Chevron U.S.A. Inc.
C-147 Registration Application Package
Dagger Lake T22S R33E

- Section 4 Above Ground Storage Tank (AST) Containment

Submitted: 10/19/2021

Chevron U.S.A. Inc.

Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST) Containment

Contents

I. INTRODUCTION 3
II. NMOCD FORM C-147 3
III. SITING REQUIREMENTS 4
A. DISTANCE TO GROUNDWATER 4
B. DISTANCE TO SURFACE WATER 4
C. DISTANCE TO PERMANENT RESIDENCE OR INSTITUTIONS 4
D. DISTANCE TO DOMESTIC AND STOCK WATER SUPPLIES 5
E. DISTANCE TO MUNICIPAL BOUNDARIES AND FRESH WATER FIELDS 5
F. DISTANCE TO WETLANDS 5
G. DISTANCE TO SUBSURFACE MINES 5
H. DISTANCE TO CAVE / KARST FEATURES 5
I. DISTANCE TO 100-YEAR FLOODPLAINS 5
IV. DESIGN AND CONSTRUCTION PLAN 6
A. GENERAL SPECIFICATIONS 6
B. STOCKPILING OF TOPSOIL 7
C. SIGNS 7
D. FENCING 7
E. NETTING AND WILDLIFE PROTECTION 8
V. OPERATING AND MAINTENANCE PLAN 8
VI. CLOSURE PLAN 9
VII. FINANCIAL ASSURANCE REQUIREMENTS 10
VIII. VARIANCE REQUESTS 10
IX. APPENDICES 11

Chevron U.S.A. Inc. | Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST) Containment

I. INTRODUCTION

Chevron U.S.A. Inc. (Chevron) requests registration under 19.15.34 NMAC of the following produced water above ground storage tank (AST) containment in the Dagger Lake development area located in Township 26 South, Range 27 East.

- Section 4 Above Ground Storage Tank (AST) Containment

Appendix 1 contains a survey plat identifying the location of the above ground storage tank. Note that the Section 4 AST containment is identified within the as "Proposed Frac Pond" area, respectively on the plat.

Compliance with the requirements of 19.15.34.11 through 19.15.34.15 is described in this application. Note that Chevron is requesting variances to the design and construction specifications for a recycling containment listed in NMAC 19.15.34.12 as noted in Section IV and fully described in Section VIII.

A copy of Form C-147 found in Section II has been submitted to the Bureau of Land Management (BLM), which is the surface landowner, as required under 19.15.34.10.A.

II. NMOCD FORM C-147

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

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

Form C-147
Revised April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: ☐ 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: Chevron U.S.A. Inc. (For multiple operators attach page with information) OGRID #: 4323

Address: 1400 Smith Street, Houston TX 77002

Facility or well name (include API# if associated with a well): Dagger Lake Sec 4 AST Containment

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

U/L or Qtr/Qtr I Section 4 Township 22 South Range 33 East County: Lea

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

2.

☐ **Recycling Facility:**

Location of recycling facility (if applicable): Latitude _____ Longitude _____ 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:** Produced Water Aboveground Storage Tank (AST)

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

Center of Recycling Containment (if applicable): Latitude 32.417858 Longitude -103.569555 NAD83

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

☒ Lined ☒ Liner type: Thickness 2 x 30 mil LLDPE, 1 x 40 mil HDPE ☒ LLDPE ☒ HDPE ☐ PVC ☐ Other _____

☐ String-Reinforced

Liner Seams: ☒ Welded ☐ Factory ☐ Other _____ Volume: 60,000 bbl Dimensions: L (Diameter) 189' x W____ x D 12'

☐ Recycling Containment Closure Completion Date: _____

4.

Bonding:

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

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

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

5.

Fencing:

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

☐ Alternate. Please specify_____

6.

Signs:

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

☐ Signed in compliance with 19.15.16.8 NMAC

7.

Variances:

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

Check the below box only if a variance is requested:

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

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

8.

Siting Criteria for Recycling Containment

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

General siting

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

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

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

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

Name (Print): Tony Vallejo Title: Senior Workforce Safety and Environmental Specialist - Factory

Signature: Tony Vallejo Date: 10/19/2021

e-mail address: jvallejo@chevron.com Telephone: O: 432-687-7524 or C: 325-450-3428

11.
OCD Representative Signature: _____ **Approval Date:** _____

Title: _____ **OCD Permit Number:** _____

☐ OCD Conditions _____
☐ Additional OCD Conditions on Attachment

III. SITING REQUIREMENTS

A. DISTANCE TO GROUNDWATER

Appendix 2 / Figure 1, Appendix 3, and the discussion below demonstrates that depth to groundwater at the proposed AST containment location is greater than 50 feet beneath the bottom of the AST containment. Appendix 2 / Figure 1 is a geologic map based on a GIS database of geologic units and structural features in the general location.

The Hobbs Sheet of the Geologic Atlas of Texas and the Arcadis survey report from January 2019 locates the AST containment site within recent eolian deposits consisting of drift sand a few feet in thickness and local occurrences of sand dunes. The eolian deposits are underlain by Pleistocene to recent alluvial deposits consisting of unconsolidated to partially consolidated sand, silt, clay, and caliche. Alluvium thickness in this area appears to be approximately 20 feet or less. Ogallala Formation underlies the alluvium and consists of sand, silt, clay, gravel, and caliche. Its thickness ranges up to approximately 205 feet in the survey area. Triassic Dockum trata underlie the Ogallala Formation and its thickness appears to be over 1,000 feet or more in some places. The Dockum Group has been divided into three formations: lower red shale, siltstone, and very fine-grained sandstone called the Tecovas Formation (or Pierce Canyon redbeds); middle reddish-brown and gray sandstone called the Santa Rosa sandstone; and upper brick-red to maroon and purple shale with thin beds of fine red or gray sandstone and siltstone called the Chinle Formation. Permian strata consisting of the Dewey Lake redbeds (sometimes correlated with the Tecovas Formation and the Rustler Formation underlie the Triassic Dockum. The Dewey Lake is a series of red beds consisting of micaceous red siltstone, shale, and sandstone with gypsum cementation.

On August 25th and 26th, site-specific geotechnical boring (B-1) was conducted to a depth of 70 feet and groundwater was not encountered in the boring during drilling. The Test Boring Logs may be found in Appendix 3.

B. DISTANCE TO SURFACE WATER

Appendix 2 / Figure 2 illustrates that the AST containment is not located 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).

No continuously flowing watercourses of other significant water features, as defined by NMOCD rules, are located with the prescribed setbacks. Appendix 2 / Figure 2 identifies the nearest watercourses approximately 3,032 feet south and 4,156 feet northeast of the AST containment.

C. DISTANCE TO PERMANENT RESIDENCE OR INSTITUTIONS

Appendix 2 / Figure 3 illustrates that the AST containment is not located within 1,000 feet of a permanent residence, school, hospital, institution, or church in existence at the time of this initial

registration. The only development and structures in the prescribed setback area is associated with oil and gas production operations.

D. DISTANCE TO DOMESTIC AND STOCK WATER SUPPLIES

Appendix 2 / Figure 4 illustrates that the AST containment is not located within 500 feet of a spring or fresh water well used for domestic of stock watering purposes at the time of this initial registration. Appendix 2 / Figure 4 identifies that the nearest water well listed in the NMOSE database and the BLM CFO dataset.

E. DISTANCE TO MUNICIPAL BOUNDARIES AND FRESH WATER FIELDS

Appendix 2 / Figure 5 illustrates that the AST containment is not within incorporated municipal boundaries or within defined municipal fresh water well fields covered under a municipal ordinance adopted pursuant to Section 3-27-3 NMSA 1978, as amended.

The nearest municipal community to the AST containment:

- City of Eunice, which is incorporated, but does not operate any municipal fresh water well fields, located approximately 24 miles east of the AST containment.
- Village of Loving, which is incorporated but does not operate any municipal fresh water well fields, located approximately 32 miles west/southwest.

F. DISTANCE TO WETLANDS

Appendix 2 / Figure 3 illustrates that the AST containment is not located within 500 feet of any identified wetland. The nearest identified wetland is approximately 8,038 feet west of the AST containment.

G. DISTANCE TO SUBSURFACE MINES

General knowledge based on interaction with the Bureau of Land Management (BLM) Carlsbad Field Office (CFO) staff and a search of the NM EMNRD Mining and Minerals Division database confirms that there are no subsurface mines in proximity of the AST containment. The only identified facilities in the general vicinity are surface caliche and aggregate pits.

H. DISTANCE TO CAVE / KARST FEATURES

The AST containment is located within a BLM-identified low potential karst zone. Appendix 2 / Figure 6, BLM inventory data of existing cave/karst features, and results of site-specific geotechnical studies as detailed in Appendix 6 verify that the AST containment is not located within an unstable area.

I. DISTANCE TO 100-YEAR FLOODPLAINS

Appendix 4 / Figure 7 and the Arcadis survey report from January 2019 provides information that the Federal Emergency Management Agency (FEMA) National Flood Hazard Layer indicates the AST containment is mapped as Zone D. The Zone D designation is used for areas where there are possible but undetermined flood hazards, as no analysis of flood hazards has been conducted. Lea County has a

floodplain management department, but no apparent floodplain management ordinances. The Arcadis survey report leads to a determination that the AST containment is not within any floodplain, and no well-established drainages in the immediate vicinity.

IV. DESIGN AND CONSTRUCTION PLAN

Chevron will erect and install a pre-engineered, synthetically lined, steel, AST Containment for the storage of produced waters at the Project Site. Appendix 4 contains the design drawings and details for the AST containment, which was developed and stamped by a Professional Engineer licensed in the state of New Mexico. Appendix 5 contains the construction specifications to accompany the design drawings and details. These design and construction specifications meet or exceed NMOCD requirements for AST containment. A variance from the requirements of NMAC 19.15.34.12 is requested for the AST Containment design and specifications. The variance for the design is described in detail in this Section and in Section VIII. Appendix 6 contains the Geotechnical Engineering Study Report for the AST containment site.

A. GENERAL SPECIFICATIONS

The following general specifications have been incorporated into the design and will be met during construction.

- The AST containment is designed and will be constructed to ensure confinement of produced water, to prevent releases, and to prevent overtopping due to wave action or rainfall.
- The AST containment, as designed, will be constructed on a proper foundation consisting of a firm, unyielding base, which is smooth and free of rocks, debris, sharp objects, and irregularities. In addition, 8-ounce non-woven geotextile will be installed under the secondary liner to provide additional protection from any protuberances in the foundation and reduction of localized stress-strain.
- The AST containment will be constructed with 2 ea. – 30-mil LLDPE liners which will function as the primary liner system, an interstitial leak detection sensor, and a 40-mil HDPE secondary liner. Note that the design of the containment, including the specification for the liner system, requires a variance from that specified by NMAC 19.15.34.12. Please refer to Section VIII which provides a full description and basis for this variance request.
- The AST containment will be constructed of vertical engineered steel walls instead of being constructed within an earthen levee with an inside grade no steeper than two horizontal feet to one vertical foot and outside grade no steeper than three horizontal feet to one vertical foot as specified by NMAC 19.15.34.12. Please refer to Section VIII which provides a full description and basis for this variance request.
- The exterior edges of the primary and secondary liners will be strapped to the upper, exterior walls of the AST containment instead of being anchored within a compacted earth-filled trench

18-inches deep as specified by NMAC 19.15.34.12. Please refer to Section VIII which provides a full description and basis for this variance request.

- Liner seams will be minimized and oriented vertically within the interior Containment walls, not horizontally, across the walls of the AST. Factory welded seams will be utilized to the maximum extent possible. No horizontal seams will be placed within 5 feet of the bottom of the tank wall.
- All welds will be subjected to non-destructive field testing by qualified personnel per the appropriate testing standard to ensure proper thermal sealing. Details on liner testing procedures may be found in Section 33 47 13 / Subpart 3.04 of the construction specification (Appendix 5). Field seams will be overlapped a minimum of four to six inches.
- The primary liner will be protected from excessive hydraulic force or mechanical damage from discharge or suction within the AST containment. No discharge or suction lines penetrate the liners.
- The AST containment will be constructed with a leak detection system between the upper and lower liners. Please refer to Section VIII which provides a full description and basis for this variance request.
- The AST containment is designed to prevent run-on of surface water. The distance from the existing ground surface elevation to the top of the containment wall will be approximately 12.6 feet.

B. STOCKPILING OF TOPSOIL

Where topsoil is present, prior to constructing the AST containment, it will be stripped and stockpiled on site for use as final cover or fill at time of closure.

C. SIGNS

An upright sign no less than 12 inches by 24 inches with lettering no less than two inches in height will be installed in a conspicuous place on the fence surrounding the AST containment. The sign will be installed in such a manner and location that a person can easily read the legend. The sign will include the following information:

- The operator's name;
- The location of the site by quarter-quarter or unit letter, section, township, and range;
- Emergency telephone number.

D. FENCING

The AST containment will be constructed with the minimum required four foot fence with at least four strands of barbed wire evenly spaced in the intervals between one foot and four feet above ground level, which provides equivalent or greater wildlife and human deterrence.

The fence will be gated to provide access to Operations personnel and will be closed and locked when access is not required.

E. NETTING AND WILDLIFE PROTECTION

The AST containment will have netting installed across the water surface inside the AST containment and will provide protection of avian species.

AST containment inspections will be conducted at least once per week to include visual determination of any wildlife impacts. If any dead migratory birds or other wildlife is detected, notification to the New Mexico Department of Game and Fish and NMOCD District Office will be provided as soon as practicable but no later than 30 days from the date of discovery.

V. OPERATING AND MAINTENANCE PLAN

The AST containment will be operated in such a manner to contain liquids, solids, and the integrity of the liner and leak detection system will be monitored in such a manner to prevent contamination of fresh water and protect public health and the environment as described below. The purpose of the AST containment is to facilitate recycling of produced water for new well completions. The AST containment will not be used for disposal of produced water or other oilfield wastes.

The AST containment and associated leak detection system will be inspected at least weekly while it contains any fluid and results of the inspection will be documented on an inspection checklist. These inspections will be performed by Chevron personnel. Third-party contractor will operate and monitor the AST containment. The contractor will continuously staff these facilities while in operation. The completed checklists will be retained and made available for review upon request.

These inspections will address, at a minimum, the following:

- Removal of any visible layer of oil from the liquid surface.
- Verification that a minimum of three-foot freeboard is maintained.
- If a liner breach is identified above the liquid surface, the liner will be repaired, or liner replacement will be initiated within 48 hours of detection. Alternatively, the NMOCD district office will be contacted within 48 hours to seek an extension for liner repair / replacement.
- If a liner breach is identified below the liquid surface, all liquid above the identified breach will be removed, the NMOCD district office will be notified, and liner repair / replacement shall be initiated within 48 hours of discovery.
- Visual inspection of AST containment walls integrity and condition to ensure the prevention of surface water run-on.
- An oil absorbent boom is present and in proper condition to contain an unanticipated release.

The AST containment will be equipped with continuous liquid level monitoring and interstitial leak detection systems connected through a SCADA system to provide immediate notification to third-party contractor and Chevron field personnel.

Produced water deposits into and withdrawals from the AST containment will be measured and documented to determine when the system has ceased operations (less than 20% of the total fluid capacity is used during each rolling six-month period following the initial withdrawal of produced water). The third-party contractor will keep accurate records of total volumes of water received and output through the AST containment and provide data to Chevron field personnel. Chevron will submit Form C-148 monthly to NMOCD within 30 days of the end of the calendar month listing: volumes of produced water received, volumes of brackish water received; and total volume of water leaving the AST containment.

Upon cessation of operation, the NMOCD district office will be notified. Chevron will submit to NMOCD a completed Form C-148 within 30 days following the end of each calendar month. Each submittal will certify that the AST containment has not ceased operation based on the 20% threshold described above.

VI. CLOSURE PLAN

After operations cease (less than 20% of the total fluid capacity is used every six months following the initial withdrawal of produced water), all fluids will be removed within 60 days and the AST containment closed within six months.

All liquids, solids, and liner materials will be removed and transferred to an NMOCD-approved disposal facility within the six-month period.

A five-point composite sample will be collected from beneath the AST containment and tested for contamination. The composite sample will include stained or wet soil areas, if any, and analyzed for constituents listed in Table I of 19.15.34.14 NMAC.

- If any contaminant concentration exceeds the values listed in Table I (based on depth from bottom of containment to groundwater), the NMOCD district office will be contacted requesting approval before proceeding with closure activity.
- If all contaminant concentrations are less than or equal to the values listed in Table I, closure will proceed by backfilling with non-waste containing, uncontaminated, earthen material.

Within 60 days of completing closure, a Closure Report on NMOCD Form C-147, including required attachments, will be submitted to document all closure activities including sampling results and details of any backfilling, capping, or covering, were applicable. The Closure Report will certify that all information in the report and attachments is correct and that all applicable closure requirements and conditions specified in NMOCD rules and directives have been met.

The AST containment location will be reclaimed to a safe and stable condition that blends with the surrounding undisturbed areas. Topsoil's and subsoils will be replaced to their original relative positions

and contoured to achieve erosion control, long-term stability, and preservation of surface water flow patterns.

The AST containment location will be reseeded in the first favorable growing season following closure with the goal of substantially restoring the impact surface location to the existing condition prior to construction of the AST containment. Surface reclamation will be deemed complete when: all ground surface disturbing activities have been completed; a uniform vegetative cover with a life-form ratio of plus or minus 50% of pre-disturbance levels has been established; and a total percent plant over of at least 70%, excluding noxious weeds, has been established.

Surface reclamation obligations imposed by the Bureau of Land Management or New Mexico State Trust Land on lands managed by those agencies will supersede these requirements, provided that these other requirements provide equal or greater protection of fresh water, human health, and the environment. NMOCD will be notified when reclamation and re-vegetation are complete.

VII. FINANCIAL ASSURANCE REQUIREMENTS

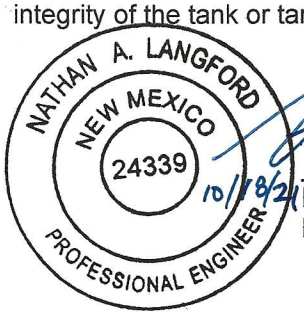
Chevron U.S.A. Inc. (OGRID 4323) has existing financial assurance in place with NMOCD as required by 19.15.8 NMAC and use of the AST containment will be limited to support completion of only wells owned and operated by Chevron U.S.A. Inc. Therefore, no additional financial assurance associated with the AST containment is required.

VIII. VARIANCE REQUESTS

This registration includes requests for variances to the design and construction specifications for a recycling containment listed in NMAC 19.15.34.12 as described below.

PROFESSIONAL ENGINEER'S CERTIFICATION

I hereby certify that the contents of the variance request associated with the following components of the C-147 application for the Chevron, Dagger Lake Area, Produced Water AST Installation located in the SE 1/4 of Section 4, Township 22 South, Range 33 East in Lea County, New Mexico, have been prepared in accordance with best engineering judgment and are complete and accurate. Engineering drawings and project specifications included are prepared are prepared by OTHERs for permit application purposes only to meet the NMOCD request and requirements for the Chevron Dagger Lake Area, Produced Water AST Installation, C-147 permit application. I do not and cannot attest to the structural design or structural integrity of the tank or tank panels for the intended project.



10/18/2024

Nathan Langford, P.E.
PE License No. 24339, New Mexico

Date

The following attachments include engineering components for the C-147 application:

- Attachment 1.0 – Variance Requests
- Appendix A – Table 1: Typical Water Quality Parameters for AST Containment
- C-147 Application, Appendix 4 - Engineering Design Drawing Details, Design Documentation and Product Specifications

1.0 VARIANCE REQUESTS

A. Design Plan:

Per NMAC 19.15.34.12 A(2-4): *(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.
(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.

Chevron is proposing the installation and operation a steel, field-erected above-ground storage tank (AST), lined with a synthetic LLDPE polyethylene liner for use as the primary storage AST Containment. As described in the application, the AST Containment will store produced waters for use in blending with non-potable waters (i.e.TDS > 2,000 ppm) for use in recycling during exploration and production activities. The AST will be used intermittently driven by completions activities over the allowable 5-year operational life of the AST Containment. A copy of the planned site is provided as a survey plat in Appendix 1 of the application. Typical water quality parameters for produced waters stored are provided in Appendix A.

The primary AST Containment is designed and will be constructed with a dual, 30-mil LLDPE geomembrane liner system supported by the steel structural panels. The primary AST Containment will be equipped with a passive liquid leak detection system, which will notify the operator in the event of a leak within the primary LLDPE liner system for the primary containment.

A secondary containment will be installed below the primary storage containment. The secondary containment will consist of a 40-mil HDPE, which will be anchored by fastening the liner to 36"-high, containment walls, consisting of polyethylene "muscle walls", beyond the extent of the primary AST Containment. The secondary containment will include a 200-mil drainage net above the 40-mil HDPE liner for liquid leak detection. The leak detection system will be equipped with a conductivity sensor and alarm, which will notify operations personnel in the event of a leak.

The secondary leak detection system will meet the NMAC 19.15.34.12 (A) for leakage collection and removal of any fluids that may leak in the event of a failure from the primary containment system. The drainage net will extend and thus be exposed beyond the limits of the primary AST Containment and any leakage will be visible for detection and may be evacuated. In addition, a geotextile layer will be installed directly beneath the 200-mil geonet layer and beneath 40-mil HDPE liner to serve as cushioning protection of the 40-mil HDPE liner. A copy of the containment design details and specifications are included in Appendices 4 of the application.

This proposed containment liner system is requested as a variance from a 45-mil (primary)/30 mil LLDPE (secondary) string reinforced liner system required by NMAC 19.15.34.12 (4). In regard

to other PVC and HDPE liner materials specified in the cited regulation, PVC liner material are not deemed to be chemically compatible with the waters to be stored and will not be used for this system.
LLDPE is determined by the containment designer and installer to be a flexible to conform to the proposed, steel, pre-engineered AST Containment. A 60-mil HDPE has been determined by the installer to not be flexible material to conform to the containment and will not allow for proper installation of the liner system. Therefore, HDPE liners will not be used for the containment's primary liner system.

Based on review of the manufacturer's geosynthetics specifications for the liner the containment system (the dual 30-mil LLDPE for the primary AST Containment liner and the 40-mil HDPE liner secondary containment liner), the liner system will provide a level of operational performance equivalent to a liner system consisting of either a 30-mil flexible PVC primary liner or 45-mil LLDPE string reinforced primary liner, or a 60-mil HDPE liner; and a 30-mil LLDPE string reinforced secondary liner. The system will have a hydraulic conductivity equivalent to or less than $1x10^{-9}$ cm/sec. To our knowledge the manufacturer has not tested the materials specifically for the produced waters stored, however, based on our experience with the LLDPE material, these liners have a higher chemical resistance to hydrocarbons than PVC alternatives suggested by the regulations. Furthermore, the HDPE liner to be installed as secondary containment is chemically resistant to fluids stored within the containment and liner system.

The containment systems and lined secondary containment will be monitored for indications of structural failures of the containment, leaks, liner or and system degradation. LLDPE and HDPE liner systems in the containments will be inspected for signs of UV degradation and will be replaced in the tanks every five years (minimum) or as recommended by the manufacturer. Liners will not be manufactured with more than 10% recycled materials. Used liners will be disposed and will not be reused in subsequent systems.

The primary AST Containment utilizes a standard structural design by Beck Engineering (c. December 2010) intended for storage of waters and other liquids and is used in industrial applications. The structural design of the primary AST Containment, designed by Beck Engineering, has been evaluated by Mr. Steven Valero, P.E. on 3/19/15. According to his analysis, the loads for the system up to and including full capacity for the 188.6 foot-diameter tank, are within acceptable limits for the conditions analyzed. The subject referral and analysis are provided in Appendix 4 of the application, "AST Containment Engineering Drawings, Construction Specifications, and HDPE Liner Specifications".

The containment design requirements of NMAC 19.15.34 A (2), as mentioned above, assume that a structural containment will be erected by construction of an earthen impoundment system or similar, and describes certain requirements as such, including interior and exterior sloping meeting 2H:1V and 3H:1V, respectively. The requirement also describes use of an anchor trench for securing the liner system. As described above and shown in the drawings and specifications included in Appendices 4 of the application, the steel panel walls of the primary AST Containment will be installed and fastened to erect a 12.6-foot high, steel vertical walled containment. Since the primary steel AST Containment's structure is deemed acceptable by the engineer to contain fluids for the system described, an additional lined earthen containment berm will not be utilized in this case. The secondary containment will be constructed of polyethylene "muscle-wall" which is lined, as described above. The liner will be secured to the wall by fastening the liner to the top of the muscle wall with batten strips or similar fastening system. Anchor trenches will not be used with the secondary containment structure.

The containment system will be installed as described above and in the main application, and in accordance with the design drawings and specifications and per the manufacturer's recommendations. A copy of the drawings and specifications for the primary and secondary containment systems is included in Appendices 4 of the application.

B. Description of Operations and Leak Detection System Monitoring During Operations:

As described in the application, the AST Containment will be operated in such a manner to contain liquids and solids, and the integrity of the liner and leak detection system will be monitored in such a manner to prevent contamination of fresh water and protect public health and the environment as described below. The purpose of the AST Containment is to facilitate recycling of produced water for new well completions. The AST Containment will not be used for disposal of produced water or other oilfield wastes.

The AST Containment will be equipped with continuous liquid level monitoring and interstitial leak detection systems connected through a SCADA system to provide immediate notification to third-party contractor and Chevron field personnel.

Produced water deposits into and withdrawals from the AST Containment will be measured and documented to determine when the system has ceased operations (less than 20% of the total fluid capacity is used during each rolling six-month period following the initial withdrawal of produced water). The third-party contractor will keep accurate records of total volumes of water received and output through the AST Containment and provide data to Chevron field personnel. Chevron will submit Form C-148 monthly to NMOCD within 30 days of the end of the calendar month listing: volumes of produced water received, volumes of brackish water received, and total volume of water leaving the AST Containment.

As described in the Section above, a sensor will be installed to detect the presence of a leak in the primary containment system. In the event of a leak from the primary liner system, the AST Containment will be drained and taken out of service for repairs prior to placing the AST Containment back in service.

The AST Containment and associated leak detection system will be inspected on a weekly basis while it is in operation and contains fluids. The results of the inspections and any fluid removal or maintenance will be recorded. The inspections and monitoring will include:

- Observation and removal of any visible layer of oil from the liquid surface.
- Verification that a minimum of three-foot freeboard is maintained during operation.
- If a liner breach is identified above the liquid surface, the liner will be repaired, or liner replacement will be initiated within 48 hours of detection. Alternatively, the NMOCD district office will be contacted within 48 hours to seek an extension for liner repair / replacement.
- If a liner breach is identified below the liquid surface, all liquid above the identified breach will be removed, the NMOCD district office will be notified, and liner repair / replacement shall be initiated within 48 hours of discovery.
- Visual inspection of the AST Containment wall's integrity and condition to ensure the prevention of seepage or a leak.
- Visual inspection of the AST Containment primary and secondary liners' integrity and overall condition to ensure the prevention of seepage or a leak. This includes visual observation for indication of:
    - Degradation caused by use during operations or normal wear and tear;
    - Tears, punctures, penetrations, or separation at the seams and structural walls;
    - UV degradation;
    - Proper operation of the leak detection system;
    - Leaking or seepage from the primary liner system;
- Visual inspection of the AST Containment wall's integrity and condition to ensure the prevention of surface water run-on.
- An oil absorbent boom is present and in proper condition to contain an unanticipated release.

Records and documentation of inspections and any liquid removal will be available for review upon request.

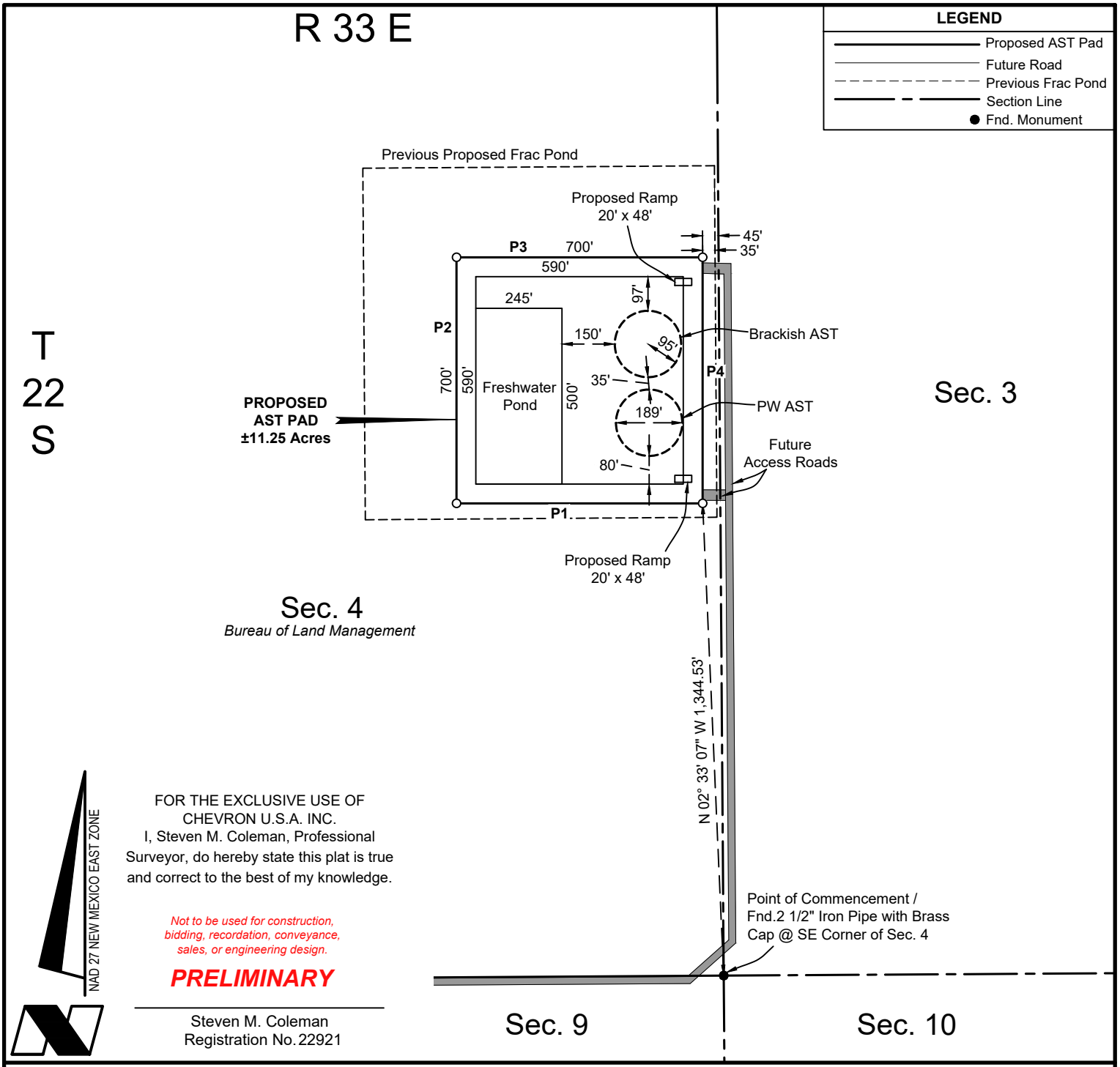
Upon cessation of operation, the NMOCD district office will be notified. Chevron will submit to NMOCD a completed Form C-148 within 30 days following the end of each calendar month. Each submittal will certify that the AST Containment has not ceased operation based on the 20% threshold described above.

APPENDIX A – Dagger Lake PW AST Containment: Typical Water Quality Parameters, Engineering Design Drawing Details, Design Documentation and Product Specifications

TABLE 1: TYPICIAL WATER QUALITY PARAMETERS FOR AST CONTAINMENT	
PARAMETERS	**LIMITS**
PH	5.5-7.5
TDS, MG/L	<200,000
BACTERIA, CFU/ML	</= 10^3
SULFATES, MG/L	<3,000
CALCIUM AND MAGNESIUM, MG/L	<40,000 (COMBINED)
IRON, MG/L	</= 30
BARIUM, MG/L	< 5.0
ORP, MV	>/=150.0
O&G, MG/L	<15
DISSOLVED H2S, MG/L	0

IX. APPENDICES

Appendix 1 – AST Containment Survey Plat



FOR THE EXCLUSIVE USE OF
CHEVRON U.S.A. INC.
I, Steven M. Coleman, Professional Surveyor, do hereby state this plat is true and correct to the best of my knowledge.

Not to be used for construction, bidding, recordation, conveyance, sales, or engineering design.

PRELIMINARY

Steven M. Coleman
Registration No. 22921

SURFACE USE PLAT

Scale: 1" = 400'
400' 0 200' 400'

Page 1 of 2

CHEVRON U.S.A. INC.

PROPOSED AST PAD
DAGGER LAKE
SECTION 4, T22S-R33E
LEA COUNTY, NEW MEXICO

FENSTERMAKER
C. H. Fenstermaker & Associates, L.L.C.
135 Regency Sq. Lafayette, LA 70508
Ph. 337-237-2200 Fax. 337-232-3299
www.fenstermaker.com

	REVISIONS			
DRAWN BY: RMB	#	BY:	DATE:	DESCRIPTION:
PROJ. MGR.: GDG	1	VHV	02/04/2021	Moved ramps to east edge
DATE: 09/17/2020				
FILENAME: T:\2019\2199757\DWG\Dagger Lake AST_SUP.dwg				

NW AST PAD CORNER			NE AST PAD CORNER		
X=	735,300'	NAD 27	X=	736,000'	NAD 27
Y=	517,009'		Y=	517,009'	
LAT.	32.419063° N		LAT.	32.419049° N	
LONG.	103.570808° W		LONG.	103.568539° W	
X=	776,483'	NAD83/86	X=	777,183'	NAD83/86
Y=	517,070'		Y=	517,070'	
LAT.	32.419186° N		LAT.	32.419173° N	
LONG.	103.571293° W		LONG.	103.569025° W	
ELEV.	+3627'	NAVD88	ELEV.	+3619'	NAVD88
SW AST PAD CORNER			SE AST PAD CORNER		
X=	735,300'	NAD 27	X=	736,000'	NAD 27
Y=	516,309'		Y=	516,309'	
LAT.	32.417139° N		LAT.	32.417125° N	
LONG.	103.570824° W		LONG.	103.568556° W	
X=	776,483'	NAD83/86	X=	777,183'	NAD83/86
Y=	516,370'		Y=	516,370'	
LAT.	32.417262° N		LAT.	32.417248° N	
LONG.	103.571309° W		LONG.	103.569041° W	
ELEV.	+3627'	NAVD88	ELEV.	+3620'	NAVD88

COURSE	BEARING	DISTANCE
P1	WEST	700.00'
P2	NORTH	700.00'
P3	EAST	700.00'
P4	SOUTH	700.00'

DISCLAIMER: At this time, C. H. Fenstermaker & Associates, L.L.C. has not performed nor was asked to perform any type of engineering, hydrological modeling, flood plain, or "No Rise" certification analyses, including but not limited to determining whether the project will impact flood hazards in connection with federal/FEMA, state, and/or local laws, ordinances and regulations. Accordingly, Fenstermaker makes no warranty or representation of any kind as to the foregoing issues, and persons or entities using this information shall do so at their own risk.

NOTE:
Please be advised, that while reasonable efforts are made to locate and verify pipelines and anomalies using our standard pipeline locating equipment, it is impossible to be 100 % effective. As such, we advise using caution when performing work as there is a possibility that pipelines and other hazards, such as fiber optic cables, PVC pipelines, etc. may exist undetected on site.

NOTE:
Many states maintain information centers that establish links between those who dig (excavators) and those who own and operate underground facilities (operators). It is advisable and in most states, law, for the contractor to contact the center for assistance in locating and marking underground utilities. For guidance, New Mexico One Call www.nm811.org

FOR THE EXCLUSIVE USE OF
CHEVRON U.S.A. INC.
I, Steven M. Coleman, Professional Surveyor, do hereby state this plat is true and correct to the best of my knowledge.

Not to be used for construction, bidding, recordation, conveyance, sales, or engineering design.

PRELIMINARY

Steven M. Coleman
Registration No. 22921

SURFACE USE PLAT

Page 2 of 2

CHEVRON U.S.A. INC.

PROPOSED AST PAD
DAGGER LAKE
SECTION 4, T22S-R33E
LEA COUNTY, NEW MEXICO

C. H. Fenstermaker & Associates, L.L.C.
135 Regency Sq. Lafayette, LA 70508
Ph. 337-237-2200 Fax. 337-232-3299
www.fenstermaker.com

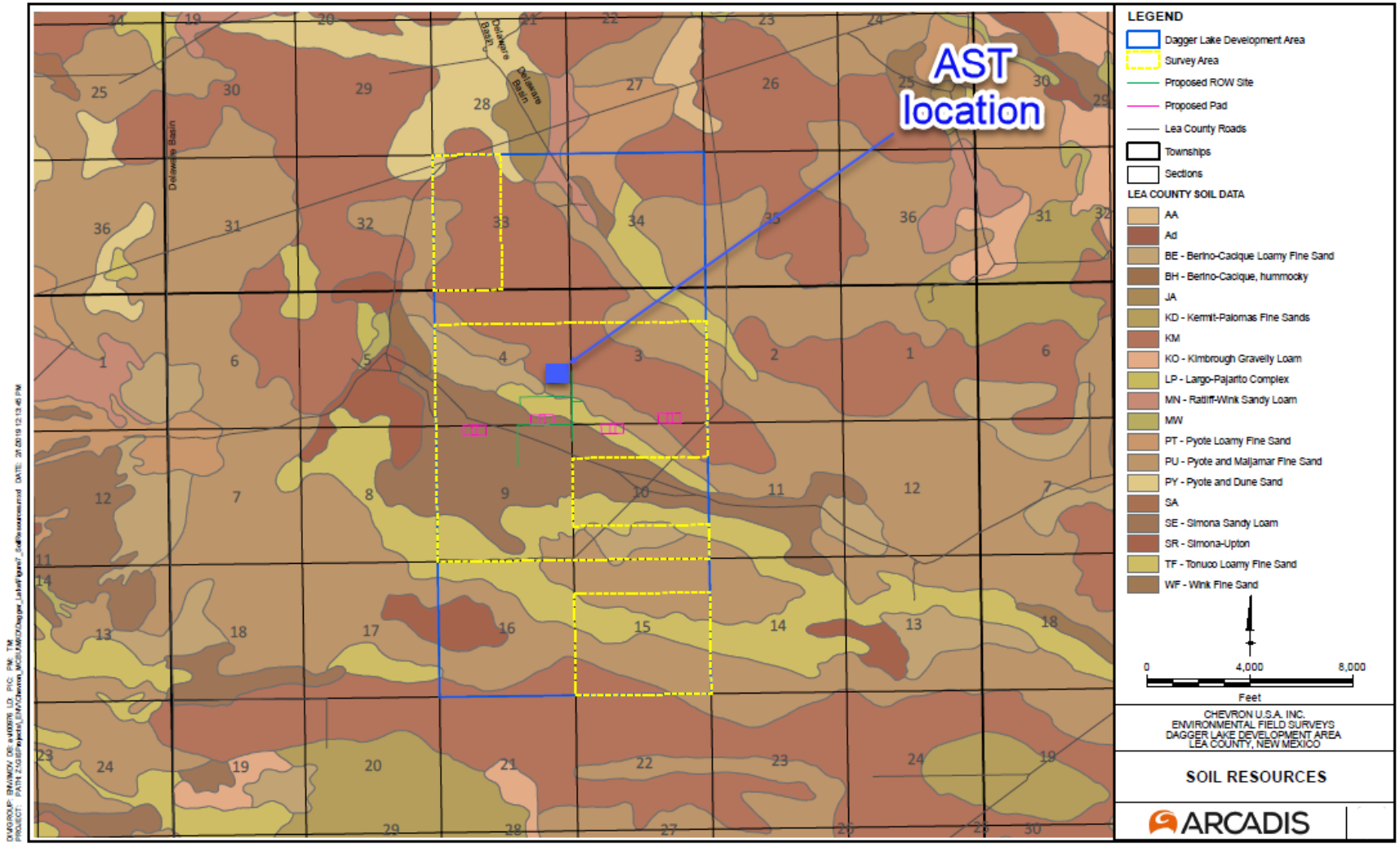
	REVISIONS			
DRAWN BY: RMB	#	BY:	DATE:	DESCRIPTION:
PROJ. MGR.: GDG	1	VHV	02/04/2021	Moved ramps to east edge
DATE: 09/17/2020				
FILENAME: T:\2019\2199757\DWG\Dagger Lake AST_SUP.dwg				

Appendix 2 – AST Containment Figures

Chevron U.S.A. Inc.

Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST)

Appendix 2 / Figure 1: Geologic Map



Chevron U.S.A. Inc.	Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST)

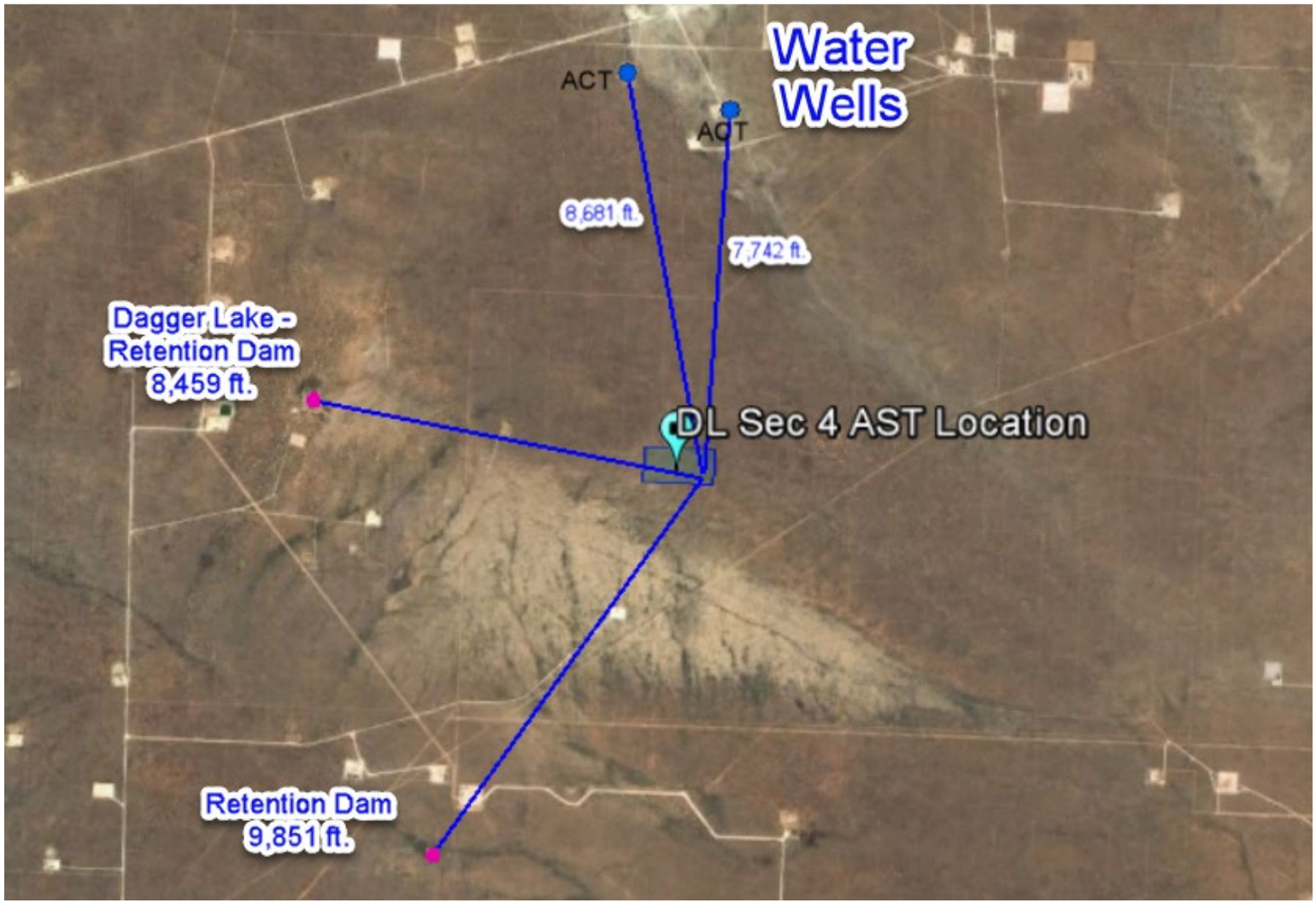
Appendix 2 / Figure 2: Surface Water Features and Watercourses

Chevron U.S.A. Inc.	Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST)

Appendix 2 / Figure 3: Permanent Residences and Institutions, Wetlands

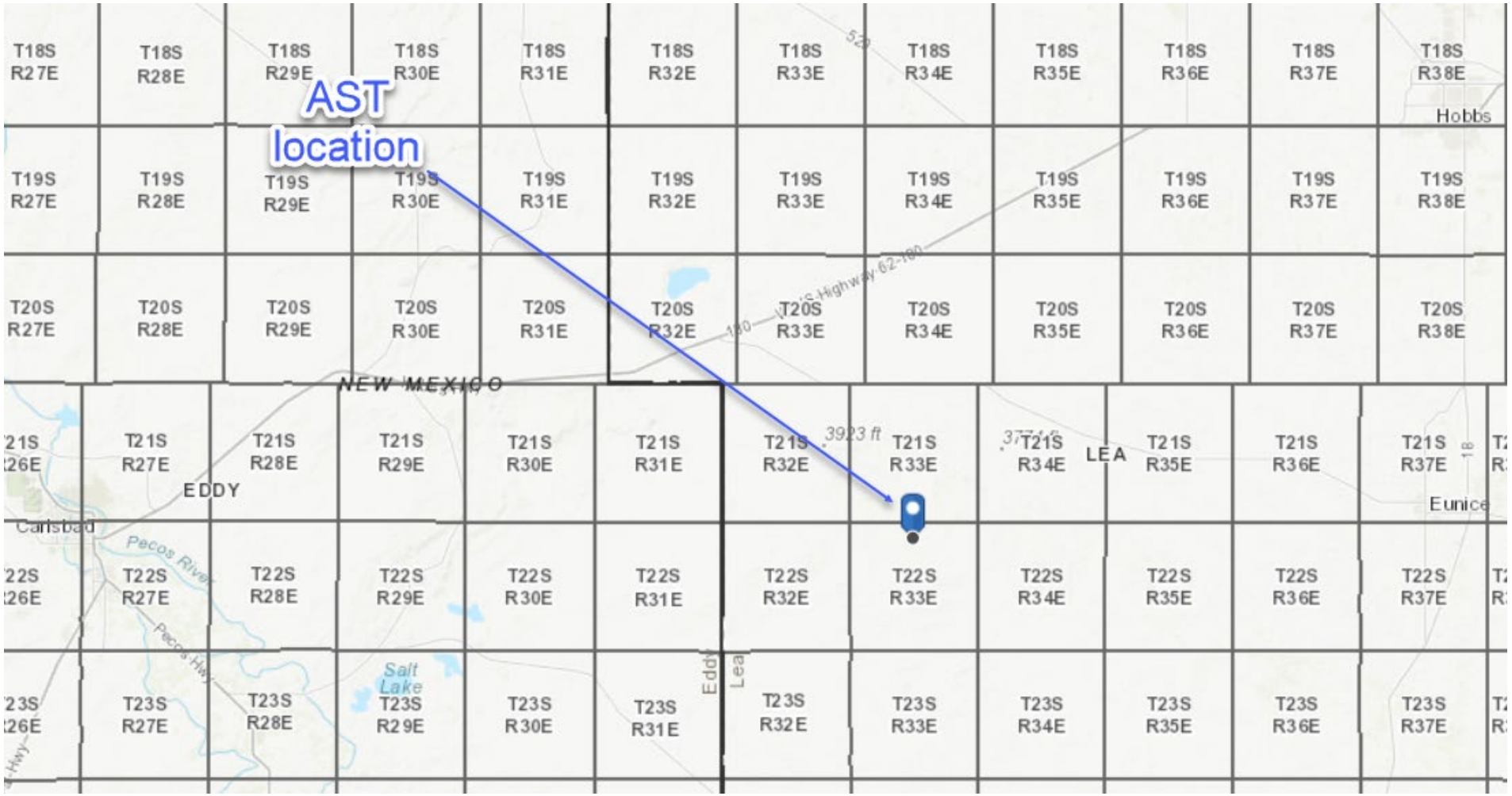
Chevron U.S.A. Inc.	Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST)

Appendix 2 / Figure 4: Domestic and Stock Water Supplies



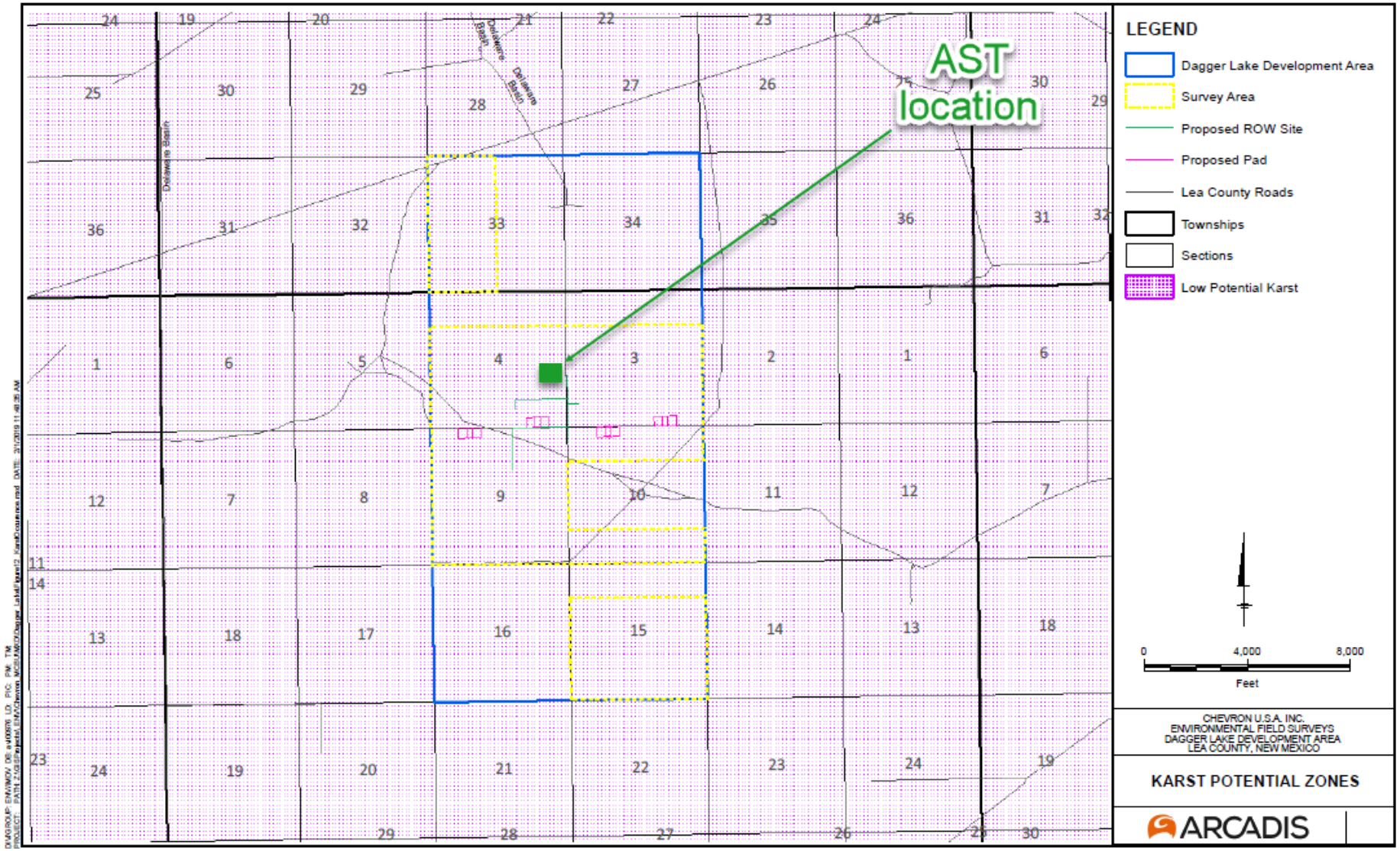
Chevron U.S.A. Inc.	Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST)

Appendix 2 / Figure 5: Municipal Boundaries and Fresh Water Fields



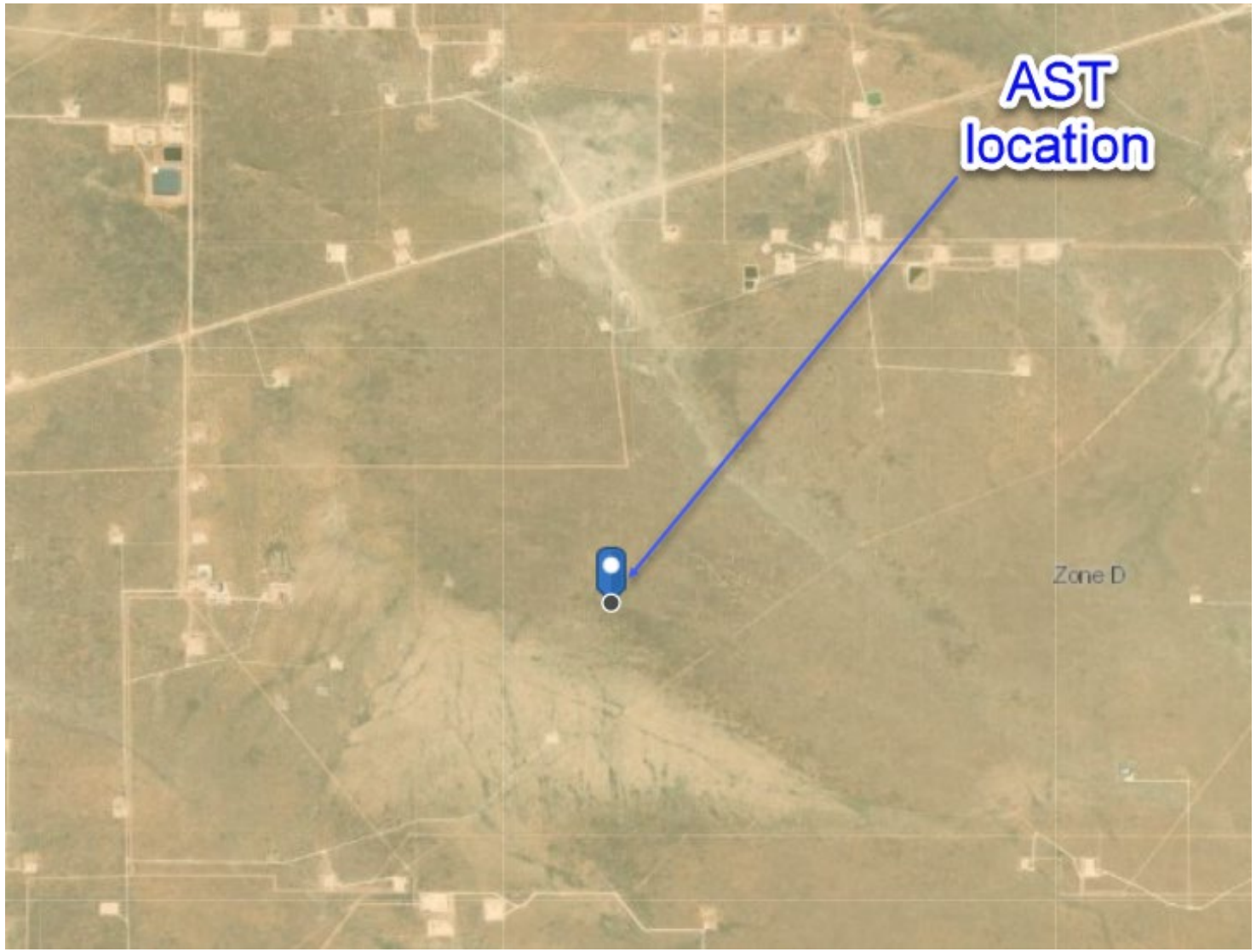
Chevron U.S.A. Inc.	Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST)

Appendix 2 / Figure 6: Cave/Karst Features



Chevron U.S.A. Inc.	Dagger Lake T22S R33E Section 4 Above Ground Storage Tank (AST)

Appendix 2 / Figure 7: 100-Year Flood Plain



Appendix 3 – AST Containment Geotechnical Engineering Report

TETRA TECH

September 3, 2020

Ms. Anna Deily
Facilities Infrastructure Engineer
Chevron North America – MCBU
Exploration and Production Company
6301 Deauville Blvd.
Midland, Texas 79706

RE: Baseline Sampling Results and Boring Log for Dagger Lake AST Pad located in Lea County, New Mexico

Dear Ms. Deily:

Tetra Tech Inc. (Tetra Tech) was retained by Chevron to conduct baseline environmental sampling and drill a deep boring for purposes of identifying groundwater at the proposed Dagger Lake produced water above-ground storage tank (AST) pad. The pad is located in Lea County, New Mexico. The GPS coordinates for the proposed tank pad are N 32.417858° and W 103.569555°. The site location is shown on a topographic map, Figure 1, and an aerial map, Figure 2.

Chevron requested that Tetra Tech drill a deep boring at the produced water AST pad and perform baseline environmental sampling. The purpose of the deep boring is for observation of the presence of groundwater at the tank site. The purpose of the environmental baseline sampling is to establish a baseline of existing soil conditions at this site prior to the installation of the produced water tank and start of operations. As part of the baseline sampling program, Chevron requested that Tetra Tech collect soil samples at 8-inches in depth below the surface with a hand-auger and the samples be analyzed by a qualified laboratory for BTEX, TPH, and Chlorides.

Boring

On August 25th and 26th, one (1) boring, B-1, was installed to a depth of 70 feet. Groundwater was not encountered in the boring during drilling. The boring was backfilled with auger cuttings upon completion of the drilling. Standard Penetration Tests SPTs were performed at five to ten foot intervals in the upper 40 feet for understanding the relative density of the soils. A copy of the boring log is included in Appendix A. The boring location for B-1 is shown in Figure 2.

Environmental Baseline Sampling and Laboratory Analyses

Tetra Tech personnel conducted the baseline environmental soil sampling on August 25th, 2020 and a total of five (5) sample points (AH-1 through AH-5) were collected using a hand-auger with sampling bucket. Four (4) of the five sample locations were at the perimeter of the proposed 190'-diameter, produced water tank; and one (1) sample was located in the middle area of the AST. All soil samples were collected at 8-12" below ground surface (bgs). The sample locations are shown in Figure 2.

Each of the five (5) samples (AH-1 through AH-5) were collected and placed into laboratory-provided containers and delivered to the laboratory under chain of custody. The samples from the site were delivered to Xenco Laboratories in Midland, Texas, for chloride analysis by Method SM 4500 Cl B, TPH analysis by method SW8015 (Mod) Extended, and BTEX by method EPA 8021B.

Tetra Tech
901 W. Wall St, Suite 100 Midland, TX 79701
Tel 432.682.4559 Fax 432.682.3946 www.tetratech.com

The laboratory results are summarized in Table 1. Copies of the laboratory reports and results are included in Appendix B.

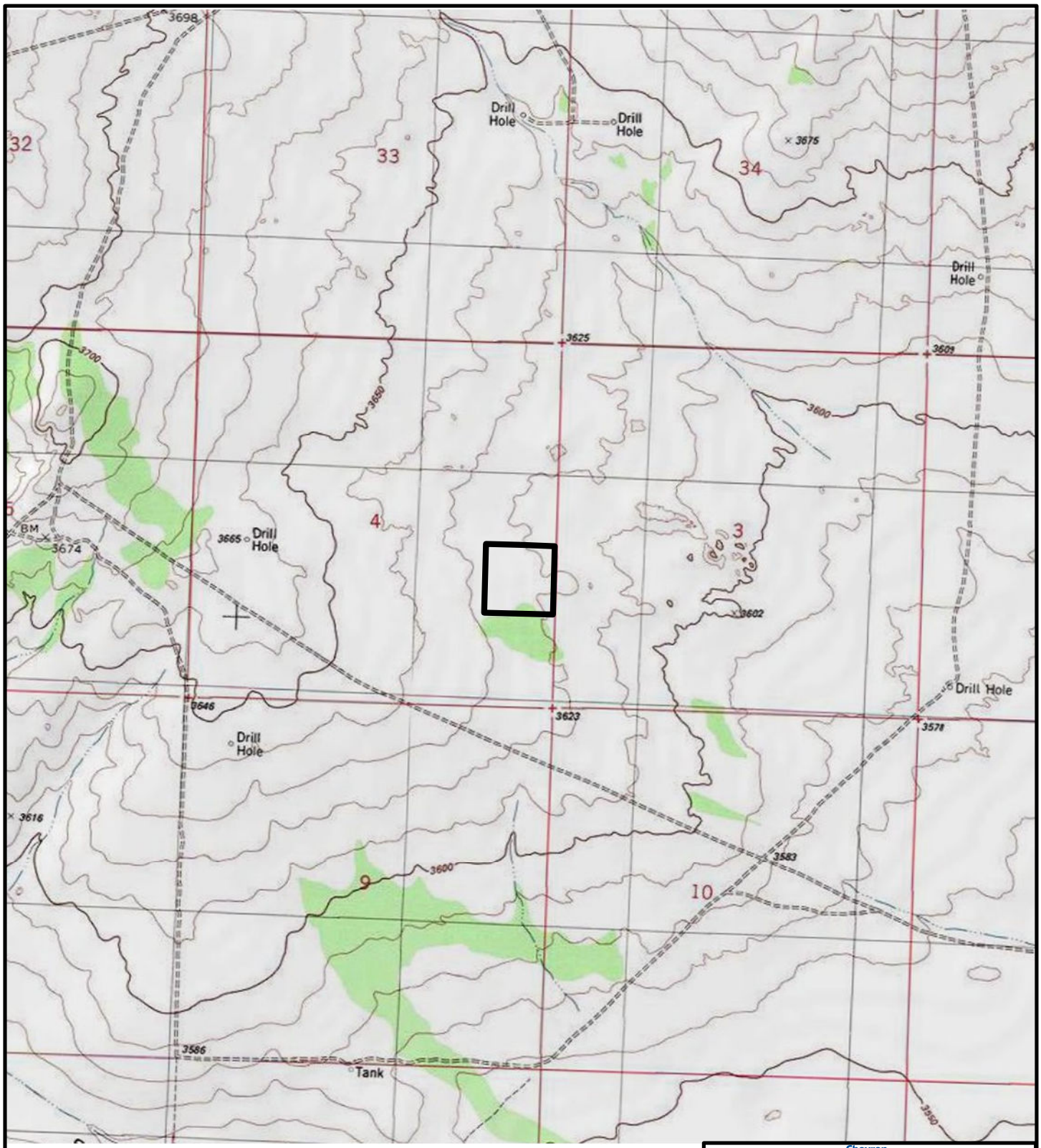
If Chevron should require additional support with this project, please contact Nathan Langford at 432-250-0652 or if we can be of further assistance.

Sincerely,

TETRATECH, INC

Nathan Langford, PE
Project Manager

Figures



LEGEND

SITE LOCATION

N
W
E
S

0 1,000 2,000
Feet

SOURCE: MODIFIED FROM USGS, GRAMA RIDGE, NM 1984 QUADRANGLE.

Chevron

Figure 1

Dagger Lake Produced Water AST
(32.4179, -103.56902)

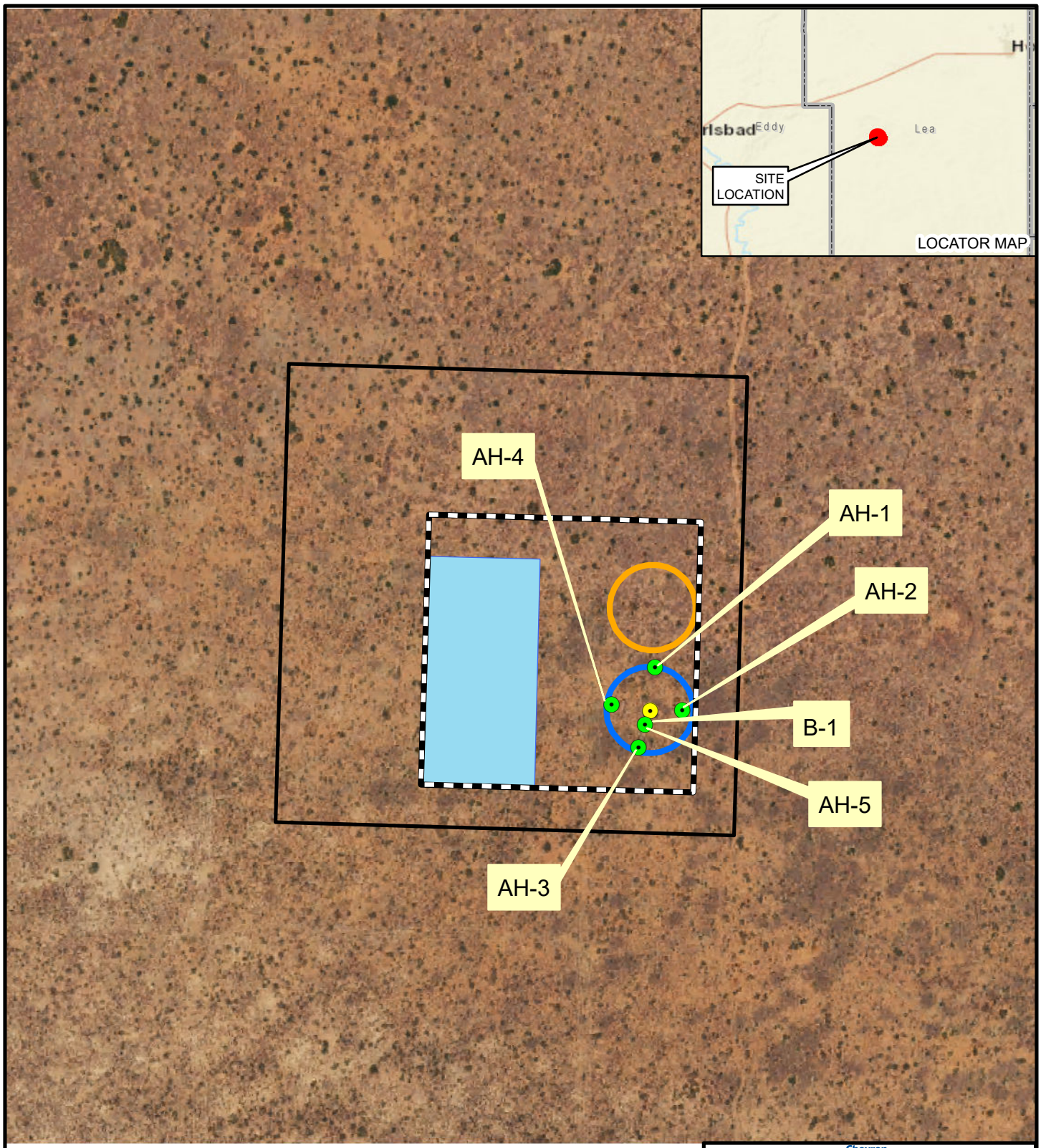
Topographic Map
Lea County, New Mexico

Project : 212C-MD-02292

Date : 9/3/2020

File : H:\GIS\212C-MD-02292

Date Saved: 9/3/2020 User: joel.peters Path: C:\GIS\chevron\212C_MD_02292 Chevron Dagger Lake\212C_MD_02292_Chevron_DaggerLakePWAST_Fig1_Topo.mxd



LEGEND

- 70-FOOT BORING (B-1)
- AUGER HOLE (AH-1 TO AH-5)
- FRESHWATER POND
- BERMED AREA
- BRACKISH WATER AST
- PRODUCED WATER AST
- WATER INFRASTRUCTURE APPROVED IN APD

N W E S

0 150 300
Feet

SOURCE: MODIFIED FROM USDA NAIP IMAGERY, 2018.

Chevron

Figure 2

Dagger Lake Produced Water AST
(32.4179, -103.56902)

Aerial Map
Lea County, New Mexico

Project : 212C-MD-02292	
Date : 9/3/2020	
File : H:\GIS\212C-MD-02292	

Date Saved: 9/3/2020 User: joel.peters Path: C:\GIS\chevron\212C_MD_02292 Chevron Dagger Lake\212C_MD_02292_Chevron_DaggerLakePWAST_Fig2_Aerial.mxd

Tables

Table 1
Summary of Analytical Results
Chevron N.A. E1, MCBU
Dagger Lake AST Pad
Lea County, New Mexico

Sample ID	Sample Date	Sample Depth	Chloride[1]	BTEX[2]					TPH[3]		
				Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	GRO C_6 - C_{10}	DRO > C_{10} - C_{28}	Total TPH (GRO+DRO)
		ft. bgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
AH-1	8/25/2020	'0.5-1	11.2	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<49.8	<49.8	<49.8
AH-2	8/25/2020	'0.5-1	9.36	<0.00198	<0.00198	<0.00198	<0.00198	<0.00198	<50.0	<50.0	<50.0
AH-3	8/25/2020	'0.5-1	8.53	<0.00199	<0.00199	<0.00199	<0.00199	<0.00199	<50.0	<50.0	<50.0
AH-4	8/25/2020	'0.5-1	9.66	<0.00199	<0.00199	<0.00199	<0.00199	<0.00199	<49.9	<49.9	<49.9
AH-5	8/25/2020	'0.5-1	8.67	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<50.0	<50.0	<50.0

NOTES:

ft. Feet

bgs Below ground surface

mg/kg Milligrams per kilogram

TPH Total Petroleum Hydrocarbons

GRO Gasoline range organics

DRO Diesel range organics

1 SM4500Cl-B

2 EPA 8021B

3 SW8015 (Mod) Extended

Appendix A

TETRA TECH
Tetra Tech, Inc.
901 West Wall, Suite 100
Midland, Tx. 79701
Phone: 432-682-4559
Fax:

BOREHOLE ID: B-1

CLIENT Chevron **PROJECT NAME** Dagger Lake PW AST Boring

PROJECT NUMBER 212C-MD-02292 **PROJECT LOCATION** Lea County, NM

DATE(S) OF DRILLING: 08/26/2020 **GROUND ELEVATION: NA** **METHOD: Auger/Air Rotary**

CONSULTANT: Tetra Tech, Inc. **LATITUDE: 32.41790 N** **LOGGED BY: Carlos Tomlinson**

DRILLING CONTRACTOR: TSS Drilling, Inc **LONGITUDE: 103.56950 W** **DRILLED BY: Tim Y.**

Notes: No groundwater encountered.

DEPTH (ft)	SAMPLE TYPE	RECOVERY %	BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						Loose, Reddish Brown, **SILTY SAND**, Low-Plasticity, Weakly Cemented, Dry
	SS 1	100	8-8-9			
	SS 2	100	9-12-32	SM		Changes to Dense, Pink, Traces Subangular Gravel at 3.5'.
5						Changes to Non-Plastic, Uncemented at 4.5'.
						8.5
	SS 3	100	50/5"			Very Dense, Pink to Reddish, **SAND**, Non-Plastic, Uncemented, Trace Subangular Gravel, Dry
10						Switch Drilling Method to Air Rotary at 10.0'.
	SS 4	100	31-32-37	SM		
15						Loose Sand Layer from 16.0' to 18.5'.
						18.5
	SS 5	100	18-30-46			Very Dense, Reddish Brown, **SILTY SAND**, Low-Plasticity, Weakly Cemented, Trace Subangular Gravel, Dry
20				SM		
25						

BOREHOLE/TP/WELL - TT DRAFT_DAGGER LAKE PW AST.GPJ LAB SUMMARY.GDT 9/3/20

(Continued Next Page)

Tetra Tech, Inc.
901 West Wall, Suite 100
Midland, Tx. 79701
Phone: 432-682-4559
Fax:

BOREHOLE ID: B-1

CLIENT Chevron **PROJECT NAME** Dagger Lake PW AST Boring

PROJECT NUMBER 212C-MD-02292 **PROJECT LOCATION** Lea County, NM

DEPTH (ft)	SAMPLE TYPE	RECOVERY %	BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
25						Very Dense, Reddish Brown, **SILTY SAND**, Low-Plasticity, Weakly Cemented, Trace Subangular Gravel, Dry *(continued)*
30	SS 6	100	*24-40-43*			
35						
40	SS 7	100	*26-45-50/4"*	SM		
45						
50						

BOREHOLE/TP/WELL - TT DRAFT_DAGGER LAKE PW AST.GPJ LAB SUMMARY.GDT 9/3/20

(Continued Next Page)

TETRA TECH
Tetra Tech, Inc.
901 West Wall, Suite 100
Midland, Tx. 79701
Phone: 432-682-4559
Fax:

BOREHOLE ID: B-1

CLIENT Chevron **PROJECT NAME** Dagger Lake PW AST Boring

PROJECT NUMBER 212C-MD-02292 **PROJECT LOCATION** Lea County, NM

DEPTH (ft)	SAMPLE TYPE	RECOVERY %	BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
55				SM		Very Dense, Reddish Brown, **SILTY SAND**, Low-Plasticity, Weakly Cemented, Trace Subangular Gravel, Dry *(continued)*
60						
						62.0
						LIMESTONE, Slightlly Weathered, Hard, Reddish Yellow, Fine Grained, Broken, Dry
65						
70						70.0
						Borehole terminated at 70.0 ft.

BOREHOLE/TP/WELL - TT DRAFT_DAGGER LAKE PW AST.GPJ LAB SUMMARY.GDT 9/3/20

Water Encountered: (YES) at Depth (ft) _____ **(NO)**

Appendix B

eurofins | Environment Testing Xenco

Certificate of Analysis Summary 671100

Tetra Tech- Midland, Midland, TX

Project Name: DL AST

Project Id: 212C-MD-02292
Contact: Nathan Langford
Project Location: New Mexico

Date Received in Lab: Wed 08.26.2020 16:10
Report Date: 08.31.2020 16:30
Project Manager: Jessica Kramer

Analysis Requested		671100-001		671100-002		671100-003		671100-004		671100-005	
	Field Id:	AH-1		AH-2		AH-3		AH-4		AH-5	
	Depth:	5-1 ft		5-1 ft		5-1 ft		5-1 ft		5-1 ft	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	08.25.2020 00:00		08.25.2020 00:00		08.25.2020 00:00		08.25.2020 00:00		08.25.2020 00:00	
BTEX by EPA 8021B	*Extracted:*	08.28.2020 10:30		08.28.2020 10:30		08.28.2020 10:30		08.28.2020 10:30		08.28.2020 10:30	
	Analyzed:	08.28.2020 18:18		08.28.2020 18:39		08.28.2020 18:59		08.28.2020 19:20		08.28.2020 19:42	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Benzene		<0.00200	0.00200	<0.00198	0.00198	<0.00199	0.00199	<0.00199	0.00199	<0.00200	0.00200
Toluene		<0.00200	0.00200	<0.00198	0.00198	<0.00199	0.00199	<0.00199	0.00199	<0.00200	0.00200
Ethylbenzene		<0.00200	0.00200	<0.00198	0.00198	<0.00199	0.00199	<0.00199	0.00199	<0.00200	0.00200
m,p-Xylenes		<0.00399	0.00399	<0.00397	0.00397	<0.00398	0.00398	<0.00398	0.00398	<0.00399	0.00399
o-Xylene		<0.00200	0.00200	<0.00198	0.00198	<0.00199	0.00199	<0.00199	0.00199	<0.00200	0.00200
Total Xylenes		<0.00200	0.00200	<0.00198	0.00198	<0.00199	0.00199	<0.00199	0.00199	<0.00200	0.00200
Total BTEX		<0.00200	0.00200	<0.00198	0.00198	<0.00199	0.00199	<0.00199	0.00199	<0.00200	0.00200
Inorganic Anions by EPA 300/300.1	*Extracted:*	08.26.2020 18:00		08.26.2020 18:00		08.26.2020 18:00		08.26.2020 18:00		08.26.2020 18:00	
	Analyzed:	08.27.2020 00:34		08.27.2020 00:50		08.27.2020 00:56		08.27.2020 01:01		08.27.2020 01:06	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		11.2	5.04	9.36	5.03	8.53	5.04	9.66	4.99	8.67	5.05
TPH By SW8015 Mod	*Extracted:*	08.26.2020 17:00		08.26.2020 17:00		08.26.2020 17:00		08.26.2020 17:00		08.26.2020 17:00	
	Analyzed:	08.27.2020 04:01		08.27.2020 04:24		08.27.2020 04:46		08.27.2020 05:09		08.27.2020 05:32	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Gasoline Range Hydrocarbons (GRO)		<49.8	49.8	<50.0	50.0	<50.0	50.0	<49.9	49.9	<50.0	50.0
Diesel Range Organics (DRO)		<49.8	49.8	<50.0	50.0	<50.0	50.0	<49.9	49.9	<50.0	50.0
Motor Oil Range Hydrocarbons (MRO)		<49.8	49.8	<50.0	50.0	<50.0	50.0	<49.9	49.9	<50.0	50.0
Total TPH		<49.8	49.8	<50.0	50.0	<50.0	50.0	<49.9	49.9	<50.0	50.0

BRL - Below Reporting Limit

Jessica Kramer

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Analytical Report 671100

for

Tetra Tech- Midland

Project Manager: Nathan Langford

DL AST

212C-MD-02292

08.31.2020

Collected By: Client

1211 W. Florida Ave
Midland TX 79701

Xenco-Houston (EPA Lab Code: TX00122):
Texas (T104704215-20-37), Arizona (AZ0765), Florida (E871002-33), Louisiana (03054)
Oklahoma (2019-058), North Carolina (681), Arkansas (20-035-0)

Xenco-Dallas (EPA Lab Code: TX01468):
Texas (T104704295-20-26), Arizona (AZ0809)

Xenco-El Paso (EPA Lab Code: TX00127): Texas (T104704221-20-18)
Xenco-Lubbock (EPA Lab Code: TX00139): Texas (T104704219-20-23)
Xenco-Midland (EPA Lab Code: TX00158): Texas (T104704400-19-21)
Xenco-Carlsbad (LELAP): Louisiana (05092)
Xenco-San Antonio (EPA Lab Code: TNI02385): Texas (T104704534-20-8)
Xenco-Tampa: Florida (E87429), North Carolina (483)

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08.31.2020

Project Manager: **Nathan Langford**
Tetra Tech- Midland
901 West Wall ST
Midland, TX 79701

Reference: Eurofins Xenco, LLC Report No(s): **671100**
DL AST
Project Address: New Mexico

Nathan Langford:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the Eurofins Xenco, LLC Report Number(s) 671100. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by Eurofins Xenco, LLC. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 671100 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting Eurofins Xenco, LLC to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Jessica Kramer

Jessica Kramer
Project Manager

A Small Business and Minority Company

Houston - Dallas - Midland - Tampa - Phoenix - Lubbock - San Antonio - El Paso - Atlanta - New Mexico

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Sample Cross Reference 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
AH-1	S	08.25.2020 00:00	5 - 1 ft	671100-001
AH-2	S	08.25.2020 00:00	5 - 1 ft	671100-002
AH-3	S	08.25.2020 00:00	5 - 1 ft	671100-003
AH-4	S	08.25.2020 00:00	5 - 1 ft	671100-004
AH-5	S	08.25.2020 00:00	5 - 1 ft	671100-005

CASE NARRATIVE

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Client Name: Tetra Tech- Midland

Project Name: DL AST

Project ID: *212C-MD-02292*
Work Order Number(s): *671100*

Report Date: *08.31.2020*
Date Received: *08.26.2020*

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-3135707 TPH By SW8015 Mod

Surrogate o-Terphenyl recovered below QC limits. Matrix interferences is suspected; data confirmed by re-analysis.

Samples affected are: 671100-002,671100-004.

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id: **AH-1** Matrix: Soil Date Received:08.26.2020 16:10

Lab Sample Id: 671100-001 Date Collected: 08.25.2020 00:00 Sample Depth: 5 - 1 ft

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Tech: SPC % Moisture:

Analyst: SPC Date Prep: 08.26.2020 18:00 Basis: Wet Weight

Seq Number: 3135641

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**11.2**	5.04	mg/kg	08.27.2020 00:34		1

Analytical Method: TPH By SW8015 Mod Prep Method: SW8015P

Tech: DVM % Moisture:

Analyst: ARM Date Prep: 08.26.2020 17:00 Basis: Wet Weight

Seq Number: 3135707

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<49.8	49.8	mg/kg	08.27.2020 04:01	U	1
Diesel Range Organics (DRO)	C10C28DRO	<49.8	49.8	mg/kg	08.27.2020 04:01	U	1
Motor Oil Range Hydrocarbons (MRO)	PHCG2835	<49.8	49.8	mg/kg	08.27.2020 04:01	U	1
Total TPH	PHC635	<49.8	49.8	mg/kg	08.27.2020 04:01	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	76	%	70-130	08.27.2020 04:01	
o-Terphenyl	84-15-1	72	%	70-130	08.27.2020 04:01	

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id:	**AH-1**	Matrix:	Soil	Date Received:	08.26.2020 16:10
Lab Sample Id:	671100-001	Date Collected:	08.25.2020 00:00	Sample Depth:	5 - 1 ft
Analytical Method:	BTEX by EPA 8021B			Prep Method:	SW5035A
Tech:	AMF			% Moisture:	
Analyst:	AMF	Date Prep:	08.28.2020 10:30	Basis:	Wet Weight
Seq Number:	3135896				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	08.28.2020 18:18	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	08.28.2020 18:18	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	08.28.2020 18:18	U	1
m,p-Xylenes	179601-23-1	<0.00399	0.00399	mg/kg	08.28.2020 18:18	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	08.28.2020 18:18	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	08.28.2020 18:18	U	1
Total BTEX		<0.00200	0.00200	mg/kg	08.28.2020 18:18	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,4-Difluorobenzene	540-36-3	102	%	70-130	08.28.2020 18:18	
4-Bromofluorobenzene	460-00-4	102	%	70-130	08.28.2020 18:18	

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id: **AH-2** Matrix: Soil Date Received:08.26.2020 16:10

Lab Sample Id: 671100-002 Date Collected: 08.25.2020 00:00 Sample Depth: 5 - 1 ft

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Tech: SPC % Moisture:

Analyst: SPC Date Prep: 08.26.2020 18:00 Basis: Wet Weight

Seq Number: 3135641

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**9.36**	5.03	mg/kg	08.27.2020 00:50		1

Analytical Method: TPH By SW8015 Mod Prep Method: SW8015P

Tech: DVM % Moisture:

Analyst: ARM Date Prep: 08.26.2020 17:00 Basis: Wet Weight

Seq Number: 3135707

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<50.0	50.0	mg/kg	08.27.2020 04:24	U	1
Diesel Range Organics (DRO)	C10C28DRO	<50.0	50.0	mg/kg	08.27.2020 04:24	U	1
Motor Oil Range Hydrocarbons (MRO)	PHCG2835	<50.0	50.0	mg/kg	08.27.2020 04:24	U	1
Total TPH	PHC635	<50.0	50.0	mg/kg	08.27.2020 04:24	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	71	%	70-130	08.27.2020 04:24	
o-Terphenyl	84-15-1	68	%	70-130	08.27.2020 04:24	**

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id:	**AH-2**	Matrix:	Soil	Date Received:	08.26.2020 16:10
Lab Sample Id:	671100-002	Date Collected:	08.25.2020 00:00	Sample Depth:	5 - 1 ft
Analytical Method:	BTEX by EPA 8021B			Prep Method:	SW5035A
Tech:	AMF			% Moisture:	
Analyst:	AMF	Date Prep:	08.28.2020 10:30	Basis:	Wet Weight
Seq Number:	3135896				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00198	0.00198	mg/kg	08.28.2020 18:39	U	1
Toluene	108-88-3	<0.00198	0.00198	mg/kg	08.28.2020 18:39	U	1
Ethylbenzene	100-41-4	<0.00198	0.00198	mg/kg	08.28.2020 18:39	U	1
m,p-Xylenes	179601-23-1	<0.00397	0.00397	mg/kg	08.28.2020 18:39	U	1
o-Xylene	95-47-6	<0.00198	0.00198	mg/kg	08.28.2020 18:39	U	1
Total Xylenes	1330-20-7	<0.00198	0.00198	mg/kg	08.28.2020 18:39	U	1
Total BTEX		<0.00198	0.00198	mg/kg	08.28.2020 18:39	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	103	%	70-130	08.28.2020 18:39	
1,4-Difluorobenzene	540-36-3	104	%	70-130	08.28.2020 18:39	

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id: **AH-3** Matrix: Soil Date Received:08.26.2020 16:10

Lab Sample Id: 671100-003 Date Collected: 08.25.2020 00:00 Sample Depth: 5 - 1 ft

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Tech: SPC % Moisture:

Analyst: SPC Date Prep: 08.26.2020 18:00 Basis: Wet Weight

Seq Number: 3135641

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**8.53**	5.04	mg/kg	08.27.2020 00:56		1

Analytical Method: TPH By SW8015 Mod Prep Method: SW8015P

Tech: DVM % Moisture:

Analyst: ARM Date Prep: 08.26.2020 17:00 Basis: Wet Weight

Seq Number: 3135707

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<50.0	50.0	mg/kg	08.27.2020 04:46	U	1
Diesel Range Organics (DRO)	C10C28DRO	<50.0	50.0	mg/kg	08.27.2020 04:46	U	1
Motor Oil Range Hydrocarbons (MRO)	PHCG2835	<50.0	50.0	mg/kg	08.27.2020 04:46	U	1
Total TPH	PHC635	<50.0	50.0	mg/kg	08.27.2020 04:46	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	72	%	70-130	08.27.2020 04:46	
o-Terphenyl	84-15-1	73	%	70-130	08.27.2020 04:46	

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Tetra Tech- Midland, Midland, TX

DL AST

Sample Id:	**AH-3**	Matrix:	Soil	Date Received:	08.26.2020 16:10
Lab Sample Id:	671100-003	Date Collected:	08.25.2020 00:00	Sample Depth:	5 - 1 ft
Analytical Method:	BTEX by EPA 8021B			Prep Method:	SW5035A
Tech:	AMF			% Moisture:	
Analyst:	AMF	Date Prep:	08.28.2020 10:30	Basis:	Wet Weight
Seq Number:	3135896				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00199	0.00199	mg/kg	08.28.2020 18:59	U	1
Toluene	108-88-3	<0.00199	0.00199	mg/kg	08.28.2020 18:59	U	1
Ethylbenzene	100-41-4	<0.00199	0.00199	mg/kg	08.28.2020 18:59	U	1
m,p-Xylenes	179601-23-1	<0.00398	0.00398	mg/kg	08.28.2020 18:59	U	1
o-Xylene	95-47-6	<0.00199	0.00199	mg/kg	08.28.2020 18:59	U	1
Total Xylenes	1330-20-7	<0.00199	0.00199	mg/kg	08.28.2020 18:59	U	1
Total BTEX		<0.00199	0.00199	mg/kg	08.28.2020 18:59	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,4-Difluorobenzene	540-36-3	103	%	70-130	08.28.2020 18:59	
4-Bromofluorobenzene	460-00-4	101	%	70-130	08.28.2020 18:59	

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id: **AH-4** Matrix: Soil Date Received:08.26.2020 16:10

Lab Sample Id: 671100-004 Date Collected: 08.25.2020 00:00 Sample Depth: 5 - 1 ft

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Tech: SPC % Moisture:

Analyst: SPC Date Prep: 08.26.2020 18:00 Basis: Wet Weight

Seq Number: 3135641

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**9.66**	4.99	mg/kg	08.27.2020 01:01		1

Analytical Method: TPH By SW8015 Mod Prep Method: SW8015P

Tech: DVM % Moisture:

Analyst: ARM Date Prep: 08.26.2020 17:00 Basis: Wet Weight

Seq Number: 3135707

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<49.9	49.9	mg/kg	08.27.2020 05:09	U	1
Diesel Range Organics (DRO)	C10C28DRO	<49.9	49.9	mg/kg	08.27.2020 05:09	U	1
Motor Oil Range Hydrocarbons (MRO)	PHCG2835	<49.9	49.9	mg/kg	08.27.2020 05:09	U	1
Total TPH	PHC635	<49.9	49.9	mg/kg	08.27.2020 05:09	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	70	%	70-130	08.27.2020 05:09	
o-Terphenyl	84-15-1	68	%	70-130	08.27.2020 05:09	**

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id:	**AH-4**	Matrix:	Soil	Date Received:	08.26.2020 16:10
Lab Sample Id:	671100-004	Date Collected:	08.25.2020 00:00	Sample Depth:	5 - 1 ft
Analytical Method:	BTEX by EPA 8021B			Prep Method:	SW5035A
Tech:	AMF			% Moisture:	
Analyst:	AMF	Date Prep:	08.28.2020 10:30	Basis:	Wet Weight
Seq Number:	3135896				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00199	0.00199	mg/kg	08.28.2020 19:20	U	1
Toluene	108-88-3	<0.00199	0.00199	mg/kg	08.28.2020 19:20	U	1
Ethylbenzene	100-41-4	<0.00199	0.00199	mg/kg	08.28.2020 19:20	U	1
m,p-Xylenes	179601-23-1	<0.00398	0.00398	mg/kg	08.28.2020 19:20	U	1
o-Xylene	95-47-6	<0.00199	0.00199	mg/kg	08.28.2020 19:20	U	1
Total Xylenes	1330-20-7	<0.00199	0.00199	mg/kg	08.28.2020 19:20	U	1
Total BTEX		<0.00199	0.00199	mg/kg	08.28.2020 19:20	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	95	%	70-130	08.28.2020 19:20	
1,4-Difluorobenzene	540-36-3	102	%	70-130	08.28.2020 19:20	

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id: **AH-5** Matrix: Soil Date Received:08.26.2020 16:10

Lab Sample Id: 671100-005 Date Collected: 08.25.2020 00:00 Sample Depth: 5 - 1 ft

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Tech: SPC % Moisture:

Analyst: SPC Date Prep: 08.26.2020 18:00 Basis: Wet Weight

Seq Number: 3135641

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**8.67**	5.05	mg/kg	08.27.2020 01:06		1

Analytical Method: TPH By SW8015 Mod Prep Method: SW8015P

Tech: DVM % Moisture:

Analyst: ARM Date Prep: 08.26.2020 17:00 Basis: Wet Weight

Seq Number: 3135707

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<50.0	50.0	mg/kg	08.27.2020 05:32	U	1
Diesel Range Organics (DRO)	C10C28DRO	<50.0	50.0	mg/kg	08.27.2020 05:32	U	1
Motor Oil Range Hydrocarbons (MRO)	PHCG2835	<50.0	50.0	mg/kg	08.27.2020 05:32	U	1
Total TPH	PHC635	<50.0	50.0	mg/kg	08.27.2020 05:32	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	130	%	70-130	08.27.2020 05:32	
o-Terphenyl	84-15-1	134	%	70-130	08.27.2020 05:32	**

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Certificate of Analytical Results 671100

Tetra Tech- Midland, Midland, TX

DL AST

Sample Id:	**AH-5**	Matrix:	Soil	Date Received:	08.26.2020 16:10
Lab Sample Id:	671100-005	Date Collected:	08.25.2020 00:00	Sample Depth:	5 - 1 ft
Analytical Method:	BTEX by EPA 8021B			Prep Method:	SW5035A
Tech:	AMF			% Moisture:	
Analyst:	AMF	Date Prep:	08.28.2020 10:30	Basis:	Wet Weight
Seq Number:	3135896				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	08.28.2020 19:42	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	08.28.2020 19:42	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	08.28.2020 19:42	U	1
m,p-Xylenes	179601-23-1	<0.00399	0.00399	mg/kg	08.28.2020 19:42	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	08.28.2020 19:42	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	08.28.2020 19:42	U	1
Total BTEX		<0.00200	0.00200	mg/kg	08.28.2020 19:42	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	103	%	70-130	08.28.2020 19:42	
1,4-Difluorobenzene	540-36-3	103	%	70-130	08.28.2020 19:42	

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Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit. **ND** Not Detected.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

SMP Client Sample **BLK** Method Blank

BKS/LCS Blank Spike/Laboratory Control Sample **BKSD/LCSD** Blank Spike Duplicate/Laboratory Control Sample Duplicate

MD/SD Method Duplicate/Sample Duplicate **MS** Matrix Spike **MSD:** Matrix Spike Duplicate

+ NELAC certification not offered for this compound.

* (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

QC Summary 671100

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Tetra Tech- Midland

DL AST

Analytical Method: Inorganic Anions by EPA 300/300.1 — Prep Method: E300P
Seq Number: 3135641 — Matrix: Solid — Date Prep: 08.26.2020
MB Sample Id: 7710234-1-BLK — LCS Sample Id: 7710234-1-BKS — LCSD Sample Id: 7710234-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<5.00	250	247	99	247	99	90-110	0	20	mg/kg	08.26.2020 22:49	

Analytical Method: Inorganic Anions by EPA 300/300.1 — Prep Method: E300P
Seq Number: 3135641 — Matrix: Soil — Date Prep: 08.26.2020
Parent Sample Id: 671059-009 — MS Sample Id: 671059-009 S — MSD Sample Id: 671059-009 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	14.0	248	277	106	277	106	90-110	0	20	mg/kg	08.27.2020 00:19	

Analytical Method: Inorganic Anions by EPA 300/300.1 — Prep Method: E300P
Seq Number: 3135641 — Matrix: Soil — Date Prep: 08.26.2020
Parent Sample Id: 671079-007 — MS Sample Id: 671079-007 S — MSD Sample Id: 671079-007 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	12.0	249	271	104	270	104	90-110	0	20	mg/kg	08.26.2020 23:05	

Analytical Method: TPH By SW8015 Mod — Prep Method: SW8015P
Seq Number: 3135707 — Matrix: Solid — Date Prep: 08.26.2020
MB Sample Id: 7710243-1-BLK — LCS Sample Id: 7710243-1-BKS — LCSD Sample Id: 7710243-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Gasoline Range Hydrocarbons (GRO)	<50.0	1000	1050	105	1010	101	70-130	4	20	mg/kg	08.27.2020 08:01	
Diesel Range Organics (DRO)	<50.0	1000	1170	117	1050	105	70-130	11	20	mg/kg	08.27.2020 08:01	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	105		106		98		70-130	%	08.27.2020 08:01
o-Terphenyl	122		120		105		70-130	%	08.27.2020 08:01

Analytical Method: TPH By SW8015 Mod — Prep Method: SW8015P
Seq Number: 3135707 — Matrix: Solid — Date Prep: 08.26.2020
MB Sample Id: 7710243-1-BLK

Parameter	MB Result	Units	Analysis Date	Flag
Motor Oil Range Hydrocarbons (MRO)	<50.0	mg/kg	08.27.2020 09:55	

MS/MSD Percent Recovery [D] = 100*(C-A) / B
Relative Percent Difference RPD = 200* | (C-E) / (C+E) |
LCS/LCSD Recovery [D] = 100 * (C) / [B]
Log Difference Log Diff. = Log(Sample Duplicate) - Log(Original Sample)

LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD Result

MS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

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QC Summary 671100

Tetra Tech- Midland

DL AST

Analytical Method: **TPH By SW8015 Mod** Prep Method: SW8015P
Seq Number: 3135707 Matrix: Soil Date Prep: 08.26.2020
Parent Sample Id: 671100-001 MS Sample Id: 671100-001 S MSD Sample Id: 671100-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Gasoline Range Hydrocarbons (GRO)	<50.0	999	1080	108	1040	104	70-130	4	20	mg/kg	08.27.2020 09:08	
Diesel Range Organics (DRO)	<50.0	999	1150	115	1080	108	70-130	6	20	mg/kg	08.27.2020 09:08	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	107		105		70-130	%	08.27.2020 09:08
o-Terphenyl	116		95		70-130	%	08.27.2020 09:08

Analytical Method: **BTEX by EPA 8021B** Prep Method: SW5035A
Seq Number: 3135896 Matrix: Solid Date Prep: 08.28.2020
MB Sample Id: 7710430-1-BLK LCS Sample Id: 7710430-1-BKS LCSD Sample Id: 7710430-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00200	0.100	0.0976	98	0.0929	93	70-130	5	35	mg/kg	08.28.2020 14:10	
Toluene	<0.00200	0.100	0.0862	86	0.0819	82	70-130	5	35	mg/kg	08.28.2020 14:10	
Ethylbenzene	<0.00200	0.100	0.0869	87	0.0824	82	70-130	5	35	mg/kg	08.28.2020 14:10	
m,p-Xylenes	<0.00400	0.200	0.170	85	0.161	81	70-130	5	35	mg/kg	08.28.2020 14:10	
o-Xylene	<0.00200	0.100	0.0847	85	0.0808	81	70-130	5	35	mg/kg	08.28.2020 14:10	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	97		101		101		70-130	%	08.28.2020 14:10
4-Bromofluorobenzene	86		96		94		70-130	%	08.28.2020 14:10

Analytical Method: **BTEX by EPA 8021B** Prep Method: SW5035A
Seq Number: 3135896 Matrix: Soil Date Prep: 08.28.2020
Parent Sample Id: 671103-003 MS Sample Id: 671103-003 S

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	Limits	Units	Analysis Date	Flag
Benzene	<0.00200	0.0998	0.0733	73	70-130	mg/kg	08.28.2020 14:52	
Toluene	<0.00200	0.0998	0.0531	53	70-130	mg/kg	08.28.2020 14:52	X
Ethylbenzene	<0.00200	0.0998	0.0405	41	70-130	mg/kg	08.28.2020 14:52	X
m,p-Xylenes	<0.00399	0.200	0.0778	39	70-130	mg/kg	08.28.2020 14:52	X
o-Xylene	<0.00200	0.0998	0.0400	40	70-130	mg/kg	08.28.2020 14:52	X

Surrogate	MS %Rec	MS Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	105		70-130	%	08.28.2020 14:52
4-Bromofluorobenzene	98		70-130	%	08.28.2020 14:52

MS/MSD Percent Recovery [D] = 100*(C-A) / B
Relative Percent Difference RPD = 200* | (C-E) / (C+E) |
LCS/LCSD Recovery [D] = 100 * (C) / [B]
Log Difference Log Diff. = Log(Sample Duplicate) - Log(Original Sample)

LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD Result

MS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

Chain of Custody

Work Order No: 670710 671100

Houston,TX (281) 240-4200 Dallas,TX (214) 902-0300 San Antonio,TX (210) 509-3334
Midland,TX (432) 704-5440 EL Paso,TX (915) 585-3443 Lubbock,TX (806) 794-1296 Craslbad, NM (432) 704-5440
Phoenix,AZ (480) 355-0900 Atlanta,GA (770) 449-8800 Tampa,FL (813) 620-2000 West Palm Beach, FL (561) 689-6701
www.xenco.com Page _____ of _____

Project Manager:	Nathan Langford	Bill to: (if different)	
Company Name:	Tetra Tech	Company Name:	
Address:	9081 W. Wall St #1000	Address:	
City, State ZIP:	Midland TX 79701	City, State ZIP:	
Phone:	432.215-9426	Email:	Nathan.Langford.com

Work Order Comments

Program: UST/PST ☐ PRP ☐ Brownfields ☐ RRC ☐ Superfund ☐
State of Project:
Reporting:Level II ☐ Level III ☐ PST/UST ☐ TRRP ☐ Level IV ☐
Deliverables: EDD ☐ ADaPT ☐ Other:

Project Name:	DL AST	Turn Around	
Project Number:	212C-MD-02292	Routine ☒	
Project Location	New Mexico	Rush:	
Sampler's Name:	Carlos Tomlinso	Due Date:	
PO #:		Quote #:	

SAMPLE RECEIPT			
Temp Blank:	Yes (No)	Wet Ice:	(Yes) No
Temperature (°C):	2.7 / 2.3	Thermometer ID	DL-8
Received Intact:	(Yes) No		
Cooler Custody Seals:	Yes No (N/A)	Correction Factor:	-0.4
Sample Custody Seals:	Yes No (N/A)	Total Containers:	

Lab ID	Sample Identification	Matrix	Date Sampled	Time Sampled	Depth	Number of Containers	Pres. Code	TPH - 8015	BTEX	Cl	Sample Comments
	AH-1	Soil	8/25		0-1'	1					32.41813, -103.56952
	AH2	Soil	8/25			1					32.41708, -103.56928
	AH-3	Soil	8/25			1					32.41765, -103.56959
	AH-4	Soil	8/25			1					32.4790, -103.56983
	AH-5	Soil	8/25			1					32.47790, -103.56956

ANALYSIS REQUEST

Preservative Codes

MeOH: Me
None: NO
HNO3: HN
H2S04: H2
HCL: HL
NaOH: Na
Zn Acetate+ NaOH: Zn

TAT starts the day recevied by the lab, if received by 4:00pm

Total 200.7 / 6010 200.8 / 6020: 8RCRA 13PPM Texas 11 Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Mo Ni K Se Ag SiO2 Na Sr Tl Sn U V Zn

Circle Method(s) and Metal(s) to be analyzed **TCLP / SPLP 6010**: 8RCRA Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl U **1631 / 245.1 / 7470 / 7471** : Hg

	Relinquished by: (Signature)	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Received by: (Signature)	Date/Time
1			8/26/20	2		
3				4		
5			1610	6		

Revised Date 022619 Rev. 2019.1

Eurofins Xenco, LLC

Prelogin/Nonconformance Report- Sample Log-In

Client: Tetra Tech- Midland

Date/ Time Received: 08.26.2020 04.10.00 PM

Work Order #: 671100

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : IR-8

Sample Receipt Checklist		Comments
#1 *Temperature of cooler(s)?	2.3	
#2 *Shipping container in good condition?	**Yes**	
#3 *Samples received on ice?	**Yes**	
#4 *Custody Seals intact on shipping container/ cooler?	**N/A**	
#5 Custody Seals intact on sample bottles?	**N/A**	
#6*Custody Seals Signed and dated?	**Yes**	
#7 *Chain of Custody present?	**Yes**	
#8 Any missing/extra samples?	**No**	
#9 Chain of Custody signed when relinquished/ received?	**Yes**	
#10 Chain of Custody agrees with sample labels/matrix?	**Yes**	
#11 Container label(s) legible and intact?	**Yes**	
#12 Samples in proper container/ bottle?	**Yes**	BTEX was in bulk container
#13 Samples properly preserved?	**Yes**	
#14 Sample container(s) intact?	**Yes**	
#15 Sufficient sample amount for indicated test(s)?	**Yes**	
#16 All samples received within hold time?	**Yes**	
#17 Subcontract of sample(s)?	**N/A**	
#18 Water VOC samples have zero headspace?	**N/A**	

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst: PH Device/Lot#:

Checklist completed by: Brianna Teel Date: 08.26.2020
Brianna Teel

Checklist reviewed by: Jessica Kramer Date: 08.31.2020
Jessica Kramer

Appendix 4 – AST Containment Engineering Drawings, Construction Specifications, and Product Specifications

STEPHEN N. VALERO, P.E.
4010 New Chapel Hill Way, Cumming, GA 30041
P: 404-557-5884
E: svalero@Wall-Eval.com

March 19, 2015

Matt Smiley
General Manager -Fluids Management, Above-Ground Storage Tanks
Rockwater Energy Solutions
6000 Town Center Boulevard, Suite 165
Canonsburg, PA 15317

Subject: Transmittal - Analysis of Atlantis 48m +3, 18 Panel Above Ground Storage Tank

Dear Mr. Smiley:

As requested, I have analyzed the impact of adding three panels to the standard 48m Atlantis above ground storage tank such the resulting tank diameter is approximately 57.5m (188.6-ft). Results indicate that the loads imparted on the system by this configuration are within acceptable limits under the conditions analyzed. Key information related to this configuration is as follows:

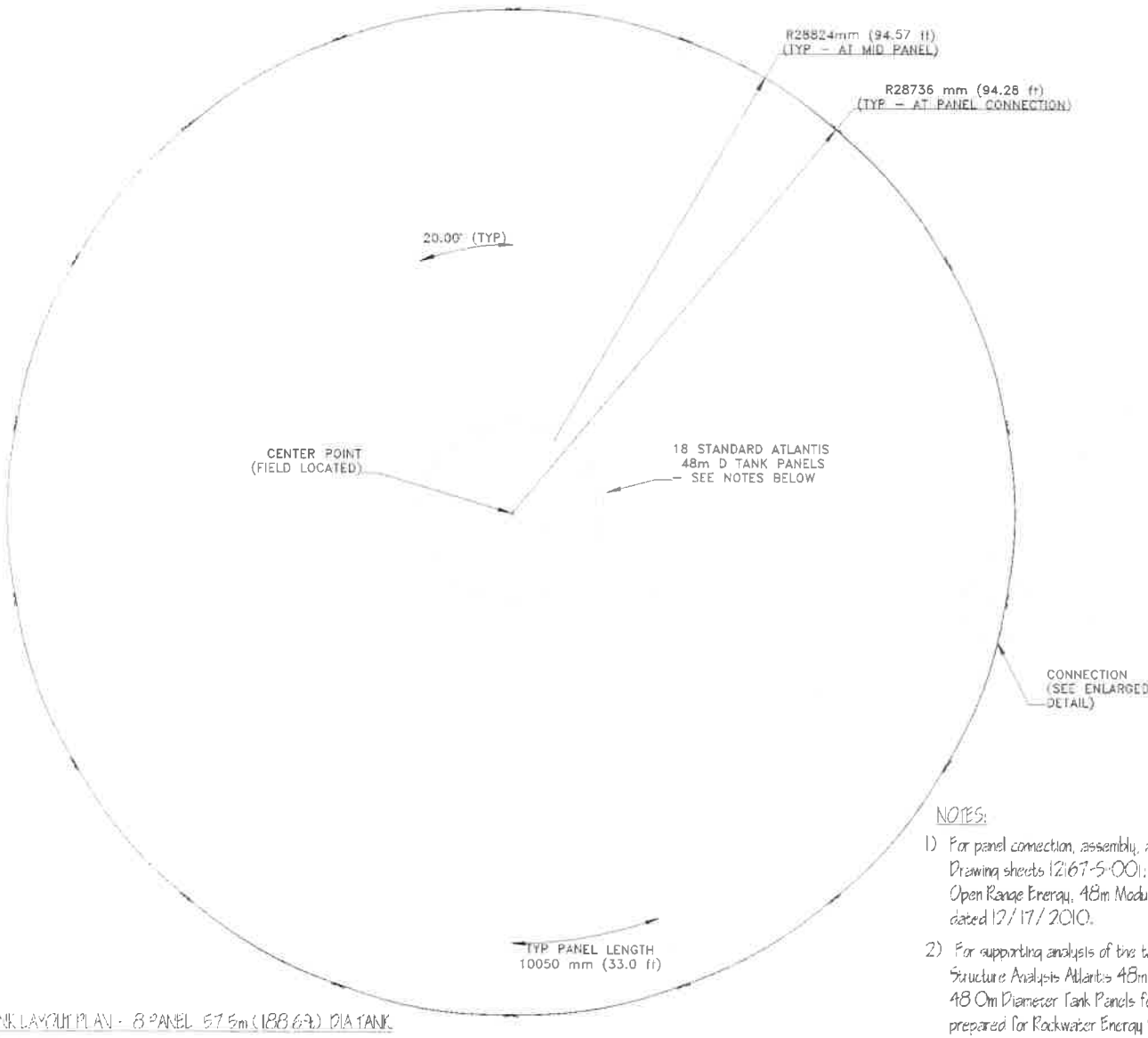
- Minimum (Empty) Diameter: 188.46 ft
- Maximum (Full) Diameter: 188.60 ft
- Maximum (Full) Capacity: 59,721 BBL
- Capacity w/12-in Freeboard: 54,748 BBL
- Capacity w/24-in Freeboard: 49,774 BBL

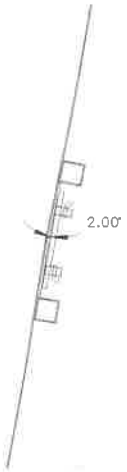
Supporting calculations and shop drawings listing the basis of the analysis, applicable codes and standards and limitations are provided in the Enclosure. Please review the analysis carefully to ensure that site specific conditions meet the limitations and assumptions of the analysis before installing this system. Thank you for the opportunity to work with you on this project. Please contact me if you have any questions or require additional information.

Sincerely,

Stephen N. Valero, P.E.
Enclosure: Supporting Calculations & Shop Drawings

Enclosure - Supporting Calculations & Shop Drawings





TANK LAYOUT PLAN - 18 PANEL 57.5m (188.6ft) DIA TANK

NOTES:

1) For panel connection, assembly, and all other structural details refer to Drawing sheets 12167-S-001; 12167-S-002; and 12167-E-001 prepared for Open Range Energy, 48m Modular Water Tank by Beck Engineering, Ltd. dated 12/17/2010.

2) For supporting analysis of the tank configuration illustrated above refer to Tank Structure Analysis Atlantis 48m + 3 Tank - Constructed using 18 Standard Atlantis 48.0m Diameter Tank Panels for total Diameter of Approximately 57.5m (188.6ft) prepared for Rockwater Energy Solutions by Stephen N. Valero, P.E. dated 3/19/2015.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
STEPHEN N. VALERO
ENGINEER
PE062714
3/19/15

DESIGNED BY:
STEPHEN N. VALERO, P.E.

REVISION/ISSUE		
0	03/19/2015	SHOP DRAWINGS

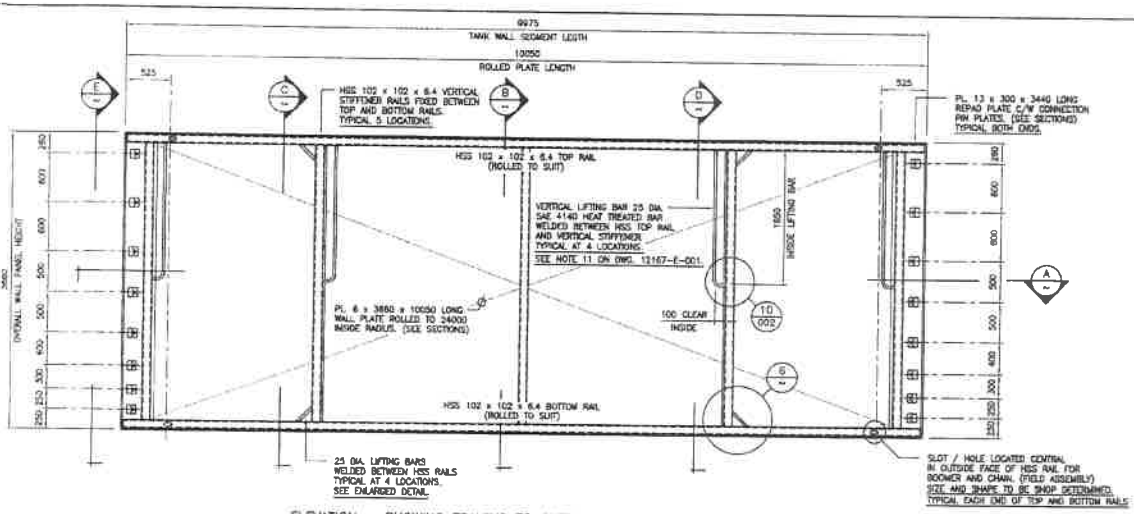
DESIGNED FOR
ROCKWATER ENERGY SOLUTIONS
6000 Town Center Boulevard, Suite 165
Canonsburg, Pennsylvania 15317

Filename: 2014098 Drawings 03-01-15.DWG

Scale: 1"=20'	Project No.: 2014098	Date Drawn: 03/19/2015
Designed By: SNV	Drawn By: LDH	Checked By: SNV

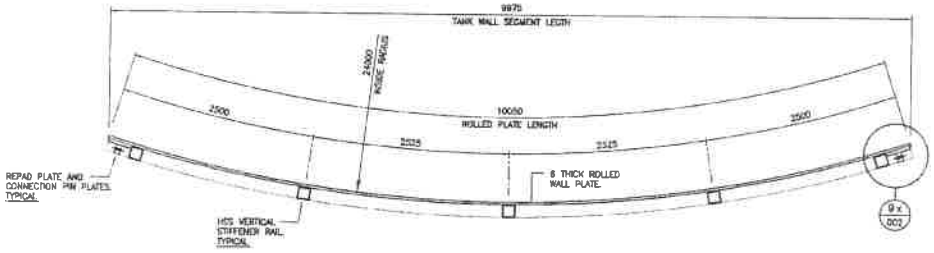
ATLANTIS 48M (+3) 18 PANEL TANK
57.5 m (188.6 ft) DIA
59,721 BBL MAX CAPACITY

TANK LAYOUT PLAN | SH1

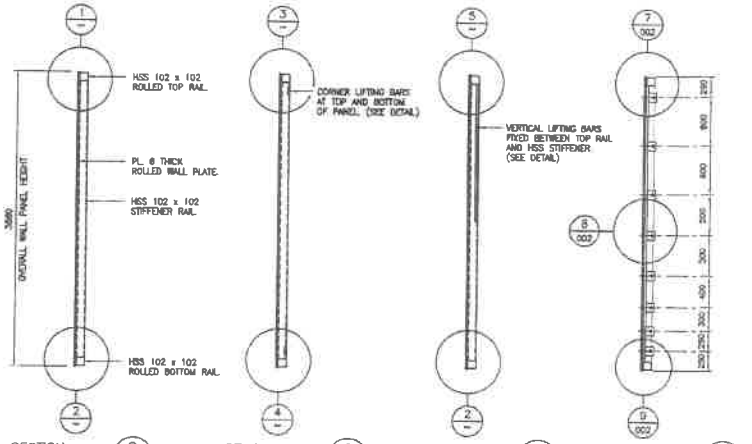


ELEVATION – SHOWING FRAMING TO OUTSIDE FACE OF WALL PANEL
SCALE 1 : 30

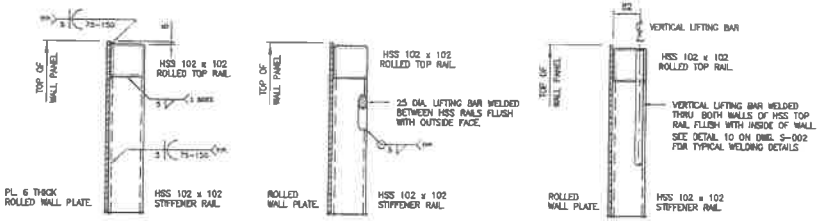
(x15 PANELS REQUIRED AS DRAWN)



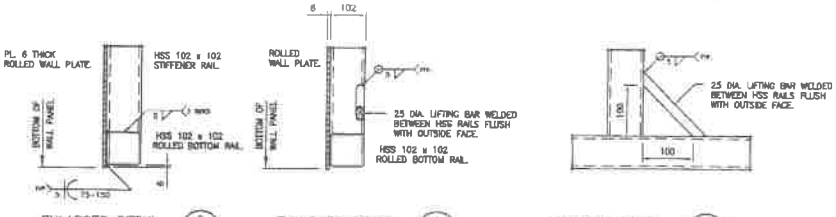
TYPICAL PLAN SECTION A
SCALE 1 : 30



SECTION B SCALE 1 : 30
SECTION C SCALE 1 : 30
SECTION D SCALE 1 : 30
ELEVATION E SCALE 1 : 30



ENLARGED DETAIL 1 NOT TO SCALE
ENLARGED DETAIL 3 NOT TO SCALE
ENLARGED DETAIL 5 NOT TO SCALE



ENLARGED DETAIL 2 NOT TO SCALE
ENLARGED DETAIL 4 NOT TO SCALE
ENLARGED DETAIL 6 NOT TO SCALE

GENERAL NOTES :

1. STRUCTURAL STEEL DESIGN, FABRICATION AND ERECTION SHALL COMPLY WITH THE LATEST EDITION OF
   - CSA-S16-01 LIMIT STATES DESIGN OF STRUCTURAL STEEL
   - CISC HANDBOOK OF STEEL CONSTRUCTION
   - CSA W59 WELDED STEEL CONSTRUCTION
2. MATERIALS SHALL CONFORM TO THE FOLLOWING GRADES OF CSA G40.21 :
   - HOLLOW STRUCTURAL SECTIONS – 350W
   - W SHAPES – 350W
   - C AND L SHAPES – 300W
   - PLATE AND ALL OTHER SECTIONS – 300W (Fy = 300 MPa / 44 KSI)
3. ALL WELDING SHALL BE IN ACCORDANCE WITH CSA W59-M 'WELDED STEEL CONSTRUCTION (METAL ARC WELDING)'
4. FRAMING TO BE OF SOLID WELDED CONSTRUCTION (E-49XX) COPE FRAMING MEMBERS INTO ONE ANOTHER.

APEGGA PERMIT NO. 2042

DWG. NO.	REFERENCE DRAWINGS	REV	REVISIONS	DATE	BY	CHK'D	APP'D	CLIENT APP'D
12167-S-002	TANK WALL PANEL FRAMING DETAILS	A	ISSUED FOR REVIEW	14.12.10	RP	MH		
12167-E-001	TANK ASSEMBLY LAYOUT PLAN & SECTIONS	0	ISSUED FOR CONSTRUCTION	17.12.10	MH			

FILE : 12167-S-001

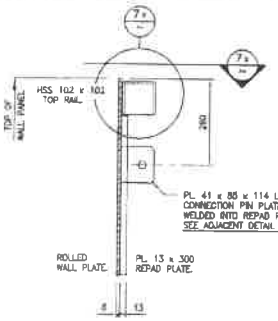
ENGINEER AND PERMIT STAMPS

Designed :	Date :	Drawn :	Date :	Checked :	Date :
MH	08.12.10	RP	11.12.10	MH	14.12.10

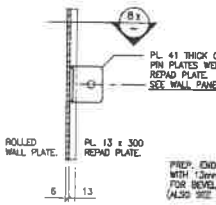
Client : OPEN RANGE ENERGY CORP
Project : 48m dia. MODULAR WATER TANK
TYPICAL TANK WALL PANEL FRAMING PLAN, ELEVATION, SECTIONS & DETAILS

Job No.	Scale :	Dwg. No.	
12167	AS NOTED	12167-S-001	0

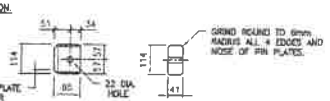
Beck ENGINEERING (1992) LTD.
www.beckeng.ab.ca



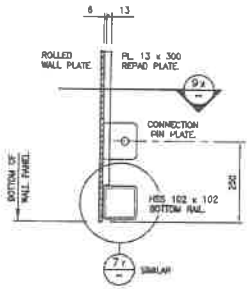
ENLARGED DETAIL 7 / 001
NOT TO SCALE



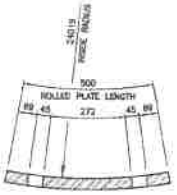
ENLARGED DETAIL 8 / 001
NOT TO SCALE



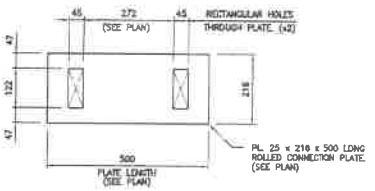
(x16 REQUIRED PER WALL PANEL)



ENLARGED DETAIL 9 / 001
NOT TO SCALE



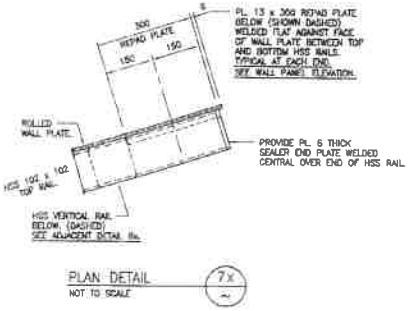
PLAN
(EXAGGERATED SCALE)



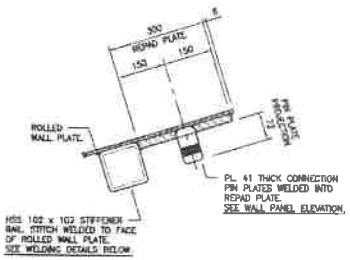
ELEVATION

WALL PANEL CONNECTION PLATES
(x8 REQUIRED PER WALL PANEL)

NOTE :
PAINT OUTSIDE FACE OF PLATE FOR IDENTIFICATION PURPOSES ONLY.



PLAN DETAIL 7x / ~
NOT TO SCALE



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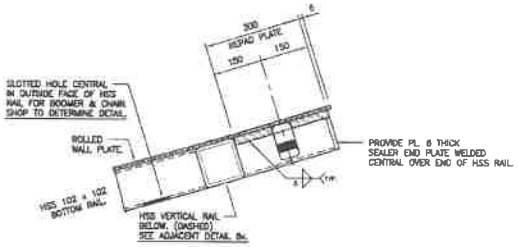

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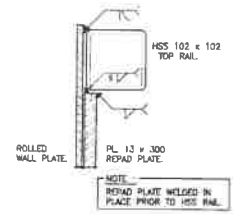
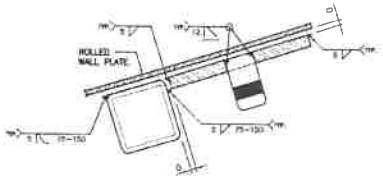
NOT TO SCALE

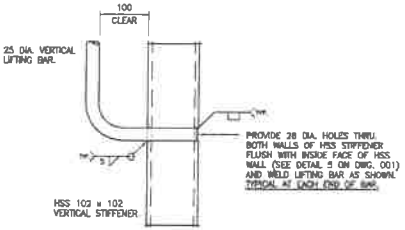


ENLARGED DETAIL 7y / ~
NOT TO SCALE

EXPLODED TO SHOW WELD DETAILS



ENLARGED TYPICAL PLAN - EXPLODED TO SHOW WELD DETAILS
NOT TO SCALE



ENLARGED DETAIL 10 / 001
NOT TO SCALE

APEGGA PERMIT NO. 2042

NOTE :
REFER TO DRAWING 12167-S-001 FOR ALL MATERIAL SPECIFICATIONS AND CONSTRUCTION NOTES.

DWG. NO.	REFERENCE DRAWINGS	REV	REVISIONS	DATE	BY	CHK'D	APP'D	CLIENT APP'D
12167-S-001	TANK WALL PANEL FRAMING LAYOUTS	A	ISSUED FOR REVIEW	14.12.10	RP	MH		
		0	ISSUED FOR CONSTRUCTION	17.12.10	MH	MH		

FILE : 12167-S-002

ENGINEER AND PERMIT STAMPS

Designed :	Date :	Drawn :	Date :	Checked :	Date :
MH	08.12.10	RP	11.12.10	MH	14.12.10

Client : OPEN RANGE ENERGY CORP
Project : 48m dia. MODULAR WATER TANK
TYPICAL TANK WALL PANEL FRAMING SECTIONS AND DETAILS

Job No.	Scale :	Dwg. No.	
12167	AS NOTED	12167-S-002	0

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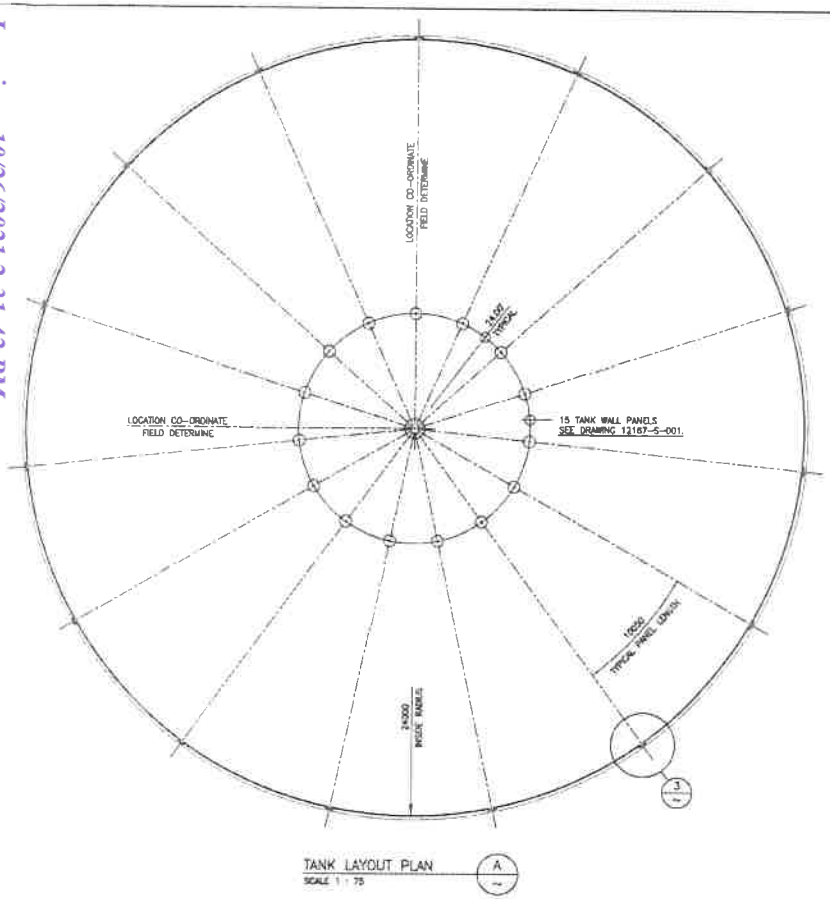
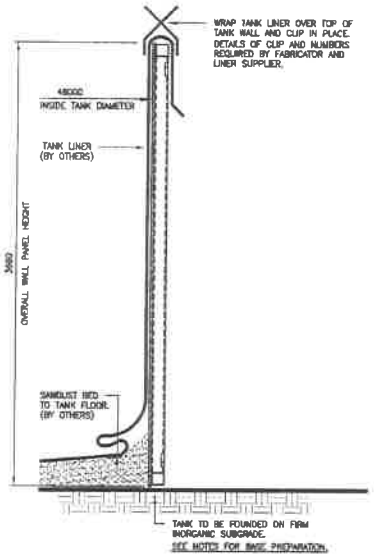
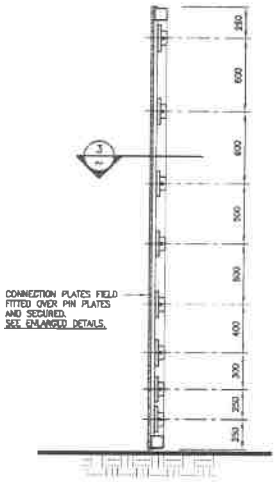


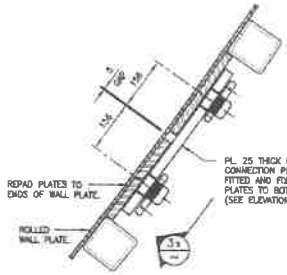
TANK LAYOUT PLAN (A)
SCALE 1 : 75



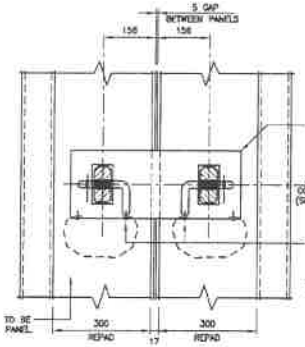
TYPICAL TANK WALL SECTION (1)
SCALE 1 : 20



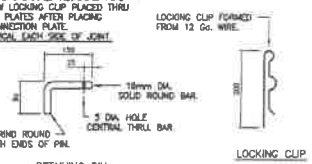
WALL SECTION AT PANEL JOINT (2)
SCALE 1 : 20



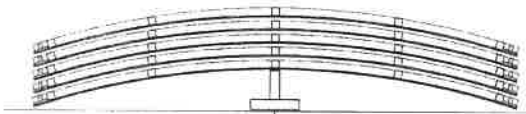
ENLARGED PLAN DETAIL (3)
NOT TO SCALE



ENLARGED ELEVATION (3x)
NOT TO SCALE



SUGGESTED PIN AND CLIP DETAILS
SHOP TO CONFIRM ALL DETAILS



TRANSPORT AND STORAGE DETAILS
NOT TO SCALE

APEGGA PERMIT NO. 2042

NOTES :

1. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE AND FOR THE SAFETY OF ALL PERSONNEL DURING ASSEMBLY AND DISASSEMBLY. ALL WORK SHALL BE IN STRICT ACCORDANCE WITH OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.
2. THE CONTRACTOR SHALL ENSURE ALL THE PANELS ARE ADEQUATELY SUPPORTED OR BRACED UNTIL THE ENTIRE STRUCTURE IS ASSEMBLED.
3. ALL TOPSOIL, ORGANICS, SOFT OR WET SOILS, DEBRIS OR OTHER DELETERIOUS MATERIALS SHALL BE REMOVED FROM THE TANK SITE.
4. THE FINISHED GRADES ALONG THE PERIMETER OF THE TANK SHALL BE LEVEL AND TRUE TO PLANE. THE MAXIMUM ELEVATION DIFFERENCE ACROSS ANY TWO DIAMETRICAL POINTS SHALL BE LESS THAN 250mm.
5. THE MAXIMUM DEVIATION FROM PLANE OVER ANY 3.0 METERS OF CIRCUMFERENCE SHALL BE LESS THAN 8mm AND LESS THAN 12mm OVER ANY 10.0 METERS OF CIRCUMFERENCE.
6. THE AREA SURROUNDING THE TANKS SHALL BE GRADED TO DIRECT SURFACE WATER AWAY FROM THE TANK.
7. THE EDGE OF ANY (EXCAVATED) SUMP SHALL BE A MINIMUM OF 1000mm FROM THE EDGE OF THE TANK WALL.
8. THE PANELS SHALL BE ERECTED PLUMB. THE MAXIMUM OUT-OF-PLUMBNESS OF THE TOP OF THE PANEL RELATIVE TO THE BOTTOM SHALL BE LESS THAN 25mm.
9. THE MAXIMUM DEVIATION FROM THE THEORETICAL RADIUS SHALL BE LESS THAN 50mm AT ANY POINT ALONG THE TANK WALL.
10. THE LINER SHALL BE SECURELY FASTENED TO THE TOP OF EACH PANEL IN ACCORDANCE WITH THE LINER'S MANUFACTURER'S RECOMMENDATIONS. THE LINER SHALL BE INSTALLED WITH SUFFICIENT SLACK AT THE BASE OF THE PANEL TO PREVENT ANY TENSION IN THE LINER.
11. THE VERTICAL LIFTING BAR SHALL ONLY BE USED TO LIFT THE PANELS INTO THE VERTICAL POSITION. THE LIFT RIGGING MUST BE WITHIN 250mm OF THE TOP RAIL PRIOR TO LIFTING THE PANEL.

DWG. NO.	REFERENCE DRAWINGS	REV	REVISIONS	DATE	BY	CHK'D	APP'D	CLIENT APP'D
12167-S-001	TANK WALL PANEL FRAMING LAYOUTS	A	ISSUED FOR REVIEW	14.12.10	RP	MH		
12167-S-002	TANK WALL PANEL FRAMING DETAILS	0	ISSUED FOR CONSTRUCTION	17.12.10	MH	MH		

FILE : 12167-E-001

ENGINEER AND PERMIT STAMPS

Designed :	Date :	Drawn :	Date :	Checked :	Date :
MH	08.12.10	RP	11.12.10	MH	14.12.10

Client : OPEN RANGE ENERGY CORP

Project : 48m dia. MODULAR WATER TANK

TANK INSTALLATION AND ASSEMBLY
LAYOUT PLAN, SECTIONS AND DETAILS

Job No.	Scale :	Dwg. No.	
12167	AS NOTED	12167-E-001	0

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Tank Structure Analysis
Atlantis 48m +3 Tank - Constructed using 18 Standard Atlantis 48.0m Diameter Tank Panels for total Diameter of Approximately 57.5m (188.6ft)

Date: 3/19/2015

Prepared for:

Rockwater Energy Solutions
6000 Town Center Blvd, Suite 165
Canonsburg, PA 15317

Prepared by:

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4010 New Chapel Hill Way, Cumming, GA 30041
P: 404-557-5884 | F: 678-807-2902
E: svalero@Wall-Eval.com

PROBLEM STATEMENT:

Evaluate the feasibility of using standard panels designed for the Atlantis 48m diameter tank to construct a 51.2m diameter tank by adding 1 panel from the standard set up configuration (Atlantis 48m +1). The analysis that follows will consider the adequacy of the following parts of the tank configuration:

1) Wall shell capacity
2) Wall panel connection assembly capacity
3) Impact of difference in tank radius and panel radius of curvature on system

Adequacy of lifting hooks, etc. will not be evaluated as this is not changed from standard Atlantis 48m tank.

INPUT INFORMATION:

Tank & Panel Geometry

$L := 10050mm = 32.97\ ft$ Single wall panel length, per Ref 1

$H := 3.66m = 12.01\ ft$ Tank height, per Ref 1

$n := 18$ Number of Panels used to construct tank, per Ref 2

$Gap := 5mm = 0.02\ ft$ Gap between panel shells when tank is in service, per Ref 1

$\alpha_{org} := 24deg$ Original sector angle for panels in standard configuration, per Ref 1

$C_{org} := 9975mm = 32.73\ ft$ Chord length of panels, per Ref 1

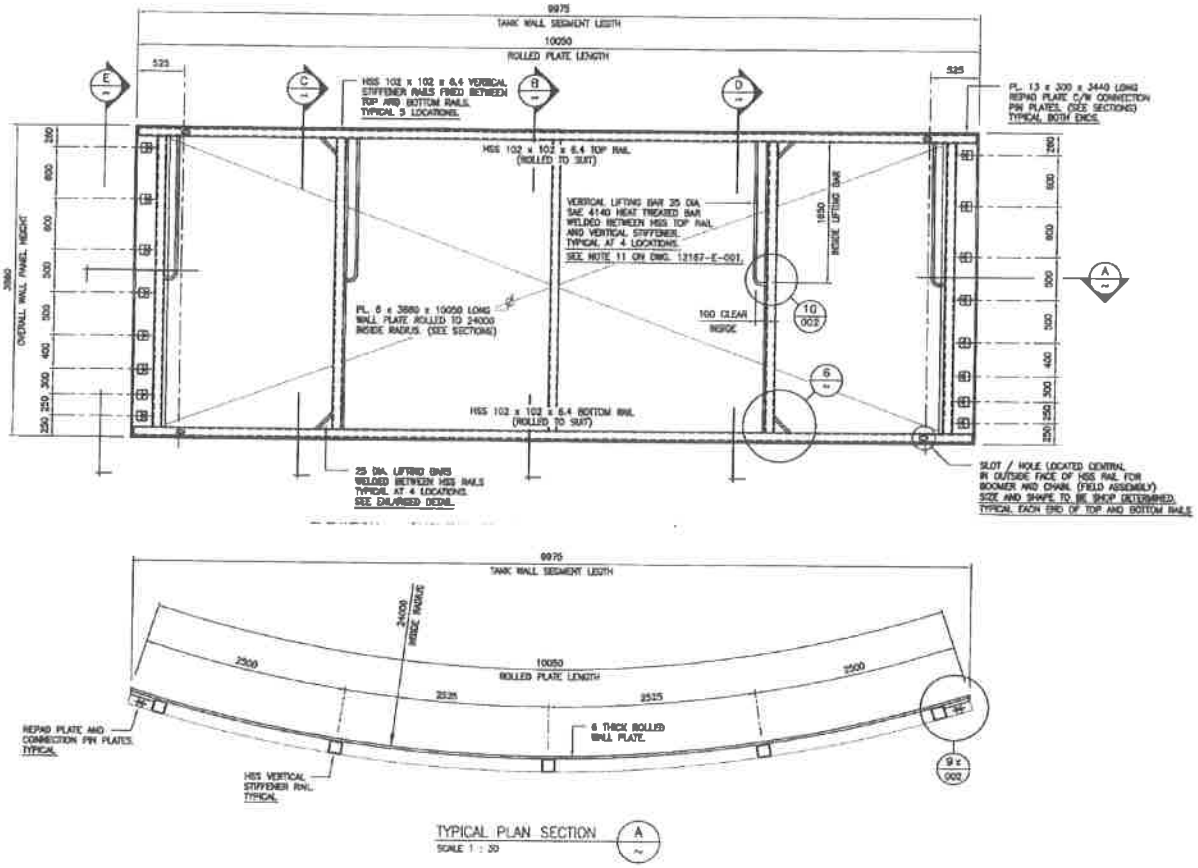
$c := 8$ Number of connection pin plates per panel side, per Ref 1

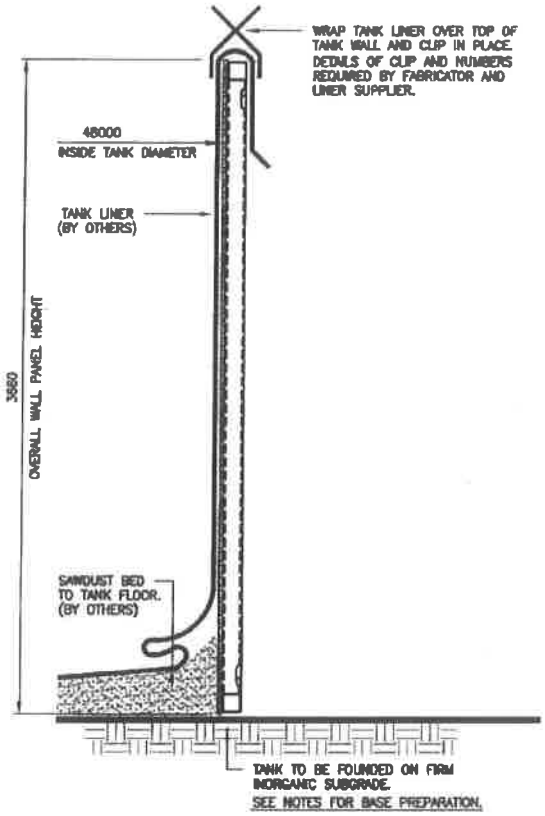
$i := 1 .. c + 1$

$d_i :=$ Vertical distances between connection pin points on panel, per Ref 1

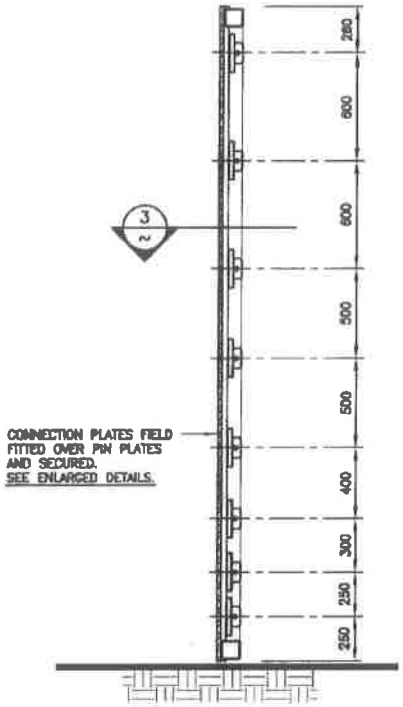
260mm	Top of Panel to Con 1
600mm	Con 1 to Con 2
600mm	Con 2 to Con 3
500mm	Con 3 to Con 4
500mm	Con 4 to Con 5
400mm	Con 5 to Con 6
300mm	Con 6 to Con 7
250mm	Con 7 to Con 8
250mm	Con 8 to Bottom of Panel

Tank Panel Layout and Connection Details are as follows, After Ref 1:

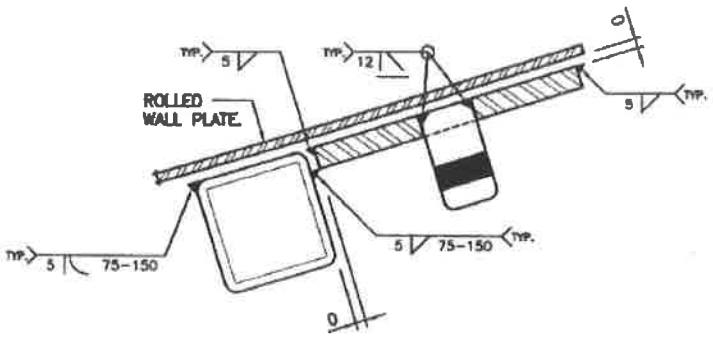




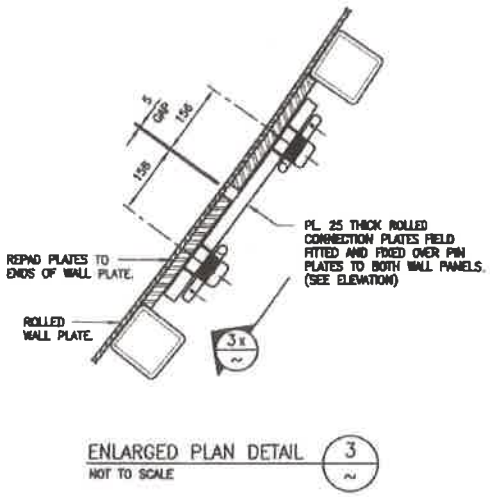
TYPICAL TANK WALL SECTION (1)
SCALE 1 : 20

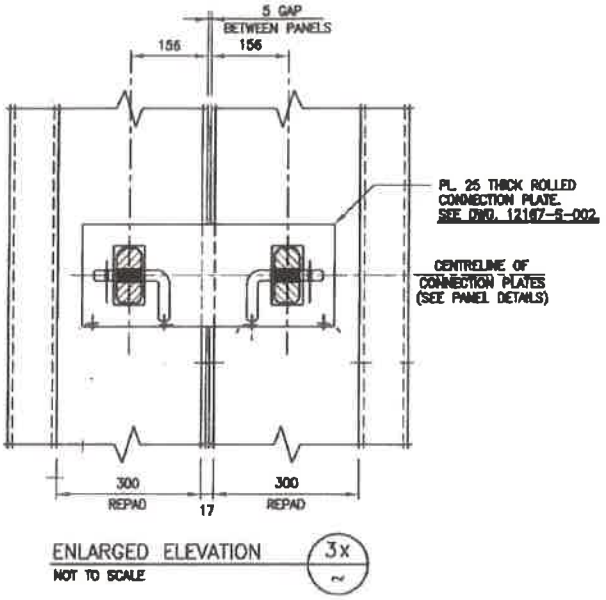


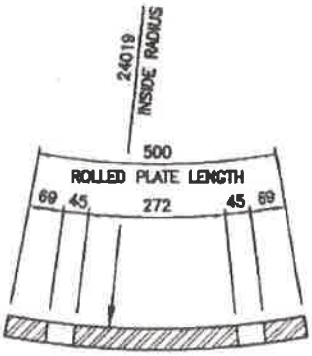
WALL SECTION AT PANEL JOINT (2)
SCALE 1 : 20



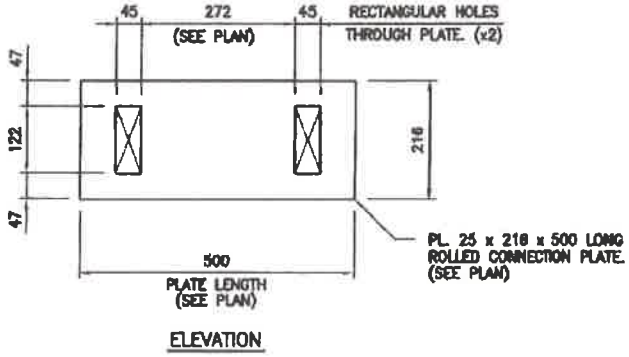
ENLARGED TYPICAL PLAN – EXPLODED TO SHOW WELD DETAILS.
NOT TO SCALE





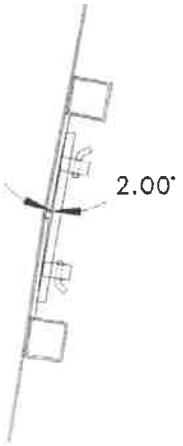


PLAN
(EXAGGERATED SCALE)



ELEVATION

WALL PANEL CONNECTION PLATES
(x8 REQUIRED PER WALL PANEL)



The figure to the right shows the impact on tank/connection roundness due to the difference in panel radius of curvature and tank curvature due to changing the number of standard panels used. By inspection, the impact of this geometry is insignificant with regard to mid-panel bending failure. However, the small angle between the connection plate and repad plate will be taken into consideration when calculating maximum stress to be carried by the connection assembly.

$\beta := 2.0\text{deg}$ Angle between connection plate and repad plate for this tank configuration

Tank shell, Repad Plate, Connection Pin Plate and Connection Plate Steel Specifications

Steel := "CSA G40.21 300W Steel"	Steel specification, per Ref 1
Fu := 450MPa = 65266.98 psi	Ultimate strength, per Ref 3
Fy := 300MPa = 43.51·ksi	Yield strength, per Ref 3

Tank shell/rail specifications:

$t_{shell} := 6mm = 0.24 \cdot in$	Thickness, per Ref 1
$d_{rail} := 102mm = 4.02 \cdot in$	Depth of top/bottom rails connected to shell

Repad plate specifications:

$t_{rpad} := 13mm = 0.51 \cdot in$	Thickness, per Ref 1
$de_{rpad} := 129.5mm = 5.1 \cdot in$	Distance from connection pin plate hole to outside edge of plate, per Ref 1
$b_{rpad} := 300mm = 11.81 \cdot in$	Width of repad plate, per Ref 1
$d_{rpad} := 3440mm = 135.43 \cdot in$	Length of repad plate, per Ref 1
$s_{rpad} := 5mm = 0.2 \cdot in$	Weld leg dimension for fillet welds between repad plate and shell, per Ref 1

Connection pin plate specifications

$t_{pin} := 41mm = 1.61 \cdot in$	Thickness, per Ref 1
$h_{pin} := 114mm = 4.49 \cdot in$	Height, per Ref 1
$dph_{pin} := 27mm = 1.06 \cdot in$	Distance from repad to inside of retaining pin hole, Per Ref 1

Connection plate specifications:

$t_{cplate} := 25mm = 0.98 \cdot in$	Thickness, per Ref 1
$h_{cplate} := 216mm = 8.5 \cdot in$	Height, per Ref 1
$de_{cplate} := 69mm = 2.72 \cdot in$	Distance from pin hole to outside edge of plate, per Ref 1
$h_{pinhole} := 122mm = 4.8 \cdot in$	Dimensions of pin hole slots in connection plate, per Ref 1
$w_{pinhole} := 45mm = 1.77 \cdot in$	

ASSUMPTIONS:

The following assumptions were required in order to complete this analysis:

$Freeboard := 0ft$ Maximum permissible liquid depth (overflow condition)

$G_s := 1.0$ Specific gravity of contained liquid, assumed to be fresh water

$\gamma_{water} := 62.4pcf$ Unit weight of water

Resisting forces are provided by hoop tension in the wall panels/connections only.

$F_{E60} := 413MPa = 59.9 \cdot ksi$ 60 ksi electrodes used for all arc welding

The applied liquid pressure is considered a dead load as its maximum depth is limited by the maximum height of the tank walls. It is highly unlikely that the tank would remain full to the struck capacity for an extended period. Therefor, the following load factor will apply throughout these calculations

$LF := 1.4$

The only load applied to the system is due to the contained liquid. This analysis does not consider:

- Ice load
- Wind load
- Impact load
- Seismic load
- or any other potential internal/external load.

It is assumed that the tank is installed properly, on firm, level ground and that all steel, welds, etc. are in good condition.

REFERENCES:

1) Drawing sheets 12167-S-001; 12167-S-002; and 12167-E-001 prepared for Open Range Energy, 48m Modular Water Tank by Beck Engineering, Ltd. dated 12/17/2010.

2) CSA G40.20-13/G40.21-13 - General requirements for rolled or welded structural quality steel / Structural quality steel.

3) AISC Manual of Steel Construction, 13th Ed.

CALCULATIONS:

1) Determine the average (design) diameter of the tank:

$\alpha := \frac{360deg}{n} = 20 \cdot deg$ Sector angle for each panel

$C_{tot} := C_{org} + Gap = 32.74\ ft$ Total segment length for each panel

$R := \frac{C_{tot}}{\sqrt{2 - 2\cos(\alpha)}} = 94.28\ ft$ New radius of tank constructed with n panels

$D := 2 \cdot R = 188.56\ ft$ Inside diameter of tank

2) Check stress level vs. capacity of tank shell:

$z_{cpshell} := H - Freeboard - d_{rail} = 140.08 \cdot in$ Depth from top of tank to top of bottom rail, critical unsupported point of tank shell

$\gamma := LF \cdot G_s \cdot \gamma_{water} = 87.36 \cdot pcf$ Factored unit weight of contained liquid

$Pcp_{shell} := (z_{cpshell} - Freeboard) \cdot \gamma =$ Maximum internal tank pressure at critical unsupported point in shell (between vertical stiffener rails and just above bottom rail).

$\sigma_{shell} := \frac{Pcp_{shell} \cdot D}{2 \cdot t_{shell}} = 33917.21\ psi$ Use diameter Equation to estimate hoop tensile stress in shell at critical point (valid since tshell/tank radius << 0.10)

$Ta_{shell} := \min(0.9 \cdot Fy, 0.75 \cdot Fu) = 39160.19\ psi$ Allowable axial tensile stress per Ref 4

$Check_{shell} := if(\sigma_{shell} < Ta_{shell}, "OK", "Shell thickness is insufficient")$

$Check_{shell} = "OK"$ Check shell thickness

3) Check stress level vs. capacity of panel connection assembly:

The connection assembly consists of: Repad plate welds to shell; repad plate, connection pins and connection plates.

3a) Check sufficiency of welds between repad plate and tank shell:

$Pmax_{rpad} := (H - Freeboard)\cdot\gamma = 7.28\ psi$ Maximum internal tank pressure at critical unsupported point in shell (between vertical stiffener rails and just above bottom rail).

$Tmax_{rpad} := \frac{\frac{1}{2}\cdot Pmax_{rpad}\cdot H\cdot D}{2} = 593786.38\ lbf$ Use Young-Laplace Equation to estimate total hoop tension to be transferred from shell to repad plate (valid since tshell/tank radius << 0.10)

$M_{rpad} := \left(\frac{H}{2} - \frac{H}{3}\right)\cdot Tmax_{rpad} = 14260223.97\cdot lbf\cdot in$ Torque on line welds transferring stress from shell to repad (5mm fillet along both sides)

$C := \frac{\sqrt{b_{rpad}^{\ 2} + d_{rpad}^{\ 2}}}{2} = 67.97\cdot in$ Distance from neutral axis to extreme fibers of welds

$J_w := \frac{H}{6}\cdot\left(3b_{rpad}^{\ 2} + d_{rpad}^{\ 2}\right) = 450550.26\cdot\frac{in^4}{in}$ Polar moment of inertia of line welds

$f := \frac{M_{rpad}\cdot C}{J_w} = 2151.41\cdot\frac{lbf}{in}$ Force of extreme fibers of welds

$f_t := 0.75\left(0.6F_{E60}\right)\cdot\left(s_{rpad}\cdot 0.707\right) = 3751.45\cdot\frac{lbf}{in}$ Maximum allowable stress of welds

$Check_{rpadwelds} := if\left(f < f_t, "OK", "Welds insufficient"\right)$

$Check_{rpadwelds} = "OK"$ Check repad plate welds

3b) Determine critical connection pin location and load:

$j := 2 .. c - 1$

$z_0 := 0in \qquad z_1 := d_1 + \frac{d_2}{2}$

$z_j := z_{j-1} + \left(\frac{d_j + d_{j+1}}{2}\right)$

Depth from top of wall panel to the bottom of contributory load area carried by each connection plate/pin set:

$z_8 := z_7 + \frac{d_8}{2} + d_9$

$j := 0 .. c$

$z_j =$

0	Top of tank
22.05	Bottom of contributory area where load is carried by Connection 1
45.67	
67.32	
87.01	
104.72	
118.5	
129.33	
144.09	Bottom of contributory area where load is carried by Connection 8

in

$P_j := \text{if}\left[z_j - \text{Freeboard} > 0in, \gamma \cdot \left(z_j - \text{Freeboard}\right), 0psi\right]$

$P_j =$

0.00 psi	Top of tank
1.11	Con 1
2.31	Con 2
3.40	Con 3
4.40	Con 4
5.29	Con 5
5.99	Con 6
6.54	Con 7
7.28	Con 8

Pressure distribution inside tank at the bottom of contributory area carried by each connection point

$k := 1 .. c$

$$T_{con_k} := \left[P_{k-1}\cdot\left(z_k - z_{k-1}\right) + \frac{1}{2}\left(P_k - P_{k-1}\right)\cdot\left(z_k - z_{k-1}\right)\right]\cdot\frac{D}{2} = \ldots$$

Use Young-Laplace Equation to estimate total hoop tension to be transferred from repad plate to each connection (valid since tshell/tank radius << 0.10)

$T_{con_k} =$

13900.94	lbf	Con 1
45745.43		Con 2
69970.12		Con 3
86880.86		Con 4
97142.56		Con 5
87966.87		Con 6
76735.53		Con 7
115444.06		Con 8

Estimate of total tension carried at each connection point (actual load distribution is likely more evenly spread from repad plate to connections reducing total load carried by bottom connections). For this analysis, bottom connection will be considered critical and analyzed vs. total contribution load (conservative).

$T_{con} := T_{con_c} = 115444.06\ \text{lbf}$ Critical connection load, bottom connection

$$T_{con} := \frac{T_{con}}{\cos(\beta)} = 115514.42\ \text{lbf}$$

Effect of load vector due to change in geometry at connection point induced by difference in tank radius and radius of curvature of panels

$d_{rpad} := z_c - z_{c-1} = 14.76\cdot\text{in}$ Contributory length of repad plate carrying critical load

3c) Check the repad plate for sufficient strength to transfer critical load to connection pins:

$Ag_{rpad} := d_{rpad}\cdot t_{rpad} = 7.56\cdot\text{in}^2$ Theoretical gross section area subject to tension

$An_{rpad} := \left(d_{rpad} - h_{pin}\right)\cdot t_{rpad} = 5.26\cdot\text{in}^2$ Theoretical net section area subject to tension

$Ans_{rpad} := 2\cdot de_{rpad}\cdot t_{rpad} = 5.22\cdot\text{in}^2$ Theoretical net section area subject to shear (tear out)

$Tn_{rpad} := \min\left[0.9\cdot Fy\cdot Ag_{rpad}, 0.75\cdot Fu\cdot An_{rpad}, 0.75\cdot(0.6\cdot Fu)\cdot Ans_{rpad}\right] = 153278.67\ \text{lbf}$

Allowable tension on the repad considering yielding on the gross section, fracture on the net section and tear out.

$Check_{rpad} := \text{if}\left(T_{con} < Tn_{rpad}, \text{"OK"}, \text{"Repad insufficient"}\right)$

$Check_{rpad} = \text{"OK"}$ Check on thickness of repad plate

3d) Check the connection pin plates for sufficient strength to transfer critical load to connection plates.

$Rn_{pin} := 0.75 \cdot (0.6 \cdot Fu) \cdot h_{pin} \cdot t_{pin} = 212778.29\ lbf$ Allowable shear load on pin plate

$M_{pin} := T_{con} \cdot \left(dph_{pin} - \frac{t_{cplate}}{2} \right) = 65943.27 \cdot lbf \cdot in$ Factored maximum moment on pin plate at intersection with repad plate (critical point) under worst case conditions (plate contacts retaining pin)

$Mn_{pin} := 0.9 \cdot \frac{h_{pin} \cdot t_{pin}^2}{6} \cdot Fy = 76324.67 \cdot lbf \cdot in$ Allowable bending moment on pin plate

$Check_{pin} := if\left(T_{con} < Rn_{pin}, if\left(M_{pin} < Mn_{pin}, "OK", "Pin Insufficient"\right), "Pin Insufficient"\right)$

$Check_{pin} = "OK"$ Check on pin dimensions

3e) Check the connection plate for sufficient strength to transfer critical load from connection pins to next panel:

$Ag_{cplate} := h_{cplate} \cdot t_{cplate} = 8.37 \cdot in^2$ Gross section area subject to tension

$At_{cplate} := \left(h_{cplate} - h_{pinhole}\right) \cdot t_{cplate} = 3.64 \cdot in^2$ Net section area subject to tension

$Anbs_{cplate} := \left(de_{cplate} + \frac{h_{cplate} - h_{pinhole}}{2} \right) \cdot t_{cplate} = 4.5 \cdot in^2$ Net section area subject to block shear (tear out)

$Avg_{cplate} := \left(de_{cplate} + \frac{w_{pinhole}}{2} \right) \cdot t_{cplate} = 3.55 \cdot in^2$ Gross section area subject to shear yield

$Atg_{cplate} := \left(\frac{h_{cplate}}{2} \right) \cdot t_{cplate} = 4.19 \cdot in^2$ Gross section area subject to tensile yield

$Ans_{cplate} := de_{cplate} \cdot t_{cplate} = 2.67 \cdot in^2$ Net section area subject to shear fracture

$Ant_{cplate} := \left(\frac{h_{cplate} - h_{pinhole}}{2} \right) \cdot t_{cplate} = 1.82 \cdot in^2$ Net section area subject to tensile fracture

$Tngen_{cplate} := \min\left(0.9 \cdot Fy \cdot Ag_{cplate}, 0.75 \cdot 1.0Fu \cdot At_{cplate}\right) = 178301.59\ lbf$ Allowable general yield/fracture limit tension

$Tnbs_{cplate} := 0.75 \cdot (0.6 \cdot Fu) \cdot Anbs_{cplate} = 132019.05\ lbf$ Allowable block shear tension

$Tnsy_{cplate} := \min\left[0.75 \cdot \left(0.6Fy \cdot Avg_{cplate} + Fu \cdot Ant_{cplate}\right), 0.75 \cdot \left(0.6Fu \cdot Ans_{cplate} + Fy \cdot Atg_{cplate}\right)\right] = 158574.61\ lbf$

Allowable yield/fracture tension

$Tn_{cplate} := \min(Tngen_{cplate}, Tnbs_{cplate}, Tnsy_{cplate}) = 132019.05\ lbf$ Block shear controls

$Check_{cplate} := if(T_{con} < Tn_{cplate}, "OK", "Connection plate insufficient")$

$Check_{cplate} = "OK"$ Check on dimensions of connection plate

4) Summary of final Capacity and Dimensions

$D = 188.56\ ft$ Design inside diameter of tank

$\alpha = 20 \cdot deg$ Arc intersected by each panel

$D_{min} := \frac{2C_{org}}{\sqrt{2 - 2\cos(\alpha)}} = 188.46\ ft$ Minimum inside diameter of tank when empty

$D_{max} := \frac{2\left[C_{tot} + \left(\frac{w_{pinhole} - t_{pin}}{2}\right)\right]}{\sqrt{2 - 2\cos(\alpha)}} = 188.60\ ft$ Maximum inside diameter of tank when full

$Freeboard = 0 \cdot in$ Design freeboard used in analysis

$V_{design} := (H - Freeboard) \cdot \frac{\pi \cdot D^2}{4} = 59721 \cdot BBL$ Design capacity (No freeboard)

$V_{max} := H \cdot \pi \cdot \frac{D^2}{4} = 59721 \cdot BBL$ Maximum capacity (filled to top)

Design capacity (with varying freeboard):

$Freeboard := 12in$ $V_{design} := (H - Freeboard) \cdot \frac{\pi \cdot D^2}{4} = 54748 \cdot BBL$

$Freeboard := 24in$ $V_{design} := (H - Freeboard) \cdot \frac{\pi \cdot D^2}{4} = 49774 \cdot BBL$

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 30mil LLDPE

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

Note;

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

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

* 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.

SOLMAX

TECHNICAL DATA SHEET

Geomembrane HDPE Smooth

Solmax, 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tel.: (450) 929-1234 Fax: (450) 929-2550 www.solmax.com

PROPERTY	TEST METHOD	FREQUENCY (1)	UNIT Metric	Solmax 440-7000
SPECIFICATIONS				
Thickness (Nominal ±10%) (11)	ASTM D-5199	Every roll	mm	1.00
Resin Density	ASTM D-1505	Certification	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D-1238	Certification	g/10 min	1.0
Sheet Density (8)	ASTM D-1505	1/Batch	g/cc	≥ 0.940
Carbon Black Content (9)	ASTM D-4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D-5596	Every 10 rolls	Category	Cat. 1 / Cat. 2
OIT - standard (avg.)	ASTM D-3895	1/Batch	min	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 5 rolls		
Strength at Yield			kN/m	15
Elongation at Yield			%	12
Strength at Break			kN/m	27
Elongation at Break			%	700
Tear Resistance (min. avg.)	ASTM D-1004	Every 10 rolls	N	106
Puncture Resistance (min. avg.)	ASTM D-4833	Every 10 rolls	N	320
Dimensional Stability	ASTM D-1204	Certification	%	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D-5397	1/Batch	hr	500
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation		
HP OIT (min. avg.)	ASTM D-5885		%	80
UV Resistance - % retained after 1600 hr	GRI-GM-11	Per formulation		
HP-OIT (min. avg.)	ASTM D-5885		%	50
SUPPLY SPECIFICATIONS (Roll dimensions may vary ±1%)				
Roll Dimension - Width	-		m	6.80
Roll Dimension - Length	-		m	237.7
Area (Surface/Roll)	-		m²	1616.4

NOTES

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

* All values are nominal test results, except when specified as minimum or maximum.
* The information contained herein is provided for reference purposes only and is not intended as a warranty of guarantee. Final determination of suitability for use contemplated is the sole responsability of the user. SOLMAX assumes no liability in connection with the use of this information.

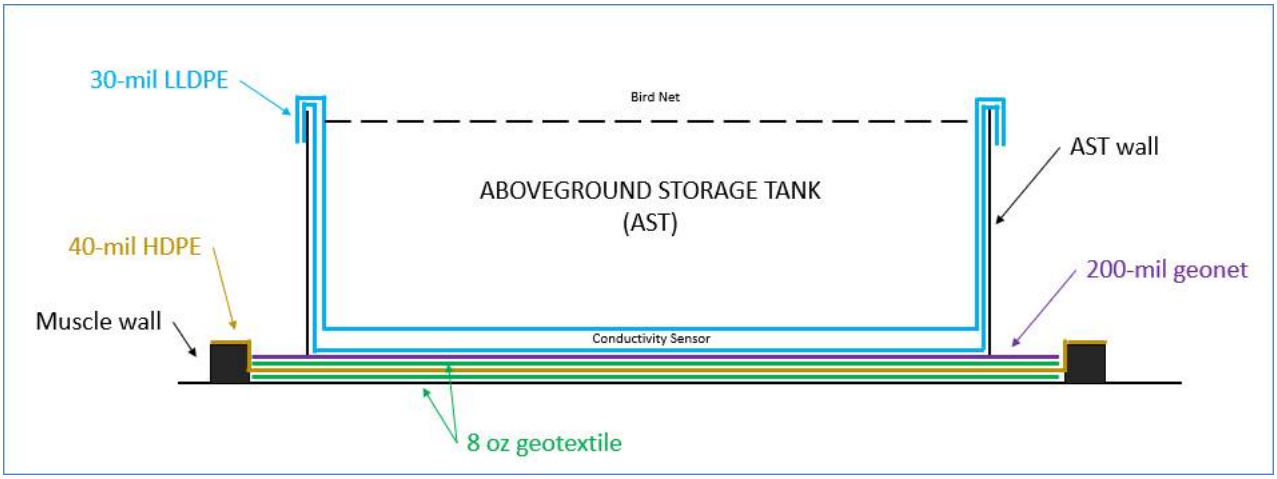
Venegas, Victoria, EMNRD

From: Vallejo, Tony <JVallejo@chevron.com>
Sent: Thursday, October 21, 2021 12:16 PM
To: Venegas, Victoria, EMNRD
Subject: [EXTERNAL] RE: 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT FACILITY ID fVV2129439449.

CAUTION: This email originated outside of our organization. Exercise caution prior to clicking on links or opening attachments.

Victoria,

Please see the proposed drawing below. Let me know if you need additional information.



Thank you,
Tony Vallejo

Sr. Workforce Safety & Environmental Specialist - Factory
Chevron USA Inc. (MCBU)
6301 Deauville Blvd/N3210
Midland, Tx 79706
O: 432-687-7524
C: 325-450-1413
jvallejo@chevron.com

Safety is as simple as ABC - Always Be Careful

From: Venegas, Victoria, EMNRD <Victoria.Venegas@state.nm.us>
Sent: Thursday, October 21, 2021 12:34 PM
To: Vallejo, Tony <JVallejo@chevron.com>
Subject: [**EXTERNAL**] 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT FACILITY ID fVV2129439449.

1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT FACILITY ID fVV2129439449.

Venegas, Victoria, EMNRD

From: Venegas, Victoria, EMNRD
Sent: Tuesday, October 26, 2021 2:16 PM
To: Vallejo, Tony; Zemen, Jessica; Visairo, Omar
Subject: 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT . Approved with Conditions.
Attachments: C-147 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449.pdf

1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449

Good afternoon Mr. Vallejo
NMOCD has reviewed the recycling containment permit application and related documents, submitted by [4323] CHEVRON USA INC on October 14, 2021 for 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 in Unit Letter04, Section 20, Township 22S, Range 33E, Lea County, New Mexico.
[4323] CHEVRON USA INC requested variances from 19.15.34 NMAC for 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 related to 19.15.34. NMAC

The following variances have been 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.
- [4323] CHEVRON USA INC requested a variance to 19.15.34.12 A (4) NMAC for the installation on the AST containment of a dual (primary and secondary) 30-mil LLDPE geomembrane liner system with a passive liquid leak detection system. A secondary containment will be installed below the primary storage containment. The secondary containment will consist of a 40-mil HDPE and will include a 200-mil drainage net above the 40-mil HDPE liner for liquid leak detection. The leak detection system will be equipped with a conductivity sensor and alarm, which will notify operations personnel in the event of a leak. In addition, a geotextile layer will be installed directly beneath the 200-mil geonet layer and beneath 40-mil HDPE liner to serve as cushioning protection of the 40-mil HDPE liner. A copy of the containment design details and specifications are included in Appendix 4 of the application. This variance request is approved.

The form C-147 and related documents 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 is approved with the following conditions of conditions of approval:

- [4323] CHEVRON USA INC shall construct, operate, maintain, close, and reclaim 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 consisting one (1) ASTs of 60,000.00 bbl of capacity, in compliance with 19.15.34 NMAC.
- 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 is approved for five years of operation from the date of permit application. 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 permit expires on October 14, 2026. If [4323] CHEVRON USA INC wishes to extend operations past five years, an annual permit extension request must be submitted using an OCD form C-147 through OCD Online by September 14, 2026.
- Water reuse and recycling from 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 is limited to wells owned or operated by [4323] CHEVRON USA INC.
- [4323] CHEVRON USA INC shall notify OCD when construction of 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 commences.

- [4323] CHEVRON USA INC shall notify OCD when recycling operations commence and cease at 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449
- A minimum of 3-feet freeboard must be maintained at 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449, at all times during operations.
- [4323] CHEVRON USA INC shall provide OCD with the calculations for the operational total fluid capacity of the containment within 30 days of receiving produced water in the containment. The operational fluid capacity is the total volume of the containment, minus the volume not utilized due to the freeboard.
- If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdrawal, operation of the facility is considered ceased and notification of cessation of operations should be sent electronically to OCD Online. An extension to extend the cessation of operation, not to exceed six months, may be submitted using a C-147 form through OCD Online.
- [4323] CHEVRON USA INC shall submit monthly reports of recycling and reuse of produced water, drilling fluids, and liquid oil field waste on OCD form C-148 through OCD Online even if there is zero activity.
- [4323] CHEVRON USA INC shall comply with 19.15.29 NMAC Releases in the event of any release of produced water or other oil field wastes at 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449.

Please reference number 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 in all future communications.
Regards,

Victoria Venegas ● Environmental Specialist
Environmental Bureau
EMNRD - Oil Conservation Division
811S. First St. | Artesia, NM 88210
(575) 909-0269 | Victoria.Venegas@state.nm.us
http://www.emnrd.state.nm.us/OCD/

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

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

Form C-147
Revised April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: ☐ Recycling Facility ☒ Recycling Containment*

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

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

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

1.

Operator: Chevron U.S.A. Inc. (For multiple operators attach page with information) OGRID #: 4323

Address: 1400 Smith Street, Houston TX 77002

Facility or well name (include API# if associated with a well): Dagger Lake Sec 4 AST Containment

OCD Permit Number: 1RF-475 - (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr I Section 4 Township 22 South Range 33 East County: Lea

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

2.

☐ **Recycling Facility:**

Location of recycling facility (if applicable): Latitude _____ Longitude _____ 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:** Produced Water Aboveground Storage Tank (AST)

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

Center of Recycling Containment (if applicable): Latitude 32.417858 Longitude -103.569555 NAD83

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

☒ Lined ☒ Liner type: Thickness 2 x 30 mil LLDPE, 1 x 40 mil HDPE ☒ LLDPE ☒ HDPE ☐ PVC ☐ Other _____

☐ String-Reinforced

Liner Seams: ☒ Welded ☐ Factory ☐ Other _____ Volume: 60,000 bbl Dimensions: L (Diameter) 189' x W____ x D 12'

☐ Recycling Containment Closure Completion Date: _____

4.

Bonding:

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

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

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

5.

Fencing:

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

☐ Alternate. Please specify_____

6.

Signs:

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

☐ Signed in compliance with 19.15.16.8 NMAC

7.

Variances:

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

Check the below box only if a variance is requested:

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

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

8.

Siting Criteria for Recycling Containment

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

General siting

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

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

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

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

Name (Print): Tony Vallejo Title: Senior Workforce Safety and Environmental Specialist - Factory

Signature: Tony Vallejo Date: 10/19/2021

e-mail address: jvallejo@chevron.com Telephone: O: 432-687-7524 or C: 325-450-3428

11.
OCD Representative Signature: Victoria Venegas **Approval Date:** 10/26/2021

Title: Environmental Specialist **OCD Permit Number:** 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449

☒ OCD Conditions

☒ Additional OCD Conditions on Attachment

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

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

CONDITIONS

Action 55877

CONDITIONS

Operator: CHEVRON U S A INC 6301 Deauville Blvd Midland, TX 79706	OGRID: 4323
	Action Number: 55877
	Action Type: [C-147] Water Recycle Long (C-147L)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	NMOCD has reviewed the recycling containment permit application and related documents, submitted by [4323] CHEVRON USA INC on October 14, 2021 for 1RF-475 - DAGGER LAKE SEC 4 AST CONTAINMENT - FACILITY ID fVV2129439449 in Unit Letter 04, Section 20, Township 22S, Range 33E, Lea County, New Mexico. The application is approved with conditions.	10/26/2021