May 2025

Rule 34 Registration
System Connector In Ground Containment
Section 16, T24S, R32E, Lea County
Volume 2

- ***C-147 Form***
- ***Closure Cost Estimate for the In-Ground Containment and AST***
- ***Stamped Design Drawings with Liner Equivalency Demonstration and Avian Deterrence***
- ***Recently Approved Plans for Design/Construction, O&M, and Closure***

Looking west from the northeast corner of the 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/

Form C-147
Revised October 11, 2022

Recycling Facility and/or Recycling Containment

Type of Facility: ☑ Recycling Facility ☑ Recycling Containment*

Type of action: ☐ Permit ☑ Registration ☐ Modification ☐ Extension ☐ Closure ☐ Other (explain) _____

1RF-540

*** 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: 9651 Katy freeway, Suite 400, Houston, Tx 77024

Facility or well name (include API# if associated with a well): System Connector Pond Containment and Recycling Facility

OCD Permit Number: _____ (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr L and K Section 16 Township 24 S Range 32 E County: Lea

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

2.

☑ **Recycling Facility:**

Location of recycling facility (if applicable): Latitude 32.216111 Longitude -103.685810 NAD83

Proposed Use: ☑ Drilling* ☑ Completion* ☑ Production* ☑ Plugging *

The re-use of produced water may NOT be used until fresh water zones are cased and cemented

☐ Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***

☑ Fluid Storage

☑ Above ground tanks ☑ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type_____

☐ Activity permitted under 19.15.36 NMAC explain type:_____ ☐ Other explain _____

☐ For multiple or additional recycling containments, attach design and location information of each containment

☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date:_____

3.

☑ **Recycling Containment:**

☐ Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)

Center of Recycling Containment (if applicable): Latitude 32.215598 Longitude -103.684098 NAD83

☐ For multiple or additional recycling containments, attach design and location information of each containment

☐ Lined ☐ Liner type: Thickness 60 mil pri & 40 mil sec mil ☐ LLDPE ☑ HDPE ☐ PVC ☐ Other _____

☐ String-Reinforced

Liner Seams: ☑ Welded ☐ Factory ☐ Other _____ Volume: 768 K bbl Dimensions: L 800 ft. x W 425 ft. x D 23 ft.

☐ 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 $ $458,056.08 **(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 Closure Costs, Vol. 2

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.

General siting

Ground water is less than 50 feet below the bottom of the Recycling Containment. NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells Plates 1 and 2	☐ Yes ☑ No ☐ NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality Plate 3	☐ Yes ☑ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division Plate 4	☐ Yes ☑ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map Plate 5	☐ Yes ☑ No
Within a 100-year floodplain. FEMA map Plate 6	☐ Yes ☑ No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site Plate 7	☐ Yes ☑ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; aerial photo; satellite image Plate 8	☐ Yes ☑ No
Within 500 horizontal feet of a spring or a fresh water well used for domestic or stock watering purposes, in existence at the time of initial application. Plates 1 and 7 - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☑ No
Within 500 feet of a wetland. Plate 9 - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	☐ Yes ☑ No

9.

Recycling Facility and/or Containment Checklist:

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

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

10.

Operator Application Certification:

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

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

Signature: Drew Dixon Date: 05/05/2025

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

11.

OCD Representative Signature: Victoria Venegas **Approval Date:** 05/09/2025

Title: Environmental Specialist **OCD Permit Number:** 1RF-540

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

CLOSURE COSTS

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

System Connector In-Ground Containment and AST Containment Financial Assurance Cost Estimate

Attached is the cost estimate for reclamation of the System Connector Recycling In-Ground and AST containments. Total bonding is ($423,079.20+$34,976.88=) $**458,056.08**.

System Connector 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	$ 415,579.20

RT Hicks Consultants

Preparation of sampling results and closure report	$ 7500.00
Total for in-ground Containment Closure Activities	**$ 423,079.20**

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. The AST Containment is placed on the treatment pad adjacent to 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
System Connector AST Containment			
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

Subtotal:	**$32,500.00**
Est. Tax	$2,476.88
Total for AST Closure Activities	**$34,976.88**

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
952 Echo Ln
Ste 375
Houston, TX 77024-2814
www.cascadeservicesllc.com

Estimate

ADDRESS
Solaris Water Midstream LLC
9651 Katy Freeway, Suite 400
Houston, TX 77024

SHIP TO
Solaris Water Midstream LLC
9651 Katy Freeway, Suite 400
Houston, TX 77024

ESTIMATE 2008
DATE 04/08/2025

CUSTOMER PROJECT NAME
System Connector Closure

PROJECT LOCATION COORDINATES
32.216111 -103.685810

DESCRIPTION	QTY	UNIT	RATE	AMOUNT
This is pricing a package to reclaim the single 768k bbl pond and treatment pad on the West of the pond Mobilize equipment to site. 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.	88,090		2.00	176,180.00
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 testing	1		1,725.00	1,725.00
Environmental Soil testing Before earthwork can begin the soil must be tested for contamination in case of liner leakage. Cost include trip, labor, materials, and laboratory testing of 18 tests.	1		2,700.00	2,700.00
Broadcast seeding of pond area Seed will be a native mix for Lea County NM Includes purchase of seed mix and placement	1		3,000.00	3,000.00

Fence removal and disposal Fence estimated at 3,724 ft This includes removal of all posts, braces, wire, fabric, gates, and hardware.	3,724	4.00	14,896.00
Remove and dispose of all four layers. Textile, 40 mil, net, and 60 mil	1,447,188	0.15	217,078.20

Preferred payment method: ACH/Wire
Email AR@cascadeservicesllc.com for ACH/Wire details.

Remit Checks To:
Cascade Services LLC
PO Box 200954
Dallas, TX 75320-0954
**THIS ESTIMATE IS SUBJECT TO THE TERMS & CONDITIONS ATTACHED.

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

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

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

Questions? Email AR@Cascadeservicesllc.com

SUBTOTAL	415,579.20
TAX	0.00
TOTAL	**$415,579.20**

Accepted By

Accepted Date

RECYCLING CONTAINMENT DESIGN DRAWINGS

SYSTEM CONNECTOR POND AND REUSE FACILITY

SOLARIS WATER MIDSTREAM

SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST

LEA COUNTY, NEW MEXICO

32° 12' 57.999" N, 103° 41' 08.916" W

32.216111°, -103.685810°

SOLARIS® WATER MIDSTREAM

INDEX TO DRAWINGS

CONTACTS

JEFFERY COOK - SOLARIS WATER MIDSTREAM - (713)-614-3644

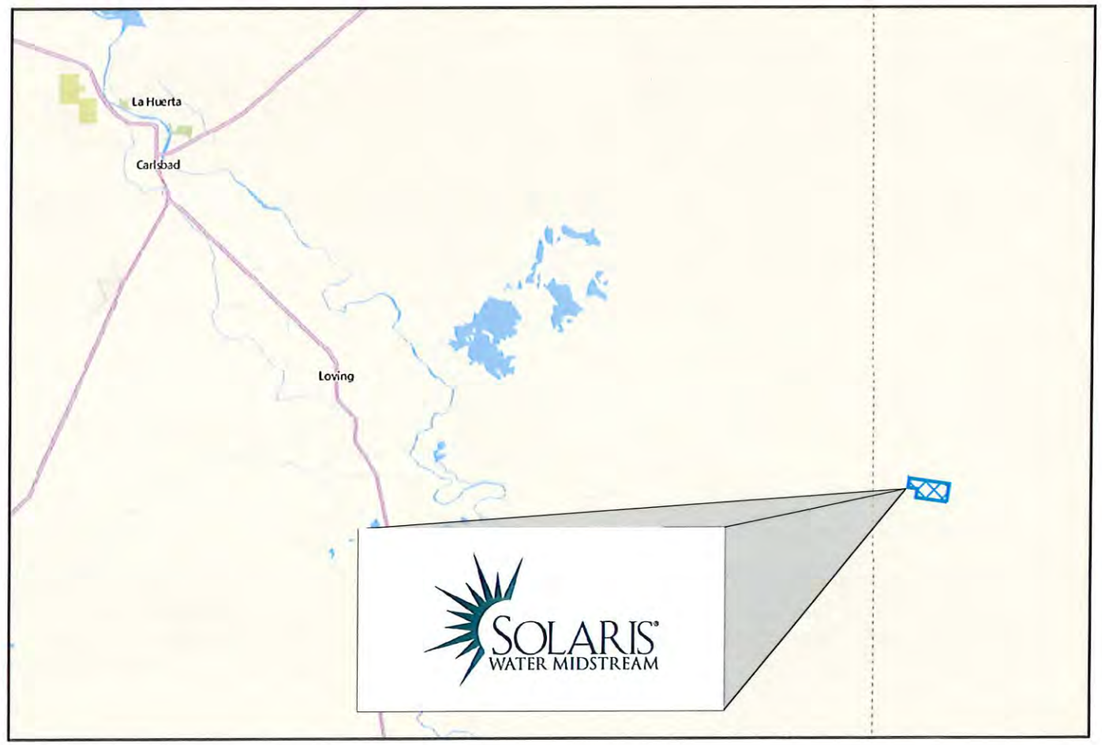
ENVIROTECH ENGINEERING & CONSULTING - ROSHAN MOHAN (580)-234-8780 (DESIGN ENGINEER)

ENVIROTECH ENGINEERING & CONSULTING - MITCHELL RATKE, PE (580)-234-8780 (SUPERVISING ENGINEER)

nm811 Professional Resources for Damage Prevention

UTILITY CAUTION

THE CONTRACTOR IS CAUTIONED THE LOCATION AND DEPTH OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON PUBLICLY AVAILABLE RECORDS OF THE VARIOUS UTILITY COMPANIES AND FIELD MEASUREMENTS. THE INFORMATION PROVIDED IS NOT TO BE RELIED ON AS BEING PRECISE OR COMPLETE. THE CONTRACTOR MUST CONTACT THE LOCAL UTILITY LOCATION CENTER AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES.

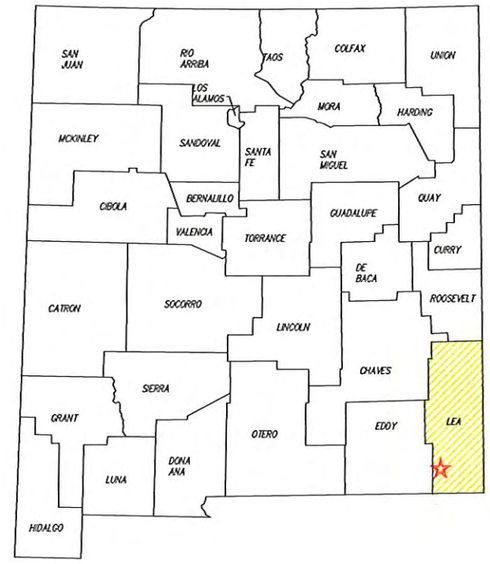


MITCHELL JOSEPH RATKE
NEW MEXICO
29736
PROFESSIONAL ENGINEER
4-1-2025

ENVIROTECH ENGINEERING

2500 N. Eleventh Street Enid, OK 73701 • 580.234.8780 • envirotechconsulting.com
PE #29736 - Expiration Data: 12-31-2026

N
NORTH
0 250 500
Scale 1" = 500'
Bar Scale is intended for 11" x 17" (Full Size)



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2500 North Eleventh Street
Enid, Oklahoma
580.234.8780
envirotechconsulting.com
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NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

MITCHELL JOSEPH RATKE
NEW MEXICO
29736
PROFESSIONAL ENGINEER
4-1-2025

PROJECT LOCATION
SYSTEM CONNECTOR POND AND REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE:	APRIL 2025
SCALE:	1" = 500'
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	2 OF 11

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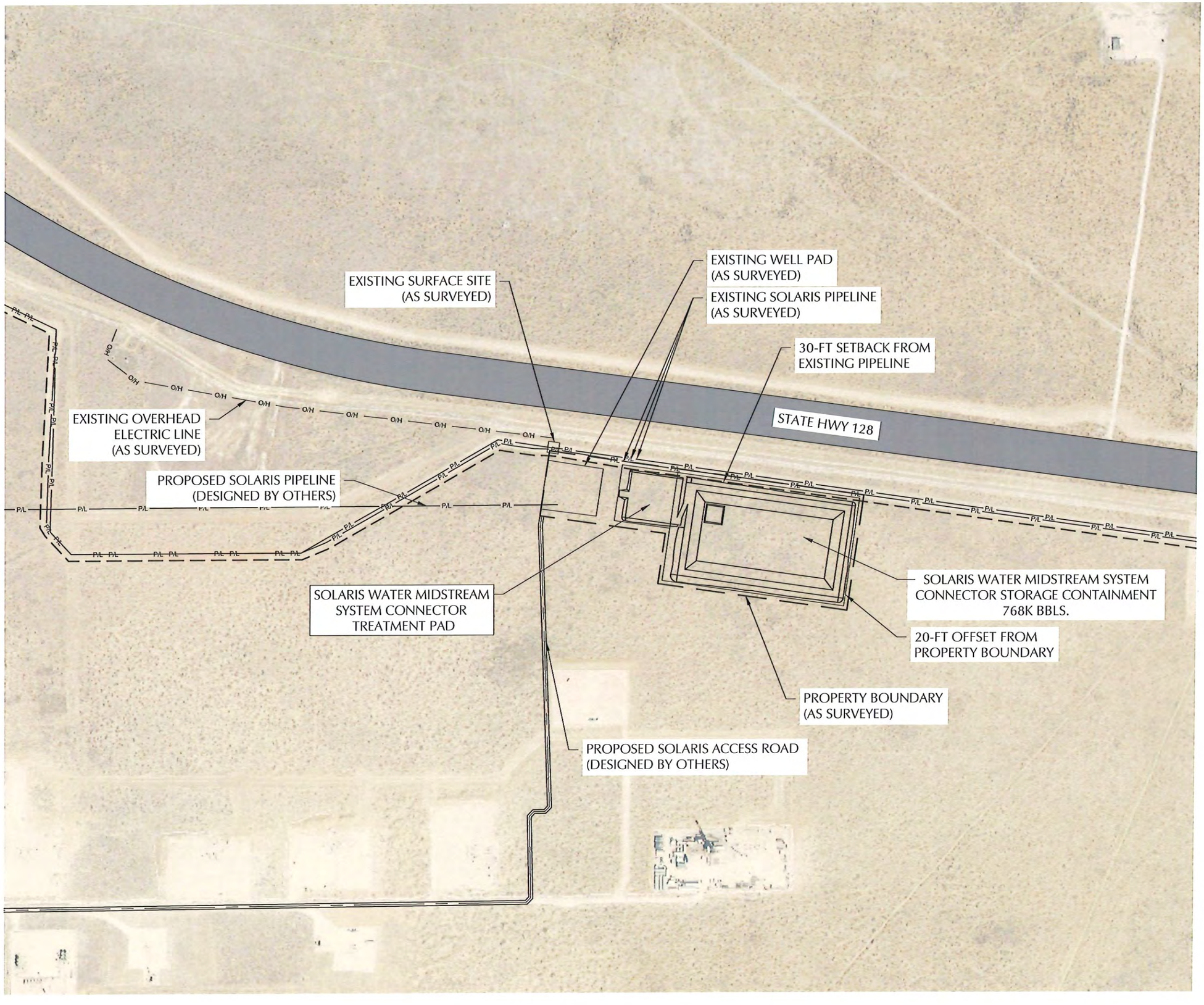

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0 250 500
Scale 1"=500'
Bar Scale is intended for 11" x 17" (Full Size)

ENVIROTECH ENGINEERING
2500 North Eleventh Street
Enid, Oklahoma
580.234.8780
envirotechconsulting.com
P.E. #29736 - Expiration Date: 12-31-2026

NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

EXISTING SITE FEATURES
SYSTEM CONNECTOR POND AND
REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE:	APRIL 2025
SCALE:	1" = 500'
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	3 OF 11

4/1/2025 11:20:30 AM
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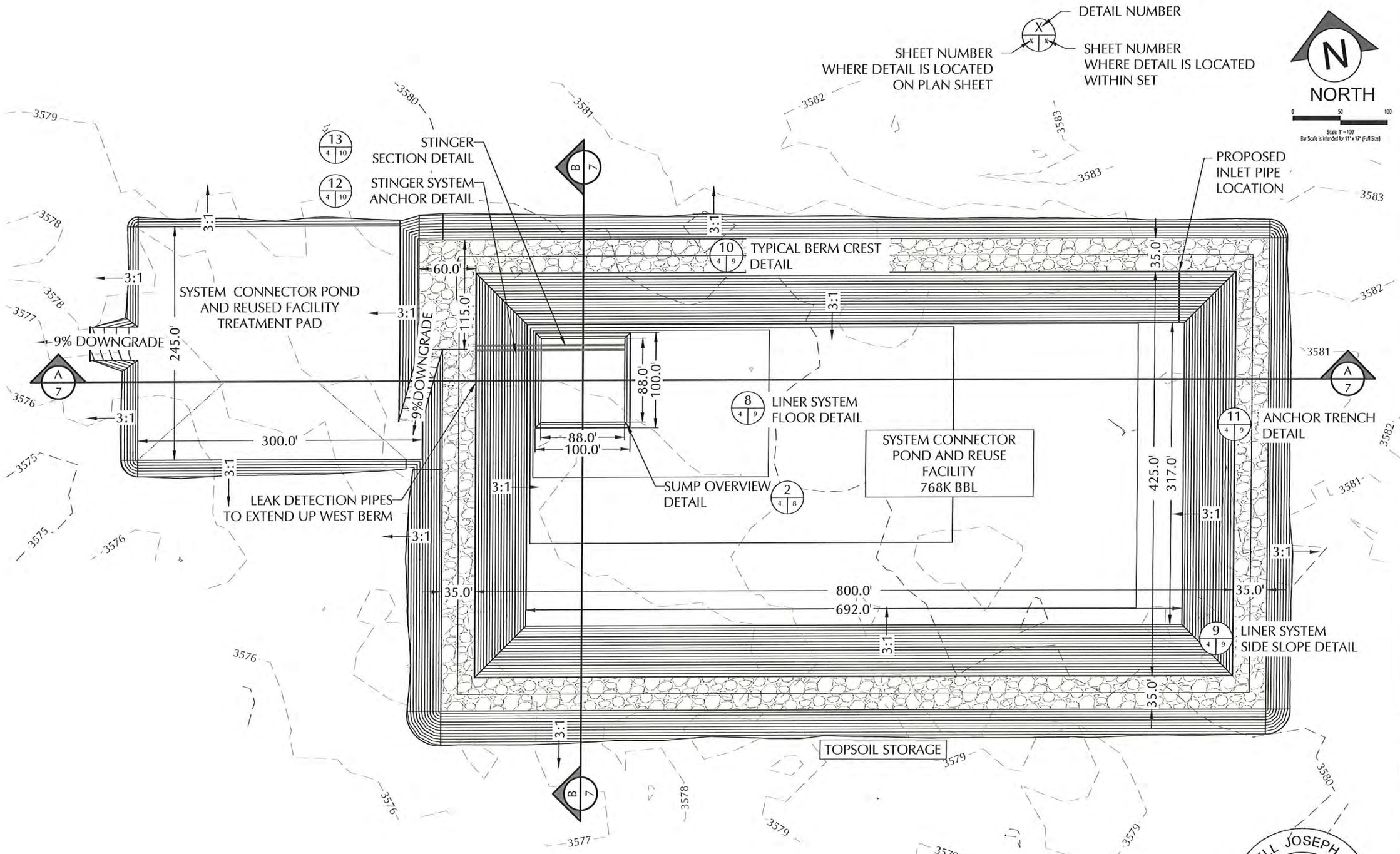
MITCHELL JOSEPH RATKE
NEW MEXICO
29736
PROFESSIONAL ENGINEER
4-1-2025



ENVIROTECH ENGINEERING
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Enid, Oklahoma
580.234.8787
envirotechconsulting.com
P.E. #29736 - Expiration Date: 12-31-2026

NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

SITE PLAN
SYSTEM CONNECTOR POND AND REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

MITCHELL JOSEPH RATKE
NEW MEXICO
29736
PROFESSIONAL ENGINEER
4-7-2025

DATE:	APRIL 2025
SCALE:	1" = 100'
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	4 OF 11

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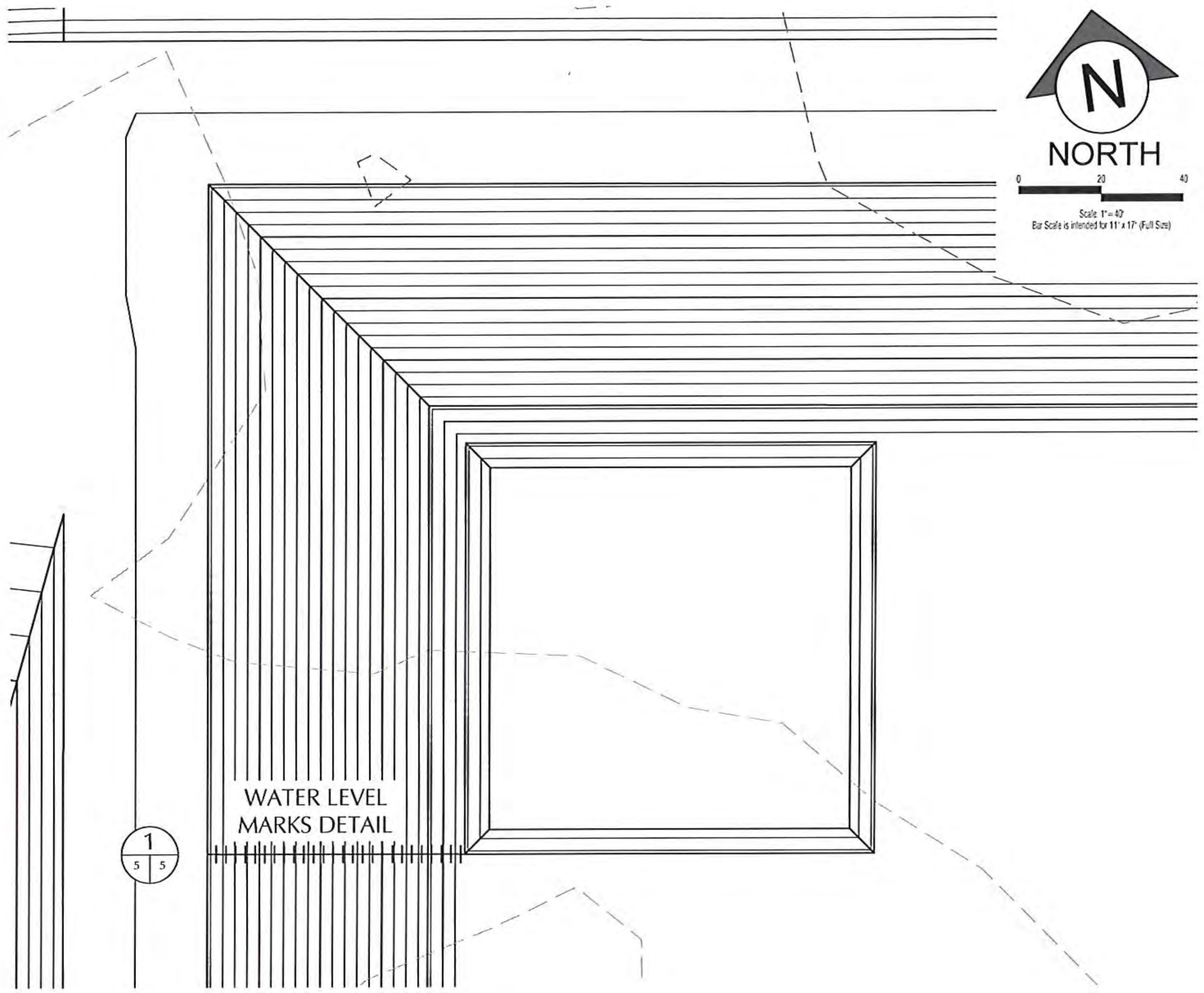
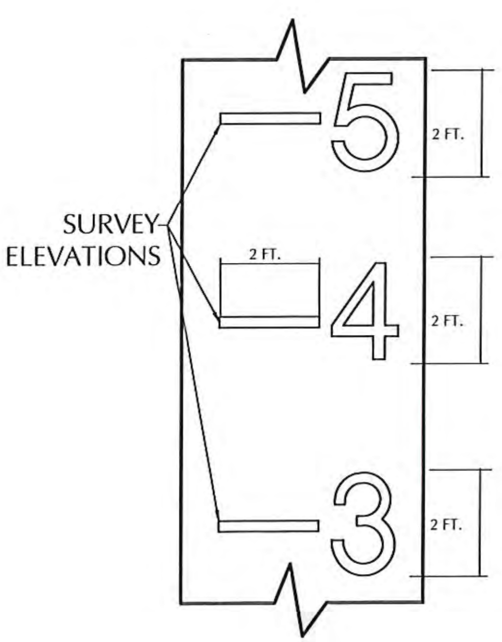
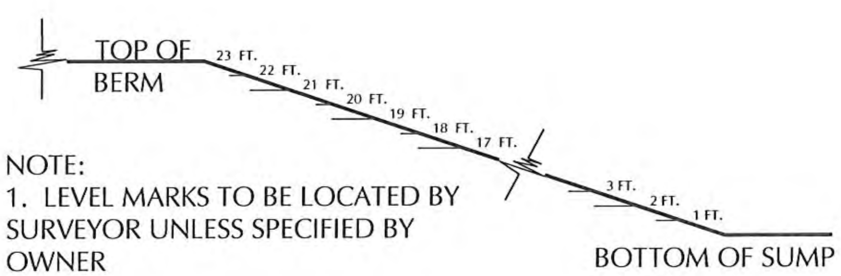


Owner	SOLARIS WATER MIDSTREAM		
Site Name	SYSTEM CONNECTOR STORAGE CONTAINMENT		
Lagoon Features	Top	Bottom	Max Liq. Level
Side slope Ratio	3		3
Maximum Depth (ft)	23		20.0
Lagoon Top Width (ft)	800	692	782
Lagoon Top Length (ft)	425	316	407
Maximum Total Vol (ft^3)	5,296,086		4,308,969
Maximum Total Vol (bbls)	943,334		767,509

Legend: Freeboard; Maximum Capacity; Storage Volume; Floor; Sump

Elevation ft	Lagoon Liq Depth ft	Storage ft	Remaining Stor Vol ft3	Gallons Storage gal	BBLS Storage bbls	Percent of Total Volume %	Vol in lagoon ft^3	Gallons Storage gal	Vol in Lagoon bbls	Vol in Lagoon ac-ft	Percent Total Vol %
3589.25	23.0	0.0	-	-		0.0%	5,296,086	39,620,020	943,334	121.58	100%
3588.25	22.0	1.0	316,292	2,515,802	59,900	6.3%	4,959,794	37,104,218	883,434	111.06	94%
3587.25	21.0	2.0	665,307	4,977,163	118,504	12.6%	4,630,779	34,642,857	824,030	106.31	87%
3586.25	20.0	3.0	987,117	7,384,623	175,824	18.6%	4,308,969	32,235,397	767,509	98.92	81%
3585.25	19.0	4.0	1,301,794	9,738,721	231,874	24.6%	3,994,292	29,881,299	711,459	91.70	75%
3584.25	18.0	5.0	1,609,410	12,039,997	286,667	30.4%	3,686,676	27,580,023	656,667	84.63	70%
3583.25	17.0	6.0	1,910,037	14,288,985	340,214	36.1%	3,386,049	25,331,035	603,120	77.73	64%
3582.25	16.0	7.0	2,203,746	16,486,227	392,529	41.6%	3,092,340	23,133,793	550,805	70.99	58%
3581.25	15.0	8.0	2,490,611	18,632,262	443,625	47.0%	2,805,475	20,987,758	499,709	64.40	53%
3580.25	14.0	9.0	2,770,703	20,727,627	493,515	52.3%	2,525,383	18,892,393	449,819	57.97	48%
3579.25	13.0	10.0	3,044,093	22,772,860	542,211	57.5%	2,251,993	16,847,160	401,123	51.70	43%
3578.25	12.0	11.0	3,310,854	24,768,502	589,726	62.5%	1,985,232	14,851,518	353,608	45.57	37%
3577.25	11.0	12.0	3,571,059	26,715,091	636,074	67.4%	1,725,027	12,904,929	307,260	39.60	33%
3576.25	10.0	13.0	3,824,778	28,613,162	681,266	72.2%	1,471,308	11,006,858	262,068	33.78	28%
3575.25	9.0	14.0	4,075,053	30,485,474	725,845	76.9%	1,221,033	9,134,546	217,489	28.03	23%
3574.25	8.0	15.0	4,313,048	32,265,915	768,236	81.4%	983,038	7,354,105	175,098	22.57	19%
3573.25	7.0	16.0	4,547,744	34,021,675	810,040	85.9%	748,342	5,598,345	133,294	17.18	14%
3572.25	6.0	17.0	4,776,243	35,731,070	850,740	90.2%	519,844	3,888,950	92,594	11.93	10%
3571.25	5.0	18.0	4,998,616	37,394,645	890,349	94.4%	297,470	2,225,375	52,985	6.83	6%
3570.25	4.0	19.0	5,166,411	38,649,919	920,236	97.6%	129,675	970,101	23,098	2.98	2%
3569.25	3.0	20.0	5,250,155	39,276,409	935,153	99.1%	45,931	343,611	8,181	1.05	1%
3568.25	2.0	21.0	5,278,392	39,487,653	940,182	99.7%	17,694	132,367	3,152	0.41	0%
3567.25	1.0	22.0	5,287,803	39,558,057	941,858	99.8%	8,283	61,963	1,475	0.19	0%
3566.25	0.0	23.0	5,296,086	39,620,020	943,334	100.0%	-	-	-	-	0%





NOTE:
1. LEVEL MARKS TO BE LOCATED BY SURVEYOR UNLESS SPECIFIED BY OWNER
2. MARKS TO BE MADE BY AN EXTRUSION WELDER USING BLACK FILAMENT (OR WHITE FILAMENT ON BLACK LINER).
3. MARKS SHOULD BEGIN AT THE TOP OF BERM AND CONTINUE TO THE BOTTOM OF THE SUMP. (TOP OF BERM SHOULD READ 23-FT, BOTTOM OF SUMP +1-FT SHOULD READ 1-FT)
4. REFERENCE PIT CAPACITY TABLES FOR ACCURATE ELEVATIONS

WATER LEVEL MARKS DETAIL 1/5
NOT TO SCALE

MITCHELL JOSEPH RATKE NEW MEXICO 29736 PROFESSIONAL ENGINEER
4-1-2025

ENVIROTECH ENGINEERING
2500 North Eleventh Street
Enid, Oklahoma
580.234.8780
envirotechconsulting.com
P.E. #29736 - Expiration Date: 12-31-2026

NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

PIT CAPACITY
SYSTEM CONNECTOR POND AND REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE:	APRIL 2025
SCALE:	1" = 40'
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	5 OF 11

4/1/2025 11:20:37 AM
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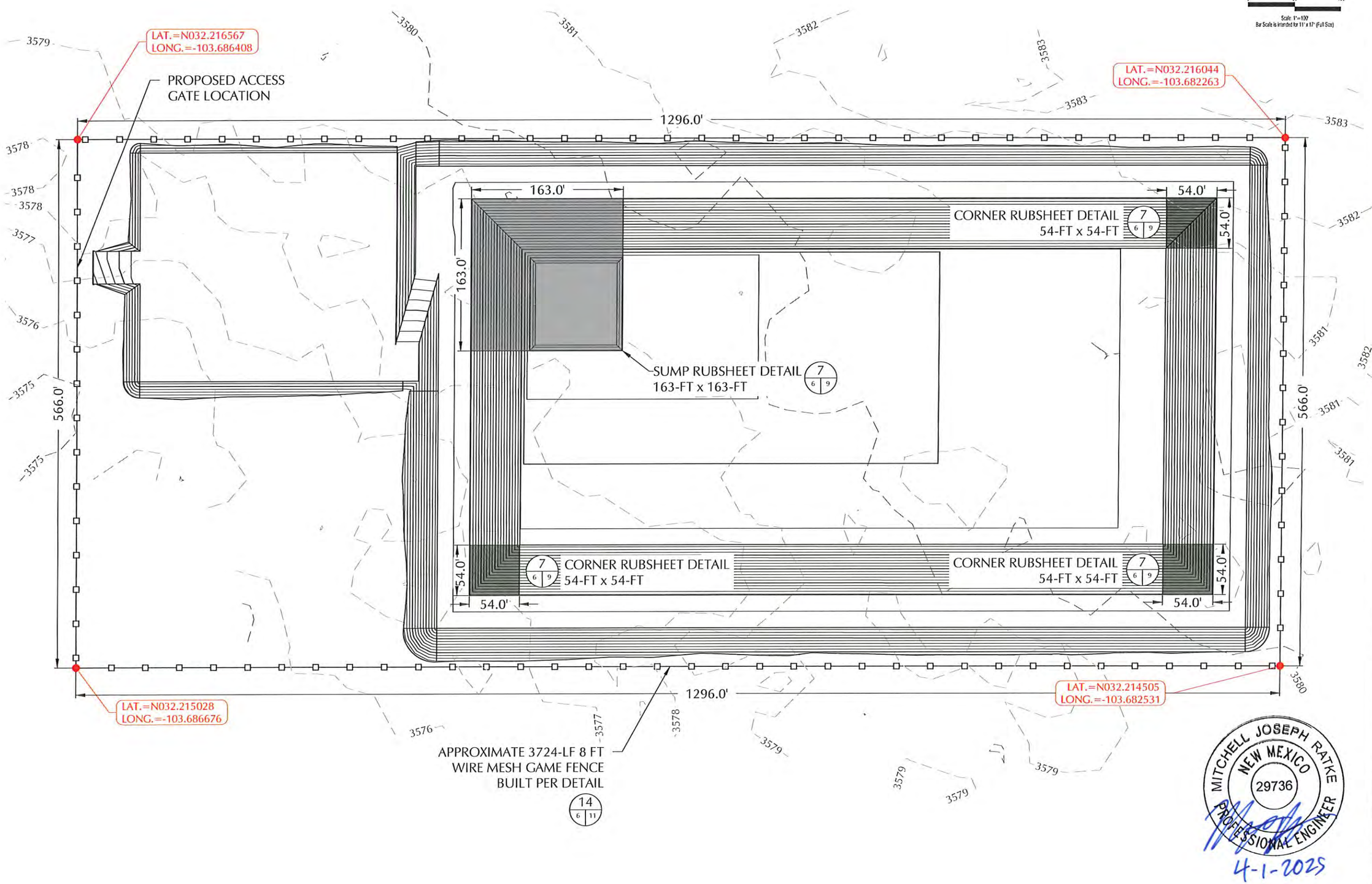

N
NORTH
0 50 100
Scale: 1"=100'
Bar Scale is intended for 11" x 17" (Full Size)

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Enid, Oklahoma
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NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

RUBSHEET & FENCE PLAN
SYSTEM CONNECTOR POND AND REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

MITCHELL JOSEPH RATKE
NEW MEXICO
29736
PROFESSIONAL ENGINEER
4-1-2025

DATE:	APRIL 2025
SCALE:	1" = 100'
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	6 OF 11

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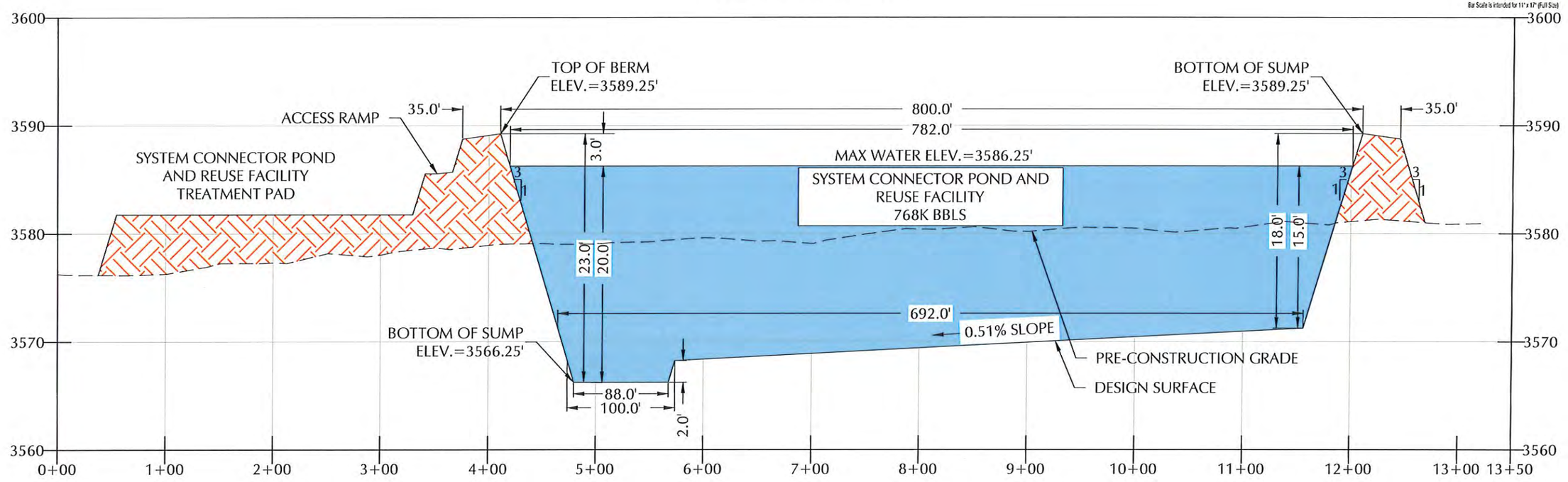
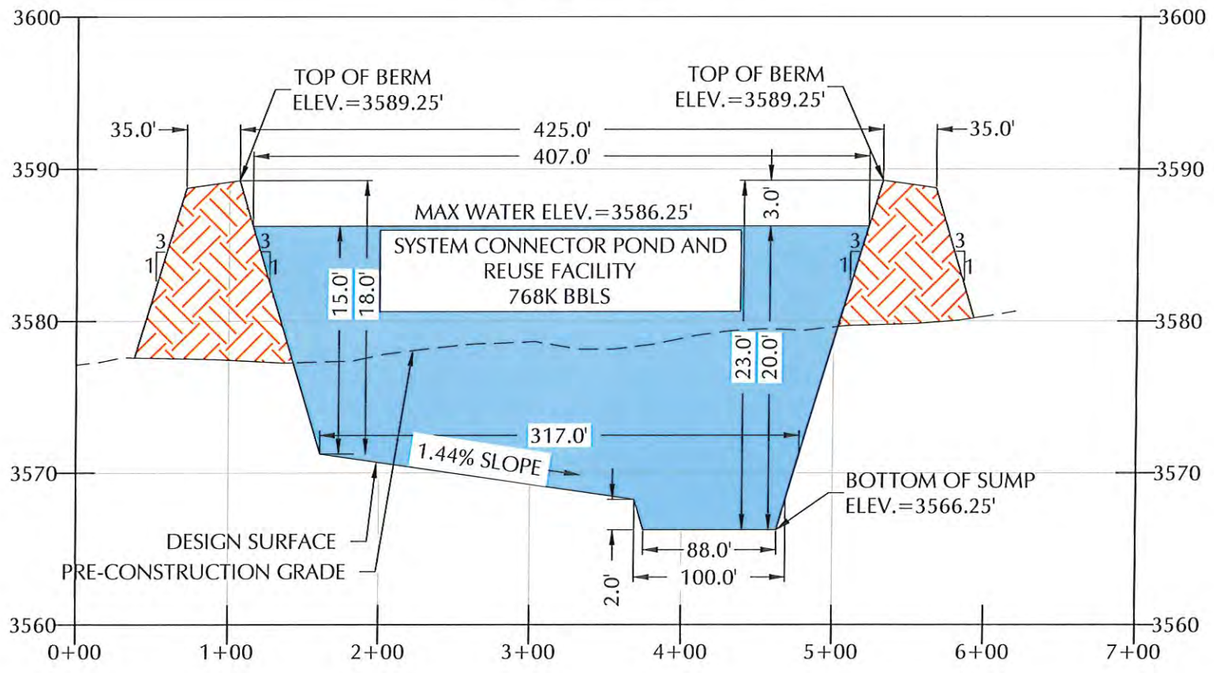
CROSS SECTION A-A



CROSS SECTION B-B



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NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

MITCHELL JOSEPH RATKE
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4-1-2025

CROSS SECTIONS A & B
SYSTEM CONNECTOR POND AND
REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE:	APRIL 2025
SCALE:	HORIZONTAL 1"=100' VERTICAL 1"=10'
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	7 OF 11

4/1/2025 11:20:43 AM
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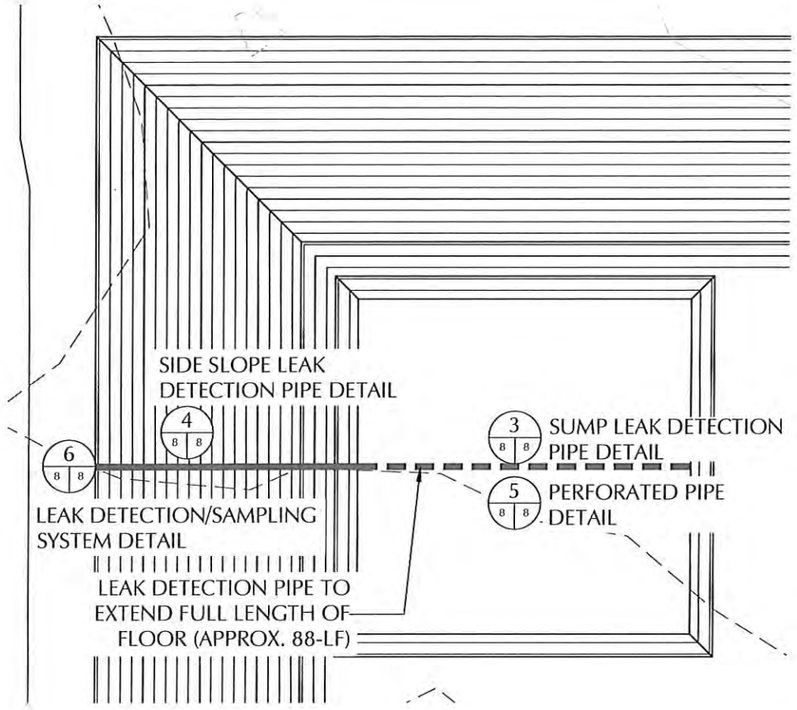
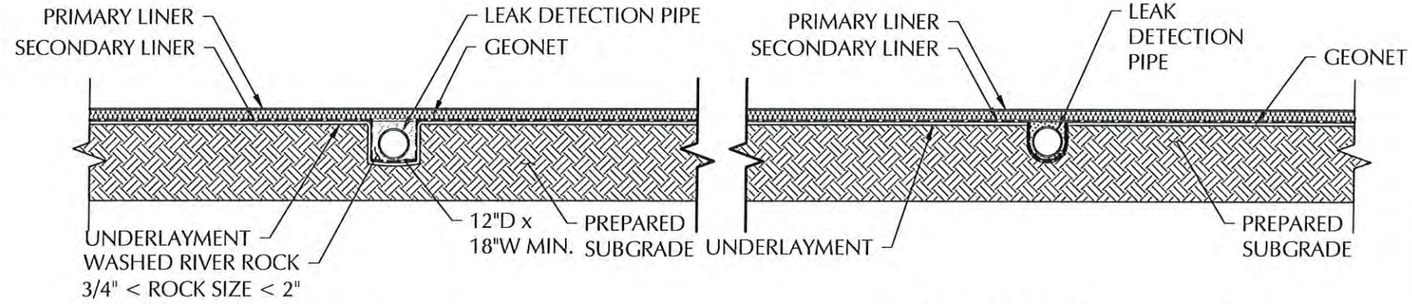
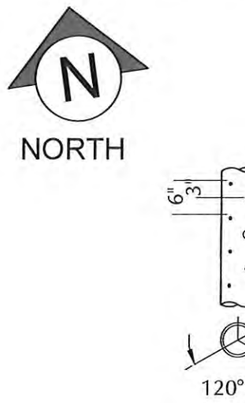


SUMP OVERVIEW DETAIL (2 / 4 8)
NOT TO SCALE

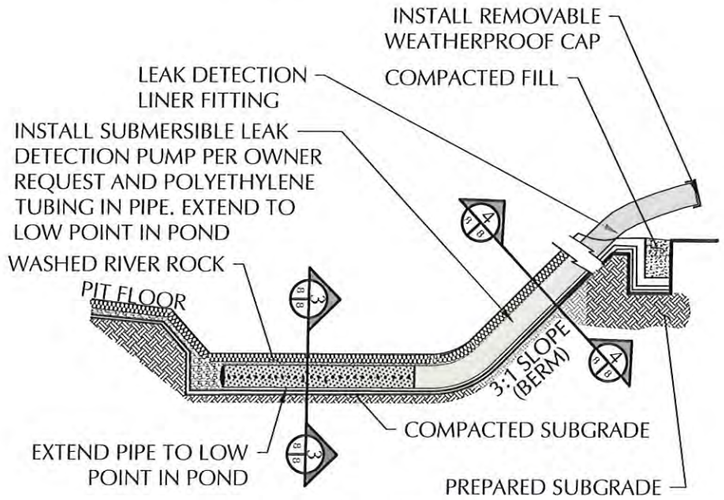


SUMP LEAK DETECTION PIPE DETAIL (3 / 8 8)
NOT TO SCALE

SIDE SLOPE LEAK DETECTION PIPE DETAIL (4 / 8 8)
NOT TO SCALE



PERFORATED PIPE DETAIL (5 / 8 8)
NOT TO SCALE



LEAK DETECTION/SAMPLING SYSTEM DETAIL (6 / 8 8)
NOT TO SCALE

PROPOSED PIT REFERENCE TABLE

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	3566.25-FT ELEVATION
BERM (ROAD CREST)	DESIGN ELEV. 3589.25 FT- RD CREST (35-FT)
LEAK DETECTION PIPING	6-IN DR11.X PERFORATED HDPE LEAK DETECTION PIPE

NOTES:
1. LEAK DETECTION SYSTEM TO BE INSTALLED BY OWNER.
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.

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4-1-2025

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NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

SUMP DETAILS
SYSTEM CONNECTOR POND AND
REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE:	APRIL 2025
SCALE:	NOT TO SCALE
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	8 OF 11

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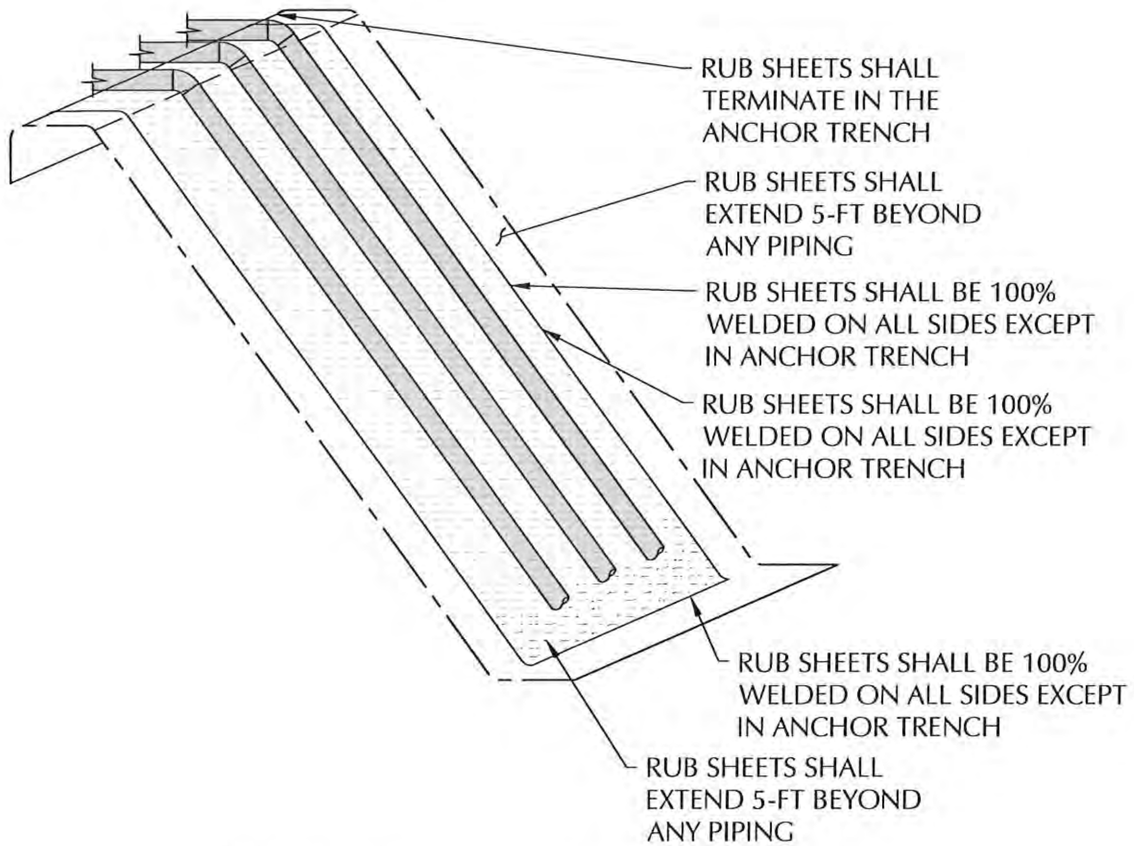
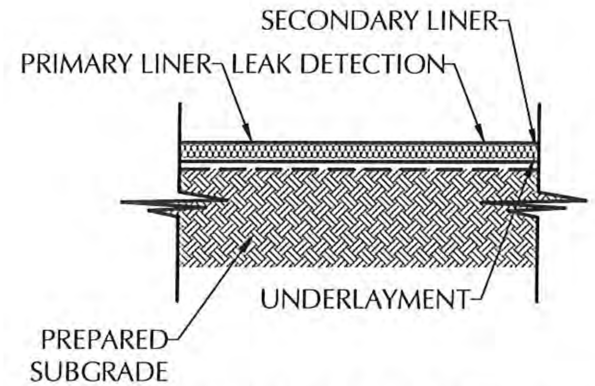
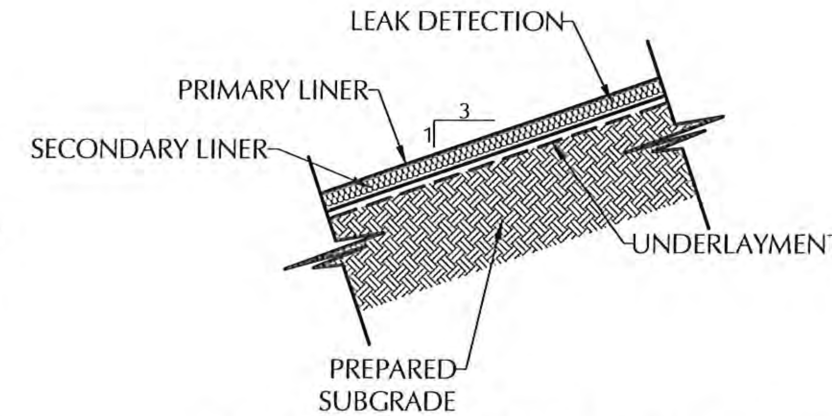


SUMP/CORNER RUB SHEET DETAIL (7 — 6 | 9)
NOT TO SCALE



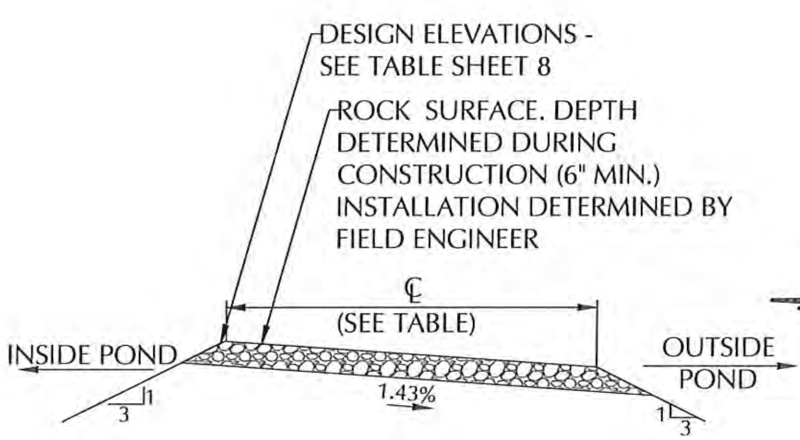
LINER SYSTEM FLOOR DETAIL (8 — 4 | 9)
NOT TO SCALE



LINER SYSTEM SIDE SLOPE DETAIL (9 — 4 | 9)
NOT TO SCALE

GENERAL NOTES:

1. SEE REFERENCE TABLES SHEET 8 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 — 4 | 9)
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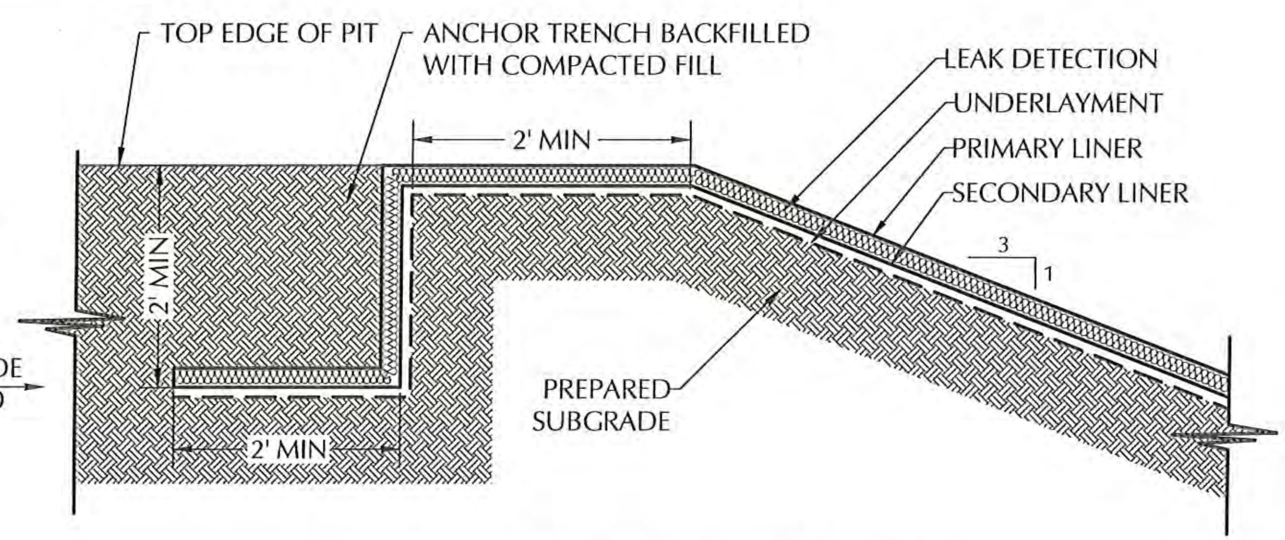

ANCHOR TRENCH DETAIL (11 — 4 | 9)
NOT TO SCALE

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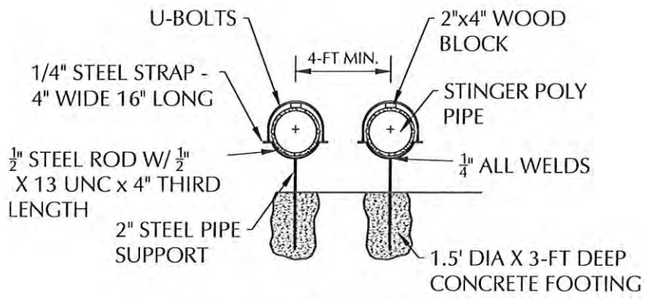
NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

LINER DETAILS
SYSTEM CONNECTOR POND AND REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE:	APRIL 2025
SCALE:	NOT TO SCALE
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	9 OF 11



STINGER SYSTEM ANCHOR DETAIL 12 (4 | 10)
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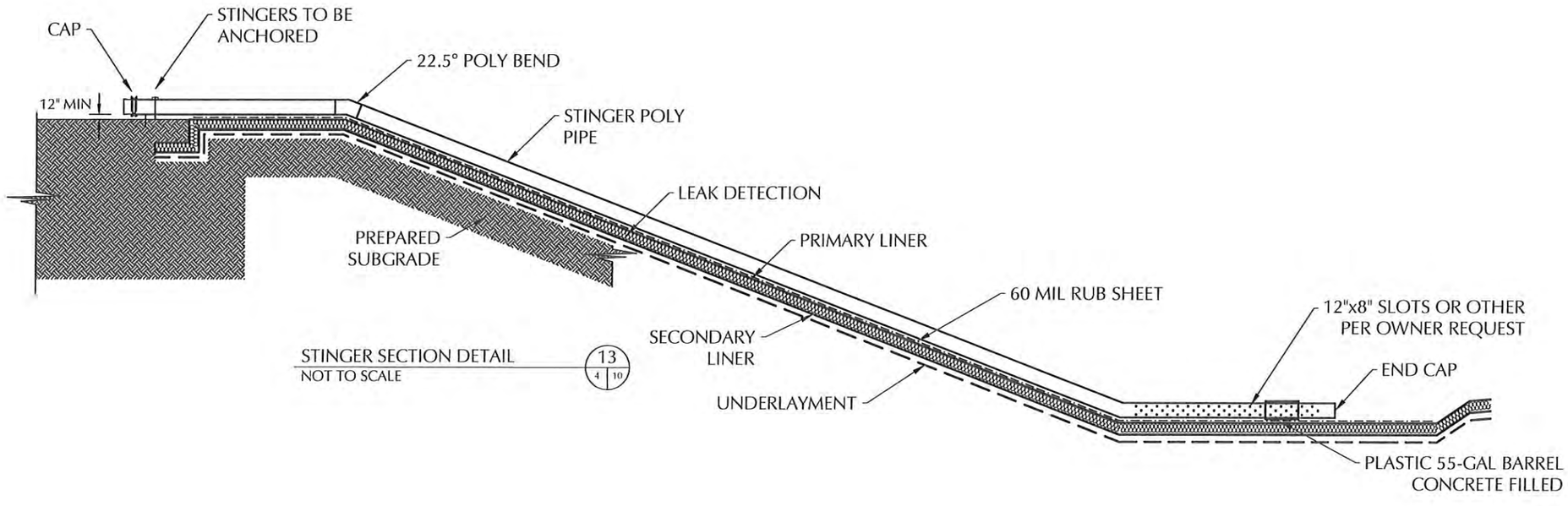

STINGER SECTION DETAIL 13 (4 | 10)
NOT TO SCALE

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NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

STINGER DETAILS
SYSTEM CONNECTOR POND AND REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

MITCHELL JOSEPH RATKE
NEW MEXICO
29736
PROFESSIONAL ENGINEER
4-1-2025

DATE:	APRIL 2025
SCALE:	NOT TO SCALE
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	10 OF 11

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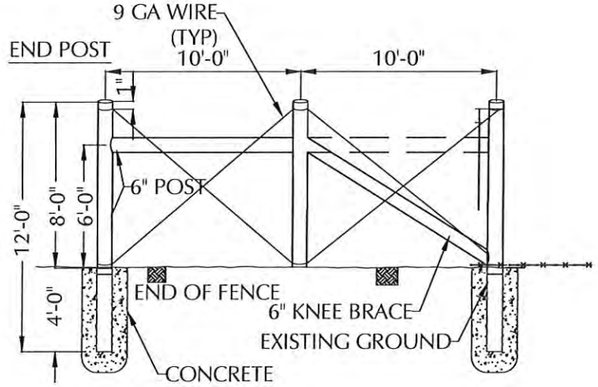
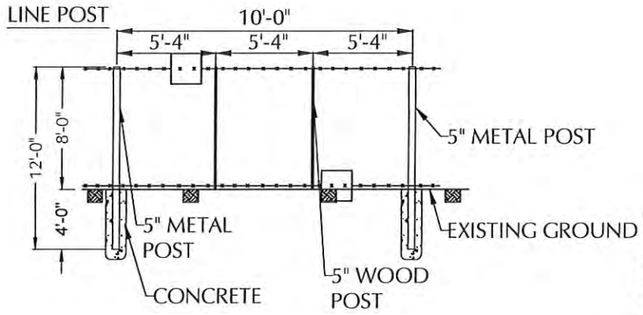
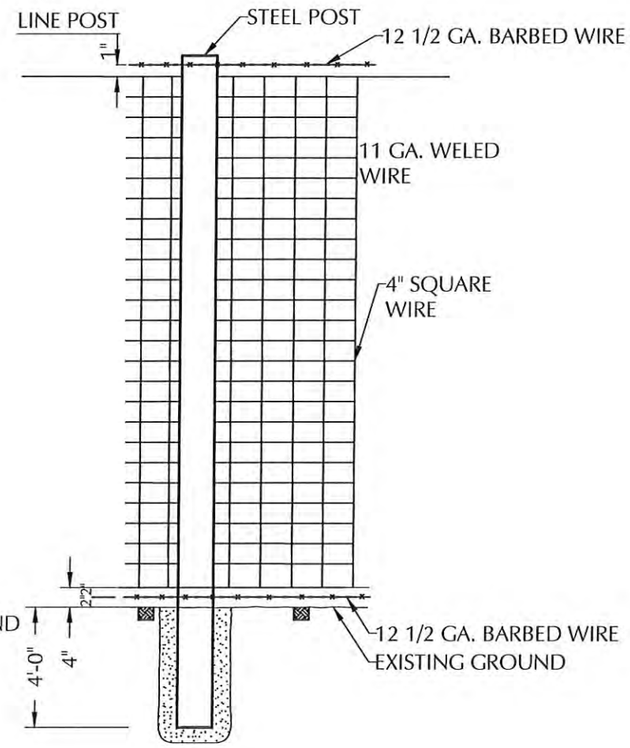
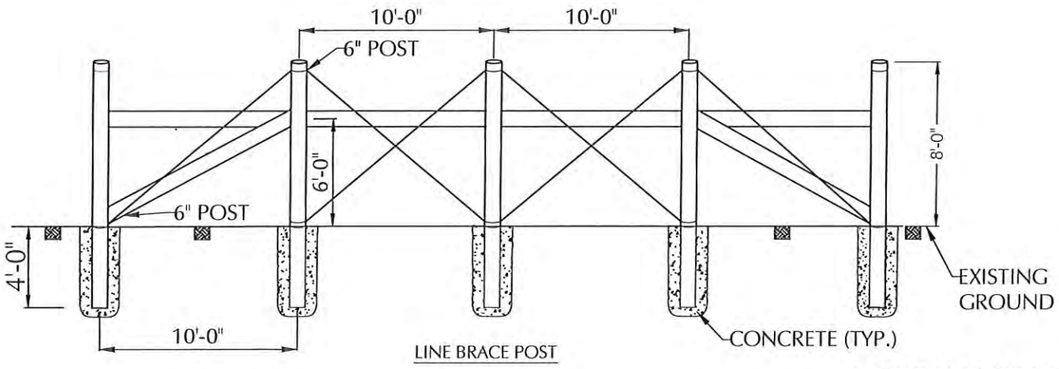
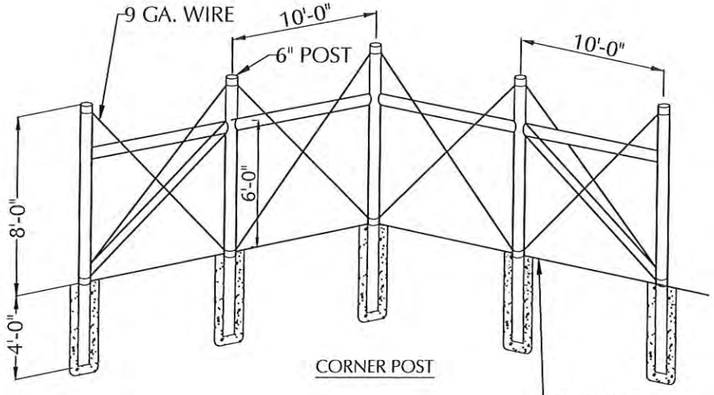








LINE BRACE POST



8-FT GAME FENCE DETAIL (14 / 6 | 11)
Not to Scale

GENERAL 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 0E 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.
5. WOVEN WIRE SHALL BE SINGLE WRAPPED AND TIED OFF. FENCE TO BE CONTINUED, SHALL BE RESTARTED IN LIKE MANNER. 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.

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NO.	DATE	DESCRIPTION

SOLARIS WATER MIDSTREAM

FENCE DETAILS
SYSTEM CONNECTOR POND AND REUSE FACILITY
SOLARIS WATER MIDSTREAM
SECTION 16, TOWNSHIP 24 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE:	APRIL 2025
SCALE:	NOT TO SCALE
DESIGNED BY:	R. MOHAN
DRAWN BY:	K. TALBOTT
CHECKED BY:	M. RATKE
PROJECT NO.	025112-00
SHEET NO.	11 OF 11

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MITCHELL JOSEPH RATKE
NEW MEXICO
29736
PROFESSIONAL ENGINEER
4-1-2025

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/grispecs) 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).

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*

(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

Sincerely Yours,

R K 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

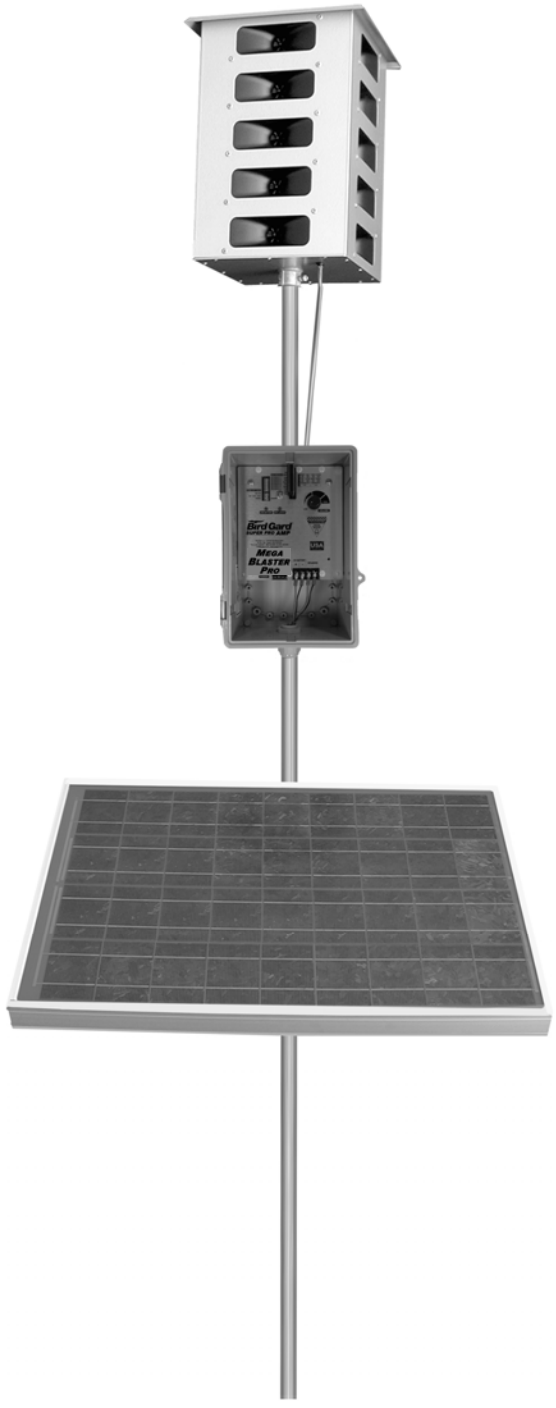
ASTM Geosynthetics Standards 2017
www.ASTM.org/Standards

AVIAN DETERRENT SYSTEM

MEGA BLASTER PRO

BIRD-X

User's Manual



Overview

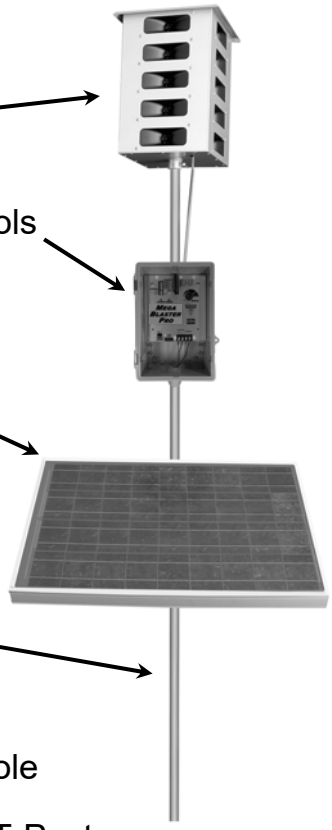
The Bird-X Mega Blaster Pro utilizes the innate power of the natural survival instincts of birds to effectively repel them. Digital recordings of distressed and alarmed birds, along with the sounds made by their natural predators are broadcast through high fidelity weather-resistant speakers over the 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.

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

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.

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

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

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

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 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.

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).

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.

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[1] 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.

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…

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).

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).

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.

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.

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 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.

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

The 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.

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

The 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
(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…

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

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.

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.

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.

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.

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.

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).

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.

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

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.

19.15.34.9 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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 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,

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.

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 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.

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.

May 2025

C-147 Permit Package
System Connector AST Containment
Section 16, T24S, R32E, Lea County

Volume 3:

- *C-147 Form*
- *Stamped Design Drawings and Specifications*
- *Plans for Design/Construction, O&M, and Closure*
- *EPP AST Set Up SOP*
- *Variances for AST Storage Containments*
- *Applicability of Engineering Variances to Permian Basin Conditions*

Looking west from the northeast corner of the 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

C-147

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

Form C-147
Revised October 11, 2022

Recycling Facility and/or Recycling Containment

Type of Facility: ☑ Recycling Facility ☑ Recycling Containment*

Type of action: ☑ Permit ☐ Registration ☐ Modification ☐ Extension ☐ Closure ☐ Other (explain) _____

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

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

1.

Operator: Solaris Water Midstream LLC (For multiple operators attach page with information) OGRID #: 371643

Address: 9651 Katy freeway, Suite 400, Houston, Tx 77024

Facility or well name (include API# if associated with a well): System Connector Pond Recycling Facility and AST

OCD Permit Number: 1RF-540 (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr L Section 16 Township 24 S Range 32 E County: Lea

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

2.

☑ **Recycling Facility:**

Location of recycling facility (if applicable): Latitude 32.216111 Longitude -103.685810 NAD83

Proposed Use: ☑ Drilling* ☑ Completion* ☑ Production* ☑ Plugging *

The re-use of produced water may NOT be used until fresh water zones are cased and cemented*

☐ Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***

☑ Fluid Storage

☑ Above ground tanks ☑ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type_____

☐ Activity permitted under 19.15.36 NMAC explain type:_____ ☐ Other explain _____

☐ For multiple or additional recycling containments, attach design and location information of each containment

☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date:_____

3.

☑ **Recycling Containment:**

☐ Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)

Center of Recycling Containment (if applicable): Latitude 32.216111 Longitude -103.685810 NAD83

☐ For multiple or additional recycling containments, attach design and location information of each containment

☐ Lined ☐ Liner type: Thickness 40 mil pri mil ☑ LLDPE ☐ HDPE ☐ PVC ☐ Other 30 mil sec. LLDPE

☐ String-Reinforced

Liner Seams: ☑ Welded ☐ Factory ☐ Other _____ Volume: 40,000 bbl Dimensions: L_____ x W_____ x D_____

☐ Recycling Containment Closure Completion Date:_____ See Attached 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 Combined Closure Costs in Vol. 2

5.

Fencing:

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

☑ Alternate. Please specify Security Gate - 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. See Transmittal Letter in Vol. 1

8.

Siting Criteria for Recycling Containment

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

General siting

Ground water is less than 50 feet below the bottom of the Recycling Containment. NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells Plates 1 and 2	☐ Yes ☑ No ☐ NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality Plate 3	☐ Yes ☑ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division Plate 4	☐ Yes ☑ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map Plate 5	☐ Yes ☑ No
Within a 100-year floodplain. FEMA map Plate 6	☐ Yes ☑ No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site Plate 7	☐ Yes ☑ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; aerial photo; satellite image Plate 8	☐ Yes ☑ No
Within 500 horizontal feet of a spring or a fresh water well used for domestic or stock watering purposes, in existence at the time of initial application. Plates 1 and 7 - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☑ No
Within 500 feet of a wetland. Plate 9 - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	☐ Yes ☑ No

9.

Recycling Facility and/or Containment Checklist:

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

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

10.

Operator Application Certification:

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

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

Signature: Drew Dixon Date: 05/05/2025

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

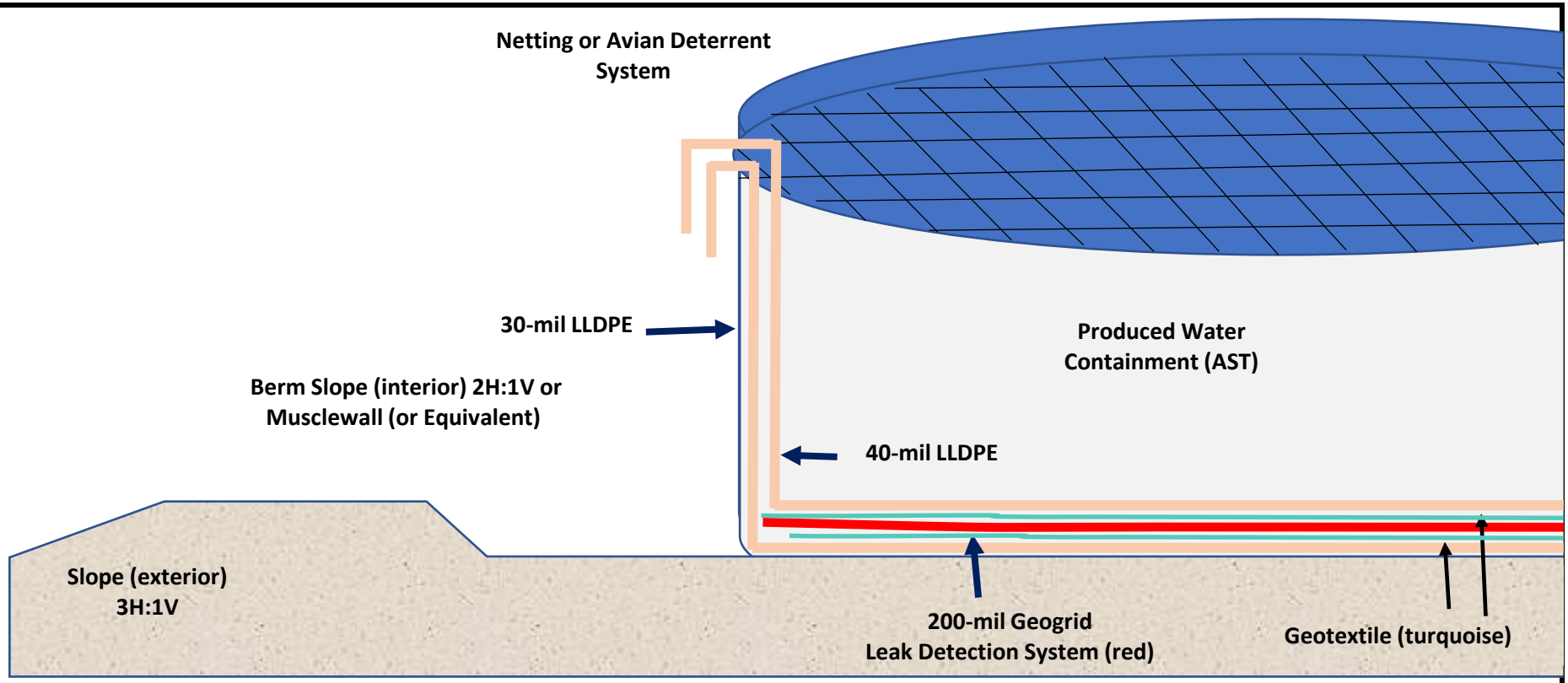
11.

OCD Representative Signature: Victoria Venegas **Approval Date:** 05/09/2025

Title: Environmental Specialist **OCD Permit Number:** 1RF-540

☒ OCD Conditions

☒ Additional OCD Conditions on Attachment



Description of Leak Detection System

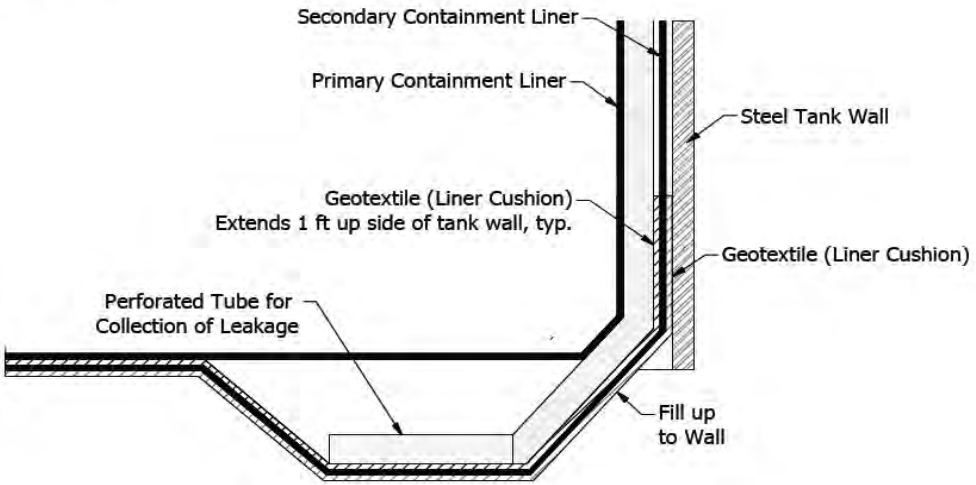
- 40-mil LLDPE comprise primary liner and 30-mil LLDPE comprise the secondary liner
- 200-mil geogrid drainage layer lies between the primary and secondary liner per Plate 2
- Geotextile between the geogrid and each liner
- > 3-inch deep sump excavated on down slope side of AST per Sump Design Drawing
- 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 - System Connector AST	**May 2025**

Determine slope of pad and low point of AST

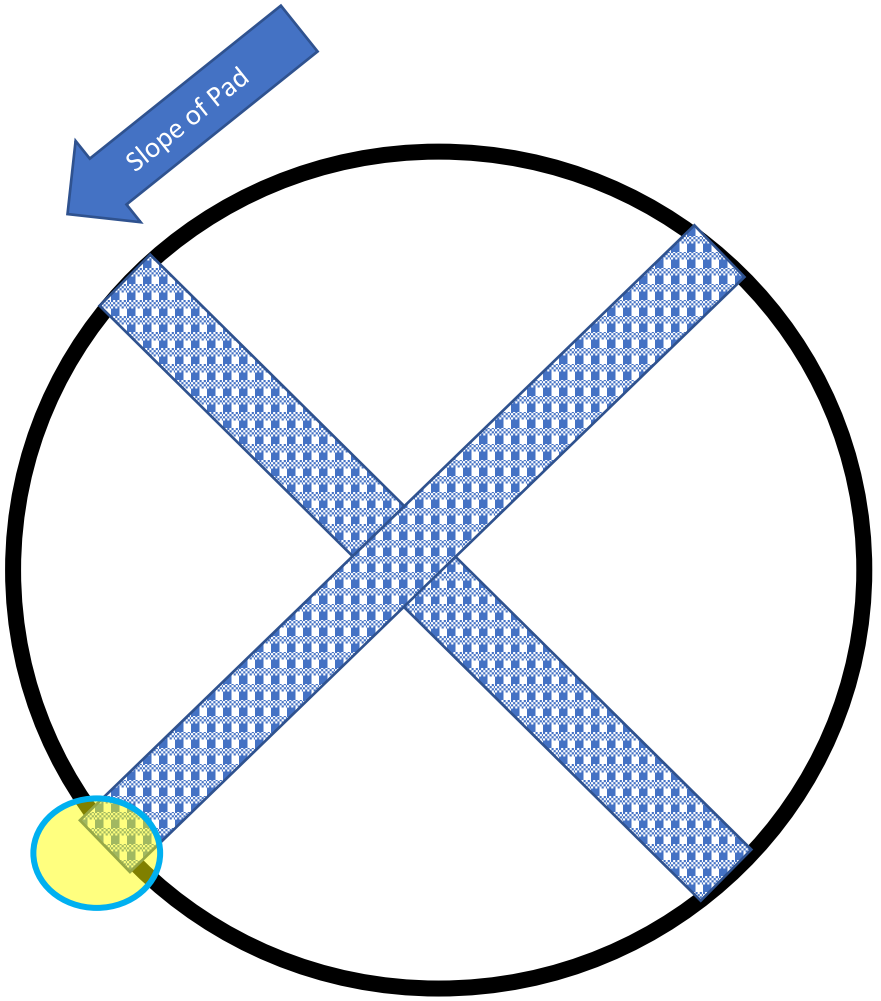
200 mil geogrid placed
above 8-oz geotextile and 30-mil secondary liner
inside of AST after set up, before installation of primary liner
below two 40-mil primary liner system
geotextile is placed around the 200-mil geogrid drainage system

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



SECTION B
SUMP DETAIL

Sump Location



R.T. Hicks Consultants Albuquerque, NM	Layout of Geogrid Drainage Mat	Plate 2
	Solaris Water Midstream - System Connector AST	May 2025

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.

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

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

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

The operator shall post an upright sign no less than 12 inches by 24 inches with lettering not less than two inches in height in conspicuous places surrounding the containment. The operator shall post the sign in a manner and location such that a person can easily read the legend. The sign shall provide the following information: the operator's name, the location of the site by quarter-quarter or unit letter, section, township and range, and emergency telephone numbers.

19.15.34.12 C
Signs. The operator shall post an upright sign no less than 12 inches by 24 inches with lettering not less than two inches in height in a conspicuous place on the fence surrounding the containment. The operator shall post the sign in a manner and location such that a person can easily read the legend. The sign shall provide the following information: the operator's name, the location of the site by quarter-quarter or unit letter, section, township and range, and emergency telephone numbers.

Site Preparation

Foundation for AST Containment

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

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

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

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

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

- the AST Containment will have a properly constructed compacted earth foundation and interior slopes (vertical steel) consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear.
- Geotextile will be placed under the liner where needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.
- If the AST Containment is within a levee, the inside grade is no steeper than two horizontal feet to one vertical foot (2H: 1V) and the outside grade no steeper than three horizontal feet to one vertical foot (3H: IV). The vertical steel walls of the AST Containment are the *subject of a requested variance*.

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

The Operator will ensure that at a point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage and external discharge or suction lines shall not penetrate the liner.

Liner and Leak Detection Materials

The liner and geotextile specifications show that all primary (upper) liners in a recycling containment shall be geomembrane liners composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. All primary liners shall be *an equivalent liner [to that stated in Rule 34] approved by OCD pursuant to a variance.* The liner system is presented in an earlier section of this submission.

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

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

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

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.

All AST containments holding produced water will have a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions. The rule states that the edges of all secondary liners shall be anchored in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep. *The lack of an anchor trench with an AST Containment is also the subject of requested variance.*

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

The AST Containment Contractor will cause the recycling containment will have a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet to facilitate drainage. The leak detection system shall consist of a properly designed drainage and collection and removal system placed above the lower geomembrane liner in depressions and sloped to facilitate the earliest possible leak detection (see attached design sketch).

19.15.34.12 A
(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.

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

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.

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

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.

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

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

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

- The operator will use the treated produced water in the containments for drilling, completion (stimulation), producing or processing oil or gas or both. If other uses are planned, the operator will notify the OCD though the submission of a modified C-147.

- For all exploration and production operations that use produced water, the operator will conduct these activities in a manner consistent with hydrogen sulfide gas provisions in 19.15.11 NMAC or NORM provisions in 19.15.35 NMAC, as applicable.

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

- The operator will address all releases from the recycling and re-use of produced water in accordance with 19.15.29 NMAC.

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

- The operator will not discharge into or store any hazardous waste in the recycling containments, but they may hold fluids such was freshwater, brackish water, recycled and treated water, water generated by oil or gas processing facilities, or other waters that are gathered for well drilling or completion. The recycling facility will not be used for the disposal of produced water. The operator will maintain the containments free of miscellaneous solid waste or debris.

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

- The operator will verify that no oil is on the surface of the contained fluid. If oil is observed, the oil shall be removed using an absorbent boom or other device and properly disposed at an approved facility. An absorbent boom or other device will be maintained on site.

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

- The operator will install and use a header and diverter described in the design/construction plan in order to prevent damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes during injection or withdrawal of liquids.

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

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

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

- If the liner develops a leak or if any penetration of the liner occurs above the liquid's surface, then the operator will repair the damage or initiate replacement of the liner within 48 hours of discovery or will seek a variance from the division district office within this time period.

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

- If visible inspection suggests that the liner developed a leak or if any penetration of the liner occurs below the liquid's surface, then the operator will remove all liquid above the damage or leak line within 48 hours of discovery. The operator will also notify the district division office within this same 48 hours of the discovery and repair the damage or replace the liner.

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

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

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

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

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

Monitoring, Inspections, and Reporting

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

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

Weekly inspections consist of:

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

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

- Inspect netting (may not be used if Mega Blaster Pro avian deterrent is used) for damage or dead wildlife, including migratory birds. Operator shall report the discovery of a dead animal to the appropriate wildlife agency and to the district within 30 days of discovery. Further prevention measures may be required.

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

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

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

Monthly, the operator will:

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

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

Cessation of Operations

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

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

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

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

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

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

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

Closure Plan

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

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

Excavation and Removal Closure Plan – Protocols and Procedures

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

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

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

Closure Plan
Above Ground Tank Containment (AST)

Closure Documentation

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

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

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

Reclamation and Re egetation

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

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.

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.

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.

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 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

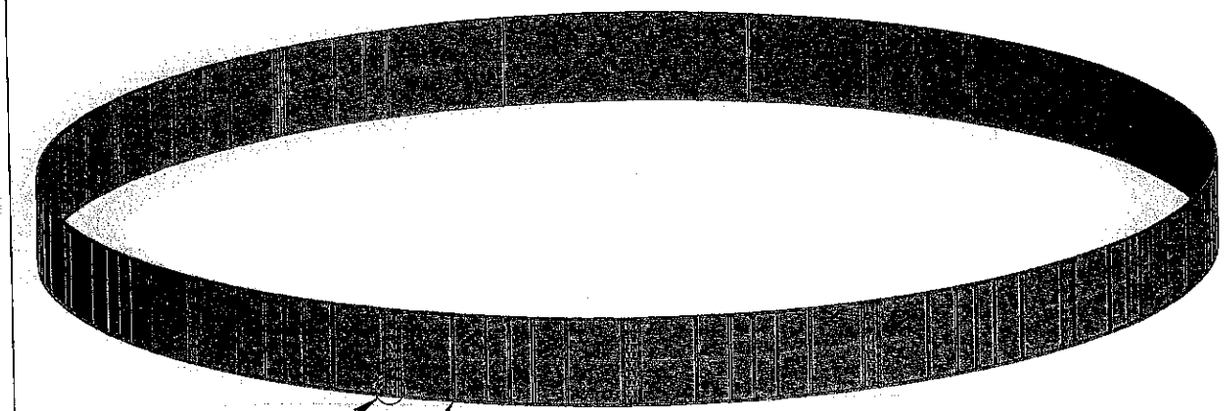
Three Amigos Tank Design

RAMSEY ENGINEERING
STRONG BY DESIGN

40K Assembly Prints

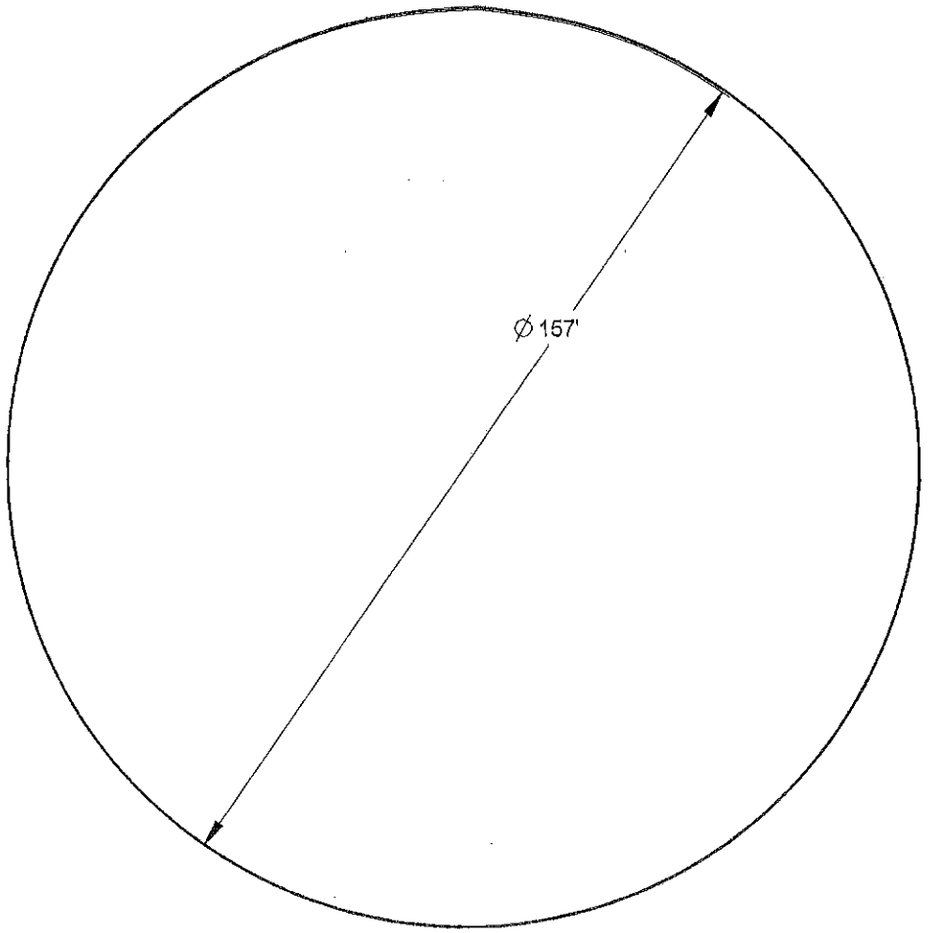
ITEM	PART NUMBER	QTY
1	40K-300	15
2	LC-001	120
3	LC-002	240

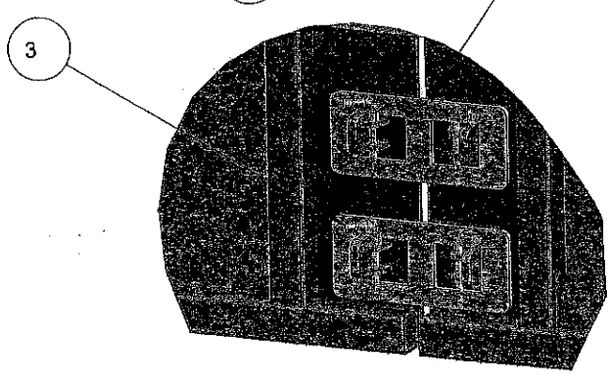
1) MAXIMUM FILL HEIGHT = 11'-6"
2) VOLUME AT MAX FILL HEIGHT = 39,700 BBL.
3) INCREMENTAL VOLUME = 3448 BBL PER FOOT



SEE DETAIL B

SCALE 0.005

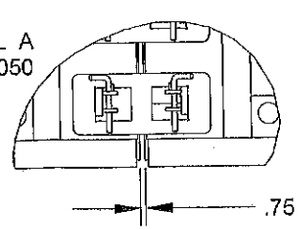




DETAIL B
SCALE 0.070

12' 2"

SEE DETAIL A



DETAIL A
SCALE 0.050

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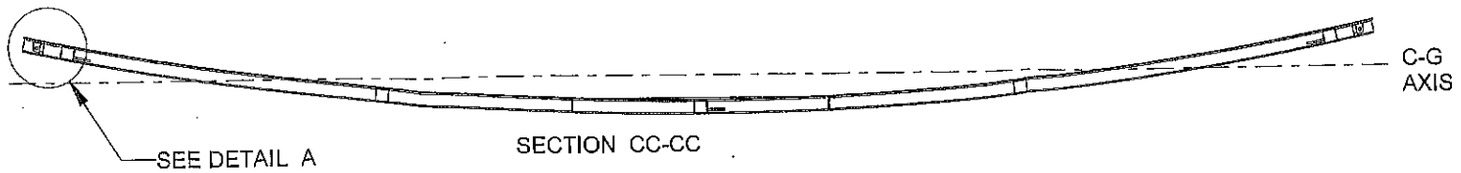
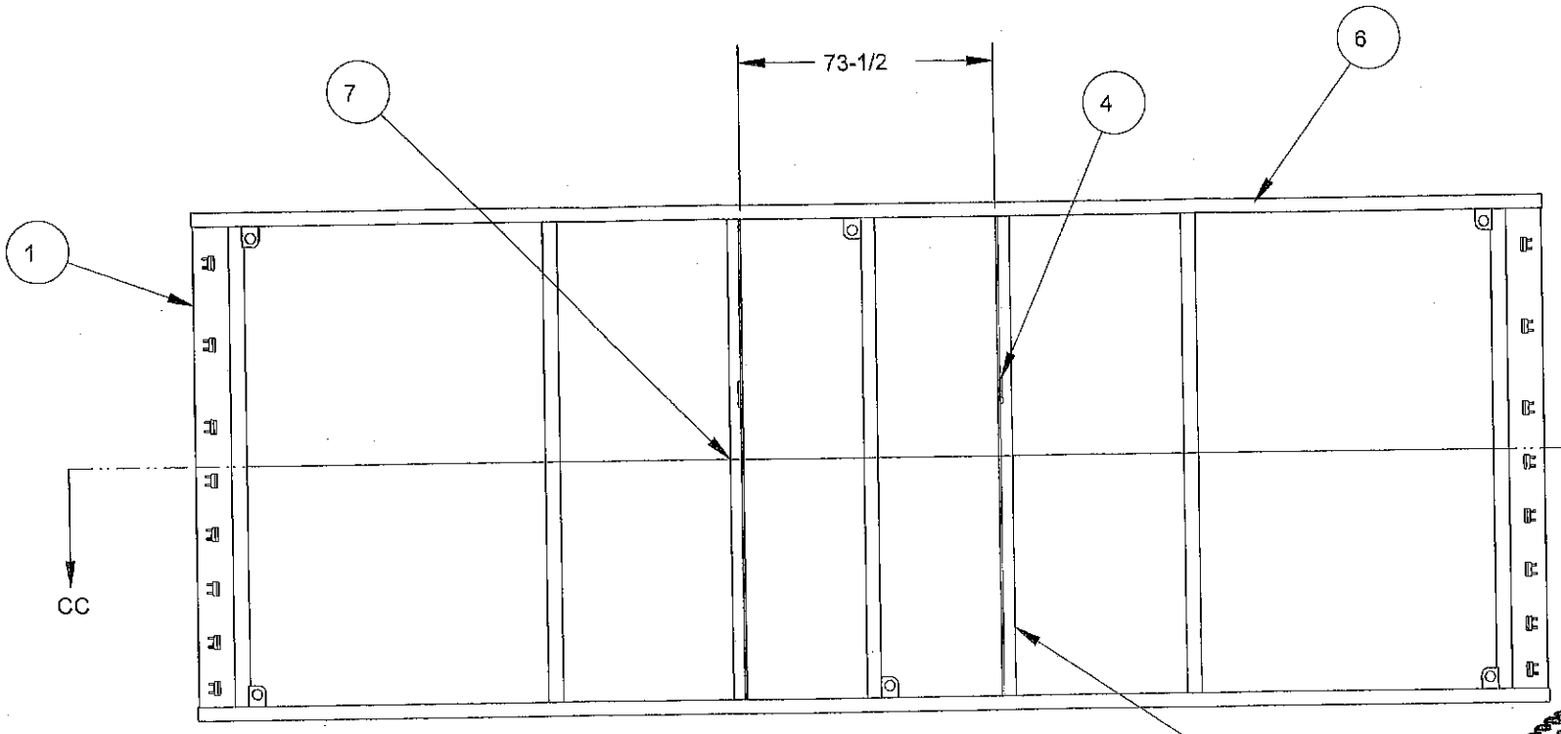
PROFESSIONAL ENGINEER

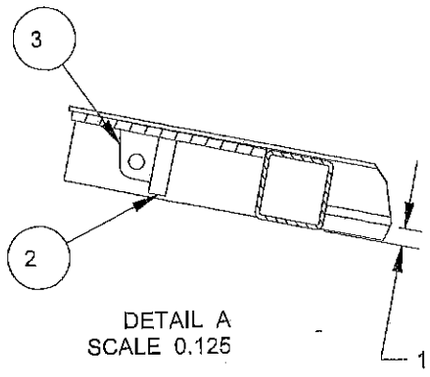
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	SHEET 1 OF 1
		40K ASSEMBLY
		MCR 3/15/2013
SEE BOM		40K-ASSEMBLY

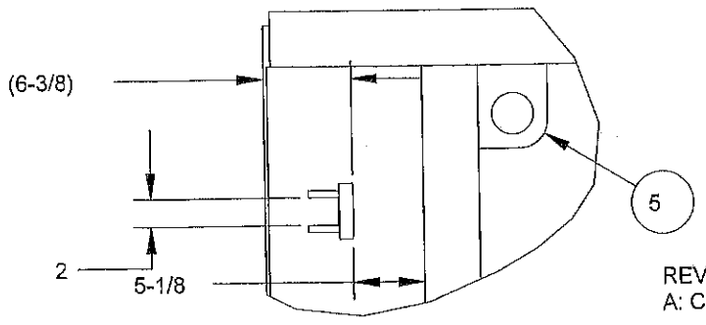
ITEM	PART NUMBER	QTY
1	40K-004	2
2	40K-005	16
3	40K-006	32
4	40K-008	2
5	40K-009	6
6	40K-200	1
7	40K-007(L)	1
8	40K-007(R)	1



SECTION CC-CC

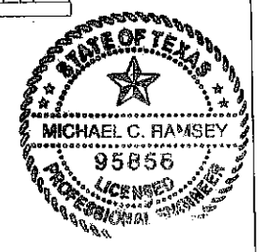






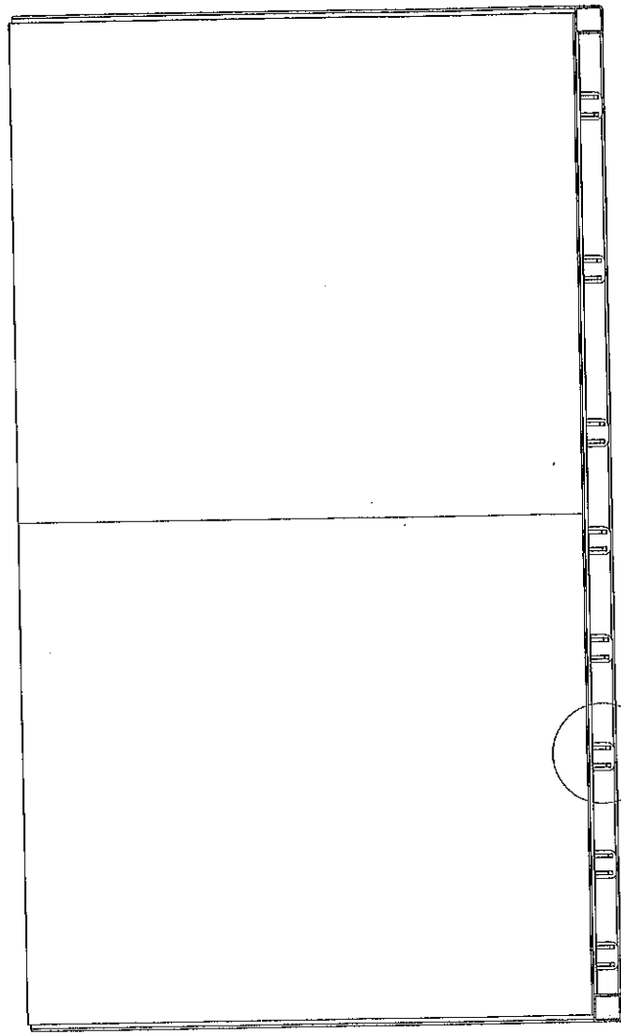
SCALE 0.100

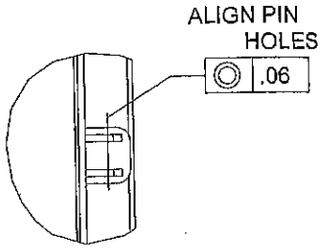
REVISION NOTES:
A: CHANGED HEIGHT TO MATCH PRODUCT. ADDED LIFTING LUGS.



TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX∟±0.005	RAMSEY ENGINEERING	SHEET 1 OF 2
		40K-300
		MCR 10/31/12
SEE BOM	REV A	40K-300

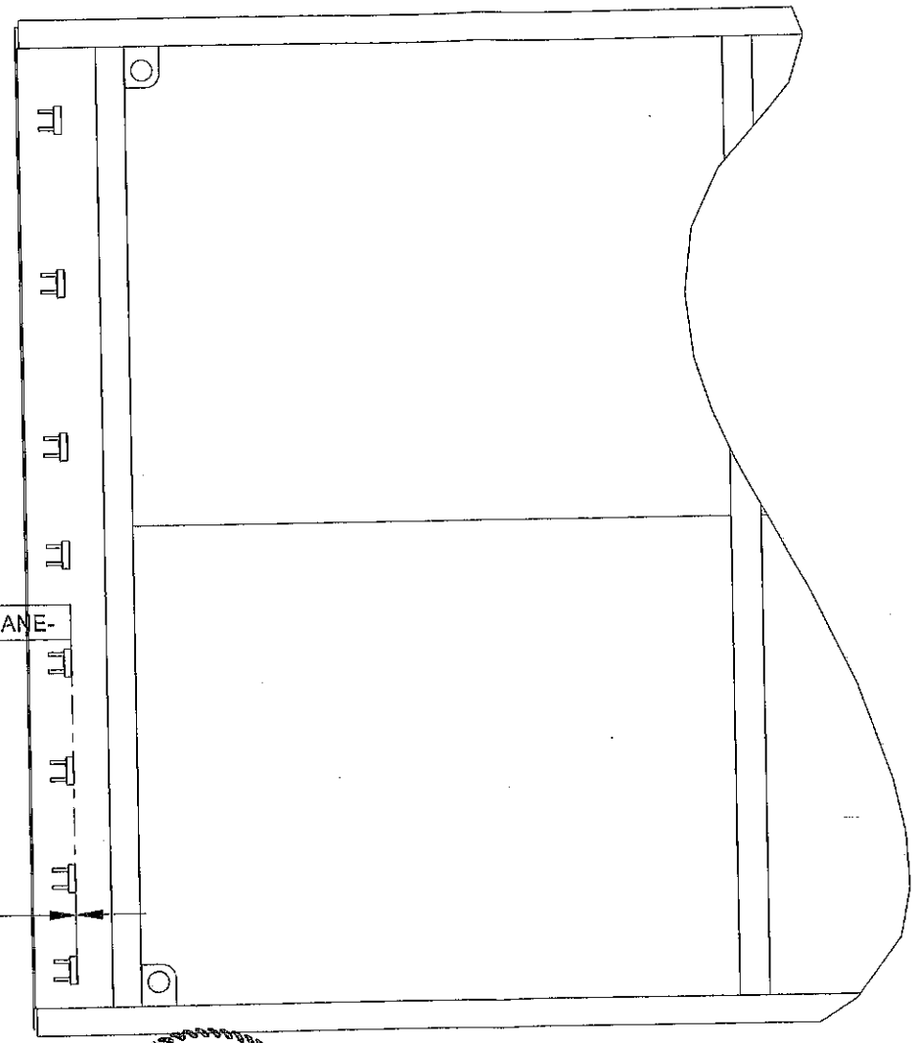
NOTES:
1) ALIGN TABS WITHING 1/16 OF PLANE ESTABLISHED BY THE AVERAGE OF 3 NEAREST TABS.





DETAIL B
SCALE 0.100

SEE DETAIL B



.00 SEE NOTE 1

⌖	.06	TAB_PLANE
//	.06	TAB_PLANE

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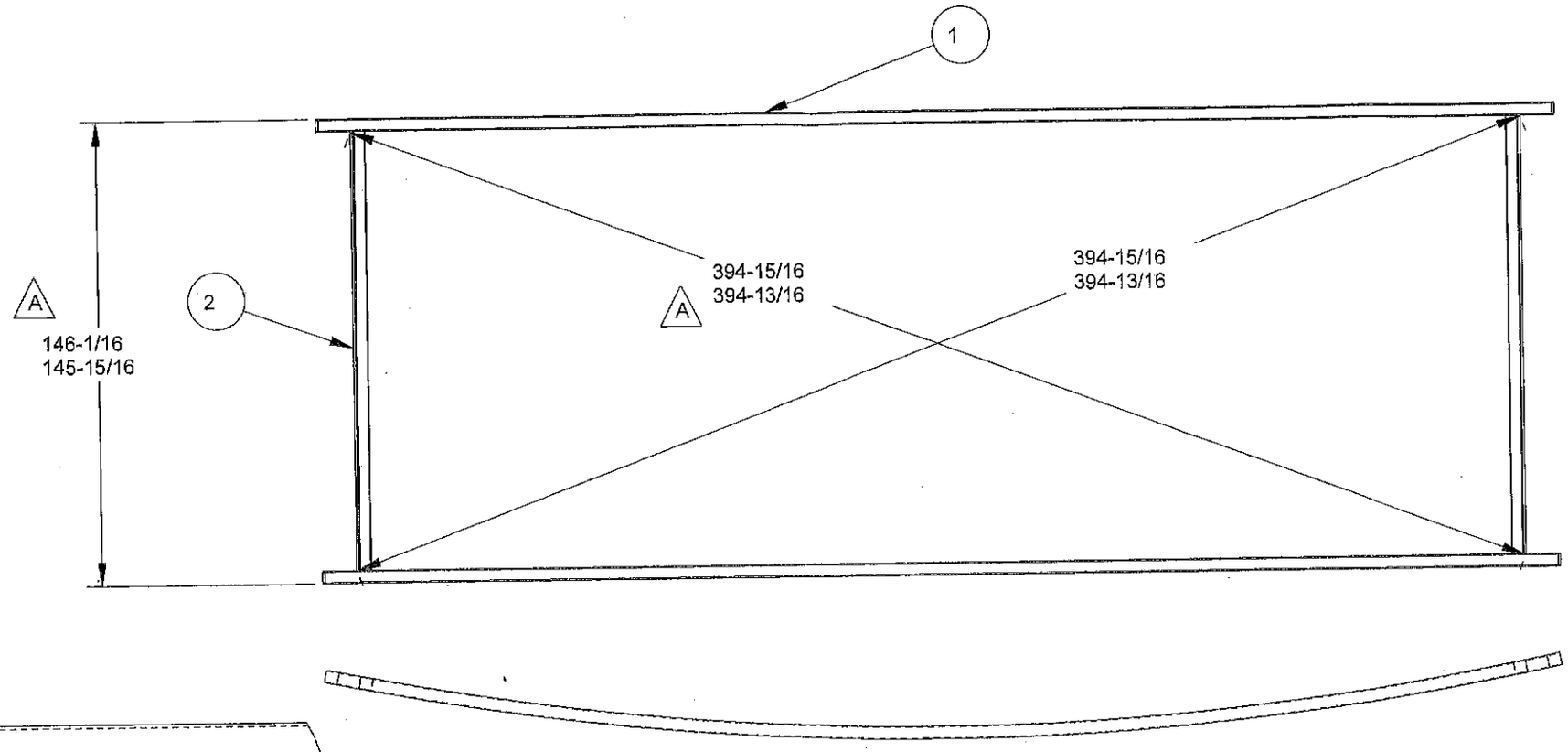
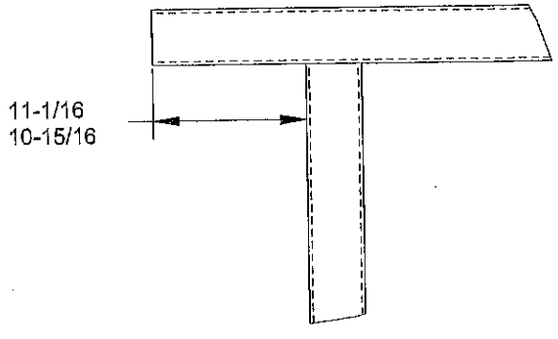
TOLERANCES UNLESS NOTED OTHERWISE X.XD±0.05 X.XXG±0.01 X.XXXL±0.005	RAMSEY ENGINEERING	SHEET 2 OF 2
		40K-300
		MCR 10/31/12
	REV A	40K-300

ITEM	PART NUMBER	QTY
1	40K-001	2
2	40K-002	2





SCALE 0.100

REVISION NOTES:
A: CHANGED HEIGHT TO MATCH PRODUCT.

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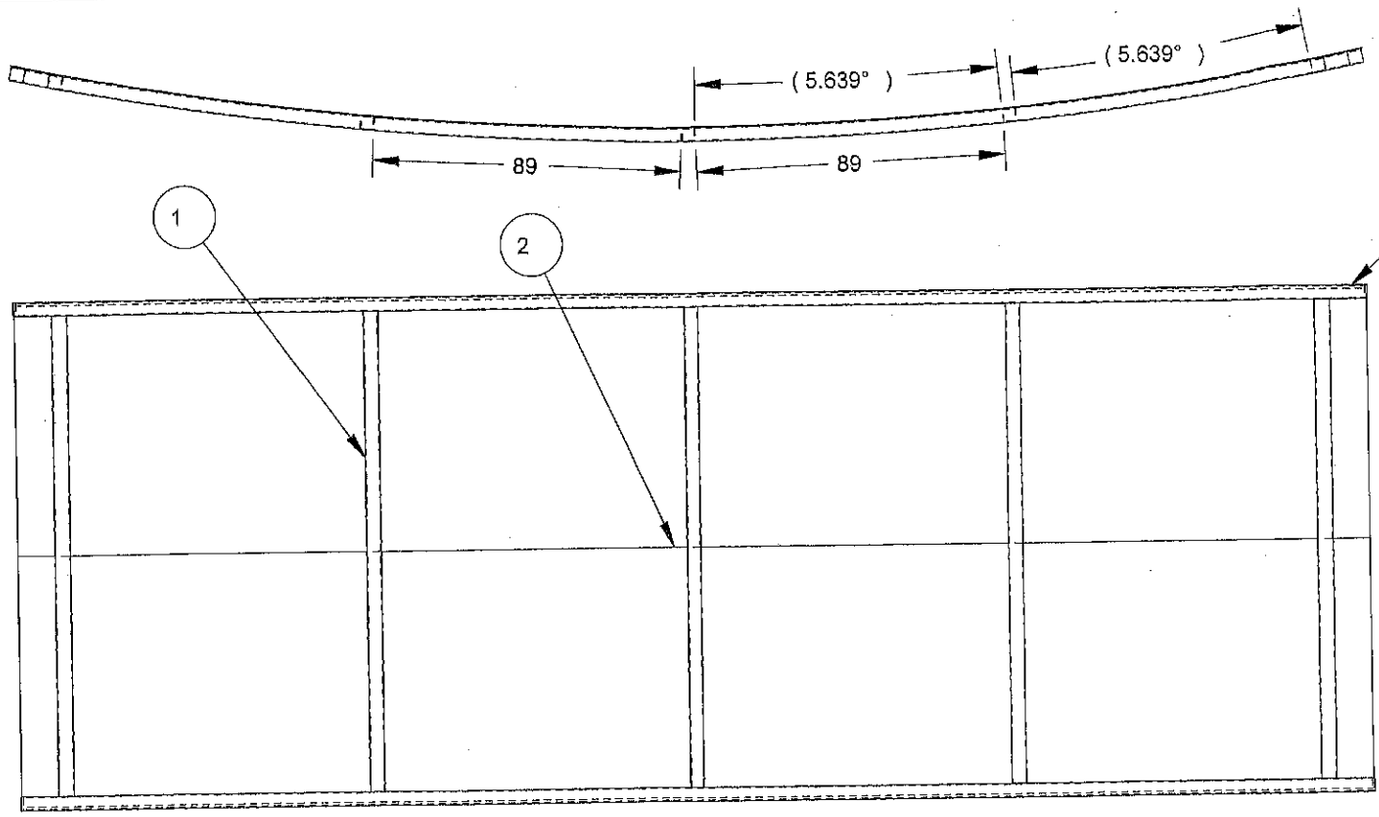
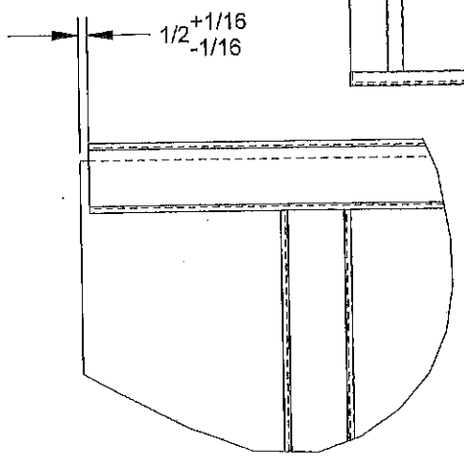
TOLERANCES UNLESS NOTED OTHERWISE X.XX±0.05 X.XXX±0.01 X.XXXX±0.005	RAMSEY ENGINEERING	SHEET 1 OF 1 40K-100 MCR 10/31/12
SEE BOM	REV A	40K-100

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





SCALE 0.125

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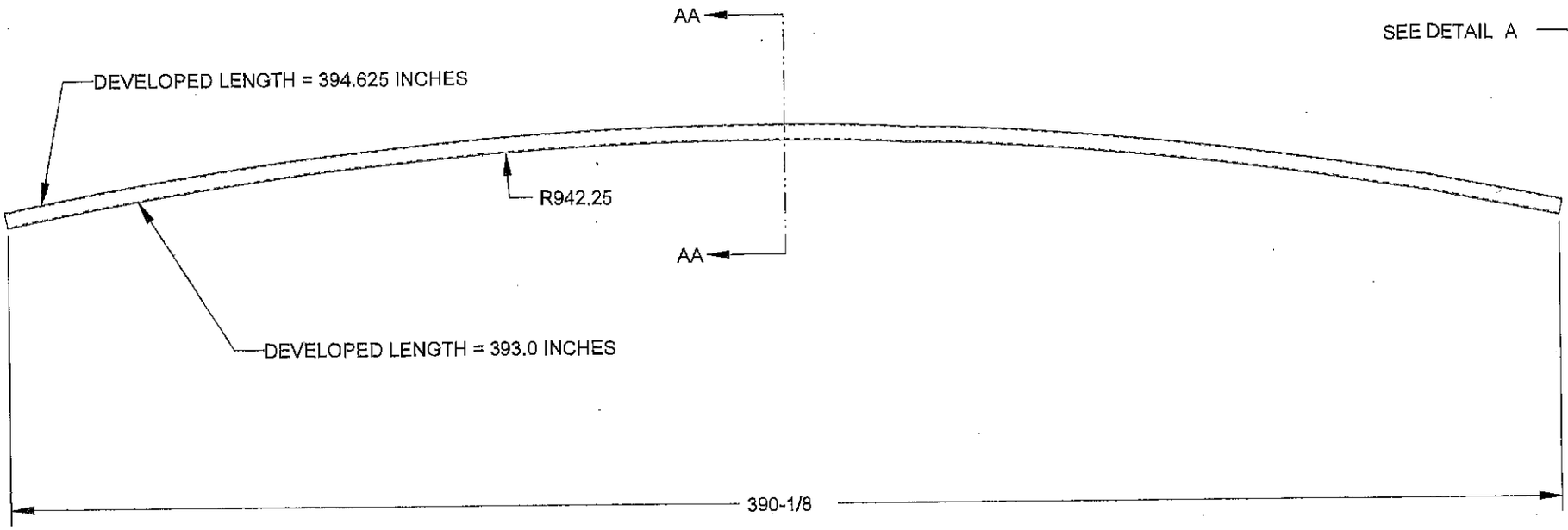
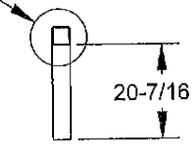
STATE OF TEXAS

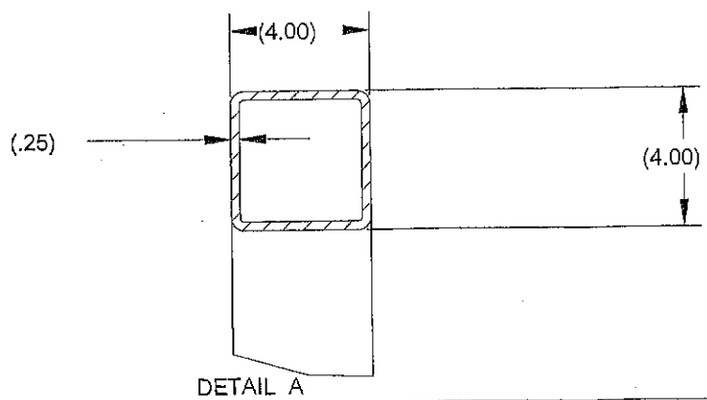
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	SHEET 1 OF 1
		40K-200
		MCR 10/31/12
SEE BOM		40K-200

40K Components





SECTION AA-AA



DETAIL A
SCALE 0.250

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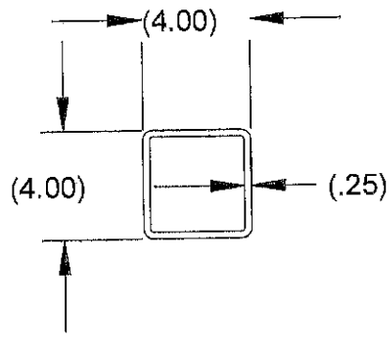
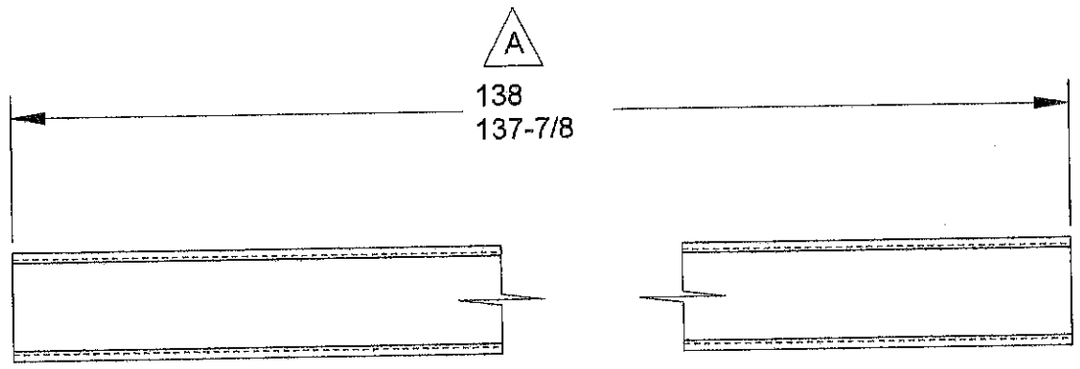
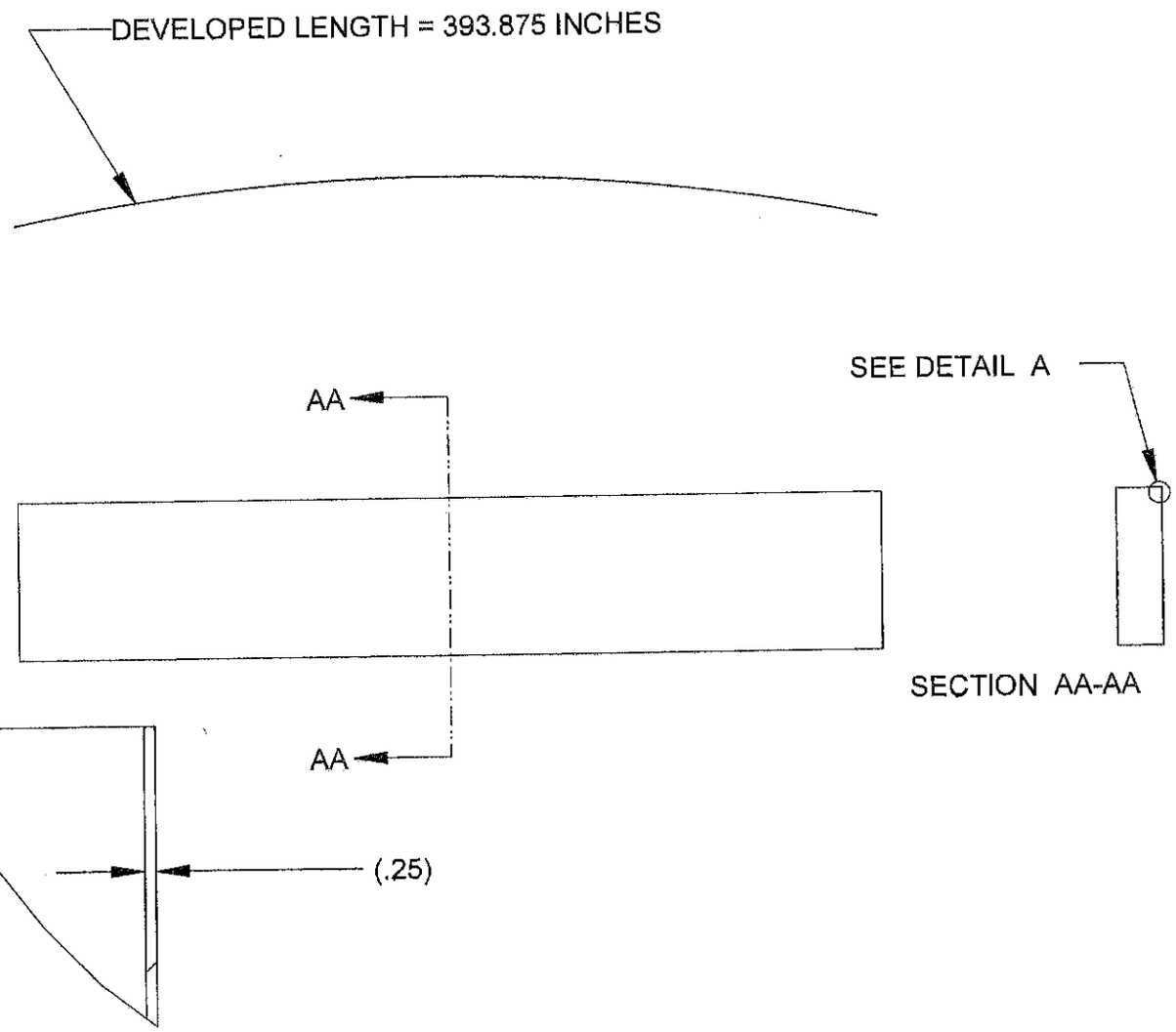
TOLERANCES UNLESS NOTED OTHERWISE X.X○±0.05 X.XX□±0.01 X.XXX△±0.005	RAMSEY ENGINEERING	SHEET 1 OF 1
		TUBING, BENT
ASTM A500 GR B		40K-001





		SHEET 1 OF 1
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	40K-002
		MCR 10/30/2012
ASTM A500 GR B	REV A	40K-002



SECTION AA-AA

DETAIL A
SCALE 0.250

STATE OF TEXAS
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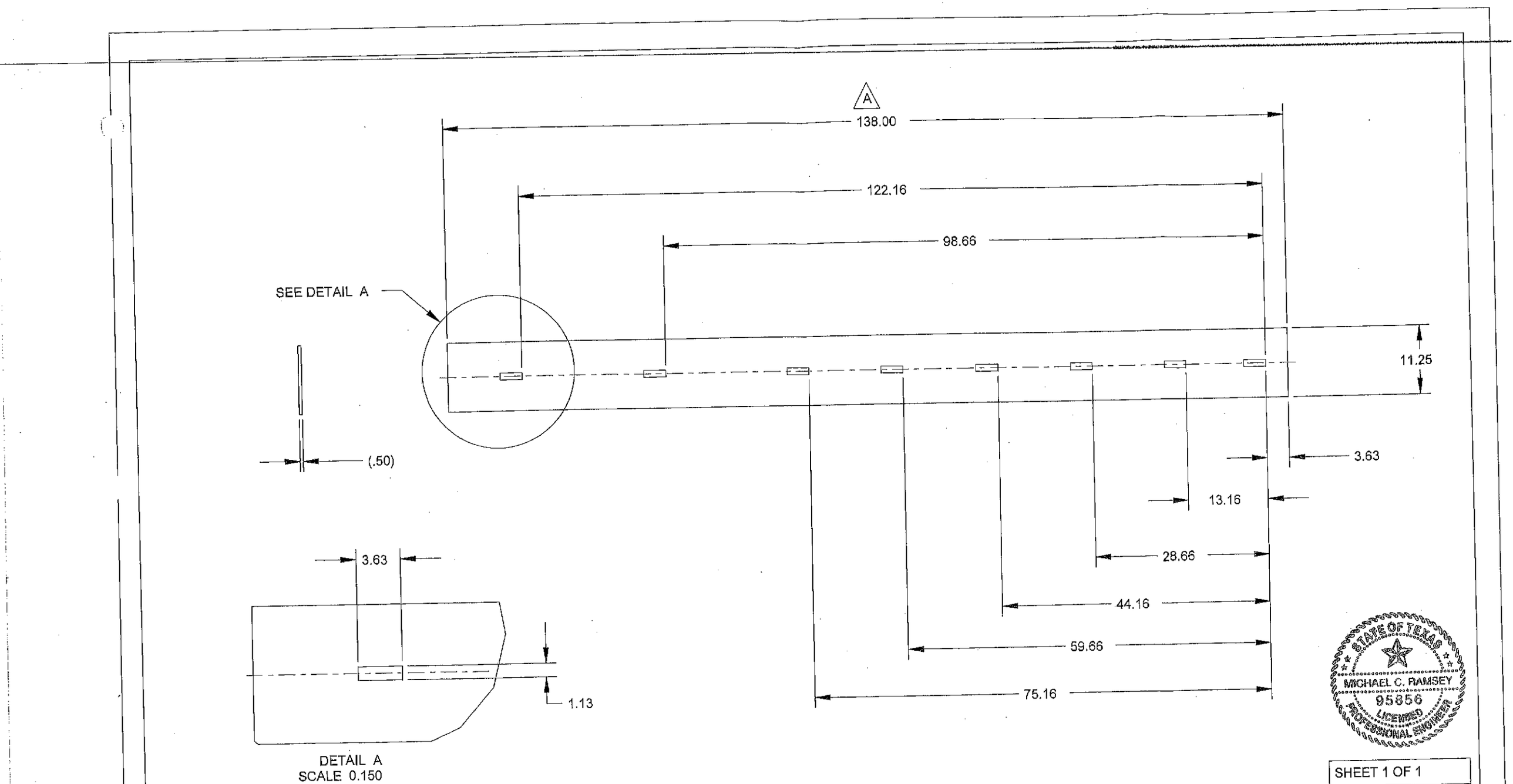
		SHEET 1 OF 1
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	40K-003
		MCR 10/31/12
ASTM A36 OR EQV		40K-003



DETAIL A
SCALE 0.150

REVISION NOTES:
A: CHANGED LENGTH TO MATCH PRODUCT.

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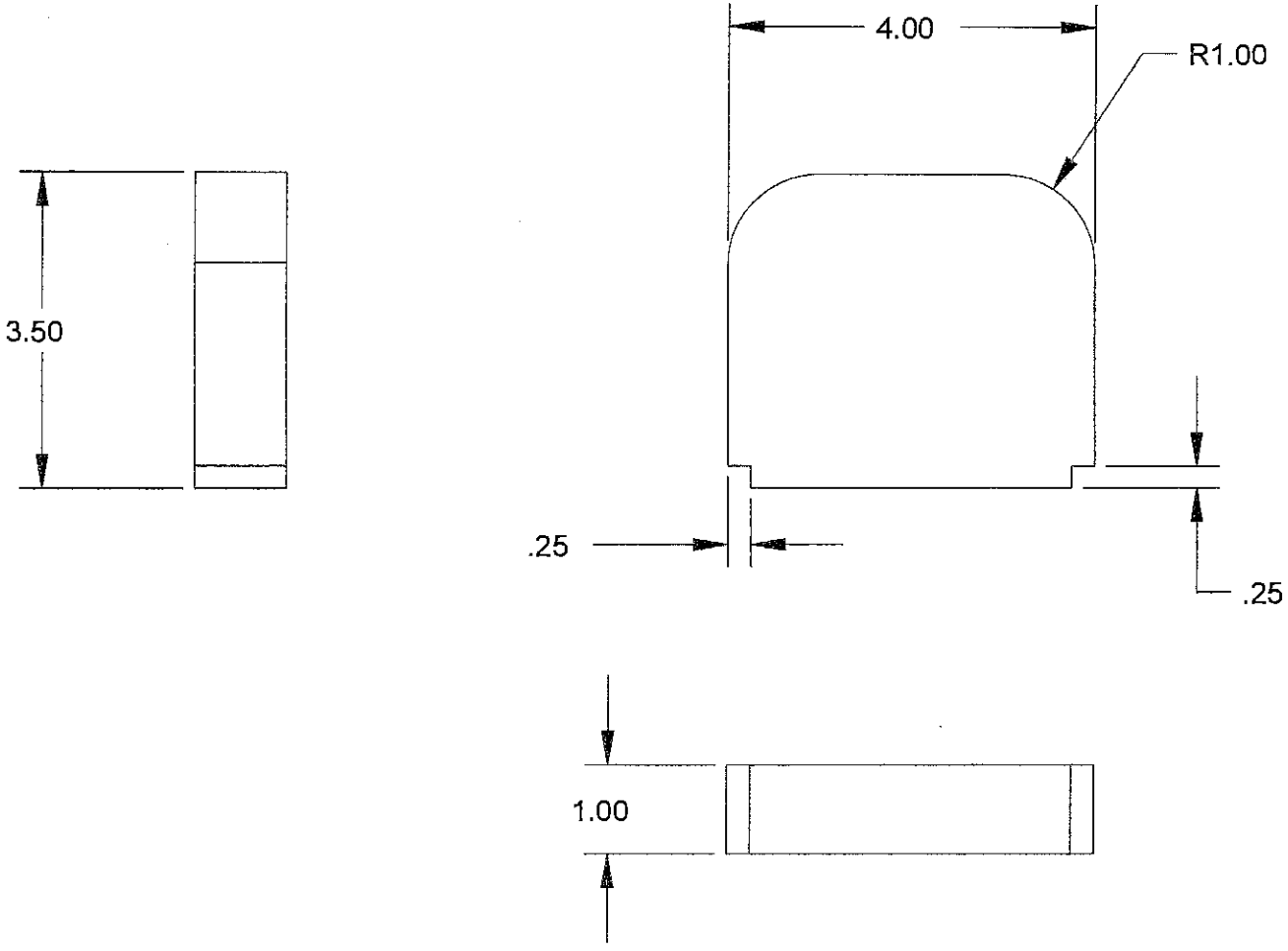
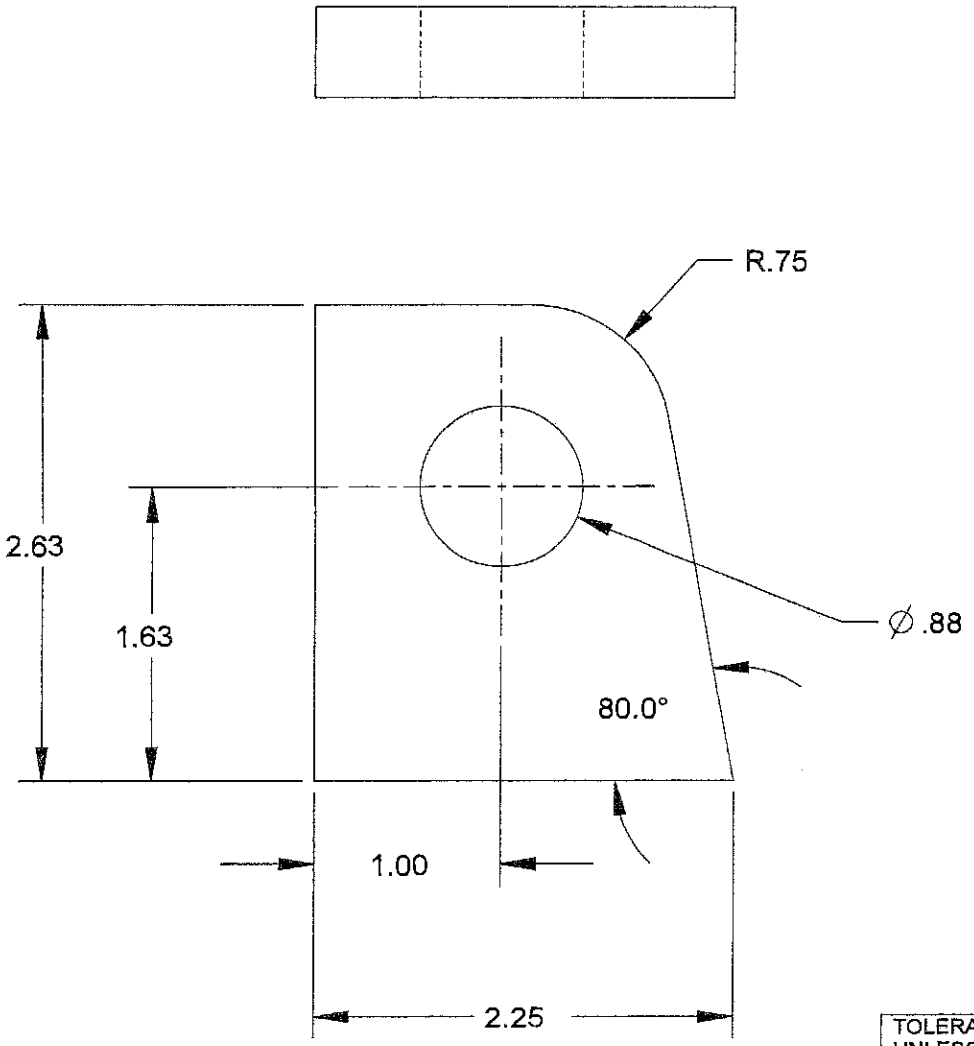
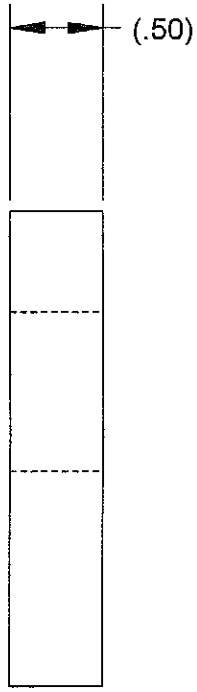
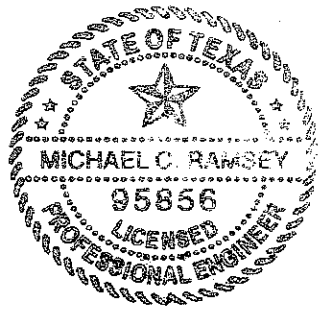
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXL±0.005	RAMSEY ENGINEERING	SHEET 1 OF 1 40K-004 MCR 10/30/12
ASTM A36 OR EQV	REV A	40K-004



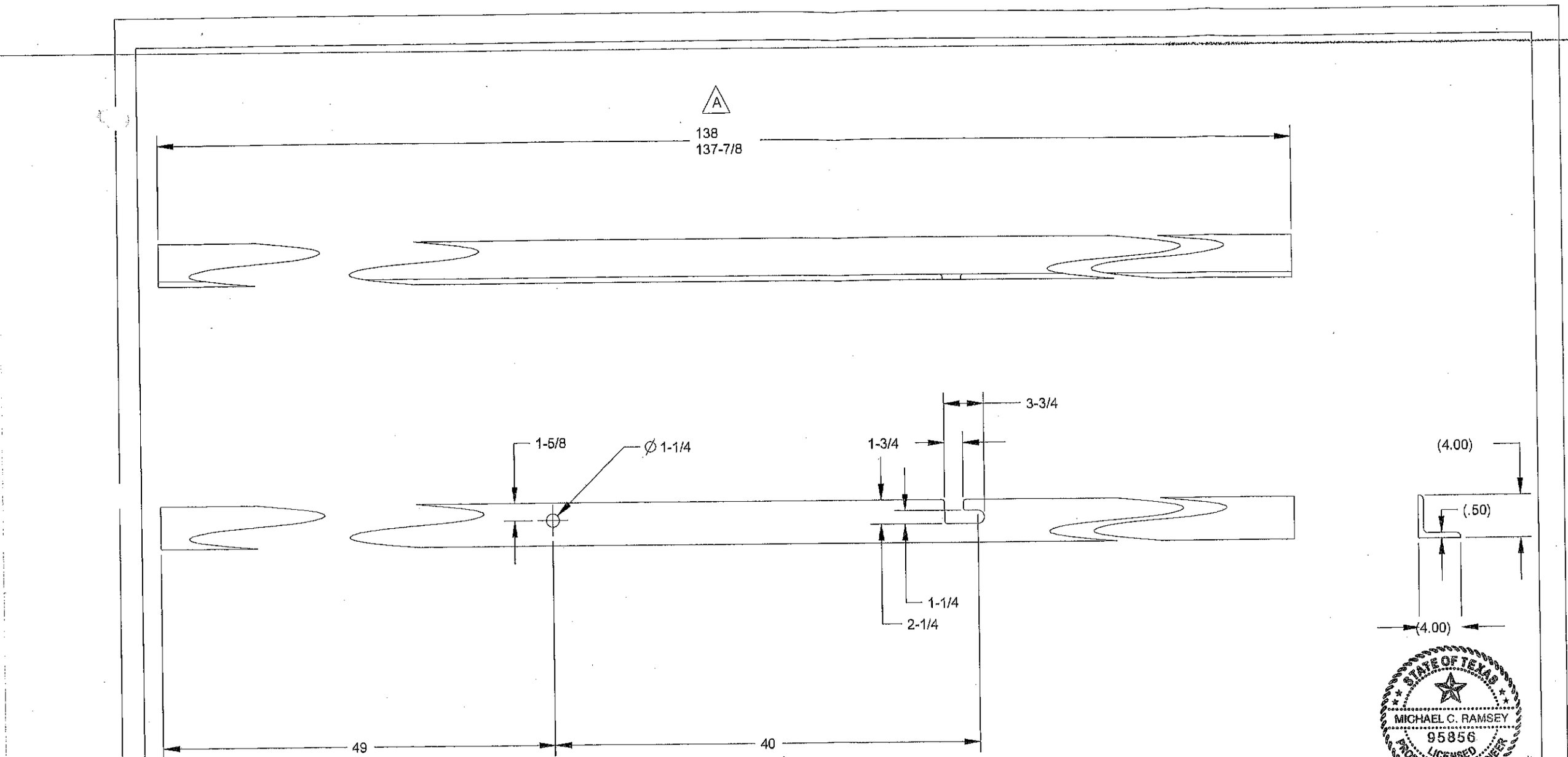
		SHEET 1 OF 1
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	40K-005
ASTM A36 OR EQV		40K-005







		SHEET 1 OF 1
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	40K-006
ASTM A36 OR EQV		40K-006



REVISION NOTES:
A: CHANGED LENGTH TO MATCH PRODUCT.

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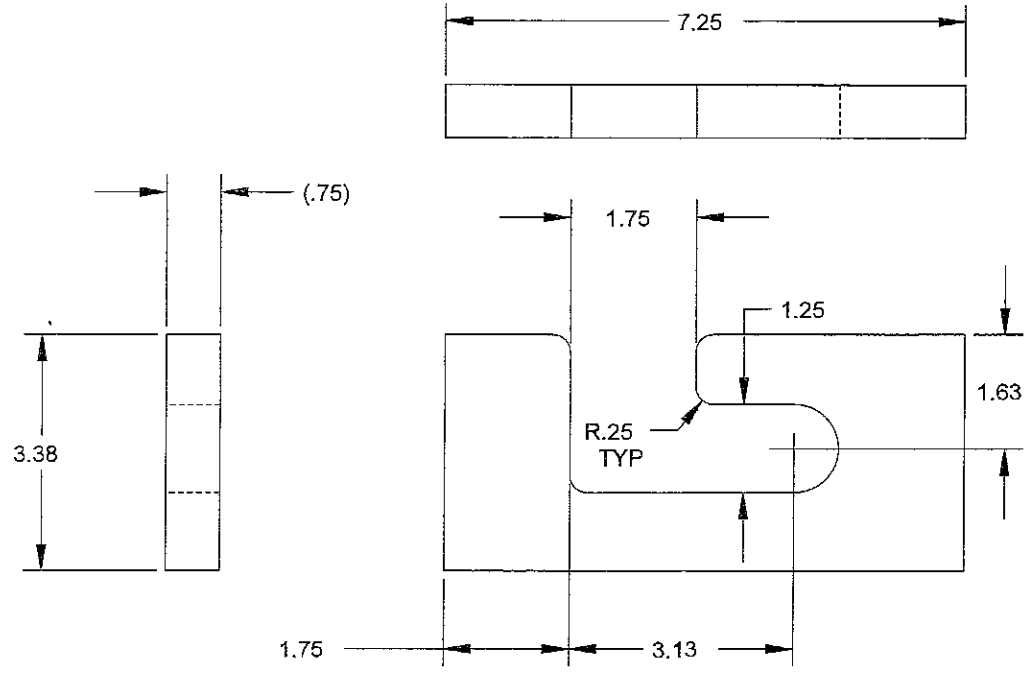
		SHEET 1 OF 1
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	40K-007
		MCR 10/30/12
ASTM A36 OR EQV	REV A	40K-007



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95856
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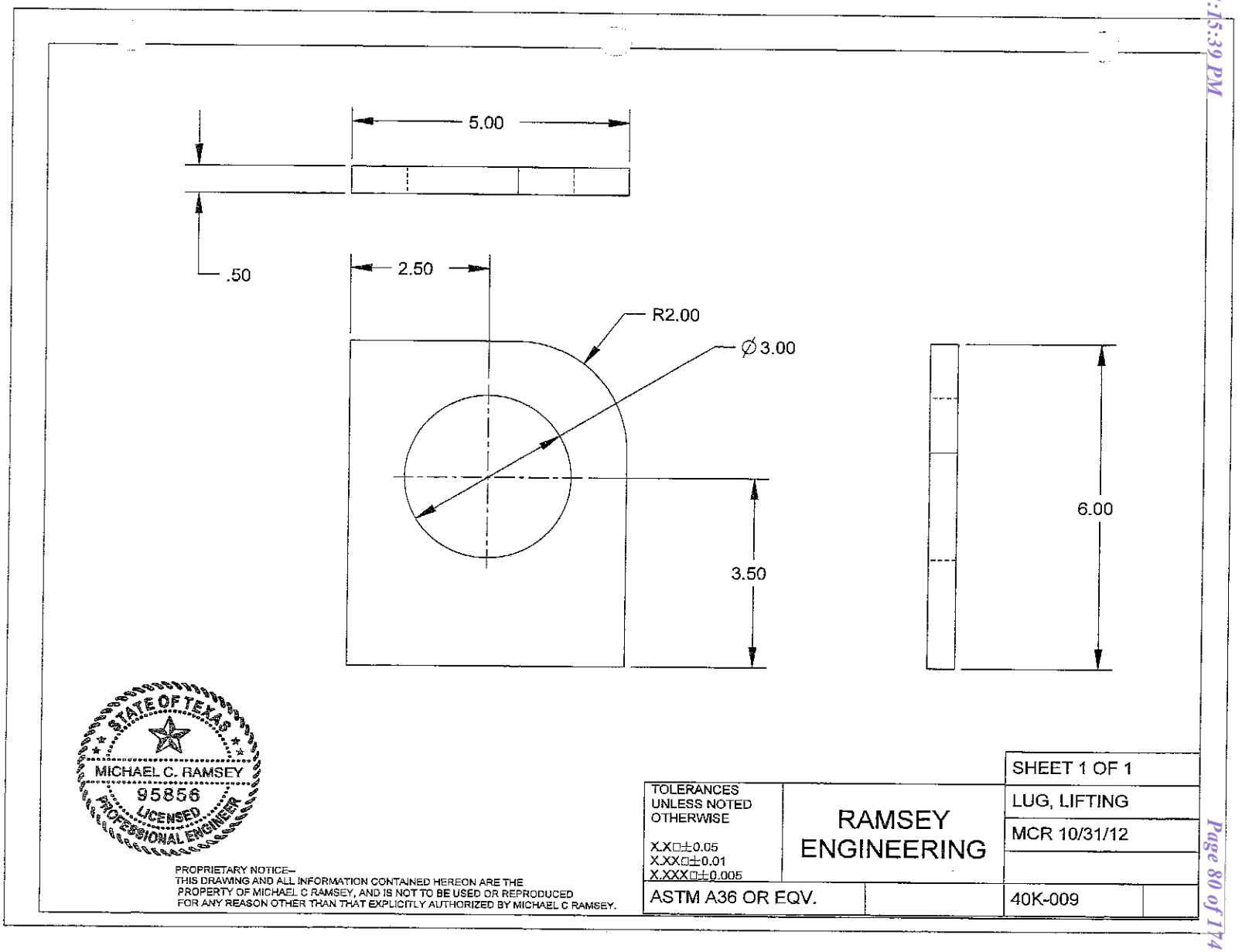
PROFESSIONAL ENGINEER

		SHEET 1 OF 1
TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	40K-008
ASTM A36 OR EQV.		40K-008



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TOLERANCES UNLESS NOTED OTHERWISE X.X□±0.05 X.XX□±0.01 X.XXX□±0.005	RAMSEY ENGINEERING	SHEET 1 OF 1
		LUG, LIFTING
		MCR 10/31/12
ASTM A36 OR EQV.		40K-009

Inland TARP & LINER

Premium Quality - Built to Last

www.inlandtarp.com

Geotextile Product Description Sheet
GT-110
Nonwoven Geotextile

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

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

PACKAGING

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

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

Made in U.S.A.

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

TECHNICAL DATA SHEET
Geomembrane 40mil LLDPE

Property	Test Method	Frequency (A)	Unit Metric		Solmax 140-7000
Thickness (Nominal +/- 10%) (E)	ASTM D 5199	Every roll	mm		1.00
Resin Density	ASTM D 1505	1/Batch	g/cc		<0.926
Melt Index-190/2.16(max)	ASTM D 1238	1/Batch	g/10min		1.0
Sheet Density (C)	ASTM D 1505	Every 2 rolls	g/cc		<0.939
Carbon Black Content (D)	ASTM D 4218	Every 2 rolls	%		2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	Every 6 rolls	Category		Cat. 1 / Cat. 2
Oxidative Induction Time (min. avg)	ASTM D3895	1/Batch	min		100
Tensile Properties (min. avg)(B)	ASTM D 6693	Every 2 rolls			
Strength as Break			kN/m		23
Elongation at Break			%		800
2% Modulus (max.)	ASTM D 5323	PerFormulation	kN/m		420
Tear Resistance (min. avg.)	ASTM D 1004	Every 6 rolls	N		85
Puncture Resistance (min. avg.)	ASTM D 4833	Every 6 rolls	N		215
Dimensional Stability	ASTM D 1204	Every 6 rolls	%		+/- 2
Multi-Axial Tensile (min.)	ASTM D 5617	PerFormulation	%		90
Oven Aging-% retained after 90 days	ASTM D 5721	PerFormulation			
STD OIT (min. avg.)	ASTM D 3895		%		35
HP OIT (min. avg.)	ASTM D 5885		%		60
UV Resistance-% retained after 1600 hr	GRI-GM-11	PerFormulation			
HP-OIT (min. avg.)	ASTM D 5885		%		35

Note;

(A) Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
(B) Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.
(C) Correlation table is available for ASTM D792 vs. ASTM D1505. Both methods give the same results.
(D) Correlation table is available for ASTM D1603 vs. ASTM D4218. Both methods give the same results.
(E) The minimum average thickness is +/- 10% of the nominal value.

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

SKAPS TRANSNET™

HDPE GEONET TN 220

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

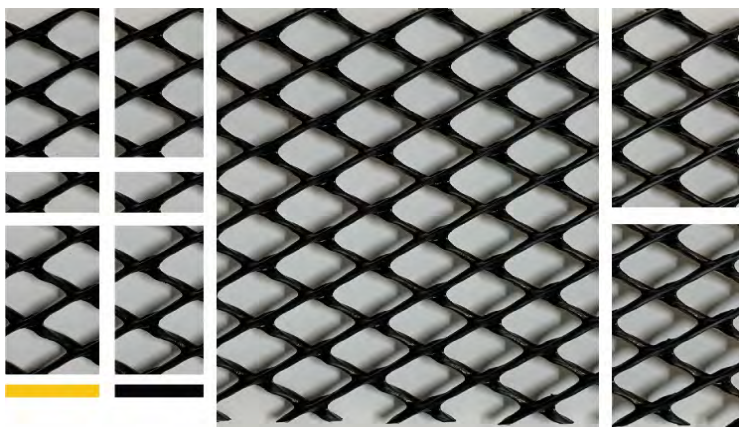
PROPERTY	TEST METHOD	UNIT	VALUE	QUALIFIER
Thickness	ASTM D 5199	mm	5.08	MAV(3)
Carbon Black	ASTM D 4218	%	2.0	MAV
Tensile Strength	ASTM D 7179	N/mm	7.87	MAV
Melt Flow	ASTM D 1238(2)	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	MAV
Transmissivity(1)	ASTM D 4716	m^2/sec	2.0×10^{-3}	MAV

Notes:

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

(2) Condition 190/2.16

(3) Minimum average value



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www.inlandtarp.com

TECHNICAL DATA SHEET
Geomembrane 30mil LLDPE

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

Note;

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

AST SET UP SOP

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

Policy Template

APPROVALS

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

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

REVISION HISTORY

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

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

Table of Contents

1. PURPOSE

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

2. SCOPE

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

3. DEFINITIONS

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

4. RESPONSIBILITIES

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

5. REQUIREMENTS

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

6. POLICY

Procedure for installing Epic 360 Tanks.

6.1 Prepare Surface Area

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

6.2 Ground Cover Installation

- Determine whether any special conditions exist for tank installation.

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

6.3 Primary Tank Wall Assembly

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

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

6.4 Primary Tank Liner Installation

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

6.5 Secondary Tank Wall Assembly

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

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

6.6 Secondary Tank Liner Installation

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

6.7 Installation of Tank Accessories

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

6.8 Final Inspection

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

7. APPLICABLE REFERENCES

- Chain Length Angle Chart

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

Additional Variance for Recycling storage Containments (In-Ground and AST)

- Alternative Testing Methods
- Fencing AST Containments

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

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

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

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

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

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

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

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

Table I
Closure Criteria for Recycling Containments

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

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

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

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

The referenced Table I, is reproduced in part below.

Table I
Closure Criteria for Soils Impacted by a Release

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

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

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

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

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

Statement Explaining Why the Applicant Seeks a Variance

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

> D. Fencing.
> (1) The operator shall fence **or enclose** a recycling containment in a manner that deters unauthorized **wildlife** and human access and shall maintain the fences in good repair. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
> (2) Recycling containments shall be fenced with a four foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level.
> E. Netting. The operator shall ensure that a recycling containment is screened, netted or otherwise protective of **wildlife**, including migratory birds. The operator shall on a monthly basis inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring**.**

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

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

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

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

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

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

40-MIL NON-REINFORCED LLDPE LINER AS ALTERNATE PRIMARY AND 30-MIL NON-REINFORCED LLDPE AS SECONDARY LINER FOR ABOVE GROUND STEEL TANK MODULAR RECYCLING STORAGE CONTAINMENTS

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

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

NMAC 19.15.34.12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

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

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

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

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

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

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

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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

NMAC 19.15.34.12 A (4)

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

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

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

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

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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.

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

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

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

Sincerely Yours,

RK Frobel

Ronald K. Frobel, MSCE, PE

COLORADO REGISTERED RONALD KENNETH FROBEL 15742 PROFESSIONAL ENGINEER

References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2018

ASTM Standards 2018

Attachments:

R. K. Frobel C.V.

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

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

NMAC 19.15.34.12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

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

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

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

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

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

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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

NMAC 19.15.34.12 A (4)

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

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

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

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

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

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

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

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

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

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

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

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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

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

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

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

COLORADO REGISTERED
RONALD KENNETH FROBEL
15742
PROFESSIONAL ENGINEER

References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2018

ASTM Standards 2018

Attachments:

R. K. Frobel C.V.

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

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

Statement Explaining Why the Applicant Seeks a Variance

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

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT:

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

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

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

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

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

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

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

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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

NMAC 19.15.34.12 A (2), (3)

Side Slope

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

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

Anchor Trench

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

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

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

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

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

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

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

Attachments:

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January 2020

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

R.K. FROBEL & ASSOCIATES
Consulting Engineers

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

NMAC 19.15.34.12 A (2)

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

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

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

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

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

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Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

References:

NMAC 19.15.34.12 DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

ASTM Standards 2019

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RONALD K. FROBEL, MSCE, P.E.

CIVIL ENGINEERING
GEOSYNTHETICS
EXPERT WITNESS
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FIRM: R. K. FROBEL & ASSOCIATES
Consulting Civil / Geosynthetics Engineers

TITLE: Principal and Owner

PROFESSIONAL AFFILIATIONS:

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

ACADEMIC BACKGROUND:

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

PROFESSIONAL EXPERIENCE:

R. K. Frobel & Associates - Consulting Engineers
Evergreen, Colorado, Principal and Owner, 1988 - Present

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

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

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

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

United States Navy, Commissioned Naval Officer, 1970 - 1973

REPRESENTATIVE EXPERIENCE:

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

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

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

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

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

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

PUBLICATIONS: Over 85 published articles, papers and books.

CONTACT DETAILS:

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May 2025

Rule 34 Registration: Volume 1
System Connector Ponds and RF
Section 16, T24S, R32E, Lea County

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

Looking west from the northeast corner of the 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

April 28, 2025

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

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

RE: Solaris Water Midstream, LLC, System Connector Ponds and Recycling Facility
In-ground Containment Registration and AST Permit
Section 16, T24S 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 registration for the above-referenced project. Please note that the area which the siting criteria are demonstrated to meet contains and is larger than the area of the engineered plans.

Volume 1 of the C-147 package contains:

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

Volume 2 contains:

- The C-147 Form to register the in-ground containment
- Closure cost estimate for the In-Ground Containment **and for the AST**
- 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
- Plans for Design/Construction, O&M, and Closure
- Stamped Design Drawings and Specifications
- 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

"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 the BLM, the surface owner. If you have any questions or concerns regarding this permit or the attached C-147, please contact me. As always, we appreciate your work ethic and diligence.

Sincerely,
R.T. Hicks Consultants

Randall T. Hicks PG
Principal

Copy: Solaris Water Midstream, LLC,
BLM

SITE ASSESSMENT & CHARACTERIZATION

TEXT AND FIGURES

PLATES

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 Solaris Water Midstream System Connector Ponds and Recycling Facility (RF).

Plate 1 is a geologic/ topographic map that shows:

1. The area of the System Connector Ponds and the RF is identified by the blue diagonally striped polygon.
2. Water wells from the OSE database as a blue triangle inside colored circles. 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). The permit data generally show "no date" as data. Plate 1 has screened the OSE data and eliminated permit information from Plate 1 but locations with a date and a DTW of 0 are typically borings that may be useful. We provide depth to water data for the OSE wells although these data do not represent static water levels and may be misleading.

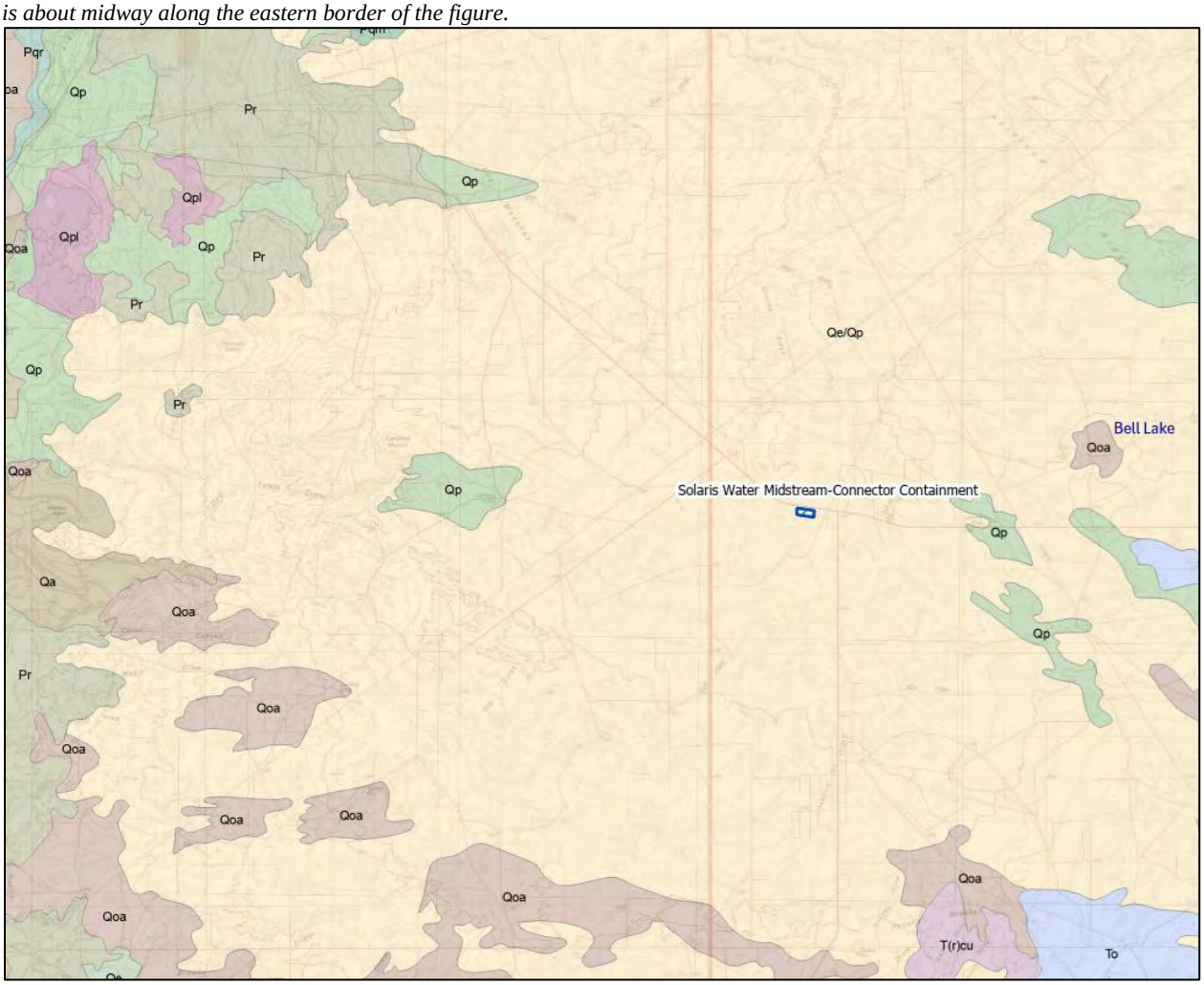
Plate 2 is an area topographic and geologic map that shows:

1. The recycling containment area identified by the blue diagonally striped polygon with the surface elevation of the site provided.
2. Water wells from the USGS database as large triangles color-coded to the formation from which the well draws water. The calculated groundwater elevation and the date of measurement are presented in the Plate.
3. 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). These water wells were measured by professionals and documented in published reports or by staff of Hicks Consultants. The calculated groundwater elevation and the date of measurement are presented. Several wells from the Misc. database are within the area of Plate 2 at the time of writing.

Hydrogeology

As shown on Figure 1, below, the Permian Rustler Formation (Pr) crops out in the western edge of the map and the overlying Permian Quartermaster Formation crops out in the northwestern corner. Overlying both of these formations is the Triassic upper Chinle formation (T(r)cu) exposed in the southeast corner of the map. Exposed along the eastern edge of the map is the Tertiary Ogallala formation (To). The surface geology at the containment site is Quaternary eolian and piedmont deposits (Qe/Qp).

Figure 1: *Geology of the greater area around the System Connector Ponds. The Permian Quartermaster formation (Pqr) is shown in blue in the upper left corner. The Triassic Chinle formation (T(r)cu) is present near the southeastern corner. Bell Lake is about midway along the eastern border of the figure.*



Five driller's logs of varying quality are in the NM OSE database for T24S R32E. These are described briefly below and presented in Appendix Well logs (see location map in appendix). Beginning northwest of the System Connector Ponds and moving in a clockwise rotation, the wells are:

- C3555 is in section 5, about 2 miles north-northwest of the containment. This log shows 240 feet of dry red clay from 160 feet to 400 feet, which is typical of the Chinle. The contact between the Chinle and the overlying alluvium may be the brown sandstone penetrated at 60 feet. The uppermost water encountered by the driller is at 475 feet, which is probably the 75-foot thick Santa Rosa Sandstone.
- MISC-12 is about 0.4 miles north of its actual location. It is about 2.3 miles north-northeast of the System Connector Ponds. The well has a windmill and provides water for stock. Data from a measurement in 1970 gives a depth to water of 198 feet. The surface elevation of 3660 feet results in a groundwater elevation of (3660-198=) 3462 feet. The well is known as New Well.

- C-3528 is in Section 15, about 1 mile northeast of the System Connector Ponds. This well (Cotton Place) is in a closed depression that exhibits a perched, shallow groundwater table. The driller's log shows water encountered from 18 feet to 26 feet with 107 feet of dry red clay (probably Chinle) underlying the perched water. The driller notes on the log that first water is encountered at 133 feet.
- C4622(POD 1) is in Section 24, about 3 miles east-southeast of the containments. The log describes 55 feet of unsaturated alluvium.
- C4536 is in Section 33, about 2 miles due south of the containments. Below the 12 feet of dry alluvium is 168 feet of red clay, which indicates the Chinle Formation. This boring is dry to 235 feet.
- C4665 is southwest of the containments in Section 30. This log shows dry red sand/clay from 25 feet to 120 feet. The 25 feet of alluvium is unsaturated at this location.
- C-4775 is about 2.1 miles northwest of the System Connector Ponds. A boring made in December 2023 encountered no groundwater to the total depth of 105 feet.

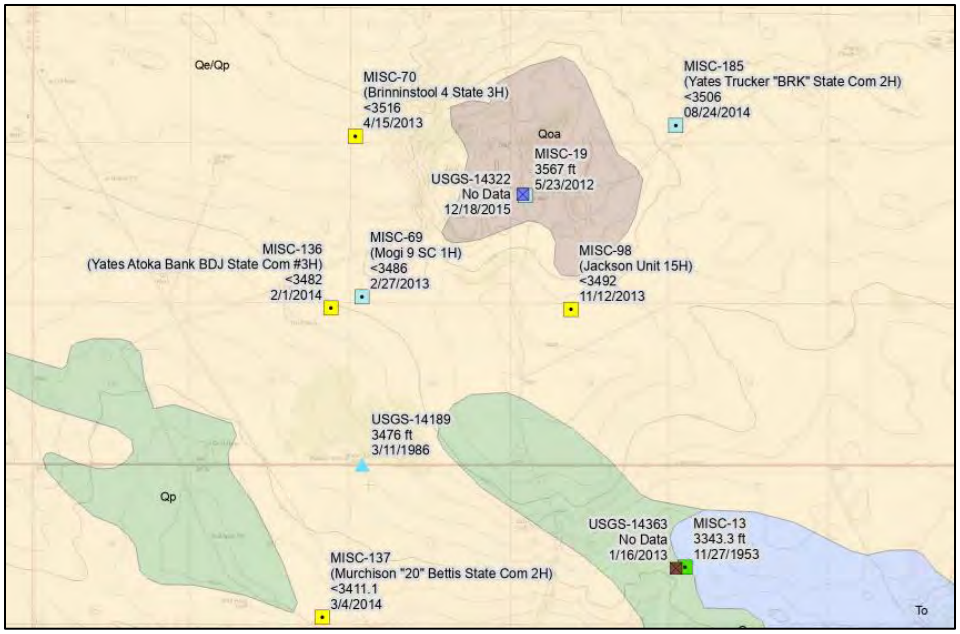
Also included in the Appendix Well Logs are well data and boring logs near Bell Lake. See Figure 2 below for the locations. Data from these borings suggest that localized perched groundwater exists in alluvium overlaying bedrock in some closed depressions.

The principal groundwater bearing unit around the System Connector Ponds is the Chinle Formation. The Quartermaster Formation (formerly Dewey Lake) is identified in some WIPP well logs northwest of the location. The Chinle and Quartermaster may be confused in drill cuttings.

Groundwater Data

As stated above, groundwater perched on the upper contact of the Chinle occurs in some closed depressions in the area. The Bell Lake "sink" is 7 miles east-northeast of the System Connector Ponds and 1 ½ mile north of Route 128. Data from this area are presented in Figure 2 at a larger scale.

Figure 2: *Wells in the Bell Lake area.*

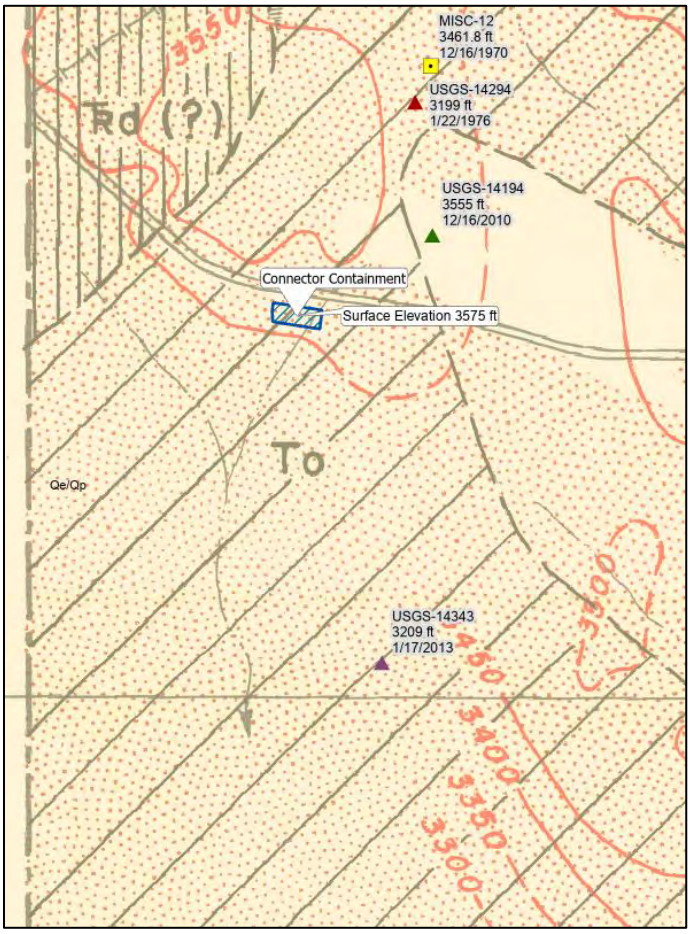


The elevation of groundwater at Misc-19, an abandoned windmill in the

center of Bell Lake is 3567 feet (22-feet depth). The five Misc. data points around the depression are conductor pipe borings that were dust dry to 100 feet in one boring (Misc-185) and dry to 120 feet in the other 5 conductor pipe borings. We contend that closed depressions in the area contain localized perched water.

Cotton Place wells lie in a closed depression less than 1 mile north-northeast of the System Connector Ponds. Here, USGS-14194 exhibits a depth of groundwater of 33.96 feet in 2010. North of Cotton Place is USGS-14294 and Misc-12. These two wells have only one measurement each and it is posted on Plate 2. The USGS data show USGS-14294 is a Santa Rosa (lower Chinle) well with a depth to water of more than 450 feet in 1970.

Figure 3: *The red contours are of the top of the Chinle formation from Nicholson and Clebsch*



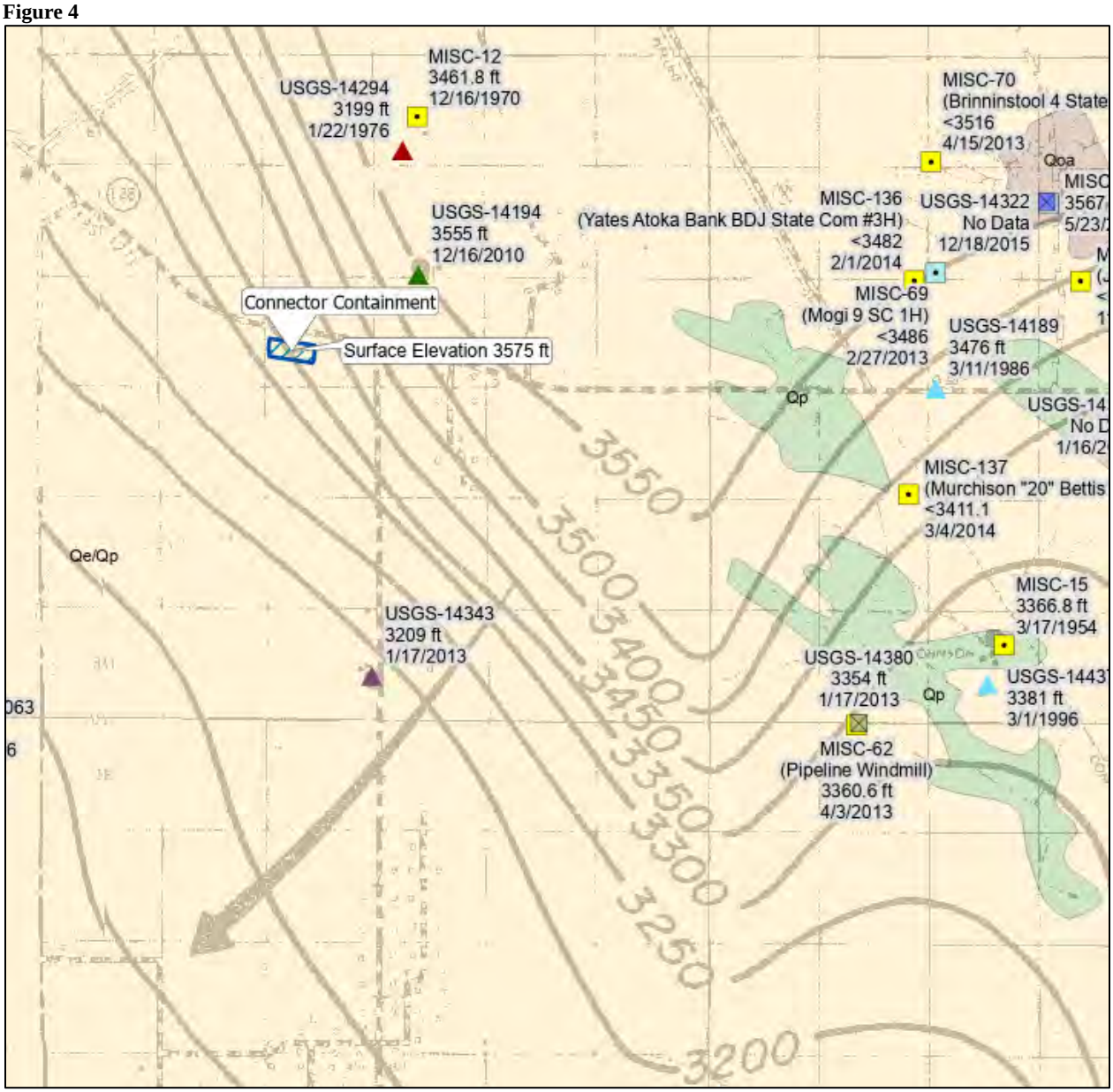
Misc-12 is also a Chinle Formation well also. The surface elevation of the well is 3660. The Nicholson and Clebsch map shows that the top of the Chinle formation is at 3525 feet. Groundwater was at 3461 feet, more than 60 feet below the top of the Chinle formation. The lower ground water elevations at these two wells support our conclusion that the Cotton Place well, within the closed depression, is a localized body of perched water that is suitable for stock or domestic uses.

USGS-14343 is located about 3.4 miles south-southeast of the System Connector Ponds. It has a surface elevation of 3499 feet with a 2013 groundwater elevation of 3209 giving a depth to water of (3499-3209=) 290 feet. The USGS lists the well as ~~being~~ completed in the Chinle formation. An extrapolation of the Nicholson and Clebsch contours gives an elevation of about 3350 for the top of the Chinle Formation, about 140 feet above the groundwater elevation.

Figure 4 shows the 1978 Open File 95 groundwater elevation map and USGS and MISC well data in the area of the System Connector Ponds. The USGS well data classifies the closest wells to the System Connector Ponds as being completed in either the Chinle formation or the Santa Rosa Sandstone, the bottommost unit in the Chinle formation. Groundwater present in this formation is confined.

In Figure 4, below, the 3350-foot contour runs beneath the site with groundwater moving to the southwest. An examination of the USGS well and MISC well data with this potentiometric surface shows good agreement.

Figure 4



We relied upon the most recent data measured by the USGS, published data, and measurements by Hicks Consultants in Plate 2. Water level data from the OSE database rely upon observed water levels by drillers during the completion of the water well. The OSE dataset provides some useful data in certain areas but were not used to generate groundwater elevations. Based upon our field surveys and examination of Google Earth images, we are confident that the wells shown on Plate 2 are close to the plotted points.

We conclude:

- Localized, thin, unconfined groundwater zones exist in some closed depressions of the area. The lateral extent of these groundwater zones that are perched upon underlying Chinle Formation clay units is limited to the area of the depression, based upon detailed study of the Bell Lake area and Cotton Place.
- The uppermost groundwater zone beneath the containment resides in thin sandstones of the Chinle or in its basal unit, the Santa Rosa Sandstone. The overlying alluvium is dry.
- The elevation of groundwater in the uppermost water-bearing unit (Chinle) is about 3350 in the area of the System Connector Ponds.
- Using this groundwater elevation, the depth to potentiometric surface beneath the lower liner of the System Connector Ponds is about (3575-25-3350=) 200 feet

Distance to Municipal Boundaries and Fresh Water Fields

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

- The closest municipality is Malaga, approximately 21 miles to the west.
- The closest mapped public wells belongs to the Carlsbad Municipal Water System. These municipal wells are about 14.6 miles to the northwest.

Distance to Subsurface Mines

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

- The nearest mapped caliche pit is about 0.75 miles to the east. This pit was either small in extent or mislocated. There is a caliche pit 1.54 miles to the east of the System Connector Ponds and 0.13 miles south of NM 528.
- The closest subsurface mine is more than 10 miles to the northwest

Distance to High or Critical Karst Areas

Plate 5 shows the System Connector Ponds is not within mapped zone of high or critical Karst with respect to BLM mapped areas.

- The proposed containments are located within a “no karst” area.
- The nearest “Medium karst” potential areas are located approximately 10.25 miles to the northwest and 12.5 miles to the southeast. The closest “High karst“ potential area is 13.3 miles to the northwest.
- We observed no evidence of solution voids or unstable ground near the site during the field inspection.

Distance to 100-Year Floodplain

Plate 6 demonstrates that the System Connector Ponds is within Zone D as designated by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

- FEMA describes the location as an area with possible but undetermined flood hazards. No flood hazard analysis has been conducted.

- Our field inspection and examination of the topography permits a conclusion that the location is not within any floodplain and has low risk for flooding.
- The nearest mapped flood hazard is about 8.8 miles to the southwest and is associated with a number of closed depressions within a dune area.

Distance to Surface Water

Plate 7 shows the closest surface water bodies.

- The closest Lake/Pond is slightly more than 0.50 miles northeast of the System Connector Ponds. Further to the northeast is a larger Lake/Pond at Cotton Place.
- The closest intermittent streams are more than 6 miles to the east.

The site visit and photographs demonstrate that the containment area is not within 300 feet of a continuously flowing watercourse or 200-feet of any other significant watercourse, lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark) or spring.

Distance to Permanent Residence or Structures

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

- The nearest structures are well pads and buried pipelines.
- No residences or other structures are in the area.
- A tank battery exists in the northwest corner of the project area.

Distance to Non-Public Water Supply

Plates 1 and 7 demonstrate that the System Connector Ponds 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.

- Plates 1 and 2 show the locations of all water wells, active or plugged.
- There are no domestic water wells located within 1,000 feet of the area of interest.
- No springs were identified within the mapping area (see Plate 7)

Distance to Wetlands

Plate 9 demonstrates the System Connector Ponds is not within 500 feet of mapped wetlands using the USA Wetlands database.

- The nearest designated wetlands to the containment are the same locations that are mapped as Lake/Ponds northeast of the System Connector Ponds on Plate7.

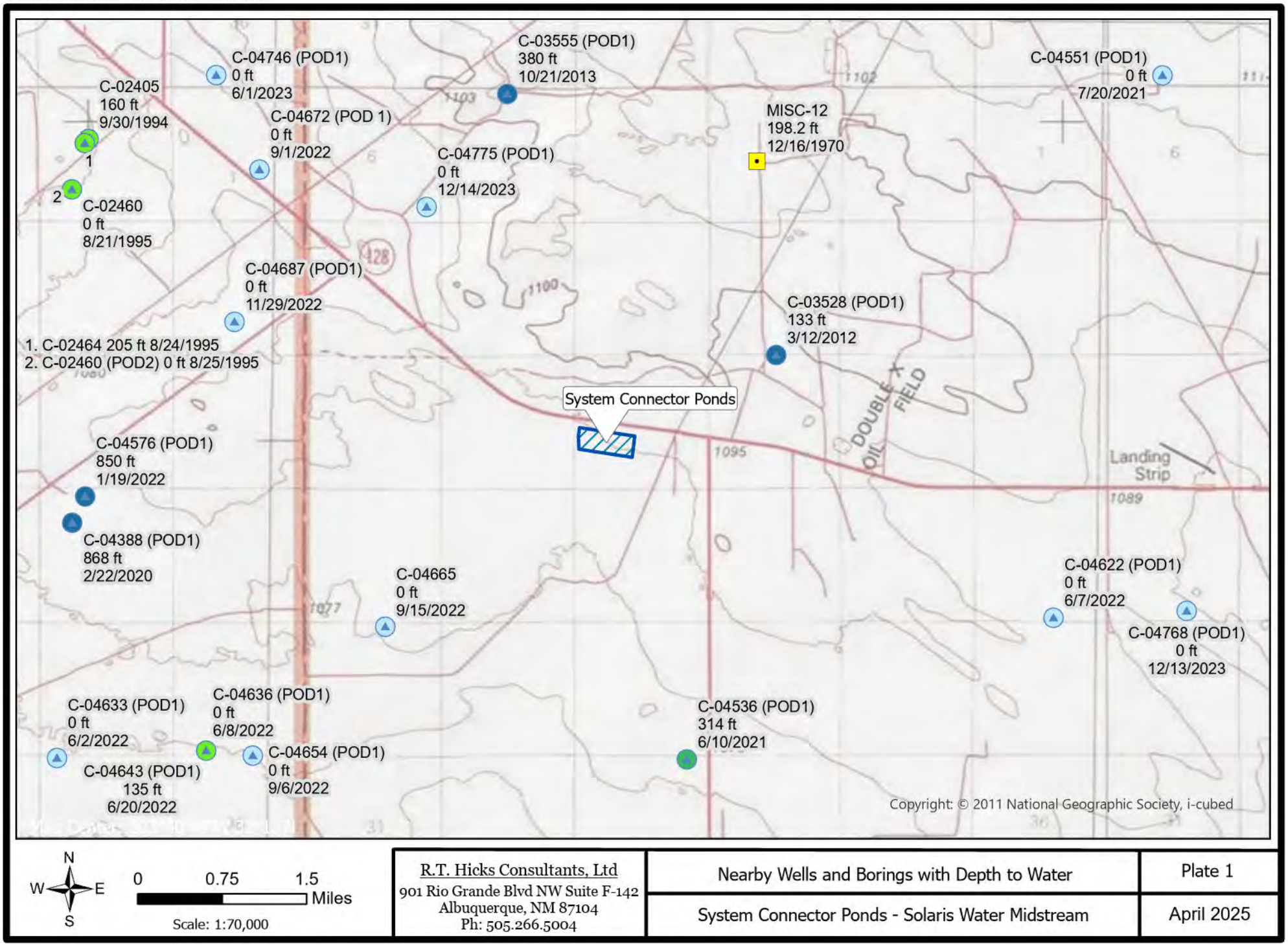
References

Geohydrology Associates, Inc. 1978. Collection of Hydrologic Data Eastside Roswell Range EIS Area. Open file Report 95. Denver, Colorado. Bureau of Land Management

Nicholson, A., Clebsch, A. 1961. Geology and Ground-Water Conditions in Southern Lea County, New Mexico. Socorro, New Mexico. New Mexico Institute of Mining and Technology.

PLATES

P:\SolarisConnector\SolarisConnector.aprx



N
W E
S

0 0.75 1.5 Miles

Scale: 1:70,000

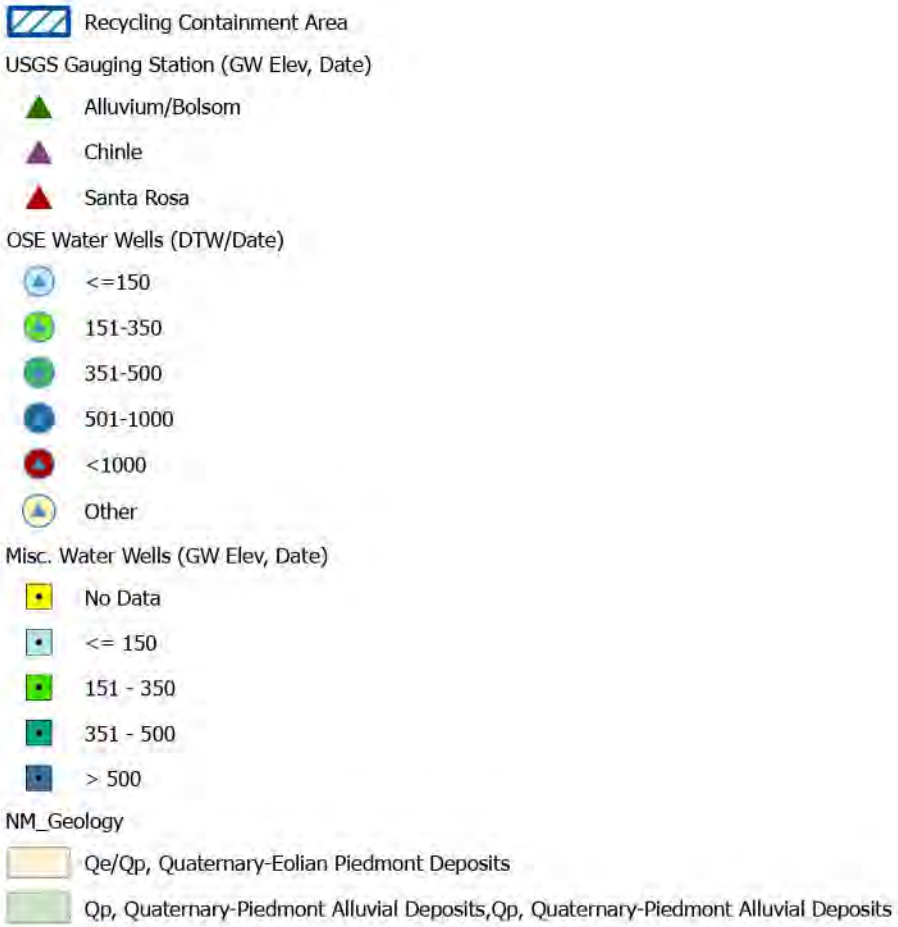
R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Nearby Wells and Borings with Depth to Water

Plate 1

System Connector Ponds - Solaris Water Midstream

April 2025



Scale: 1:70,000

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Albuquerque, NM 87104
Ph: 505.266.5004

System Connector Ponds - Solaris Water Midstream

PLates 1 and 2

April 2025

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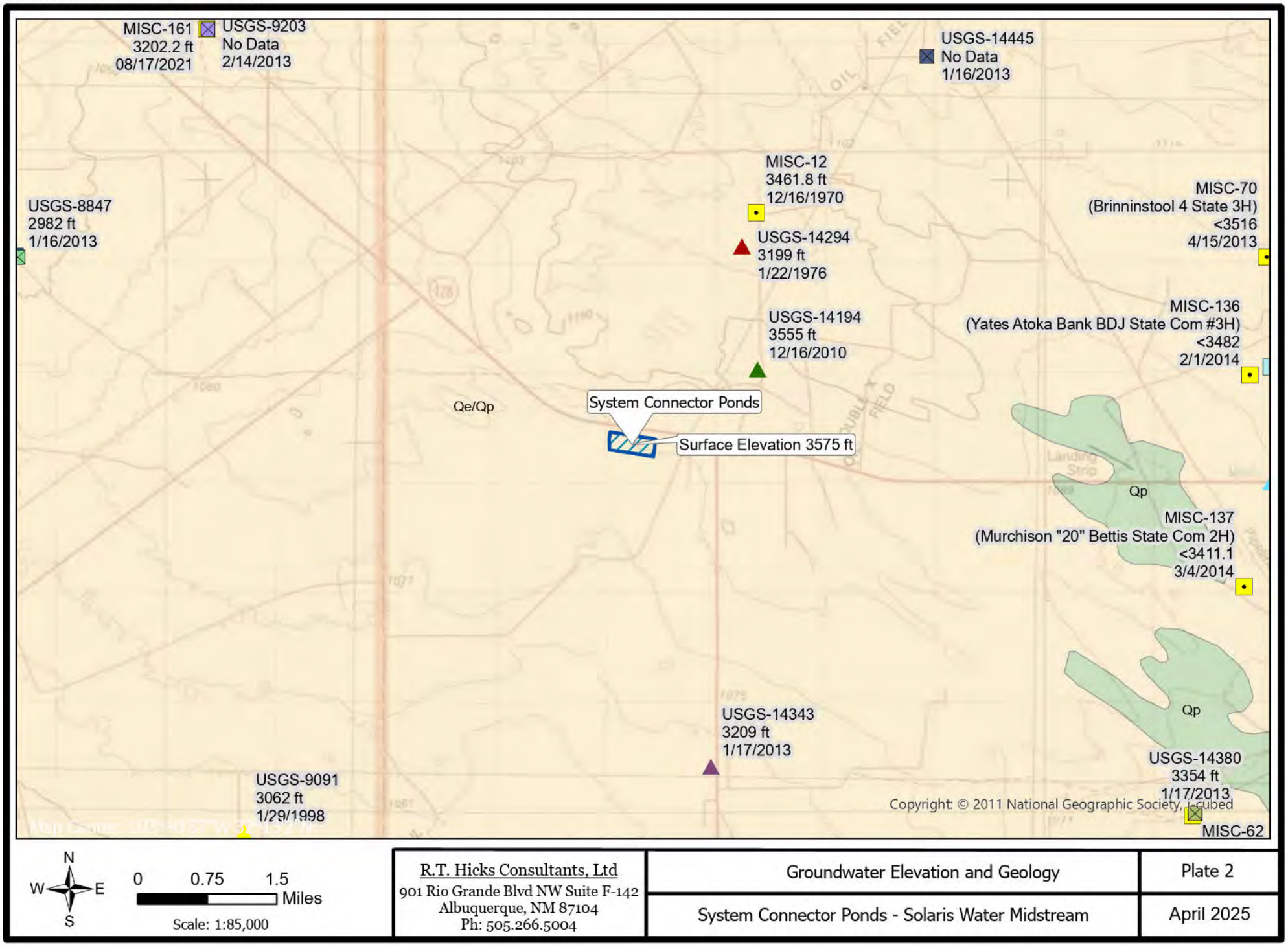

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Groundwater Elevation and Geology	Plate 2
	System Connector Ponds - Solaris Water Midstream	April 2025

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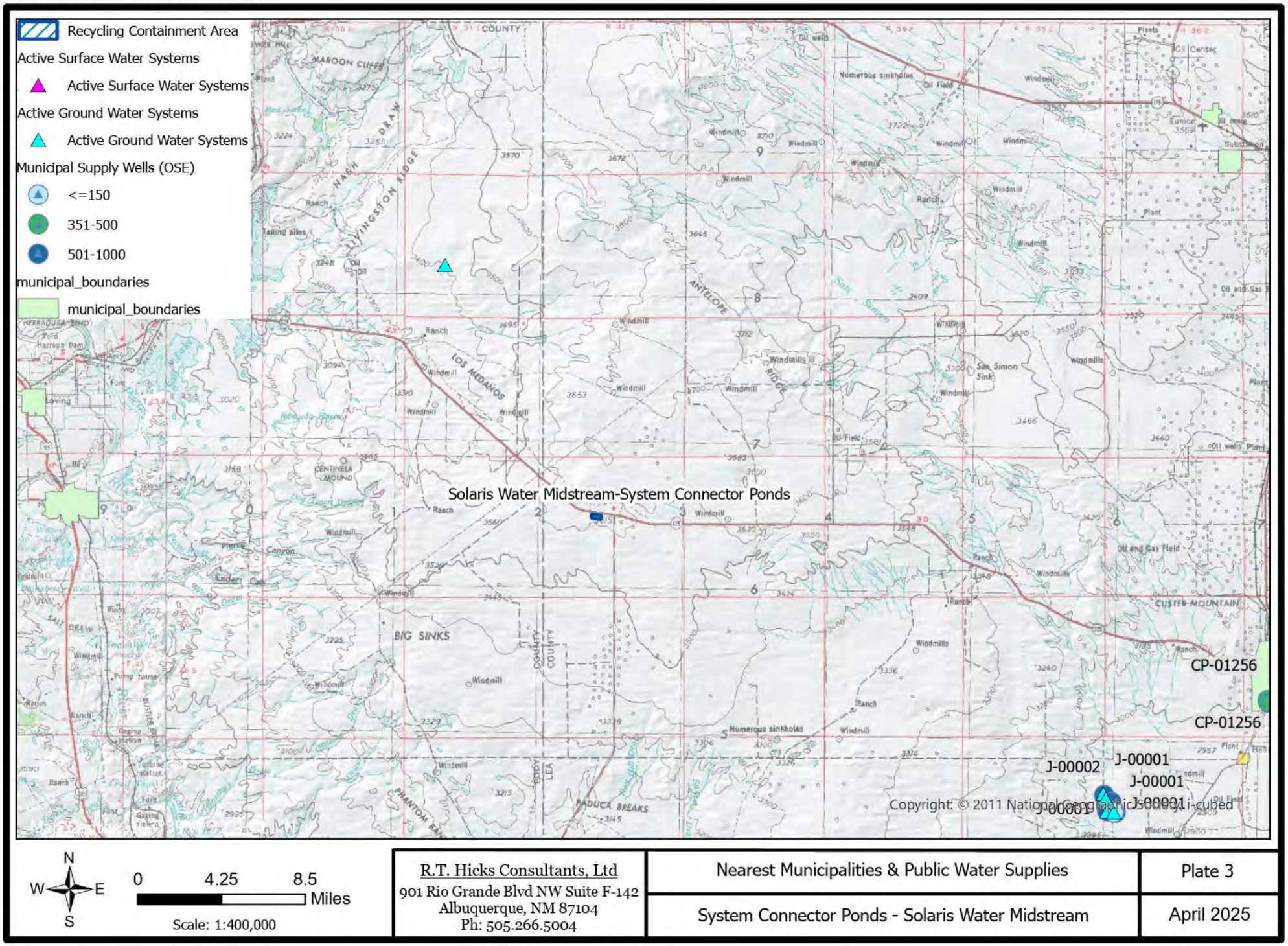

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearest Municipalities & Public Water Supplies	Plate 3
	System Connector Ponds - Solaris Water Midstream	April 2025

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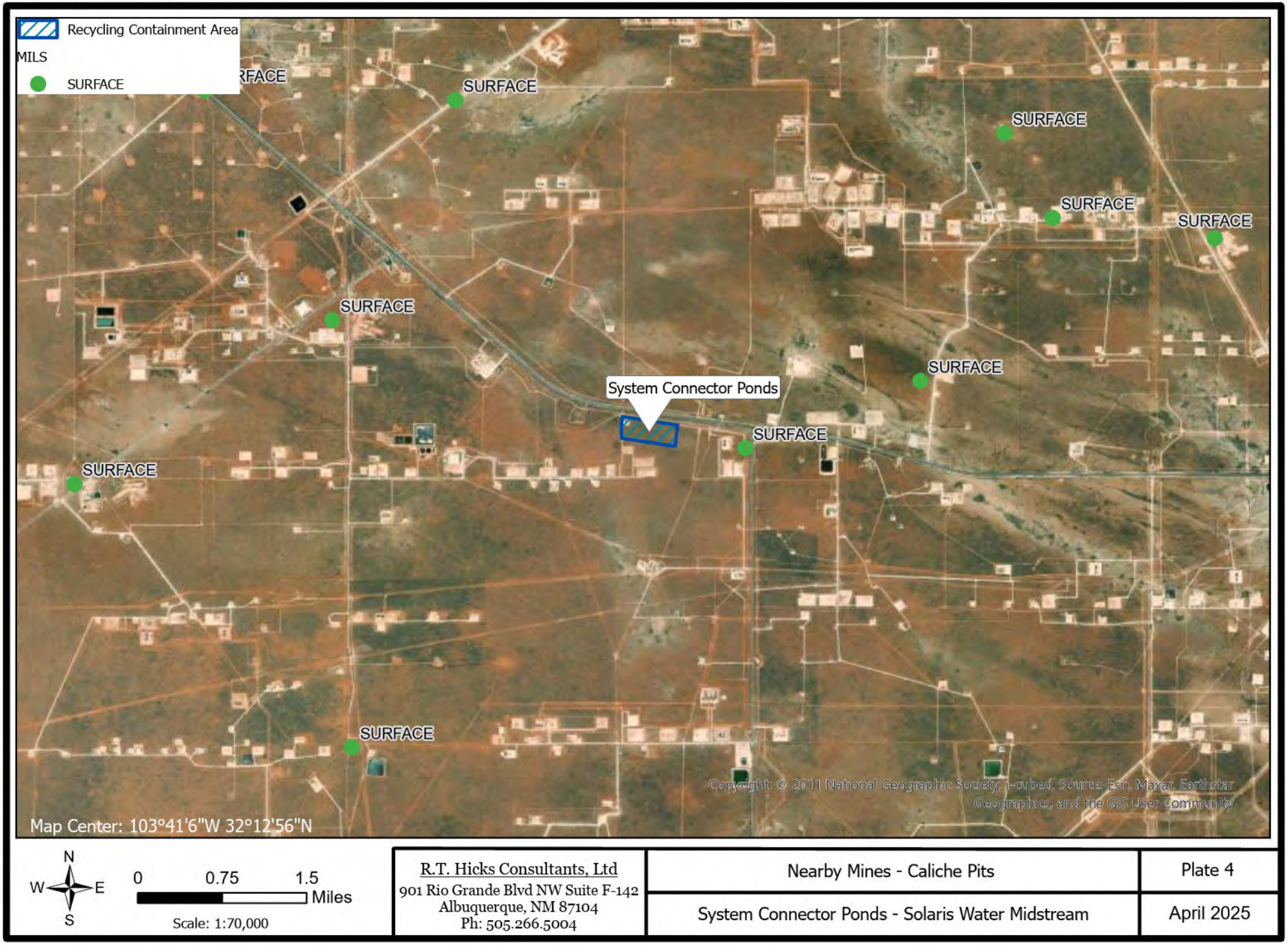

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Mines - Caliche Pits	Plate 4
	System Connector Ponds - Solaris Water Midstream	April 2025

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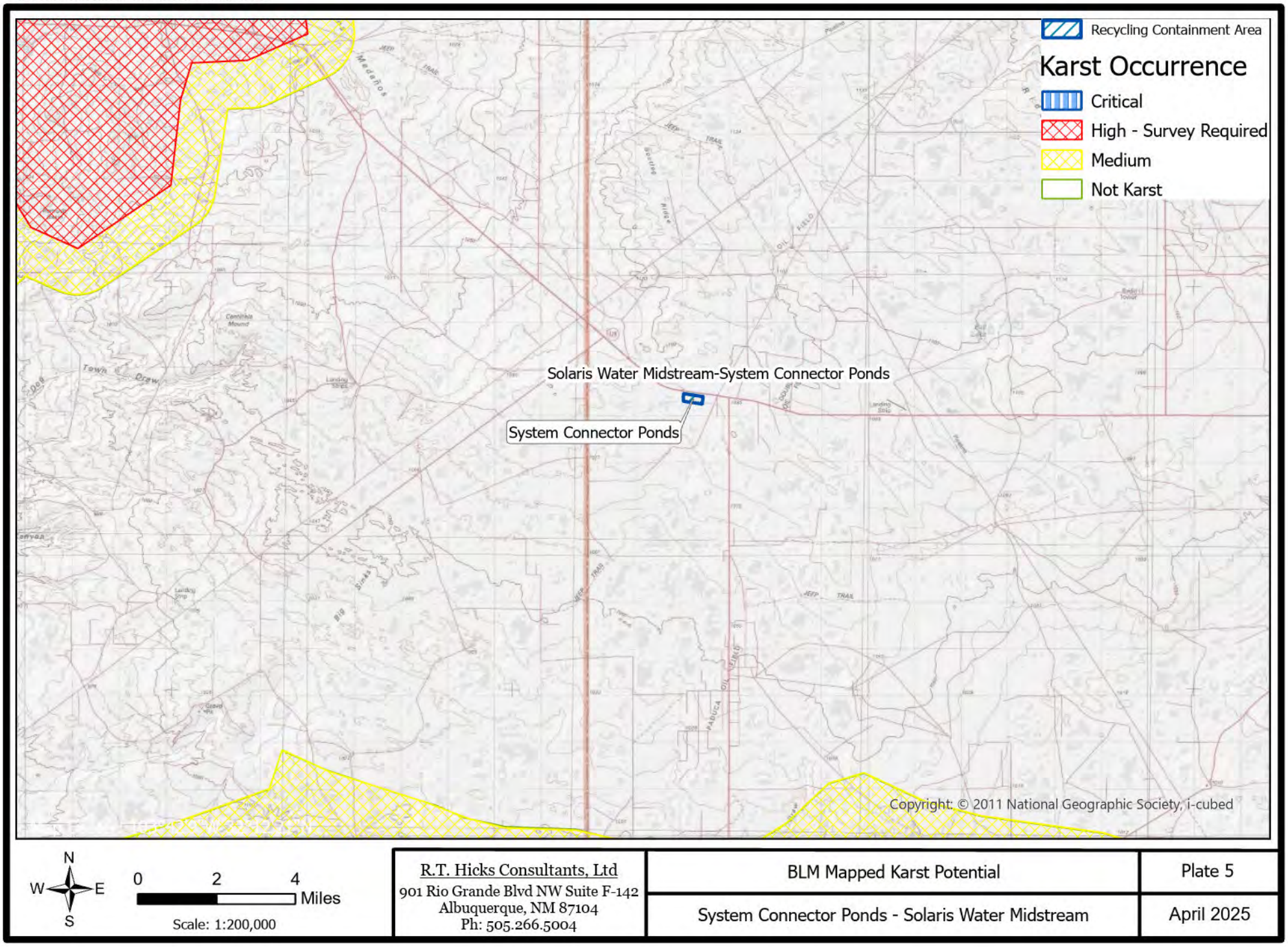

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	BLM Mapped Karst Potential	Plate 5
	System Connector Ponds - Solaris Water Midstream	April 2025

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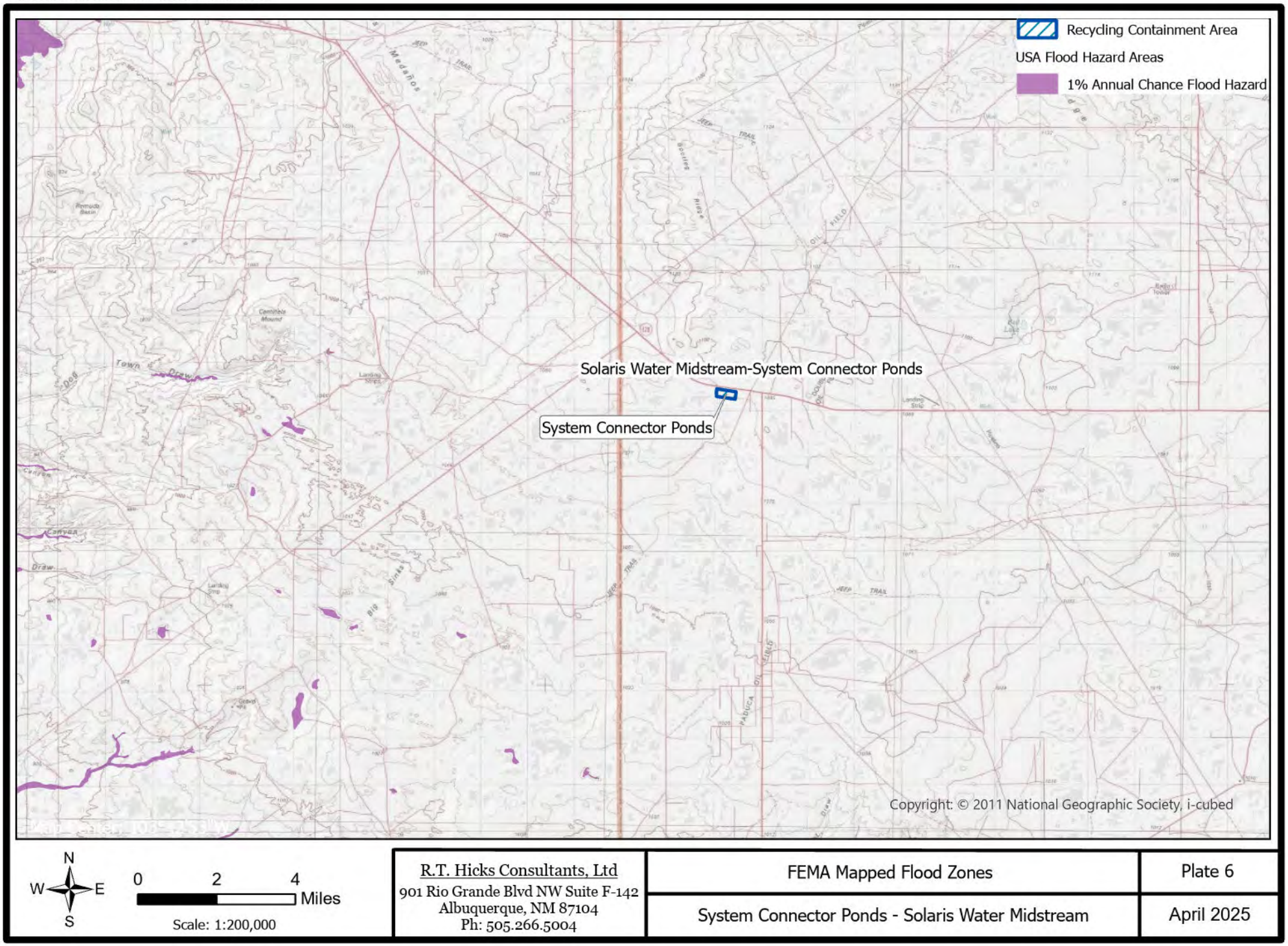

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	FEMA Mapped Flood Zones	Plate 6
	System Connector Ponds - Solaris Water Midstream	April 2025

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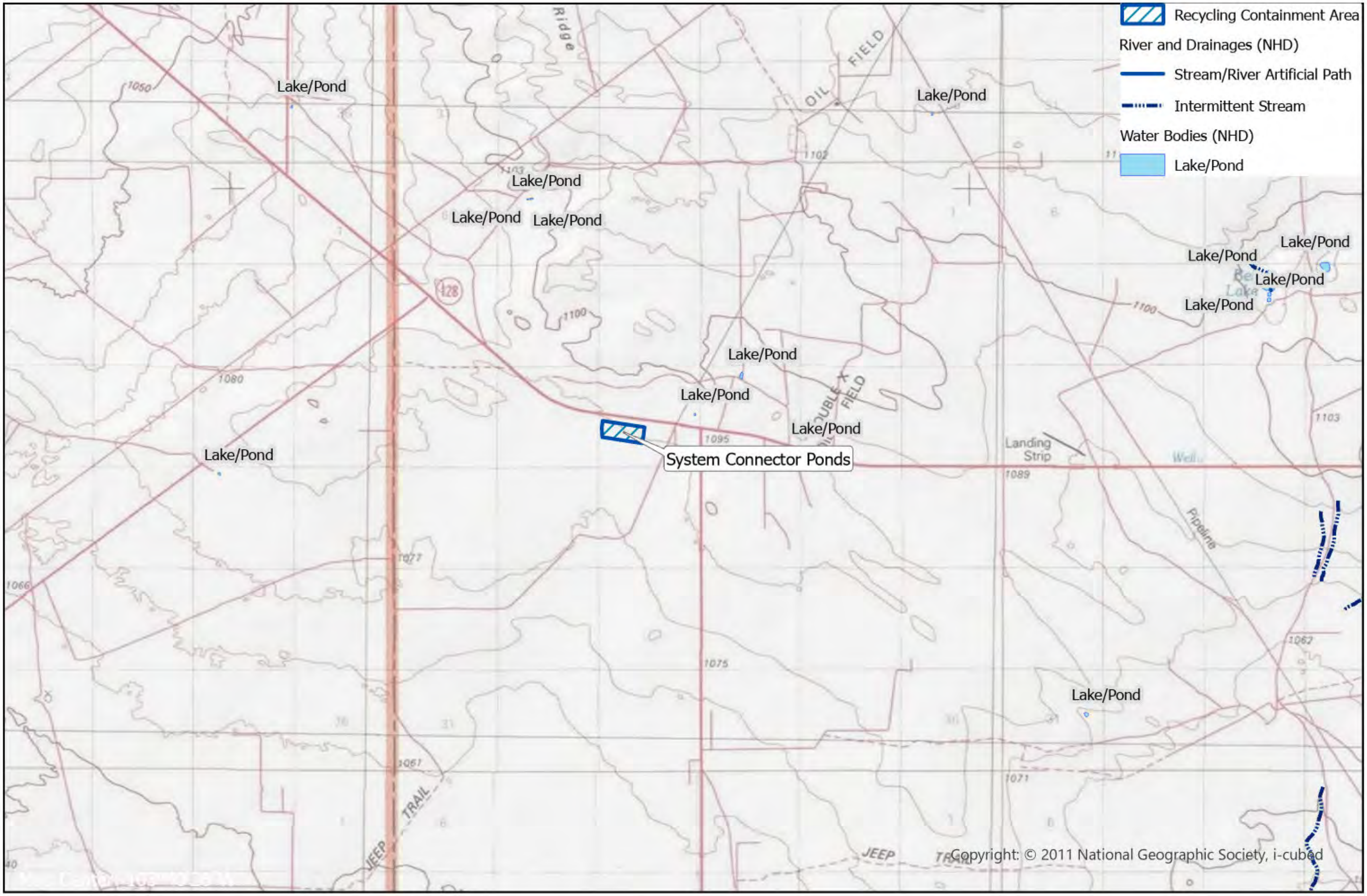

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Albuquerque, NM 87104
Ph: 505.266.5004

Mapped Surface Water

System Connector Ponds - Solaris Water Midstream

Plate 7

April 2025

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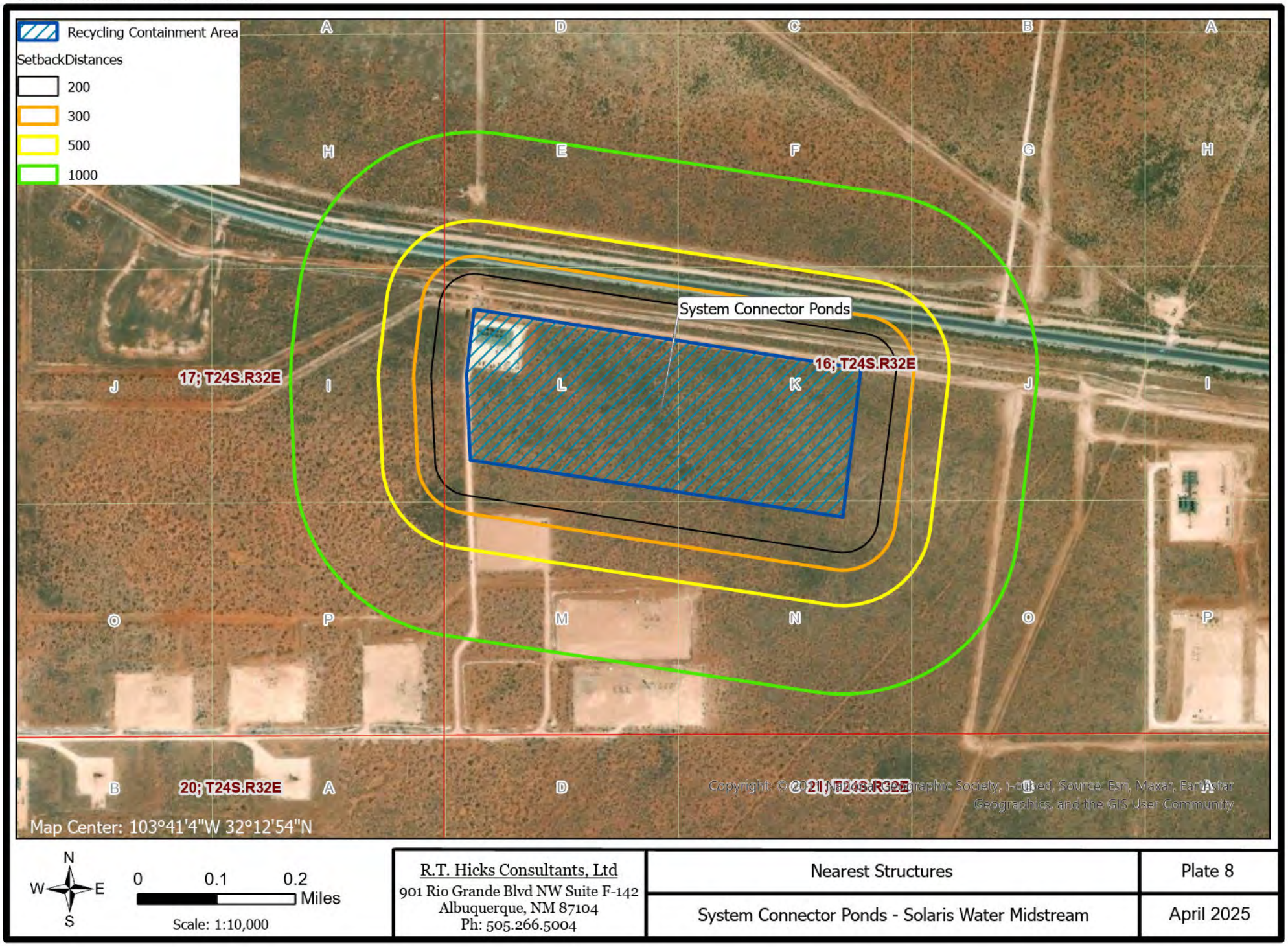

N
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S

0 0.1 0.2 Miles

Scale: 1:10,000

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearest Structures	Plate 8
	System Connector Ponds - Solaris Water Midstream	April 2025

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N
W E
S

0 0.42 0.85 Miles

Scale: 1:40,000

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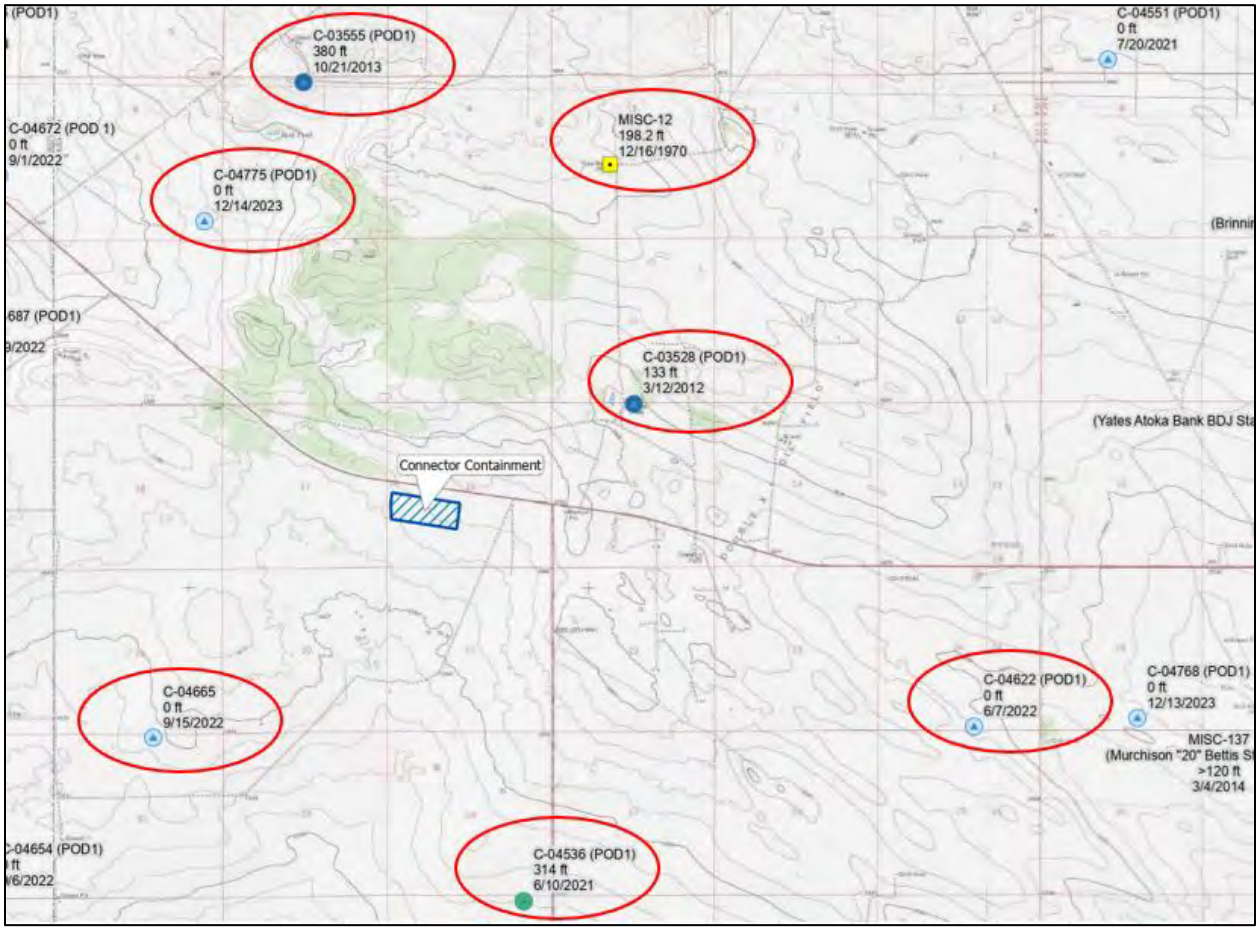
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Mapped Wetlands	Plate 9
System Connector Ponds - Solaris Water Midstream	April 2025

APPENDIX WELL LOGS

- *OSE WELL LOGS*
- *USGS Well Data*
- *Bell Lake Well Data*

Locations of the OSE wells near the site are shown below.



WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO

2015 NOV -7 A 11:11

1. GENERAL AND WELL LOCATION

OSE POD NUMBER (WELL NUMBER): C-3555-POD1	OSE FILE NUMBER(S): C-3555
WELL OWNER NAME(S): Mark McCloy - McCloy Ranches	PHONE (OPTIONAL): 432-940-4459
WELL OWNER MAILING ADDRESS: Box 1076 254 Diamond Road	CITY: Jal STATE: NM ZIP: 88252

WELL LOCATION (FROM GPS): DEGREES / MINUTES / SECONDS

- LATITUDE: 32 15 12.71 N
- LONGITUDE: 103 41 49.24 W

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

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS – PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE: Hwy 128 mm 20 4 miles North - 1/4 east

2. DRILLING & CASING INFORMATION

LICENSE NUMBER: 1654	NAME OF LICENSED DRILLER: John Sirman	NAME OF WELL DRILLING COMPANY: Sirman Drilling & Const. LLC
DRILLING STARTED: 10/20/13	DRILLING ENDED: 10/21/13	DEPTH OF COMPLETED WELL (FT): 600'-0
BORE HOLE DEPTH (FT): 600'-0	DEPTH WATER FIRST ENCOUNTERED (FT): 475-0	
COMPLETED WELL IS: ☐ ARTESIAN ☐ DRY HOLE ☑ SHALLOW (UNCONFINED)	STATIC WATER LEVEL IN COMPLETED WELL (FT): 380'-0	
DRILLING FLUID: ☐ AIR ☑ MUD ☐ ADDITIVES – SPECIFY:		
DRILLING METHOD: ☑ ROTARY ☐ HAMMER ☐ CABLE TOOL ☐ OTHER – SPECIFY:		

DEPTH (feet bgl) FROM	TO	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)
0	460	10	PVC	Certa-Lok	6	DR-17	Blank
460	520	10	PVC	Certa-Lok	6	DR-17	.032 screen
520	600	10	PVC	Certa-Lok	6"	DR-17	Blank

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
0	20	10	3/8 bentonite hole plug	6 Bags	gravity
34	600	10	3/8 pea gravel pack	4 yds	gravity

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 06/08/2012)

FILE NUMBER	C-3555	POD NUMBER		TRN NUMBER	534311

LOCATION 24S.32E.05 1-2-2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	10	10	white caliche	☐Y ☒N	
10	60	50	Red sand	☐Y ☒N	
60	75	15	Brown Sandstone	☐Y ☒N	
75	100	25	grey sandstone	☐Y ☒N	
100	110	10	Red clay	☐Y ☒N	
110	160	50	Brown Sandstone	☐Y ☒N	
160	400	240	Red clay	☐Y ☒N	
400	450	50	Brown Sandstone	☐Y ☒N	
450	475	25	Red Clay	☐Y ☒N	
475	550	75	Brown Sandstone & Sand	☒Y ☐N	5
550	600	50	Red clay	☐Y ☒N	
				☐Y ☐N	
				☐Y ☐N	
				☐Y ☐N	
	600			☐Y ☐N	
				☐Y ☐N	
				☐Y ☐N	
				☐Y ☐N	
				☐Y ☐N	
				☐Y ☐N	
				☐Y ☐N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA: ☑ PUMP ☑ AIR LIFT ☐ BAILER ☐ OTHER – SPECIFY:

TOTAL ESTIMATED WELL YIELD (gpm): 5

STATE ENGINEER OFFICE RECEIVED NOV 04 2013 ROSWELL, NM

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:

None

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

none

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:

John Sirman — SIGNATURE OF DRILLER / PRINT SIGNEE NAME

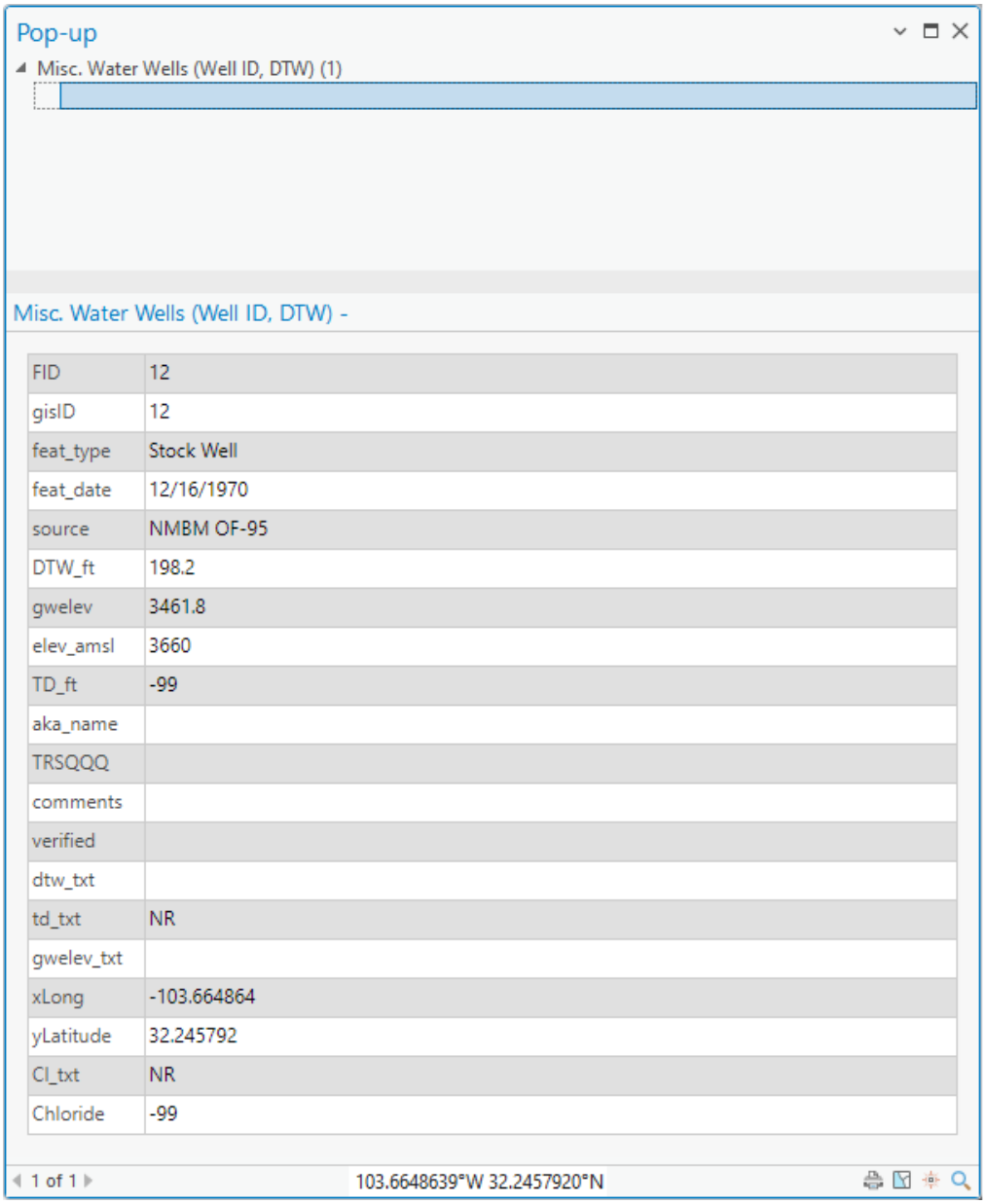
11/3/13 — DATE

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 06/08/2012)

FILE NUMBER	C-3555	POD NUMBER		TRN NUMBER	534311

LOCATION 24S.32E.05 1-2-2

MISC-12 Well Data



FID	12
gisID	12
feat_type	Stock Well
feat_date	12/16/1970
source	NMBM OF-95
DTW_ft	198.2
gwelev	3461.8
elev_amsl	3660
TD_ft	-99
aka_name	
TRSQQQ	
comments	
verified	
dtw_txt	
td_txt	NR
gwelev_txt	
xLong	-103.664864
yLatitude	32.245792
Cl_txt	NR
Chloride	-99

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

4-23-12

Corrected well log

1. GENERAL AND WELL LOCATION

POD NUMBER (WELL NUMBER): C-03528-POD1	OSE FILE NUMBER(S): C-03528-POD1
WELL OWNER NAME(S): MARK & ANNETTE MCCLOY	PHONE (OPTIONAL): 432-940-4459
WELL OWNER MAILING ADDRESS: PO BOX 1076	CITY: JAL STATE: NM ZIP: 88252

WELL LOCATION (FROM GPS)	DEGREES	MINUTES	SECONDS	
LATITUDE	32	13	29.00	N
LONGITUDE	103	39	44.60	W

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

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS: Coordinates Based on Map (Non-GPS)

2. OPTIONAL

(2.5 ACRE)	(10 ACRE)	(40 ACRE)	(160 ACRE)	SECTION	TOWNSHIP	RANGE
NW ¼	NW ¼	NW ¼	NE ¼	15	24 ☐ NORTH ☒ SOUTH	32 ☒ EAST ☐ WEST

SUBDIVISION NAME	LOT NUMBER	BLOCK NUMBER	UNIT/TRACT

HYDROGRAPHIC SURVEY	MAP NUMBER	TRACT NUMBER

3. DRILLING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD1682	JOHN NORRIS	HUNGRY HORSE,LLC

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
2-20-12	3-12-12	541	541	133

COMPLETED WELL IS: ☐ ARTESIAN ☐ DRY HOLE ☑ SHALLOW (UNCONFINED) — STATIC WATER LEVEL IN COMPLETED WELL (FT):

DRILLING FLUID: ☐ AIR ☑ MUD ☐ ADDITIVES – SPECIFY:

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

DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA. CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)
0	541	8 3/4	PVC	GLUED	6"	3/8	1/8

4. WATER BEARING STRATA

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	YIELD (GPM)
133	152	19	SAND	UK

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA: N/A

TOTAL ESTIMATED WELL YIELD (GPM):

2012 APR 30 A 11:41
STATE ENGINEER OFFICE
ROSWELL

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER C-3528	POD NUMBER C-03528-POD1	TRN NUMBER 491386
LOCATION 24.32.15.211		PAGE 1 OF 2

5. SEAL AND PUMP

TYPE OF PUMP: ☐ SUBMERSIBLE ☐ JET ☐ NO PUMP – WELL NOT EQUIPPED ☐ TURBINE ☐ CYLINDER ☐ OTHER – SPECIFY: UNKNOWN

ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT
	0	20	8 3/4	GROUT & CEMENT	8	TOP

6. GEOLOGIC LOG OF WELL

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?
0	3	3	TOPSOIL	☐ YES ☑ NO
3	18	15	CALICHE	☐ YES ☑ NO
18	26	8	SAND	☑ YES ☐ NO
26	133	107	RED CLAY	☐ YES ☑ NO
133	152	19	SAND	☑ YES ☐ NO
152	318	166	RED CLAY	☐ YES ☑ NO
318	345	27	SAND	☑ YES ☐ NO
345	384	39	RED CLAY AND ROCK	☐ YES ☑ NO
384	418	34	SAND	☑ YES ☐ NO
418	444	26	RED CLAY AND ROCK	☐ YES ☑ NO
444	468	24	SAND	☑ YES ☐ NO
468	500	32	RED CLAY	☐ YES ☑ NO
500	508	8	SAND	☑ YES ☐ NO
508	541	33	RED CLAY AND ROCK	☐ YES ☑ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO

WELL TEST — METHOD: ☐ BAILER ☐ PUMP ☐ AIR LIFT ☐ OTHER – SPECIFY: N/A

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

ADDITIONAL STATEMENTS OR EXPLANATIONS:

8. 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:

John Mors — SIGNATURE OF DRILLER

4-23-12 — DATE

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER C-3528	POD NUMBER C-03528-POD1	TRN NUMBER 491386
LOCATION 24.32.15.2111		PAGE 2 OF 2

Locator Tool Report

General Information:

Application ID:29 Date: 04-03-2012 Time: 08:10:09

WR File Number: C-03528-POD1
Purpose: POINT OF DIVERSION

Applicant First Name: MARK & ANNETTE MCCLOY
Applicant Last Name: NEW STOCK WELL (COTTON PLACE)(WELL LOG LOCATION)

(Based on Application Not Driller GPS)

GW Basin: CARLSBAD
County: LEA

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

NW 1/4 of NW 1/4 of NW 1/4 of NE 1/4 of Section 15, Township 24S, Range 32E.

Coordinate System Details:

Geographic Coordinates:

Latitude:	32 Degrees	13 Minutes	29.0 Seconds	N
Longitude:	103 Degrees	39 Minutes	44.6 Seconds	W

Universal Transverse Mercator Zone: 13N

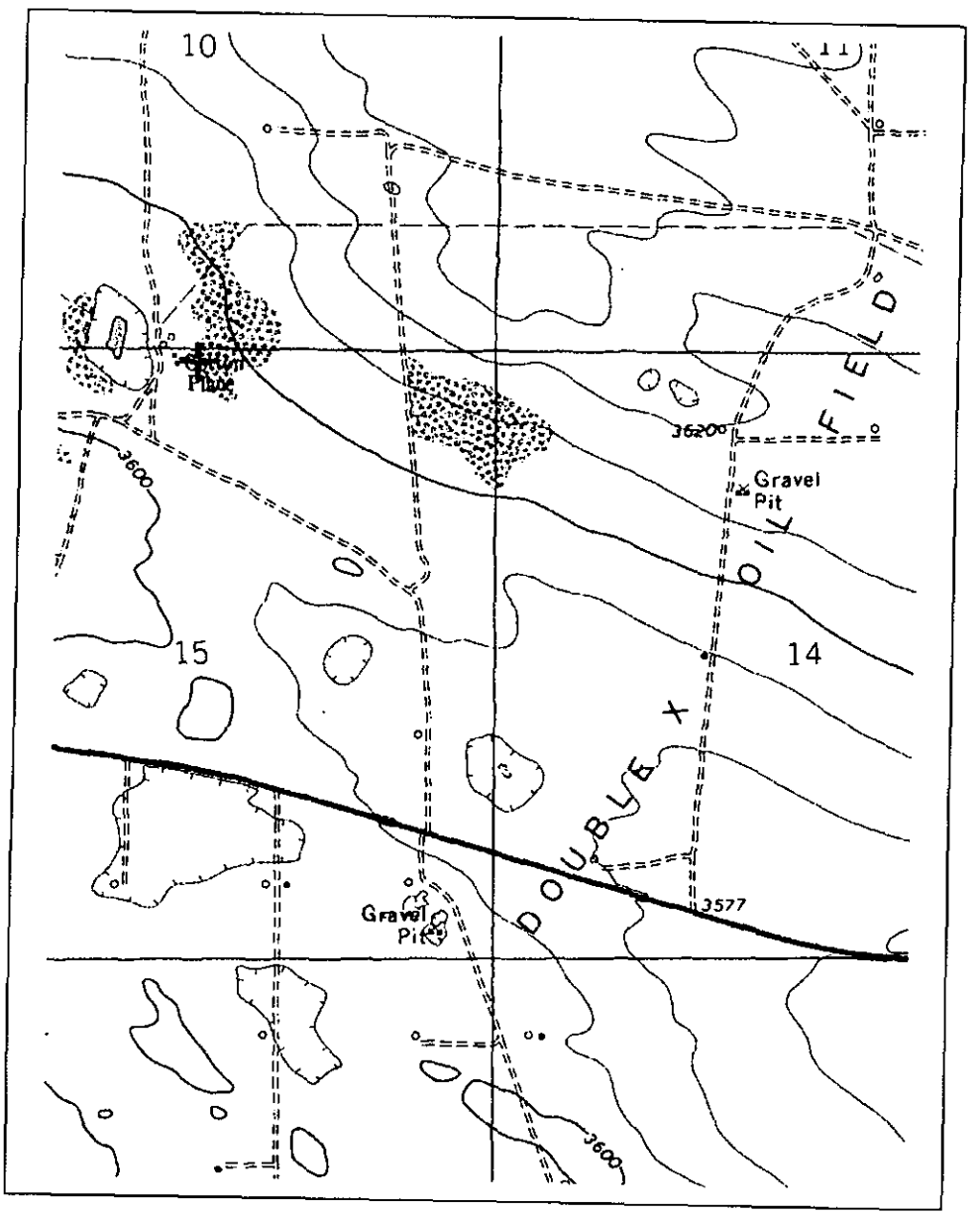
NAD 1983(92) (Meters)	N: 3,566,130	E: 626,040
NAD 1983(92) (Survey Feet)	N: 11,699,877	E: 2,053,934
NAD 1927 (Meters)	N: 3,565,928	E: 626,089
NAD 1927 (Survey Feet)	N: 11,699,215	E: 2,054,092

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 135,982	E: 228,239
NAD 1983(92) (Survey Feet)	N: 446,136	E: 748,815
NAD 1927 (Meters)	N: 135,964	E: 215,686
NAD 1927 (Survey Feet)	N: 446,077	E: 707,631

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: C-03528-POD1 Scale: 1:19,970

Northing/Easting: UTM83(92) (Meter): N: 3,566,130 E: 626,040

Northing/Easting: SPCS83(92) (Feet): N: 446,136 E: 748,815

GW Basin: Carlsbad

Print Date: 04/03/2012

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NO. (WELL NO.)	WELL TAG ID NO.	OSE FILE NO(S).
POD 1 (TW-1)	N/A	C-4622

WELL OWNER NAME(S)	PHONE (OPTIONAL)
Devon Energy	575-748-1838

WELL OWNER MAILING ADDRESS	CITY	STATE	ZIP
6488 7 Rivers Hwy	Artesia	NM	88210

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	11	46.22	N
	LONGITUDE	103	37	36.41	W

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

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

SW SW SE Sec.24 T24S R32S NMPM

2. DRILLING & CASING INFORMATION

LICENSE NO.	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
1249	Jackie D. Atkins	Atkins Engineering Associates, Inc.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
6/7/2022	6/7/2022	Temporary Well	±55	N/A

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

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

DATE STATIC MEASURED: 6/13/2022

DRILLING FLUID: ☐ AIR ☐ MUD ADDITIVES – SPECIFY:

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

CHECK HERE IF PITLESS ADAPTER IS INSTALLED ☐

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE (add coupling diameter)	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
0	55	±6.5	Boring-HSA	--	--	--	--

3. ANNULAR MATERIAL

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

OSE DII JUN 16 2022 PM3:03

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 01/28/2022)

FILE NO. C-4622-POD1	POD NO. 1	TRN NO. 726166
LOCATION 24.32.24.334	WELL TAG ID NO. —	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	4	4	Sand, Fine-grained, poorly graded, 2.5 YR 3/6, Dark Red	Y ✓ N	
4	13	9	Caliche, with Fine-grained sand, 7.5 YR 7/4, Pink	Y ✓ N	
13	34	21	Sand, Fine-grained, poorly graded, with Caliche, 7.5 YR 7/6, Reddish Yellow	Y ✓ N	
34	55	21	Sand, Fine-grained, poorly graded,unconsolidated, 7.5 YR 7/6, Reddish Yellow	Y ✓ N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

☐ PUMP ☐ AIR LIFT ☐ BAILER ☐ OTHER – SPECIFY:

TOTAL ESTIMATED WELL YIELD (gpm): 0.00

5. TEST; RIG SUPERVISION

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

MISCELLANEOUS INFORMATION: Temporary well material removed and soil boring backfilled using drill cuttings from total depth to ten feet below ground surface(bgs), then hydrated bentonite chips ten feet bgs to surface.
15
Bell Lake 24 Fed 4

OSE DIT JUN 16 2022 PM3:09

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

Shane Eldridge, Cameron Pruitt

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 30 DAYS AFTER COMPLETION OF WELL DRILLING:

Jack Atkins — Jackie D. Atkins — 6/16/2022

SIGNATURE OF DRILLER / PRINT SIGNEE NAME — DATE

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 01/28/2022)

FILE NO. C-4622-POD1	POD NO. 1	TRN NO. 726166	
LOCATION 24.32.24.334		WELL TAG ID NO. —	PAGE 2 OF 2

Mike A. Hamman, P.E.
State Engineer

Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER

Trn Nbr: 726166
File Nbr: C 04622
Well File Nbr: C 04622 POD1

Jun. 16, 2022

DALE WOODALL
DEVON ENERGY
6488 7 RIVERS HWY
ARTESIA, NM 88210

Greetings:

The above numbered permit was issued in your name on 05/23/2022.

The Well Record was received in this office on 06/16/2022, stating that it had been completed on 06/07/2022, and was a dry well. The well is to be plugged according to 19.27.4.30 NMAC.

Please note that another well can be drilled under this permit if the well is completed and the well log filed on or before 05/23/2023.

If you have any questions, please feel free to contact us.

Sincerely,

Maret Amaral
(575)622-6521

drywell

Atkins ENGINEERING ASSOCIATES INC.
2904 W 2nd St.
Roswell, NM 88201
voice: 575.624.2420
fax: 575.624.2421
www.atkinseng.com

June 8, 2022

DII-NMOSE
1900 W 2nd Street
Roswell, NM 88201

Hand Delivered to the DII Office of the State Engineer

Re: Well Record C-4622 Pod1 at Bell Lake 24 Fed 4

To whom it may concern:

Attached please find a well log & record and a plugging record, in duplicate, for a one (1) soil borings, C-4622 Pod1.

If you have any questions, please contact me at 575.499.9244 or lucas@atkinseng.com.

Sincerely,

Lucas Middleton

Enclosures: as noted above

OSE DII JUN 16 2022 PM3:09

OSE DIT JUL 9 2021 PM1:52

OSE DIT JUN 2L 2021 PM10:14

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NO. (WELL NO.)	WELL TAG ID NO.	OSE FILE NO(S).
~~C-4536~~ POD 1	20E37	C-4536

WELL OWNER NAME(S)	PHONE (OPTIONAL)
BASIN PROPERTIES RANCHES LLC	

WELL OWNER MAILING ADDRESS	CITY	STATE	ZIP
3300 N A STREET, BLDG 1, STE 220	MIDLAND	TX	79705

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	10	50.8	N
	LONGITUDE	103	40	25.9	W

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

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

2. DRILLING & CASING INFORMATION

LICENSE NO.	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD1706	Bryce Wallace	Elite Drillers Corporation

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
06/09/21	06/10/21	500	500	314

COMPLETED WELL IS: ☐ ARTESIAN ☐ DRY HOLE ☑ SHALLOW (UNCONFINED) — STATIC WATER LEVEL IN COMPLETED WELL (FT): 314

DRILLING FLUID: ☑ AIR ☐ MUD ADDITIVES – SPECIFY:

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

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE (add coupling diameter)	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
0	20	12 3/4	STEEL	N/A	8.28	.337	
0	300	7 7/8	SDR17 PVC	SPLINE	4.3	SDR17	
300	500	7 7/8	SDR17 PVC	SPLINE	4.3	SDR17	.032

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
0	20	12 3/4	CEMENT	10	TOP FILL
0	20	7 7/8	CEMENT	6	TOP FILL
300	500	7 7/8	8/16 SILICA SAND	46	TOP FILL

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 06/30/17)

FILE NO. C-4536-POD1	POD NO. 1	TRN NO. 695378	
LOCATION STK 24.32.33.122		WELL TAG ID NO. 20E37	PAGE 1 OF 2

OSE DIT JUL 9 2021 PM1:53

OSE DIT JUN 21 2021 PM10:14

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	3	3	RED SAND	Y ✓ N	
3	12	9	CALICHE	Y ✓ N	
12	180	168	RED CLAY	Y ✓ N	
180	235	415	TAN SANDSTONE	Y ✓ N	
235	480	245	TAN SANDSTONE & CLAY STRINGERS	✓ Y N	4.00
480	500	20	RED CLAY WITH SAND STRINGERS	Y ✓ N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

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

TOTAL ESTIMATED WELL YIELD (gpm): 4.00

5. TEST; RIG SUPERVISION

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

MISCELLANEOUS INFORMATION:

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

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:

Bryce Wallace — SIGNATURE OF DRILLER / PRINT SIGNEE NAME

06/16/2021 — DATE

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 06/30/2017)

FILE NO. C-4536-POD1	POD NO. 1	TRN NO. 695378	
LOCATION STK-24.32.33.122		WELL TAG ID NO. 20E37	PAGE 2 OF 2

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NO. (WELL NO.)	WELL TAG ID NO.	OSE FILE NO(S).
C-04665 POD 1		C-04665

WELL OWNER NAME(S)	PHONE (OPTIONAL)
COG OPERATING LLC	575-988-2043

WELL OWNER MAILING ADDRESS	CITY	STATE	ZIP
2208 W MAIN ST	ARTESIA	NM	88210

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	11	42.72	N
	LONGITUDE	-103	42	45.30	W

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

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

KING TUT FEDERAL 001H

2. DRILLING & CASING INFORMATION

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

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
9/15/2022	09/15/2022	120		

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

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

DRILLING FLUID: ☑ AIR ☐ MUD ADDITIVES – SPECIFY:

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

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

OSE DIT SEP 26 2022 PM3:28

3. ANNULAR MATERIAL

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

FOR OSE INTERNAL USE

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

FILE NO.	C-04665	POD NO.	1	TRN NO.	732879
LOCATION	24S. 32E. 30 112			WELL TAG ID NO.	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	1		CALICHIE PAD	Y ✔ N	
1	3		SANDY TOPSOIL	Y ✔ N	
3	25		CALICHIE	Y ✔ N	
25	27		RED SAND	Y ✔ N	
27	120		RED SANDY CLAY	Y ✔ N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

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

TOTAL ESTIMATED WELL YIELD (gpm): 0.00

5. TEST; RIG SUPERVISION

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

MISCELLANEOUS INFORMATION:

OSE DIT SEP 26 2022 PM3:28

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

RUSSELL SOUTHERLAND

6. SIGNATURE

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

RUSSELL SOUTHERLAND — SIGNATURE OF DRILLER / PRINT SIGNEE NAME

09/15/2022 — DATE

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 04/30/2019)

FILE NO. C-04665	POD NO. 1	TRN NO. 732879	
LOCATION 24S. 32E. 30 112		WELL TAG ID NO.	PAGE 2 OF 2

Mike A. Hamman, P.E.
State Engineer

Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER

Trn Nbr: 732879
File Nbr: C 04665
Well File Nbr: C 04665

Oct. 04, 2022

KALEI JENNINGS
ENSOLUM
601 N MARIENFIELD ST SUITE 400
MIDLAND, TX 79701

Greetings:

The above numbered permit was issued in your name on 08/26/2022.

The Well Record was received in this office on 09/26/2022, stating that it had been completed on 09/15/2022, and was a dry well. The well is to be plugged according to 19.27.4.30 NMAC.

Please note that another well can be drilled under this permit if the well is completed and the well log filed on or before 08/26/2023.

If you have any questions, please feel free to contact us.

Sincerely,

Vanessa Clements

Vanessa Clements
(575)622-6521

drywell

WELL RECORD & LOG

mesa Verde bfed.

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NO. (WELL NO.)	WELL TAG ID NO.	OSE FILE NO(S).
~~C-4775~~ POD1	NA	C04775

WELL OWNER NAME(S)	PHONE (OPTIONAL)
Devon Energy Resources	

WELL OWNER MAILING ADDRESS	CITY	STATE	ZIP
205 E. Bender Road # 150	Hobbs	NM	88240

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	14	26.8944	N
	LONGITUDE	-103	42	26.1864	W

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

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

2. DRILLING & CASING INFORMATION

LICENSE NO.	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
1833	Jason Maley	Vision Resources

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
12-14-23	12-14-23	105'	105'	Dry

COMPLETED WELL IS: ☐ ARTESIAN *add Centralizer info below ☑ DRY HOLE ☐ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): Dry

DATE STATIC MEASURED: 12-18-23

DRILLING FLUID: ☑ AIR ☐ MUD ADDITIVES – SPECIFY:

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

CHECK HERE IF PITLESS ADAPTER IS INSTALLED ☐

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE (add coupling diameter)	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
0	95'	6"	2" PVC SCH40	Thread	2"	SCH40	N/A
95'	105'	6"	2" PVC SCH40	Thread	2"	SCH40	.05

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3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL *(if using Centralizers for Artesian wells- indicate the spacing below)	AMOUNT (cubic feet)	METHOD OF PLACEMENT
			None Pulled and Plugged		

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 09/22/2022)

FILE NO. C-4775-POD1	POD NO. 1	TRN NO. 751179	
LOCATION Expl 24.32.06.444		WELL TAG ID NO.	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	10'	10'	Red coarse sand	Y ✓N	
10'	30'	20'	Tan Fine sand wih coarse rock	Y ✓N	
30'	40'	10'	Red sand with white caliche	Y ✓N	
40'	60'	20'	Tan sand with white caliche	Y ✓N	
60'	80'	20'	Red sand with small rock	Y ✓N	
80'	105'	25'	Tan fine sand with caliche	Y ✓N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

☐ PUMP ☐ AIR LIFT ☐ BAILER ☐ OTHER – SPECIFY: Dry

TOTAL ESTIMATED WELL YIELD (gpm): 0

5. TEST; RIG SUPERVISION

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

MISCELLANEOUS INFORMATION:

OSE DII JAN 12 2024 PM 1:53

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

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 30 DAYS AFTER COMPLETION OF WELL DRILLING:

Jason Maley — 1/10/24

SIGNATURE OF DRILLER / PRINT SIGNEE NAME — DATE

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 09/22/2022)

FILE NO. C-4775-POD 1	POD NO. 1	TRN NO. 751179
LOCATION Exp 24 32.06.444	WELL TAG ID NO. —	PAGE 2 OF 2

Mike A. Hamman, P.E.
State Engineer

well Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER

Trn Nbr: 751179
File Nbr: C 04775
Well File Nbr: C 04775 POD1

Jan. 12, 2024

DALE WOODALL
DEVON ENERGY RESOURCES
205 E BENDER ROAD #150
HOBBS, NM 88240

Greetings:

The above numbered permit was issued in your name on 09/19/2023.

The Well Record was received in this office on 01/12/2024, stating that it had been completed on 12/14/2023, and was a dry well. The well is to be plugged according to 19.27.4.30 NMAC.

Please note that another well can be drilled under this permit if the well is completed and the well log filed on or before 09/18/2024.

If you have any questions, please feel free to contact us.

Sincerely,

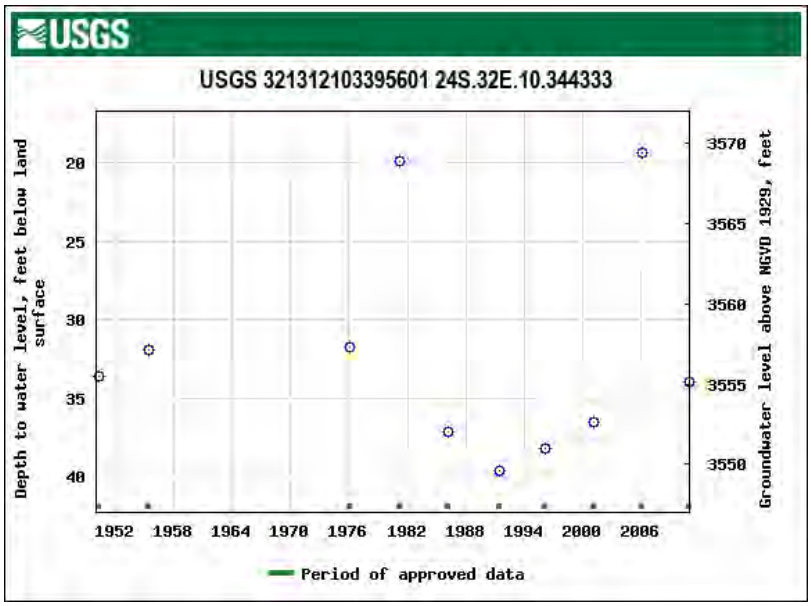
Maret Thompson
(575)622-6521

drywell

USGS Well Data

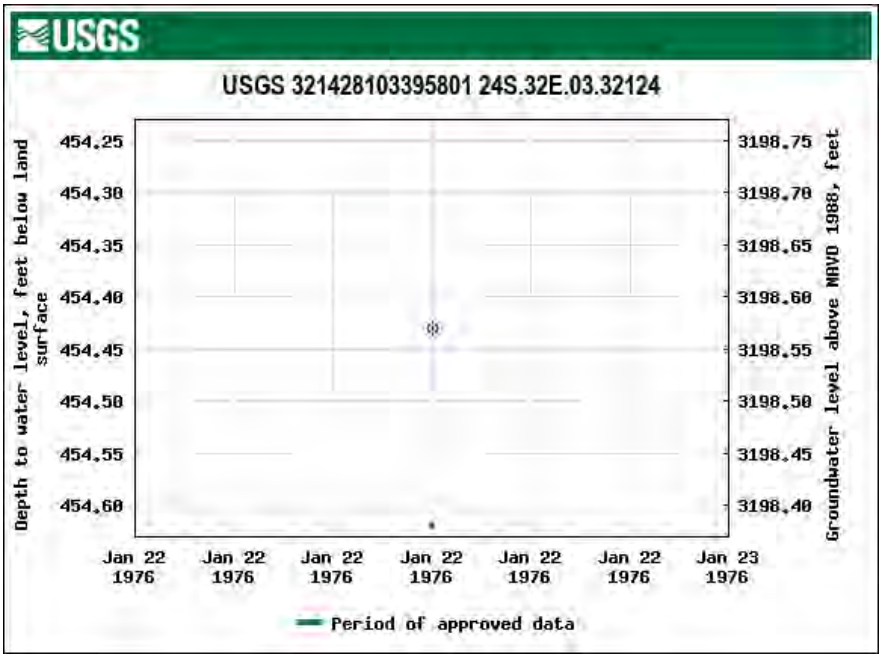
USGS 321312103395601 24S.32E.10.344333 USGS-14194 at Cotton Place

Lea County, New Mexico
Hydrologic Unit Code 13070007
Latitude 32°13'30.4",
Longitude 103°39'52.7"
NAD83
Land-surface elevation 3,589.00 feet above NGVD29
The depth of the well is 60 feet below land surface.
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.



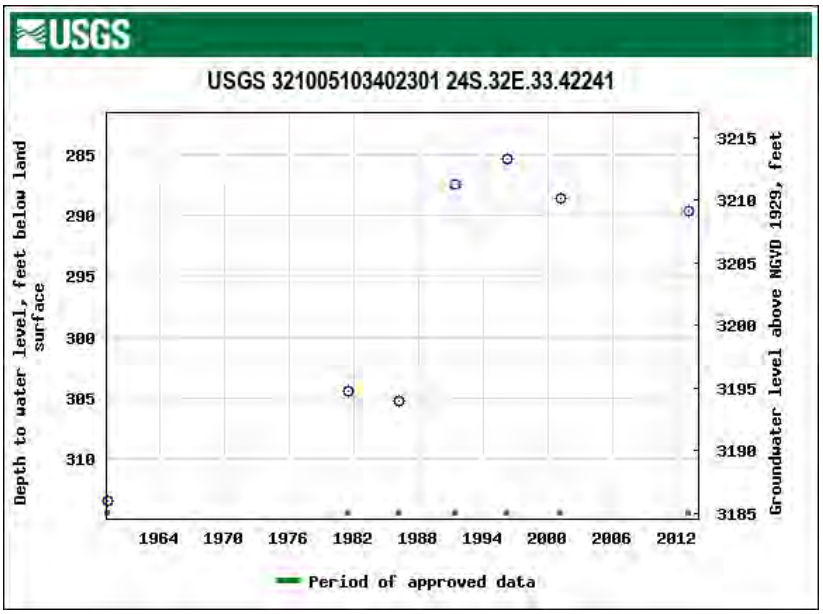
USGS 321428103395801 24S.32E.03.32124 USGS-14294 N-NE of Connector

Lea County, New Mexico
Latitude 32°14'28",
Longitude 103°39'58"
NAD27
Land-surface elevation 3,653 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.

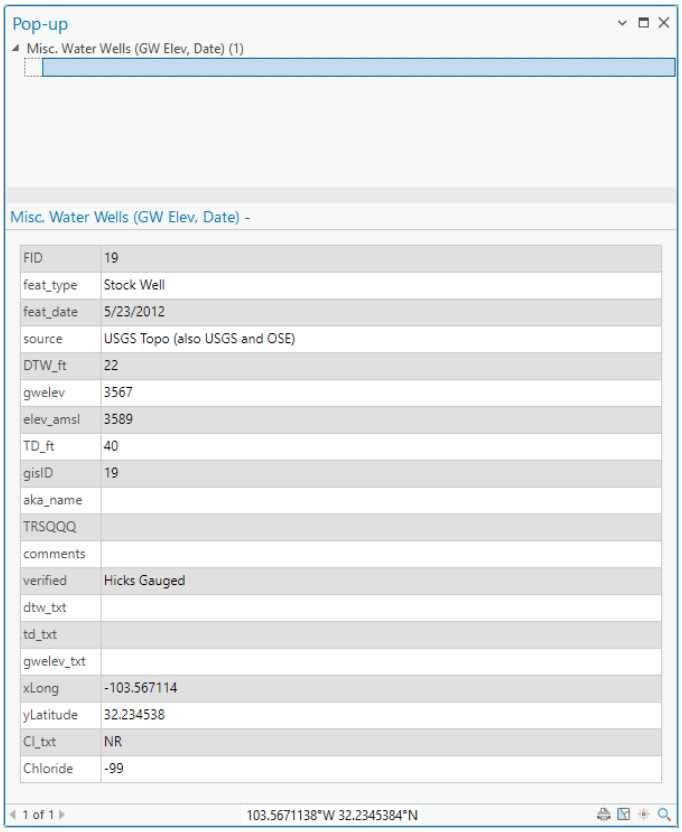


USGS 321005103402301 24S.32E.33.42241 USGS-14343 - About 3 miles south

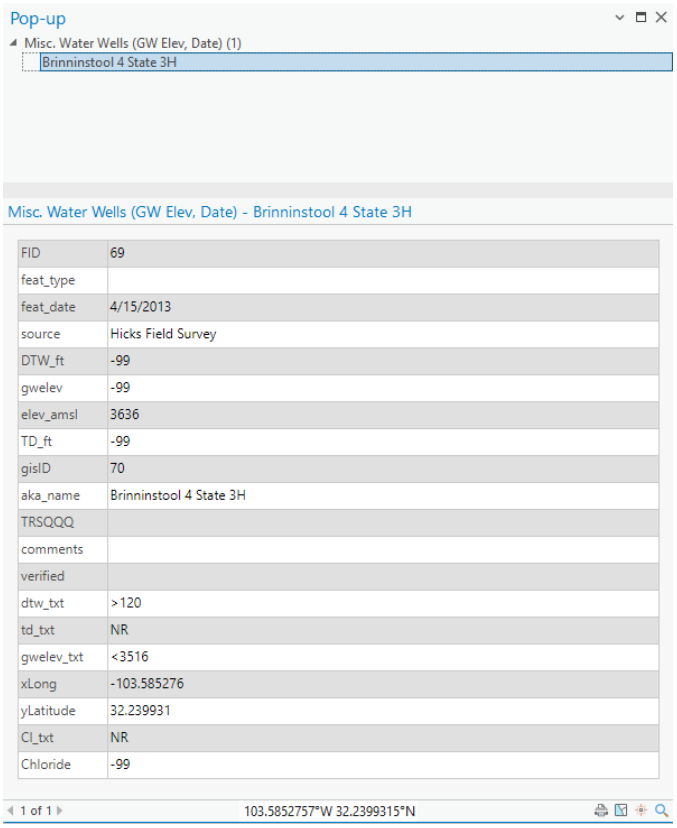
Latitude 32°10'21.6", Longitude 103°40'18.9" NAD83
Lea County, New Mexico , Hydrologic Unit 13070001
Well depth: 367 feet
Land surface altitude: 3,499.00 feet above NGVD29.
Well completed in "Other aquifers" (N9999OTHER) national aquifer.
Well completed in "Chinle Formation" (231CHNL) local aquifer



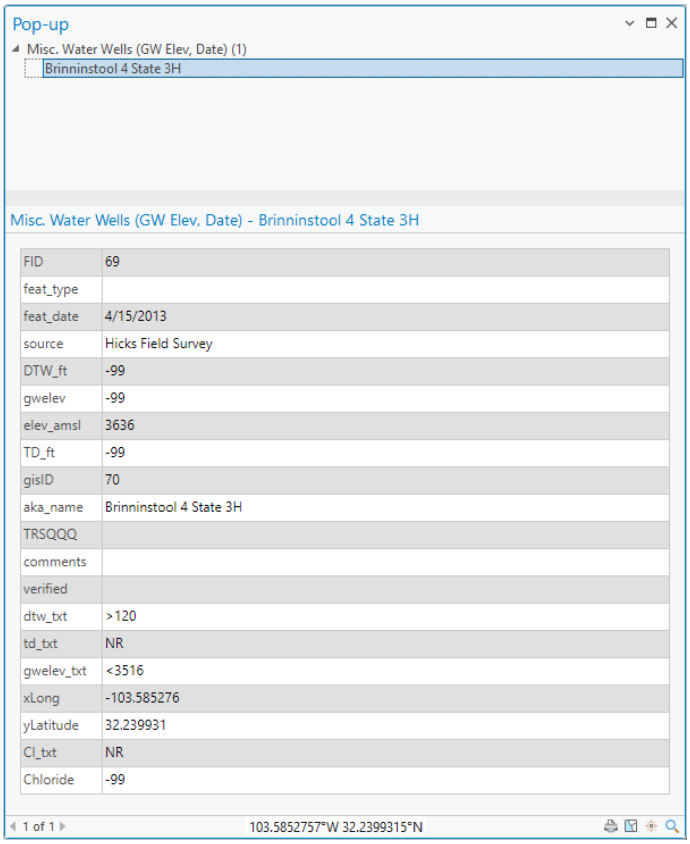
MISC-19 Well Data



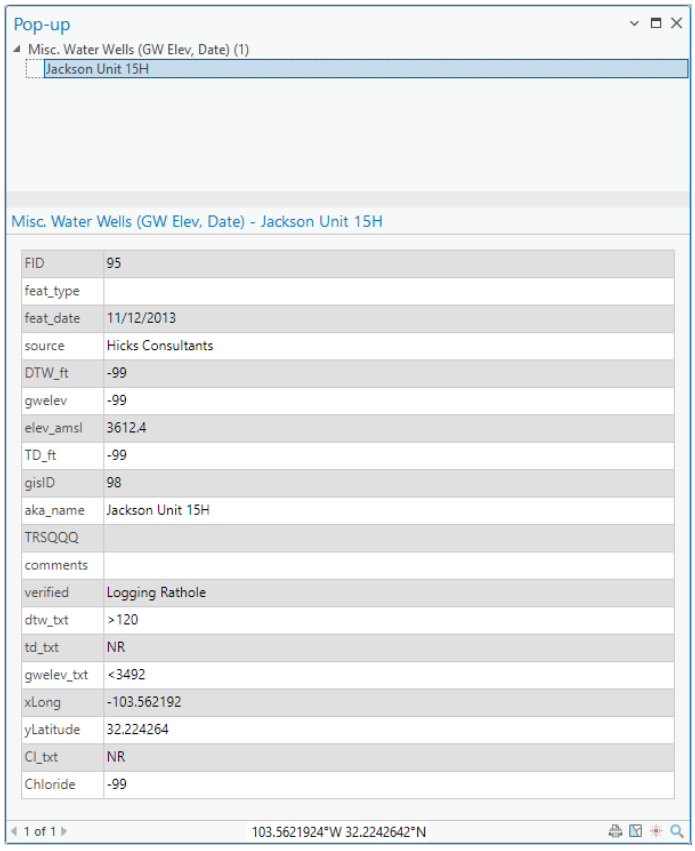
MISC-69



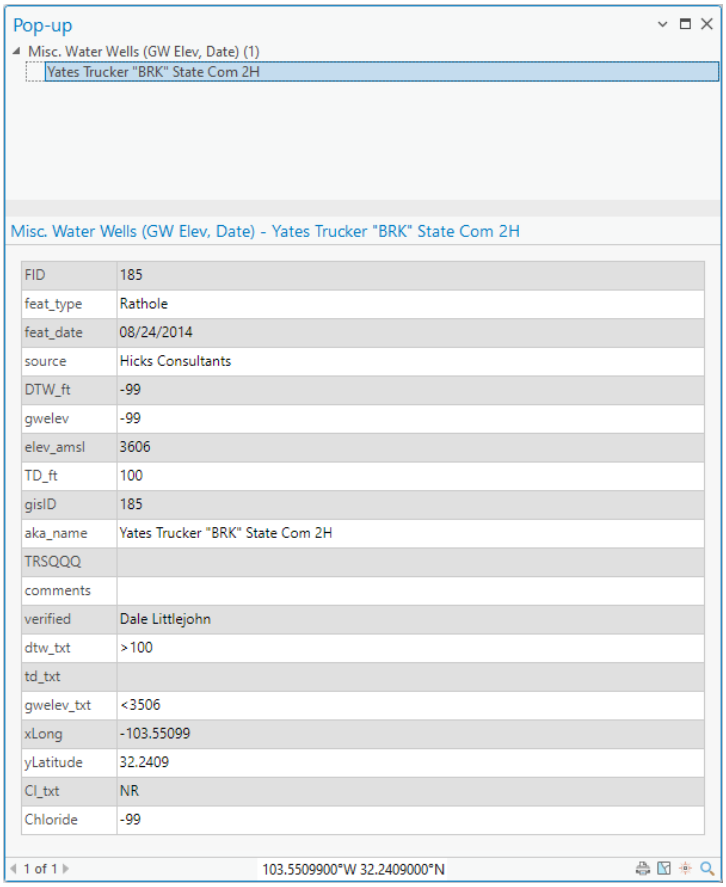
MISC-70



MISC-98



MISC-185


Pop-up
Misc. Water Wells (GW Elev, Date) (1)
Yates Trucker "BRK" State Com 2H
Misc. Water Wells (GW Elev, Date) - Yates Trucker "BRK" State Com 2H
FID 185
feat_type Rathole
feat_date 08/24/2014
source Hicks Consultants
DTW_ft -99
gwelev -99
elev_amsl 3606
TD_ft 100
gisID 185
aka_name Yates Trucker "BRK" State Com 2H
TRSQQQ
comments
verified Dale Littlejohn
dtw_txt >100
td_txt
gwelev_txt <3506
xLong -103.55099
yLatitude 32.2409
Cl_txt NR
Chloride -99
1 of 1
103.5509900°W 32.2409000°N

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NO. (WELL NO.)	WELL TAG ID NO.	OSE FILE NO(S).
C-4741 POD-1 (SB-1)		C-4741

WELL OWNER NAME(S)	PHONE (OPTIONAL)
Plains All American	

WELL OWNER MAILING ADDRESS	CITY	STATE	ZIP
1106 Griffith Drive	Midland	TX	79706

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	15	53.91	N
	LONGITUDE	103	33	20.72	W

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

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

Neptune

2. DRILLING & CASING INFORMATION

LICENSE NO.	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD-1456	John W. White	White Drilling Company, Inc.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
5/8/2023	5/11/2023		55.0	

COMPLETED WELL IS: ☐ ARTESIAN *add Centralizer info below ☑ DRY HOLE ☐ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT):

DATE STATIC MEASURED:

DRILLING FLUID: ☑ AIR ☐ MUD ADDITIVES – SPECIFY:

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

CHECK HERE IF PITLESS ADAPTER IS INSTALLED ☐

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE (add coupling diameter)	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)

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3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL *(if using Centralizers for Artesian wells- indicate the spacing below)	AMOUNT (cubic feet)	METHOD OF PLACEMENT
0.0	55.0	6.0	Cement-Bentonite Slurry	10.8	Tremie Pipe

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 09/22/2022)

FILE NO. C-4741	POD NO. 1	TRN NO. 746179	
LOCATION 24S.33E.10 1 2 4		WELL TAG ID NO. NA	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES **(attach supplemental sheets to fully describe all units)**	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0.0	10.0	10.0	Brown sand	Y ✓ N	
10.0	15.0	5.0	Yellow brown sand	Y ✓ N	
15.0	21.0	6.0	Light tan sand/sandstone	Y ✓ N	
21.0	26.0	5.0	Brown sand /sandstone	Y ✓ N	
26.0	43.0	17.0	Red brown silty sandy shale	Y ✓ N	
43.0	55.0	12.0	Brown/red brown mudstone	Y ✓ N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

☐ PUMP ☐ AIR LIFT ☐ BAILER ☐ OTHER – SPECIFY:

TOTAL ESTIMATED WELL YIELD (gpm):

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:

William B. Atkins

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 30 DAYS AFTER COMPLETION OF WELL DRILLING:

John W. White — SIGNATURE OF DRILLER / PRINT SIGNEE NAME

6/6/2023 — DATE

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 09/22/2022)

FILE NO. C-4741	POD NO. 1	TRN NO. 746179	
LOCATION 24S. 33E. 10 L 24		WELL TAG ID NO. NA	PAGE 2 OF 2

SITE PHOTOGRAPHS

Figures

The photographs were taken during R T Hicks Consultants site visit on April 29, 2025. The aerial photo shown in Figure 1 shows the photograph locations marked with blue markers. North is up in the aerial image.

Figure 1: *Aerial view of the System Connector Containment area.*

Figure 2: *View is to the southwest from the northeast corner (Location 1) and towards the center of the site. Dune sand is present over the location.*

Figure 3: *Looking north from the southeast corner (Location 7). The utility poles are along NM 128.*

Figure 4: *Looking north from the southwest corner (Location 4). The index aerial photo, Figure 1, was taken in 2023; and this road along the west side of the location and the battery did not exist then.*

Figure 5: *The view is to the northeast toward the center of the site from the southwest corner. Hummocky dunes are present.*

Figure 6: *View is to the north from the eastern side of the pad that the battery is located on (Figure 4). The topsoil from the pad is stored as a berm around the pad.*

Figure 7: *View is to the north from the center of the northern side of the System Connector site (Location 2. NM 128 crosses the photo in the background.*

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Figure 8: *View is to the east from the center of the site (Location 6).*

Figure 9: *View is to the west from the center of the site (Location 6). The tank battery is on the right horizon.*

Venegas, Victoria, EMNRD

From: Venegas, Victoria, EMNRD
Sent: Friday, May 9, 2025 2:09 PM
To: 'Chad Gallagher'
Subject: 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876]
Attachments: C-147 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] AST.pdf

1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876]

Good afternoon Mr. Gallagher.

The NMOCD has reviewed the recycling containment permit application and related documents, submitted by [371643] SOLARIS WATER MIDSTREAM, LLC on 05/06/2025, Application ID 459405, for 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] in L-16-24S-32E, Lea County, New Mexico. [371643] SOLARIS WATER MIDSTREAM, LLC requested variances from 19.15.34 NMAC for 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876].

The following variances have been approved:

- The variance to 19.15.34.14 NMAC Table I for the use of alternate analytical method 8015/8015M for total petroleum hydrocarbons (TPH) is approved.
- The variance to 19.15.34.14 NMAC Table I for the use of alternate analytical method EPA 300.0 or SM4500 for the analysis of chloride is approved.
- The variance to 19.15.34.12.A.(2) NMAC for the no side-slope requirement for the AST containment with vertical walls is approved.
- The variance to 19.15.34.12.A.(3) NMAC for the liners to be anchored to the top of the AST steel walls and no anchor trenches is approved.
- The variance to 19.15.34.12.A.(4) NMAC for the installation on the AST containment of a 40-mil non-reinforced LLDPE primary liner and a 30-mil non-reinforced LLDPE secondary liner or a liner system consisting of a 40-mil non-reinforced LLDPE primary liner and a 40-mil non-reinforced LLDPE secondary liner is approved. [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 will provide a mechanism to lock the gate when responsible personnel are not onsite.

The form C-147 and related documents for 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] are approved with the following conditions of approval:

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

- 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] is approved for five years of operation from the date of permit application of 05/06/2025. 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] permit expires on 05/06/2030. If [371643] SOLARIS WATER MIDSTREAM, LLC wishes to extend operations past five years, an annual extension request must be submitted using on form C-147 Long through OCD Permitting by 04/06/2025.
- 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] consists of one (1) inground containment with a fluid capacity of 768,000.00 barrels and one (1) AST of 40,000.00 barrels.
- The total closure cost estimated of 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] in the amount of $ $458,056.08, meets the requirements of NMAC 19.15.34.15.A. The financial assurance should be mailed to: **EMNRD - Oil Conservation Division, Administration & Compliance Bureau Attn: Bond Administrator 1220 S. St. Francis Drive | Santa Fe, NM 87505**.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall construct, operate, maintain, close, and reclaim 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] in compliance with NMAC 19.15.34 NMAC.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall notify OCD, through OCD Permitting, when construction of 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] commences.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall notify NMOCD through OCD Permitting when recycling operations commence and cease at 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876].
- A minimum of 3-feet freeboard must be maintained at 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] at all times during operations.
- If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdrawal, operations of the 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] are considered ceased and a notification of cessation of operations should be sent electronically to OCD Permitting. A request to extend the cessation of operations, not to exceed six months, may be submitted using a C-147 form through OCD Permitting. If after that 6-month extension period, the 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] is not utilized at a minimum of 20% fluid capacity, no additional extensions would be granted, and the operator would be directed to remove all fluids and proceed with the closure requirements.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall submit monthly reports of recycling and reuse of produced water, drilling fluids, and liquid oil field waste on OCD form C-148 via OCD Permitting even if there is zero activity.
- [371643] SOLARIS WATER MIDSTREAM, LLC shall inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the logs 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-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876].

Please reference number 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] in all future communications.
Regards,

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

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

General Information
Phone: (505) 629-6116

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

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

CONDITIONS

Operator: SOLARIS WATER MIDSTREAM, LLC 9651 Katy Fwy Houston, TX 77024	OGRID: 371643
	Action Number: 459405
	Action Type: [C-147] Water Recycle Long (C-147L)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] permit expires on 05/06/2030. If [371643] SOLARIS WATER MIDSTREAM, LLC wishes to extend operations past five years, an annual extension request must be submitted using on form C-147 Long through OCD Permitting by 04/06/2025. • [371643] SOLARIS WATER MIDSTREAM, LLC shall construct, operate, maintain, close, and reclaim 1RF-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876] in compliance with NMAC 19.15.34 NMAC. • [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-540 - SYSTEM CONNECTOR POND RECYCLING FACILITY AND AST [fVV2512941876].	5/9/2025