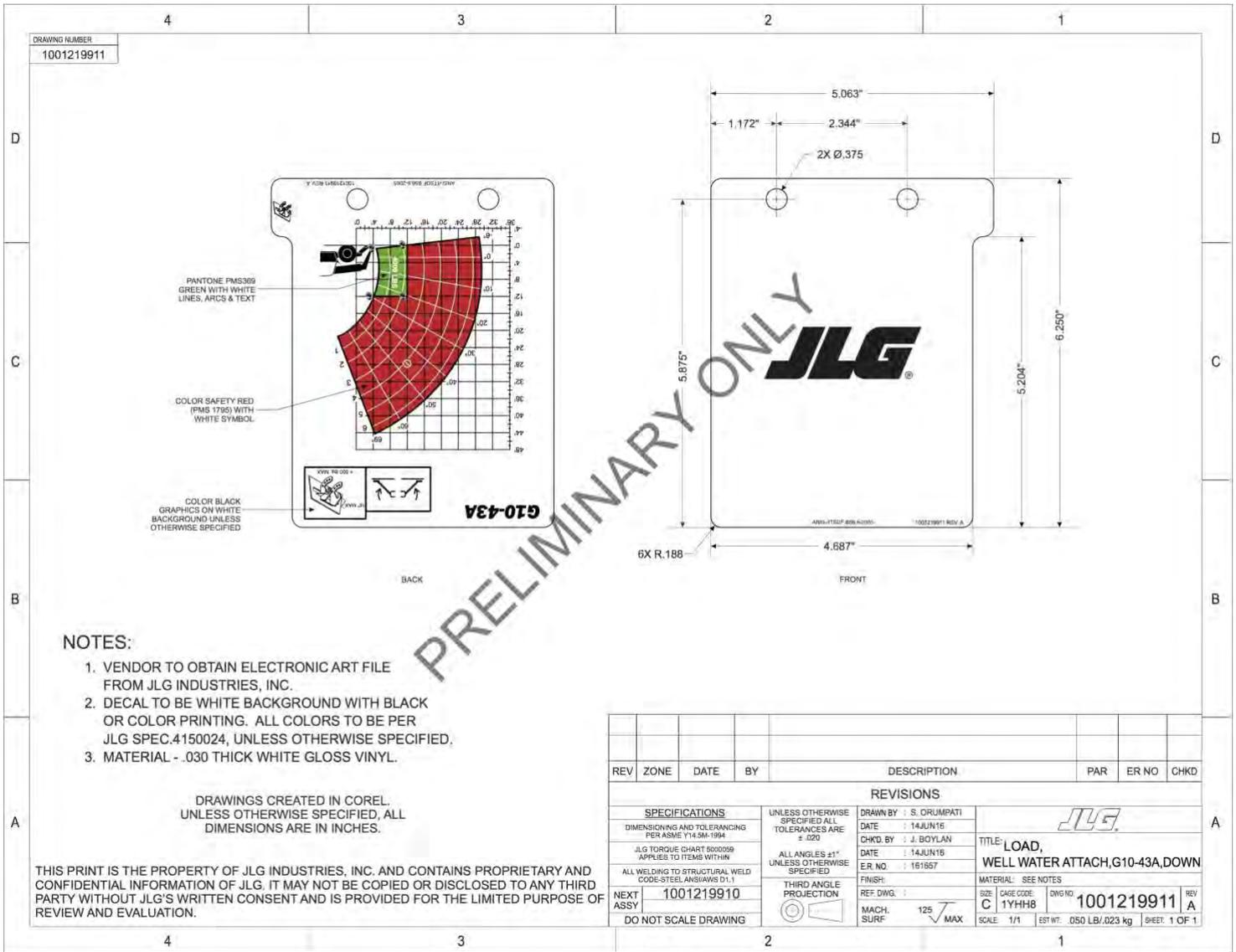
Section 1.09 Proper AST Setback and Location Sample











**NOTES:**

1. VENDOR TO OBTAIN ELECTRONIC ART FILE FROM JLG INDUSTRIES, INC.
2. DECAL TO BE WHITE BACKGROUND WITH BLACK OR COLOR PRINTING. ALL COLORS TO BE PER JLG SPEC.4150024, UNLESS OTHERWISE SPECIFIED.
3. MATERIAL - .030 THICK WHITE GLOSS VINYL.

DRAWINGS CREATED IN COREL.  
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	DESCRIPTION	PAR	ER NO	CHKD
<b>REVISIONS</b>							
<b>SPECIFICATIONS</b>				UNLESS OTHERWISE SPECIFIED ALL TOLERANCES ARE ± .020			
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994				DRAWN BY : S. ORUMPATI			
JLG TORQUE CHART 5002099 APPLIES TO ITEMS WITHIN				DATE : 14JUN16		TITLE: <b>LOAD, WELL WATER ATTACH, G10-43A, DOWN</b>	
ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSIAAWS D1.1				CHKD BY : J. BOYLAN			
NEXT ASSY : 1001219910				DATE : 14JUN16		MATERIAL: SEE NOTES	
DO NOT SCALE DRAWING				E.R. NO. : 161857			
				FINISH:		DWG NO. <b>1001219911</b> REV <b>A</b>	
				THIRD ANGLE PROJECTION		SCALE: 1/1 EST. WT. 050 LB./023 kg SHEET 1 OF 1	
				MACH. SURF 125 MAX			

Section 1.13 Geomembrane Fabrication Manual and Testing Chart

# MLVT GEOMEMBRANE PANEL FABRICATION MANUAL

## Well Water Solutions, Inc.

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Colorado Lining International  
Parker CO 80138  
800-524-8672/303-841-2022  
Fax: 303-841-5780  
[www.coloradolining.com](http://www.coloradolining.com)

## TERMINOLOGY

The following definitions will be used throughout this document.

**Geomembrane Manufacturer**- The party responsible for compounding resin into geomembrane roll goods.

**Geomembrane Fabricator**- The party who is responsible for welding the geomembrane roll goods, through factory fabrication using controlled welding methods, into geomembrane panels. **Colorado Lining International – 800-524-8672**

**Geomembrane Installer** -The party responsible for placing and/or joining geomembrane panels in the field or on the job site.

**Geomembrane Sheet** -The product of the Geomembrane manufacturer, provided on rolls to the fabricator.

**Geomembrane or Panels or Geomembrane Panels** -The term applied to multiple geomembrane sheets that have been welded together, through factory fabrication, under controlled conditions. The actual size of the panels will depend upon weight, mil thickness, and design configurations.

**Sample** -The piece of liner or seam section taken for testing. It is usually large enough to contain specimens for a series of tests.

**Seam** -The completed process of welding two geomembrane sheets together.

**Specimen** -The term applied to an individual part of a sample. Specimens are used to test peel and shear values of a welded seam.

**Welding** -The process whereby two sheets or panels of geomembrane are joined together.

**MLVT** – Modular Large Volume Tank

**MLVT Geomembrane Liner** – One or more factory fabricated Geomembrane Panel(s) for placement inside an engineered containment ring.

## **1.0 GENERAL**

### **1.1 Products**

- A. The geomembrane material shall be 30 to 60 mils thick, as specified. The geomembrane shall be manufactured consisting of first quality ingredients. The finished compound shall be uniform in color, thickness, size and surface texture.

### **1.2 Markings**

- A. In the case of round tanks, panels shall include a highly visible "cross hair" style marking denoting the center point of the panel to coincide with the center point of the tank. Radial spoke-like markings will be painted on the panel surface to assist with field measures to assure vertical alignment up the tank walls.

## **2.0 Subgrade Preparation**

- A. The Earthwork Contractor shall be responsible for preparing and maintaining the subgrade in a condition suitable for installation of MLVT Geomembrane Panel. Any damage to the surface caused by weather conditions or other conditions must be repaired prior to MLVT Geomembrane Panel deployment. The installer will submit, prior to installing the MLVT Geomembrane Panel, written approval of the subgrade surface on which the MLVT Geomembrane Panel will be installed.
- B. All surfaces in contact with the MLVT Geomembrane Panel must be free of sharp stones, stones over 3/8" in diameter, sticks and other debris that can puncture or tear the MLVT Geomembrane Panel. No standing water, mud, snow or excessive moisture should be on the subgrade when the MLVT Geomembrane Panel is deployed. Subgrade should be constructed of a firm stable material compacted to a 95% proctor.

## **3.0 Deployment of MLVT Geomembrane Panels**

- A. The MLVT Geomembrane Panel shall be placed at the edge of the tank layout and be lined up with the centerline of the tank layout. Unroll the MLVT Geomembrane Panel down the centerline of the tank layout. Verify the markings on the MLVT Geomembrane Panel line up with the tank layout. If needed adjust the placement of the MLVT Geomembrane Panel prior to proceeding with installation.
- B. The MLVT Geomembrane Panel is then unfolded in the perpendicular direction to which it was unrolled in one direction. The next step is to unfold the MLVT Geomembrane Panel in the opposite direction of the first unfold direction.
- C. See sketch at end of document for clarification of these steps.

## **4.0 MLVT Geomembrane Representative Welds**

- A. At the start of each day's work and once every 4 hours thereafter, before any welding machine shall be deployed on a liner panel, a sample of a representative seam shall be produced and evaluated for each welding machine to be utilized.

Representative welds shall also be required if there is a change in environmental conditions. Representative samples shall be prepared non-destructively using strips of geomembrane cut from excess sheets of liner being seamed. Peel and shear samples are to be tested with a calibrated tensiometer. Field seam welding shall commence only after successful representative seam test results are achieved by each machine.

- B. Test results shall be representative of subsequently made seams on an actual liner fabricated after the test. There shall be one representative seam evaluation made every four hours and on each machine utilized. Representative welds shall be recorded on the CLI Seam Quality Control Form which shall be available to customers upon request.

## 5.0 Seam Testing Criterion

Samples shall be non-destructive, not requiring patching of fabricated panels. Four test specimens (2 shear and 2 peel) shall be cut from each seam sample and tensiometer tested for bonded seam strength and peel adhesion. All test results shall be recorded in the Seam Quality Control Form.

- A. Tensiometer Peel Strength Test:

Peel adhesion shall be in accordance with ASTM D 7747. In seam samples when tested in peel, failure shall occur resulting in a Film Tearing Bond (or "FTB"). The tensiometer peel test provides a numerical value for the peel strength achieved in addition to visually inspection for film tearing bonds. Samples should be 1" wide centered over the seam.

- B. Tensiometer Tensile Strength Test:

Samples shall be tested with a tensiometer and evaluated for bonded seam strength (shear) using method ASTM D 7749.

- C. Shear and peel test results shall conform to either GRI GM 19 requirements or to the manufacturer's requirements.
- D. All Field Seams shall be 100% tested by high pressure air lance in accordance with ASTM D 4437.

## 6.0 Field Thermal Wedge Weld Seaming Procedures

4 to 6 inches per NMOCD Rule

- A. Adjacent MLVT Geomembrane Panels shall be overlapped by approximately 4" for fusion welding. Panel edges to be seamed shall be clean of all foreign matter or debris before seaming commences. Welding can occur once the sheets to be joined have been cleaned and brought into their exact position.
- B. When starting a new weld, the machine shall be manually placed into the overlapped sheet of material.

- C. Welder alignment and temperature shall be monitored during the seaming process and adjustments will be made as necessary. The welded seams must be 100% visually inspected as welding machinery advances.
- D. All cross seams or "T" intersections caused by material roll splices where 3 layers of membrane material occur shall be patched where they intersect with 3" or larger diameter patches of the MLVT Geomembrane material. Patches shall be applied by use of a hand held heat gun and seam roller. All patches and repairs shall be 100% tested by high pressure air lance or vacuum box in accordance with ASTM D 4437 and ASTM D 5641.
- E. Should a defective seam be found, welding shall be ceased until the cause of the defect is determined and rectified and the seam is repaired. Documentation of the defect and repair shall be recorded on the Seam Quality Control Form.

**7.0 Fold back of MLVT Geomembrane Panels**

- A. Once all field seaming is completed the outer limits of the MLVT Geomembrane Panels need to be folded back on top of themselves far enough to provide enough room for assembly of the steel tank sections without damage to the system.

**8.0 MLVT Geomembrane Panel final deployment**

- A. Once the steel walls are assembled they need to be inspected for any sharp surfaces that could damage the MLVT Geomembrane Panels and there needs to be a support material placed as a chamfer at the transition from the wall to the subgrade to eliminate the possibility of stressing the MLVT Geomembrane panel at the 90 degree transition. This support material can be sand tubes, precut foam, etc.
- B. Next the MLVT Geomembrane Panels need to be placed up and over the walls. This step is completed with the assistance of equipment used to lift the edge of the MLVT Geomembrane Panel up the height of the steel wall. Enough material should be lifted up and over the wall to create the proper overhang so the liner does not fall back off the wall while the clamping system is installed.
- C. The MLVT Geomembrane Panels shall be protected at all times from damage and all equipment and methods used to lift, place and clamp shall not damage the MVLТ GEomembrane Panel and shall not impart excess stress in the MVLТ GEomembrane Panels and thermally welded seam areas.
- D. ALL tank panel erection, assembly, placement and lifting of MVLТ GEomembrane Panel is by others. CLI shall not be responsible for damages to the MVLТ GEomembrane Panel after delivery / customer pickup or once installation is completed, if performed by CLI.

End of Specification



Section 1.14 Geomembrane Installation Manual

# MLVT GEOMEMBRANE PANEL INSTALLATION MANUAL

## Well Water Solutions, Inc.

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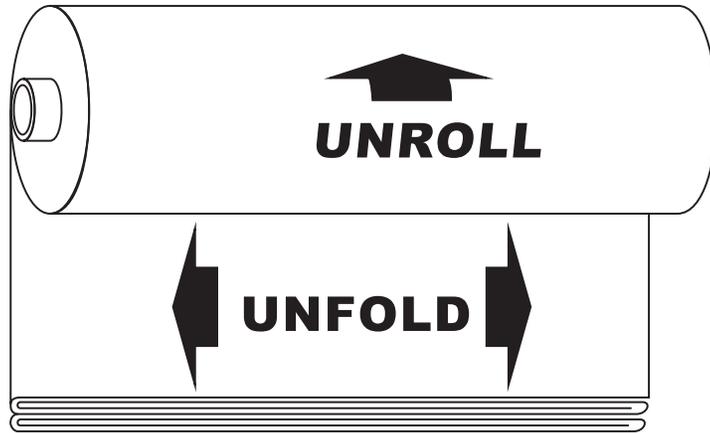


Colorado Lining International  
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Fax: 303-841-5780  
[www.coloradolining.com](http://www.coloradolining.com)



# DEPLOYMENT OF DUAL DIRECTION ACCORDION FOLDED PANELS

(SHEET 1 OF 2)

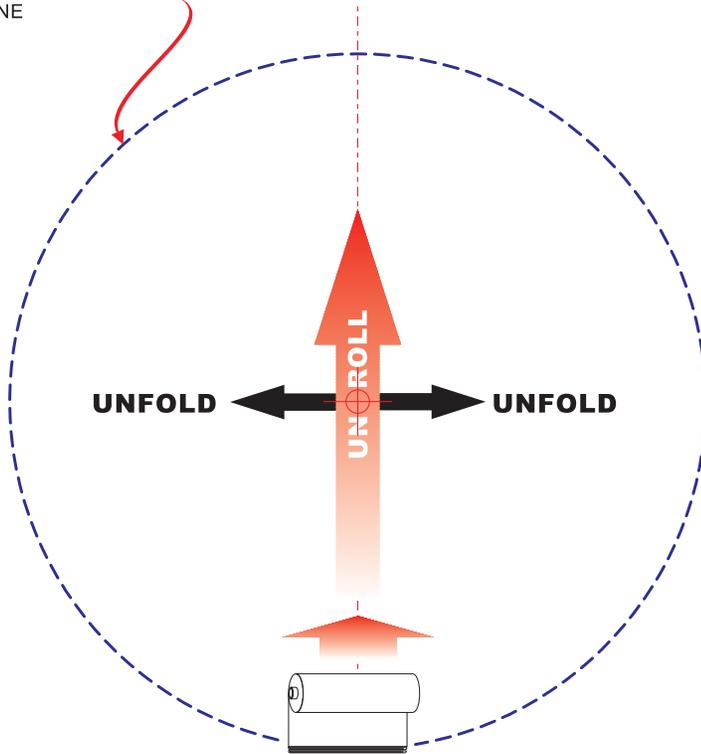




## DEPLOYMENT OF DUAL DIRECTION ACCORDION FOLDED PANELS (SHEET 2 OF 2)

CLI FABRICATES FRAC TANK PANEL LINERS AND UNDERLAYMENTS IN A DUAL DIRECTION ACCORDION FOLDED MANNER SO THAT THE PANELS CAN BE DEPLOYED ON THE TANK'S CENTERLINE. AFTER THE INITIAL UN-ROLLING THE PANELS ARE THEN UN-FOLDED IN PERPENDICULAR DIRECTIONS

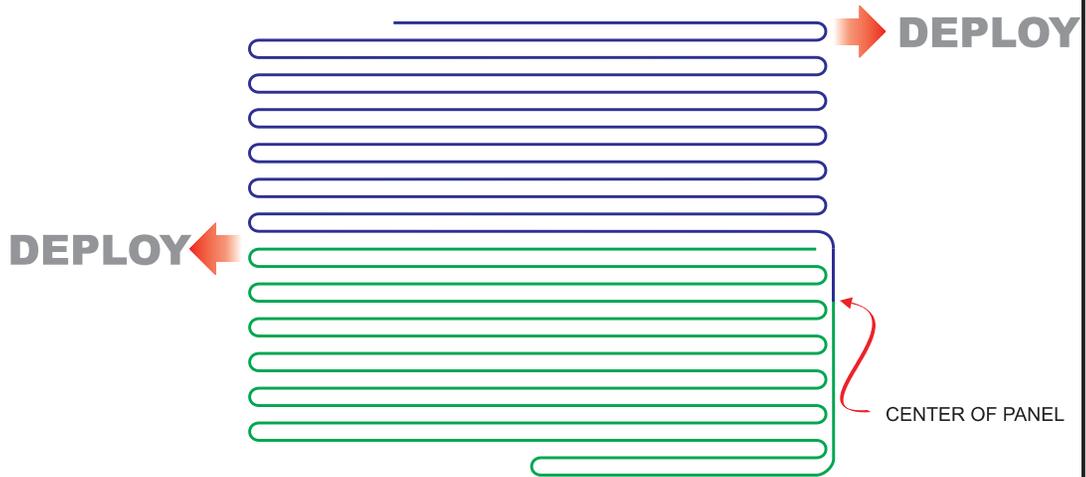
TANK EXTENTS  
OUTLINE



UNROLL PANEL  
ON TANK'S  
CENTERLINE  
PRIOR TO WALLS  
GOING UP



**DOUBLE DIRECTION ACCORDION FOLDED  
PANEL SCHEMATIC**  
(SHEET 2 OF 2)



**EXAMPLE OF A 26 SHEET B-40 TANK LINER**

Section 1.15 WWS Preferred Liner Spec or Comparable Substitute



---

19103 Gundle Road  
Houston, TX 77073  
281 230 8650 Fax  
www.gseworld.com

January 22, 2018

Western ProLine  
184 Hwy 59 North  
Miles City, MT 59301

RE: GSE LLDPE Geomembrane Permeability

**Certification of Compliance**

The undersigned, being qualified and authorized to do so, hereby certifies that GSE High Performance 30 mil Nominal and GSE High Performance 40 mil Nominal UltraFlex LLDPE Geomembranes will meet a permeability of  $1 \times 10^{-12}$  cm/s when tested per ASTM E96.

Sincerely,

A handwritten signature in black ink that reads "Miguel Garcia". The signature is written in a cursive style.

Miguel Garcia  
GSE Technical Support

MG18-0005

TECHNICAL NOTE

# Chemical Resistance Chart

GSE is the world's leading supplier of high quality, polyethylene geomembranes. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. Note that the effect of chemicals on any material is influenced by a number of variable factors such as temperature, concentration, exposed area and duration. Many tests have been performed that use geomembranes and certain specific chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for, and various criteria may be used to judge performance. Reported performance ratings may not apply to all applications of a given material in the same chemical. Therefore, these ratings are offered as a guide only.

Medium	Concentration	Resistance at:		Medium	Concentration	Resistance at:	
		20° C (68° F)	20° C (140° F)			20° C (68° F)	20° C (140° F)
<b>A</b>				Copper chloride	sat. sol.	S	S
Acetic acid	100%	S	L	Copper nitrate	sat. sol.	S	S
Acetic acid	10%	S	S	Copper sulfate	sat. sol.	S	S
Acetic acid anhydride	100%	S	L	Cresylic acid	sat. sol.	L	—
Acetone	100%	L	L	Cyclohexanol	100%	S	S
Adipic acid	sat. sol.	S	S	Cyclohexanone	100%	S	L
Allyl alcohol	96%	S	S	D			
Aluminum chloride	sat. sol.	S	S	Decahydronaphthalene	100%	S	L
Aluminum fluoride	sat. sol.	S	S	Dextrine	sol.	S	S
Aluminum sulfate	sat. sol.	S	S	Diethyl ether	100%	L	—
Alum	sol.	S	S	Diethylphthalate	100%	S	L
Ammonia, aqueous	dil. sol.	S	S	Dioxane	100%	S	S
Ammonia, gaseous dry	100%	S	S	E			
Ammonia, liquid	100%	S	S	Ethanediol	100%	S	S
Ammonium chloride	sat. sol.	S	S	Ethanol	40%	S	L
Ammonium fluoride	sol.	S	S	Ethyl acetate	100%	S	U
Ammonium nitrate sat. sol.	S	S	S	Ethylene trichloride	100%	U	U
Ammonium sulfate	sat. sol.	S	S	F			
Ammonium sulfide	sol.	S	S	Ferric chloride	sat. sol.	S	S
Amyl acetate	100%	S	L	Ferric nitrate	sol.	S	S
Amyl alcohol	100%	S	L	Ferric sulfate	sat. sol.	S	S
<b>B</b>				Ferrous chloride	sat. sol.	S	S
Barium carbonate	sat. sol.	S	S	Ferrous sulfate	sat. sol.	S	S
Barium chloride	sat. sol.	S	S	Fluorine, gaseous	100%	U	U
Barium hydroxide	sat. sol.	S	S	Fluorosilicic acid	40%	S	S
Barium sulfate	sat. sol.	S	S	Formaldehyde	40%	S	S
Barium sulfide	sol.	S	S	Formic acid	50%	S	S
Benzaldehyde	100%	S	L	Formic acid	98-100%	S	S
Benzene	—	L	L	Furfuryl alcohol	100%	S	L
Benzoic acid	sat. sol.	S	S	G			
Beer	—	S	S	Gasoline	—	S	L
Borax (sodium tetraborate)	sat. sol.	S	S	Glacial acetic acid	96%	S	L
Boric acid	sat. sol.	S	S	Glucose	sat. sol.	S	S
Bromine, gaseous dry	100%	U	U	Glycerine	100%	S	S
Bromine, liquid	100%	U	U	Glycol	sol.	S	S
Butane, gaseous	100%	S	S	H			
1-Butanol	100%	S	S	Heptane	100%	S	U
Butyric acid	100%	S	L	Hydrobromic acid	50%	S	S
<b>C</b>				Hydrobromic acid	100%	S	S
Calcium carbonate	sat. sol.	S	S	Hydrochloric acid	10%	S	S
Calcium chlorate	sat. sol.	S	S	Hydrochloric acid	35%	S	S
Calcium chloride	sat. sol.	S	S	Hydrocyanic acid	10%	S	S
Calcium nitrate	sat. sol.	S	S	Hydrofluoric acid	4%	S	S
Calcium sulfate	sat. sol.	S	S	Hydrofluoric acid	60%	S	L
Calcium sulfide	dil. sol.	L	L	Hydrogen	100%	S	S
Carbon dioxide, gaseous dry	100%	S	S	Hydrogen peroxide	30%	S	L
Carbon disulfide	100%	L	U	Hydrogen peroxide	90%	S	U
Carbon monoxide	100%	S	S	Hydrogen sulfide, gaseous	100%	S	S
Chloracetic acid	sol.	S	S	Lactic acid	100%	S	S
Carbon tetrachloride	100%	L	U	Lead acetate	sat. sol.	S	—
Chlorine, aqueous solution	sat. sol.	L	U	Magnesium carbonate	sat. sol.	S	S
Chlorine, gaseous dry	100%	L	U	Magnesium chloride	sat. sol.	S	S
Chloroform	100%	U	U	Magnesium hydroxide	sat. sol.	S	S
Chromic acid	20%	S	L	Magnesium nitrate	sat. sol.	S	S
Chromic acid	50%	S	L	Maleic acid	sat. sol.	S	S
Citric acid	sat. sol.	S	S	Mercuric chloride	sat. sol.	S	S
				Mercuric cyanide	sat. sol.	S	S
				Mercuric nitrate	sol.	S	S



## Section 1.16 Geo Grid Mesh Spec



SKAPS Industries  
 571 Industrial Parkway  
 Commerce, GA 30529 (U.S.A.)  
 Phone (706) 336-7000 Fax (706) 336-7007  
 e-mail: [info@skaps.com](mailto:info@skaps.com)

**SKAPS TRANSNET™ (TN)  
 HDPE GEONET 220**

**SKAPS TRANSNET™ Geonet consists of SKAPS GeoNet made from HDPE resin.**

Property	Test Method	Unit	Required Value	Qualifier
<b>Geonet</b>				
Thickness	ASTM D 5199	mil.	220±20	Range
Carbon Black	ASTM D 4218	%	2 to 3	Range
Tensile Strength	ASTM D 7179	lb/in	45	Minimum
Melt Flow	ASTM D 1238 <sup>3</sup>	g/10 min.	1	Maximum
Density	ASTM D 1505	g/cm <sup>3</sup>	0.94	Minimum
Transmissivity <sup>1</sup>	ASTM D 4716	m <sup>2</sup> /sec.	2x10 <sup>-3</sup>	MARV <sup>2</sup>

**Notes:**

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

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Section 1.17 Patents and Patent Protections



US008376167B2

(12) **United States Patent**  
**Lovelace et al.**

(10) **Patent No.:** **US 8,376,167 B2**

(45) **Date of Patent:** **Feb. 19, 2013**

(54) **PORTABLE RESERVOIR FRAME**

(75) Inventors: **Sean Michael Lovelace**, Casper, WY (US); **Christopher Jason Songe**, Casper, WY (US)

(73) Assignee: **Energy Innovations, LLC**, Casper, WY (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/469,883**

(22) Filed: **May 11, 2012**

(65) **Prior Publication Data**

US 2012/0223073 A1 Sep. 6, 2012

**Related U.S. Application Data**

(63) Continuation of application No. 13/245,492, filed on Oct. 21, 2011.

(51) **Int. Cl.**  
**B65D 6/00** (2006.01)

(52) **U.S. Cl.** ..... **220/4.17; 220/4.16; 220/693; 220/567; 220/4.12**

(58) **Field of Classification Search** ..... 220/1.6, 220/4.12, 4.16, 4.17, 9.4, 23.9, 495.06, 495.08, 220/567, 681, 693  
See application file for complete search history.

(56) **References Cited**

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CA 2692016 7/2010

\* cited by examiner

*Primary Examiner* — Anthony Stashick

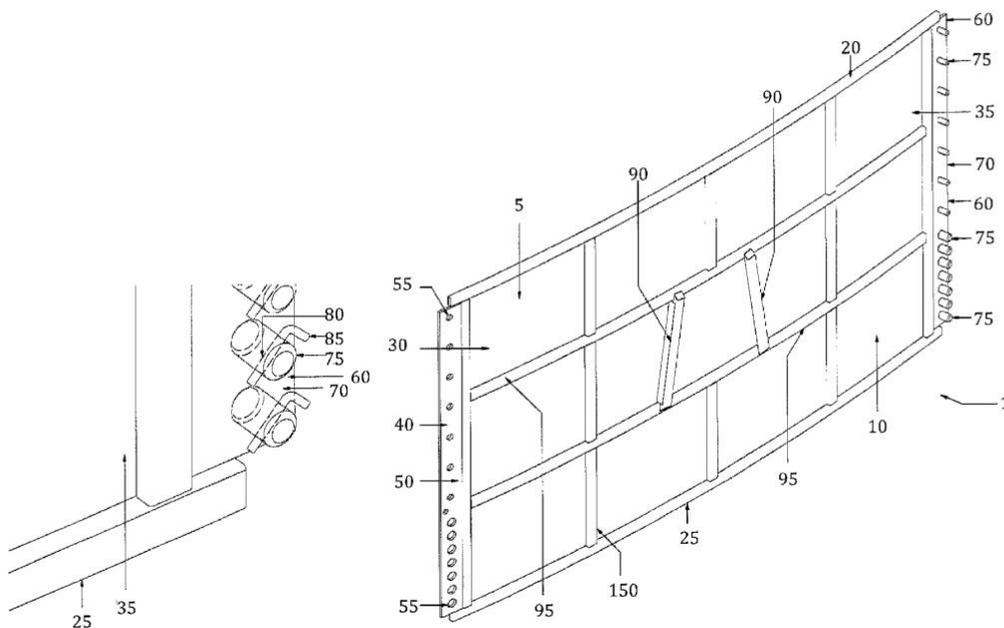
*Assistant Examiner* — Christopher McKinley

(74) *Attorney, Agent, or Firm* — Gordon Silver, Ltd.; Ronald C. Gorsché

(57) **ABSTRACT**

A portable reservoir frame composed of interlocking panels secured by a series of flanges having holes and pegs. An inner liner to hold liquid inside the reservoir frame is presented.

**16 Claims, 11 Drawing Sheets**





US008365937B2

(12) **United States Patent**  
**Lovelace et al.**

(10) **Patent No.:** **US 8,365,937 B2**  
(45) **Date of Patent:** **Feb. 5, 2013**

- (54) **PORTABLE RESERVOIR FRAME**
- (75) Inventors: **Sean Michael Lovelace**, Casper, WY (US); **Christopher Jason Songe**, Casper, WY (US)
- (73) Assignee: **Energy Innovations, LLC**, Casper, WY (US)
- (\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: **13/469,845**
- (22) Filed: **May 11, 2012**
- (65) **Prior Publication Data**  
US 2012/0234829 A1 Sep. 20, 2012

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- Related U.S. Application Data**
- (63) Continuation of application No. 13/426,286, filed on Mar. 21, 2012, which is a continuation-in-part of application No. 13/245,492, filed on Oct. 21, 2011.
- (51) **Int. Cl.**  
**B65D 6/00** (2006.01)
- (52) **U.S. Cl.** ..... **220/4.17**; 220/4.16; 220/693; 220/567; 220/4.12
- (58) **Field of Classification Search** ..... 220/565, 220/567, 1.6, 4.16, 4.12, 9.4, 495.06, 495.08, 220/23.9, 4.17, 693, 681  
See application file for complete search history.

**FOREIGN PATENT DOCUMENTS**

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\* cited by examiner

*Primary Examiner* — Anthony Stashick

*Assistant Examiner* — Christopher McKinley

(74) *Attorney, Agent, or Firm* — Gordon Silver Ltd.; Ronald C. Gorsché

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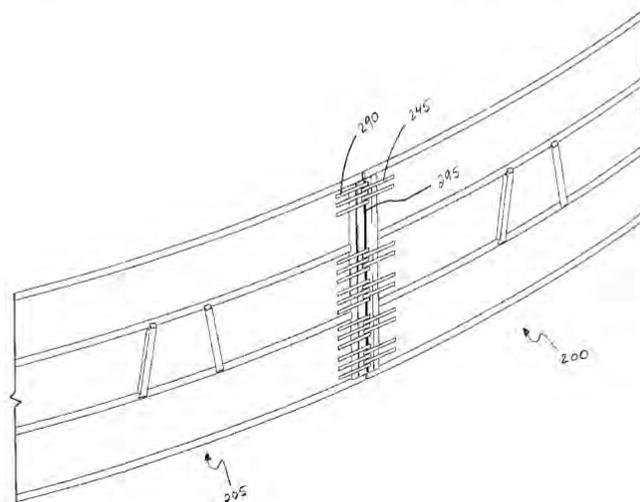
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(57) **ABSTRACT**

A portable reservoir frame having a number of interlocking panels secured by a plurality of interleaved knuckle members is provided.

**20 Claims, 20 Drawing Sheets**





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

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

Manufacture & Distribution of Hay Tarps, Truck Tarps, Industrial Liners, Building & Athletic Field Covers.  
 1-800-346-7744

March 2020

**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  $1 \times 10^{-9}$  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  $1 \times 10^{-9}$  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](mailto: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  $1 \times 10^{-9}$  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

**R.K. FROBEL & ASSOCIATES**  
*Consulting Engineers*

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

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

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

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

**R.K. FROBEL & ASSOCIATES**  
*Consulting Engineers*

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

*In summary, it is my professional opinion that the two layers of 40 mil non-reinforced LLDPE geomembranes will provide a Primary/Secondary liner system that is equal to or better than 45 mil string reinforced LLDPE, 30 mil PVC, 60 mil HDPE (primary liner) and 35 mil LLDPEr (secondary liner). Additionally, the two layers of 40 mil LLDPE will provide a superior installation and function better than liners referenced in the OCD 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](mailto: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](mailto: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.

***Freeboard Variance Request for Above Ground Steel Tank  
Modular Recycling Storage Containments***

## **STATEMENT EXPLAINING WHY THE APPLICANT SEEKS A VARIANCE FOR FREEBOARD 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 19.15.34.13**

#### **19.15.34.13 OPERATIONAL REQUIREMENTS FOR RECYCLING CONTAINMENTS:**

**B.** The operator shall maintain and operate a recycling containment in accordance with the following requirements.

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

**The applicant requests variance to allow for a freeboard of 2 feet as opposed to the prescribed 3 feet in the setting of an above ground steel tank modular system.**

Rule 34 did not take into consideration above ground steel tank modular containment systems. With respect to lined earthen impoundments that may hold 25-acre feet of produced water, a 3-foot freeboard stipulation makes sense. For example, wave action and other factors could focus stress on the upper portion of the levee or the liner system in these large impoundments. The smaller diameter steel tank (modular impoundment) does not share the same characteristics as these large earthen pits.

We believe 3-feet of freeboard is not necessary – especially during active hydraulic stimulation of wells when maximum storage volume provides the highest value. Moreover, meeting the 3-foot freeboard requirement at all times significantly reduces the storage capacity of a single modular impoundment – negatively impacting the economics of using produced water in lieu of fresh water for E&P activities.

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

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

**R.K. FROBEL & ASSOCIATES**  
Consulting Engineers

**Freeboard Requirements for Above Ground Steel Tank Modular  
Recycling Storage Containments**  
NMAC 19.15.34.13 B (2)

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

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

*In summary, it is my professional opinion that the design freeboard of 2.0 ft will provide requisite storage volume and prevent overtopping due to wind and wave action, potential seismic events and high precipitation.*

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

Sincerely Yours,

*R.K. Frobel*

Ronald K. Frobel, MSCE, PE

References:

NMAC 19.15.34.13 OPERATIONAL REQUIREMENTS FOR RECYCLING CONTAINMENTS



***R.K. FROBEL & ASSOCIATES***  
***Consulting Engineers***

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.

The modular impoundment is designed for use with fluids that are 8.34 pounds/gallon (62.4 pounds per cubic foot) or lighter. Exceeding this specification for fluid weight at full tank capacity (12') could lead to failure at the connection plate(s).

Assuming a freeboard of 0.5 ft (minimum modular impoundment freeboard requirement) the Hydro Pressure (p) of water is 718 pounds per square foot (psf), where

$$\begin{aligned}
 p &= \text{Design Density} \times \text{Height} \\
 &= 62.4 \text{ PCF} \times 11.5 \text{ ft} \\
 (\text{design density} &= 8.34 \frac{\text{lb}}{\text{gal}} \times 7.48 \frac{\text{ft}^3}{\text{gal}})
 \end{aligned}$$

The density of the conditioned produced water is 9.3 pounds/gallon. Assuming a freeboard of 3-ft (19.15.17.12.F(3) NMAC), the Hydro Pressure (p) of conditioned produced water is 626 psf, where

$$\begin{aligned}
 p &= \text{Design Density} \times \text{Height} \\
 &= 69.64 \text{ PCF} \times 9 \text{ ft} \\
 (\text{design density} &= 9.3 \frac{\text{lb}}{\text{gal}} \times 7.48 \frac{\text{ft}^3}{\text{gal}})
 \end{aligned}$$

Using conditioned produced water with the Pit Rule freeboard requirements of 3-feet results in a Hydro Pressure 92 psf less than the engineered design.

The operator asks the District Division to allow for a 2-foot freeboard, which yields a Hydro Pressure (p) of 696.4 psf, where

$$\begin{aligned}
 p &= \text{Design Density} \times \text{Height} \\
 &= 69.64 \text{ PCF} \times 10 \text{ ft} \\
 (\text{design density} &= 9.3 \frac{\text{lb}}{\text{gal}} \times 7.48 \frac{\text{ft}^3}{\text{gal}})
 \end{aligned}$$

January 2020

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

**R.K. FROBEL & ASSOCIATES**  
*Consulting Engineers*

**Technical Memorandum: Applicability of Variances for Modular AST Containments in the Permian Basin of New Mexico**  
**NMAC 19.15.34.12 A (2)**

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

- C-147 Registration Package for Myox Above Ground Storage Tank Section 32, T25S, R28E, Eddy County (January 20, 2020)
- C-147 Registration Package for Fez Recycling Containment and Recycling Facility Area (100+ acres) Section 8, T25-S, R35-E, Lea County, Volume 2 – Above-Ground Storage Tank Containments
- Hackberry 16 Recycling Containments and Recycling Facility Section 16, T19S, R31E, Eddy County

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

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

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

**Ronald K. Frobel, MSCE, P.E.**  
**R. K. Frobel & Associates**  
**Consulting Civil/Geosynthetics Engineers**  
**PO Box 2633**  
**Evergreen, Colorado 80439 USA**  
**Phone 720-289-0300**  
**Email: geosynthetics@msn.com**

## **Additional VARIANCE FOR RECYCLING STORAGE CONTAINMENTS (Inground and AST)**

- **Alternative Testing Methods**

### 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.

**Venegas, Victoria, EMNRD**

---

**From:** Venegas, Victoria, EMNRD  
**Sent:** Monday, March 21, 2022 2:44 PM  
**To:** 'Holly, Mark'; r@rthicksconsult.com; 'Walla, Jeff'; 'Louderback, Lauren'  
**Cc:** Enviro, OCD, EMNRD  
**Subject:** 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172].  
Conditions of Approval  
**Attachments:** C-147. 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY ID [fVV2207553172].pdf

**2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172]. Conditions of Approval**

Good afternoon,  
NMOCD has reviewed the recycling containment permit application and related documents, submitted by [217817] CONOCOPHILLIPS COMPANY on March 15, 2022, for 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172] in Unit Letter H, Section 6, Township 25S, Range 28E, Eddy County, New Mexico.

[217817] CONOCOPHILLIPS COMPANY requested variances from 19.15.34 NMAC for 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172] related to 19.15.34. NMAC

The following variances have been approved.

- The variance to 19.15.34.14 NMAC Table I for the use of alternate analytical method 8015/8015M for total petroleum hydrocarbons (TPH) is approved.
- The variance to 19.15.34.14 NMAC Table I for the use of alternate analytical method EPA 300.0 or SM4500 for the analysis of chloride is approved.
- The variance to 19.15.34.12.A.(2) NMAC for the no side-slope requirement for the AST containment with vertical walls is approved.
- The variance to 19.15.34.12.A.(3) NMAC for the liners to be anchored to the top of the AST steel walls and no anchor trenches is approved.
- The variance to 19.15.34.12.A.(4) NMAC for the installation on the AST containment of a 40-mil non-reinforced LLDPE primary liner and a 30-mil non-reinforced LLDPE secondary liner with a 200-mil geogrid drainage layer is approved.

The following variance has been denied.

- The variance to 19.15.34.13.B.(2) NMAC for a 2-foot freeboard has been denied. The AST containment must operate with the 3-foot freeboard as specified by rule.

The form C-147 and related documents for the 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172] is approved with the following conditions of approval:

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

- [217817] CONOCOPHILLIPS COMPANY shall construct, operate, maintain, close, and reclaim the 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172], consisting of one (1) AST of 60,000.00 bbl of capacity, in compliance with 19.15.34 NMAC.
- 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172] is approved for five years of operation from the date of permit application. 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172] permit expires on March 15, 2027. If [217817] CONOCOPHILLIPS COMPANY wishes to extend operations past five years, an annual permit extension request must be submitted using an OCD form C-147 through OCD Online by February 15, 2027.
- Water reuse and recycling from 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172] is limited to wells owned or operated by [217817] CONOCOPHILLIPS COMPANY.
- [217817] CONOCOPHILLIPS COMPANY shall notify NMOCD when construction of the 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172] commences.
- [217817] CONOCOPHILLIPS COMPANY shall notify NMOCD when recycling operations commence and cease at 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172].
- A minimum of 3-feet freeboard must be maintained in the AST recycling containment, at all times during operations.
- If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdrawal, operation of the facility is considered ceased and notification of cessation of operations should be sent electronically to [OCD Online](#). An extension to extend the cessation of operation, not to exceed six months, may be submitted using a C-147 form through [OCD Online](#).
- [217817] CONOCOPHILLIPS COMPANY shall submit monthly reports of recycling and reuse of produced water, drilling fluids, and liquid oil field waste on NMOCD form C-148 through [OCD Online](#) even if there is zero activity.
- [217817] CONOCOPHILLIPS COMPANY shall comply with 19.15.29 NMAC Releases in the event of any release of produced water or other oil field wastes at 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [fVV2207553172].

Please reference number 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY ID [fVV2207553172] in all future communications.

Regards,

**Victoria Venegas** • Environmental Specialist

Environmental Bureau

EMNRD - Oil Conservation Division

(575) 909-0269 | [Victoria.Venegas@state.nm.us](mailto:Victoria.Venegas@state.nm.us)

<http://www.emnrd.state.nm.us/OCD/>



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

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

Form C-147  
Revised April 3, 2017

## Recycling Facility and/or Recycling Containment

Type of Facility:  Recycling Facility  Recycling Containment\*  
Type of action:  Permit  Registration  
 Modification  Extension  
 Closure  Other (explain) \_\_\_\_\_

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

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

1.  
Operator: ConocoPhillips Company (For multiple operators attach page with information) OGRID #: 217817  
Address: 600 W. Illinois Ave. Midland, Texas 79707  
Facility or well name (include API# if associated with a well): Scout AST Containment and Recycling Facility  
OCD Permit Number: 2RF-170 (For new facilities the permit number will be assigned by the district office)  
U/L or Qtr/Qtr H Section 6 Township 25S Range 28E County: Eddy  
Surface Owner:  Federal  State  Private  Tribal Trust or Indian Allotment

2.  
 **Recycling Facility:**  
Location of recycling facility (if applicable): Latitude 32.161240 Longitude -104.119368 Approx      NAD83  
Proposed Use:  Drilling\*  Completion\*  Production\*  Plugging \*  
*\*The re-use of produced water may NOT be used until fresh water zones are cased and cemented*  
 Other, requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.  
 Fluid Storage  
 Above ground tanks  Recycling containment  Activity permitted under 19.15.17 NMAC explain type \_\_\_\_\_  
 Activity permitted under 19.15.36 NMAC explain type: \_\_\_\_\_  Other explain \_\_\_\_\_  
 For multiple or additional recycling containments, attach design and location information of each containment  
 **Closure Report (required within 60 days of closure completion):**  Recycling Facility Closure Completion Date: \_\_\_\_\_

3.  
 **Recycling Containment:**  
 Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)  
Center of Recycling Containment (if applicable): Latitude 32.161240 Longitude -104.119368 NAD83  
 For multiple or additional recycling containments, attach design and location information of each containment  
 Lined  Liner type: Thickness See Drawings mil  LLDPE  HDPE  PVC  Other \_\_\_\_\_  
 String-Reinforced  
Liner Seams:  Welded  Factory  Other \_\_\_\_\_ Volume: 60,000 bbl Dimensions: L \_\_\_\_\_ x W \_\_\_\_\_ x D \_\_\_\_\_  
 Recycling Containment Closure Completion Date: \_\_\_\_\_

4.

**Bonding:**

Covered under bonding pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC (These containments are limited to only the wells owned or operated by the owners of the containment.)

Bonding in accordance with 19.15.34.15(A)(1). Amount of bond \$ \_\_\_\_\_ (work on these facilities cannot commence until bonding amounts are approved)

Attach closure cost estimate and documentation on how the closure cost was calculated.

5.

**Fencing:**

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

Alternate. Please specify \_\_\_\_\_

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.*

<b>General siting</b>	
<b>Ground water is less than 50 feet below the bottom of the Recycling Containment.</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells <b>FIGURE 2</b>	<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. <b>FIGURE 3</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
- Written confirmation or verification from the municipality; written approval obtained from the municipality	<input type="checkbox"/> NA
Within the area overlying a subsurface mine. <b>FIGURE 4</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
- Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	
Within an unstable area. <b>FIGURE 5</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
- Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	
Within a 100-year floodplain. FEMA map <b>FIGURE 6</b>	<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). <b>FIGURE 7</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
- Topographic map; visual inspection (certification) of the proposed site	
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
- Visual inspection (certification) of the proposed site; aerial photo; satellite image <b>FIGURE 8</b>	
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. <b>FIGURES 1 AND 7</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
- NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	
Within 500 feet of a wetland. <b>FIGURE 9</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
- US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	

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): MARK HOLLY Title: SUPERINTENDENT - DELAWARE BRAN  
 Signature: [Handwritten Signature] Date: 3/14/2022  
 e-mail address: MARK.HOLLY@CONOCOPHILLIPS.COM Telephone: (432) 312-0423

11.

OCD Representative Signature: Victoria Venegas Approval Date: 03/21/2022

Title: Environmental Specialist OCD Permit Number: 2RF-170

- OCD Conditions \_\_\_\_\_
- Additional OCD Conditions on Attachment \_\_\_\_\_

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

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

CONDITIONS  
 Action 90545

**CONDITIONS**

Operator: CONOCOPHILLIPS COMPANY 600 W. Illinois Avenue Midland, TX 79701	OGRID: 217817
	Action Number: 90545
	Action Type: [C-147] Water Recycle Long (C-147L)

**CONDITIONS**

Created By	Condition	Condition Date
venegas	NMOCD has reviewed and approved the recycling containment permit application and related documents, submitted by [217817] CONOCOPHILLIPS COMPANY on March 15, 2022, for 2RF-170 - SCOUT AST CONTAINMENT AND RECYCLING FACILITY [FVV2207553172] in Unit Letter H, Section 6, Township 25S, Range 28E, Eddy County, New Mexico.	3/21/2022