

August 2024

# Rule 34 Registration: Volume 1

## Aurora Reuse Facility

### Section 23, T23S, R32E, Lea County

- *Transmittal Letter*
- *Closure Cost Estimate*
- *Siting Criteria Demonstration with Plates & Appendices*



*Topographic Map of Aurora Reuse Facility site.*

**Prepared for:**  
**Solaris Midstream Waters, LLC**  
**Houston, Texas**

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

# R. T. HICKS CONSULTANTS, LTD.

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

August 8, 2024

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

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

RE: Solaris Water Midstream, LLC, Aurora Recycling Facility and Containments  
In-ground Containment Registration and AST Permit  
Section 23 T23S R32E, Lea County

Dear Ms. Barr and Ms. Venegas:

On behalf of Solaris Water Midstream, LLC, R.T. Hicks Consultants is pleased to submit a C-147 permit application for the above-referenced project. Solaris anticipates that construction will commence no sooner than Q3 of 2024. Produced water will flow into the containment in Q4 of 2024 (earliest).

Volume 1 of the C-147 package contains:

- Transmittal Letter
- Closure cost estimate for the In-Ground Containment and an AST.
- Siting Criteria Demonstration with Plates and Appendices

Volume 2 contains:

- The C-147 Form to register the in-ground containment
- Stamped Design Drawings with Liner Equivalency Demonstration and Avian Deterrence
- Recently Approved Plans for Design/Construction, O&M, Closure

Volume 3 is a permit that contains

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

This submission refers to the following elements that some OCD reviewers have considered variances for in-ground containments:

1. An equivalency demonstration written by experts for the proposed 40-mil HDPE secondary liner has been previously approved by OCD. We maintain that the language of the Rule is clear, and a variance is not required.
2. OCD has approved the proposed Avian Protection Plan (Bird-X Mega Blaster Pro) for other containments. Thus, the plan meets the requirement of the rule that the

December 21, 2022

Page 2

“otherwise protective of wildlife, including migratory birds” and a variance is not required.

3. Using the proposed deer fence in lieu of a 4-strand barbed wire fence is not a variance. Because feral pigs, javelina and deer are present in the area, a tall game fence is required to comply with Section 19.15.34.12 D.1 of the Rule. The specification for fencing provided in 19.15.34.12 D.2 contradicts D.1 because pigs will move beneath the lower strand of a 4-foot high barbed wire fence and deer will jump over. Thus, compliance with D.2 results in a violation of D.1. We maintain that compliance with D.1 is the critical component of the Rule and operators need not be required to submit a variance request to follow Best Management Practices and comply with the Rule. Nevertheless, Solaris will attach 4 strands of barbed wire to the game fence if required by OCD.

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

Sincerely,  
R.T. Hicks Consultants



Randall T. Hicks PG  
Principal

Copy: Solaris Water Midstream, LLC,  
BLM

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## Aurora In-Ground Containment and AST Containment Financial Assurance Cost Estimate

Attached is the cost estimate for reclamation of the Aurora Recycling In-Ground and AST containments. Total bonding is (\$615,382.00+\$34,976.88=) **\$643,358.88**.

### Aurora In-Ground Containment

The contractor’s detailed estimate for closure of the in-ground containment immediately follows this outline of closure costs.

Closure sampling and analysis cost is estimated at \$1725 (sampling) plus \$2,700 (laboratory cost) to “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” of Rule 34.

RT Hicks Consultants will assist with the sampling as necessary and prepare the Closure Report for the site. Total closure sampling costs are estimated at \$7500. The cost estimates from Cascade Services (attached) and from RT Hicks Consultants are presented below.

### Cascade Services

*All work elements required by Rule 34* \$ 607,882.00

### RT Hicks Consultants

Preparation of sampling results and closure report \$ 7500.00

**Total for in ground Containment Closure Activities** **\$ 615,382.00**

### AST Containment

Total estimated cost for closure, reclamation, and restoration of the facility (AST, fencing,etc.) pursuant to Rule 34 is **\$34,976.88** based upon the work elements shown in the table (below). We used the same estimate as previously approved AST Containments. As described in the transmittal letter, the AST Containment will be placed on the extended working pad to the east of the recycling facility. The cost for reclamation of the AST pad is included in the estimate.

ITEM DESCRIPTION	UNITS	UNIT PRICE	Rule 34 TOTAL PRICE
<b>Aurora AST Containment</b>			
Removal of AST and Liner and Disposal	1	\$30,000.00	\$30,000.00
Assess soil for impacts	1	\$2,500.00	\$2,500.00

May 10, 2024

Page 2

<b>Subtotal:</b>	<b>\$32,500.00</b>
Est. Tax	\$2,476.88
<b>Total for AST Closure Activities</b>	<b>\$34,976.88</b>

The reclamation must meet terms set forth in the surface lease agreement with the landowner who received a copy of the registration.

Please contact Randall Hicks if you have any questions concerning this closure cost estimate.

**Cascade Services, LLC**

www.cascadeservicesllc.com



**Estimate**

ADDRESS	SHIP TO	ESTIMATE	1681
Solaris Water Midstream LLC	Solaris Water Midstream LLC	DATE	07/25/2024
9651 Katy Freeway, Suite 400	9651 Katy Freeway, Suite 400	EXPIRATION	08/26/2024
Houston, TX 77024	Houston, TX 77024	DATE	

CUSTOMER PROJECT NAME	PROJECT LOCATION COORDINATES
Aurora Closure	32.285728 -103.648483

DATE	DESCRIPTION	QTY	RATE	AMOUNT
	Service & Material (other) Remove and dispose of all four layers of geosynthetics	1,780,000	0.17	302,600.00
	Construction This is pricing a package to reclaim the One 1,101K Pond Mobilize equipment to site. Existing Pond estimated dimensions 441'x 666' floor 655' x 880' outside to outside 19' top of wall Average 20' deep 3:1 slopes Dirt reclaim of pond consist of- Bury all material (Caliche, Gypsum, Sand, ect.) below ground level, backfill pond area with uncontaminated soil from pond walls. Pond area will be reclaimed to natural elevations and water flow patterns. All stockpiled strippings will be put down last to ensure ground has been completely returned to native design.	1	270,000.00	270,000.00
	Construction Environmental soil sampling This will include digging 6 sample locations for each containment. One composite sample from 0-4 feet below surface and one discrete sample from each location at 4.25 feet Cost include trip, labor, materials, and laboratory testin	1	2,587.00	2,587.00
	Construction Environmental Soil testing Before earthwork can begin the soil must be tested for contamination in case of liner leakage.	1	4,050.00	4,050.00

Questions? Email [AR@cascadeservicesllc.com](mailto:AR@cascadeservicesllc.com)

	Cost include trip, labor, materials, and laboratory testing of 27 tests.			
Construction	Broadcast seeding of pond area Seed will be a native mix for Lea County NM Includes purchase of seed mix and placement	1	4,500.00	4,500.00
Fence	Fence removal and disposal Fence estimated at 3,370 ft per pond This includes removal of all posts, braces, wire, fabric, gates, and hardware.	1	24,145.00	24,145.00

\*\*If pumping is needed due to weather conditions, a \$350 daily fee will be charged on final invoice.

SUBTOTAL 607,882.00

TAX 0.00

\*\*Materials will be invoiced upon receipt of customer purchase order or job approval.

TOTAL **\$607,882.00**

\*\*This estimate does not include tax and may be added on invoice unless customer provides a valid tax exemption document.

Questions? Email AR@Cascadeservicesllc.com

Accepted By

Accepted Date

## SITING CRITERIA DEMONSTRATION

SITING CRITERIA (19.15.34.11 NMAC)  
SOLARIS MIDSTREAM WATERS LLC – AURORA REUSE FACILITY**Distance to Groundwater**

Plate 1, Plate 2, and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the locations is greater than 100 feet beneath the area of interest that will include the location of the Aurora Reuse Facility.

Plate 1 is a topographic map that shows:

1. The area of the Aurora Reuse Facility is identified by the blue stippled polygon.
2. Water wells from the OSE database as a blue triangle inside a colored circle. OSE wells are often mislocated in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range. Additionally, the OSE database can include locations of proposed wells (i.e., permit applications). In this case, the permit data generally show “no date” and “DTW=0”. On Plate 1, the OSE data has been screened with permit data being eliminated. We provide no depth to water data for the OSE wells as these data do not represent static water levels and are often misleading.
3. Water wells from the USGS database as large triangles color-coded to the formation from which the well draws water. Depth to water and the date of measurement are presented in the Plate.
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. well database).

Plate 2 is a topographic and geologic map that shows:

1. The Aurora Reuse Facility is identified by the blue stippled polygon. Elevation is from about 3685 feet at the northernmost point to about 3660 feet ASL at the southwestern corner of the site.
2. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface.
3. The geologic unit present at the Aurora site is Quaternary Older Alluvium overlying reworked Ogallala Formation materials explained below (Qoa/To).

**Hydrogeology**

The location is within the Mescalero Plains between the Pecos River floodplain to the west and the southern High Plains that are east of the Mescalero Escarpment. The material in the Mescalero Plains is derived from erosion and redeposition of Ogallala materials by the Pecos River and its tributary drainages. This reworked material is sometimes referred to as Ogallala formation within the Mescalero Plains area although the original bedding no longer exists. The area is mapped as surface Quaternary eolian and piedmont deposits (Qe/Qp).

Of the wells closest to the site, none draw water from the Ogallala materials (aka High Plains Aquifer in some USGS reports). Wells from southwest and east of the site are completed within the Santa Rosa Formation, the basal unit of the Chinle formation beneath the reworked Ogallala materials. This water is confined and at depths of more than 400 feet. To the northwest and east-northeast are two wells accessing confined groundwater in the Chinle formation. This is the shallowest groundwater documented around the site.

SITING CRITERIA (19.15.34.11 NMAC)  
SOLARIS MIDSTREAM WATERS LLC – AURORA REUSE FACILITY

## Groundwater Data

We relied upon the most recent data measured by the USGS for groundwater elevations in Plate 2. Water level data from the OSE database rely upon observed water levels by drillers during the completion of the water well. Data from the nearby USGS sites is presented below.

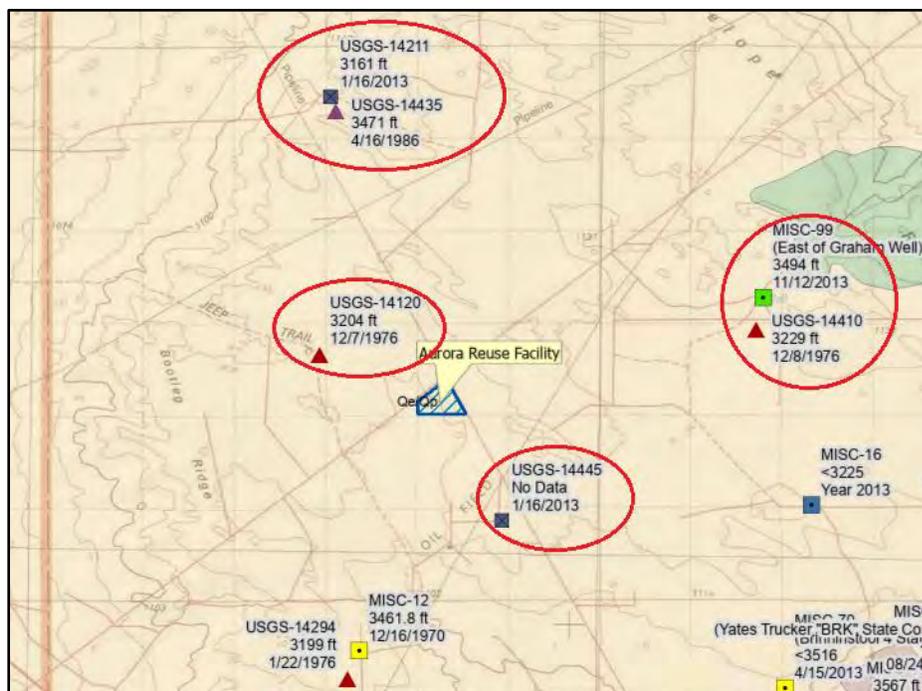


Figure 1 - Location and data of USGS Wells relative to the site location.

USGS-14211 is 3.45 miles north-northwest of the site. The USGS topographic map shows this location as the Clifton Well with a surface elevation of 3641 feet (Plate 2). Examination of historic aerial photographs show a windmill is present from 2012 to the most recent image in 2022. Earlier images are not sufficiently clear to identify what is present at the site.

In 1976, depth to water was recorded as 420 feet. Six measurements from 1980 to 1996 show a depth to water of about 438 feet. The most recent measurement in 2012 recorded a depth to water of 488 feet. The well is completed within the confined Santa Rosa sandstone.

USGS-14435 is about 3.2 miles northwest of the Aurora site and about 1150 feet southeast of the Clifton well. No well is identifiable in any of the historic aerial photographs at this location. Four measurements exist from 1972 to 1986 with a depth to water varying from 214 feet (1977) to 197 feet (1981 and 1986). The well is listed as completed in the Chinle formation rather than the Santa Rosa formation as are the other wells in this area.

The location of USGS-14120 366 is about 1.15 miles west-northwest of the Aurora site. Nothing is present at this location. About 750 feet northwest of the given coordinates is a dismantled windmill, present in the 2012 to 2017 images. Earlier images are not sufficiently clear to establish its presence. Depth to water measurements taken in 1972 and 1977 document a depth to water of 480 feet and 478 feet respectively. The well is completed within the Santa Rosa Sandstone.

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SITING CRITERIA (19.15.34.11 NMAC)  
SOLARIS MIDSTREAM WATERS LLC – AURORA REUSE FACILITY

USGS-14445 is about 1.35 miles southeast of the site. No well feature is present at this location. About 300 feet northwest of this location is a bare area not dissimilar to that created around a watering tank by cattle. It is present in all images. One measurement in December 1976 found a depth to water of 487 feet. A USGS visit in 2013 records no data, consistent with removal of the well. Like the first two discussed wells, this well is reported as completed in the Santa Rosa sandstone.

The given location for USGS-14410 is 3.37 miles east of the Aurora site. Nothing is identifiable in historical aerial photos of this location. In the last 10 years, a caliche pit has grown over the location. However, about 1900 feet to the north is the Graham Well. It appears that the adjacent stock tank is currently fed by an electric pump. A windmill was most likely present in earlier time. It is likely that this well is USGS 14410. Two depth to water measurements exist of 505 feet (1972) and 470 feet (1977). The well is listed as being completed in the Santa Rosa formation.

We examined two drillers logs from the NM OSE database. These are described briefly below and presented in Appendix Well logs. We note there is a paucity of drillers logs for the wells near the site.

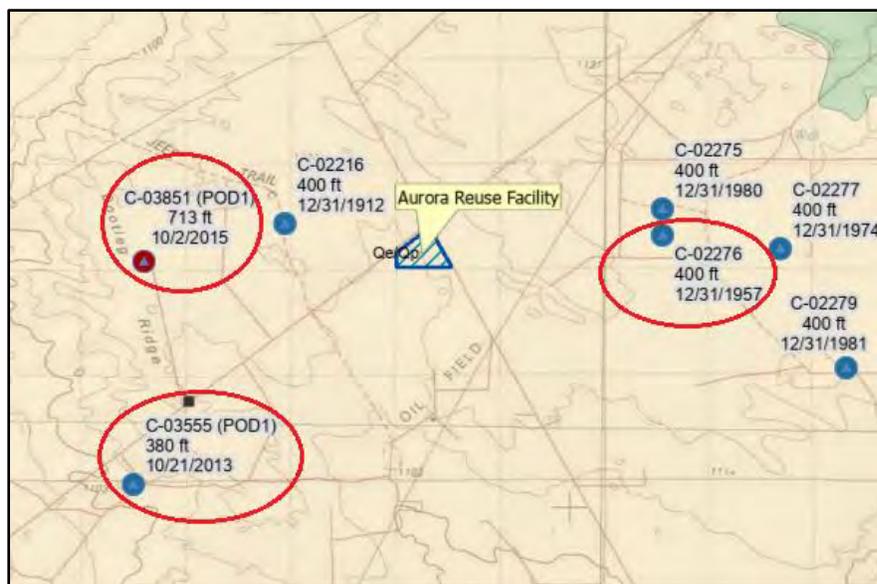


Figure 2 - Location and data of OSE Wells relative to the site location.

- C-03851 is a well drilled in October 2015 at a location about 2.3 miles west of the site. The well was drilled to a total depth of 1,405 feet. Groundwater was first encountered at the depth of 1,354 feet in the Culebra Dolomite with a later static water depth of 713 feet. In southeastern New Mexico, unconfined water is often encountered on top of the Chinle formation. The log identifies a Chinle formation sandstone from the depth of 130 feet to 440 feet. The Santa Rosa Sandstone was recorded between the depths of 440 feet to 576 feet. No water was encountered in the formations above the Culebra Dolomite at this location.

SITING CRITERIA (19.15.34.11 NMAC)  
SOLARIS MIDSTREAM WATERS LLC – AURORA REUSE FACILITY

- C-03555 is about 3.2 miles southwest of the site. It was drilled to a total depth of 600 feet in October 2013. Water was first encountered at the depth of 475 feet. A static water depth of 380 feet existed after well completion. The water bearing zone was described as a brown sandstone present in the depth interval of 475 feet to 550 feet. The description is consistent with that of the Santa Rosa Sandstone.
- C-2276 is about 2.15 miles east of the site. While we could not locate the well log, OSE documents for the well list it as having a total depth of 650 feet with a depth to water of 400 feet. This is consistent with the confined groundwater at C-03555 discussed immediately above.

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

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

- The closest municipalities are Loving and Malaga, approximately 25 miles to the west.
- The closest mapped public wells are 30 miles to the southeast.

**Distance to Subsurface Mines**

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

- The closest caliche pit is located 1.9 miles to the northeast.
- There are no subsurface mines in the area shown in Plate 4.

**Distance to High or Critical Karst Areas**

Plate 5 shows the Aurora Reuse Facility is not within mapped zone of high or critical Karst with respect to BLM mapped areas.

- The proposed facility is located within a “low” potential karst area.
- The nearest “high” or “critical” potential karst area is 12 miles west-northwest of the proposed containment.

**Distance to 100-Year Floodplain**

Plate 6 demonstrates that the Aurora Reuse Facility are within Zone D as designated by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

- FEMA describes the location as an area with possible but undetermined flood hazards. No flood hazard analysis has been conducted.
- The nearest mapped flood hazard areas are 15 miles to the west.

**Distance to Surface Water**

Plate 7 shows the closest surface water bodies are:

- A Lake/Pond is more than 1.5 miles southeast of the site.
- The next closest Lake/Ponds are to the east and then to the southwest.
- The closest mapped water courses are more than 5 miles to the east-northeast.

SITING CRITERIA (19.15.34.11 NMAC)  
SOLARIS MIDSTREAM WATERS LLC – AURORA REUSE FACILITY

### **Distance to Permanent Residence or Structures**

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

- There are no structures within 1000 feet of the site.
- Oil field infrastructure is present in all directions from the site.

### **Distance to Non-Public Water Supply**

Plates 1, 7 and 8 demonstrate that the Aurora Reuse Facility is not within 500 horizontal feet of a spring or fresh water well used for domestic or stock watering purposes, in existence at the time of initial application.

- Plate 1 shows the locations of all area water wells, active or plugged.
- The nearest well in the OSE database is more than one mile to the west.
- The nearest stock watering well is more than a mile to the west-northwest (Clifton Well).
- No springs were identified within the mapping area (see Plate 7)

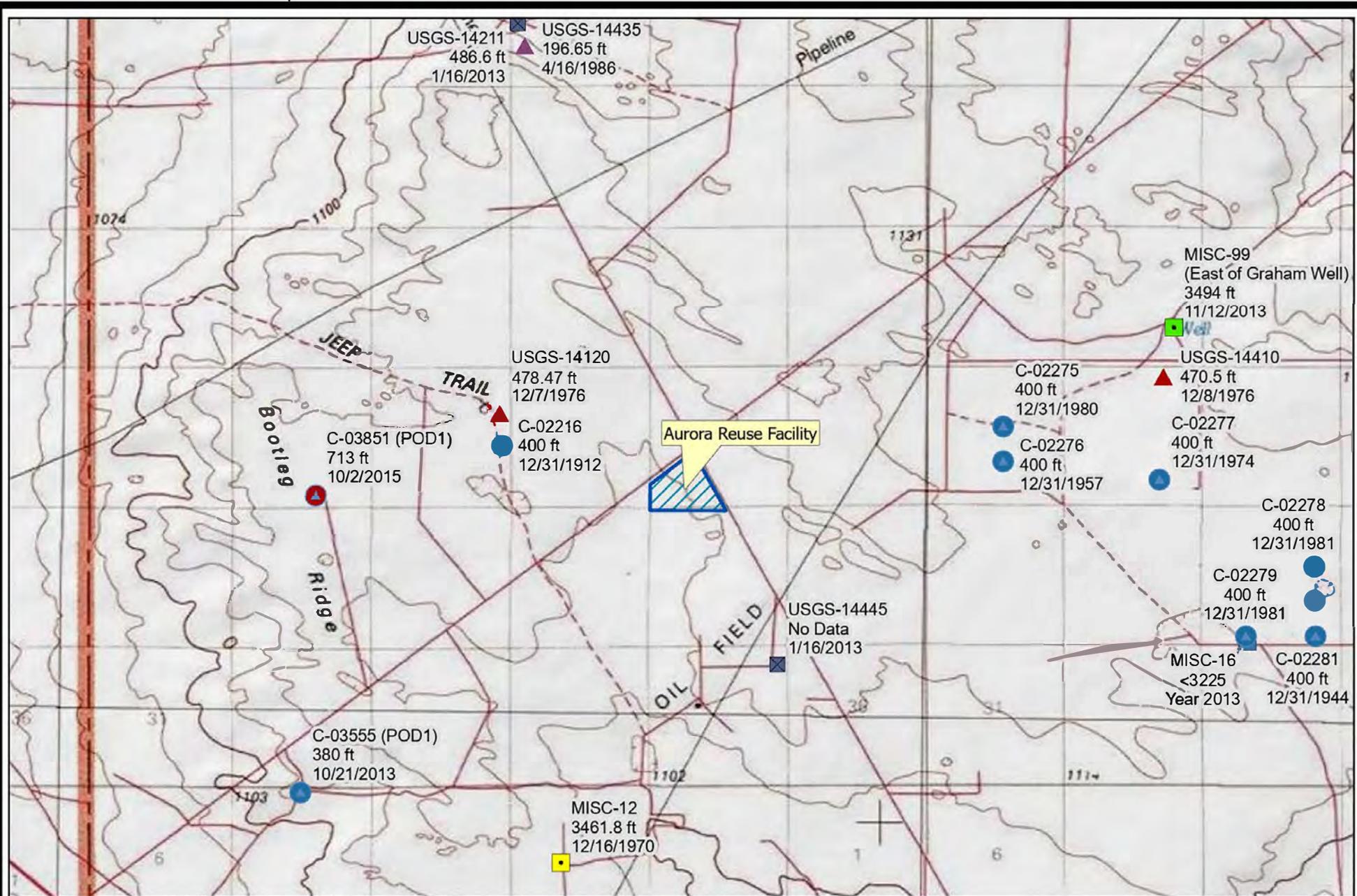
### **Distance to Wetlands**

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

- The nearest designated wetland is the freshwater pond more than 1.5 miles to the southeast.
- The USA wetlands database, which relies upon aerial imagery rather than more detailed investigations, identified all the surface water bodies of Plate 7 as wetlands.

## SITING CRITERIA DEMONSTRATION PLATES

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**R.T. Hicks Consultants, Ltd**  
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 Albuquerque, NM 87104  
 Ph: 505.266.5004

Nearby Wells and Borings with Depth to Water  
 Aurora Reuse Facility  
 Solaris Water Midstream LLC

Plate 1  
 July 2024

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 Recycling Containment Area

USGS Gauging Station (GW Elev, Date)

Aquifer Code, Well Status

 Santa Rosa

 Santa Rosa, Site was being pumped.

OSE Water Wells (DTW/Date)

Well Depth (ft)

 501-1000

 <1000

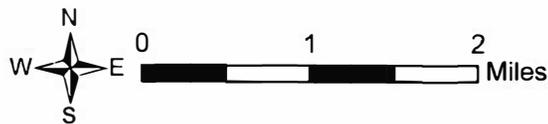
NM\_Geology

Map Unit, Description

 Qe/Qp, Quaternary-Eolian Piedmont Deposits

<u>R.T. Hicks Consultants, Ltd</u>	Plates 1 & 2 Legend	
901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Aurora Reuse Facility Solaris Water Midstream LLC	July 2024

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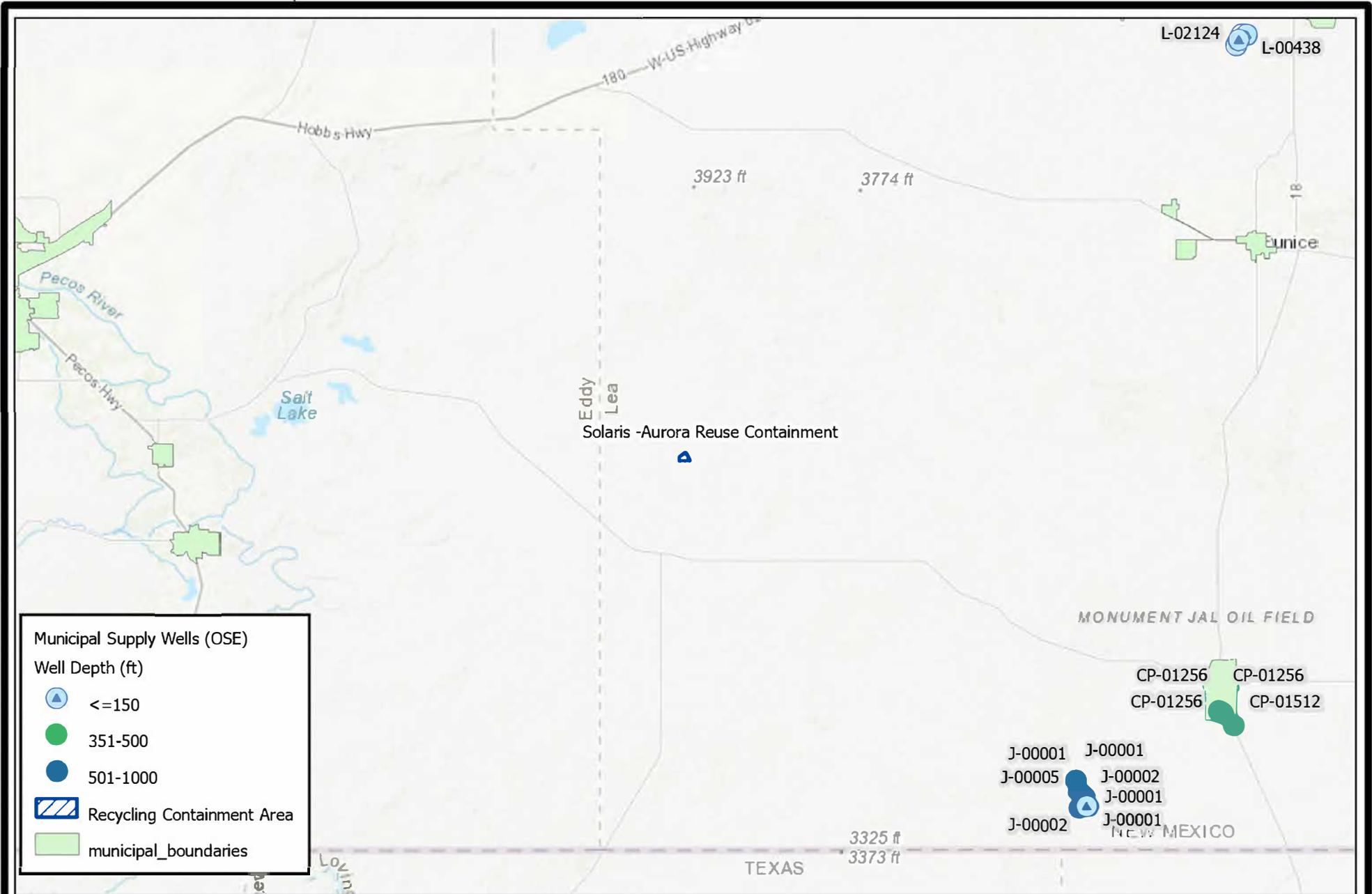


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Groundwater Elevation & Geology  
 USGS and MISC Data  
 Aurora Reuse Facility  
 Solaris Water Midstream LLC

P late 2  
 July 2024

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**Municipal Supply Wells (OSE)**

Well Depth (ft)

- ≤150
- 351-500
- 501-1000
- Recycling Containment Area
- municipal\_boundaries



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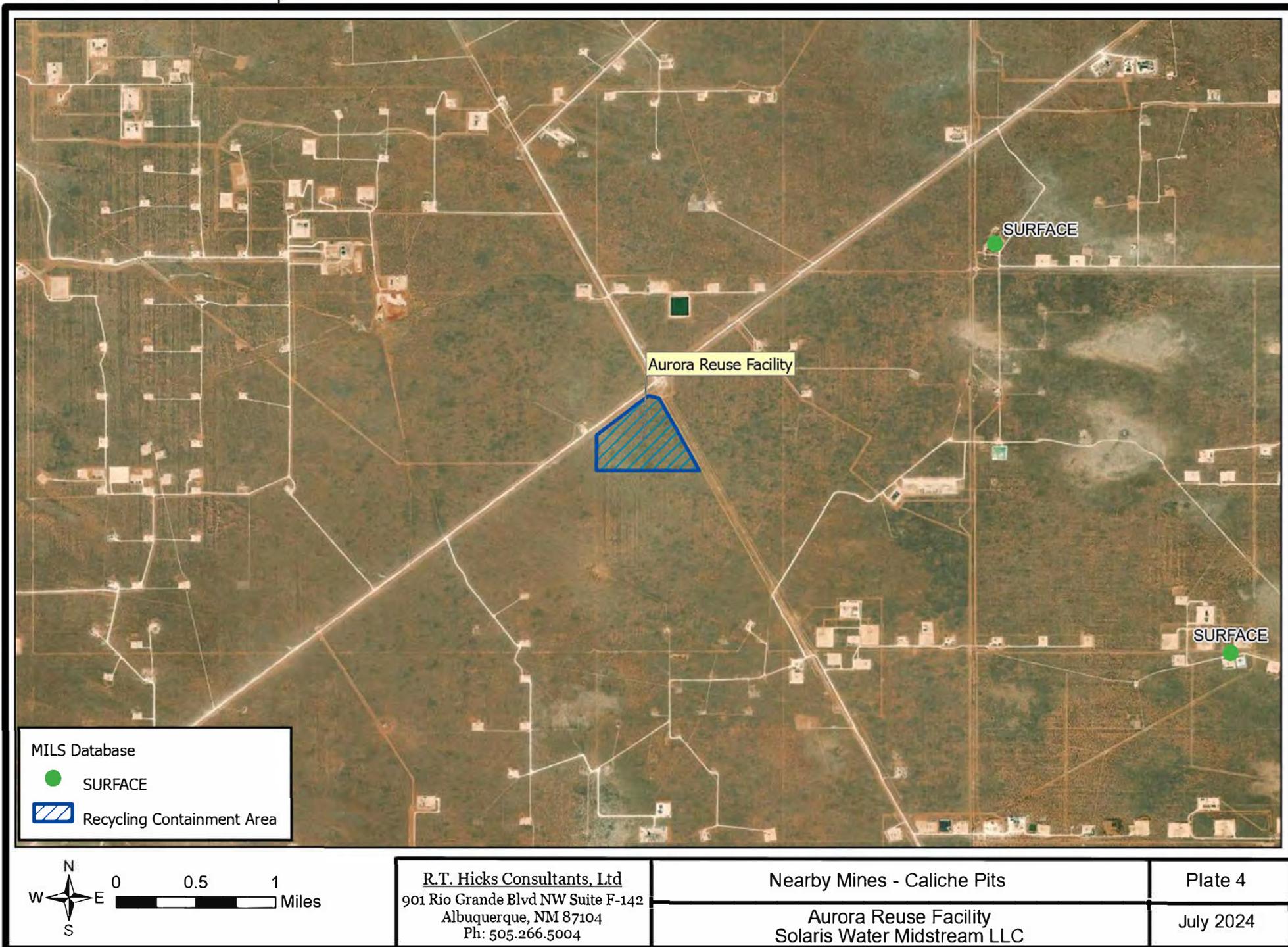
**Nearest Municipalities & Public Water Supplies**

**Aurora Reuse Facility**  
 Solaris Water Midstream LLC

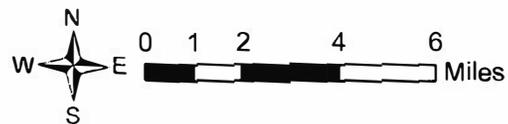
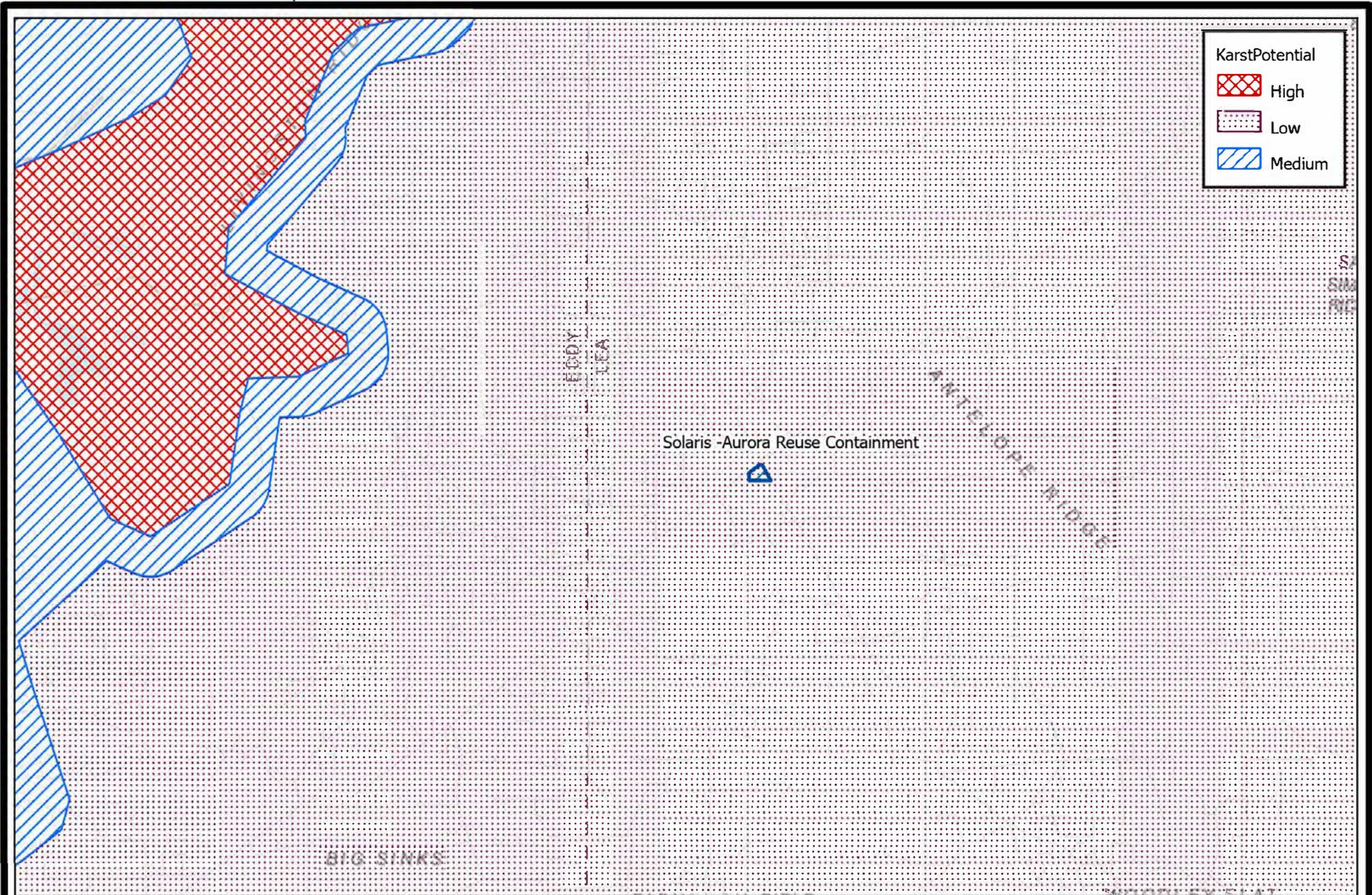
**Plate 3**

July 2024

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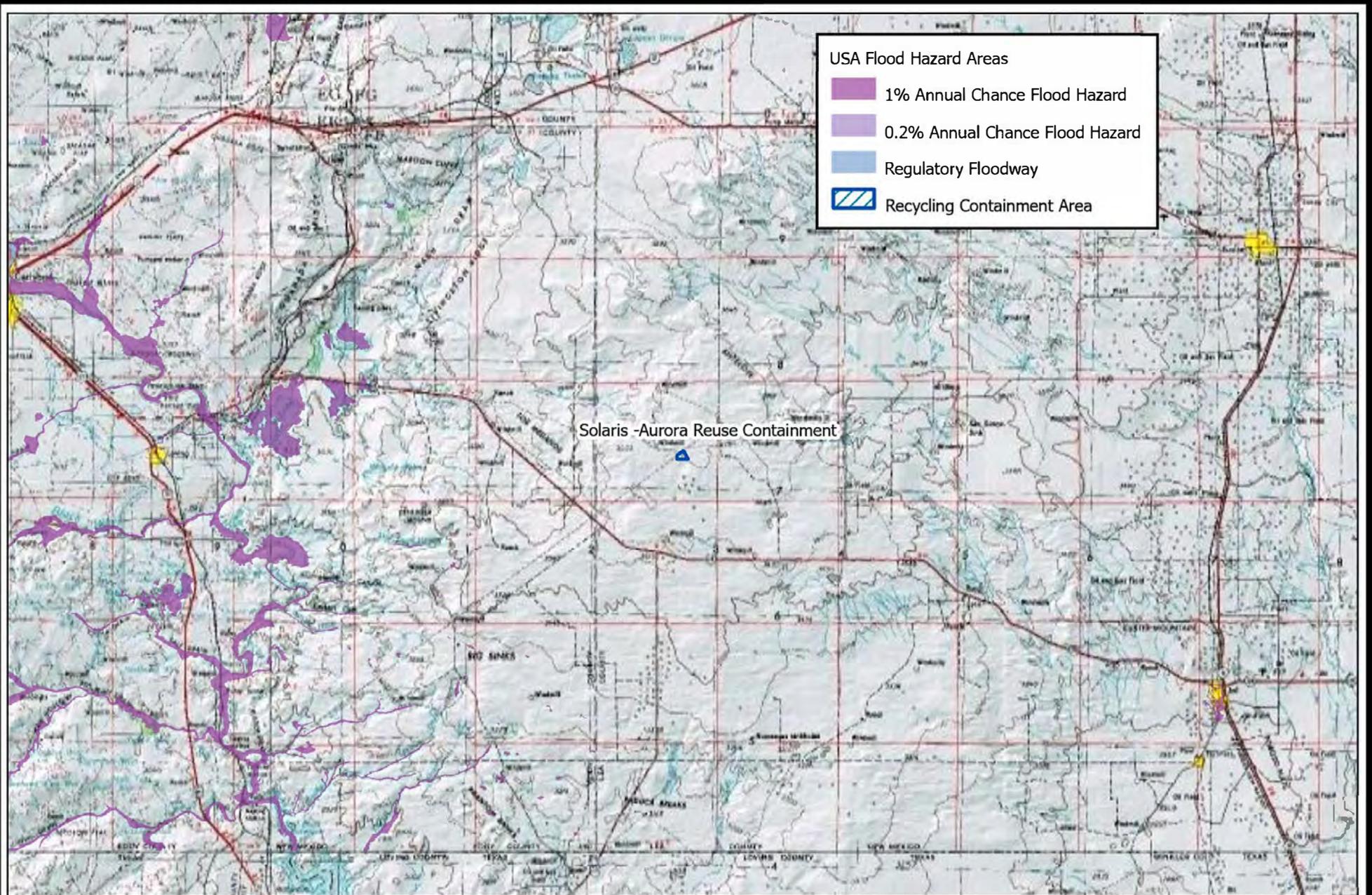


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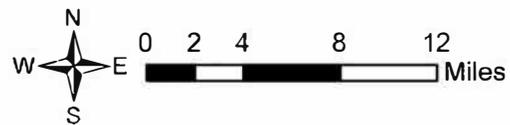
Nearest Municipalities & Public Water Supplies  
Aurora Reuse Facility  
Solaris Water Midstream LLC

Plate 5  
July 2024

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Solaris -Aurora Reuse Containment

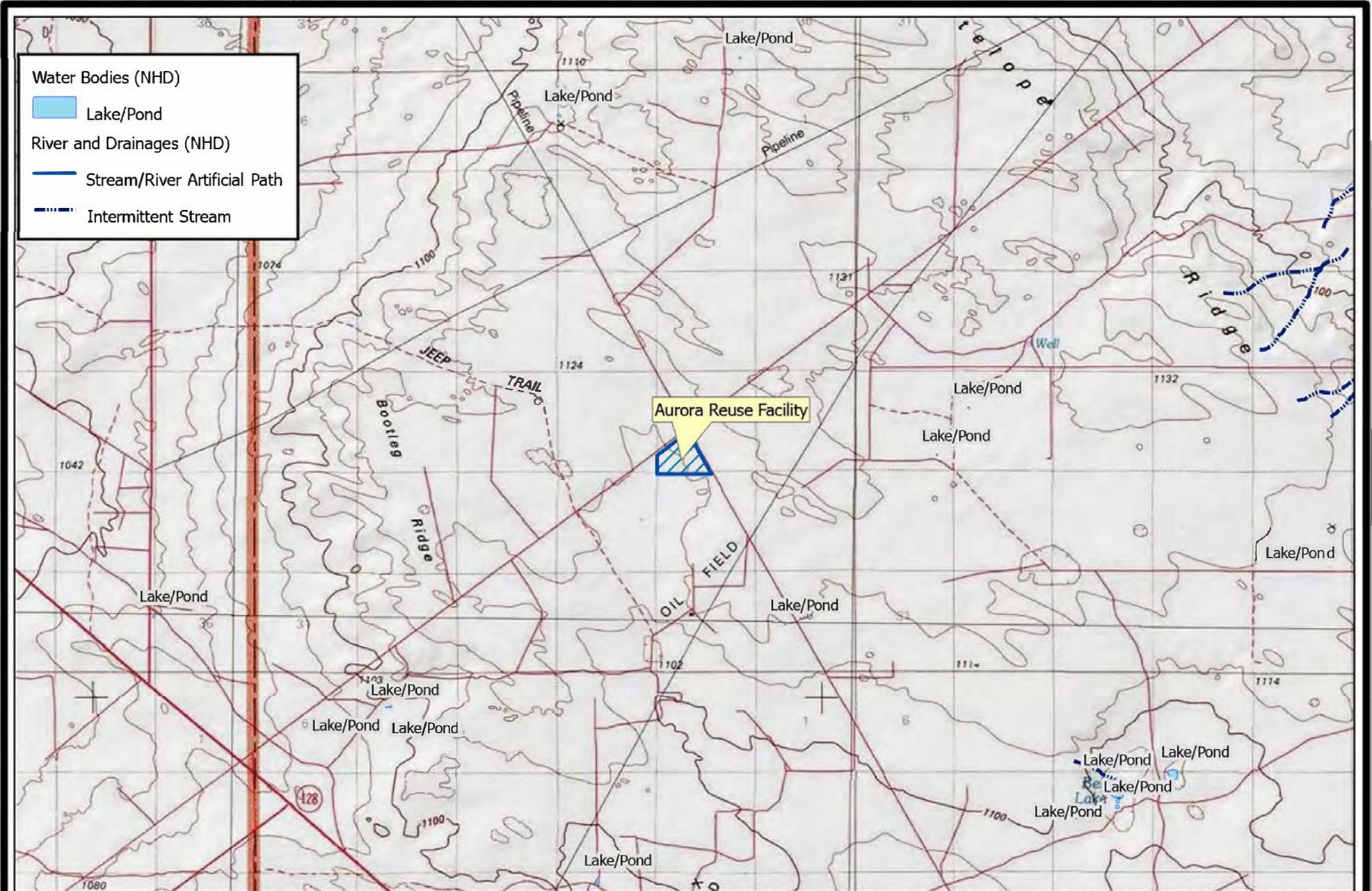


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FEMA Mapped Flood Zones  
Aurora Reuse Facility  
Solaris Water Midstream LLC

Plate 6  
July 2024

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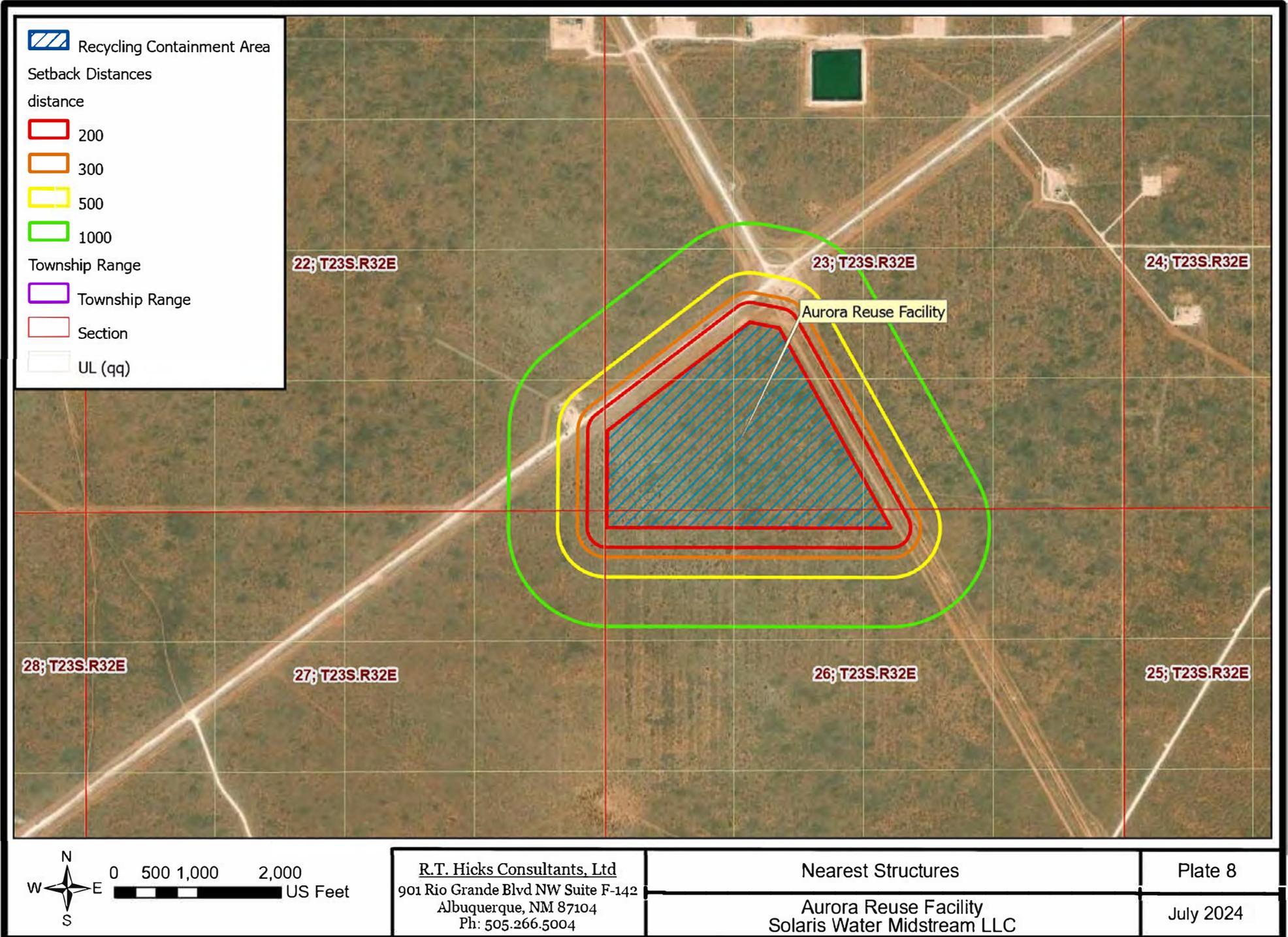


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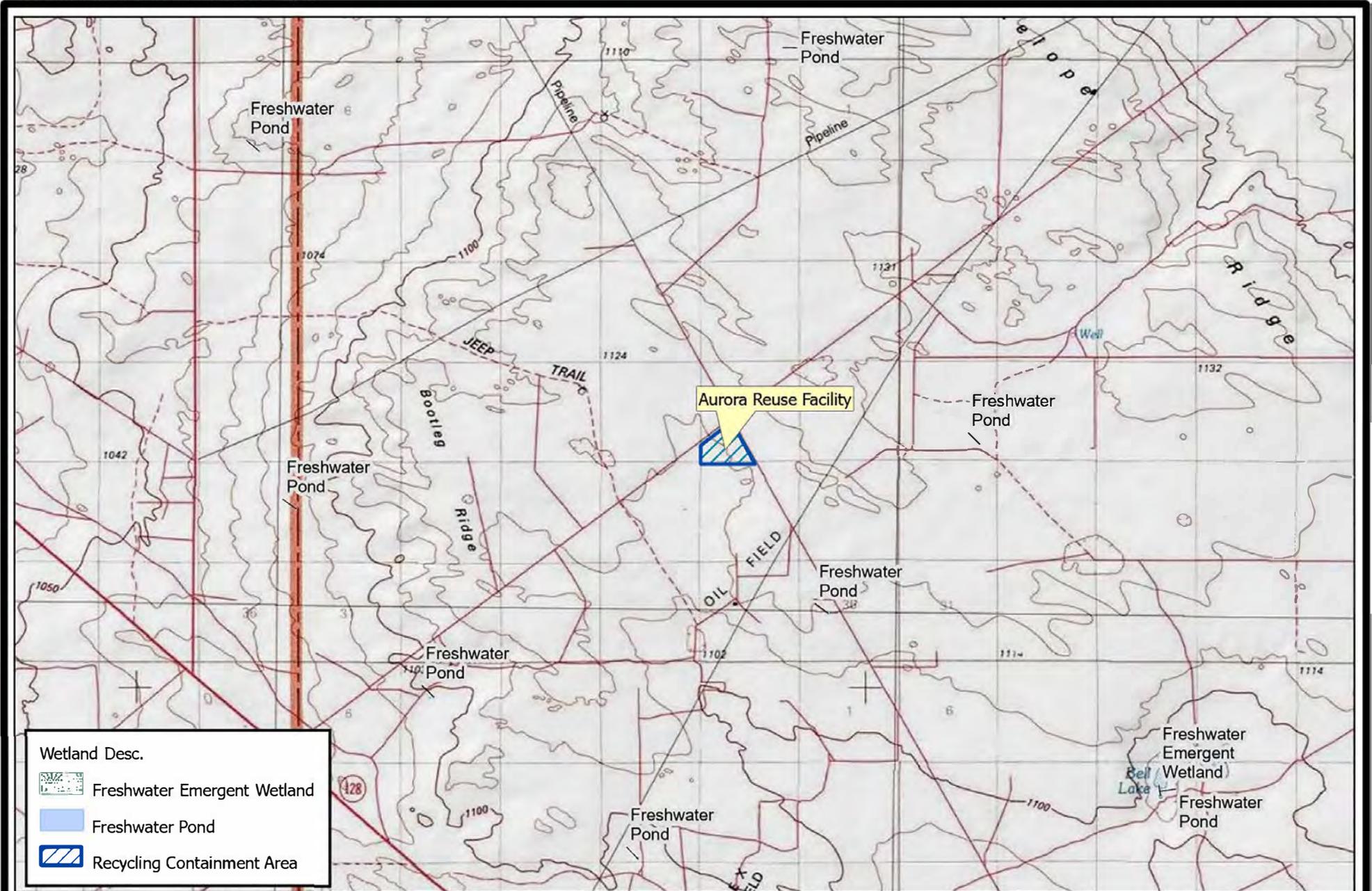
Mapped Surface Water  
 Aurora Reuse Facility  
 Solaris Water Midstream LLC

Plate 7  
 July 2024

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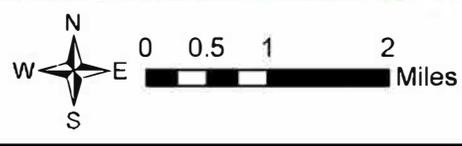


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**Wetland Desc.**

-  Freshwater Emergent Wetland
-  Freshwater Pond
-  Recycling Containment Area



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**Mapped NM Wetlands**  
**Aurora Reuse Facility**  
**Solaris Water Midstream LLC**

**Plate 9**  
**July 2024**

## APPENDIX WELL LOGS & USGS DATA

The USGS well data discussed for the Aurora Reuse Facility is presented below.

### USGS 321952103400801 23S.32E.03.311114

Lea County, New Mexico

Hydrologic Unit Code 13060011

Latitude 32°19'59.2", Longitude 103°40'12.6" NAD83

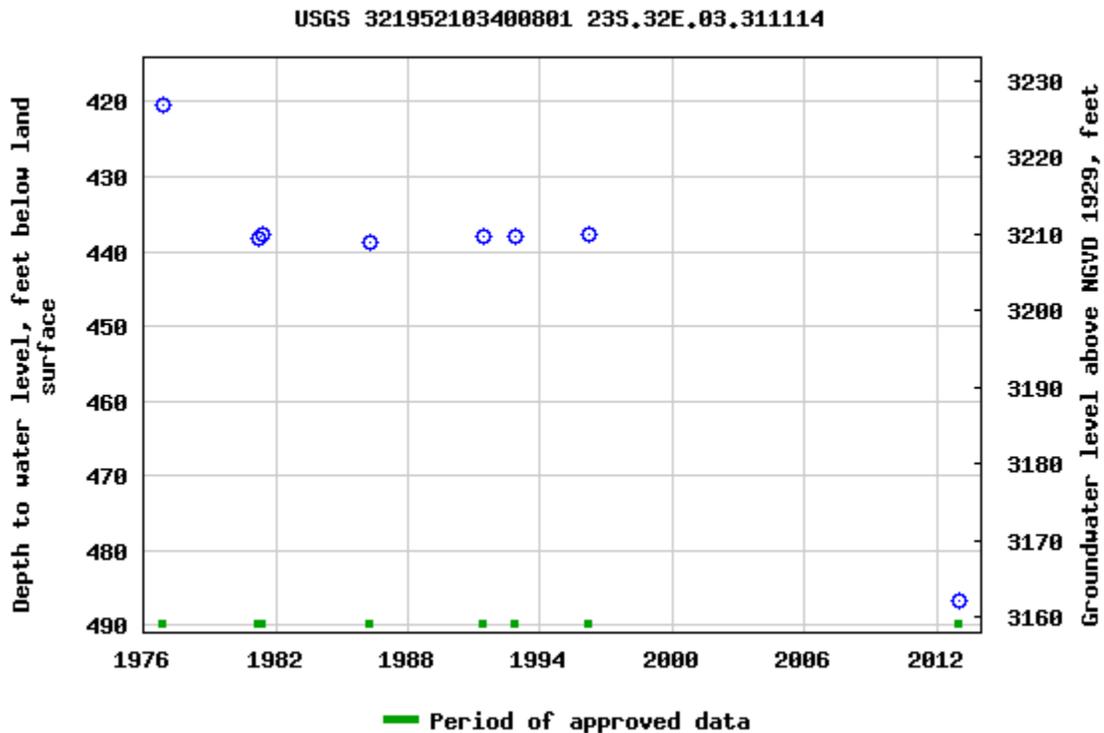
Land-surface elevation 3,648.00 feet above NGVD29

The depth of the well is 630 feet below land surface.

This well is completed in the Other aquifers (N9999OTHER) national aquifer.

This well is completed in the Santa Rosa Sandstone (231SNRS) local aquifer.

A windmill is 125 feet NW of the given lat-long. Location is 3.38 miles N-NW of Aurora site (USGS-14211), This is the Clifton Well on the Topo Map.



### USGS 321732103401701 23S.32E.21.223444

Lea County, New Mexico

Hydrologic Unit Code 13060011

Latitude 32°17'32", Longitude 103°40'17" NAD27

Land-surface elevation 3,682 feet above NAVD88

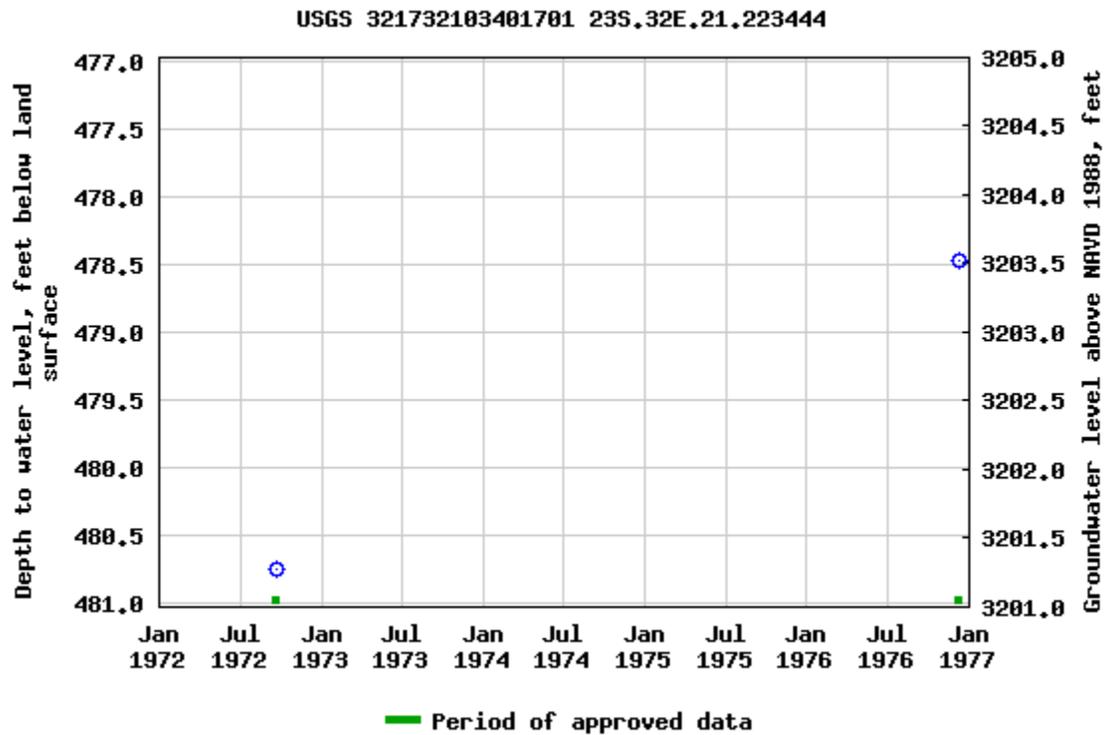
The depth of the well is 550 feet below land surface.

This well is completed in the Other aquifers (N9999OTHER) national aquifer.

This well is completed in the Santa Rosa Sandstone (231SNRS) local aquifer.

Nothing is presently visible at this location. A complex of cattle yards is present 700 feet to the NW. A windmill is about 750 feet NW of the given latitude, longitude. The site is 1.15 miles W-NW of the Aurora site.

This is USGS-14120



### USGS 321950103400601 23S.32E.03.31110

Lea County, New Mexico

Hydrologic Unit Code 13060011

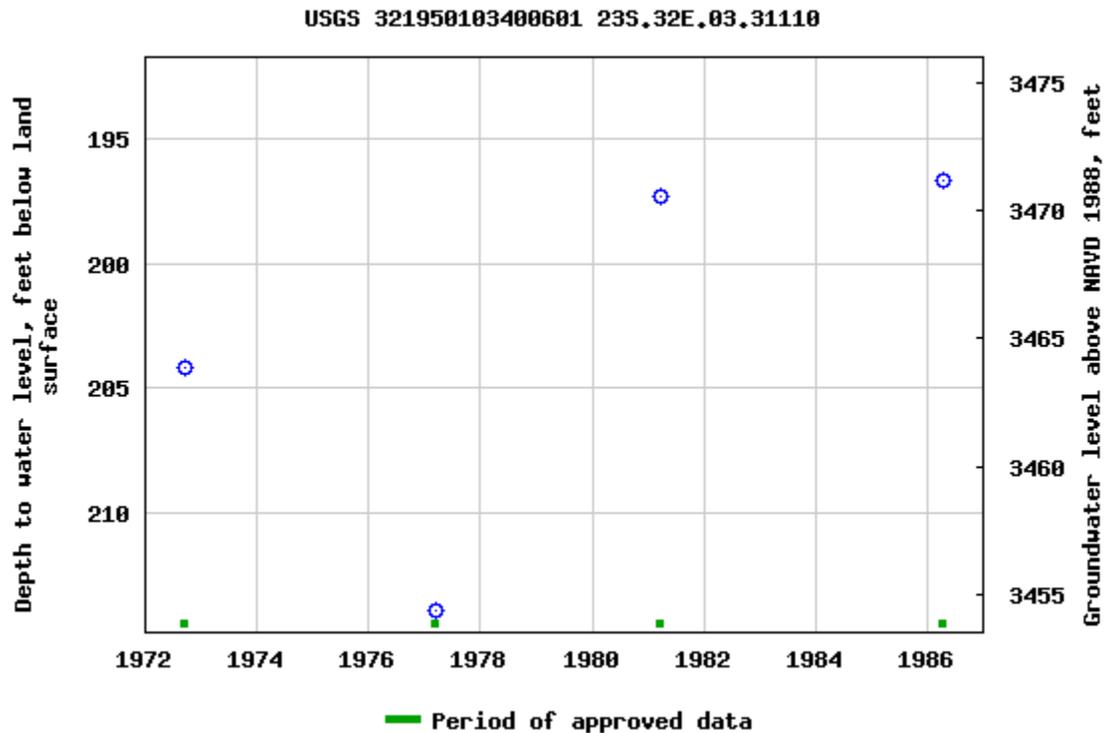
Latitude 32°19'50", Longitude 103°40'06" NAD27

Land-surface elevation 3,668 feet above NAVD88

This well is completed in the Other aquifers (N9999OTHER) national aquifer.

This well is completed in the Chinle Formation (231CHNL) local aquifer.

The Clifton well is 1150 feet NW of this location. Nothing is present at this Lat-long. The location is 3.2 miles west of N-NW of the Aurora site. It correlates with USGS-14435 although nothing is present now.



### USGS 321555103381501 23S.32E.35.224111

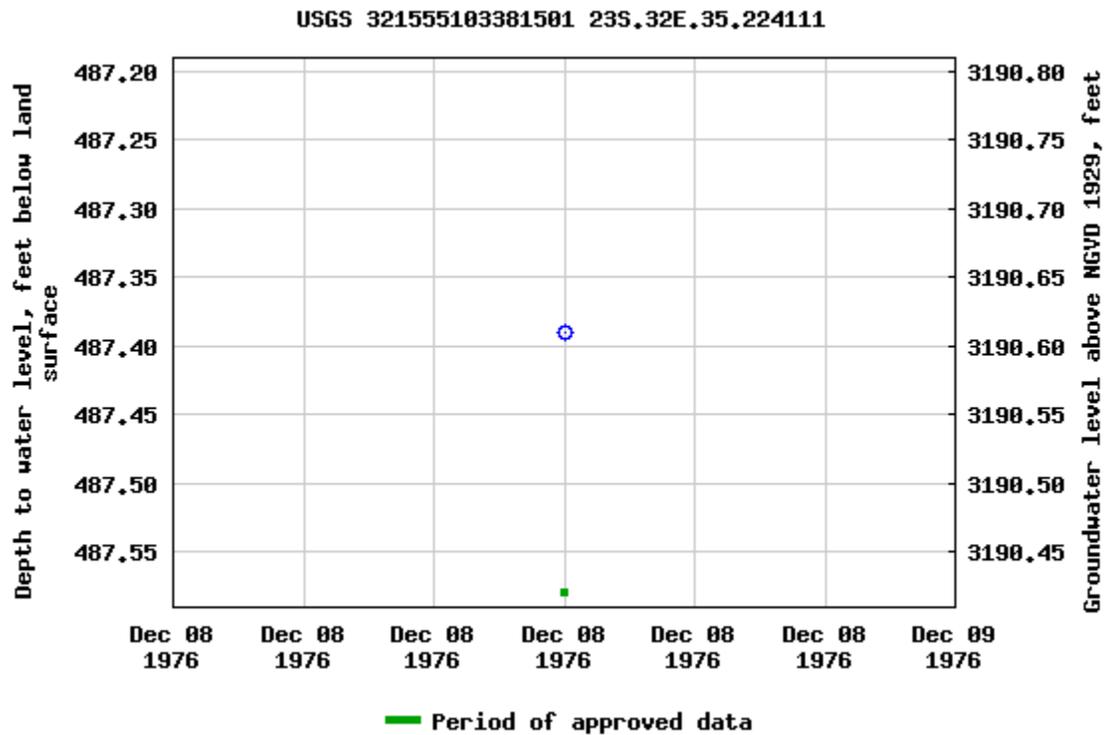
Lea County, New Mexico

Hydrologic Unit Code 13070007

Latitude 32°15'59.0", Longitude 103°38'17.6" NAD83

Land-surface elevation 3,678.00 feet above NGVD29  
 The depth of the well is 700 feet below land surface.  
 This well is completed in the Other aquifers (N9999OTHER) national aquifer.  
 This well is completed in the Santa Rosa Sandstone (231SNRS) local aquifer.

Nothing is currently present at this lat-long. A 1996 image shows a possible livestock watering feature. The location is 1.27 miles S-SW of the Aurora site. (Not USGS 14410)

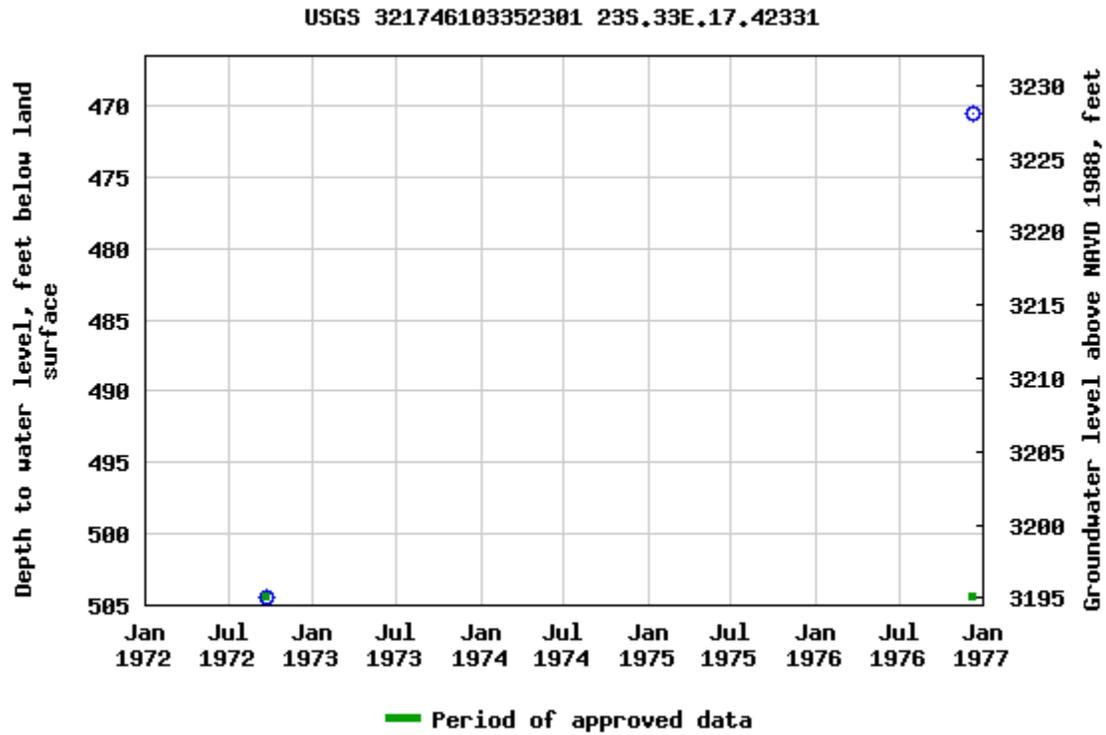


**USGS 321746103352301 23S.33E.17.42331**

Lea County, New Mexico  
 Hydrologic Unit Code 13070007  
 Latitude 32°17'46", Longitude 103°35'23" NAD27  
 Land-surface elevation 3,699 feet above NAVD88  
 The depth of the well is 550 feet below land surface.  
 This well is completed in the Other aquifers (N9999OTHER) national aquifer.  
 This well is completed in the Santa Rosa Sandstone (231SNRS) local aquifer.

This location is currently at the western end of a caliche pit. It is about 1900 feet south of the Graham well. At the Graham Well, it appears that the

adjacent stock tank is fed by an electric pump. A windmill may have been present in earlier time. It is 3.37 miles east of the Aurora site and is likely USGS 14410, the Graham Well.





# 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) POD-1				OSE FILE NUMBER(S) C-3851						
	WELL OWNER NAME(S) WIPP- Department of Energy Carlsbad Field Office				PHONE (OPTIONAL) (575)234-7488						
	WELL OWNER MAILING ADDRESS PO Box 3090				CITY Carlsbad		STATE NM		ZIP 88221-3090		
	WELL LOCATION (FROM GPS)	DEGREES		MINUTES		SECONDS		* ACCURACY REQUIRED: ONE TENTH OF A SECOND * DATUM REQUIRED: WGS 84			
		LATITUDE	32	17	2.3	N					
	LONGITUDE		103	41	42.3		W				
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS - PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE 3.5 mi. east of Redd Rd. Section 20, Township 23s, Range 32e											
2. DRILLING & CASING INFORMATION	LICENSE NUMBER WD-1723		NAME OF LICENSED DRILLER Randy Stewart				NAME OF WELL DRILLING COMPANY Stewart Brothers Drilling				
	DRILLING STARTED 8-19-15		DRILLING ENDED 10-2-15		DEPTH OF COMPLETED WELL (FT) 1392		BORE HOLE DEPTH (FT) 1405		DEPTH WATER FIRST ENCOUNTERED (FT) 1354		
	COMPLETED WELL IS: <input checked="" type="checkbox"/> ARTESIAN <input type="checkbox"/> DRY HOLE <input type="checkbox"/> SHALLOW (UNCONFINED)							STATIC WATER LEVEL IN COMPLETED WELL (FT) 713			
	DRILLING FLUID: <input type="checkbox"/> AIR <input checked="" 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	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)		
	FROM	TO									
	+2	35	24	LCS		weld	14	.375			
	35	1354	12.250	Blank FRP		Threaded	5	.25			
	1354	1383	12.250	Slotted FRP		Threaded	5	.25			
1383	1393	12.250	Blank FRP		Threaded	5	.25				
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	35	24	neat cement		61	tremie				
	35	1347	12.250	neat cement		1080	tremie				
	1347	1352	12.250	Gelacryl seal		3.25	tremie				
	1352	1353	12.250	Bentonite pellets		.35	tremie				
	1353	1383	12.250	6-9 Sand		19.60	tremie				
	1383	1389	12.250	Gelacryl seal		3.92	tremie				
1389	1405	12.250	bentonite seal(.65 cu/ft)6-9 sand		9.80	tremie					

NOV 10 PM 3:35  
 STATE ENGINEER OFFICE  
 CARLSBAD FIELD OFFICE

FOR OSE INTERNAL USE				WR-20 WELL RECORD & LOG (Version 10/29/15)			
FILE NUMBER C-3851		POD NUMBER 1		TRN NUMBER 564731			
LOCATION 23S.32E.20.4.3.3				monitor		PAGE 1 OF 2	

4. HYDROGEOLOGIC LOG OF WELL	DEPTH (feet bgl)		THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
	FROM	TO				
	0	6	6	Pad material & brown sand	Y ✓ N	
	6	36	30	Caliche	Y ✓ N	
	36	120	84	Gatuna Sandstone	Y ✓ N	
	120	440	320	Chinle Sandstone	Y ✓ N	
	440	576	136	Santa Rosa Sandstone	Y ✓ N	
	576	1198	622	Dewey Lake Sandstone	Y ✓ N	
	1198	1228	30	Anhydrite	Y ✓ N	
	1228	1238	10	Mudstone	Y ✓ N	
	1238	1248	10	Anhydrite	Y ✓ N	
	1248	1265	17	Magenta Dolomite	Y ✓ N	
	1265	1332	67	Anhydrite	Y ✓ N	
	1332	1340	8	mudstone	Y ✓ N	
	1340	1354	14	Anhydrite	Y ✓ N	
	1354	1380	16	Culebra Dolomite	✓ Y N	3.00
	1380	1390	10	mudstone	Y ✓ N	
	1390	1405	15	Anhydrite	Y ✓ N	
					Y N	
					Y N	
					Y N	
					Y N	
METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:					TOTAL ESTIMATED WELL YIELD (gpm):	
<input type="checkbox"/> PUMP <input checked="" type="checkbox"/> AIR LIFT <input type="checkbox"/> BAILER <input type="checkbox"/> OTHER - SPECIFY:					3.00	

STATE ENGINEER OFFICE  
 NEW MEXICO  
 2015 NOV 10 PM 3:35

5. TEST; RIG SUPERVISION	WELL TEST	TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.
	MISCELLANEOUS INFORMATION:	
PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE: Danny L White		

6. SIGNATURE	THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:	
	_____ SIGNATURE OF DRILLER / PRINT SIGNEE NAME	_____ DATE

FOR OSE INTERNAL USE		WR-20 WELL RECORD & LOG (Version 06/08/2012)	
FILE NUMBER	C-3851	POD NUMBER	1
LOCATION	235.32E.20.4-3-3	TRN NUMBER	564731
		monitor	PAGE 2 OF 2



# WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

STATE ENGINEER OFFICE  
ROSWELL, NEW MEXICO

1. GENERAL AND WELL LOCATION	OSE POD NUMBER (WELL NUMBER) <b>C-3555-POO1</b>			OSE FILE NUMBER <b>1517 ROW - 71A 11.11</b> <b>C-3555</b>		
	WELL OWNER NAME(S) <b>Mark McCloy - McCloy Ranches</b>			PHONE (OPTIONAL) <b>432-940-4459</b>		
	WELL OWNER MAILING ADDRESS <b>Box 1076 254 Diamond Road</b>			CITY STATE ZIP <b>Jal NM 88252</b>		
	WELL LOCATION (FROM GPS)	DEGREES	MINUTES	SECONDS	* ACCURACY REQUIRED: ONE TENTH OF A SECOND * DATUM REQUIRED: WGS 84	
	LATITUDE	<b>32</b>	<b>15</b>	<b>12.71</b>	N	
	LONGITUDE	<b>-103</b>	<b>41</b>	<b>49.24</b>	W	
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS - PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE <b>Hwy 128 mm 20 4 miles North - 1/4 east</b>						

2. DRILLING & CASING INFORMATION	LICENSE NUMBER <b>1654</b>	NAME OF LICENSED DRILLER <b>John Sirman</b>			NAME OF WELL DRILLING COMPANY <b>Siemen Drilling &amp; Const. LLC</b>			
	DRILLING STARTED <b>10/20/13</b>	DRILLING ENDED <b>10/21/13</b>	DEPTH OF COMPLETED WELL (FT) <b>600'-0</b>	BORE HOLE DEPTH (FT) <b>600'-0</b>	DEPTH WATER FIRST ENCOUNTERED (FT) <b>475'-0</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>380'-0</b>			
	DRILLING FLUID: <input type="checkbox"/> AIR <input checked="" type="checkbox"/> MUD <input type="checkbox"/> ADDITIVES - SPECIFY:							
	DRILLING METHOD: <input checked="" type="checkbox"/> ROTARY <input type="checkbox"/> GAMMER <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>0</b>	<b>460</b>	<b>10</b>	<b>PVC</b>	<b>Certa-Lok</b>	<b>6</b>	<b>DR-17</b>	<b>Blank</b>
	<b>460</b>	<b>520</b>	<b>10</b>	<b>PVC</b>	<b>Certa-Lok</b>	<b>6</b>	<b>DR-17</b>	<b>1032 screen</b>
	<b>520</b>	<b>600</b>	<b>10</b>	<b>PVC</b>	<b>Certa-Lok</b>	<b>6"</b>	<b>DR-17</b>	<b>Blank</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>20</b>	<b>10</b>	<b>3/8 bentonite hole plug</b>	<b>6 Bags</b>	<b>gravity</b>
	<b>34</b>	<b>600</b>	<b>10</b>	<b>3/8 pea gravel pack</b>	<b>4 bags</b>	<b>gravity</b>

FOR OSE INTERNAL USE		WR-20 WELL RECORD & LOG (Version 06/08/2012)	
FILE NUMBER	<b>C-3555</b>	POD NUMBER	<b>1</b>
LOCATION	<b>24S.32E.05</b>	TRN NUMBER	<b>534311</b>
			<b>1-2-2</b>



pod_basin	C
pod_nbr	02276
pod_suffix	
ref	
pod_name	C-2276
tws	23S
rng	33E
sec	19
qtr_4th	4
qtr_16th	1
qtr_64th	3
blk	
zone	
x	0
y	0
landgrant	
legal	
county	LE
start_date	<Null>
plug_date	<Null>
elevation	0
depth_well	650
sched_date	<Null>
pump_type	
discharge	
aquifer	
sys_date	10/3/2017
restrict	0
lat_deg	0
lat_min	0
lat_sec	0
lon_deg	0
lon_min	0
lon_sec	0
pod_status	
ditch_name	
utm_zone	13
easting	630848
northing	3573154
datum	NAD83

utm_source	G
xy_source	
tract_nbr	
map_nbr	
surv_map	
other_loc	
cs_code	0
wrats_s_id	0
utm_error	
well_tag	
pod_file	C-02276
basin	C
nbr	02276
suffix	
sub_basin	CUB
status	PMT
use	COM
total_div	64.5
sub_file	
sf_header	
db_file	C-02276
own_lname	HUGHES PROPERTIES LLC
own_fname	
addr1	PO BOX 5097
addr2	
city	CARLSBAD
state	NM
zip	88221
in_state	1
dump_date	12/31/2023
loc_error	0
wr_count	1
replaced	0
OBJECTID_1	74889
OBJECTID	74889
license_nb	0
finish_dat	12/31/1957
pcw_rcv_da	<Null>
grnd_wtr_s	S
percent_sh	100
depth_wate	400

log_file_d	<Null>
use_of_wel	
pump_seria	
subdiv_nam	
subdiv_loc	
surface_co	0
estimate_y	40
casing_siz	8.63
utm_accura	0
xy_accurac	
lat_lon_so	
lat_lon_ac	M
pod_rec_nb	106359
cfs_start_	
cfs_end_md	
cfs_cnv_fa	0
pod_sub_ba	CUB
static_lev	0
sum_rec_nb	105305
contact_ln	HUGHES
contact_fn	TREY
nmwrrs_wrs	<a href="http://nmwrrs.ose.state.nm.us/ReportDispatcher?type=WRHTML&amp;name=WaterRightSummaryHTMLjrxml&amp;basin=C&amp;nbr=02276&amp;suffix=">http://nmwrrs.ose.state.nm.us/ReportDispatcher? type=WRHTML&amp;name=WaterRightSummaryHTMLjrxml&amp;basin=C&amp;nbr=02276&amp;suffix=</a>

## APPENDIX SITE PHOTOGRAPHS

**R.T. HICKS CONSULTANTS, LTD.**

**Figures**

The photographs were taken during R T Hicks Consultants site visit on February 20, 2024. The aerial photo below shows the photograph locations as numbered white circles. North is up in the aerial image.



**Figure 1:** View to the south towards the center of the site from location 1.



**R.T. HICKS CONSULTANTS, LTD.**

**Figure 2:** View is to the east towards the center of the site from location 2.



**Figure 3:** Looking south from location 3. The terrain slopes downwards to the southeast throughout the area.



**R.T. HICKS CONSULTANTS, LTD.**

**Figure 4:** View is to the south from location 4. The eolian deposits are present throughout the area.



**Figure 5:** View to the west and north from location 5. The road interchange occupies the area.



**R.T. HICKS CONSULTANTS, LTD.**

**Figure 6:** View to the west from location 6 into the center of the site.



**Figure 7:** View to the east from location 6. The bounding road runs across the middle of the photograph.



August 2024

## Rule 34 Registration: Volume 2

### Aurora Reuse Facility

Section 23, T23S, R32E, Lea County

- C-147 Form
- Stamped Design Drawings with Liner Equivalency Demonstration & Avian Deterrent
- Recently Approved Plans for Design/Construction, O&M, Closure



*Aerial View of Aurora Reuse Facility site showing nature of landscape.*

**Prepared for:**  
**Solaris Water Midstream, LLC**  
**Houston, Texas**

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

C-147

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

Recycling Facility and/or Recycling Containment

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

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

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

1. Operator: Solaris Water Midstream LLC (For multiple operators attach page with information) OGRID #: 371643
Address: 9811 Katy Freeway, Suite 900, Houston, TX, 77024
Facility or well name (include API# if associated with a well): Aurora Reuse Facility and Containments
OCD Permit Number: 1RF-529 (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr N Section 23 Township 23S Range 32E County: Lea
Surface Owner: [X] Federal [ ] State [ ] Private [ ] Tribal Trust or Indian Allotment

2. [X] Recycling Facility: Aurora Reuse Facility
Location of recycling facility (if applicable): Latitude 32.285553 Longitude -103.648241 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
[ ] 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 32.284283 N Longitude -103.649469 W (approx.) NAD83
[ ] For multiple or additional recycling containments, attach design and location information of each containment
[ ] Lined [ ] Liner type: Thickness 60 mil pri and 40 mil sec [ ] LLDPE [X] HDPE [ ] PVC [ ] Other
[ ] String-Reinforced
Liner Seams: [X] Welded [ ] Factory [ ] Other Volume: 1,101K bbl Dimensions: L 555' x W 780' x D 24'
[ ] Recycling Containment Closure Completion Date: with 3' freeboard See Attachment Drawings and Plans

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. See Transmittal Letter

5.

**Fencing:**

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

Alternate. Please specify Fixed knot woven wire, 8-foot height. See Sheets 6 and 11 of Containment Plans

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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within a 100-year floodplain. FEMA map	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site	<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	<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. - 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. - 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): Drew Dixon Title: SVP- Land and Regulatory  
 Signature: *Drew Dixon* Date: 08/08/2024  
 e-mail address drew.dixon@ariswater.com Telephone: 832-304-9028

11.

OCD Representative Signature: *Victoria Venegas* Approval Date: 08/23/2024  
 Title: Environmental Specialist OCD Permit Number: 1RF-529  
 OCD Conditions \_\_\_\_\_  
 Additional OCD Conditions on Attachment \_\_\_\_\_

# RECYCLING CONTAINMENT DESIGN DRAWINGS

## ALTERNATIVE LINER EQUIVALENCY DEMONSTRATION

## AVIAN DETERRENT SYSTEM

# AURORA RECYCLE FACILITY SOLARIS WATER MIDSTREAM

SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST

32° 17' 8.6202" N, 103° 38' 54.5382" W  
32.285728°, -103.648483°



## INDEX TO DRAWINGS 11X17

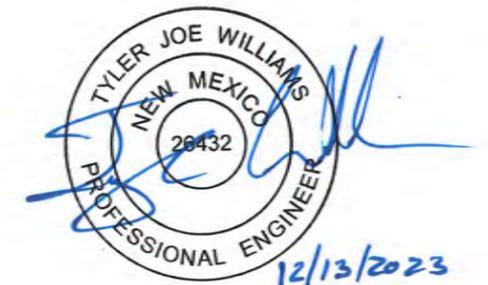
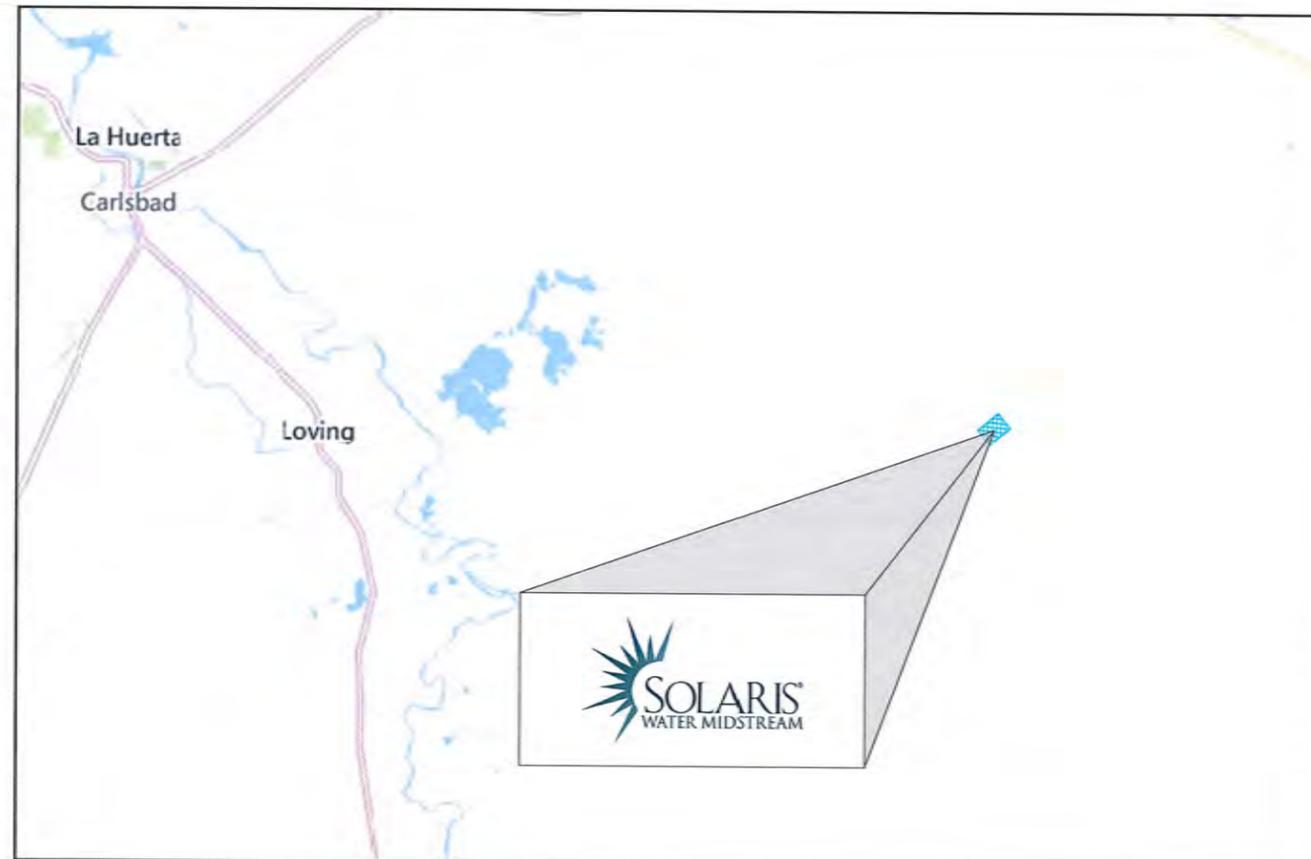
SHEET NO.	DESCRIPTION
1.	COVER SHEET
2.	PROJECT LOCATION
3.	EXISTING SITE FEATURES
4.	SITE PLAN
5.	PIT CAPACITY
6.	RUB SHEET & FENCE PLAN
7.	CROSS SECTIONS
8.	CROSS SECTIONS
9.	SUMP DETAILS
10.	LINER DETAILS
11.	FENCE DETAILS

## CONTACTS

JEFFERY COOK - SOLARIS WATER MIDSTREAM - (713)-614-3644  
BOBBI JO CRAIN - CASCADE SERVICES - (210)-632-8670

ENVIROTECH ENGINEERING & CONSULTING - MITCHELL RATKE, EIT (580)-234-8780  
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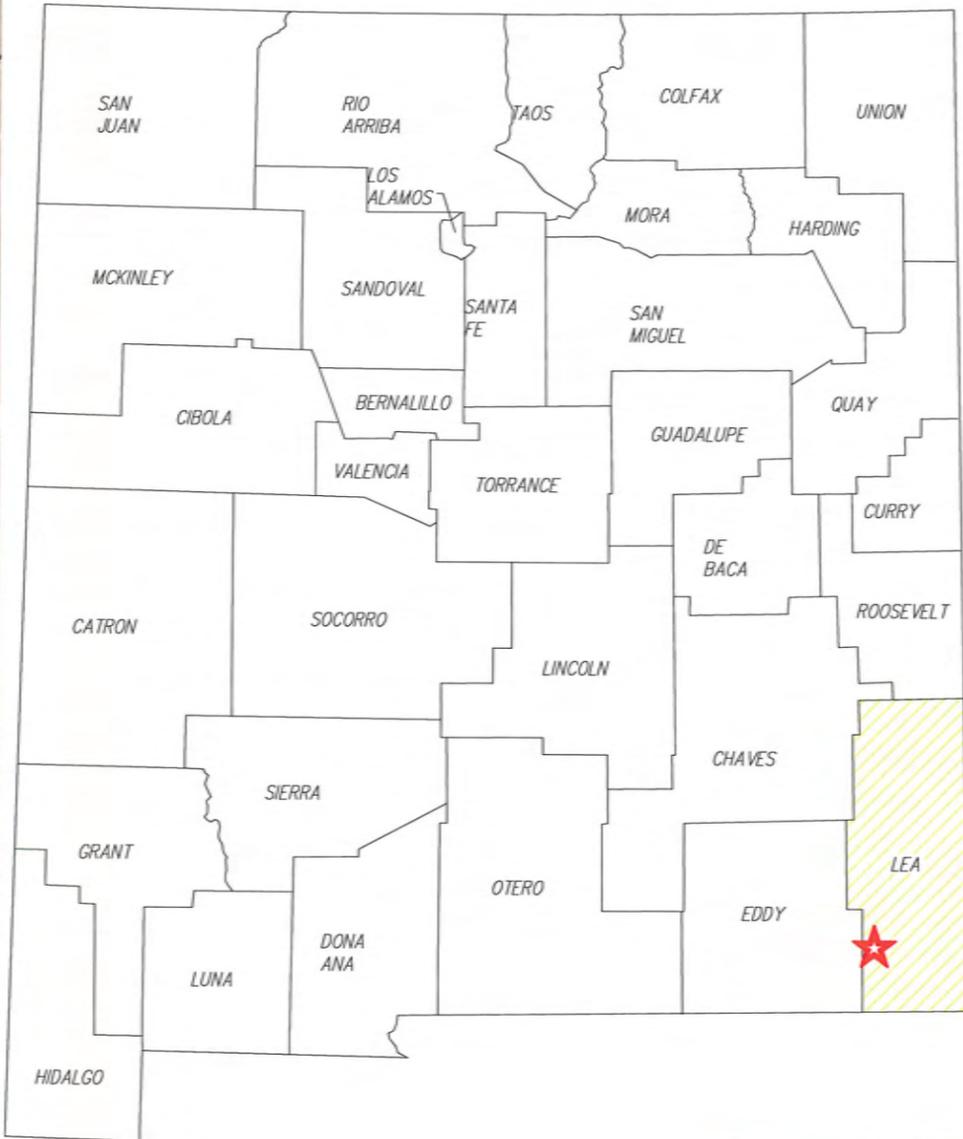
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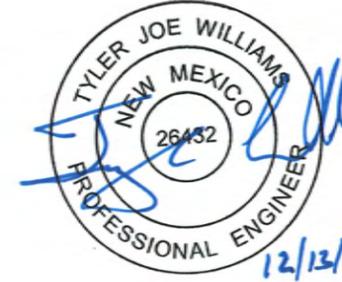
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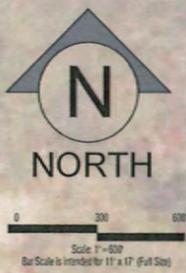


**PROJECT LOCATION**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO

DEVELOPED IN CONJUNCTION WITH  
  
**CASCADE SERVICES**



DATE:	NOVEMBER 2023
SCALE:	NOT TO SCALE
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023298-00
SHEET NO.	2 OF 11



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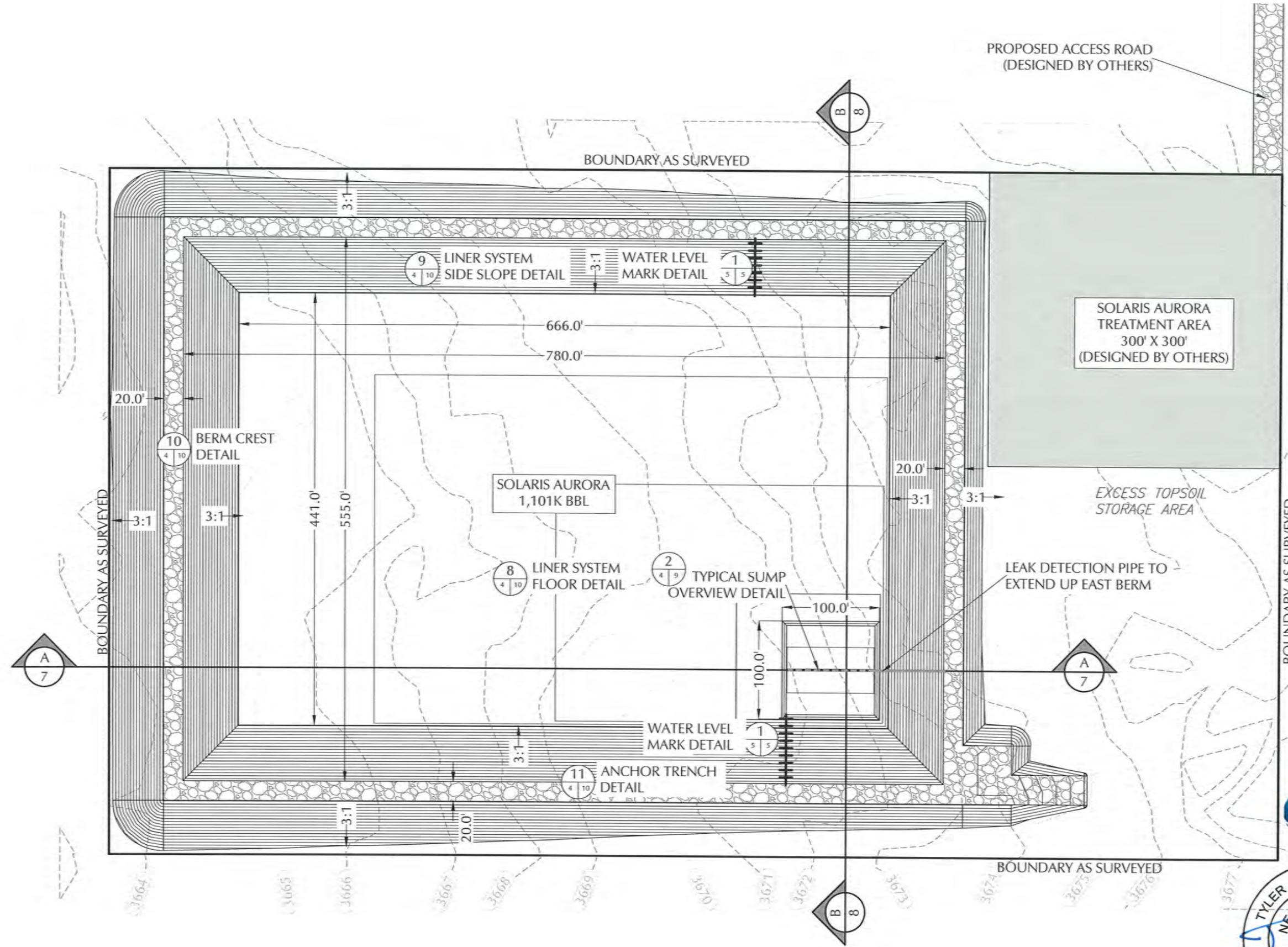
NO.	DATE	DESCRIPTION



**EXISTING SITE FEATURES**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO

DEVELOPED IN CONJUNCTION WITH  
  
**CASCADE SERVICES**

DATE:	NOVEMBER 2023
SCALE:	1" = 600'
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CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023298-00
SHEET NO.	3 OF 11



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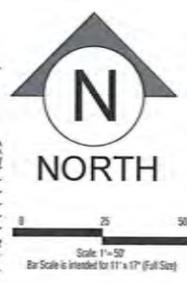
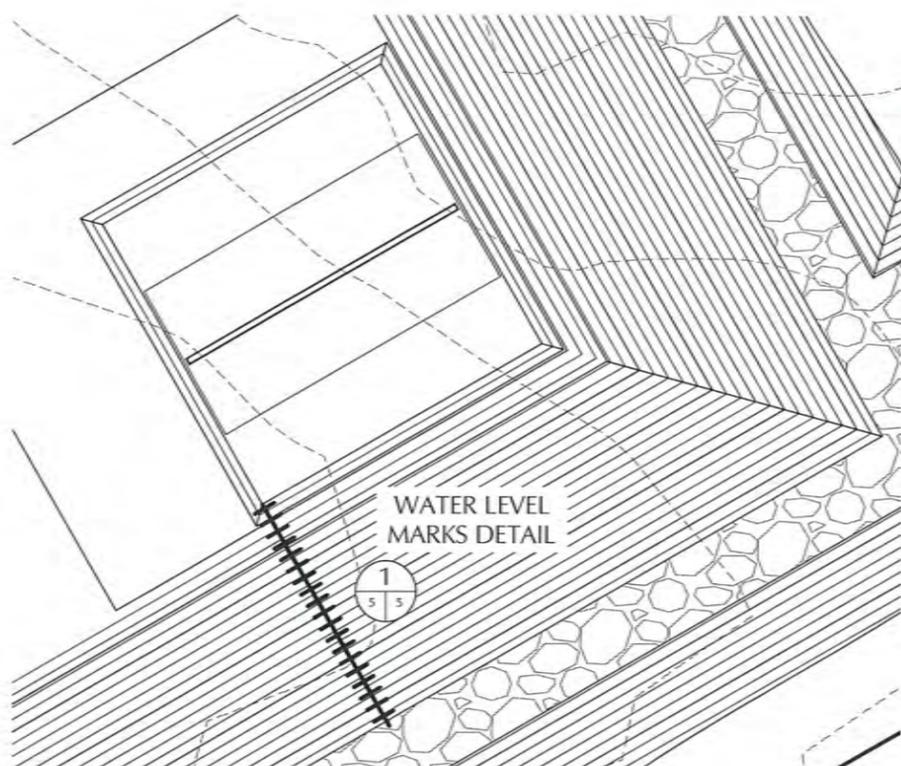
**SOLARIS WATER MIDSTREAM**

DEVELOPED IN CONJUNCTION WITH  
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**TYLER JOE WILLIAMS**  
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 PROFESSIONAL ENGINEER  
 12/13/2023

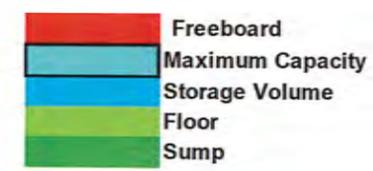
**SITE PLAN**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO

DATE:	NOVEMBER 2023
SCALE:	1" = 100'
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.:	023298-00
SHEET NO.:	4 OF 11



Owner: Solaris Water Midstream  
 Site Name: Aurora Recycle Facility

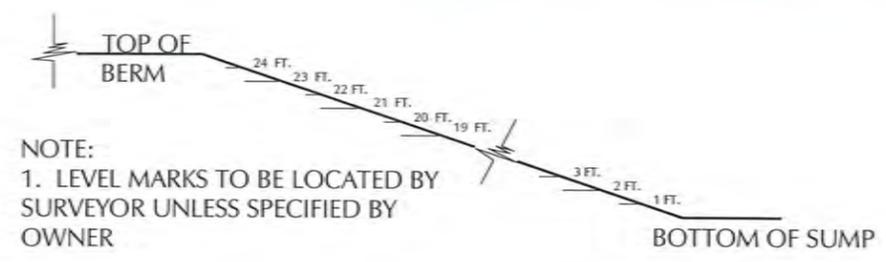
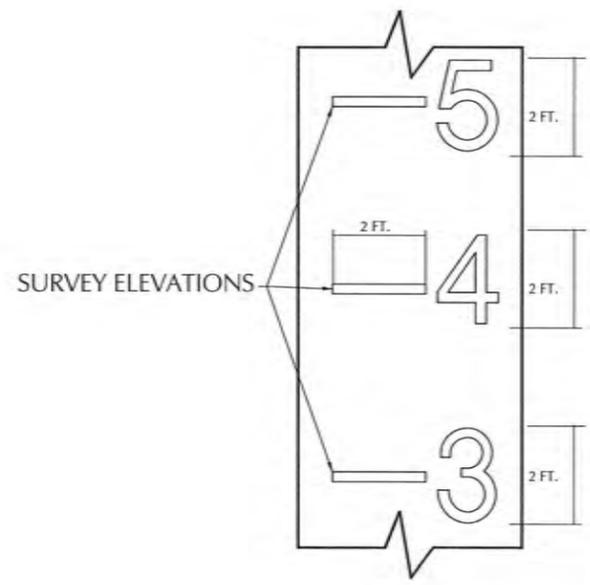
Lagoon Features	Top FB	Bottom	Max Liq. Level
Side slope Ratio	3		3
Maximum Depth (ft)	24.0		21.0
Lagoon Top Width (ft)	780	666	762
Lagoon Top Length (ft)	555	441	537
Maximum Total Vol (ft <sup>3</sup> )	7,484,496		6,180,742
Maximum Total Vol (bbls)	1,333,131		1,100,908



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Elevation ft	Lagoon Lid Depth ft	Remaining Storage ft	Remaining Stor Vol ft <sup>3</sup>	Remaining Storage gal	Remaining Storage bbls	Percent of Total Vol %	Vol in lagoon ft <sup>3</sup>	Vol in Lagoon gal	Vol in Lagoon bbls	Vol in Lagoon ac-ft	Percent Total Vol %
3681.75	24.0	0.0	-	-	-	0%	7,484,496	55,991,516	1,333,131	171.82	100%
3680.75	23.0	1.0	688,451	3,311,447	78,844	6%	7,041,848	52,680,068	1,254,287	161.66	94%
3679.75	22.0	2.0	1,364,324	6,562,397	156,248	12%	6,607,288	49,429,118	1,176,884	151.68	88%
3678.75	21.0	3.0	2,027,731	9,753,388	232,224	17%	6,180,742	46,238,128	1,100,908	141.89	83%
3677.75	20.0	4.0	2,678,785	12,884,957	306,785	23%	5,762,139	43,106,558	1,026,347	132.28	77%
3676.75	19.0	5.0	3,317,597	15,957,643	379,944	29%	5,351,407	40,033,872	953,187	122.85	71%
3675.75	18.0	6.0	3,944,280	18,971,987	451,714	34%	4,948,473	37,019,529	881,417	113.60	66%
3674.75	17.0	7.0	4,558,945	21,928,524	522,108	39%	4,553,267	34,062,992	811,024	104.53	61%
3673.75	16.0	8.0	5,161,704	24,827,795	591,138	44%	4,165,716	31,163,721	741,993	95.63	56%
3672.75	15.0	9.0	5,752,669	27,670,338	658,818	49%	3,785,748	28,321,178	674,314	86.91	51%
3671.75	14.0	10.0	6,331,952	30,456,689	725,159	54%	3,413,291	25,534,827	607,972	78.36	46%
3670.75	13.0	11.0	6,899,665	33,187,390	790,176	59%	3,048,272	22,804,126	542,955	69.98	41%
3669.75	12.0	12.0	7,455,921	35,862,978	853,880	64%	2,690,621	20,128,537	479,251	61.77	36%
3668.75	11.0	13.0	8,000,830	38,483,993	916,286	69%	2,340,265	17,507,523	416,846	53.73	31%
3667.75	10.0	14.0	8,534,505	41,050,971	977,404	73%	1,997,132	14,940,544	355,727	45.85	27%
3666.75	9.0	15.0	9,057,059	43,564,454	1,037,249	78%	1,661,150	12,427,061	295,882	38.13	22%
3665.75	8.0	16.0	9,568,602	46,024,977	1,095,833	82%	1,332,247	9,966,538	237,299	30.58	18%
3664.75	7.0	17.0	10,069,248	48,433,082	1,153,169	87%	1,010,351	7,558,434	179,963	23.19	13%
3663.75	6.0	18.0	10,559,107	50,789,305	1,209,269	91%	695,390	5,202,211	123,862	15.96	9%
3662.75	5.0	19.0	11,038,292	53,094,183	1,264,147	95%	387,292	2,897,332	68,984	8.89	5%
3661.75	4.0	20.0	11,395,162	54,810,730	1,305,017	98%	157,838	1,180,785	28,114	3.62	2%
3660.75	3.0	21.0	11,564,432	55,624,918	1,324,403	99%	49,004	366,598	8,729	1.12	1%
3659.75	2.0	22.0	11,615,746	55,871,739	1,330,280	100%	16,011	119,776	2,852	0.37	0%
3658.75	1.0	23.0	11,630,383	55,942,140	1,331,956	100%	6,600	49,375	1,176	0.15	0%
3657.75	0.0	24.0	11,640,648	55,991,516	1,333,131	100%	-	-	-	-	0%



- NOTE:
- LEVEL MARKS TO BE LOCATED BY SURVEYOR UNLESS SPECIFIED BY OWNER
  - MARKS TO BE MADE BY AN EXTRUSION WELDER USING BLACK FILAMENT (OR WHITE FILAMENT ON BLACK LINER).
  - MARKS SHOULD BEGIN AT THE TOP OF BERM AND CONTINUE TO THE BOTTOM OF THE SUMP. (TOP OF BERM SHOULD READ 24-FT, BOTTOM OF SUMP +1-FT SHOULD READ 1-FT)

4. REFERENCE PIT CAPACITY TABLES FOR ACCURATE ELEVATIONS

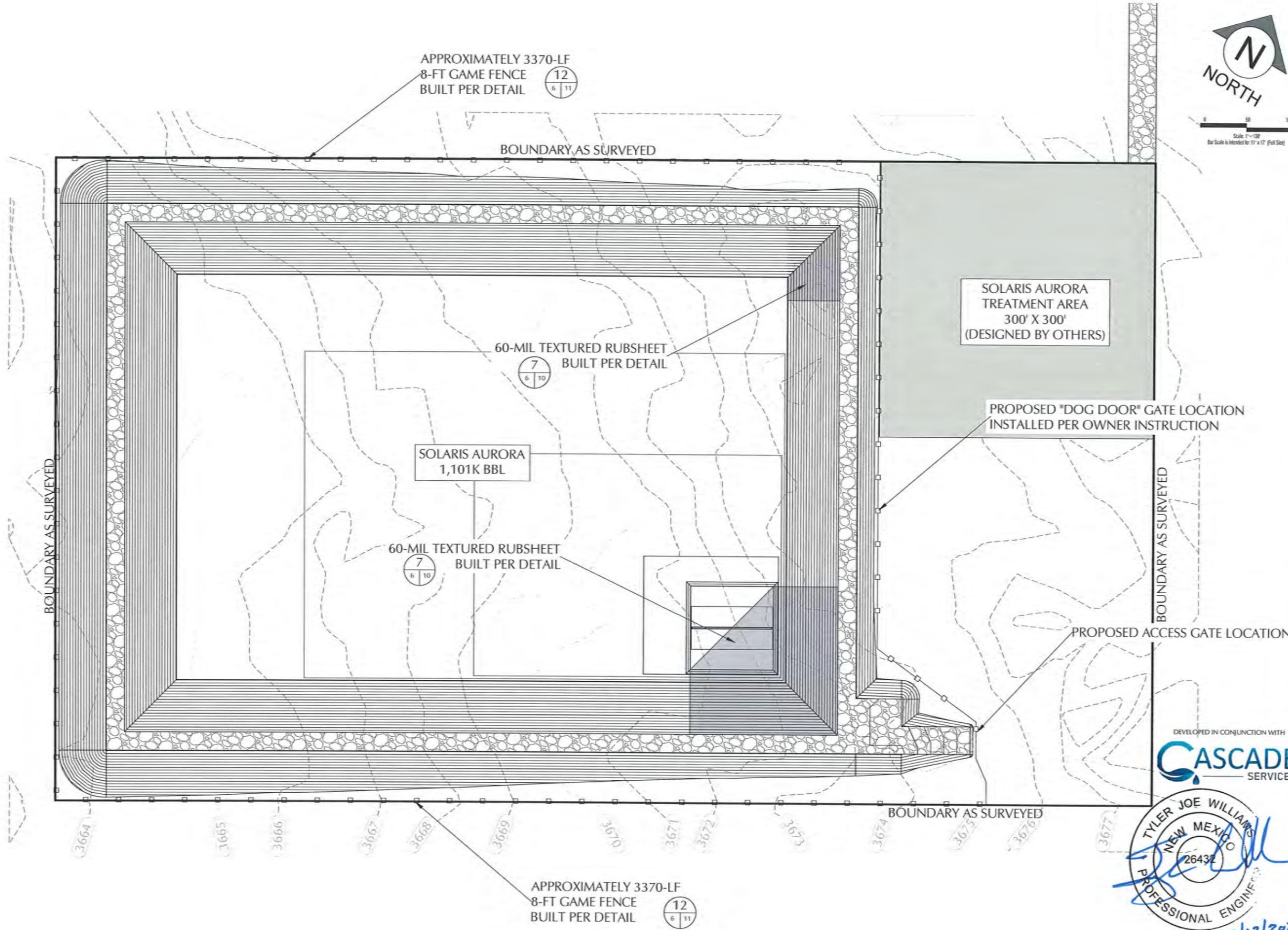


**PIT CAPACITY**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO

DEVELOPED IN CONJUNCTION WITH  
**CASCADE SERVICES**

TYLER JOE WILLIAMS  
 NEW MEXICO  
 26432  
 PROFESSIONAL ENGINEER  
 12/13/2023

DATE: NOVEMBER 2023  
 SCALE: 1" = 50"  
 DESIGNED BY: M. RATKE  
 DRAWN BY: M. RATKE  
 CHECKED BY: D. SCHRANTZ  
 PROJECT NO. 023298-00  
 SHEET NO. 5 OF 11



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NO.	DATE	DESCRIPTION

**SOLARIS WATER MIDSTREAM**

**RUB SHEET & FENCE PLAN**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO

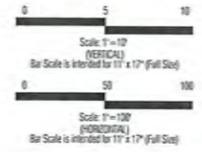
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CHECKED BY:	D. SCHRANTZ
PROJECT NO.:	023298-00
SHEET NO.:	6 OF 11

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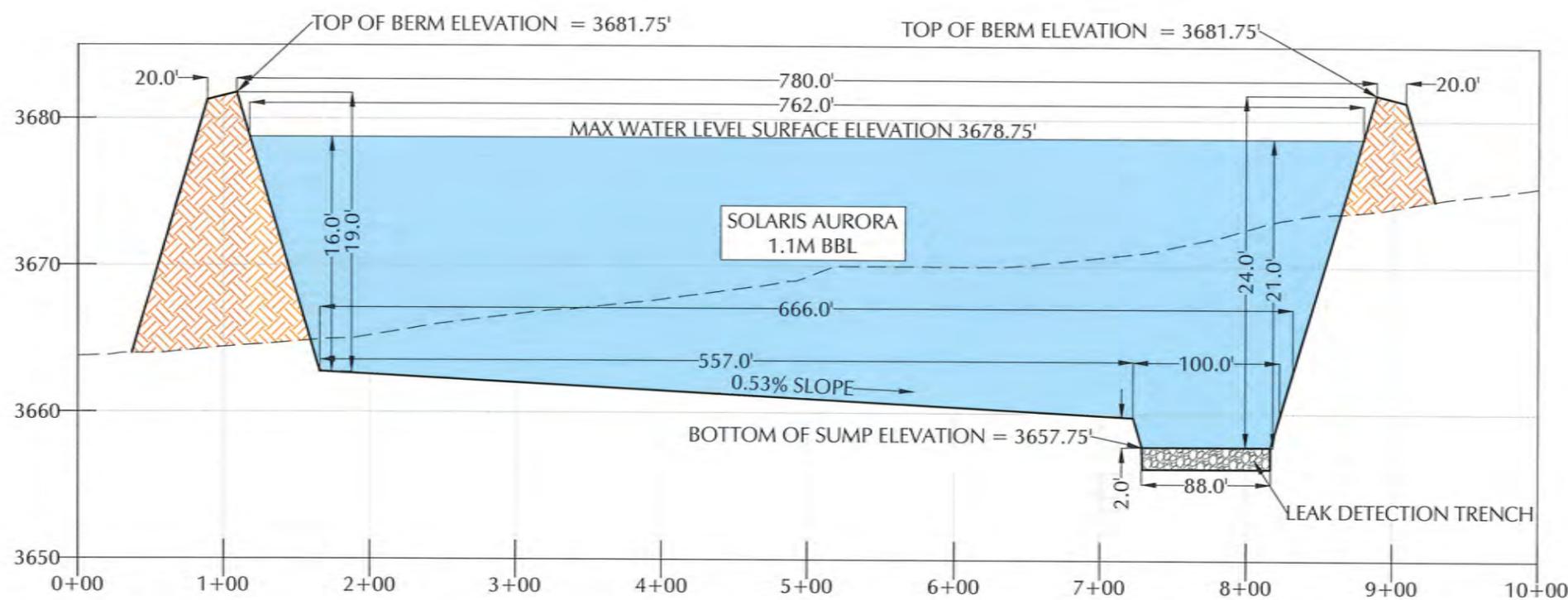


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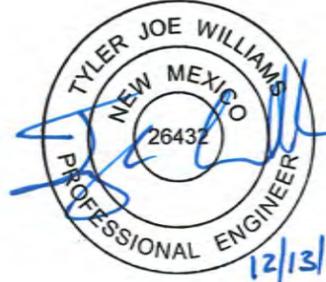
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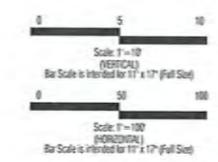


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**CROSS SECTIONS**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO



DATE:	NOVEMBER 2023
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DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.:	023298-00
SHEET NO.:	7 OF 11

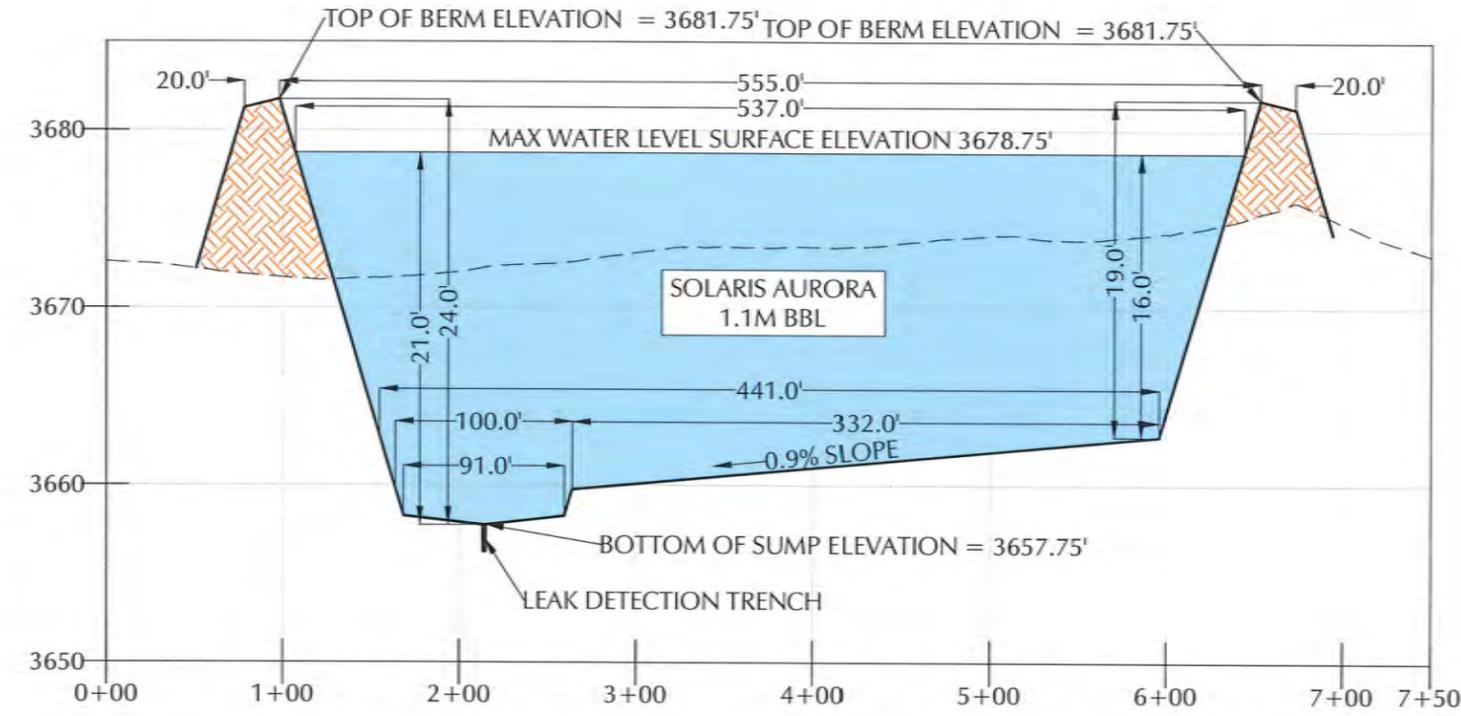


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### CROSS SECTION B-B

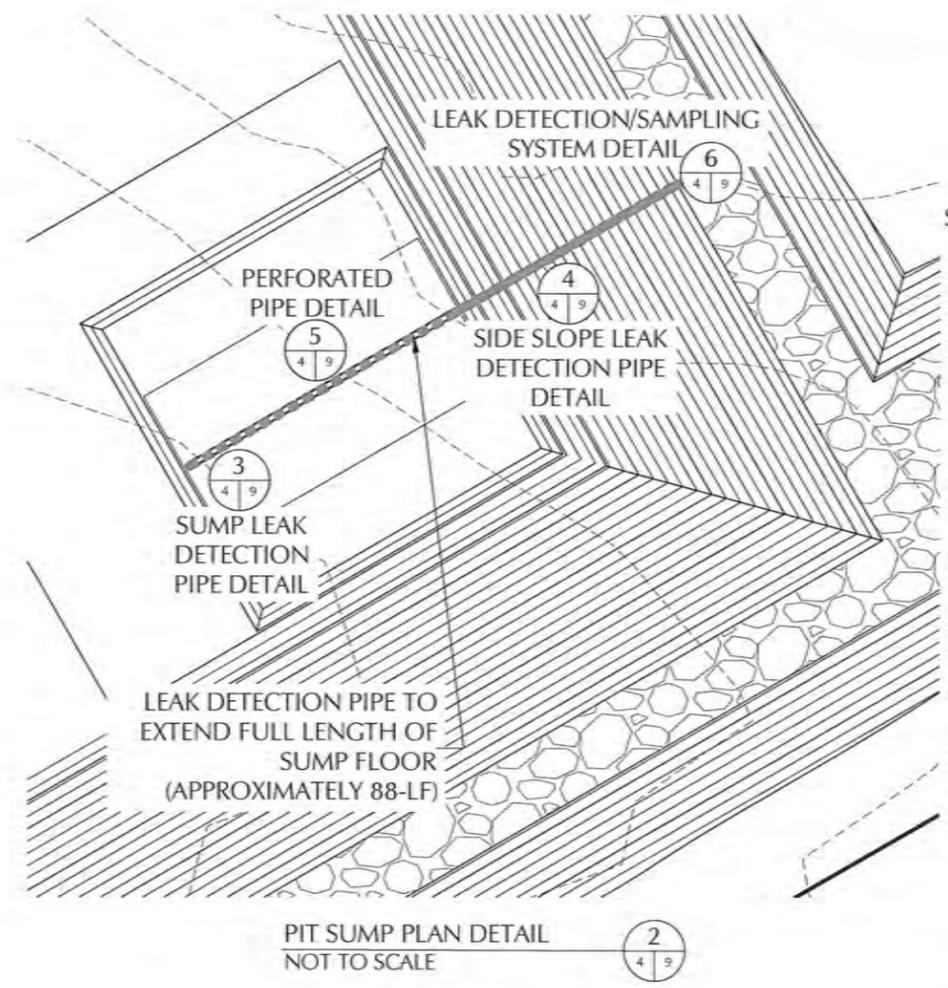


**CROSS SECTIONS**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO

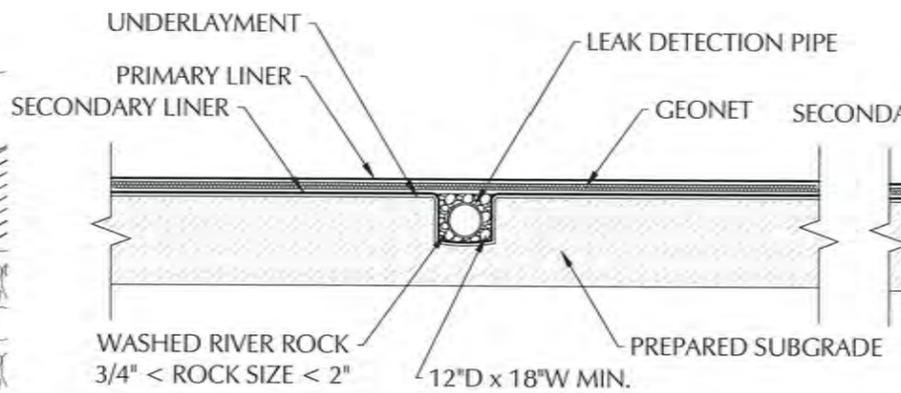
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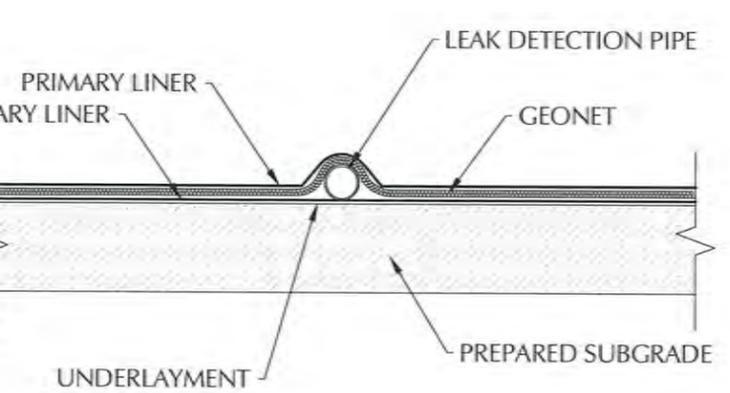
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CHECKED BY:	D. SCHRANTZ
PROJECT NO.:	023298-00
SHEET NO.:	8 OF 11



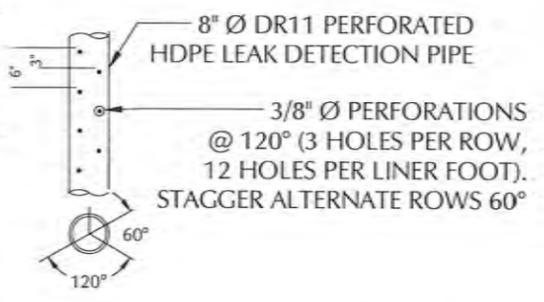
PIT SUMP PLAN DETAIL (2) NOT TO SCALE



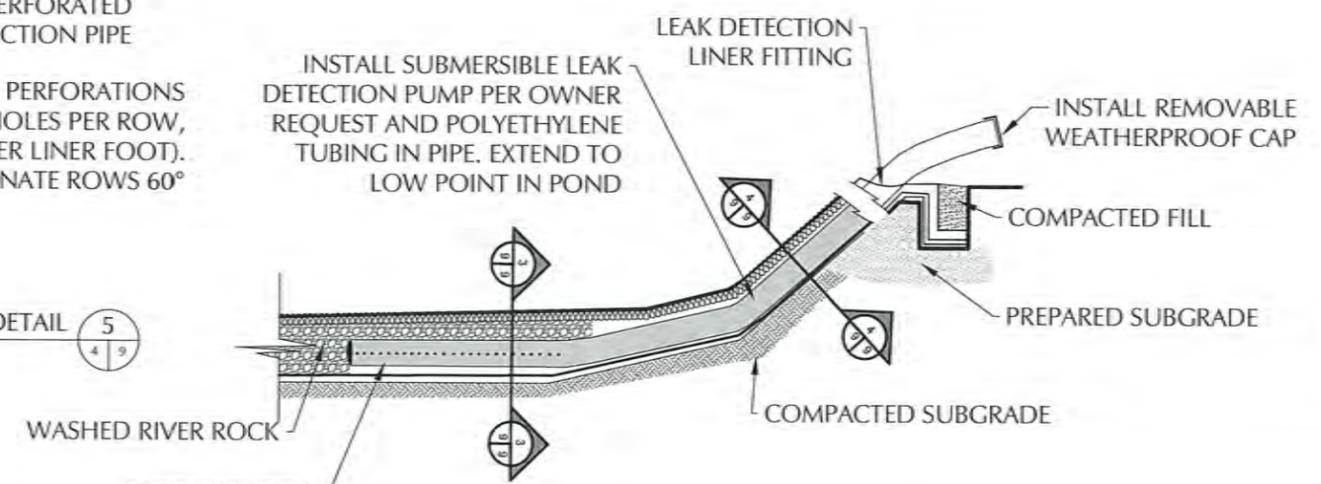
SUMP LEAK DETECTION PIPE DETAIL (3) NOT TO SCALE



SIDE SLOPE LEAK DETECTION PIPE DETAIL (4) NOT TO SCALE



PERFORATED PIPE DETAIL (5) NOT TO SCALE



LEAK DETECTION/SAMPLING SYSTEM DETAIL (6) NOT TO SCALE

- NOTES:
1. LEAK DETECTION SYSTEM TO BE INSTALLED BY OWNER AT TIME OF CONSTRUCTION.
  2. PERFORATED PIPE TO BE ALONG THE BOTTOM OF THE POND. SOLID PIPE ON THE SIDE SLOPE.
  3. CONSTRUCT COMPACTED SUBGRADE TO 95% STANDARD PROCTOR AS PER ASTM D-698.
  4. EXTEND 60 MIL. RUB SHEET 1.0-FT PAST TOP OF SHOULDER OF SUMP.
  5. WASH RIVER ROCK SHALL BE 3/4" MIN. & 2" MAX.

DETAIL	DESCRIPTION
PRIMARY LINER	60-MIL HDPE SMOOTH LINER
LEAK DETECTION	200-MIL GEONET
SECONDARY LINER	40-MIL HDPE SMOOTH LINER
UNDERLAYMENT	8 OZ GEOTEXTILE
SUMP	3657.75-FT ELEVATION
BERM (ROAD CREST)	DESIGN ELEV. 3681.75-FT - BERM CREST 20-FT
LEAK DETECTION PIPING	8-IN DR11.X PERFORATED HDPE PIPE LEAK DETECTION PIPE

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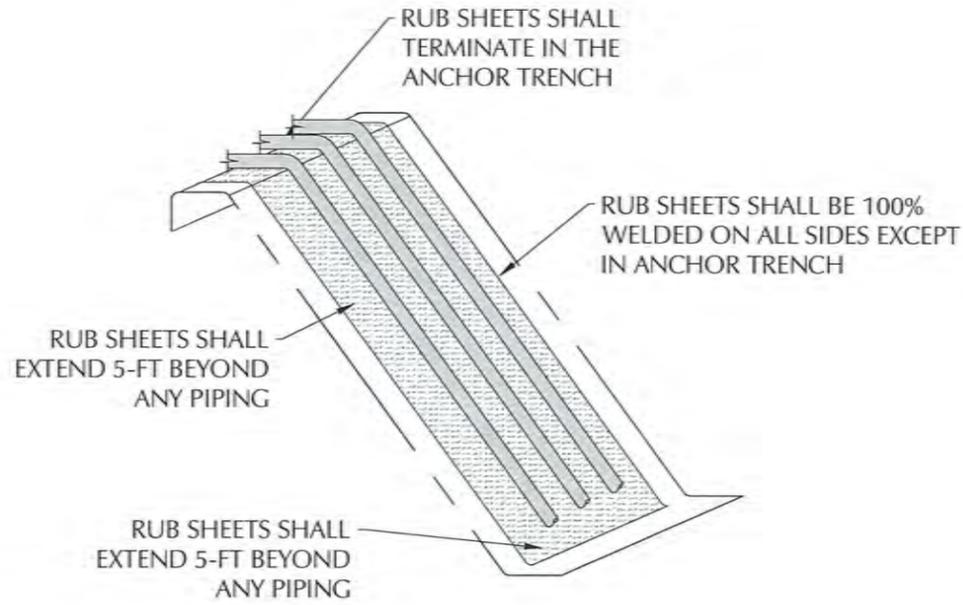
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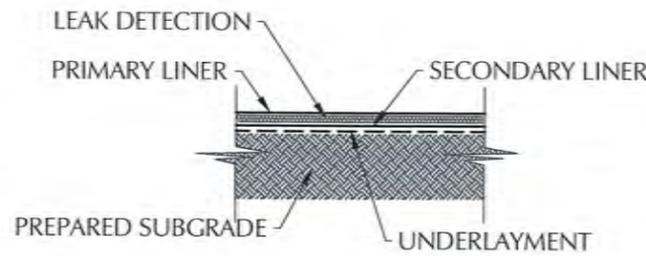
**SOLARIS WATER MIDSTREAM**

**SUMP DETAILS**  
 AURORA RECYCLE  
 SOLARIS WATER MIDSTREAM  
 SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
 LEA COUNTY, NEW MEXICO

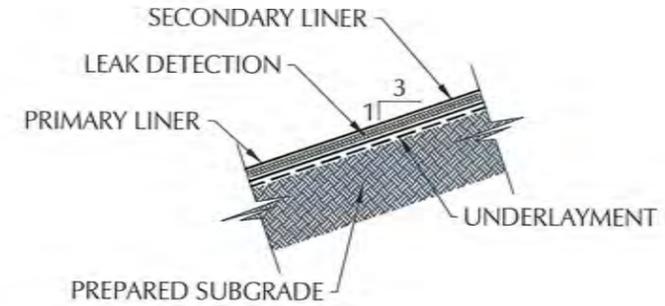
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 SCALE: NOT TO SCALE  
 DESIGNED BY: M. RATKE  
 DRAWN BY: M. RATKE  
 CHECKED BY: D. SCHRANTZ  
 PROJECT NO.: 023298-00  
 SHEET NO.: 9 OF 11



RUB SHEET DETAIL 7  
Not to Scale 6 | 10



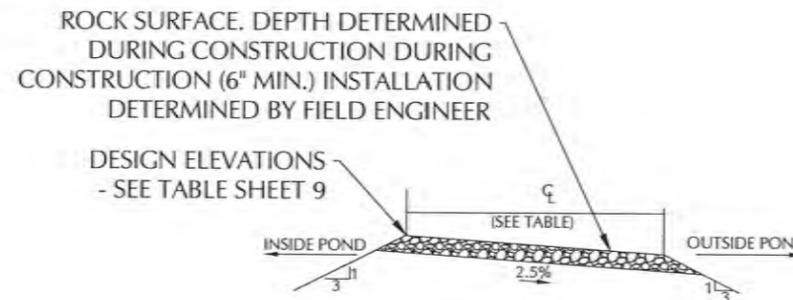
LINER SYSTEM FLOOR DETAIL 8  
NOT TO SCALE 4 | 10



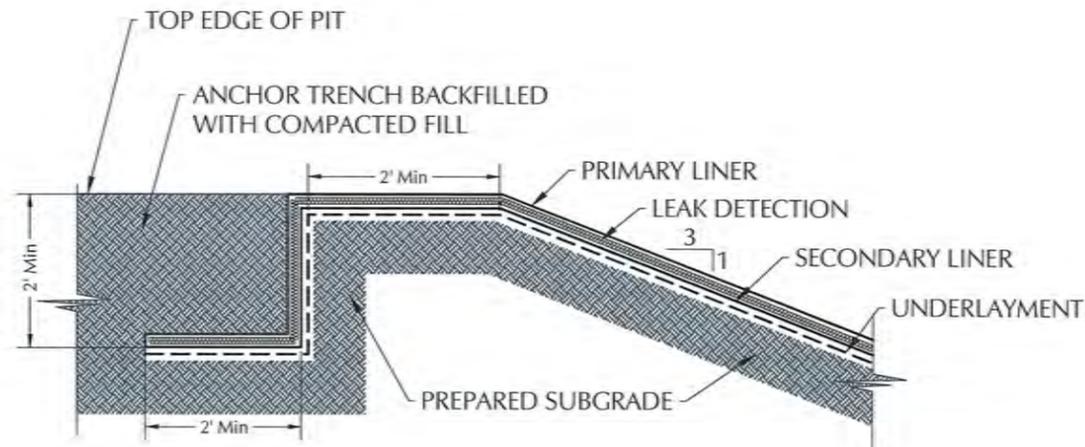
LINER SYSTEM SIDE SLOPE DETAIL 9  
NOT TO SCALE 4 | 10

LINER NOTES:

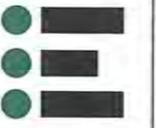
1. SEE REFERENCE TABLES SHEET 9 FOR LINER SPECIFICATIONS
2. PREPARED SUBGRADE MEANS COMPACTED SMOOTH SUBGRADE FREE OF ROCK, ROOTS, WOOD DEBRIS, CONCRETE RUBBLE AND ANY SHARP OBJECTS THAT MIGHT PUNCTURE THE HDPE LINER.
3. ALL INTERIOR SLOPES AND TOP OF BERMS TO BE SMOOTH DRUM ROLLED.
4. ALL EMBANKMENT SLOPES SHALL HAVE A RATIO OF 3:1, COMPACTED EARTH EMBANKMENTS TO BE CONSTRUCTED WITH 8 INCH (MAXIMUM LOOSE LIFTS), COMPACTED TO 95% STANDARD PROCTOR DENSITY (ASTM D698), AND MOISTURE CONDITIONS TO +/- 2% OPTIMUM MOISTURE (ASTM D698)
5. PERFORM GEOTECHNICAL ANALYSIS ON EXISTING SOIL TO CONFIRM SOIL IS SUITABLE FOR USE IN THE LEVEE.
6. ALL BOTTOM OF PITS SHALL SLOPE TO THE SUMP



TYPICAL BERM CREST DETAIL 10  
NOT TO SCALE 4 | 10



ANCHOR TRENCH DETAIL 11  
NOT TO SCALE 5 | 13



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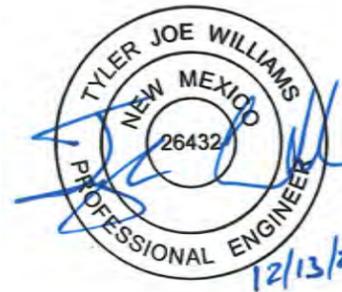
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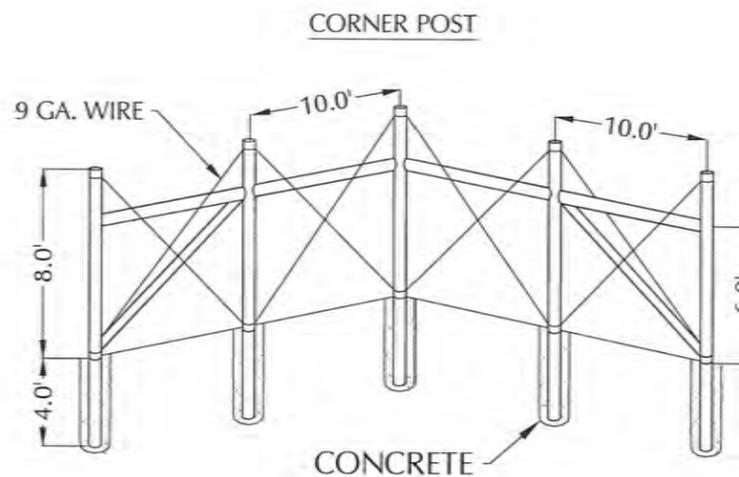
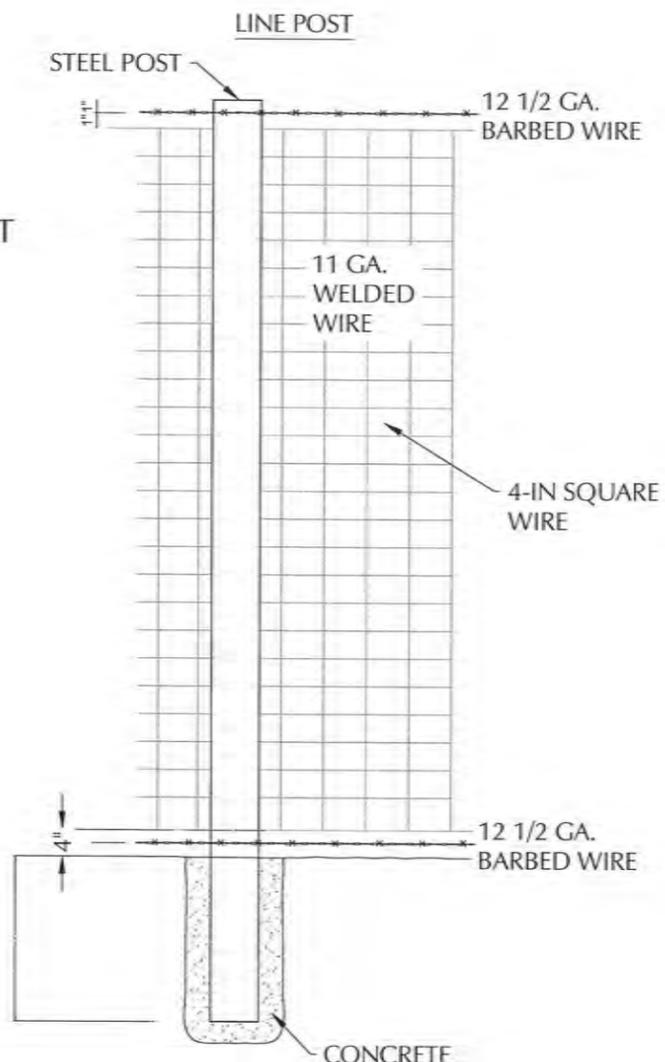
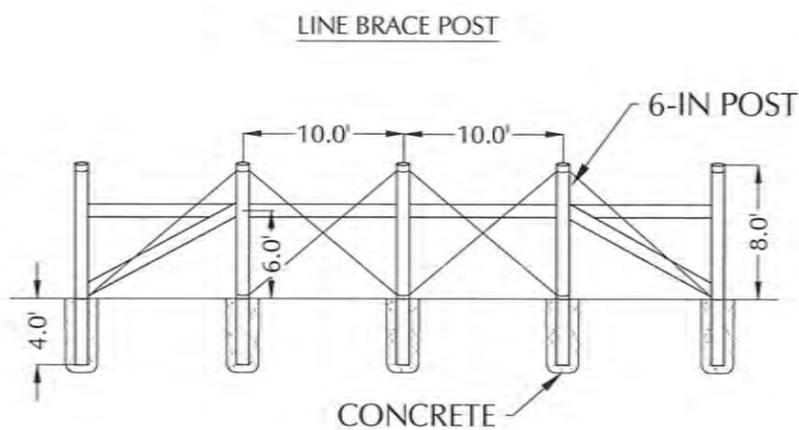
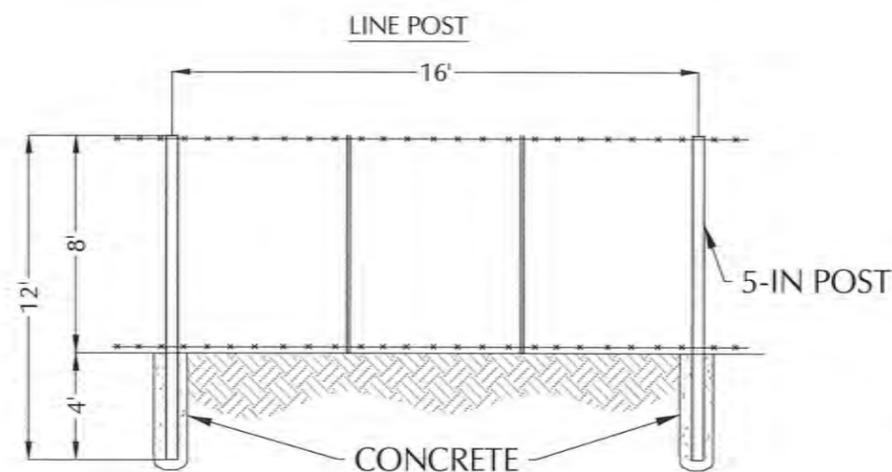
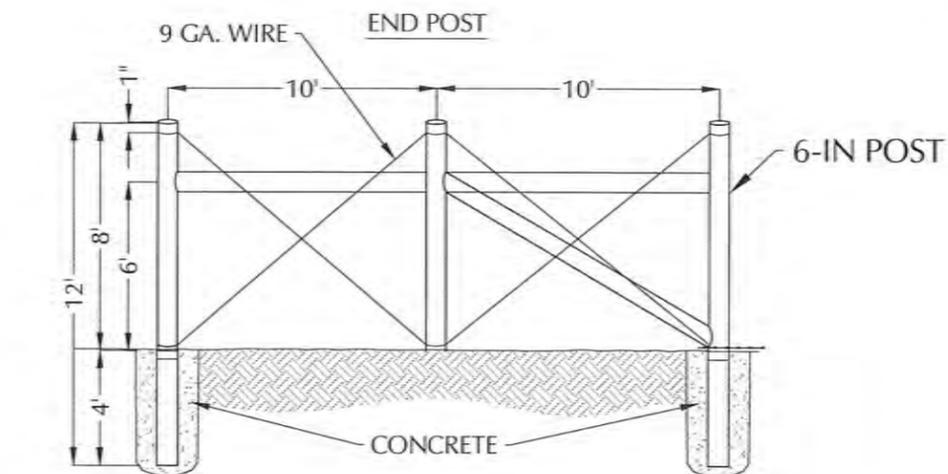


**LINER DETAILS**  
AURORA RECYCLE  
SOLARIS WATER MIDSTREAM  
SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
LEA COUNTY, NEW MEXICO

DEVELOPED IN CONJUNCTION WITH  
**CASCADE SERVICES**



DATE:	NOVEMBER 2023
SCALE:	NOT TO SCALE
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023298-00
SHEET NO.	10 OF 11



8-FT GAME FENCE DETAIL (12/6/11)  
NOT TO SCALE

FENCE NOTES:

1. AT EACH LOCATION WHERE AN ELECTRIC TRANSMISSION, DISTRIBUTION OR SECONDARY LINE CROSSES A BARRIER FENCE, THE CONTRACTOR SHALL FURNISH AND INSTALL A GROUND CONFORMING TO ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE- THE GROUND ROD SHALL BE A MINIMUM DIAMETER OF 1/2-IN. AND 8-FT. IN LENGTH, AND DRIVEN AT LEAST 7 1/2 FT. INTO THE GROUND. THE ROD SHALL BE CONNECTED TO EACH WIRE WITH A MINIMUM AWG NO. 8 STRANDED COPPER WIRE. GROUNDING WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
2. LINE BRACE POSTS SHALL BE SPACED AT 400 FT. INTERVALS, WHERE FENCING IS CONTINUOUS AND WHERE END, CORNER AND LINE BRACE POSTS ARE NOT SPECIFIED.
3. ALL LINE POSTS SHALL BE 5 IN. MIN. DIAMETER AND 12 FT. LONG. ALL END, CORNER AND LINE BRACE POSTS SHALL BE 6 IN. MIN. DIAMETER AND 12 FT. LONG.
4. BARBED WIRE SHALL BE DOUBLE WRAPPED AND TIED OFF AT END POSTS, CORNER POSTS AND LINE BRACE POSTS. WOVEN WIRE SHALL BE SINGLE WRAPPED AND TIED OFF. FENCE TO BE CONTINUED, SHALL BE RESTARTED IN LIKE MANNER.
5. WOVEN WIRE FENCE FABRIC SHALL CONFORM TO AASHTO M 279 (ASTM A 116) DESIGN NO. 1047-6-11 WITH CLASS I COATING.
6. STEEL BARBED WIRE SHALL CONFORM TO AASHTO M 200 (ASTM A 121) 12-1/2 GAGE WITH CLASS 1 COATING.
7. ALL FENCE WIRE TIES, BRACE WIRES, STAPLES AND OTHER WIRE APPURTENANCES SHALL BE GALVANIZED IN CONFORMANCE WITH AASHTO M 232.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RE-ESTABLISHING DISTURBED OR DESTROYED SURVEY MONUMENTS TO THE APPROPRIATE ACCURACY.
9. ALL MISCELLANEOUS HARDWARE SHALL BE FURNISHED GALVANIZED OR ALUMINUM COATED. ALL METAL PIPE POSTS SHALL BE CAPPED.
10. READY MIX CONCRETE MAY BE USED AS A SUBSTITUTE FOR CLASS "A" CONCRETE FOR THE CONCRETE FOOTING IF APPROVED BY THE ENGINEER.

**ENVIROTECH ENGINEERING**  
2309 Fields (Kessell) Street  
East, Chatham  
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P.E. #26432 - Expiration Date: 12-31-2024

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NO.	DATE	DESCRIPTION

**SOLARIS WATER MIDSTREAM**

**FENCE DETAILS**  
AURORA RECYCLE  
SOLARIS WATER MIDSTREAM  
SECTION 23, TOWNSHIP 23 SOUTH, RANGE 32 EAST  
LEA COUNTY, NEW MEXICO

DEVELOPED IN CONJUNCTION WITH  
**CASCADE SERVICES**

**TYLER JOE WILLIAMS**  
NEW MEXICO  
26432  
PROFESSIONAL ENGINEER  
12/13/2023

DATE:	NOVEMBER 2023
SCALE:	NOT TO SCALE
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.:	023298-00
SHEET NO.:	11 OF 11

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

**Technical Memorandum: 40-mil HDPE as Alternative Secondary Liner System for In Ground Recycling Containment Facilities**

NMAC 19.15.34.12 A

I have investigated the suitability of application for 40 mil HDPE geomembrane as an equivalent secondary liner to 30 mil scrim reinforced LLDPE (LLDPEr) in the application for In Ground Recycling Containment facilities. *In summary, it is my professional opinion that the specified 40 mil HDPE geomembrane will provide a secondary liner system that is equal to or better than 30 mil scrim reinforced LLDPEr and will provide the requisite protection of fresh water, public health and the environment for many years when engineering design provides requisite site/soil/slope preparation and when used in concert with requisite primary liners and drainage layers.*

It is understood that the lining system under discussion is composed of a 60 mil HDPE Primary liner, geonet drainage layer and a 40 mil HDPE Secondary liner. *In consideration of the secondary lining system application, size of impoundment and depth, design details as well as the chemical nature of typical processed water, it is my professional opinion that the 40 mil HDPE geomembrane will provide the requisite barrier against processed water loss and will function effectively as a secondary liner.*

The following are discussion points that hopefully will exhibit the equivalency of a 40 mil HDPE secondary liner to that of a 30 mil LLDPEr.

The nature and formulation of the 40 mil HDPE resin is the same as the Primary 60 mil HDPE. The major difference is that the 40 mil HDPE is lower in thickness (more flexible and less puncture resistant). However, in covered conditions, HDPE will resist aging and degradation and remain intact for many decades. In fact, a secondary liner of 40 mil HDPE will outlast an exposed 60 mil HDPE liner. According to the Geosynthetic Research Institute (GRI) study on lifetime prediction (GRI Paper No. 6), the half life of HDPE (GRI GM 13) exposed is > 36 years and the half-life of HDPE covered or buried is greater than 100 years. It is understood that in order to ensure compliance of materials, the primary 60 mil HDPE to be used must meet or exceed GRI GM 13 Standards. Likewise, the secondary liner that is not exposed to the same environmental and chemical conditions must meet or exceed GRI GM 13 for non-reinforced HDPE. Adhering to the minimum requirements of the GRI Specifications, 40 mil HDPE when used as a secondary liner will be equally as protective as the primary 60 mil HDPE liner (reference: [www.geosynthetic-institute.org/grispeccs](http://www.geosynthetic-institute.org/grispeccs)) and equally as protective as a 30 mil scrim reinforced LLDPEr liner.

Durability of Geomembranes is directly affected by exposure conditions. Buried or covered geomembranes are not affected by the same degradation mechanisms (UV, Ozone, Chemical, Stress, Temperature, etc) as are fully exposed geomembranes. In this regard, the secondary liner material and thickness can be much less robust than the fully exposed primary liner which in this case is 60 mil HDPE. This is also the case for

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landfill lining systems where the secondary geomembrane in a bottom landfill cell may be 40 mil HDPE.

Thermal Fusion Seaming Requirements. Thermal seaming and QC seam test requirements for geomembranes are product specific and usually prescribed by the sheet manufacturer. Dual wedge thermal fusion welding is commonly used on HDPE and QC testing by air channel (ASTM D 5820) is fully acceptable and recognized as an industry standard. In this regard, there should be no exception requirement for seaming and QC testing as both the Primary and Secondary geomembranes are HDPE. This is fully covered in comprehensive specifications for both the Primary and Secondary geomembranes (Reference: [www.ASTM.org/Standards](http://www.ASTM.org/Standards)).

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 provides immediate drainage to a low point or sump and thus no hydrostatic head or driving gradient is available to push leakage water through a hole in the secondary liner. In this regard, secondary geomembrane materials can be (and usually are) much less in thickness and also polymer type. Hydraulic Conductivity through the 40 mil HDPE liner material is extremely low due to the polymer type, structure and crystallinity and exceeds requirements of EPA SW-846 Method 9090A.

Chemical Attack. Chemical attack to polymeric geomembranes is directly a function of type of chemical, temperature and exposure time. Again, the HDPE Primary provides the chemically resistant liner and is QC tested to reduce potential defects or holes. If there is a small hole, the geonet drain takes any leakage water immediately to the sump for extraction. Thus, exposure time is very limited on a secondary liner in addition to low temperature, little volume and virtually no head pressure. In this regard, a chemically resistant geomembrane material such as 40 mil HDPE can be specified for the secondary and is a fully acceptable alternate to 30 mil scrim reinforced LLDPEr.

Mechanical Properties Characteristics. Geomembranes of different polymer and/or structure (i.e., reinforced vs non-reinforced) cannot be readily compared using such characteristics as tensile stress/strain, tear, puncture and polymer requirements. For a 40 mil HDPE liner material to function as a Secondary liner it should meet or exceed the manufacturers minimum requirements for Density, Tensile Properties, Tear, Puncture as well as other properties such as UV resistance. The sheet material must also meet or exceed GRI GM 13 minimum requirements. *In this regard, a 40 mil HDPE will be equivalent to a 30 mil LLDPEr as a secondary liner for the conditions listed below:*

- *The subgrade or compacted earth foundation will be smooth, free of debris or loose rocks, dry, unyielding and will support the lining system.*
- *The side slopes for the containment shall be equal to or less than 3H:1V.*
- *The physical properties and condition of the subgrade or liner foundation*

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(i.e., density, slope, moisture) will be inspected and certified by a Professional Engineer that it meets or exceeds specification requirements.

- Immediately prior to installation, the installation contractor shall inspect and sign off on the subgrade conditions that they meet or exceed the HDPE manufacturer and installers requirements.
- A protective geotextile will be placed on the finished and accepted subgrade between subgrade and the 40 mil HDPE Secondary liner.
- A 200 mil geonet will be placed over the 40 mil HDPE Secondary Liner.
- A 60 mil HDPE Primary liner will be placed over the 200 mil geonet drainage layer.

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 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2017  
[www.geosynthetic-institute.org](http://www.geosynthetic-institute.org)

ASTM Geosynthetics Standards 2017  
[www.ASTM.org/Standards](http://www.ASTM.org/Standards)

# EFFECTIVE WIDE-AREA BIRD CONTROL!

## Mega Blaster PRO sonic bird repeller covers 30 acres!



Mega Blaster PRO uses intermittent distress calls to create a "danger zone" that frightens infesting birds away for good. PREDATOR cries help scare all the birds.



- NEMA Rated Case
- Crystal-Clear Digital Sounds
- Laughing Gull
- Ring-Billed Gull
- Herring Gull
- California Gull
- Black-Headed Gull
- Glaucous-Winged Gull
- Double Crested Cormorant
- Marsh Hawk

**Perfect for Landfills, Airfields, Fish Farms, Farm Fields or any multi-acre facility.**

Our most powerful system features two high-output amplifiers that drive our specially-designed 20 speaker tower. The intense sound output covers up to 30 acres (12 hectares).

It features solid-state electronics mounted inside a NEMA-type control box, suitable for most any application.

The generating unit mounts easily to a post or pole using the included hardware. The unit comes pre-recorded in four different configurations for the most common bird infestations.

Choose any or all of the 8 sounds, including predators to give the birds even more of a sense of danger. Customize by choosing volume and silent time between sounds.

### Mega Blaster PRO

Complete system includes the generating unit with two built-in high-output amplifiers, 20-speaker tower with audio cables, 40 watt solar panel, battery clips and all mounting hardware.

- CONFIGURATIONS AVAILABLE:**
- Agricultural # MEGA-AG
  - Crow / Raven # MEGA-CROW
  - Woodpecker # MEGA-WP
  - Marine / Gull # MEGA-MAR



The Bird Control 'X'-Perts

**NOTE:** This unit is capable of sound output up to 125 decibels. **HEARING PROTECTION IS RECOMMENDED.**

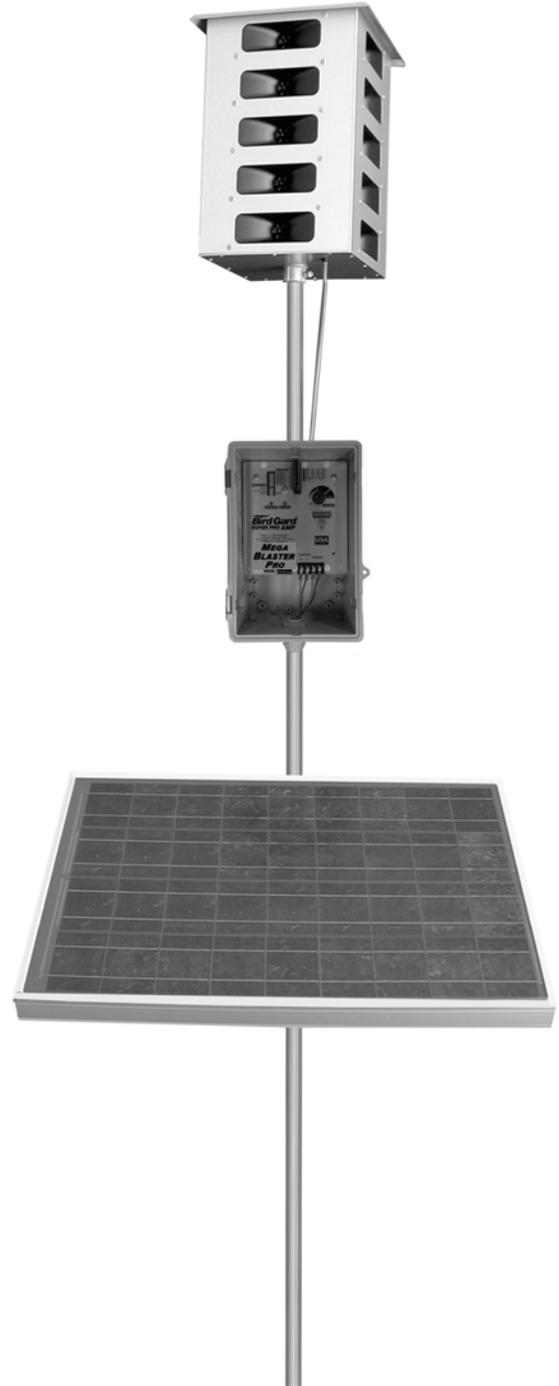


# **MEGA BLASTER PRO**



## User's Manual

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# Overview

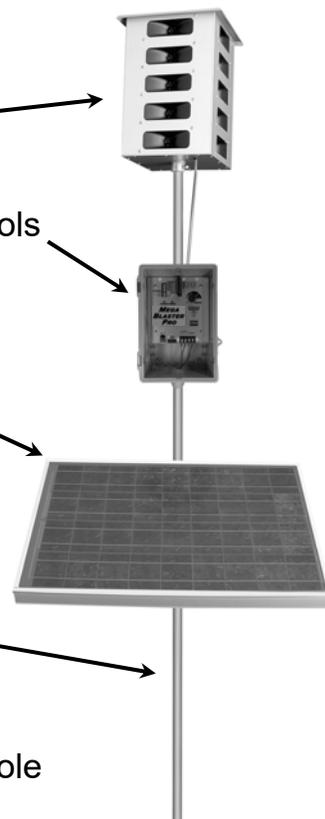
The Bird-X Mega Blaster Pro utilizes the innate power of the natural survival instincts of birds to effectively repel them. Digital recordings of distressed and alarmed birds, along with the sounds made by their natural predators are broadcast through high fidelity weather-resistant speakers over the top of areas. This action triggers a primal fear and flee response. Pest birds soon relocate to where they can feed without feeling threatened.

Your Bird-X Mega Blaster Pro system consists of:

**20-Speaker Tower** broadcasts the bird sounds

**Control Unit** produces the bird sounds and contains all operational controls

**Solar Panel** recharges the 12-volt deep cycle battery



Items needed but not included:

- (1) **Mounting Pole** or **Mast** tall enough to raise the 20-Speaker Tower at least 5 feet above the top of the areas, trees or other obstructions
- (1) **12-volt Deep Cycle Battery** (RV/Marine) Group 27 or larger wet cell
- (1) **T-Post** or similar (Optional) may be needed to support the mounting pole
- (1) **Bailing Wire** or **zip-tie** (Optional) to secure the Mounting Pole to the T-Post

**CAUTION: THE MEGA BLASTER PRO IS CAPABLE OF PRODUCING SOUNDS UP TO 125 DECIBELS. PROPER HEARING PROTECTION MUST BE WORN ANYTIME THE UNIT IS TURNED ON.**



# Bird Control Management Guidelines

**An active bird control management program is a key to successfully repelling pest birds. Bird feeding patterns may take several days or weeks to break. Follow all suggestions for maximum effectiveness. Read all instructions prior to installation.**

## **For best results:**

- **It is extremely important to fully protect your entire area from birds.** Any areas not fully protected will allow birds to begin feeding at the fringes of the sound coverage. They will soon become bolder and learn the sounds are nothing to fear. This will cause the effectiveness to diminish. Complete Bird-X product coverage forces birds to leave the area entirely.
- Install the Mega Blaster Pro unit at least two weeks before birds are attracted to your area. It is much easier to keep birds away before they have found a food source than it is to repel them once they have developed a feeding pattern.
- Most birds begin feeding from the perimeter of an area. Place Mega Blaster Pro units so the sound protection covers past the edges of the area.
- Birds will often use tall trees for roosting and observation. If birds are in bordering trees it is necessary to position the units so the sound protection covers the trees as well.
- Mount the 20-Speaker Tower at least five feet above trees, areas and structures for maximum coverage. The higher the better. Sound will disperse or reflect off structures or foliage. Mount control unit out of direct sun, if possible.
- When first installed, run Mega Blaster Pro units at FULL volume and on SHORT time off periods. This ensures maximum "bird stress" and creates a hostile environment.
- Watch for changes in bird activity and adjust the location of your Mega Blaster Pro unit if needed.
- **Check the battery and unit settings often to insure continuous bird control. Be certain that the system is not turned down or has a dead battery. Field hands or harvesters may turn down the volume.**
- Changing settings and switches often helps to prevent bird habituation. Periodically change the switch settings of the eight sounds (turning them ON or OFF). NEVER turn OFF the distress calls of the target birds you are trying to repel and always keep at least one predator bird sound turned ON.
- If different bird species enter the protected area and begin causing damage contact us immediately for an updated Sound Recording Card designed to repel the new invading birds.
- Remember that the Mega Blaster Pro system is a management tool, and should be used as part of your overall bird control strategy, sometimes in conjunction with other bird control techniques and devices.

**Be aware that under extreme drought or other adverse conditions, birds will disregard all deterrents and risks in order to survive**

# DESIGN/CONSTRUCTION PLAN

## Design and Construction Plan In Ground Containments

This plan addresses construction of the earthen containments.

Magrym Engineers is providing the design of the containment and their plans are presented in this submission.

### *Dike Protection and Structural Integrity*

The design and operation provide for the confinement of produced water, prevention of releases and prevention of overtopping due to wave action or rainfall. Additionally, the design prevents run-on of surface water as the containment is surrounded by an above-grade levee (a berm) and/or diversion ditch (between the levee and the soil stockpile) to prevent run-on of surface water.

### *Stockpile Topsoil*

Where topsoil is present, prior to constructing containment, the operator will strip and stockpile the topsoil for use as the final cover or fill at the time of closure.

### *Signage*

The operator will place an upright sign no less than 12 inches by 24 inches with lettering not less than two inches in height in a conspicuous place on the fence surrounding the containment. The sign is posted in a manner and location such that a person can easily read the legend. The sign will provide the following information:

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

### *Fencing*

The operator will provide for a fence to enclose the recycling containment in a manner that deters unauthorized wildlife and human access. As specified in the design drawings, the operator will employ a chain-link or game fence. If required by the District Office, the operator will add four-strands of barbed wire to comply with the text of the Rule. Because feral pigs, javelina and deer are present in the area, a chain link or game fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. However, 19.15.34.12 D.2 requires "a four-foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level". Therefore, a barbed wire specification will be added to the game fence to avoid a variance if required by the OCD District Office.

19.15.34.12 A Design and Construction Specifications

(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.  
(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 B. 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

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 D. Fencing

(1) The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.  
(2) Recycling containments shall be fenced with a four-foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level.

## Design and Construction Plan In Ground Containments

As stated in the O&M plan, the operator will ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

### *Netting and Protection of Wildlife*

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

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

The avian protection plan includes the use of a Bird-X Mega Blaster Pro<sup>1</sup> as a primary hazing program for avian species. The device will be equipped with sounds suitable for the Permian Basin environment. In addition to this sonic device, staff will routinely inspect the containment for the presence of avian species and, if detected, will use a blank cartridge or shell in a handgun, starter pistol or shotgun as additional hazing. Decoys of birds of prey may be placed on the game fence and other roosts around the open water to provide additional hazing.

The O&M plan calls for the operator to inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

### *Earthwork*

The containment will have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. Geotextile is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.

This volume provides the stamped drawings for the containment with the following design/construction specifications:

- a) levee has inside grade no steeper than two horizontal feet to one vertical foot (2H: 1V).

#### 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.

#### 19.15.34.12 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...

## Design and Construction Plan In Ground Containments

- b) levee outside grade is no steeper than three horizontal feet to one vertical foot (3H: 1V)
- c) top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance.
- d) The containment floor design calls for a slope toward the sump in the corner(s).

### *Liner and Drainage Geotextile Installation*

The containment has a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions.

The primary (upper) liner is a geomembrane liner composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. It is 60-mil HDPE. The secondary liner is specified in the design drawings and is 40-mil HDPE or thicker and is equivalent to 30-mil LLDPEr (in accordance with a previously approved variance) Liner compatibility meets or exceeds a subsequent relevant publication to EPA SW-846 method 9090A.

The recycling containment design has a leak detection system between the upper and lower geomembrane liners of 200-mil geonet to facilitate drainage. The leak detection system consists of a properly designed drainage and collection and removal system placed above the lower geomembrane liner in depressions and sloped to facilitate the earliest possible leak detection. The containment floor design calls for a slope toward the sump in the corner(s) of the containment, as shown in the design drawings. This slope combined with the highly transmissive geonet drainage layer provide for rapid leak detection.

The liners and drainage material will be installed consistent with the Manufacturer's specifications. In addition to any specifications of the Manufacturer, protocols for liner installation include measures to:

- i. minimizing liner seams and orient them up and down, not across, a slope of the levee.
- ii. use factory-welded seams where possible.
- iii. use field seams in geosynthetic material that are thermally seamed and prior to field seaming, overlap liners four to six inches.
- iv. minimize the number of field seams and comers and irregularly shaped areas.
- v. provide for no horizontal seams within five feet of the

19.15.34.12 A

(2) ...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

(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.

19.15.34.12 A

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

19.15.34.12 A

(7) The operator of a recycling containment shall place a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet or two feet of compacted soil with a saturated hydraulic conductivity of 1 x 10-5 cm/sec or greater to facilitate drainage. The leak detection system shall consist of a properly designed drainage and collection and removal system placed above the lower geomembrane liner in depressions and sloped to facilitate the earliest possible leak detection.

19.15.34.12 A

(5) The operator of a recycling containment shall minimize liner seams and orient them up and down, not across, a slope of the levee. Factory welded seams shall be used where possible. The operator shall ensure field seams in geosynthetic material are thermally seamed. Prior to field seaming, the operator shall overlap liners four to six inches...

## Design and Construction Plan In Ground Containments

- slope's toe.
- vi. use qualified personnel to perform field welding and testing.
  - vii. avoid excessive stress-strain on the liner
  - viii. The edges of all liners are anchored in the bottom of a compacted earth-filled trench that is at least 18 inches deep

At points of discharge into the lined earthen containment the pipe configuration effectively protects the liner from excessive hydrostatic force or mechanical damage during filling.

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

Pumping from the containment to hydraulic fracturing operations is the responsibility of stimulation contractors. Typically, lines are permanently placed in the containment with floats attached to prevent damage to the liner system. The containment may be equipped with permanent HDPE stinger (supported by a sacrificial liner or geotextile) for withdrawal of fluid if the owner deems necessary during operations.

### *Leak Detection and Fluid Removal System Installation*

The leak detection system, contains the following design elements

- a. The 200-mil HyperNet Geonet drainage material between the primary and secondary liner that is sufficiently permeable to allow the transport of fluids to the observation ports (Appendix A).
- b. The containment floor is sloped towards the monitoring riser pipe to facilitate the earliest possible leak detection of the containment bottom. A pump may be placed in the observation port to provide for fluid removal.
- c. Piping will withstand chemical attack from any seepage, structural loading from stresses and disturbances from overlying water, cover materials, equipment operation or expansion or contraction (see Appendix A).

19.15.34.12 A

(5) ...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.

19.15.34.12 A

(3) 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

(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.

# OPERATIONS AND MAINTENANCE PLAN

## CLOSURE PLAN

## Operation and Maintenance Plan In Ground Containments

### Overview

The operator will operate and maintain the lined earthen containment to contain liquids and solids (blow sand and minimal precipitates from the produced water) and maintain the integrity of the liner system in a manner that prevents contamination of fresh water and protects public health and the environment as described below. The purpose of the lined earthen containment is to facilitate recycling, reuse and reclamation of produced water derived from oil and gas wells. During periods when water for E&P operations is not needed, produced water will discharge to injection wells or to a pipeline for transfer to another recycling facility. The containment will not be used for the disposal of produced water or other oilfield waste.

The operation of the containment is summarized below.

- A. Produced water generated from nearby oil and gas wells is delivered to a treatment system located as indicated in the C-147.
- B. Unless specified in the transmittal letter, after treatment, the produced water discharges into the containment.
- C. When required, produced water is removed from the containment for E&P operations. At this time, produced water will be used for drilling beneath the freshwater zones (beneath surface casing), for well stimulation (e.g. hydraulic fracturing) and other E&P uses as approved by OCD.
- D. Whenever the maximum fluid capacity of the containment is reached, treatment and discharge to the containment ceases (see Freeboard and Overtopping Plan, below).
- E. The operator will keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148 (see attached example).
- F. The operator will maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.

19.15.34.10 D

Recycling containments may not be used for the disposal of produced water or other oilfield wastes.

19.15.34.9 E

The operator of a recycling facility shall keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.

19.15.34.9 F

The operator of a recycling facility shall maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.

## Operation and Maintenance Plan In Ground Containments

- G. The containment shall be deemed to have ceased operations if less than 20% of the total fluid capacity is used every six months following the first withdrawal of produced water for use. The operator will report cessation of operations to the appropriate division district office. The appropriate division district office may grant an extension to this determination of cessation of operations not to exceed six months.

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.

The operation of the lined earthen containment will follow the mandates listed below:

1. The operator will not discharge into or store any hazardous waste (as defined by 40 CFR 261 and NMAC 19.15.2.7.H.3) in the containments.
2. If the containment's primary liner is compromised above the fluid's surface, the operator will repair the damage or initiate replacement of the primary liner within 48 hours of discovery or seek an extension of time from the division district office.
3. If the primary liner is compromised below the fluid's surface, the operator will remove all fluid above the damage or leak within 48 hours of discovery, notify the division district office and repair the damage or replace the primary liner.
4. If any penetration of the containment liner is confirmed by sampling of fluid in the leak detection system (see Monitoring, Inspection, and Reporting Plan; below), the operator will:
  - a. Begin and maintain fluid removal from the leak detection/pump-back system,
  - b. Notify the district office within 48 hours (phone or email) of the discovery,
  - c. Identify the location of the leak, and
  - d. Repair the damage or, if necessary, replace the containment liner.
5. The operator will install, or maintain on site, an oil absorbent boom or other device to contain an unanticipated release and the operator will remove any visible layer of oil from the surface of the recycling containment.
6. The operator will report releases of fluid in a manner consistent with NMAC 19.15.29
7. The containment will be operated to prevent the collection of surface water run-on.

19.15.34.13 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.

19.15.34.13 B

(7) The operator shall install, or maintain on site, an oil absorbent boom or other device to contain an unanticipated release.

(1) The operator shall remove any visible layer of oil from the surface of the recycling containment.

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.

## Operation and Maintenance Plan In Ground Containments

8. The operator will maintain the containment free of miscellaneous solid waste or debris.
9. The operator will maintain at least three feet of freeboard for the containment and will use a free-standing staff gauge to allow easy determination of the required 3-foot of freeboard.
10. As described in the design/construction plan, the injection or withdrawal of fluids from the containment is accomplished through hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.
11. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
12. The operator will maintain the fences in good repair.

### *Monitoring, Inspection, and Reporting Plan*

The operator will inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request.

Weekly inspections consist of:

- reading and recording the fluid height of staff gauges,
- recording any evidence that the pond surface shows visible oil,
- visually inspecting the containment's exposed liners
- checking the leak detection system for any evidence of a loss of integrity of the primary liner.
- inspect 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.

As stated above, if a liner's integrity is compromised, or if any penetration of the liner occurs, then the operator will take appropriate action within 48 hours, based on if above or below water surface, as noted above.

19.15.34.13

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

19.15.34.13 B

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

19.15.34.13 B

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

19.15.34.12 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.

19.15.34.13 A

The operator shall inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request.

## Operation and Maintenance Plan In Ground Containments

Monthly, the operator will:

- A. Inspect the containment for dead migratory birds and other wildlife. Within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.
- B. 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.
- C. Record sources and disposition of all recycled water.

The operator will maintain a log of all inspections and make the log available for the appropriate Division district office's review upon request. An example of the log is attached to this section of the permit application.

### *Freeboard and Overtopping Prevention Plan*

The method of operation of the containment allows for maintaining freeboard with very few potential problems. When the capacity of the containment is reached (3-feet of freeboard), the discharge of produced water ceases and the produced water generated by nearby oil and gas wells is managed by an injection well(s).

If rising water levels suggest that 3-feet of freeboard will not be maintained, the operator will implement one or more of the following options:

- I. Cease discharging produced water to the containment.
- II. Accelerate re-use of the produced water for purposes approved by the Division.
- III. Transfer produced water from the containment to injection wells.

The reading of the staff gauge typically occurs daily when treatment operations are ongoing and weekly when discharge to the containment is not occurring.

19.15.34.12 E  
The operator shall on a monthly basis inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

19.15.34.9 E  
The operator of a recycling facility shall keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.

19.15.34.9 F  
The operator of a recycling facility shall maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.

## Operation and Maintenance Plan In Ground Containments

### *Protocol for Leak Detection Monitoring, Fluid Removal and Reporting*

As shown in Appendix A, the leak detection system includes a monitoring system. Any fluid released from the primary liner will flow to the collection sump, where fluid level monitoring is possible at the monitoring riser pipe associated with the leak detection system.

Staff may employ a portable electronic water level meter to determine if fluid exists in the monitoring riser pipe. Obtaining accurate readings of water levels in a sloped pipe beneath a containment can be a challenge. An electrician's wire snake may be required to push the probe to the bottom of the port and the probe may be fixed in a 2-inch pipe "dry housing" to avoid false readings due to water condensation on the pipe. There are many techniques to determine the existence of water in the sumps – including low flow pumps and a simple small bailer affixed to an electrician's snake. The operator will use the method that works best for this containment.

If seepage from the containment into the leak detection system is suspected by a positive fluid level measurement, the operator will:

1. Re-measure fluid levels in the monitoring riser pipe on a daily basis for one week to determine the rate of seepage.
2. Collect a water sample from the monitoring riser pipe to confirm the seepage is produced water from the containment via electrical conductivity and chloride measurements.
3. Notify NMOCD of a confirmed positive detection in the system within 48 hours of sampling (initial notification).
4. Install a pump into the monitoring riser pipe sump to continually (manually on a daily basis or via automatic timers) remove fluids from the leak detection system into the containment until the liner is repaired or replaced.
5. Dispatch a liner professional to inspect the portion of the containment suspected of leakage during a "low water" monitoring event.
6. Provide NMOCD a second report describing the inspection and/or repair within 20 days of the initial notification.

## Operation and Maintenance Plan In Ground Containments

If the point of release is obvious from a low water inspection, the liner professional will repair the loss of integrity. If the point of release cannot be determined by the inspection, the liner professional will develop a more robust plan to identify the point(s) of release. The inspection plan and schedule will be submitted to OCD with the second report. The operator will implement the plan upon OCD approval.

## Closure Plan In Ground Containments

### Overview

After operations cease, the operator will remove all fluids within 60 days and close the containment within six months from the date the operator ceases operations from the containment for use.

The operator shall substantially restore the impacted surface area to

- a. the condition that existed prior to the construction of the recycling containment or
- b. to a condition imposed by federal, state trust land or tribal agencies on lands managed by those agencies as these provisions govern the obligations of any operator subject to those provisions,

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

### *Excavation and Removal Closure Plan – Protocols and Procedures*

The containment is expected to hold a small volume of solids, the majority of which will be windblown sand and dust with some mineral precipitates from the water

1. The operator will remove all liquids from the containment and either:
  - a. Dispose of the liquids in a division-approved facility, or
  - b. Recycle, reuse or reclaim the water for reuse in drilling and stimulation.
2. The operator will close the recycling containment by first removing all fluids, contents and synthetic liners and transferring these materials to a division approved facility.
3. After the removal of the containment contents and liners, soils beneath the containment will be tested by collection of a five-point (minimum) composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I of 19.15.34.14.
4. After review of the laboratory results:
  - a. If any contaminant concentration is higher than the parameters listed in Table I, additional delineation may be required, and the operator must receive approval before proceeding with closure.

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.

19.15.34.14 E

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 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.

19.15.34.14 C

(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.

## Closure Plan In Ground Containments

- b. If all contaminant concentrations are less than or equal to the parameters listed in Table I, then the operator will proceed to
- i. backfill with non-waste containing, uncontaminated, earthen material - Or
  - ii. undertake an alternative closure process pursuant to a variance request after approval by OCD.

19.15.34.14 C

(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.

### Reclamation and Re-vegetation

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

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.

### Closure Documentation

Within 60 days of closure completion, the operator shall submit a closure report on form C-147, including required attachments, to document all closure activities including sampling results and the details on any backfilling, capping or covering, where applicable. The closure report shall certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in division rules or directives.

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.

The operator shall notify the division when reclamation and re-vegetation are complete. Specifically the notice will document that all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds.

19.15.34.14 H

The operator shall notify the division when reclamation and re-vegetation are complete.

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.

July 2024

## **C-147 Permit Package Aurora AST Containment Section 23, T23S, R32E, Lea County**

### **Volume 3:**

- *C-147 Form*
- *Design/Construction, Operations and Maintenance, & Closure Plans*
- *Engineering Drawings & Liner Specifications*
- *Mustang/Extreme AST Setup SOP*
- *Variances for AST Storage Containments*
- *Applicability of Engineering Variances to Permian Basin Conditions*



*Looking south towards the AST location from the northern portion of the Aurora site.*

**Prepared for:  
Solaris Water Midstream, LLC  
Houston, Texas**

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

C-147

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

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: Solaris Water Midstream LLC (For multiple operators attach page with information) OGRID #: 371643
Address: 9811 Katy Freeway, Suite 900, Houston, TX, 77024
Facility or well name (include API# if associated with a well): Aurora RF and AST Containment
OCD Permit Number: 1RF-529 (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr N Section 23 Township 23S Range 32E County: Lea
Surface Owner: [X] Federal [ ] State [ ] Private [ ] Tribal Trust or Indian Allotment

2. [X] Recycling Facility: Aurora Reuse Facility
Location of recycling facility (if applicable): Latitude 32.285553 Longitude -103.648241 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
[ ] 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 32.286073 N Longitude -103.647484 W (approx.) NAD83
[ ] For multiple or additional recycling containments, attach design and location information of each containment
[ ] Lined [ ] Liner type: Thickness 40 Primary mil [X] LLDPE [ ] HDPE [ ] PVC [ ] Other Second.: 30 mil LLDPE
[ ] String-Reinforced
Liner Seams: [X] Welded [ ] Factory [ ] Other Volume: 40,000 bbl Dimensions: L x W x D
[ ] Recycling Containment Closure Completion Date: See Attachment Drawings and Plans

4.

**Bonding:**

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

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

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

5.

**Fencing:**

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

Alternate. Please specify See Variance

6.

**Signs:**

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

Signed in compliance with 19.15.16.8 NMAC

7.

**Variances:**

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

**Check the below box only if a variance is requested:**

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

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

8.

**Siting Criteria for Recycling Containment**

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

<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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within a 100-year floodplain. FEMA map	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site	<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	<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. - 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. - 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.

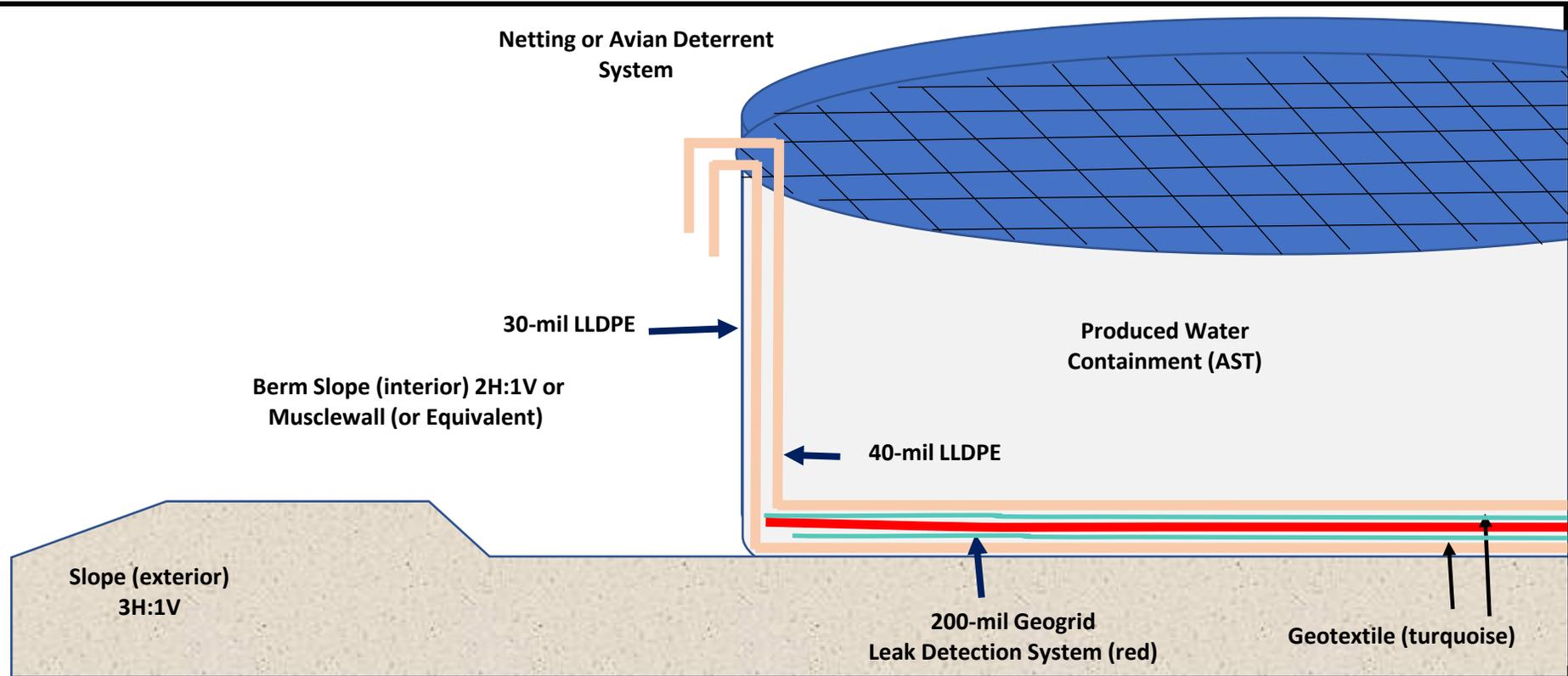
**Operator Application Certification:**

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): Drew Dixon Title: SVP- Land and Regulatory  
 Signature: *Drew Dixon* Date: 08/08/2024  
 e-mail address drew.dixon@ariswater.com Telephone: 832-304-9028

11.

OCD Representative Signature: *Victoria Venegas* Approval Date: 08/23/2024  
 Title: Environmental Specialist OCD Permit Number: 1RF-529  
 OCD Conditions \_\_\_\_\_  
 Additional OCD Conditions on Attachment \_\_\_\_\_



**Description of Leak Detection System**

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

R.T. Hicks Consultants Albuquerque, NM	Design Sketch	Plate 1
	Solaris Water Midstream - Keg Shell AST	July 2023

Determine slope of pad and low point of AST

200 mil geogrid placed

above 8-oz geotextile and 30-mil secondary liner

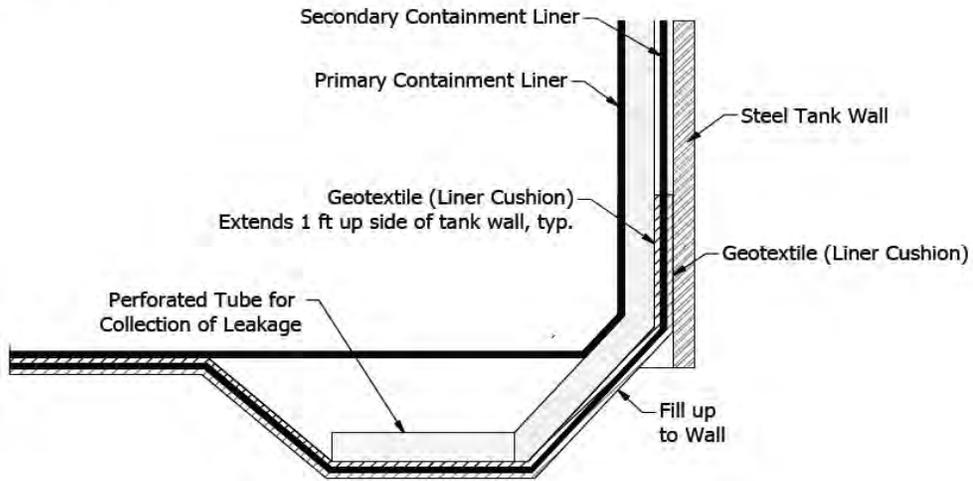
inside of AST after set up, before installation of primary liner

below two 40-mil primary liner system

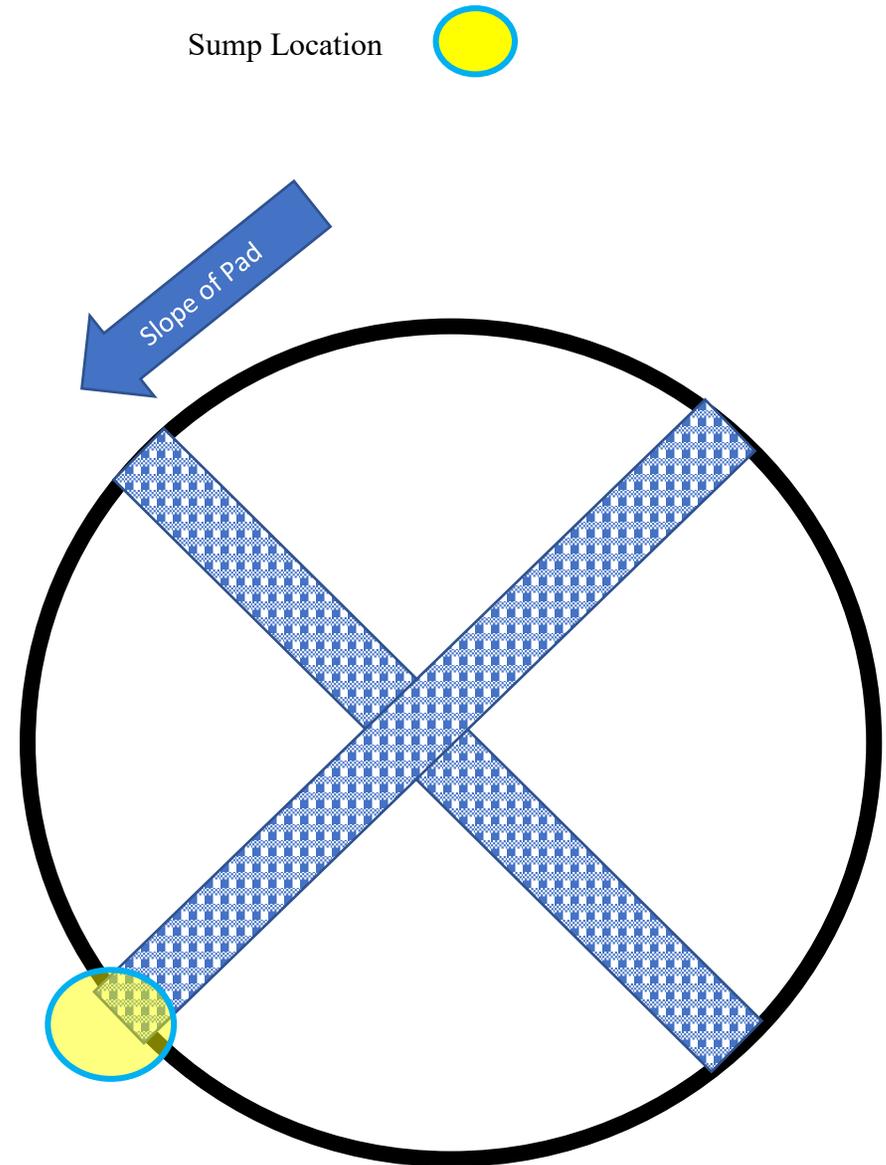
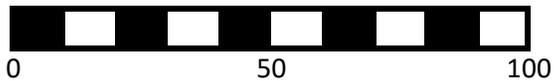
geotextile is placed around the 200-mil geogrid drainage system

Sump at lowest point of the AST set up

Leak detection riser pipe/hose installed per SOP



SECTION B  
SUMP DETAIL



R.T. Hicks Consultants  
Albuquerque, NM

Layout of Geogrid Drainage Mat

Plate 2

Solaris Water Midstream - Keg Shell AST

July 2023

DESIGN/CONSTRUCTION PLAN

OPERATIONS & MAINTENANCE PLAN

CLOSURE PLAN

## Design and Construction Plan Above Ground Tank (AST) Containments

### General

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

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

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 may be roller compacted smooth and free of loose aggregate over ½ inch. If required by the AST Set Up protocol, 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 12-foot high steel walls of the AST effectively prevent run-on of surface water into the AST. The steel walls provide an excellent diversion of run-on into the AST, thereby complying with the Rule.

### **AST Containment Setup**

As with the secondary liner, AST Containment contractor will minimize liner seams and orient them up and down, as much as possible, not across, a slope. Factory welded seams shall be used where possible. AST Containment contractor will employ field seams in geosynthetic material that are thermally seamed. Prior to field seaming, AST Containment contractor shall

19.15.34.12 A

(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 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.

## Design and Construction Plan Above Ground Tank (AST) Containments

overlap liners four to six inches and minimize the number of field seams and corners and irregularly shaped areas. There shall be no horizontal seams within five feet of the AST Containment bottom. Qualified personnel shall perform field welding and testing.

### *Fluid Injection/Withdrawal Flow Diverter*

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

19.15.34.13 B

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

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

### General Specifications

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

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

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

19.15.34.10 B

Recycling containments may hold produced water for use in connection with drilling, completion, producing or processing oil or gas or both.

19.15.34.8 A

(6) All releases from the recycling and re-use of produced water shall be handled in accordance with 19.15.29 NMAC.

19.15.34.10 B

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

19.15.34.8 A

(5) All operations in which produced water is used shall be conducted in a manner consistent with hydrogen sulfide gas provisions in 19.15.11 NMAC or NORM provisions in 19.15.35 NMAC, as applicable.

19.15.29.6

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

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

- The operator will not discharge into or store any hazardous waste in the recycling containments, but they may hold fluids such as freshwater, brackish water, recycled and treated water, water generated by oil or gas processing facilities, or other waters that are gathered for well drilling or completion. The recycling facility will not be used for the disposal of produced water. The operator will maintain the containments free of miscellaneous solid waste or debris.
  - The operator will verify that no oil is on the surface of the contained fluid. If oil is observed, the oil shall be removed using an absorbent boom or other device and properly disposed at an approved facility. An absorbent boom or other device will be maintained on site.
  - The operator will install and use a header and diverter described in the design/construction plan in order to prevent damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes during injection or withdrawal of liquids.
  - The operator shall maintain at least three feet of freeboard at each containment.
  - If the liner develops a leak or if any penetration of the liner occurs above the liquid's surface, then the operator will repair the damage or initiate replacement of the liner within 48 hours of discovery or will seek a variance from the division district office within this time period.
  - If visible inspection suggests that the liner developed a leak or if any penetration of the liner occurs below the liquid's surface, then the operator will remove all liquid above the damage or leak line within 48 hours of discovery. The operator will also notify the district division office within this same 48 hours of the discovery and repair the damage or replace the liner.
- 19.15.34.9 G  
Recycling facilities may not be used for the disposal of produced water.

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

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

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

19.5.34.13 B  
(4) If the containment's primary liner is compromised above the fluid's surface, the operator shall repair the damage or initiate replacement of the primary liner within 48 hours of discovery or seek an extension of time from the division district office.

(5) If the primary liner is compromised below the fluid's surface, the operator shall remove all fluid above the damage or leak within 48 hours of discovery, notify the division district office and repair the damage or replace the primary liner.

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

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

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

### Monitoring, Inspections, and Reporting

An inspection log will be maintained by the operator and will be made available to the division upon request. Inspection will include: freeboard monitoring, leak detection, identifying potential hazards that may have developed, change in site conditions or if the contents of the containment change from the initial use.

Weekly inspections consist of:

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

19.15.29.8 B.

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

19.15.34.13

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

19.15.34.13 A.

The operator shall inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request.

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

- Visually inspecting the containments exposed liners
- Checking the leak detection system for any evidence of a loss of integrity of the primary liner
- Inspect any diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.
- Inspect the leak detection system for evidence of damage or malfunction and monitor for leakage.
- Inspect netting (may not be used if Mega Blaster Pro avian deterrent is used) for damage or dead wildlife, including migratory birds. Operator shall report the discovery of a dead animal to the appropriate wildlife agency and to the district within 30 days of discovery. Further prevention measures may be required.

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

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

Monthly, the operator will:

- Report to the division, the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.
- Record sources and disposition of all recycled water.

### Cessation of Operations

If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdraw, operation of the facility has ceased and the division district office will be

#### 19.15.34.12 E

Netting. The operator shall ensure that a recycling containment is screened, netted or otherwise protective of wildlife, including migratory birds. The operator shall on a monthly basis inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

#### 19.15.34.9 E

The operator of a recycling facility shall keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.

#### 19.15.34.13 C

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

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

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

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

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

months following the first withdrawal of produced water for use. The operator must report cessation of operations to the appropriate division district office. The appropriate division district office may grant an extension to this determination of cessation of operations not to exceed six months.

19.15.34.14 A

Once the operator has ceased operations, the operator shall remove all fluids within 60 days and close the containment within six months from the date the operator ceases operations from the containment for use. The division district office may grant an extension for the removal of all fluids not to exceed two months.

## Closure Plan Above Ground Tank Containment (AST)

### Closure Plan

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

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

### *Excavation and Removal Closure Plan – Protocols and Procedures*

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

#### 19.15.34.14 B

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

#### 19.15.34.14 C

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

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

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

## Closure Plan Above Ground Tank Containment (AST)

### *Closure Documentation*

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

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

### *Reclamation and Revegetation*

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

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

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

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

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

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

#### 19.15.34.14 D

Within 60 days of closure completion, the operator shall submit a closure report on form C-147, including required attachments, to document all closure activities including sampling results and the details on any backfilling, capping or covering, where applicable. The closure report shall certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in division rules or directives.

#### 19.15.34.14 E

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

#### 19.15.34.14 G

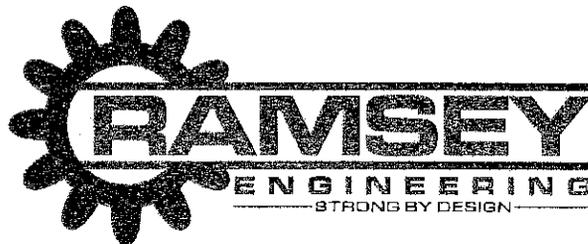
The re-vegetation and reclamation obligations imposed by federal, state trust land or tribal agencies on lands managed by those agencies shall supersede these provisions and govern the obligations of any operator subject to those provisions, provided that the other requirements provide equal or better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

#### 19.15.34.14 F

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

# ENGINEERING DRAWINGS & LINER SPECIFICATIONS

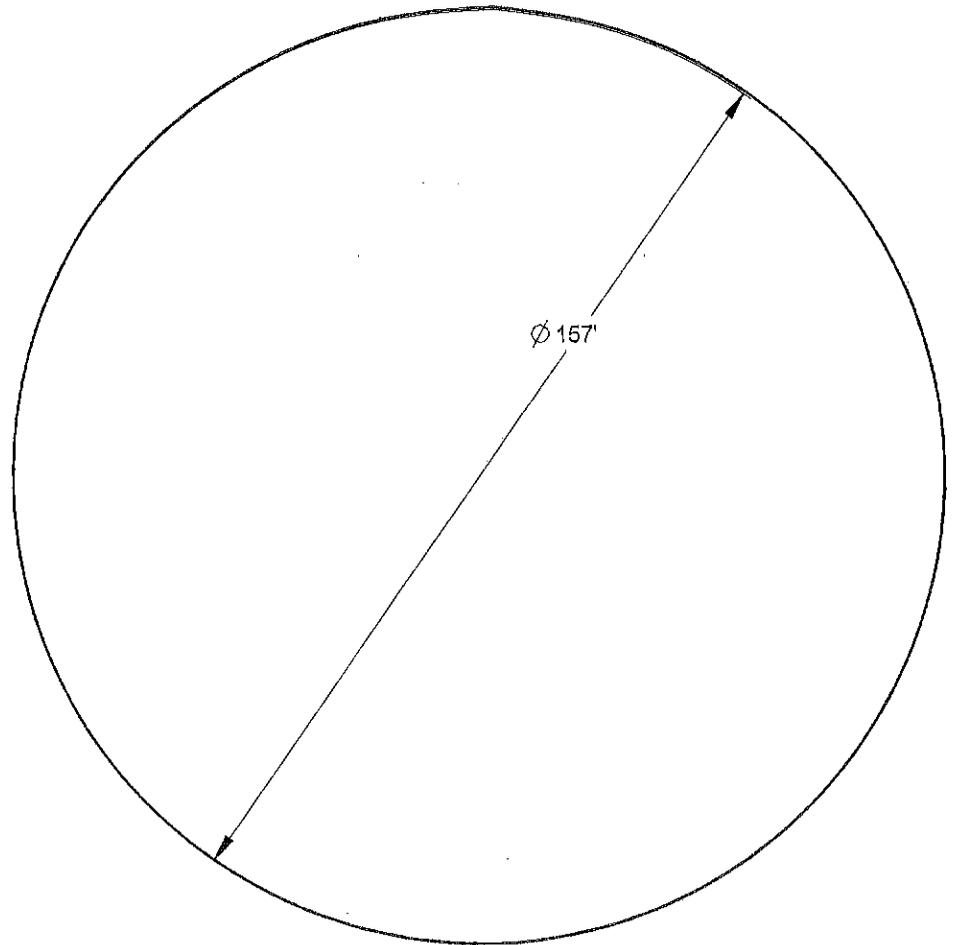
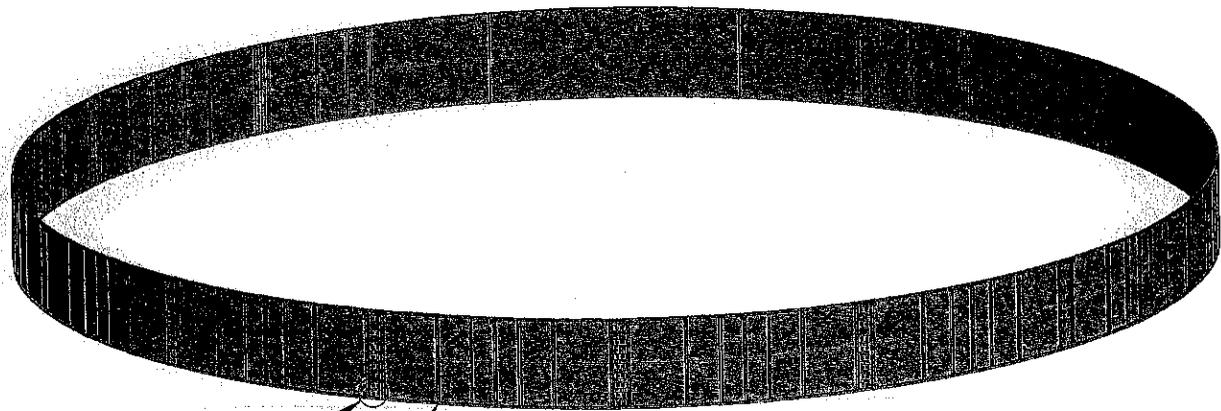
# Three Amigos Tank Design



40K Assembly Prints

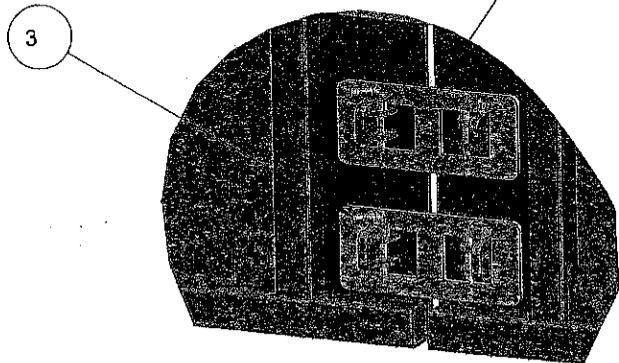
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2	LC-001	120
3	LC-002	240

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- 3) INCREMENTAL VOLUME = 3448 BBL PER FOOT

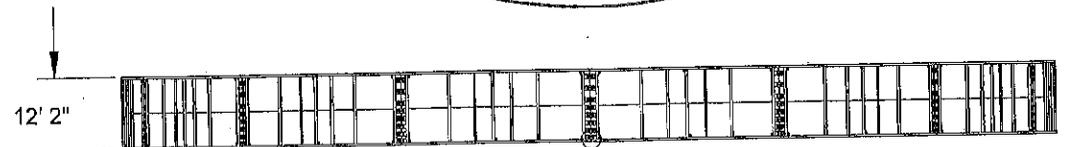


SEE DETAIL B

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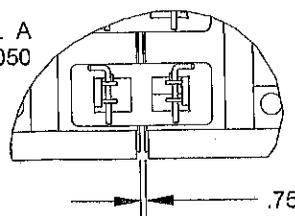


DETAIL B  
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SEE DETAIL A

DETAIL A  
SCALE 0.050



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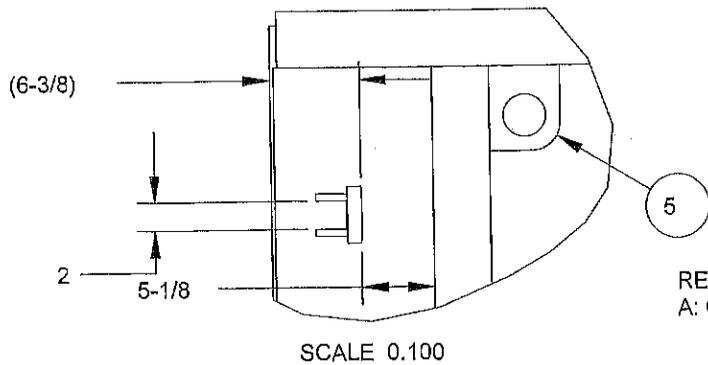
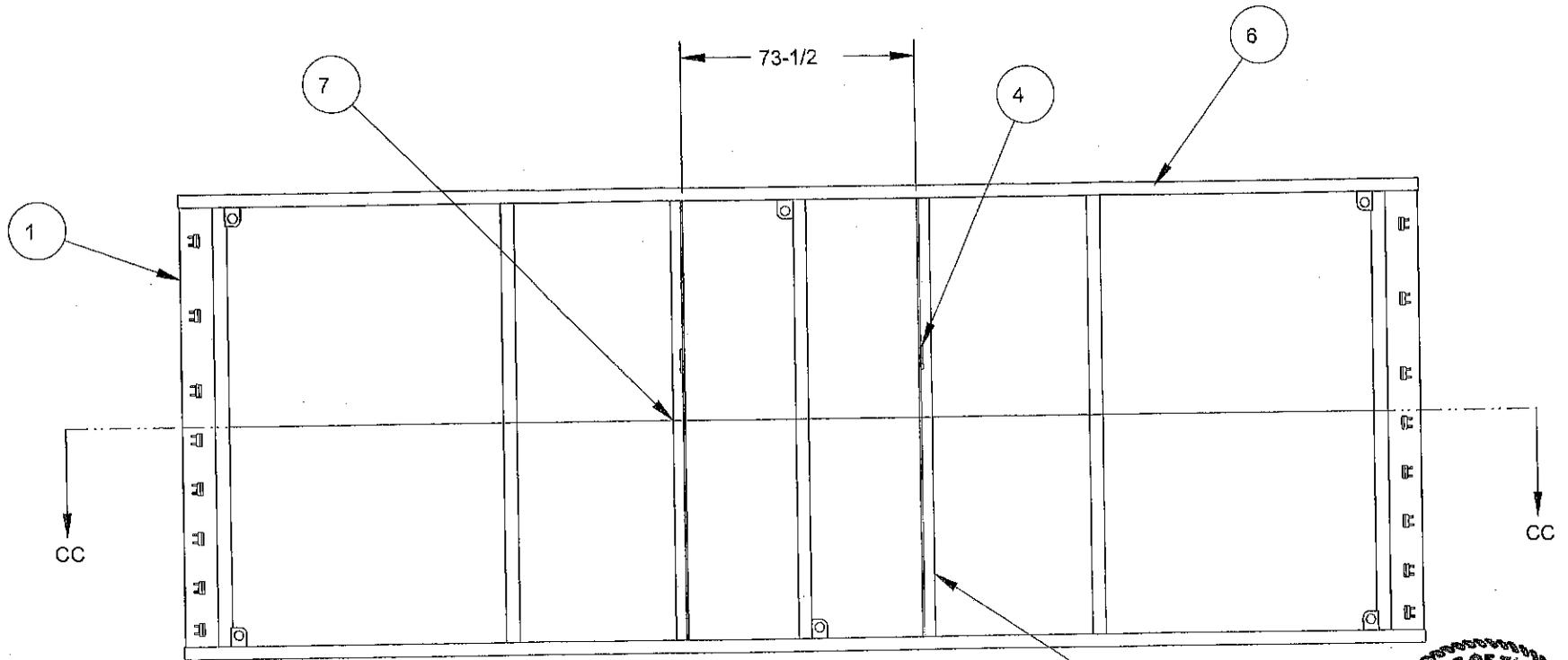
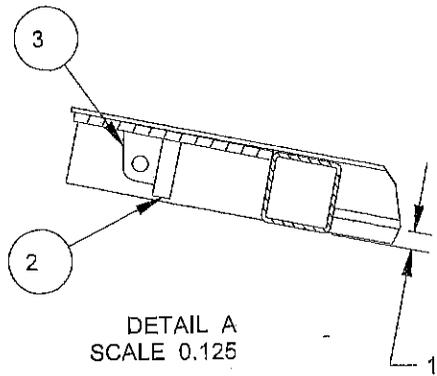
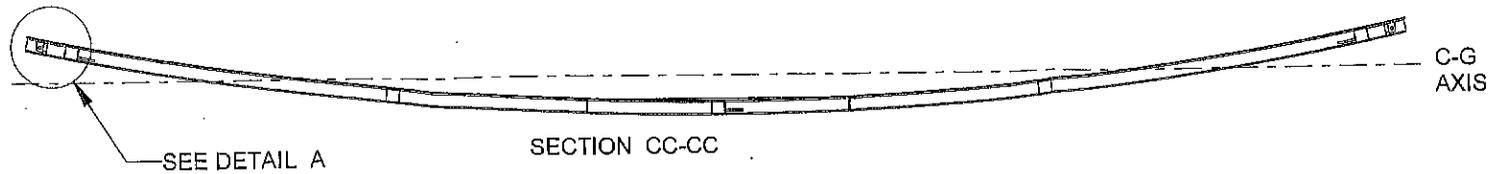
TOLERANCES  
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**RAMSEY  
ENGINEERING**

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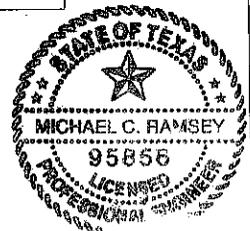
SHEET 1 OF 1
40K ASSEMBLY
MCR 3/15/2013
40K-ASSEMBLY

ITEM	PART NUMBER	QTY
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2	40K-005	16
3	40K-006	32
4	40K-008	2
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6	40K-200	1
7	40K-007(L)	1
8	40K-007(R)	1



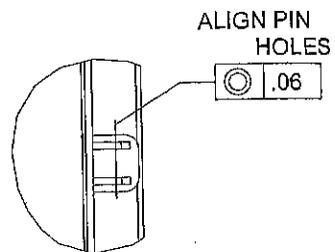
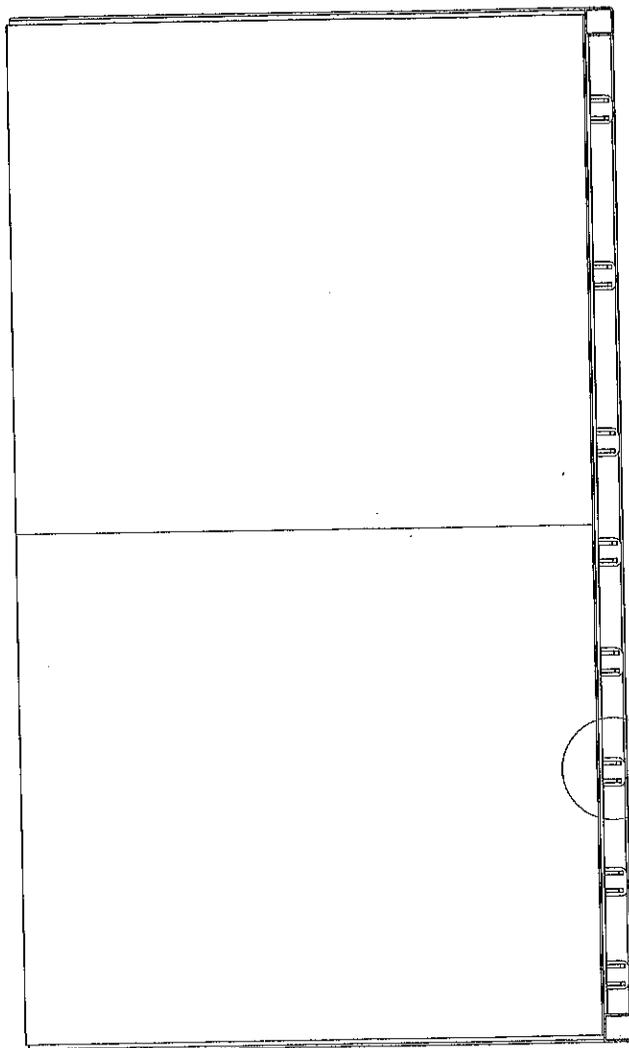
REVISION NOTES:  
A: CHANGED HEIGHT TO MATCH PRODUCT. ADDED LIFTING LUGS.

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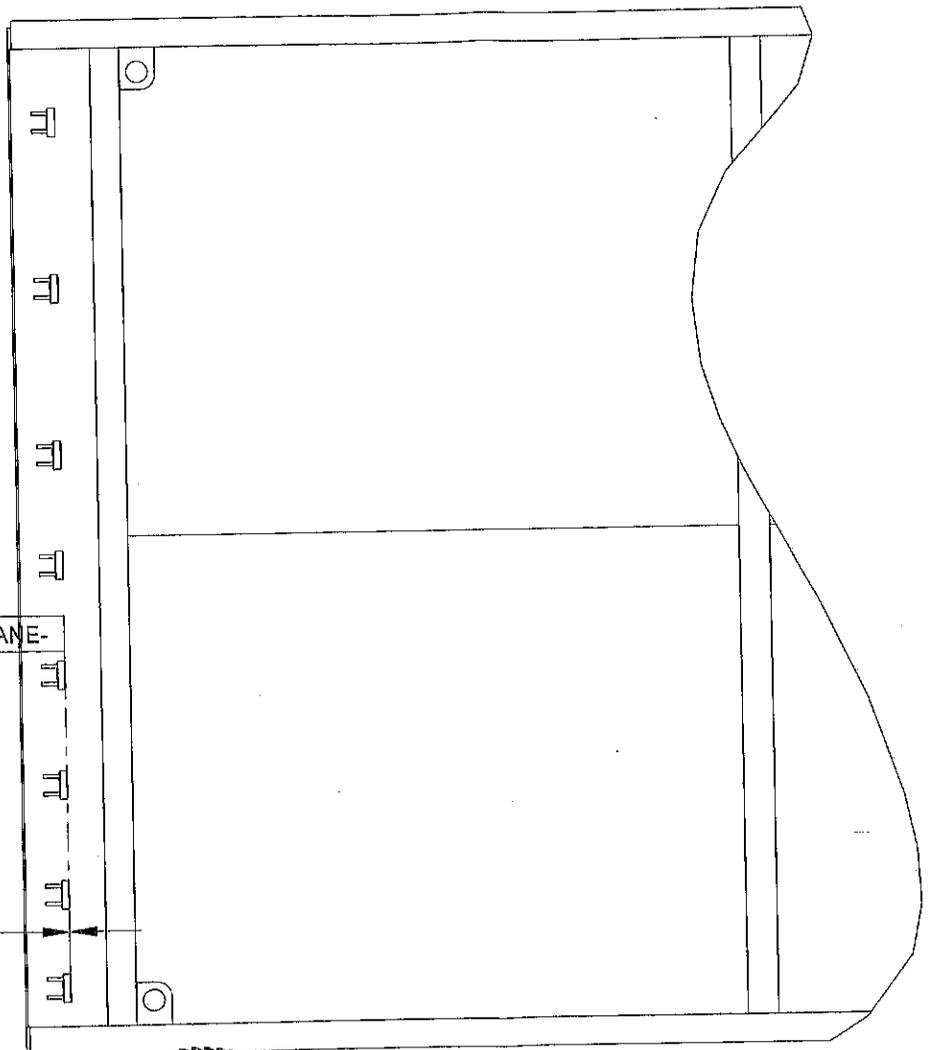
TOLERANCES UNLESS NOTED OTHERWISE X.X0±0.05 X.XX0±0.01 X.XXX±0.005	RAMSEY ENGINEERING	SHEET 1 OF 2
		40K-300
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		40K-300

NOTES:  
1) ALIGN TABS WITHING 1/16 OF PLANE ESTABLISHED BY THE AVERAGE OF 3 NEAREST TABS.



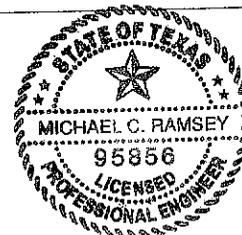
DETAIL B  
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SEE DETAIL B



-TAB\_PLANE-

	.00 SEE NOTE 1	
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TOLERANCES  
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RAMSEY  
ENGINEERING

REV A

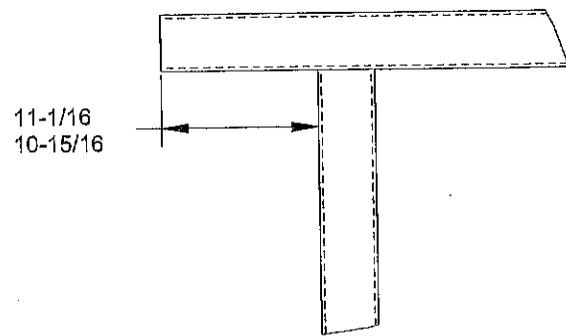
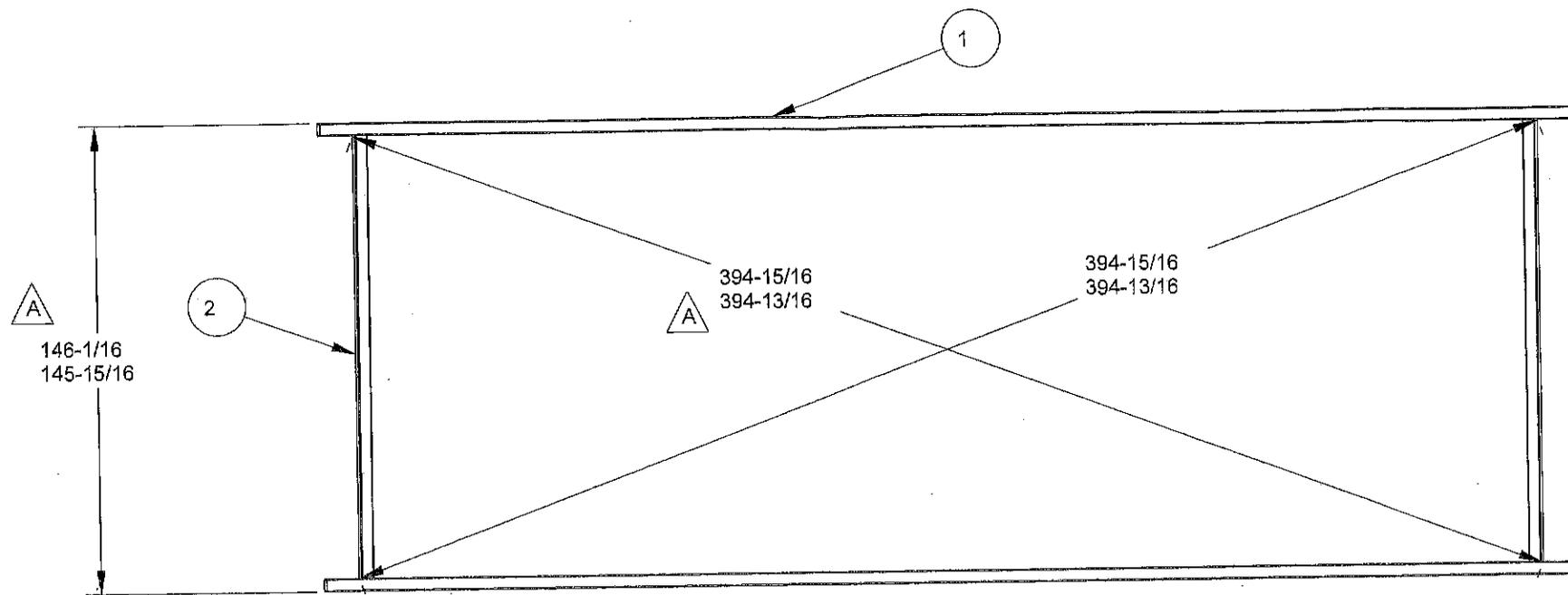
SHEET 2 OF 2

40K-300

MCR 10/31/12

40K-300

ITEM	PART NUMBER	QTY
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2	40K-002	2



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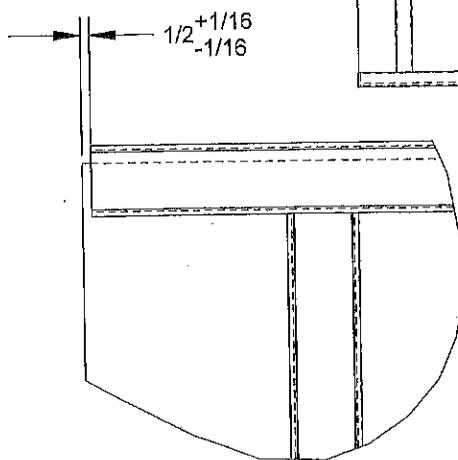
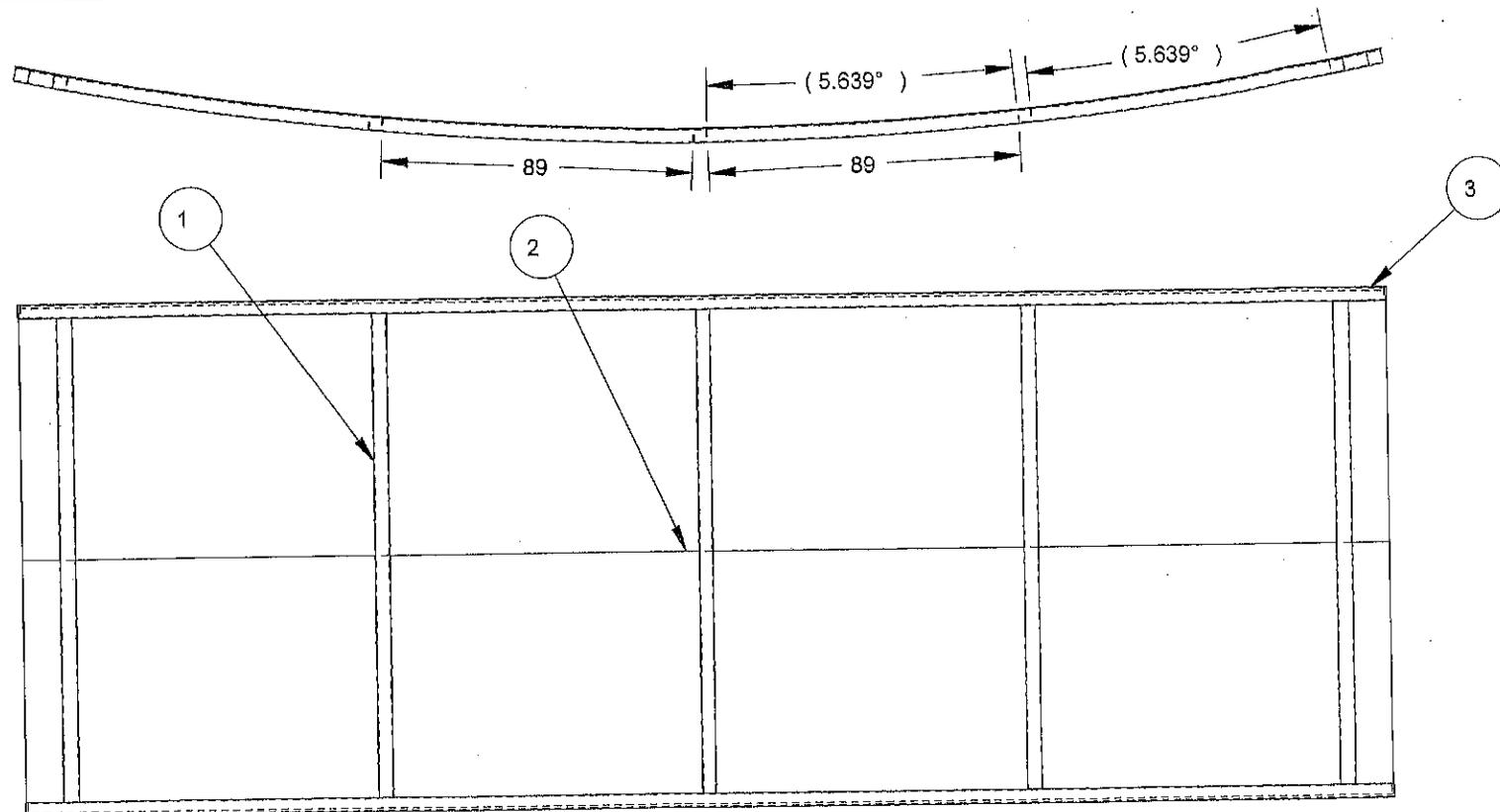
REVISION NOTES:  
A: CHANGED HEIGHT TO MATCH PRODUCT.

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TOLERANCES UNLESS NOTED OTHERWISE		SHEET 1 OF 1	
X.X0±0.05	RAMSEY ENGINEERING	40K-100	
X.XX0±0.01		MCR 10/31/12	
X.XXXL±0.005	SEE BOM	REV A	40K-100

ITEM	PART NUMBER	QTY
1	40K-002	3
2	40K-003	2
3	40K-100	1



SCALE 0.125



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**RAMSEY  
ENGINEERING**

SEE BOM

SHEET 1 OF 1

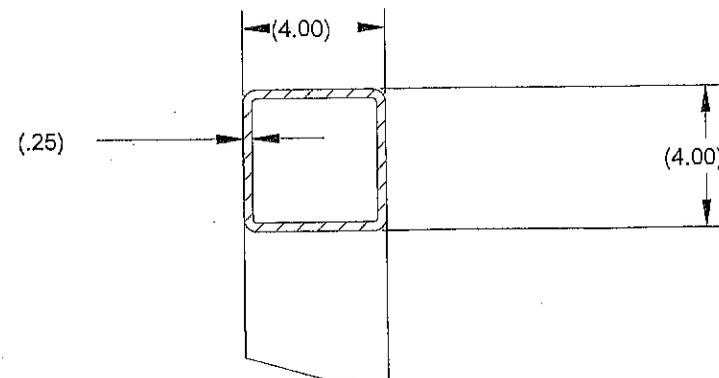
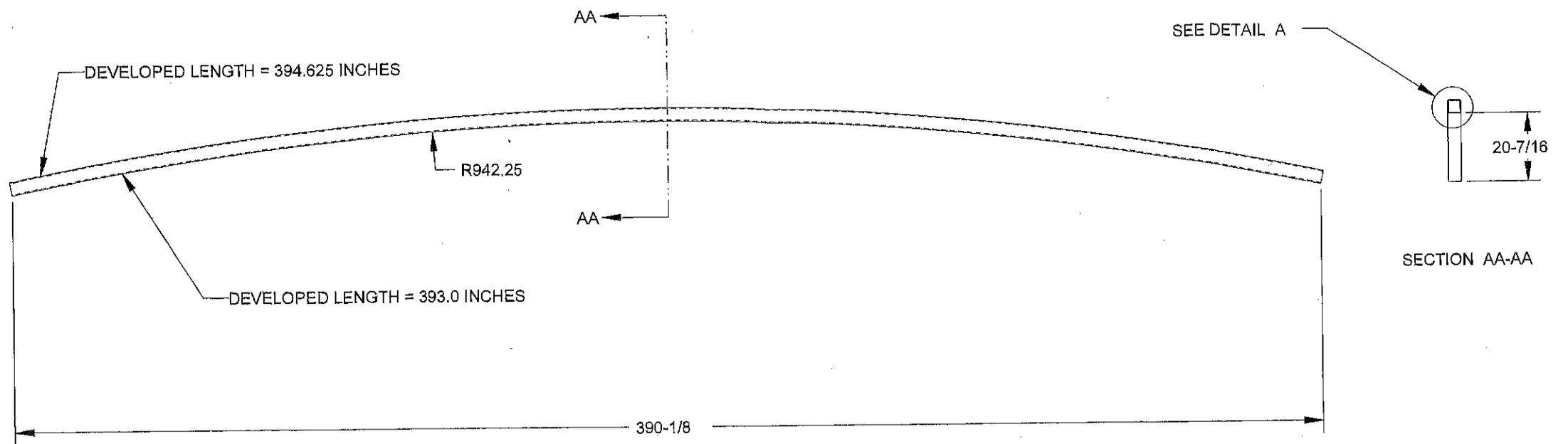
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MCR 10/31/12

40K-200

40K Components

40K Components



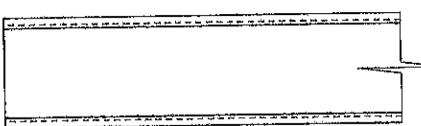
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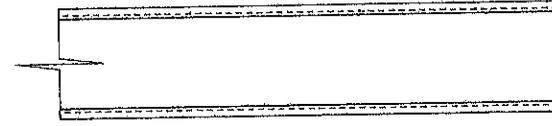
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		TUBING, BENT	
ASTM A500 GR B		40K-001	

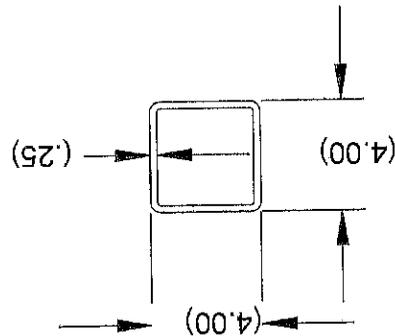
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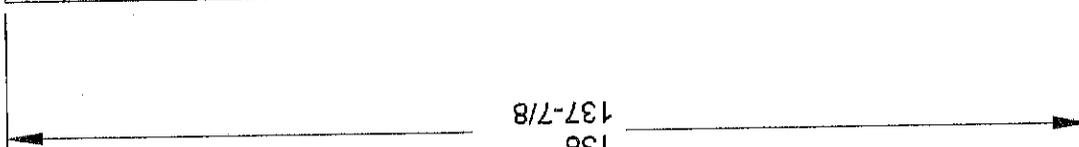




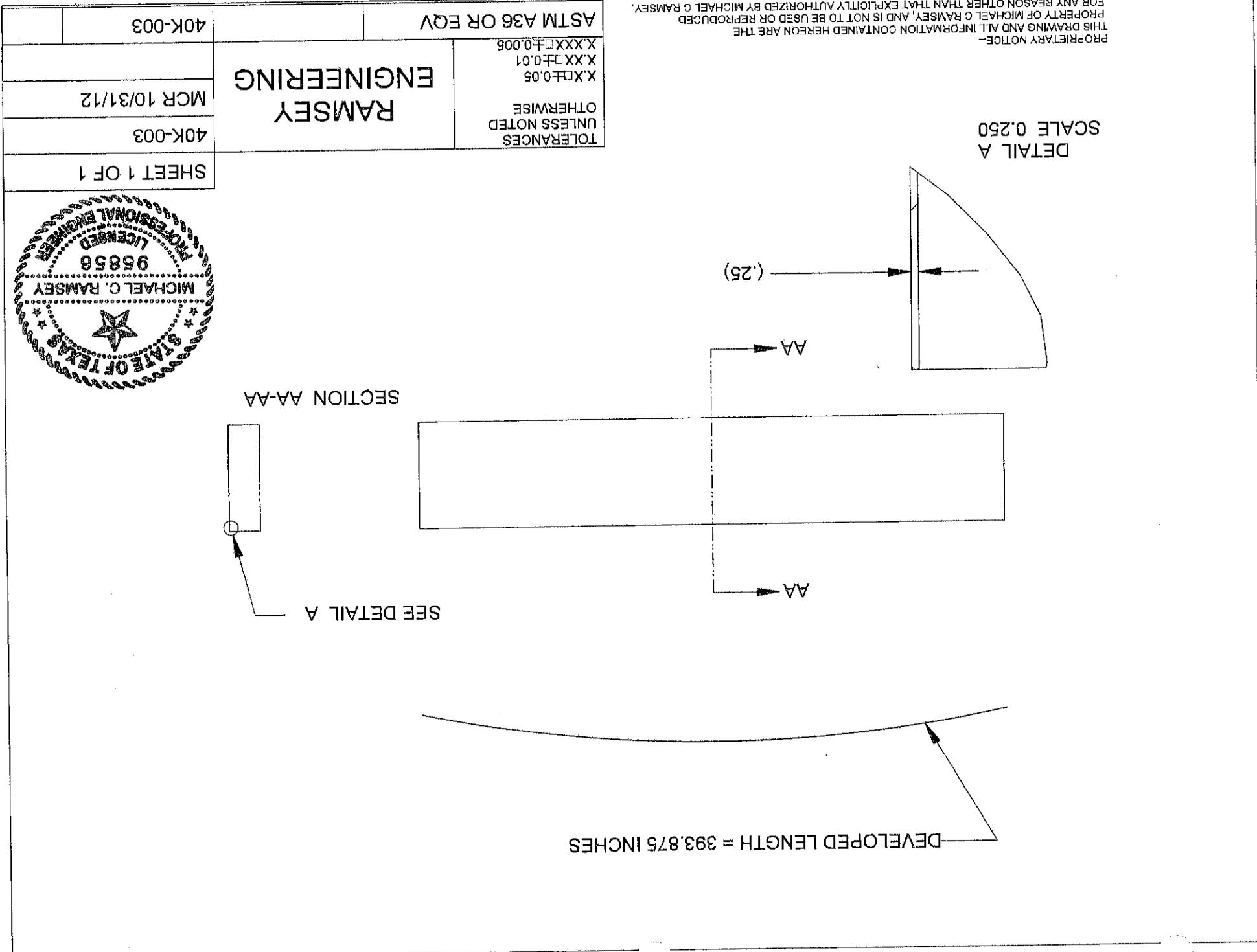


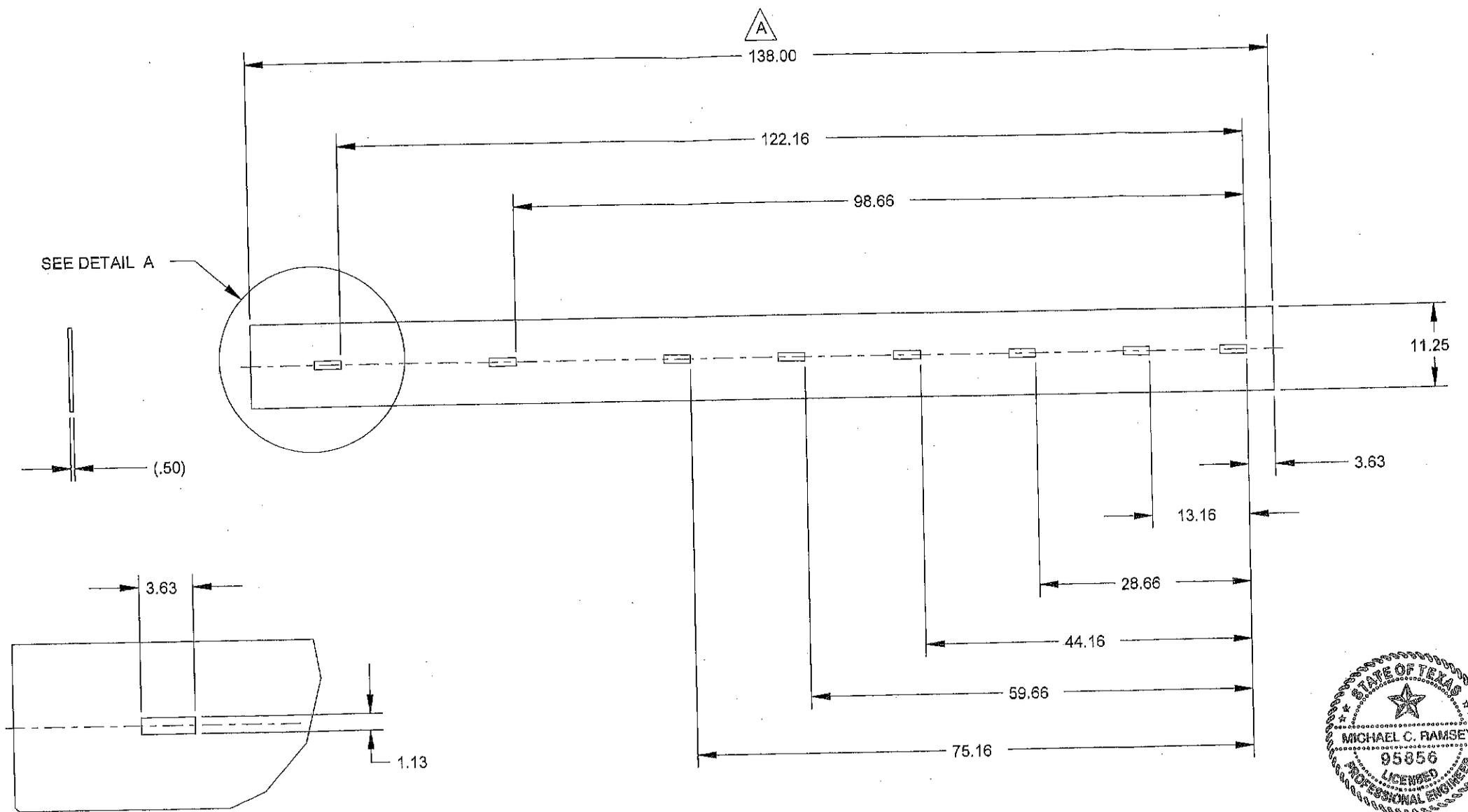


138  
137-7/8



▲ A





SEE DETAIL A

DETAIL A  
SCALE 0.150

REVISION NOTES:  
A: CHANGED LENGTH TO MATCH PRODUCT.

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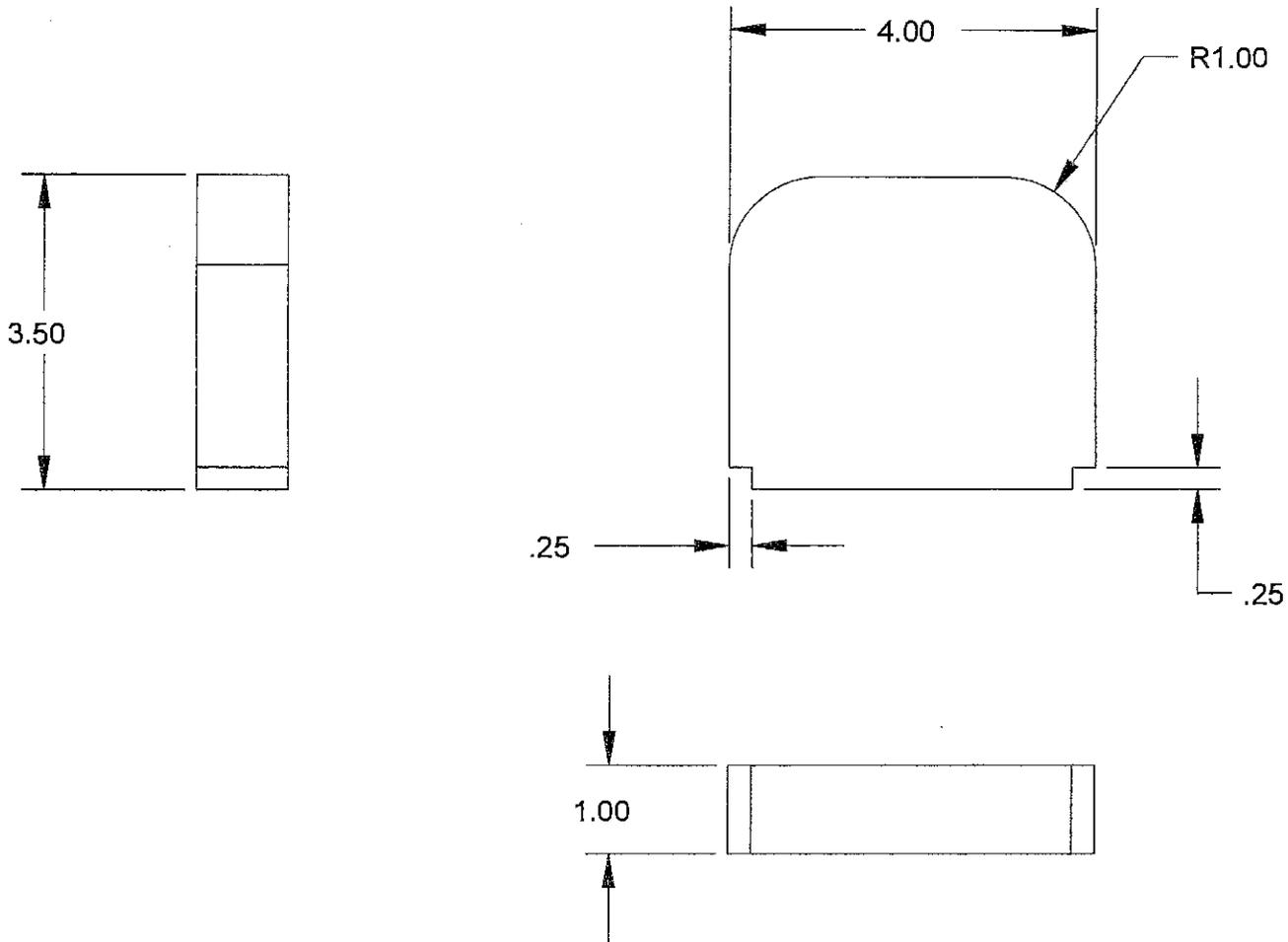
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ENGINEERING**

ASTM A36 OR EQV

REV A

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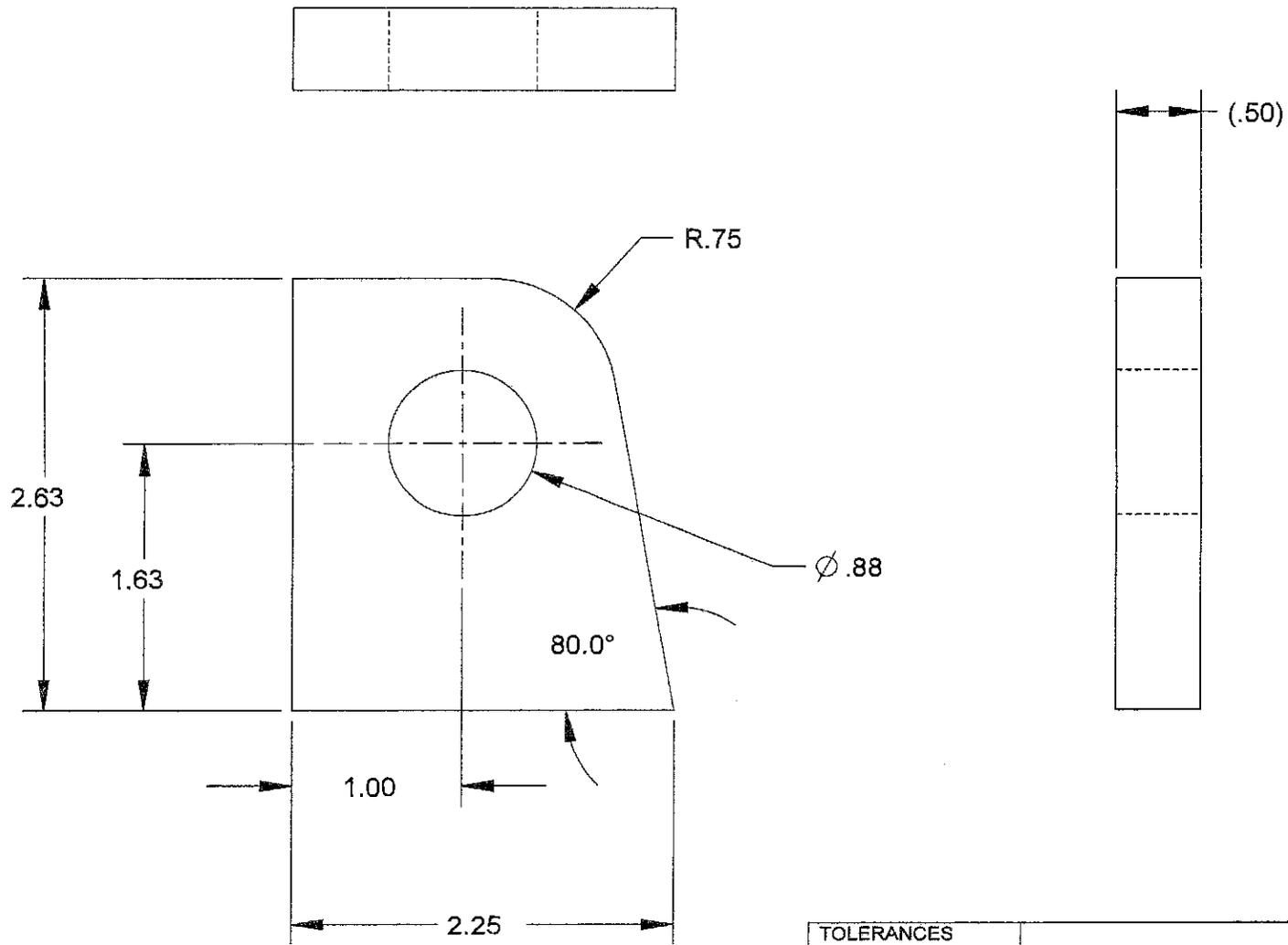
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ASTM A36 OR EQV

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40K-005

40K-005



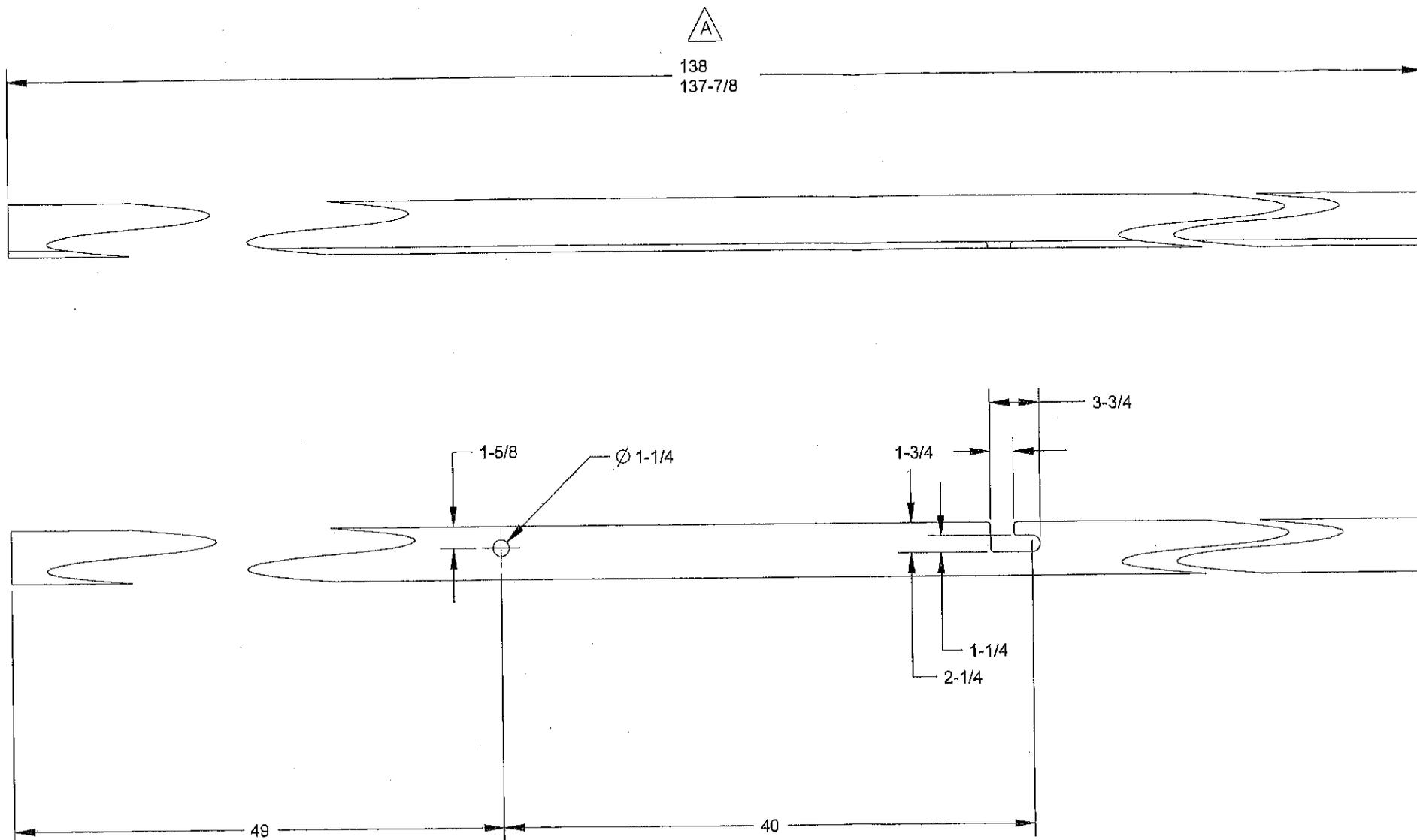
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**RAMSEY  
 ENGINEERING**

ASTM A36 OR EQV

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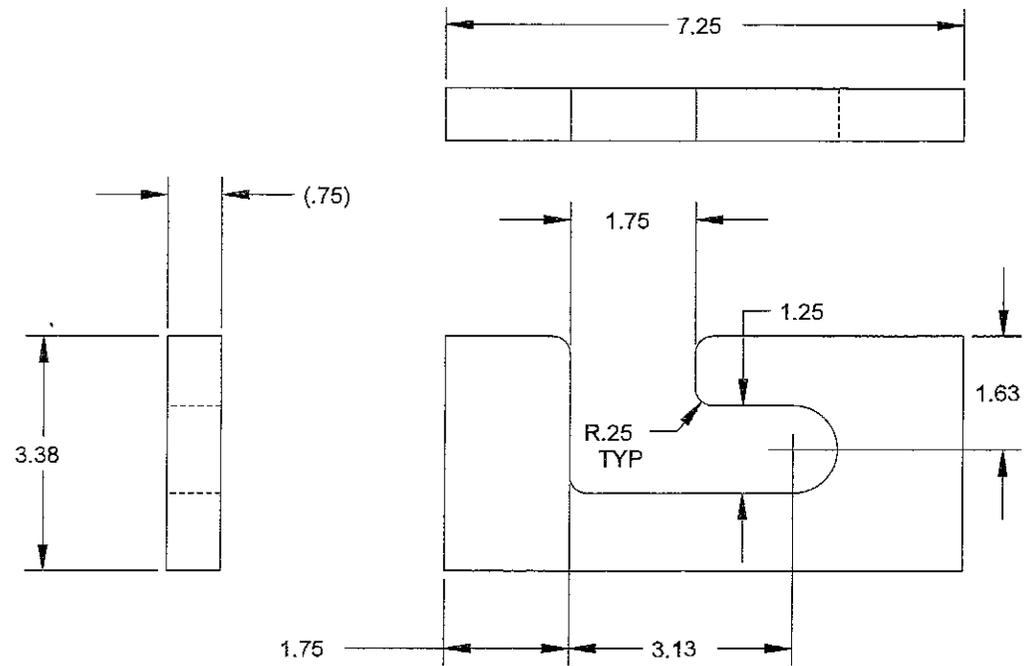


REVISION NOTES:  
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		40K-007



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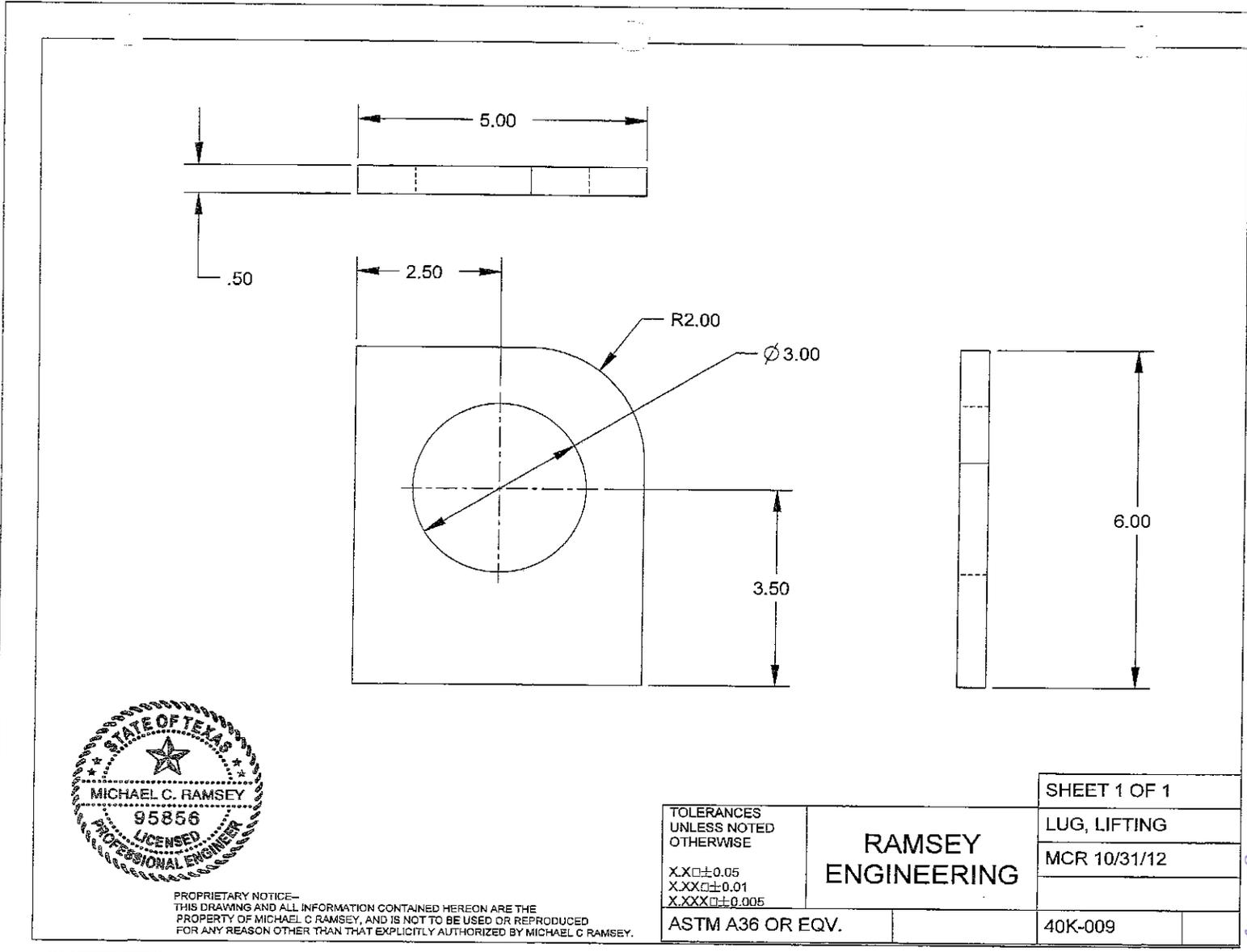
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SHEET 1 OF 1

40K-008

40K-008



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SHEET 1 OF 1

LUG, LIFTING

MCR 10/31/12

40K-009



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**Geotextile Product Description Sheet  
GT-110  
Nonwoven Geotextile**

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

**PROPERTY TEST METHOD UNIT  
M.A.R.V.  
(Minimum Average Roll Value)**

Weight (Typical) ASTM D 5261 oz/yd<sup>2</sup> (g/m<sup>2</sup>) 10.0 (339)  
 Grab Tensile ASTM D 4632 lbs (kN) 250 (1.11)  
 Grab Elongation ASTM D 4632 % 50  
 Trapezoid Tear Strength ASTM D 4533 lbs (kN) 100 (0.444)  
 CBR Puncture Resistance ASTM D 6241 lbs (kN) 700 (3.11)  
 Permittivity\* ASTM D 4491 sec.<sup>-1</sup> 1.2  
 Water Flow\* ASTM D 4491 gpm/ft<sup>2</sup> (l/min/m<sup>2</sup>) 80 (3251)  
 AOS\* ASTM D 4751 US Sieve (mm) 100 (0.150)  
 UV Resistance ASTM D 4355 %/hrs 70/500

**PACKAGING**

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

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

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## 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.

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# SKAPS TRANSNET™

## HDPE GEONET TN 220



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

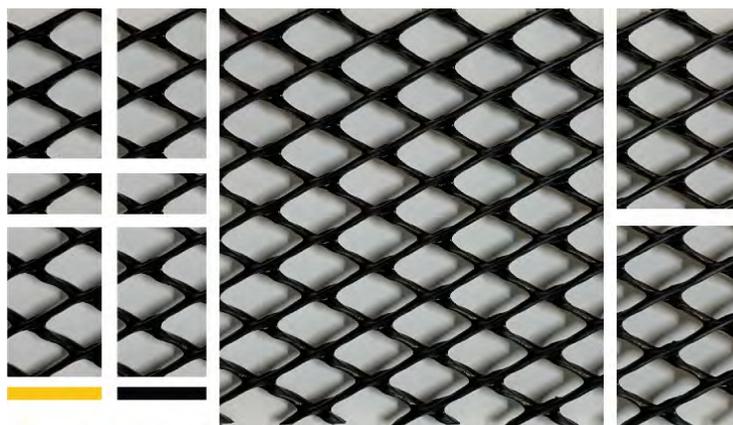
PROPERTY	TEST METHOD	UNIT	VALUE	QUALIFIER
Thickness	ASTM D 5199	mm	5.08	MAV <sup>(3)</sup>
Carbon Black	ASTM D 4218	%	2.0	MAV
Tensile Strength	ASTM D 7179	N/mm	7.87	MAV
Melt Flow	ASTM D 1238 <sup>(2)</sup>	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm <sup>3</sup>	0.94	MAV
Transmissivity <sup>(1)</sup>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

### Notes:

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

(2) Condition 190/2.16

(3) Minimum average value



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## TECHNICAL DATA SHEET Geomembrane 30mil LLDPE

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

Note;

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

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

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

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

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## AST SET UP SOP

	<b>Extreme Plastics Plus</b>		<b>Pg. 1 of 6</b>
	<b>EPP – Tank in a Tank Rig-Up</b>	<b>Rev: 05</b>	

Policy Template

**APPROVALS**

*All approvals are maintained and controlled By OPERATIONS MANAGEMENT*

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

**REVISION HISTORY**

<i>AUTHOR</i>	<i>REVISED SECTION/PARAGRAPH</i>	<i>REV</i>	<i>RELEASED</i>
<u>Jeff Anderson</u>	<u>INITIAL RELEASE</u>	05	2018-07-03

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

	<b>Extreme Plastics Plus</b>		<b>Pg. 2 of 6</b>
	<b>EPP – Tank in a Tank Rig-Up</b>	<b>Rev: 05</b>	

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	<b>Extreme Plastics Plus</b>		<b>Pg. 3 of 6</b>
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## 1. PURPOSE

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

## 2. SCOPE

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

## 3. DEFINITIONS

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

## 4. RESPONSIBILITIES

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

## 5. REQUIREMENTS

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

## 6. POLICY

Procedure for installing Epic 360 Tanks.

### 6.1 Prepare Surface Area

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

### 6.2 Ground Cover Installation

- Determine whether any special conditions exist for tank installation.

	<b>Extreme Plastics Plus</b>		<b>Pg. 4 of 6</b>
	<b>EPP – Tank in a Tank Rig-Up</b>	<b>Rev: 05</b>	

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

### 6.3 Primary Tank Wall Assembly

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

	<b>Extreme Plastics Plus</b>		<b>Pg. 5 of 6</b>
	<b>EPP – Tank in a Tank Rig-Up</b>	<b>Rev: 05</b>	

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

#### 6.4 Primary Tank Liner Installation

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

#### 6.5 Secondary Tank Wall Assembly

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

	<b>Extreme Plastics Plus</b>		<b>Pg. 6 of 6</b>
	<b>EPP – Tank in a Tank Rig-Up</b>	<b>Rev: 05</b>	

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

### 6.6 Secondary Tank Liner Installation

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

### 6.7 Installation of Tank Accessories

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

### 6.8 Final Inspection

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

## 7. APPLICABLE REFERENCES

- Chain Length Angle Chart

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

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

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

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

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

**19.15.17.13 CLOSURE AND SITE RECLAMATION REQUIREMENTS:**

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

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

Table II Closure Criteria for Burial Trenches and Waste Left in Place in Temporary Pits			
Depth below bottom of pit to groundwater less than 10,000 mg/l TDS	Constituent	Method*	Limit**
25-50 feet	Chloride	EPA Method 300.0	20,000 mg/kg
	TPH	EPA SW-846 Method 418.1	100 mg/kg

**19.15.34.14 CLOSURE AND SITE RECLAMATION REQUIREMENTS FOR RECYCLING CONTAINMENTS:**

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

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

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

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

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

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

**19.15.29.12 D. CLOSURE REQUIREMENTS.** The responsible party must take the following action for any major or minor release containing liquids.

**(1)** The responsible party must test the remediated areas for contamination with representative five-point composite samples from the walls and base, and individual grab samples from any wet or discolored areas. The samples must be analyzed for the constituents listed in Table I of 19.15.29.12 NMAC or constituents from other applicable remediation standards.

The referenced Table I, is reproduced in part below.

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

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

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

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

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

## Statement Explaining Why the Applicant Seeks a Variance

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

### D. Fencing.

(1) The operator shall **fence or enclose** a recycling containment **in a manner that deters unauthorized wildlife and human access** and shall maintain the fences in good repair. The operator shall ensure that all **gates associated with the fence are closed and locked** when responsible personnel are not onsite.

(2) Recycling containments shall be fenced with a four foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level.

E. Netting. The operator shall ensure that **a recycling containment is screened, netted or otherwise protective of wildlife, including migratory birds**. The operator shall on a monthly basis inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

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

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

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

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

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

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

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

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

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

### **NMAC 19.15.34.12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT**

**(4)** All primary (upper) liners in a recycling containment shall be geomembrane liners composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. *All primary liners shall be 30-mil flexible PVC, 45-mil LLDPE string reinforced or 60-mil HDPE liners. Secondary liners shall be 30-mil LLDPE string reinforced or equivalent with a hydraulic conductivity no greater than  $1 \times 10^{-9}$  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.

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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.

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**

## Venegas, Victoria, EMNRD

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**From:** Venegas, Victoria, EMNRD  
**Sent:** Friday, August 23, 2024 10:21 AM  
**To:** 'Chad Gallagher'; Drew Dixon  
**Subject:** 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936]  
**Attachments:** C-147 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936]  
08.23.2024.pdf

### 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936]

Good morning Mr. Gallagher.

NMOCD has reviewed the recycling containment permit application and related documents, submitted by [371643] SOLARIS WATER MIDSTREAM, LLC on August 6, 2024, Application ID: 370997, for 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] in Unit Letter N, Section 23, Township 23S, Range 32E, Lea County, New Mexico. [371643] SOLARIS WATER MIDSTREAM, LLC requested variances from 19.15.34 NMAC for 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936].

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 requirements for the AST containment with vertical walls is approved.
- The variance to 19.15.34.12.A.(3) NMAC for the liners to be anchored to the top of the AST steel walls with 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 is approved or a liner system consisting of a 40-mil non-reinforced LLDPE primary liner and a 40-mil non-reinforced LLDPE secondary liner is approved.
- [371643] SOLARIS WATER MIDSTREAM, LLC will notify the OCD through OCD Permitting of the installation of the liner system and provide the specifications of the liner system that has been installed.
- The variance to NMAC 19.15.34.12.D to install a gate or chain across the stairway between the ground surface and the open-top of the AST containment is approved. The operator shall place an appropriate sign on the gate or chain to prevent unauthorized human access to the open top of the containment and provide a mechanism to lock the gate when responsible personnel is not onsite.
- The variance from 19.15.34.13.E NMAC for the installation of an audible bird deterrence system is approved.

The form C-147 and related documents for 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] 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.

- 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] is approved for five years of operation from the date of permit application of August 6, 2024.
- 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] permit expires on August 6, 2029. If [371643] SOLARIS WATER MIDSTREAM, LLC wishes to extend operations past five years, an annual permit extension request must be submitted using an OCD form C-147 through OCD Permitting by July 6, 2029.
- 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] consists of one (1) above ground tank containment (AST) of 40,000.00 BBL and one (1) earthen containment of 1,101,000.00 bbl. The total fluid capacity of 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] is 1,141,000.00 BBL.
- The total closure cost estimated of 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] in the amount of \$607,882.00, meets the requirements of NMAC 19.15.34.15.A.
- [371643] SOLARIS WATER MIDSTREAM, LLC cannot receive produced water in the 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] until after the original copy of the financial assurance has been accepted by NMOCD.
- The financial assurance should be mailed to:

**EMNRD - Oil Conservation Division**  
**Administration and Compliance Bureau**  
**1220 S. St. Francis Drive**  
**Santa Fe, NM 87505**

- [371643] SOLARIS WATER MIDSTREAM, LLC shall construct, operate, maintain, close, and reclaim 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] in compliance with NMAC 19.15.34 NMAC.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall notify OCD, through OCD Permitting when construction of 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] commences.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall notify NMOCD through OCD Permitting when recycling operations commence and cease at 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936].
- A minimum of 3-feet freeboard must be maintained at 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] at all times during operations.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall submit monthly reports of recycling and reuse of produced water, drilling fluids, and liquid oil field waste on OCD form C-148 via OCD Permitting even if there is zero activity.
- If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdrawal, operations of the 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] is considered ceased and a notification of cessation of operations should be sent electronically to OCD Permitting. A request to extend the cessation of operation, not to exceed six months, may be submitted using a C-147 form through OCD Permitting. If after that 6-month extension period, the 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] is not utilized at a minimum of 20% fluid capacity, no additional extensions would be granted, and the operator would be directed to remove all fluids and proceed with the closure requirements.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request according to 19.15.34.13.A.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall comply with 19.15.29 NMAC Releases in the event of any release of produced water or other oil field waste at 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936].

Please reference number 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] in all future communications.

Regards,

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



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

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

CONDITIONS

Action 370997

**CONDITIONS**

Operator: SOLARIS WATER MIDSTREAM, LLC 9651 Katy Fwy Houston, TX 77024	OGRID: 371643
	Action Number: 370997
	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 [371643] SOLARIS WATER MIDSTREAM, LLC on August 6, 2024, Application ID: 370997, for 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936]. • 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] permit expires on August 6, 2029. • [371643] SOLARIS WATER MIDSTREAM, LLC shall construct, operate, maintain, close, and reclaim 1RF-529 - AURORA RF AND AST CONTAINMENT FACILITY [fVV2423550936] in compliance with NMAC 19.15.34 NMAC.	8/23/2024