AECOM

Petition for Alternative Abatement Standards

Former El Paso Natural Gas Company, LLC Jal No. 4 Plant
Lea County, New Mexico

NMOCD Abatement Plan Case #AP – 101
Incident ID #nAPP2110635360

AECOM Project No. 60735050

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Revision	Revision date	Details	Authorized	Name	Position

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1. Introduction

This document has been prepared for El Paso Natural Gas Company, LLC (EPNG) to petition the Energy, Minerals and Natural Resources Department, Oil Conservation Division (referred to in this document as "NMOCD" or "division") for approval of Alternative Abatement Standards (AAS) for chloride, total dissolved solids (TDS) and benzene concentrations in groundwater associated with historical operations at the Former EPNG Jal No. 4 Pant ("Plant" or "Site") in Lea County, New Mexico. A Site Location Map is provided as **Figure 1-1**. This petition demonstrates that the request for AAS meets the requirements of 19.15.30.9.F(1) New Mexico Administrative Code (NMAC), including the following:

(a) Either compliance with the abatement standards is not feasible, by the maximum use of technology within the responsible person's economic capability; <u>or there is no reasonable relationship between economic and social costs and benefits, including attainment of the standards set forth in 19.15.30.9 NMAC to be obtained</u>;

(b) <u>The proposed alternative abatement standards are technically achievable and cost-benefit justifiable; and</u>

(c) <u>Compliance with the proposed alternative abatement standards will not create a present or future hazard to public health or undue damage to property.</u>

1.1 Background

The Plant is located off Highway 18, approximately 10 miles north of the town of Jal and was constructed by EPNG in 1952 to treat, compress, store, and transport natural gas to EPNG's main transmission lines. From 1952 to 1981, brine and wastewater were managed in eight unlined retention ponds associated with the creation and operation of four natural gas cavern storage wells at the Plant. Beginning in 1981, brine has been managed in ponds with synthetic liners.

Investigations have revealed the presence of chloride, TDS, and benzene as constituents of concern (COCs) in groundwater beneath the Site and adjacent offsite properties that have exhibited concentrations in excess of the regulatory standards established for the Site under New Mexico Administrative Code (NMAC) 20.6.2.3103, which include:

- Chloride – 250 milligrams per liter (mg/L);
- TDS - 1,000 mg/L; and
- Benzene 0.01 mg/L.

The Site is under regulatory oversight by the NMOCD through Abatement Plan AP-101 and Incident ID #nAPP2110635360.

The impacted groundwater beneath the Site occurs within the Ogallala formation under unconfined conditions. The depth to groundwater in the Site area is approximately 100 feet below ground surface (ft bgs). The saturated thickness of the groundwater bearing unit is approximately 60 to 80 ft and does not include known aquitards or significant barriers to vertical flow. The groundwater flow direction is generally to the southeast.

EPNG has installed 31 monitor wells (ACW-01, ACW-02, ACW-04 through ACW-07, ACW-09 through ACW-29, ACW-30S/D, and ACW-32S/D) on the Site and surrounding properties that are currently being sampled annually (**Figure 1-2**). The existing monitor wells are generally screened in one of two vertical zones within the groundwater bearing unit and are grouped as upper and lower wells. The upper wells are screened across the groundwater interface and the lower wells are screened across a 20-foot interval at the base of the groundwater bearing unit which is defined by the contact with Triassic “red beds” underlying the Ogallala sediments. At several locations, paired wells have been installed, which include both an upper well and a lower well. The four 2023 quarterly Groundwater Surface Elevation Maps for the Upper Groundwater and Lower Groundwater are provided as **Figure 1-3** and **Figure 1-4**, respectively. September 2023 Isopleths of Chloride Concentrations in Upper Groundwater and Lower Groundwater are provided as **Figure 1-5** and **Figure 1-6**, respectively. Benzene concentrations for Upper Groundwater and Lower Groundwater are provided as **Figure 1-7** and **Figure 1-8**, respectively.

EPNG has also installed six recovery wells at the site. Two of the recovery wells, RW-01 and RW-02, are 10-inch diameter PVC wells that fully penetrate the aquifer with approximately 70 feet of 0.035-inch slotted screen. Recovery wells RW-03 and RW-04 are screened in the lowermost part of the aquifer. Recovery well RW-03 is constructed of 4-inch diameter PVC with 40 feet of 0.020-inch slotted screen. Recovery well RW-04 is constructed of 5-inch diameter PVC with 20 feet of 0.010-inch slotted screen. EPNG installed below-grade pipelines which connected the recovery wells to a Class II saltwater disposal well located immediately north of the Plant, which is identified as Shell State #13 SWD and has a perforated injection interval of 3,866 to 3,982 ft bgs.

EPNG initiated continuous groundwater extraction from recovery well RW-01 in October 1999, and the groundwater recovery system was eventually operated out of wells RW-01, RW-03, ACW-03 and ACW-08 on the Plant property, and RW-02 east of the Plant across State Highway 18. Locations of the groundwater recovery wells RW-01 through RW-04 are depicted on **Figure 1-2**.

The groundwater recovery system is reported to have recovered about 84,850,733 gallons of groundwater which was pumped untreated into the Shell State #13 SWD injection well. In May 2012, down hole scale build-up rendered the injection well unusable for remediation disposal purposes and groundwater remediation/recovery activities were halted. The well was rehabilitated by a workover rig during the second quarter of 2013, but groundwater pumping was not restarted, pending completion of a study to identify alternative water disposal options.

In February 2018, the NMOCD informed EPNG that the remediation effluent water does not qualify for injection to Class II wells in New Mexico. EPNG appealed this decision but was unsuccessful.

1.2 Recent Project Activities (2018 through the Present)

Project activities completed between from 2018 through the present include the following:

- Recovery well inspection/rehabilitation and aquifer testing activities were performed in March – April 2019 (recovery wells RW-1 and RW-2).
- Phase I and Phase II groundwater modeling were performed from June to November 2019 for the purpose of designing a new groundwater recovery approach. Phase I consisted of a 2-dimensional (2-D) steady state groundwater flow model and Phase II consisted of a 3-dimensional (3-D) density dependent groundwater flow and solute transport model.
- Three soil borings were drilled, and soil samples were collected for grain size analysis in October – November 2020. The grain size results were used to assist in developing an improved design for future groundwater extraction wells.
- Due to the NMOCD ruling that extracted groundwater associated with Site remediation could not be injected into Class II disposal wells in New Mexico, Sourcewater, Inc. (Sourcewater) was contracted to conduct a Class I Underground Injection Control (UIC)

Site Characterization in January 2021 to evaluate the feasibility of permitting a Class I injection well for management of extracted groundwater. The Sourcewater report concluded that it would be unlikely that EPNG would be able to permit a Class I injection well because Class I wells are not currently being permitted for the shallow geological formations, and geologic faults are present in the deeper formations within the study area (2.75-mile radius of the Plant).

- From November 2021 to February 2022 the numerical groundwater model for the Site documented in the Phase II Numerical Groundwater Model Report (AECOM 2019) was updated to account for new data, improve accuracy, and evaluate additional remedial alternatives. Revisions to the Phase II model also included use of Groundwater Vistas Version 8.16 and incorporation of density dependent viscosity into the groundwater flow simulation.
- Groundwater recovery wells EW-1 and EW-2 (see Figure 1-2) were installed in November 2021 and aquifer testing was performed on these recovery wells in June 2022.
- Aquifer test data evaluation and groundwater modeling were conducted from July to September 2022.
- Initial research was conducted to evaluate feasible alternatives for management of effluent associated with extraction of affected groundwater, with an emphasis being placed on sustainable alternatives which would facilitate reinjection or reuse of the treated groundwater, and beneficial reuse of the salt. The initial effluent management alternatives evaluation indicated the following:
  - Currently, no feasible insitu technologies exist for removing chloride and TDS from groundwater at the scale required for this site.
  - Beneficial re-use of extracted groundwater for oil field operations is not a sustainable option based on long term fluctuations in oil and gas production activities relative to the current anticipated time frame (60 years) to achieve remediation of affected groundwater to meet the current abatement standards for the COCs present at the Site.
  - Despite significant effort, to date, no options have been identified for beneficial re-use of extracted salt resulting from groundwater treatment.
- In 2024, the groundwater model was modified to incorporate TDS and benzene. The 2019 model setup, established by AECOM, serves as the foundation for the updated configuration. It employs SEAWAT Version 4 (C. Langevin, et al. 2012), integrating MODFLOW-2000 and MT3DMS to simulate three-dimensional, variable-density groundwater flow. MODFLOW-2000 handles steady-state and transient flow, incorporating factors such as recharge, evapotranspiration, and well extraction (Harbaugh 2000). MT3DMS adds capabilities for simulating chemical transport and reactions, while SEAWAT integrates density-dependent flow processes. Groundwater Vistas Version 9 was utilized as the graphical user interface program (J. &. Rumbaugh 2024). The 2024 groundwater modeling activities and results are described in the *Technical Report - Groundwater Modeling of Total Dissolved Solids and Benzene* (AECOM, 2024).

2. AAS Petition Requirements

The petition for AAS at the Site must address the requirements of 19.15.30.9.F(1) NMAC. The information associated with these requirements is provided below.

2.1 Variance Petition Requirements

For approval of alternative abatement standards for the standards set forth in Subsections A and B of 19.15.30.9 NMAC, *the responsible person shall file a written petition with the division's environmental bureau chief. The petition may include a transport, fate and risk assessment in accordance with accepted methods, and other information as the petitioner deems necessary to support the petition*." The petition shall:

1. *State the petitioner's name and address;*

   El Paso Natural Gas Company, LLC (EPNG)
   1001 Louisiana Street, Room 1445B
   Houston, TX 77002

2. *State the date of the petition*;

   December 30, 2024

3. *Describe the facility or activity for which the variance is sought*;

   Abatement of chloride, TDS and benzene concentrations in groundwater to meet the required water quality standards at the former EPNG Jal No. 4 Plant and surrounding area, Lea County, New Mexico.

4. *State the address or description of the property upon which the facility is located;*

   On the west side of State Highway 18 approximately 9 miles north of the town of Jal, located in Sections 31 and 32 of Township 23 South, Range 37 East, and Sections 5 and 6 of Township 24 South, Range 37 East, Lea County, New Mexico. The affected area for which the AAS is sought extends east of the facility across Highway 18.

5. *Describe the water body or watercourse affected by the discharge*;

   The discharge has affected groundwater within the Ogallala formation.

6. *Identify the regulation of the commission from which the variance is sought*;

   Subsections A and B of 19.15.30.9 NMAC.

7. *State in detail the extent to which the petitioner wishes to vary from the regulation;*

   The AAS sought under this petition are 55,000 mg/L for chloride, 75,000 mg/L for total dissolved solids, and 0.015 mg/L for benzene.

8. *State why the petitioner believes that compliance with the regulation will impose an unreasonable burden upon his activity*; *and*

   There is no reasonable relationship between the economic and social costs and benefits, including attainment of the standards set forth in 19.15.30.9 NMAC, to be obtained.

Furthermore, removal of the vast amount of water required to reach the existing regulatory standards would be detrimental to the overall health of the already highly stressed Ogallala aquifer system.

9. *State the period of time for which the variance is desired*.

The AAS are requested in perpetuity to facilitate a natural attenuation remediation approach.

2.2 AAS Requirements

The demonstration requirements codified in 19.15.30.9.F(1) NMAC include the following:

1. *Compliance with the abatement standard(s) is/are not feasible, by the maximum use of technology within the economic capability of the responsible person; OR <u>there is no reasonable relationship between the economic and social costs and benefits (including attainment of the standard(s) set forth in Subsections A and B of 19.15.30.9 NMAC) to be obtained</u>*;

   EPNG will demonstrate that there is no reasonable relationship between the economic and social costs and benefits.

2. *The proposed alternative abatement standard(s) is/are technically achievable and cost-benefit justifiable; and*

   The proposed AAS are based on groundwater modeling for chloride, TDS and benzene until 2053 (30 years beginning in 2023) under a monitored natural attenuation scenario. The proposed AAS are based on predicted chloride, TDS and benzene concentrations for a 20 year modeling period (2043). Actual achievement of the AAS could be expected between 20 and 30 years. The proposed period of natural attenuation monitoring is 30 years.

3. *Compliance with the proposed alternative abatement standard(s) will not create a present or future hazard to public health or undue damage to property.*

   The proposed AAS will be shown to not create a present or future hazard through administrative controls, hydrogeological considerations, and groundwater monitoring results for a period of 30 years.

3. Site Geology and Hydrogeology

The Site is located within the Eunice Plain physiographic area of Southern Lea County, New Mexico. As previously described, the impacted groundwater beneath the Site occurs within the Tertiary-age Ogallala formation, which unconformably overlies red-bed sediments of the Triassic-age Dockum Group. The water quality of the Ogallala and overlying Quaternary alluvium groundwater is better than the water quality of the underlying Triassic formations. The Ogallala and alluvial aquifers also have higher yields and are the primary sources of potable groundwater for domestic and industrial users in the Site area.

4. Development of Remedial Alternatives

Evaluation of remedial alternatives has been conducted in two primary steps, including:

- Design of a groundwater extraction system for chloride plume control and remediation; and

- Evaluation of remediation system effluent management alternatives.

4.1 Groundwater Extraction System Design

Aquifer testing and groundwater modeling were performed to facilitate the design of a new, long term groundwater extraction system for chloride plume control and remediation. The resulting groundwater extraction system design included 24 extraction wells pumping at a combined rate of about 175 gpm. The designed groundwater extraction system predicted full capture of the chloride plume and a cleanup time of 30 years to achieve chloride concentrations of 1,000 mg/L and 35 years to achieve concentrations of 250 mg/L. The simulated Potentiometric Surface and Chloride Plume after 30 years of pumping 24 extraction wells at a combined rate of about 175 gpm is shown on **Figure 4-1**.

Based on information provided by the New Mexico Office of the State Engineer (NMOSE), EPNG previously understood they had 286 acre-feet per year (AFY) of water rights in the Capitan Underground Water Basin (UWB) where the Site is located. However, in October 2023, NMOSE informed EPNG that they only possess 139.8 AFY of water rights that are currently valid for the Jal No. 4 Site. The NMOSE also indicated that there are currently no new water rights being assigned for the Capitan UWB.

Based on the water rights currently available to EPNG, the groundwater model was re-run using a total recovery system rate of 86.7 gpm (approximately 139.8 AFY) from 12 extraction wells, which indicated reduction of chloride concentrations to below 1,000 mg/L after 60 years of groundwater recovery (see **Figure 4-2**). EPNG believes this is an unreasonably long time for active groundwater remediation.

The numerical groundwater model was recently updated to incorporate TDS and benzene as COCs that exceed regulatory requirements in groundwater. Based on a total pumping rate of 86.7 gpm from 12 extraction wells over a period of 60 years, TDS concentrations are predicted to be reduced to a range between 1,000 and 5,000 mg/L for most of the Site, with only a limited area where the TDS concentrations are predicted to range from 5,000 to 10,000 mg/L (see **Figure 4.3**). Benzene concentrations are predicted to be below the current regulatory limit of 0.01 mg/L after 35 years of groundwater extraction at a total pumping rate of 86.7 gpm from 12 extraction wells. Therefore, a figure showing benzene concentrations after 60 years of pumping was not included herein.

4.2 Effluent Management Alternatives Evaluation

Deep well injection is a common means for disposing of high TDS brine water and previously appeared to be the most effective alternative for managing extracted groundwater associated with remediation of the chloride plume. However, as described above, NMOCD has determined that the remediation effluent water does not quality for injection to Class II wells in New Mexico. This determination eliminated the possibility of constructing a Class II injection well dedicated to disposal of the remediation system effluent.

In 2023, KM conferred with several of its preferred environmental consulting firms, providing background information and site-specific data, and soliciting ideas for remediation strategies. Potentially viable strategies were evaluated for practicality, implementability, and cost. The results of these studies indicated the following:

- Based on review of the model-predicted influent COC concentrations, effluent treatment and reinjection into the aquifer was eliminated from further consideration because the anticipated system influent COC concentrations in the first 5 years would be too high for treatment by a method which would yield clean water for reinjection and, subsequently, only 40% to 50% of the effluent would be clean enough for reinjection into the aquifer.

The only potentially implementable effluent management approaches identified by the study were:

- Transport the extracted groundwater by pipeline to Texas for disposal via Class II injection wells. This water management alternative would require construction of an approximately 3.2-mile pipeline to connect with an existing pipeline that is currently being used to transport fluids associated with oil and gas production in New Mexico to Texas for disposal by deep well injection. Construction of a connecting pipeline from the Site would require crossing beneath NM Highway 18 and property owned by three or four separate landowners. A major disadvantage of this alternative is that it would be dependent on the continued operation of both the pipeline and the receiving Class II injection wells (owned and operated by others). This method of water management would be considered a low reliability alternative for 60 years of remediation system operation, due to potential near-term fluctuations and the likely future decline in oil and gas production in the Site area, which would jeopardize long-term viability.
- Treat the extracted groundwater using an evaporation pond and dispose of the resulting concentrated brine waste. This approach would require the construction of a relatively large evaporation pond (about 20 acres if assisted evaporation techniques are utilized) on private, and potentially, State of New Mexico lands. The study and subsequent research identified no reuse alternatives for the concentrated brine or crystalline salt that would be produced by this approach. Brine disposal alternatives for the Site would require transportation for disposal in a Class II injection well in Texas and/or solidification of the concentrated brine and landfill disposal.
- Don’t extract the groundwater. Seek an alternative abatement standard to avoid removing the water from the already stressed Ogallala aquifer system.

5. Sustainability Assessment of Remedial Alternatives

A sustainability assessment was conducted as part of the AAS development for the Site. Economic, environmental, and social factors were compared using the AECOM Qualitative Sustainable Remediation Tool (AqSRT). The primary purpose for conducting the sustainability assessment is to determine whether there is a reasonable relationship between economic, and social costs and the benefits of active remediation at the Site.

5.1 Overview

AqSRT was developed to facilitate the integration of sustainable remediation into the overall process of site investigation and remediation. It was developed in alignment with the sustainability appraisal framework established by the Sustainable Remediation Forum in the United Kingdom (SuRF-UK) and uses the SuRF-UK Indicator Set for Sustainable Remediation Assessment. SuRF-UK defines sustainable remediation as *the practice of demonstrating, in terms of environmental, economic, and social indicators, that the benefit of undertaking remediation is greater than its impact and that the optimum remediation solution is selected through the use of a balanced decision-making process.*

AqSRT provides for different tiers of sustainability assessment depending on specific site needs. The tiers range from an overview of best management practices to a quantitative assessment of a number of sustainability indicators. Each successive tier requires a successively more detailed understanding of the site setting and the conceptual basis of each technology being considered.

AqSRT identifies points in the remedial process at which sustainability considerations can be addressed. At the point of remedial alternatives evaluation, an assessment may be used to compare the sustainability of the various remedial alternatives. The selected assessment tier for this project is a semi-quantitative approach with relative scores being applied to each remedial alternative.

The sustainability assessment began with site-specific weighting of AqSRT assessment criteria (see **Table 1**). Site-specific weighting gauges the relative importance of each assessment criterion to the relevant stakeholders. Site-specific weightings were applied incrementally as follows:

- Weighting of one reflects low importance.
- Weighting of five indicates the highest importance.
- Weightings between one and five allow for a graduated scale.

Following the site-specific criterion weighting process, technology-specific scores are selected based on project team judgment of the degree to which a given remedial technology addresses the sustainability criteria. The technology-specific scores range from one to five and are used as follows:

- A score of one indicates the remedial alternative addresses the sustainability criterion to a very low degree.
- A score of five indicates the remedial alternative addresses the sustainability criterion to a high degree
- Scores between one and five allow for a graduated scale.

For each remedial technology and criterion, the technology weighting is multiplied by the sustainability score. A percentage score is calculated (percentage of maximum possible score), normalized, and displayed in a bar chart to provide a semi-quantitative assessment of the relative merits of each technology (see **Figure 1**).

The results of this sustainability assessment are considered along with the traditional corrective measures balancing criteria in the selection of appropriate remedial measures.

5.2 Sustainability Assessment Scope

Site investigations have revealed the presence of chloride, TDS, and benzene concentrations in groundwater beneath the Site and adjacent offsite properties that exceed the applicable regulatory standards. Groundwater modeling results indicate that, at EPNG's current groundwater rights allocation, a groundwater extraction system would take approximately 60 years to achieve the cleanup standard for the primary constituent of concern (COC), chloride. EPNG has evaluated the two identified management alternatives for extracted groundwater, and implementation of AAS, as follows:

- Alternative 1: Export via pipeline for deep well injection in Texas.
- Alternative 2: Extraction and treatment via onsite evaporation pond(s).
- Alternative 3: Implementation of AAS, continuing groundwater monitoring, and implementing institutional controls for groundwater use.

5.3 Sustainability Assessment Results

The 15 assessment criteria identified in the SuRF-UK framework and their weightings for this site are listed in **Table 1**. Relative sustainability rankings for each remedial alternative and justification of scores are also included. In general, the following considerations emerged as most significant during the weighting and ranking process for this site:

- Economic:
  - Project lifespan and flexibility: Because of the extended timeframe for remediation, it is likely that regulatory conditions, technology, availability of certain water disposal options, and stakeholder needs will change during the life of the project.
- Environmental:
  - Impacts on Air: Energy required for construction of the remedy, its operation and maintenance, and associated waste disposal and the associated GHG emissions are a significant concern.
  - Impacts on groundwater: The potential for aquifer depletion is a significant concern. Leaving the groundwater in place, by way of AAS, allows for the chloride and benzene impacts to attenuate naturally. Modeling shows the plume will not move far over a very long period of time. Groundwater use in the pathway of the plume could be restricted using institutional controls.
  - Use of natural resources and waste generation: The potential for aquifer depletion is a significant concern. Because treatment and re-injection of water into the aquifer is not feasible due to technology limitations, 8,388 acre-feet of groundwater would be permanently removed from the Ogallala aquifer (assuming a 60-year cleanup timeline). Under Alternative 1, all of the extracted groundwater would be transported to Texas for deep well injection, being permanently removed from the ecosystem. Under Alternative 2, concentrated liquid brine waste would have to be transported to Texas for disposal, and solid waste (crystalline salt) would have to be transported to a landfill for disposal.
- Social:
  - Compliance, Uncertainty, and Evidence: The selected alternative will need to be resilient against potentially changing economic conditions which could negatively affect the oil and gas industry in the region. Because of the remote location of the site, societal impacts are much less of a concern.

Table 1-1 also details the relative rankings of the remedial alternatives, showing the degree to which the project team judges they meet the assessment criteria. Justification for the scoring is included. **Figure 5-1** presents the results of the assessment in graphical format. Outputs are expressed as percentage of total possible score for each pillar (economic, environmental, and social) based on the assigned weightings for each criterion and a maximum ranking score of 5 for remedial alternatives. The relative importance of each sustainability pillar for this site may be inferred from the maximum possible score for that pillar relative to the others. A summary of the key findings for each pillar is outlined below.

5.3.1 Economic

The maximum possible score for this Site is 55. Alternative 3 (AAS and Institutional Controls) scores highest in this pillar, at 93% of the possible score. Alternative 1 (Deep Well Injection; 20% of the possible score) and Alternative 2 (Evaporation Pond; 42%) are more costly in both capital and operation phases, especially for waste disposal. Because of the long lifespan of this project (estimated at 60 years), continuing availability of deep well disposal is uncertain. This alternative also has limited flexibility. The evaporation pond requires significant up-front investment while providing only limited flexibility to meet any need for change. AAS with institutional controls and continued groundwater monitoring, is cost-effective, sufficiently protective of potential receptors, and insulates the remedy from changing conditions in the oil and gas industry which could shut down Alternative 1.

5.3.2 Environmental

The maximum possible score for this site is 95, making environmental factors the most important sustainability pillar for this assessment. Alternative 3 scores highest, at 95%; while Alternatives 1 and 2 score 39% and 29%, respectively. Construction impacts for Alternatives 1 and 2 are not considered significant, as they are short-term, and the area is sparsely populated. Long-term pump use for Alternatives 1 and 2 would contribute to greenhouse gas emissions and water use for electricity production. Additionally, a 20-acre evaporation pond (with assisted evaporation) would contain elevated chloride concentrations that would pose a potential risk to local fauna, even if well-designed and protected. Most importantly, at 86.7 gpm, approximately 45 million gallons of water would be depleted from the aquifer per year, for a total of about 2.8 billion gallons over 60 years.

The groundwater model, which was constructed as described above in Section 1.2, was used to simulate water level drawdown in the Ogallala formation as the result of groundwater extraction at a rate of 86.7 gallons per minute (gpm) for a period of 60 years. As shown on **Figure 5-2**, the model predicts a maximum drawdown of 13 feet and an average drawdown of 4.2 feet across the entire model domain, which is about 4,078 acres (6.37 square miles).

5.3.3 Social

The maximum possible score for this site is 55. For social criteria, Alternative 3 is the most preferable, scoring 91% of the maximum score, while Alternatives 1 and 2 score essentially equal (47% and 45%, respectively). Although the area is currently sparsely populated and there is little interest from groundwater users in the area, this may change given the long lifespan of the remediation alternatives. The project team judges that permanently removing water from the aquifer is less desirable than leaving affected water in place.

5.4 Sustainability Assessment Conclusions and Recommendations

Remedial option #3 (Alternative Abatement Standards, continuing groundwater monitoring and implementing institutional controls for groundwater use) scores highest across all three pillars (economic, environmental, and social) and therefore, is considered the most sustainable alternative for the Site. The primary factor contributing to this conclusion is negative impact associated with permanent removal of water from the aquifer if using the active remedial alternatives that are currently considered viable. The sustainability assessment results suggest that there is no reasonable relationship between economic and social costs, and benefits of active remediation at the Site by groundwater extraction. Furthermore, a groundwater extraction approach would permanently remove the extracted water from the Ogallala aquifer, and in the case of deep well injection, from the ecosystem permanently.

6. Proposed AAS

As suggested by NMOCD personnel during a project conversation in 2023, the groundwater model was used to run a natural attenuation simulation to predict chloride concentrations in the existing monitor wells for the years 2043 and 2053. In 2024, the modified model was used to also run natural attenuation simulations for TDS and benzene to predict concentrations for those COCs for years 2043 and 2053 (AECOM, 2024). Natural attenuation modeling results, showing the highest predicted concentrations for chloride, TDS and benzene in existing monitor wells are summarized below.

Summary of Natural Attenuation Modeling Results for Monitor Wells			
COC	**Highest Baseline Concentration (2023)**	**Highest Concentration After 20 Years (2043)**	**Highest Concentration After 30 Years (2053)**
Chloride	65,900 (ACW-24)	54,555 (ACW-24)	48,400 (ACW-24)
TDS	86,021 (ACW-24)	74,444 (ACW-24)	68,920 (ACW-24)
Benzene	0.047 (ACW-04)	0.014 (ACW-20)	0.007 (ACW-20)
Note: COC concentrations reported in mg/L			

Based on the information provided above, the AAS proposed for the Site are:

- Chloride – 55,000 mg/L;
- TDS – 75,000 mg/L; and
- Benzene – 0.015 mg/L.

The chloride, TDS and benzene natural attenuation modeling results for 2043 and 2053 are provided in **Table 6-1**. The predicted changes in the chloride plume from 2023 to 2043 and 2053 are shown on **Figures 6-1**, **6-2 and 6-3**, respectively. The predicted changes in the TDS plume are similar to those for chloride. The model predictions indicate that the benzene concentrations will be below the current abatement standard of 0.01 mg/L by the year 2053.

It should be noted that benzene is the only COC present at the Site that exceeds a health-based abatement standard as provided in 20.6.2.3103.A(1) NMAC. The regulatory abatement standards listed in 20.6.2.3103.B NMAC, including chloride and TDS, are not health-based standards. They are standards that have been established for aesthetic considerations, such as taste, color and odor.

7. Online Water Well Review

The groundwater model was used to predict long term migration of the chloride plume under a natural attenuation scenario. The predicted configuration of the plume after 100, 150 and 200 years is depicted on **Figures 7-1**, **7-2** and **7-3**, respectively. The model indicates that, over time, the size of the plume will become elongated in a generally east-southeast direction and the highest concentrations will decrease due to dilution. The leading edge of the plume is expected to migrate just over 1.4 miles downgradient after 200 years of natural attenuation.

Based on the predicted plume configuration after 200 years of natural attenuation, the NMOSE Online Mapping Tool was used to search for registered water wells, or Points of Diversion (PDs) as referenced by the NMOSE, within the predicted configuration of the plume after 200 years of natural attenuation. The identified wells are shown on **Figure 7-4**. Other than groundwater monitoring wells and recovery wells installed by EPNG, CP 00348 is the only other well identified within the footprint of the “200-Year Plume” shown on **Figure 7-4**. Records indicate the well designated as CP 00348 was drilled in 1936 for livestock watering purposes. The water rights for this well were transferred to Jimmy Doom on March

8, 1967. The current status of this well is unclear from the available online NMOSE records. Although, it does not show up in the MNOSE online records, there is a water well at the Oxy facility that EPNG samples quarterly. This well is labeled as "OXY" and is shown on many of the figures provided in this document. As reported by OXY personnel, the well is not currently used for drinking water.

A brief initial review of available data for additional wells that may be affected by the groundwater plume at times longer than 200 years indicated the following:

- CP 00329 – Initial review of the NMOSE files for this well indicates that it was used for water associated with oil well drilling. The well was reported to be capped as of March 4, 1966.
- CP 000352 – The well was drilled in 1939 for livestock watering and is reported to have been abandoned as of April 1, 1996.
- CP 000342 - The files include documentation of ownership changes, but nothing regarding the use and/or current status of the well.
- CP 000343 - The files include documentation of ownership changes, but nothing regarding the use and/or current status of the well.

8. Implementation of AAS

Approval of the proposed AAS is requested based on the following.

8.1 No Reasonable Relationship Between Economic and Social Costs and Benefits

In part due to the challenges associated with limited water rights and the NMOCD restriction that doesn't allow disposal of the Site remediation effluent in Class II injection wells in New Mexico, there is no reasonable relationship between the economic and social costs and benefits of active Site remediation, including attainment of the standards set forth in 19.15.30.9 NMAC to be obtained, based on the following considerations.

- Due to the limited availability of groundwater rights for extraction of affected groundwater, a cleanup time of about 60 years is predicted just to achieve chloride concentrations of 250 – 1,000 mg/L and TDS concentrations of 10,000 mg/L or less. This is an unreasonably long cleanup time. Even after expending a significant level of effort and cost for 60 years of active remediation, the predicted groundwater concentrations would still exceed the current abatement standards of 250 mg/L for chloride and 1,000 mg/L for TDS.
- Conducting pump and treat remediation would result in an estimated 2.8 billion gallons of groundwater being permanently removed from the Ogallala formation, which is a critical future resource for the Site area.
- Without an identified beneficial use, the concentrated brine that will be produced during operation of an evaporation pond will likely need to be disposed via deep well injection in Texas or treated (solidified) for landfill disposal.

8.2 Proposed AAS are Technically Achievable and Cost-Benefit Justifiable

The proposed AAS have been developed based on groundwater transport and fate modeling simulations for the year 2043 under a natural attenuation scenario. A monitored natural attenuation (MNA) remedial action approach is proposed for the Site, which will incorporate regularly scheduled groundwater monitoring for a period of up to 30 years to verify the AAS for chlorides have been achieved. As such, the proposed AAS are technically achievable and cost-benefit justifiable.

8.3 Proposed AAS Will Not Create a Hazard to Public Health or Undue Damage to Property

The proposed AAS will be implemented as part of a MNA remedial action approach for the Site. Exposure to affected groundwater will be prohibited through implementation of institutional controls, including deed restrictions prohibiting completion of a water well in the potentially affected groundwater-bearing unit and a State Engineer Order to prohibit construction of a water well in affected groundwater.

8.3.1 Restrictive Covenants Prohibiting Use of Affected Groundwater

– EPNG will conduct negotiations with landowners regarding approval of Restrictive Covenants for the properties that are expected be affected by the COC plume. The Restrictive Covenants will be recorded in the real property records of Lea County where the Site is located. The Restrictive Covenants will provide owners, operators, prospective buyers and other parties with information regarding the prohibition of well installations and groundwater use restrictions associated with the model-defined area.

8.3.2 State Engineer Order to Prohibit Well

EPNG will request NMOCD assistance to petition the NMOSE to draft a State Engineer Order to prohibit construction of a well in the model-defined water bearing zone. The order will be established in accordance with 19.27.5.13.A NMAC. Rejection of Application, which states:

"The state engineer may reject an application for a 72-12-1.1 domestic well permit when the proposed 72-12-1.1 domestic well is to be located in an area where a restriction on the use of water or the drilling of new wells has been imposed by a court. The state engineer may reject an application for a 72-12-1.1 domestic well permit when the proposed 72-12-1.1 domestic well is to be located in an area of water quality concern where a prohibition on or a recommendation against the drilling of new wells has been established by a government entity."

9. Summary and Conclusions

The proposed AAS for chloride, TDS and benzene have been developed in accordance with the requirements of 19.15.30.9.F(1) NMAC, based on the results of contaminant transport and fate modeling. More specifically, the groundwater model was used to run a natural attenuation simulation to predict chloride concentrations in the existing monitor wells for the years 2043 and 2053. Based on the results of that model simulation, the proposed AAS are:

- Chloride – 55,000 mg/L;
- TDS – 75,000 mg/L; and
- Benzene – 0.015 mg/L.

EPNG proposes to implement the AAS using a MNA remedial action approach for the Site, which will include regularly scheduled groundwater monitoring for a period of up to 30 years to verify the AAS have been achieved. The MNA process will include thorough evaluation of the future groundwater monitoring data and additional transport and fate modeling to verify MNA remediation goals will be achieved. Based on this evaluation, adjustments to the MNA remediation approach will be implemented as needed.

Approval of the AAS is requested based on the following:

- There is no reasonable relationship between economic, and social costs and benefits of active remediation at the Site using groundwater extraction plus deep well injection in Texas and/or an evaporation pond for management of recovered groundwater associated with remediation of the groundwater plume for attainment of the standards set forth in 19.15.30.9 NMAC to be obtained;
- The proposed AAS are technically achievable and cost-benefit justifiable; and
- The proposed AAS will not create a hazard to public health or undue damage to property, as exposure to affected groundwater will be prohibited through implementation of institutional controls, including deed restrictions prohibiting completion of a water well in the potentially affected groundwater-bearing unit within the model-defined area and a State Engineer Order prohibiting installation of a water well in affected groundwater.

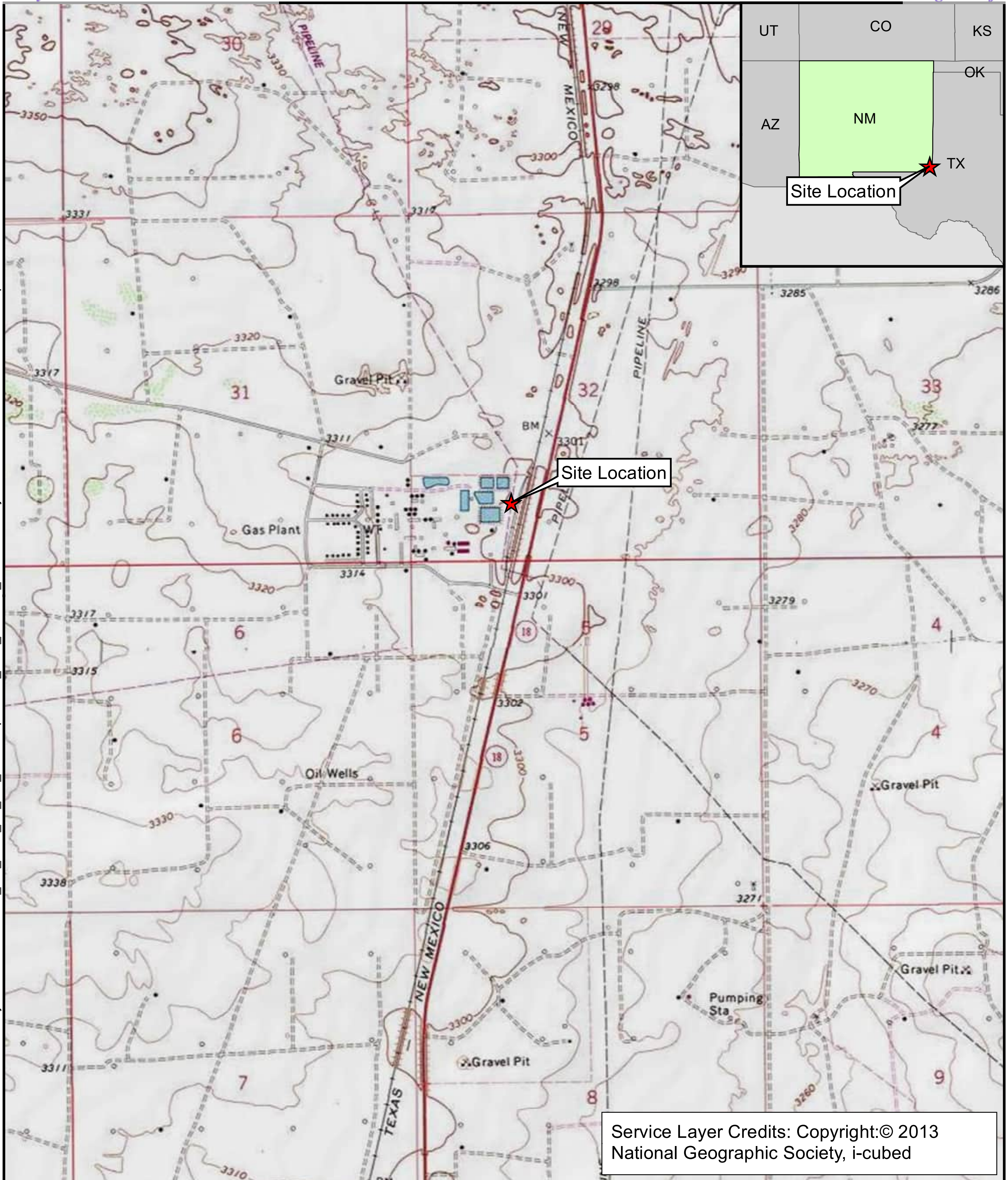
10. References

AECOM. 2023. "Summary of Project Activities 2018 - 2022, Former El Paso Natural Gas Company, LLC, Jal No. 4 Plant, Lea County, New Mexico, NMOCD Abatement Plan Case #AP - 101, Incident ID #nAPP2110635360."

AECOM. 2023. "2023 Annual Groundwater Remediation Report, Jal No. 4 Gas Plant, Lea County, New Mexico, NMOCD Abatement Plan Case #AP - 101, Incident ID #nAPP2110635360."

AECOM. 2024. "Technical Report - Groundwater Modeling of Total Dissolved Solids and Benzene, Former El Paso Natural Gas Company, LLC, Jal No. 4 Plant, Lea County, New Mexico, NMOCD Abatement Plan Case #AP - 101, Incident ID #nAPP2110635360."

Figures



Path: \\na.aecomnet.com\lfs\AMER\Houston-USHOU2\DCS\Projects\ENV\60724711_KM_2023_Jal_NM_GWMReport\900_CAD_GIS\920_GIS\From Project 60702606\MXD\Site Location Map.mxd

Legend

★ Site_Location

N

0 1,000 2,000 4,000
Feet

AECOM

19219 KATY FREEWAY, SUITE 100
HOUSTON, TX 77094
PH: (281) 646-2400
FAX: (281) 646-2401

Scale:	Drawn by:	Date:
As Shown	IL	2/27/2024
	Chk'd by: BMcC	Date: 2/27/2024

Title: **Site Location Map**

Project: 2023 Groundwater Remediation Report
El Paso Natural Gas Company
JAL #4 Gas Plant - Lea County, New Mexico

Client: **Kinder Morgan**

Project No.:	File Name:	Figure:
60724711	Site Location Map.mxd	1-1

Legend

- DISPOSAL WELL
- GROUNDWATER MONITOR WELL, SCREENED IN THE UPPER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL, SCREENED IN THE LOWER PORTION OF THE AQUIFER
- GROUNDWATER RECOVERY WELL
- GROUNDWATER MONITOR WELL CONVERTED TO GROUNDWATER RECOVERY WELL
- FUTURE GROUNDWATER EXTRACTION WELL
- WATER SUPPLY WELL
- PLUGGED/ABANDONED WATER SUPPLY WELL
- WATER SUPPLY WELL
- INJECTION WELL (WATER FLOOD)
- OIL WELL
- GAS WELL
- LPG STORAGE WELL
- PLUGGED/ABANDONED MAY 2012
- Approximate Property Boundary
- FORMER POND LOCATION WITH POND NUMBER

NOTES:

1) JAL #4 PLANT PROPERTY IS LOCATED WITHIN SECTIONS 31 AND 32 OF TOWNSHIP 23 SOUTH, RANGE 37 EAST, AND SECTIONS 5 AND 6 OF TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO.

2) SITE BASE AREA DIGITIZED FROM 11/04/76 AERIAL PHOTOGRAPH WITH PLANT PROPERTY BOUNDARY, WELLS INSERTED FROM VARIOUS OTHER SOURCES, AND DRAWING FILES PROVIDED BY SAIC ENERGY, ENVIRONMENT & INFRASTRUCTURE, LLC OF TULSA, OKLAHOMA.

3) GROUNDWATER RECOVERY SYSTEM HAS NOT BEEN OPERATED SINCE 2012.

4) AERIAL PHOTO SOURCED FROM MAXAR, DATED 8/6/2023.

5) SOURCE OF LAND OWNERSHIP IS THE LEA COUNTY APPRAISAL DISTRICT.

6) SOURCE OF INDUSTRY-RELATED WELLS IS NMOCD OIL & GAS MAP.

0 300 600 1,200
Feet

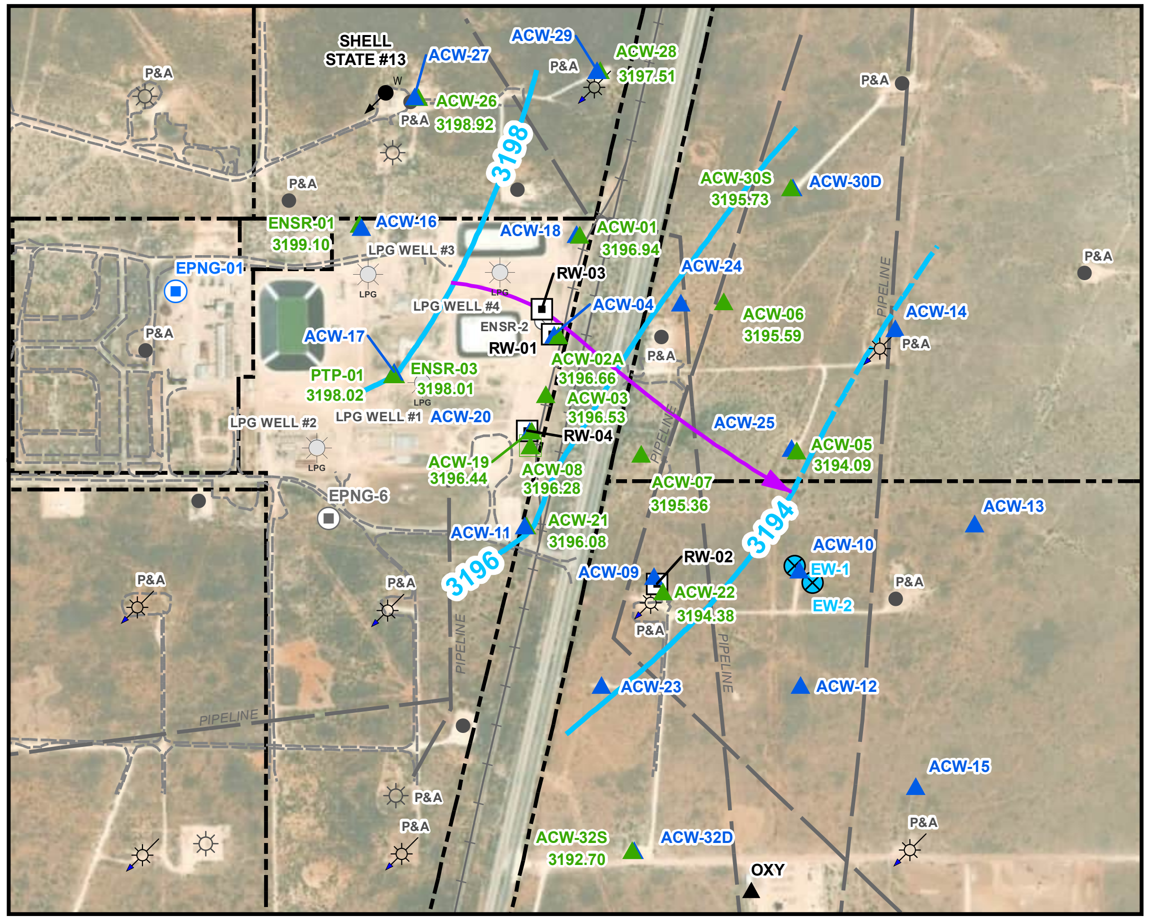
AECOM
19219 KATY FREEWAY, SUITE 100
HOUSTON, TX 77094
PH: (281) 646-2400

Title: Site Layout

Project: 2023 Groundwater Remediation Report
El Paso Natural Gas Company
JAL #4 Gas Plant - Lea County, New Mexico

Scale:	Drawn by:	Date:	Client:		
As Shown	IL	2/27/2024	Kinder Morgan		
	Chk'd by: WG	Date: 2/27/2024	Project No.: 60724711	File Name: Site Layout.mxd	Figure: 1-2

Path: \\na.aecomnet.com\lfs\AMER\Houston-USHOU2\DCS\Projects\ENV\60724711_KM_2023_Jal_NM_GWMReport\900_CAD_GIS\920_GIS\From Project 60702606\MXD\Site Layout.mxd



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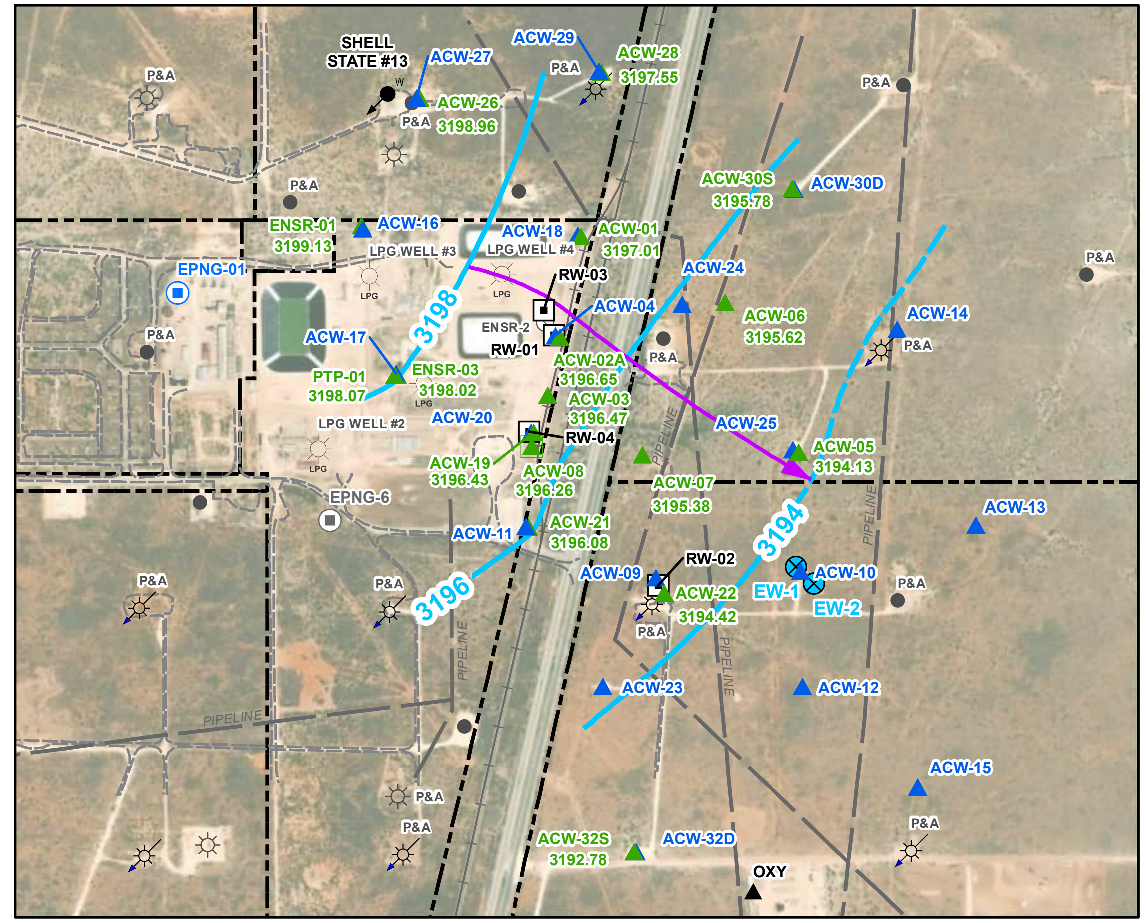
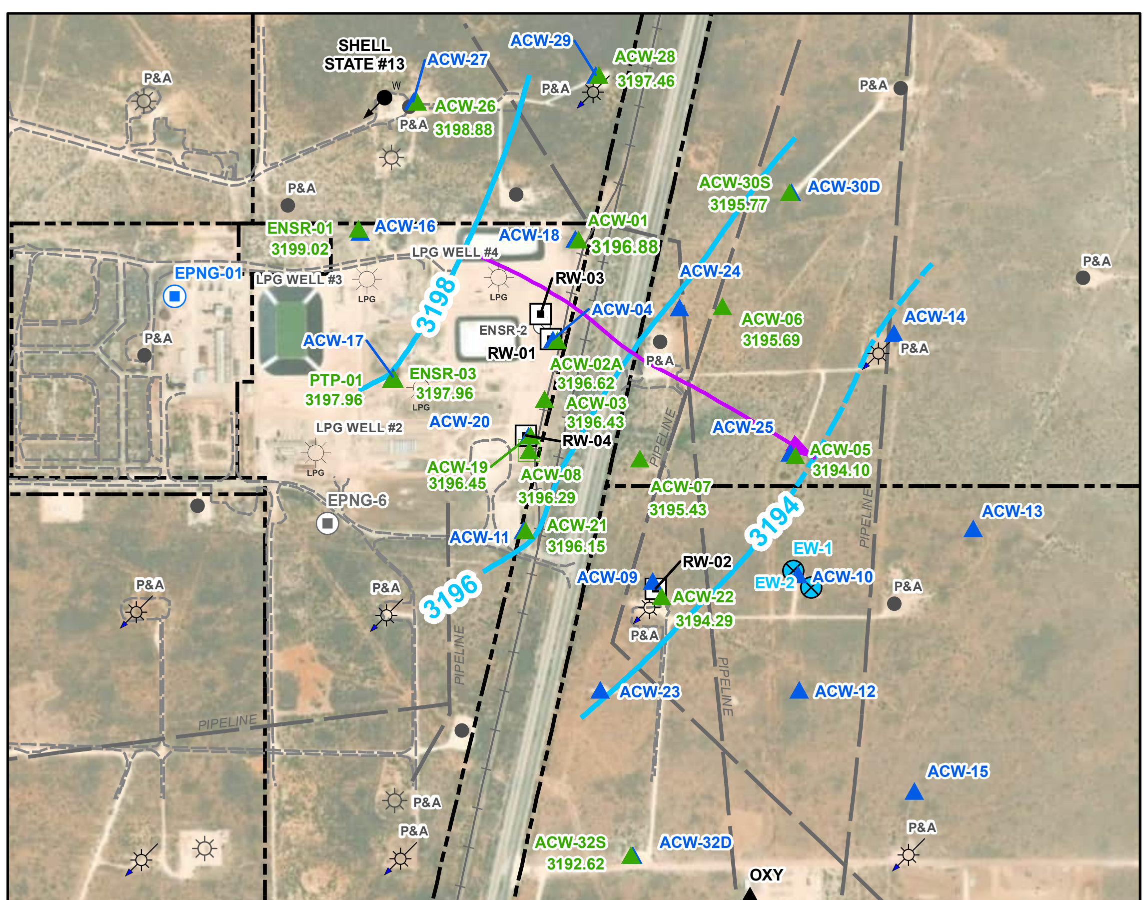


2nd QUARTER 2023 (JUNE 20, 2023)



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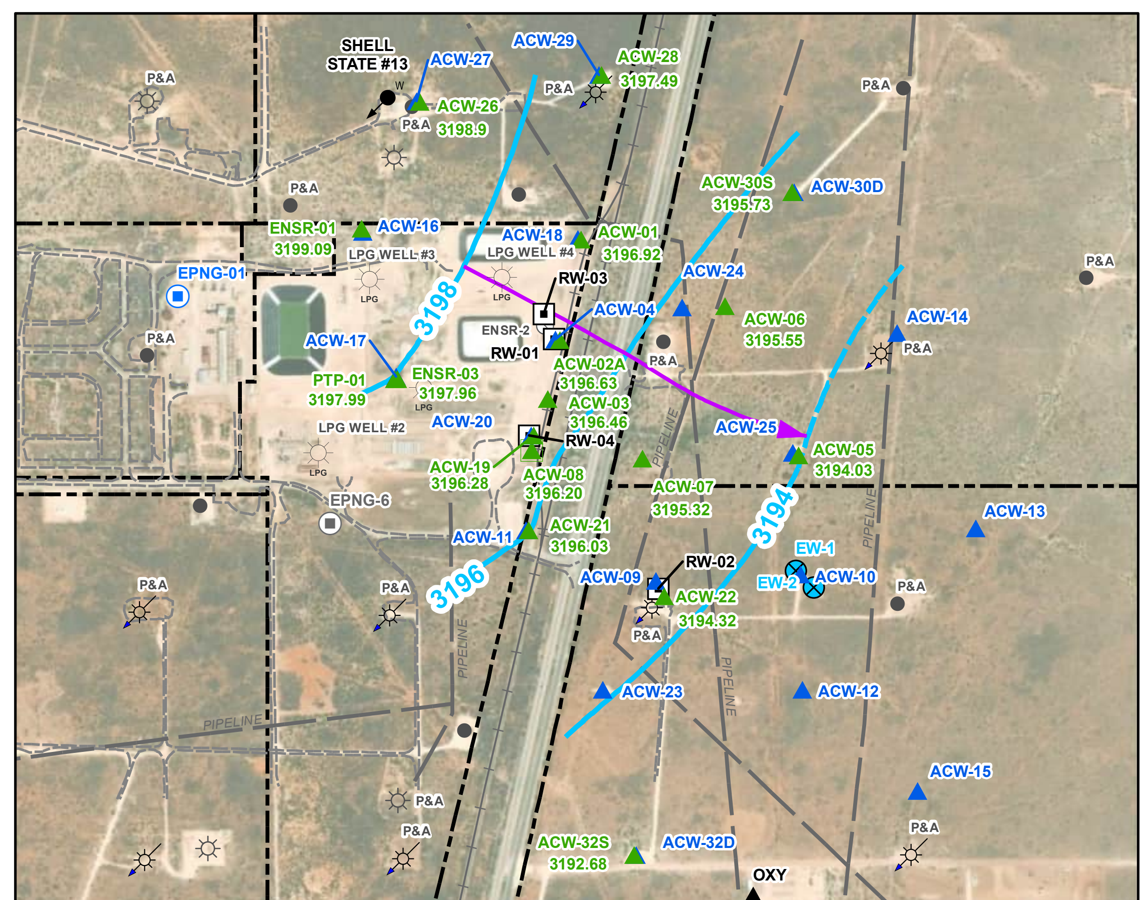

4th QUARTER 2023 (NOVEMBER 30, 2023)

Legend

- GROUNDWATER MONITOR WELL AND GROUNDWATER ELEVATION - FEET AMSL, WELLS SCREENED IN THE UPPER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL, SCREENED IN THE LOWER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL CONVERTED TO GROUNDWATER RECOVERY WELL
- GROUNDWATER RECOVERY WELL
- FUTURE GROUNDWATER EXTRACTION WELL
- WATER SUPPLY WELL
- PLUGGED/ABANDONDED WATER SUPPLY WELL
- WATER SUPPLY WELL
- CONTOUR OF GROUNDWATER ELEVATION - FEET AMSL, WELLS SCREENED IN THE UPPER PORTION OF THE AQUIFER)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- SECONDARY ROAD
- RAILROAD TRACK
- APPROXIMATE PROPERTY BOUNDARY

NOTES:
1) JAL #4 PLANT PROPERTY IS LOCATED WITHIN SECTIONS 31 AND 32 OF TOWNSHIP 23 SOUTH, RANGE 37 EAST, AND SECTIONS 5 AND 6 OF TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO.

2) SITE BASE AREA DIGITIZED FROM 11/04/76 AERIAL PHOTOGRAPH WITH PLANT PROPERTY BOUNDARY, WELLS INSERTED FROM VARIOUS OTHER SOURCES, AND DRAWING FILES PROVIDED BY SAIC ENERGY, ENVIRONMENT & INFRASTRUCTURE, LLC OF TULSA, OKLAHOMA.

3) AERIAL PHOTO SOURCED FROM MAXAR, DATED 8/6/2023.

N

0 500 1,000 2,000
Feet

AECOM
19219 KATY FREEWAY, SUITE 100
HOUSTON, TX 77094
PH: (281) 646-2400

Title:	2023 Groundwater Surface Elevation Map – Upper Groundwater		
Project:	2023 Groundwater Remediation Report El Paso Natural Gas Company JAL #4 Gas Plant - Lea County, New Mexico		
Scale: As Shown	Drawn by: IL	Date: 3/1/2024	Client: Kinder Morgan
	Chk'd by: WG	Date: 3/1/2024	Project No.: 60724711 / File Name: Upper GWE Map 2023.mxd / Figure: 1-3

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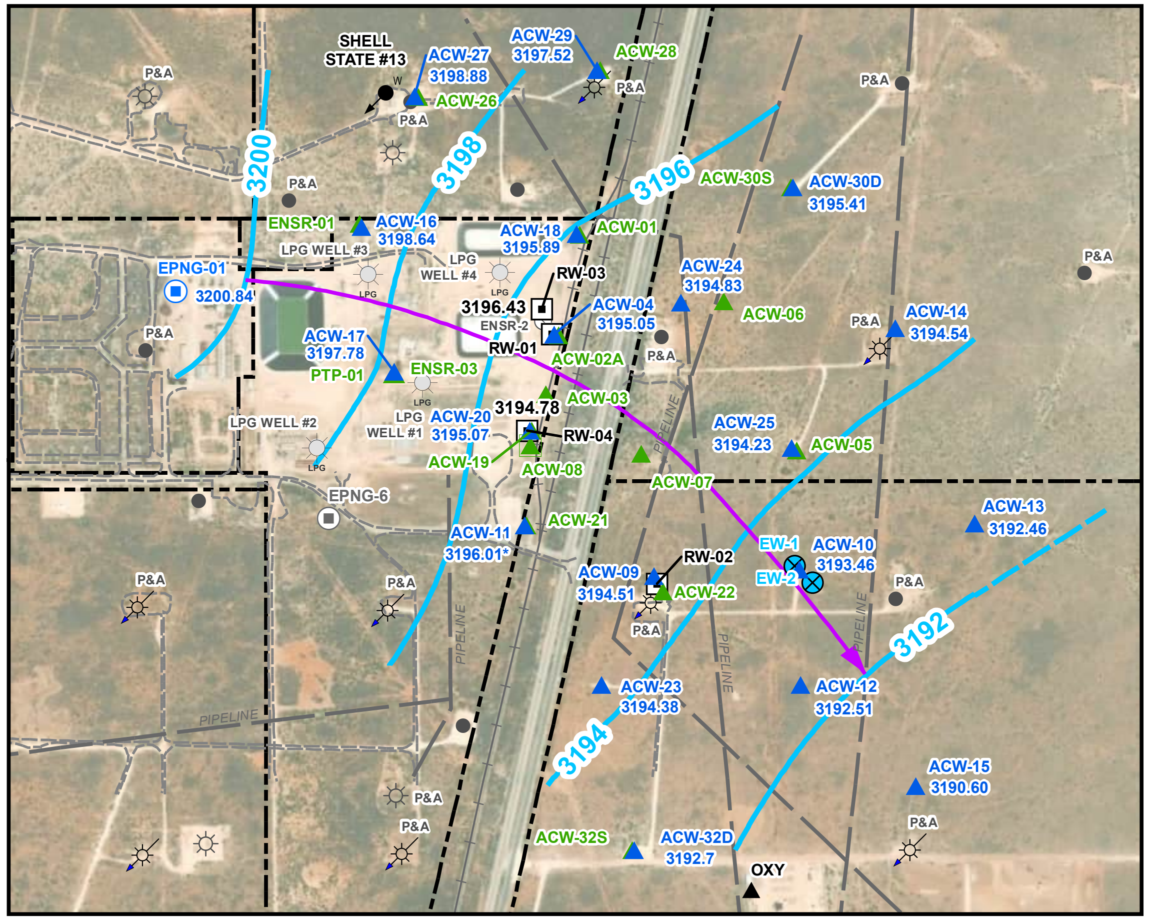
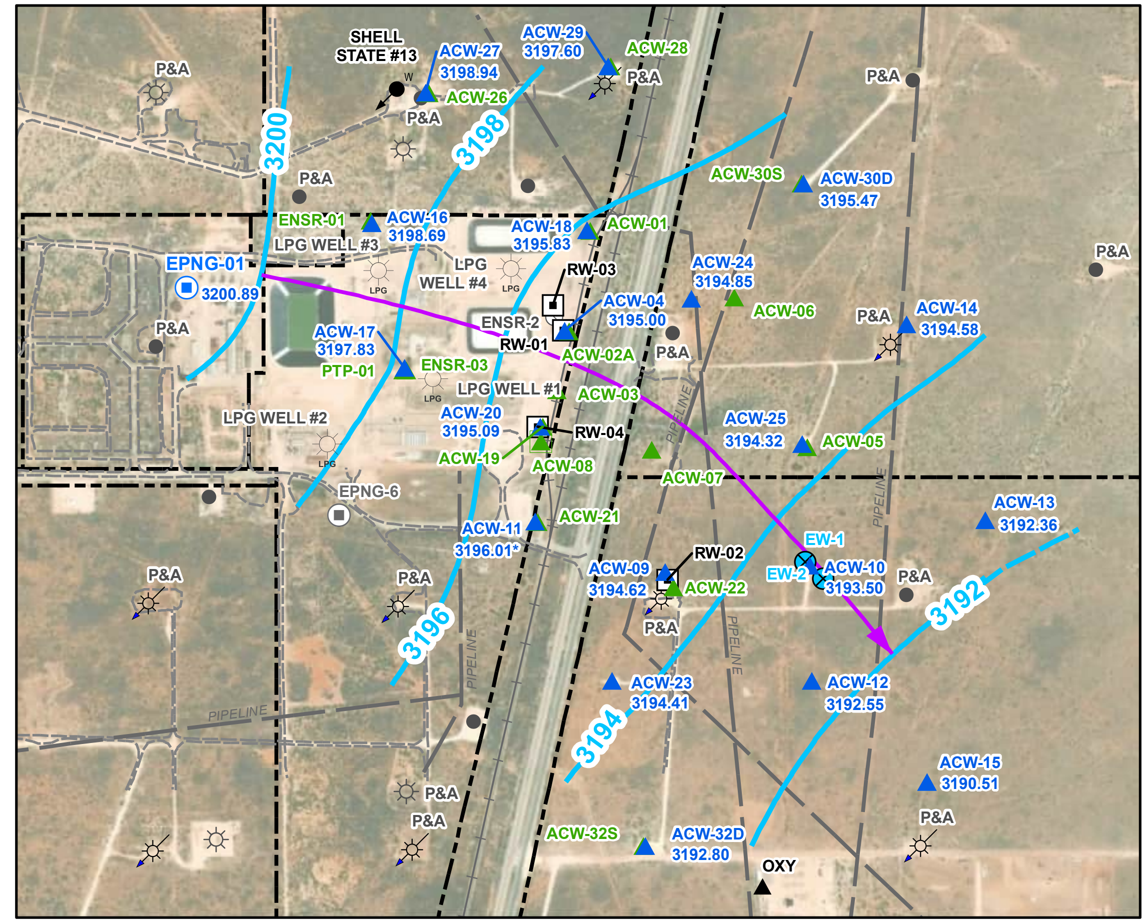
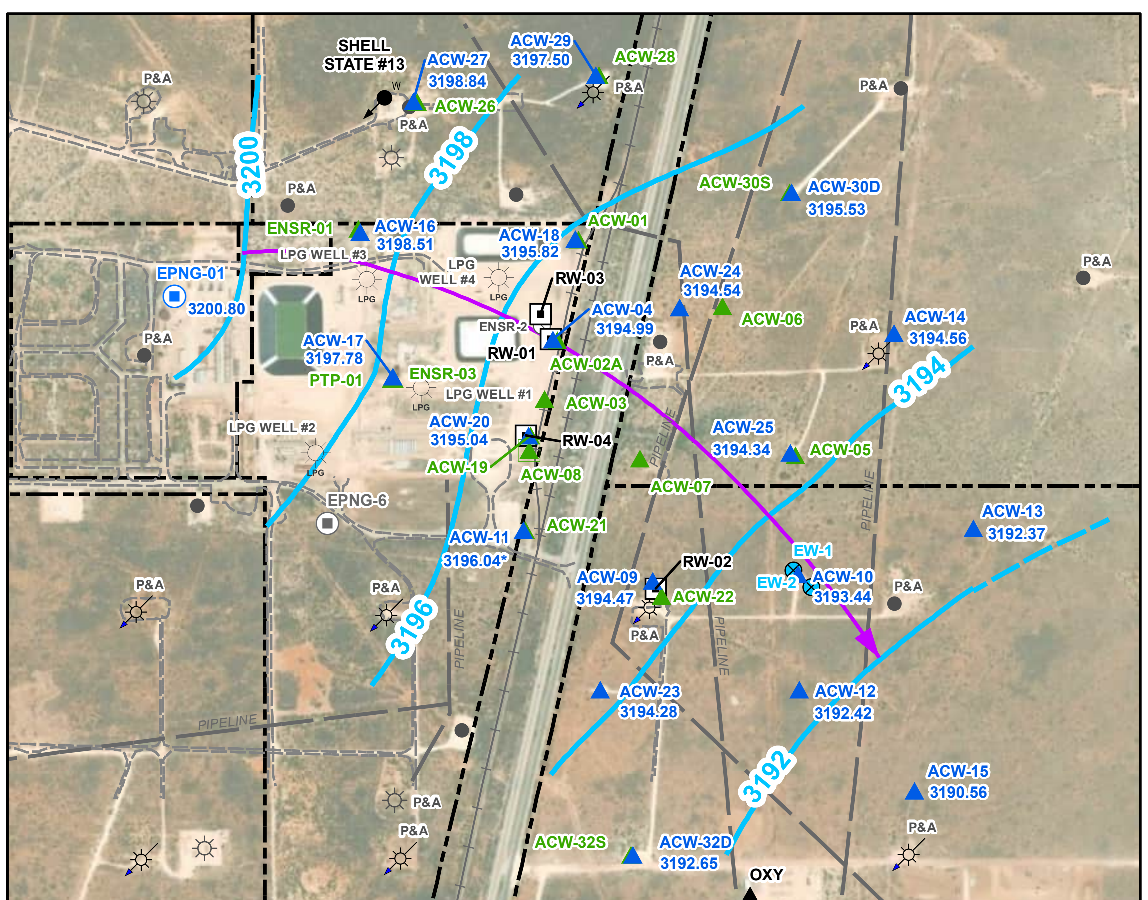


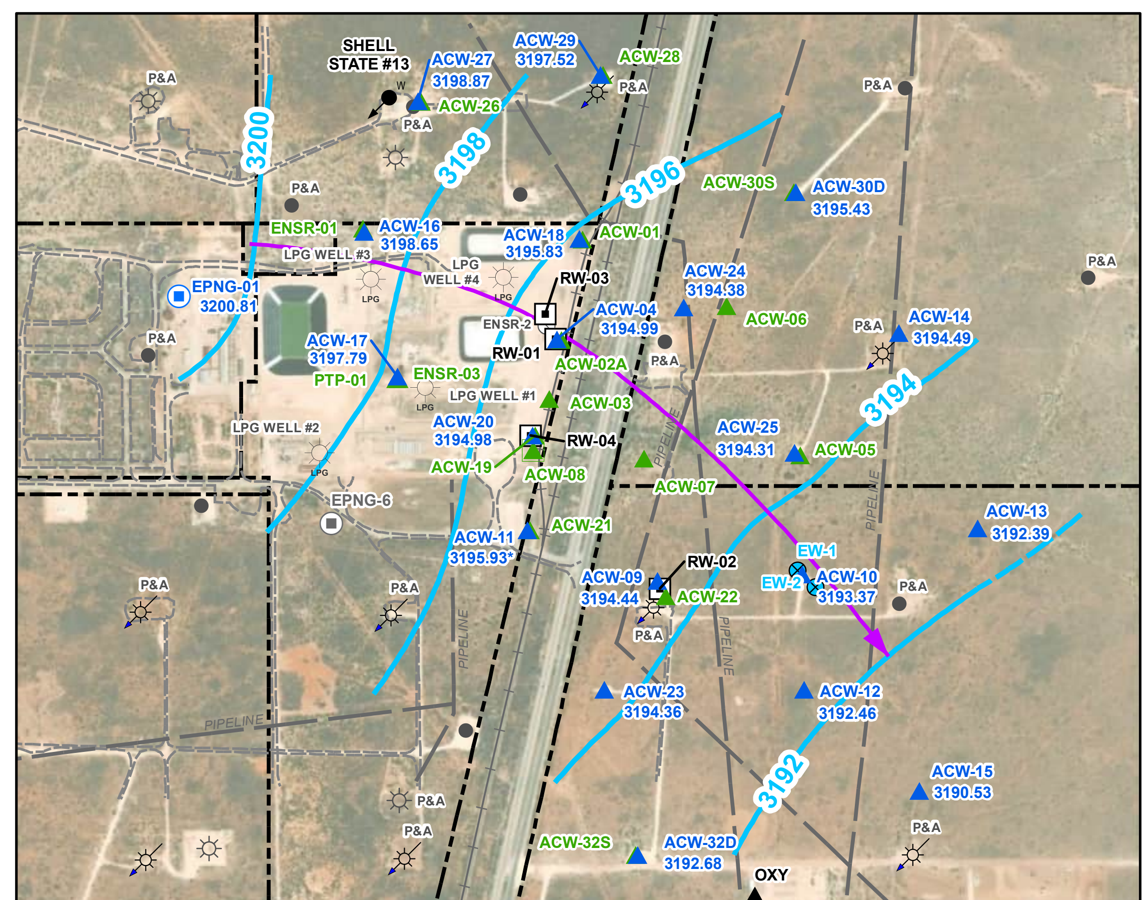
1st QUARTER 2023 (MARCH 23, 2023)



2nd QUARTER 2023 (JUNE 20, 2023)



3rd QUARTER 2023 (SEPTEMBER 12, 2023)



4th QUARTER 2023 (NOVEMBER 30, 2023)

Legend

- GROUNDWATER MONITOR WELL, SCREENED IN THE UPPER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL AND GROUNDWATER ELEVATION - FEET AMSL, WELLS SCREENED IN THE LOWER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL CONVERTED TO GROUNDWATER RECOVERY WELL
- WATER SUPPLY WELL
- GROUNDWATER RECOVERY WELL
- FUTURE GROUNDWATER EXTRACTION WELL
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- PLUGGED/ABANDONDED WATER SUPPLY WELL
- WATER SUPPLY WELL
- CONTOUR OF GROUNDWATER ELEVATION - FEET AMSL, WELLS SCREENED IN THE LOWER PORTION OF THE AQUIFER)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- SECONDARY ROAD
- RAILROAD TRACK
- APPROXIMATE PROPERTY BOUNDARY

NOTES:

1) JAL #4 PLANT PROPERTY IS LOCATED WITHIN SECTIONS 31 AND 32 OF TOWNSHIP 23 SOUTH, RANGE 37 EAST, AND SECTIONS 5 AND 6 OF TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO.

2) SITE BASE AREA DIGITIZED FROM 11/04/76 AERIAL PHOTOGRAPH WITH PLANT PROPERTY BOUNDARY, WELLS INSERTED FROM VARIOUS OTHER SOURCES, AND DRAWING FILES PROVIDED BY SAIC ENERGY, ENVIRONMENT & INFRASTRUCTURE, LLC OF TULSA, OKLAHOMA.

3) AERIAL PHOTO SOURCED FROM MAXAR, DATED 8/6/2023.

4) * - THE DATA FROM ACW-11 IS NOT USED TO CONSTRUCT THE POTENTIOMETRIC SURFACE CONTOURS.

N

0 500 1,000 2,000

Feet

AECOM
19219 KATY FREEWAY, SUITE 100
HOUSTON, TX 77094
PH: (281) 646-2400

Title:	2023 Groundwater Surface Elevation Map – Lower Groundwater
Project:	2023 Groundwater Remediation Report El Paso Natural Gas Company JAL #4 Gas Plant - Lea County, New Mexico
Client:	Kinder Morgan

Scale:	Drawn by:	Date:	Chk'd by:	Date:	Project No.:	File Name:	Figure:
As Shown	IL	3/1/2024	WG	3/1/2024	60724711	Lower GWE Map 2023.mxd	1-4

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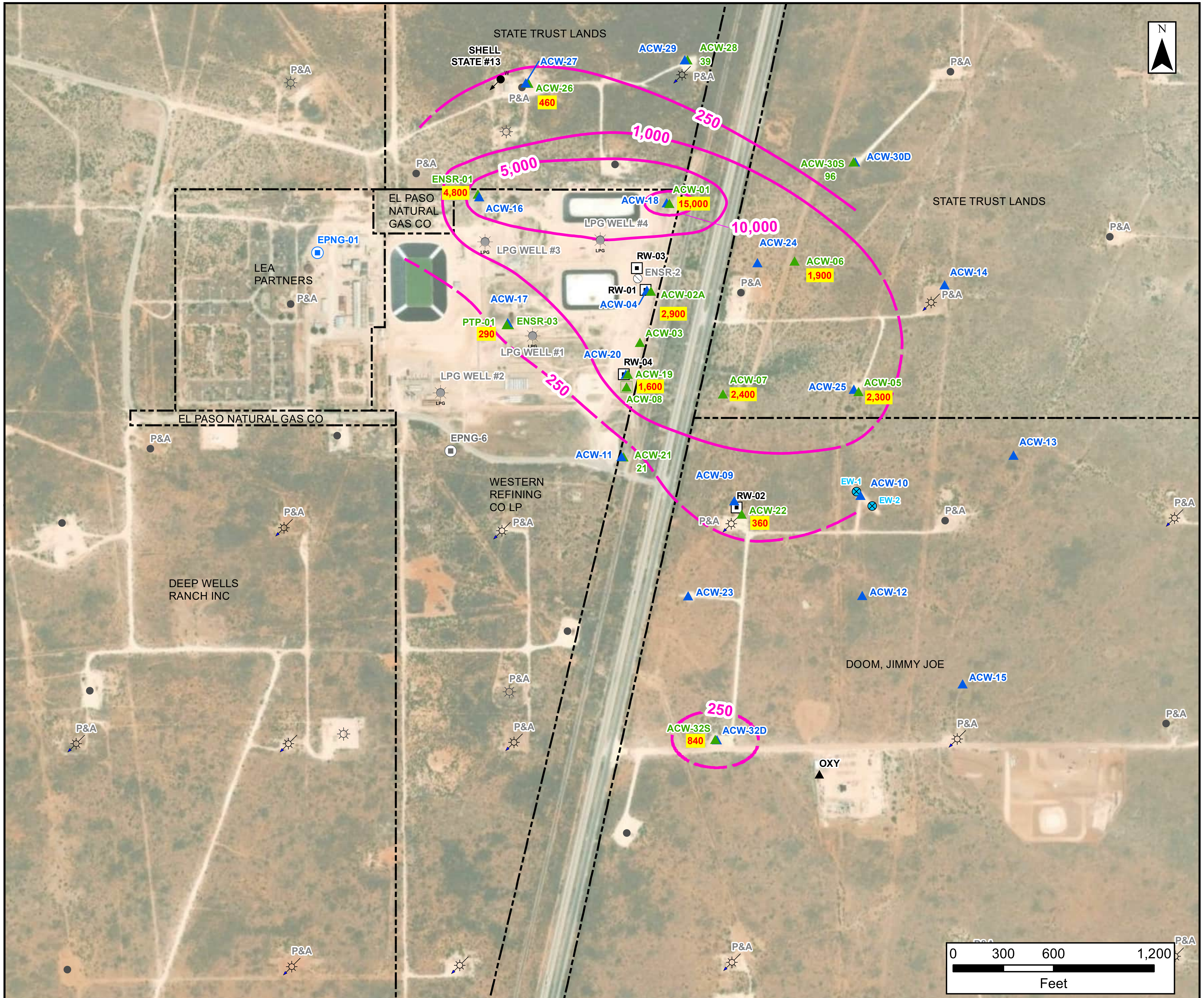

Legend

- DISPOSAL WELL
- GROUNDWATER MONITOR WELL, SCREENED IN THE UPPER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL, SCREENED IN THE LOWER PORTION OF THE AQUIFER
- GROUNDWATER RECOVERY WELL
- GROUNDWATER MONITOR WELL CONVERTED TO GROUNDWATER RECOVERY WELL
- FUTURE GROUNDWATER EXTRACTION WELL
- WATER SUPPLY WELL
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- WATER SUPPLY WELL
- INJECTION WELL (WATER FLOOD)
- OIL WELL
- GAS WELL
- LPG STORAGE WELL
- PLUGGED/ABANDONED MAY 2012
- CONTOUR LINE SHOWING EQUAL CONCENTRATIONS OF CHLORIDE IN GROUNDWATER, mg/L
- INFERRED CONCENTRATIONS OF CHLORIDE IN GROUNDWATER, mg/L
- APPROXMATE PROPERTY BOUNDARY
- 2,400 HIGHLIGHTED VALUES (in mg/L) INDICATE AN EXCEEDANCE

NOTES:

1) NEW MEXICO ENVIRONMENTAL DIVISION HAS ESTABLISHED OTHER STANDARDS FOR DOMESTIC WATER SUPPLY OF 250 mg/L FOR CHLORIDE IN GROUNDWATER CONTAINING TDS LEVELS OF 10,000 mg/L OR LESS.

2) EPA's SECONDARY DRINKING WATER STANDARD (SMCL) FOR CHLORIDE IN PUBLIC WATER SUPPLY SYSTEMS IS 250 MILLIGRAMS PER LITER (mg/L).

3) JAL #4 PLANT PROPERTY IS LOCATED WITHIN SECTIONS 31 AND 32 OF TOWNSHIP 23 SOUTH, RANGE 37 EAST, AND SECTIONS 5 AND 6 OF TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO.

4) SITE BASE AREA DIGITIZED FROM 11/04/76 AERIAL PHOTOGRAPH WITH PLANT PROPERTY BOUNDARY, WELLS INSERTED FROM VARIOUS OTHER SOURCES, AND DRAWING FILES PROVIDED BY SAIC ENERGY, ENVIRONMENT & INFRASTRUCTURE, LLC OF TULSA, OKLAHOMA.

5) AERIAL PHOTO SOURCED FROM MAXAR, DATED 8/6/2023.

6) SOURCE OF INDUSTRY-RELATED WELLS IS NMOCD OIL & GAS MAP.

AECOM
19219 KATY FREEWAY, SUITE 100
HOUSTON, TX 77094
PH: (281) 646-2400

Title: **Isopleth of Chloride Concentrations in Upper Groundwater September 2023**

Project: 2023 Groundwater Remediation Report
El Paso Natural Gas Company
JAL #4 Gas Plant - Lea County, New Mexico

Scale:	Drawn by:	Date:	Client:		
As Shown	IL	3/1/2024	Kinder Morgan		
	Chk'd by: WG	Date: 3/1/2024	Project No.: 60724711	File Name: Upper Chloride Dec2023.mxd	Fig: 1-5

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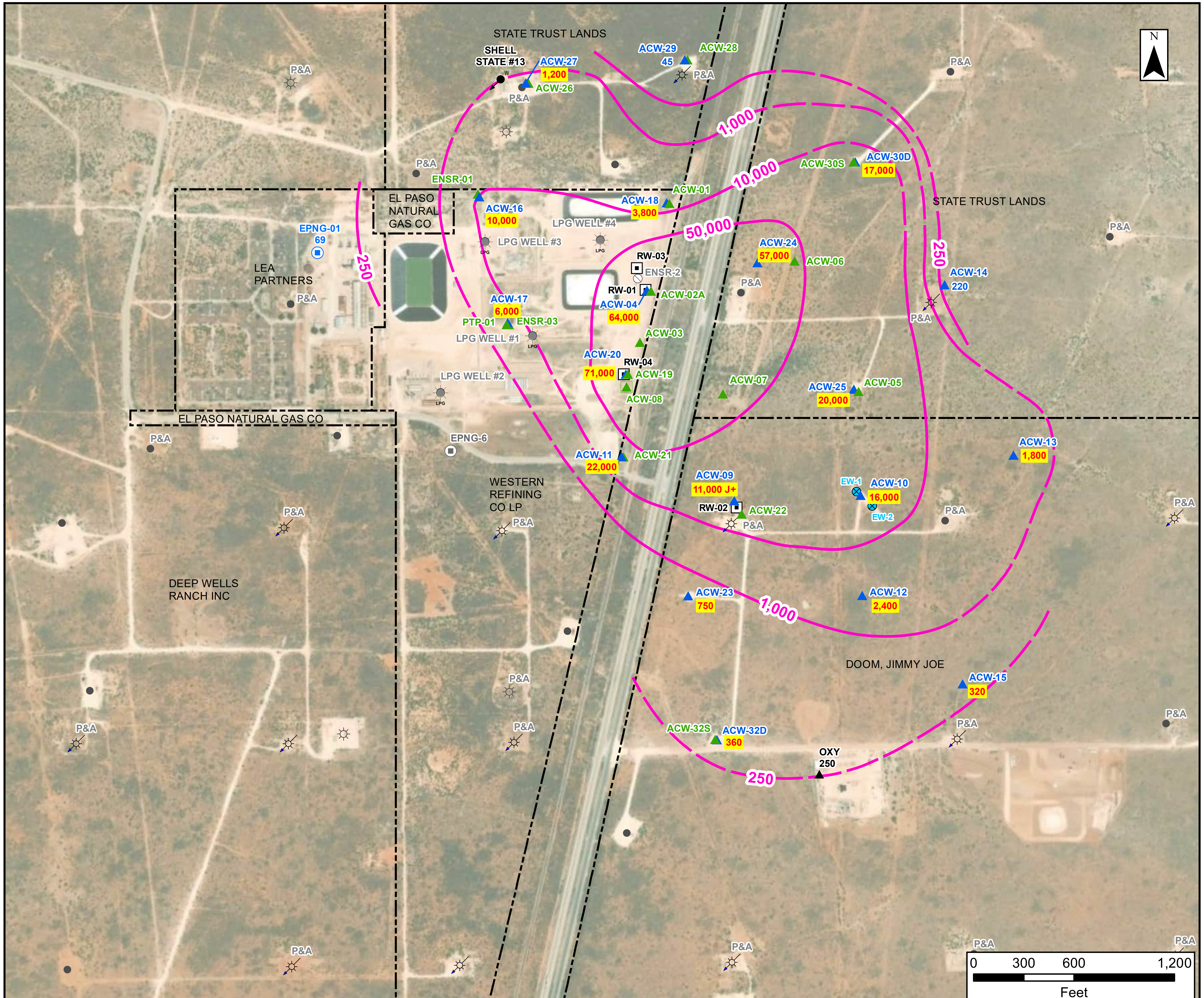

Legend

- DISPOSAL WELL
- GROUNDWATER MONITOR WELL, SCREENED IN THE UPPER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL, SCREENED IN THE LOWER PORTION OF THE AQUIFER
- GROUNDWATER RECOVERY WELL
- GROUNDWATER MONITOR WELL CONVERTED TO GROUNDWATER RECOVERY WELL
- FUTURE GROUNDWATER EXTRACTION WELL
- WATER SUPPLY WELL
- PLUGGED/ABANDONDED WATER SUPPLY WELL
- WATER SUPPLY WELL
- INJECTION WELL (WATER FLOOD)
- OIL WELL
- GAS WELL
- LPG STORAGE WELL
- PLUGGED/ABANDONED MAY 2012
- CONTOUR LINE SHOWING EQUAL CONCENTRATIONS OF CHLORIDE IN GROUNDWATER, mg/L
- INFERRED CONCENTRATIONS OF CHLORIDE IN GROUNDDWATER, mg/L
- APPROXMATE PROPERTY BOUNDARY
- 17000 HIGHLIGHTED VALUES (in mg/L) INDICATE AN EXCEEDANCE

NOTES:

1) NEW MEXICO ENVIRONMENTAL DIVISION HAS ESTABLISHED OTHER STANDARDS FOR DOMESTIC WATER SUPPLY OF 250 mg/L FOR CHLORIDE IN GROUNDWATER CONTAINING TDS LEVELS OF 10,000 mg/L OR LESS.

2) EPA's SECONDARY DRINKING WATER STANDARD (SMCL) FOR CHLORIDE IN PUBLIC WATER SUPPLY SYSTEMS IS 250 MILLIGRAMS PER LITER (mg/L).

3) JAL #4 PLANT PROPERTY IS LOCATED WITHIN SECTIONS 31 AND 32 OF TOWNSHIP 23 SOUTH, RANGE 37 EAST, AND SECTIONS 5 AND 6 OF TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO.

4) SITE BASE AREA DIGITIZED FROM 11/04/76 AERIAL PHOTOGRAPH WITH PLANT PROPERTY BOUNDARY, WELLS INSERTED FROM VARIOUS OTHER SOURCES, AND DRAWING FILES PROVIDED BY SAIC ENERGY, ENVIRONMENT & INFRASTRUCTURE, LLC OF TULSA, OKLAHOMA.

5) AERIAL PHOTO SOURCED FROM MAXAR, DATED 8/6/2023.

6) SOURCE OF INDUSTRY-RELATED WELLS IS NMOCD OIL & GAS MAP.

7) WHERE DUPLICATE SAMPLES WERE COLLECTED, THE GREATER RESULT IS SHOWN.

AECOM
19219 KATY FREEWAY, SUITE 100
HOUSTON, TX 77094
PH: (281) 646-2400

Title: **Isopleth of Chloride Concentrations in Lower Groundwater September 2023**

Project: 2023 Groundwater Remediation Report
El Paso Natural Gas Company
JAL #4 Gas Plant - Lea County, New Mexico

Scale:	Drawn by:	Date:	Client:		
As Shown	IL	3/1/2024	Kinder Morgan		
	Chk'd by:	Date:	Project No.:	File Name:	Fig:
	WG	3/1/2024	60724711	Lower Chloride Dec2023.mxd	1-6

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Legend

- DISPOSAL WELL
- GROUNDWATER MONITOR WELL, SCREENED IN THE UPPER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL, SCREENED IN THE LOWER PORTION OF THE AQUIFER
- GROUNDWATER RECOVERY WELL
- GROUNDWATER MONITOR WELL CONVERTED TO GROUNDWATER RECOVERY WELL
- FUTURE GROUNDWATER EXTRACTION WELL
- WATER SUPPLY WELL
- PLUGGED/ABANDONDED WATER SUPPLY WELL
- WATER SUPPLY WELL
- INJECTION WELL (WATER FLOOD)
- OIL WELL
- GAS WELL
- LPG STORAGE WELL
- PLUGGED/ABANDONED MAY 2012
- APPROXMATE PROPERTY BOUNDARY
- 0.028 HIGHLIGHTED VALUES (in mg/L) INDICATE AN EXCEEDANCE OF 0.01 mg/L.

NOTES:

1) NEW MEXICO ENVIRONMENTAL DIVISION HAS ESTABLISHED A HUMAN HEALTH STANDARD OF 10 µg/L (0.01 mg/L) FOR BENZENE IN GROUNDWATER.

2) EPA's PRIMARY DRINKING WATER STANDARD (MCL) FOR BENZENE IN PUBLIC WATER SUPPLY SYSTEMS IS 5 µg/L (0.005 mg/L).

3) JAL #4 PLANT PROPERTY IS LOCATED WITHIN SECTIONS 31 AND 32 OF TOWNSHIP 23 SOUTH, RANGE 37 EAST, AND SECTIONS 5 AND 6 OF TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO.

4) SITE BASE AREA DIGITIZED FROM 11/04/76 AERIAL PHOTOGRAPH WITH PLANT PROPERTY BOUNDARY, WELLS INSERTED FROM VARIOUS OTHER SOURCES, AND DRAWING FILES PROVIDED BY SAIC ENERGY, ENVIRONMENT & INFRASTRUCTURE, LLC OF TULSA, OKLAHOMA.

5) AERIAL PHOTO SOURCED FROM MAXAR, DATED 8/6/2023.

6) SOURCE OF INDUSTRY-RELATED WELLS IS NMOCD OIL & GAS MAP.

0 300 600 1,200
Feet

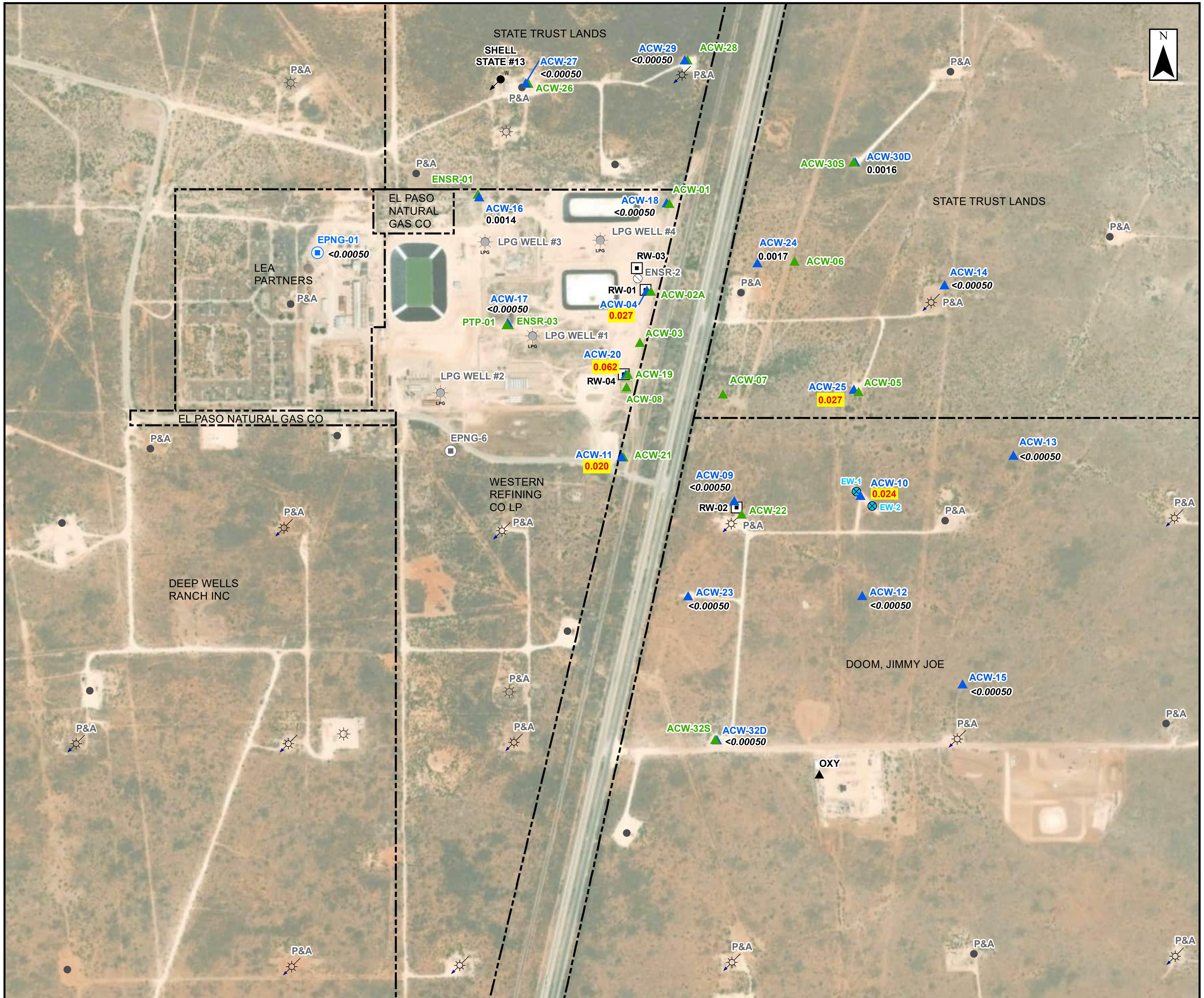
AECOM
19219 KATY FREEWAY, SUITE 100
HOUSTON, TX 77094
PH: (281) 646-2400

Title: **Benzene Concentrations in Upper Groundwater September 2023**

Project: 2023 Groundwater Remediation Report
El Paso Natural Gas Company
JAL #4 Gas Plant - Lea County, New Mexico

Scale:	Drawn by:	Date:	Client:		
As Shown	IL	3/1/2024	Kinder Morgan		
	Chk'd by: WG	Date: 3/1/2024	Project No.: 60724711	File Name: Upper Benzene Dec2023.mxd	Figure No.: 1-7

Path: \\na.aecomnet.com\lfs\AMER\Houston-USHOU2\DCS\Projects\ENV\60724711_KM_2023_Jal_NM_GWMReport\900_CAD_GIS\920_GIS\From Project 60702606\MXD\Upper Benzene Dec2023.mxd



Legend

- DISPOSAL WELL
- GROUNDWATER MONITOR WELL, SCREENED IN THE UPPER PORTION OF THE AQUIFER
- GROUNDWATER MONITOR WELL, SCREENED IN THE LOWER PORTION OF THE AQUIFER
- GROUNDWATER RECOVERY WELL
- GROUNDWATER MONITOR WELL CONVERTED TO GROUNDWATER RECOVERY WELL
- FUTURE GROUNDWATER EXTRACTION WELL
- WATER SUPPLY WELL
- PLUGGED/ABANDONDED WATER SUPPLY WELL
- WATER SUPPLY WELL
- INJECTION WELL (WATER FLOOD)
- OIL WELL
- GAS WELL
- LPG STORAGE WELL
- PLUGGED/ABANDONED MAY 2012
- APPROXMATE PROPERTY BOUNDARY
- 0.027 HIGHLIGHTED VALUES (in mg/L) INDICATE AN EXCEEDANCE OF 0.01 mg/L

NOTES:

1) NEW MEXICO ENVIRONMENTAL DIVISION HAS ESTABLISHED A HUMAN HEALTH STANDARD OF 10 µg/L (0.01 mg/L) FOR BENZENE IN GROUNDWATER.

2) EPA's PRIMARY DRINKING WATER STANDARD (MCL) FOR BENZENE IN PUBLIC WATER SUPPLY SYSTEMS IS 5 µg/L (0.005 mg/L).

3) JAL #4 PLANT PROPERTY IS LOCATED WITHIN SECTIONS 31 AND 32 OF TOWNSHIP 23 SOUTH, RANGE 37 EAST, AND SECTIONS 5 AND 6 OF TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO.

4) SITE BASE AREA DIGITIZED FROM 11/04/76 AERIAL PHOTOGRAPH WITH PLANT PROPERTY BOUNDARY, WELLS INSERTED FROM VARIOUS OTHER SOURCES, AND DRAWING FILES PROVIDED BY SAIC ENERGY, ENVIRONMENT & INFRASTRUCTURE, LLC OF TULSA, OKLAHOMA.

5) AERIAL PHOTO SOURCED FROM MAXAR, DATED 8/6/2023.

6) SOURCE OF INDUSTRY-RELATED WELLS IS NMOCD OIL & GAS MAP.

7) WHERE DUPLICATE SAMPLES WERE COLLECTED, THE GREATER RESULT IS SHOWN.

0 300 600 1,200
Feet

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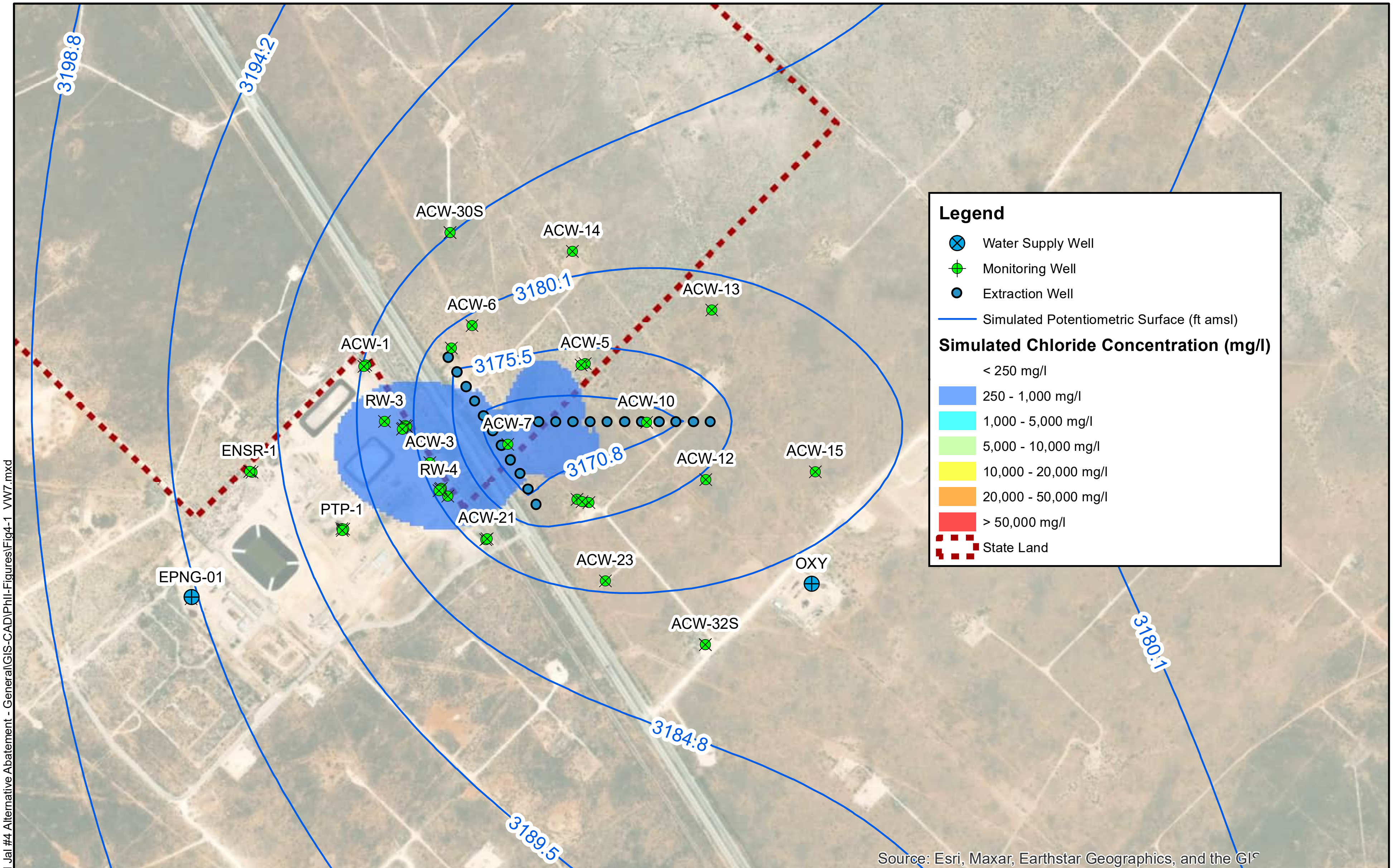
HOUSTON, TX 77094
PH: (281) 646-2400

Title: **Benzene Concentrations in Lower Groundwater September 2023**

Project: 2023 Groundwater Remediation Report
El Paso Natural Gas Company
JAL #4 Gas Plant - Lea County, New Mexico

Scale:	Drawn by:	Date:	Client:		
As Shown	IL	3/1/2024	Kinder Morgan		
	Chk'd by: WG	Date: 3/1/2024	Project No.: 60724711	File Name: Lower Benzene Dec2023.mxd	Figure No.: 1-8

Path: \\na.aecomnet.com\lfs\AMER\Houston-USHOU2\DCS\Projects\ENV\60724711_KM_2023_Jal_NM_GWMReport\900_CAD_GIS\920_GIS\From Project 60702606\MXD\Lower Benzene Dec2023.mxd



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References:
Aerial photo: USDA NAIP 2018

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DESIGNED BY:	DAE
CHECKED BY:	JZ
DATE:	12/30/2024
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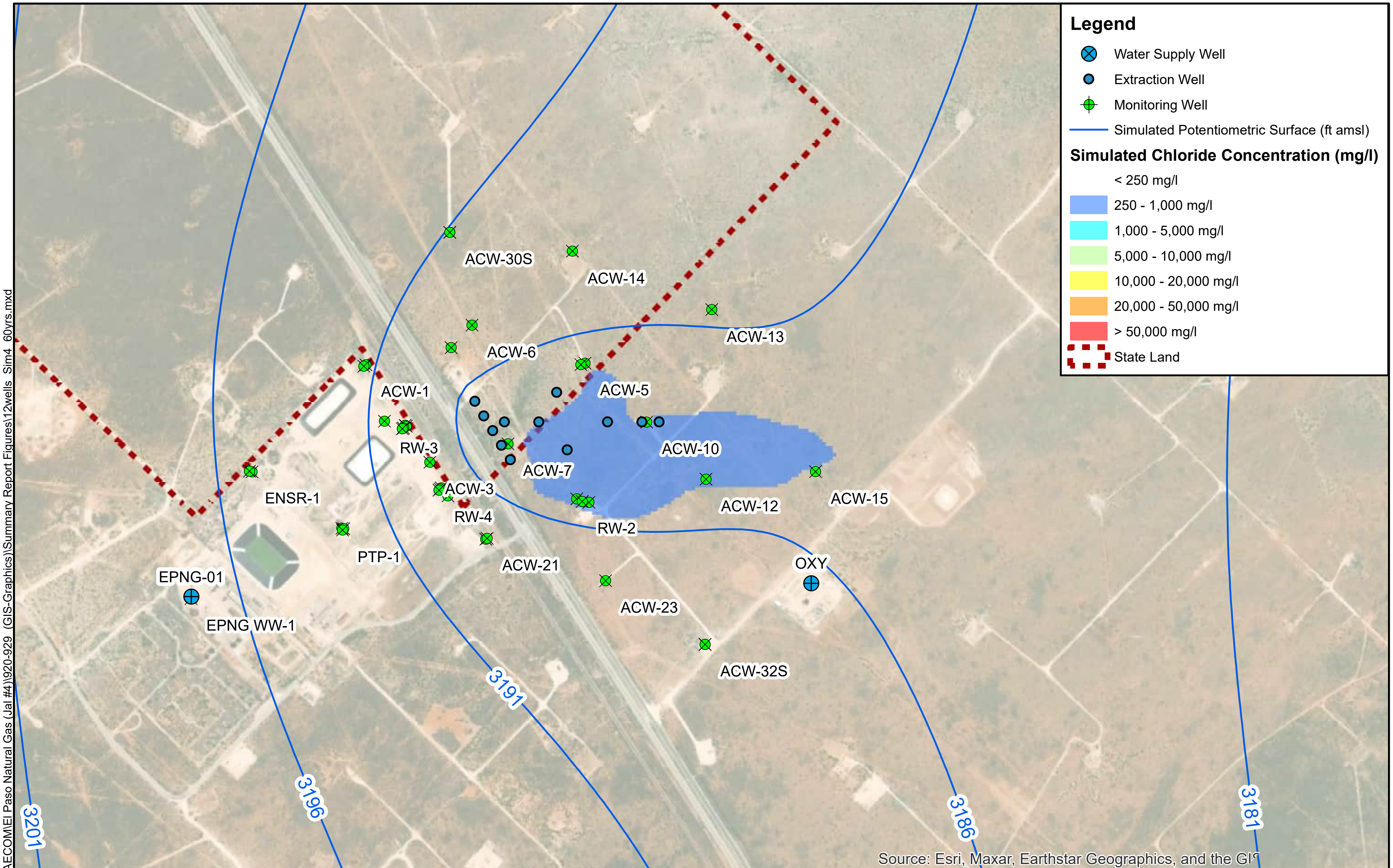
KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
After 30 Years - Recovery Rate of 175 gpm - 24 Wells
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE
4-1



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References:
Aerial photo: USDA NAIP 2018

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DESIGNED BY:	DAE
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DATE:	12/11/2023
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KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
After 60 Years - Recovery Rate of 86.7 gpm - 12 Wells
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE 4-2

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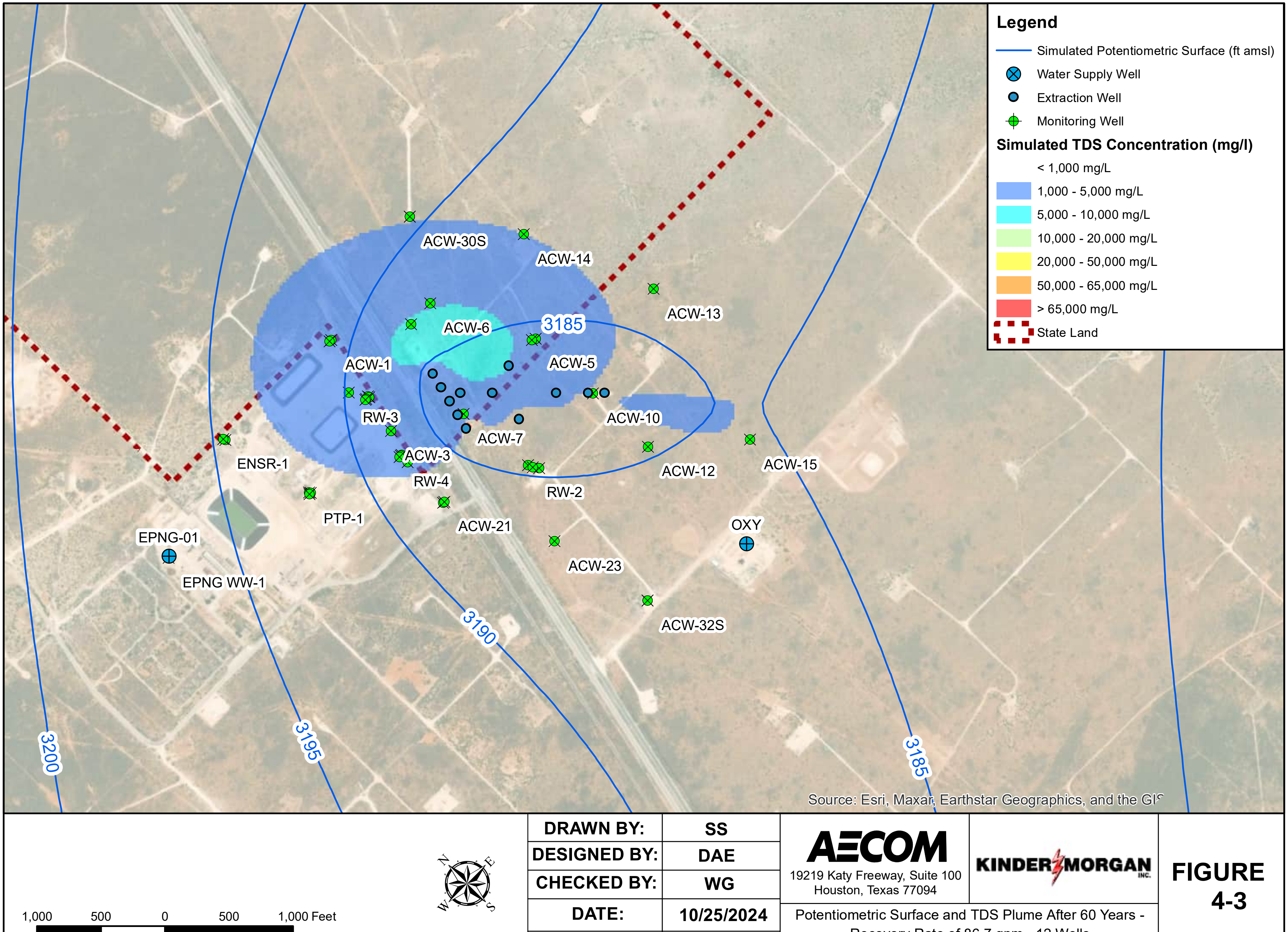
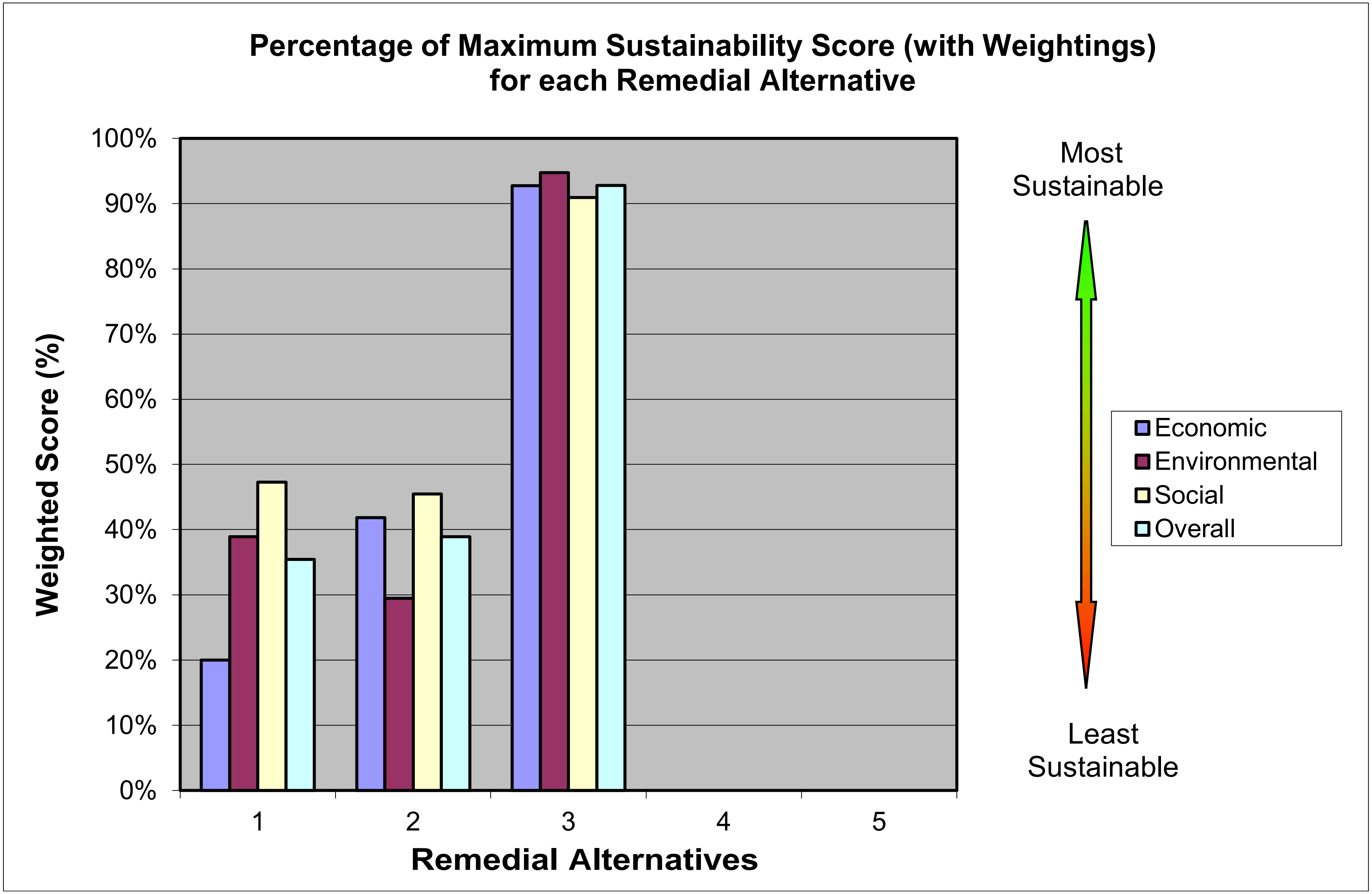


DRAWN BY:	SS	AECOM 19219 Katy Freeway, Suite 100 Houston, Texas 77094	KINDER MORGAN INC.
DESIGNED BY:	DAE		
CHECKED BY:	WG		
DATE:	10/25/2024	Potentiometric Surface and TDS Plume After 60 Years - Recovery Rate of 86.7 gpm - 12 Wells Former EPNG Jal No. 4 Plant Lea County, New Mexico	
SCALE:	1:12,000		

FIGURE 4-3



Alternative 1: Deep Well Injection, Alternative 2: Evaporation Pond, Alternative 3: Alternative Abatement Standards and Institutional Controls

Figure 5-1

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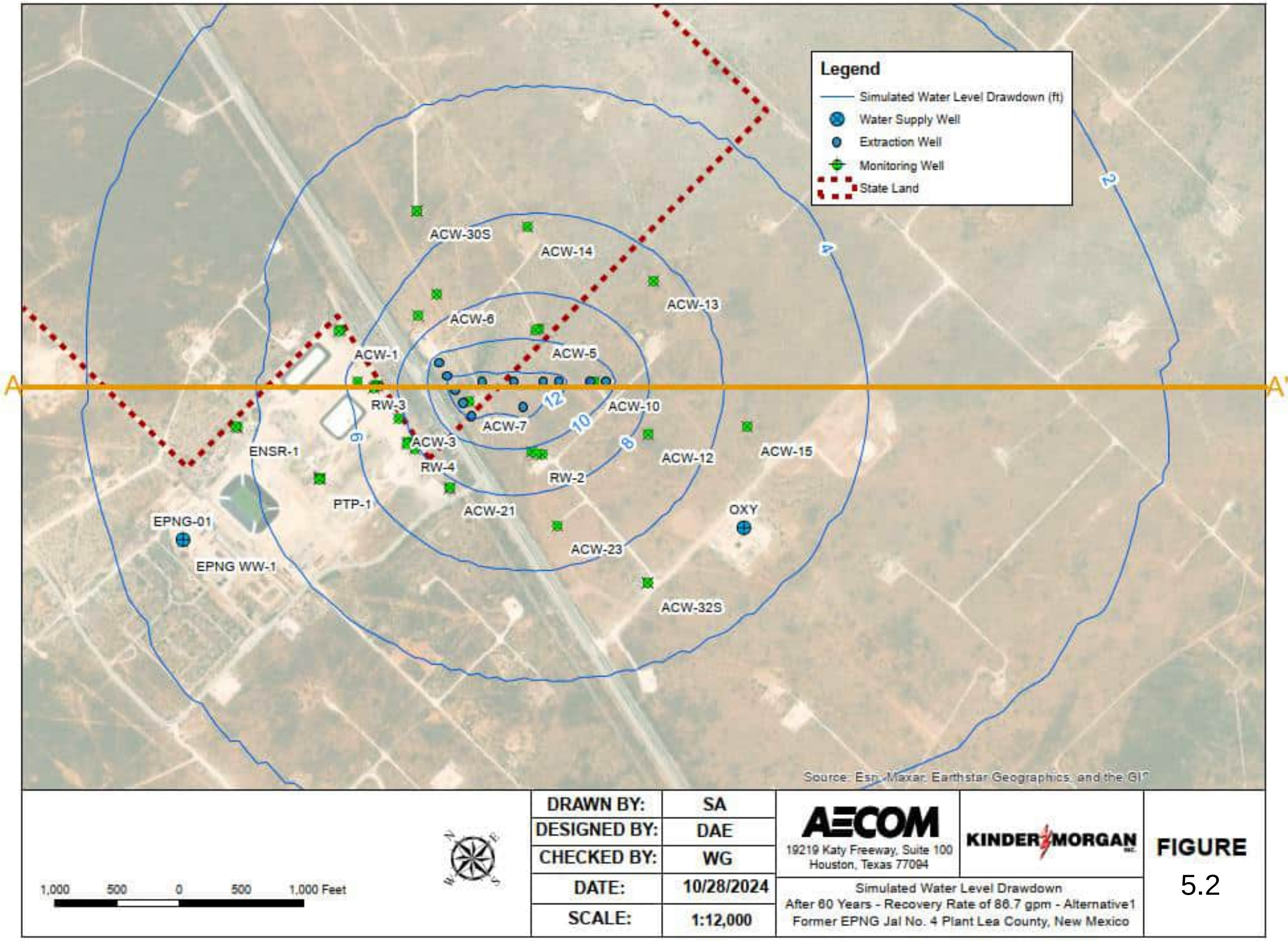
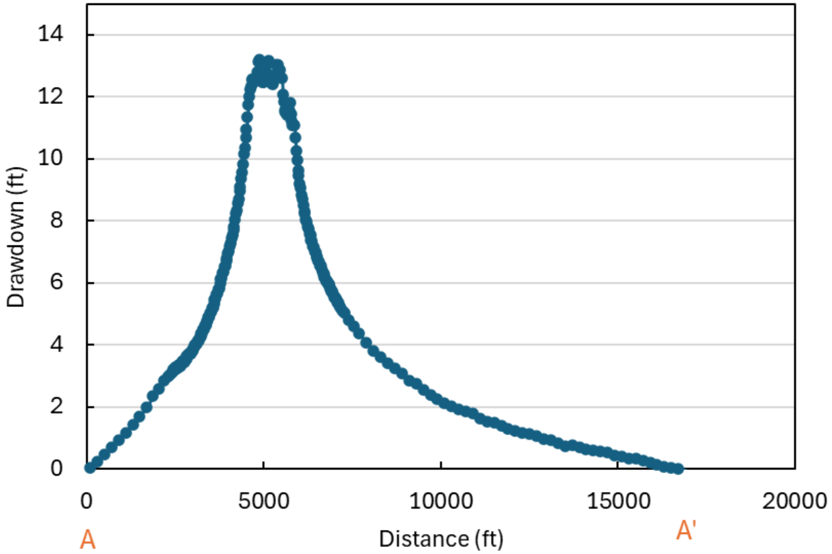
Aquifer Depletion associated with a Groundwater Extraction Rate of 86.7 gpm for 60 Years





- The simulated groundwater drawdown in Figure 5.2 represents a scenario involving extraction of about 86.7 gpm over a 60-year period from a groundwater recovery system comprising 12 extraction wells.
- Cross-Section A-A' illustrates drawdown versus distance, revealing a maximum predicted drawdown of approximately 13 feet.
- The average drawdown for the aquifer was calculated by extracting drawdown values across the entire model domain, resulting in an average drawdown of about 4.2 feet. The model domain is about 4,078 acres, or 6.37 square miles.

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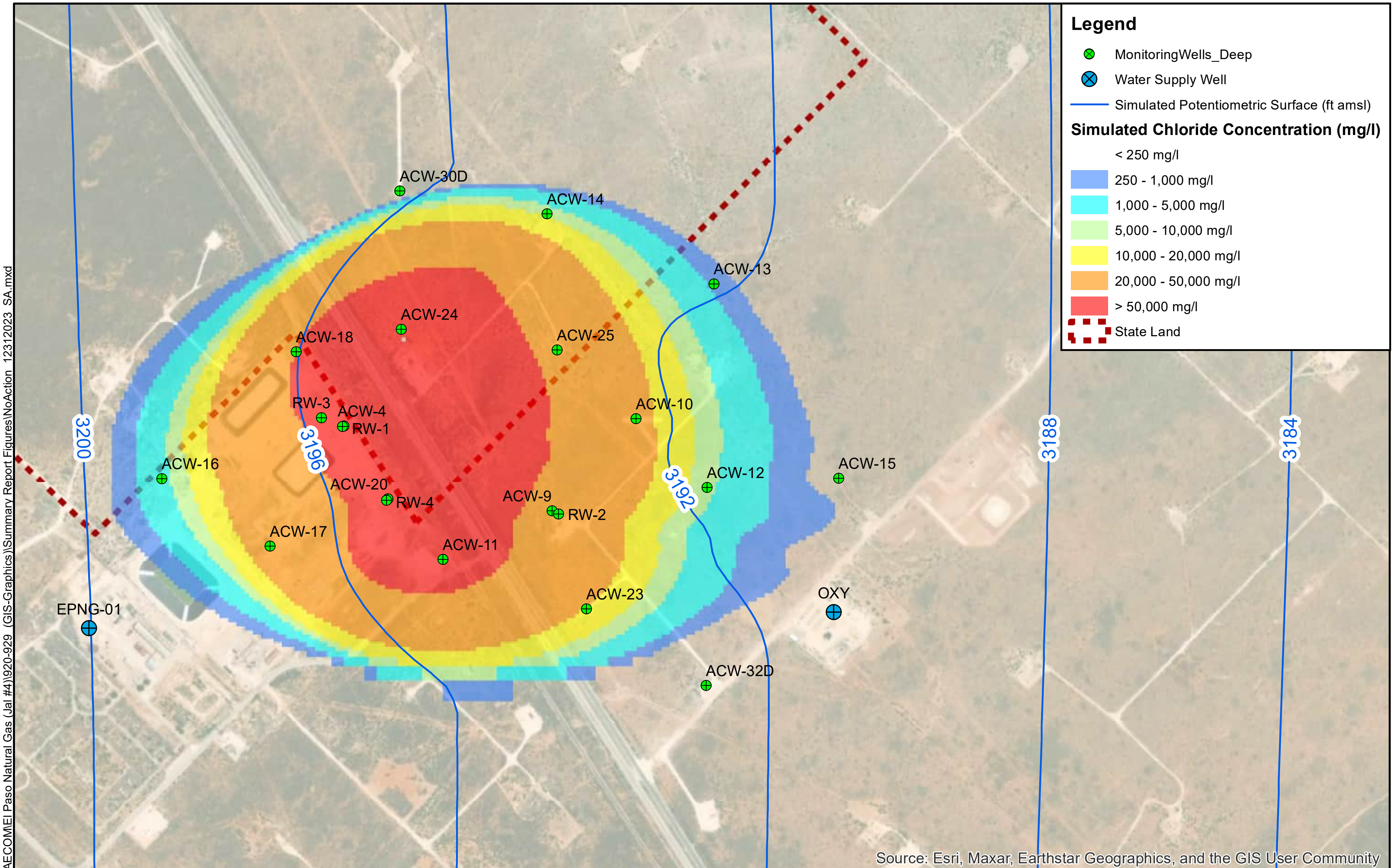

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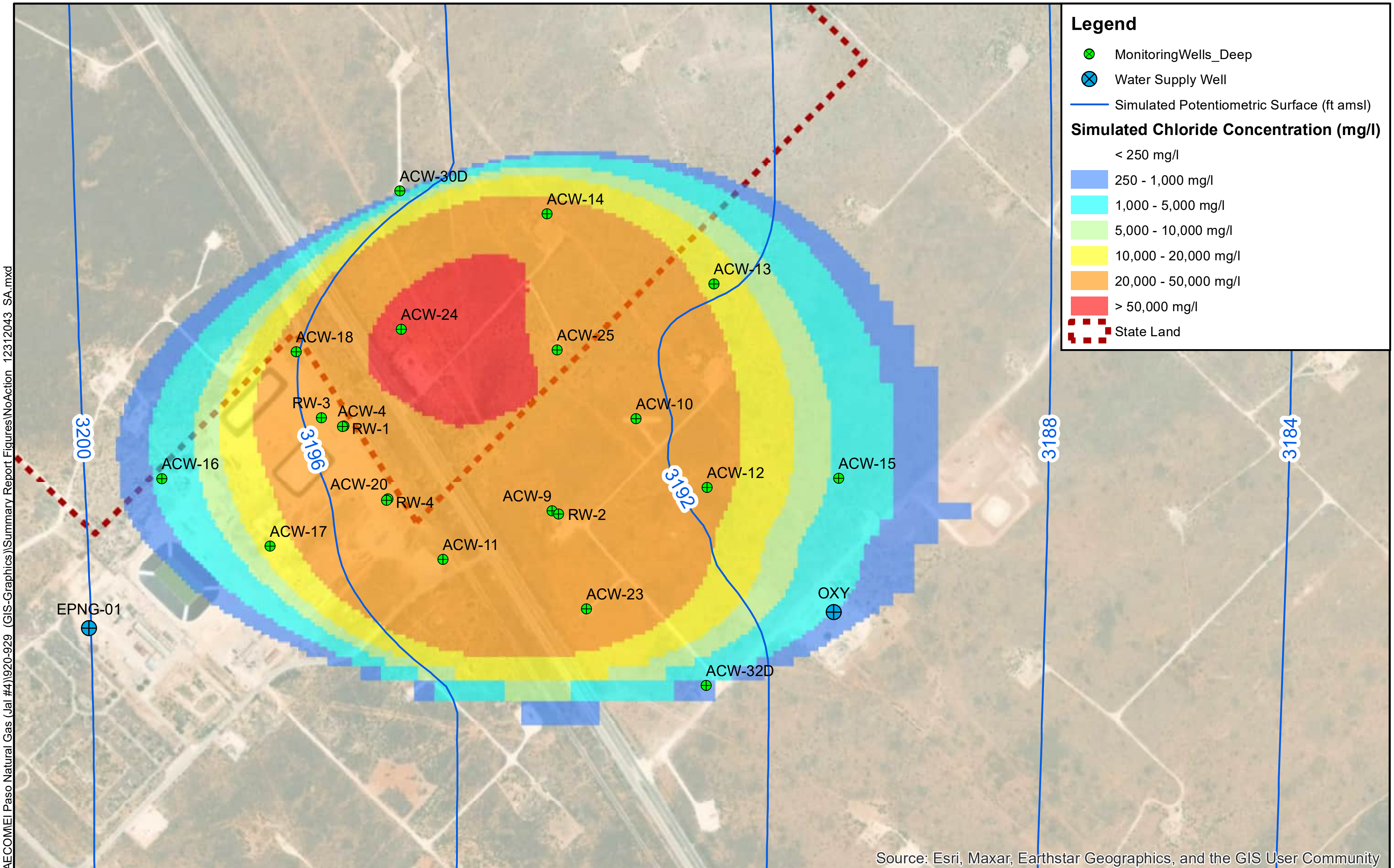
KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
End of Year 2023 - Natural Attenuation Scenario
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE 6-1



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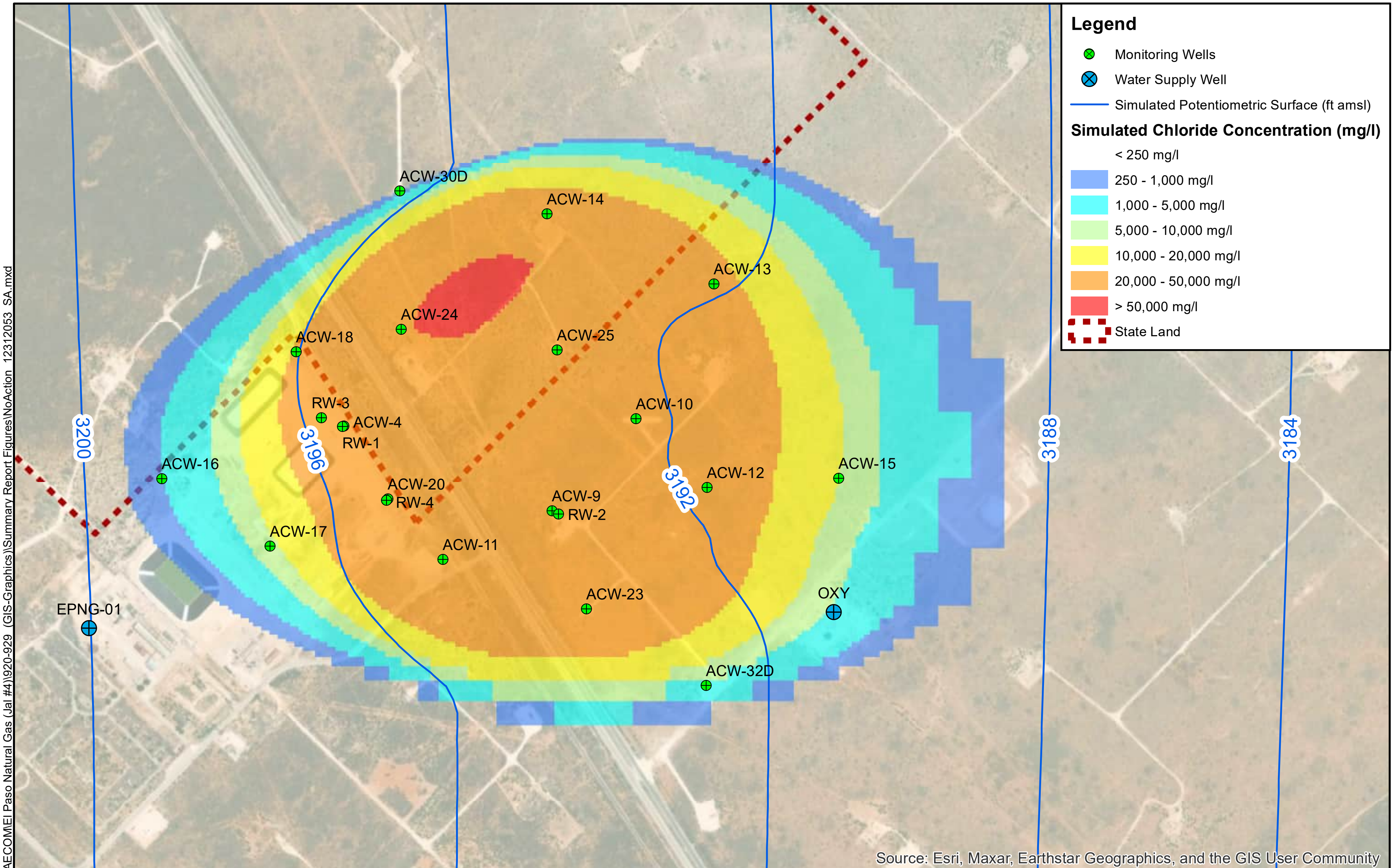
KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
End of Year 2043 - Natural Attenuation Scenario
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE 6-2



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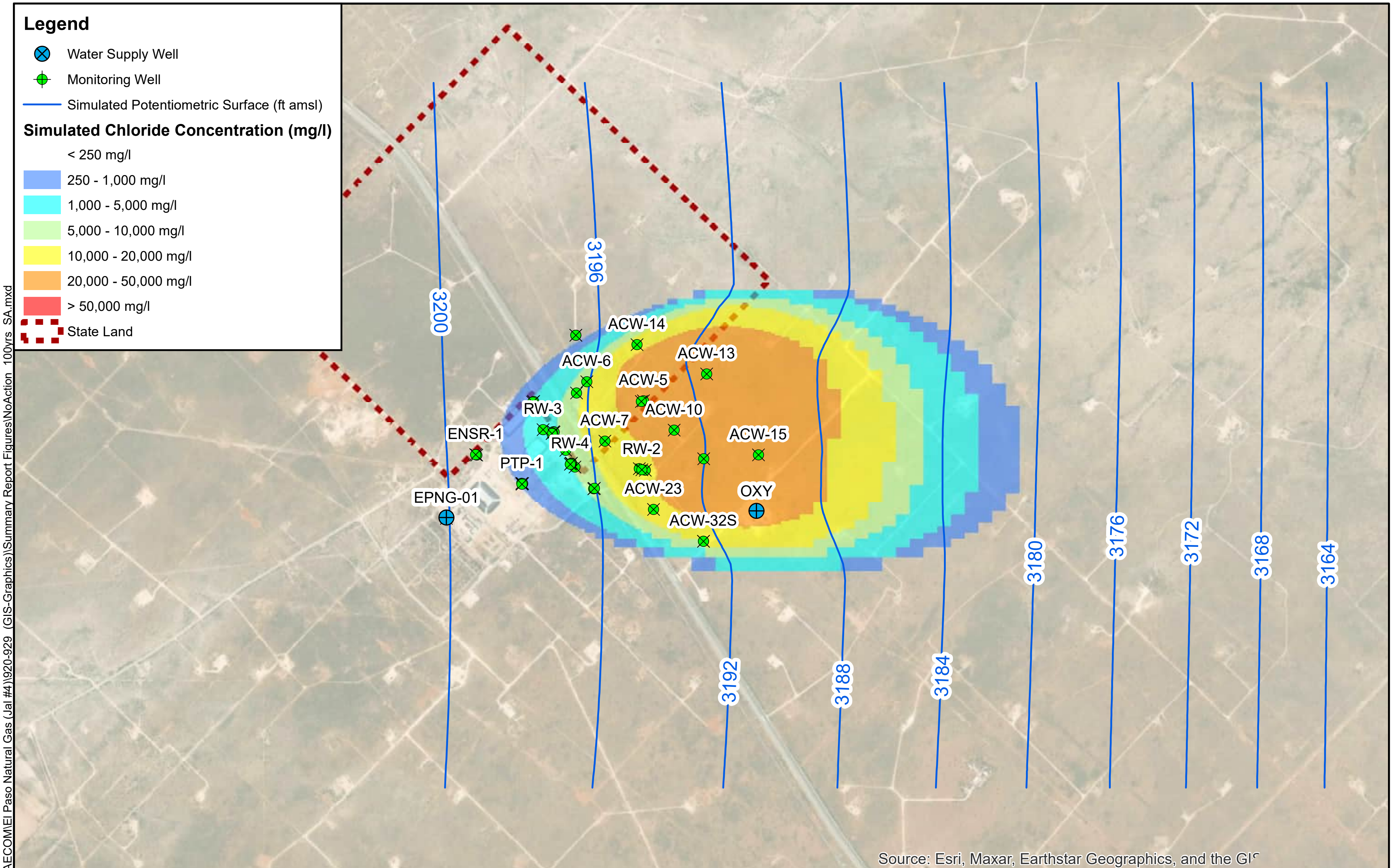
KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
End of Year 2053 - Natural Attenuation Scenario
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE 6-3



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References:
Aerial photo: USDA NAIP 2018

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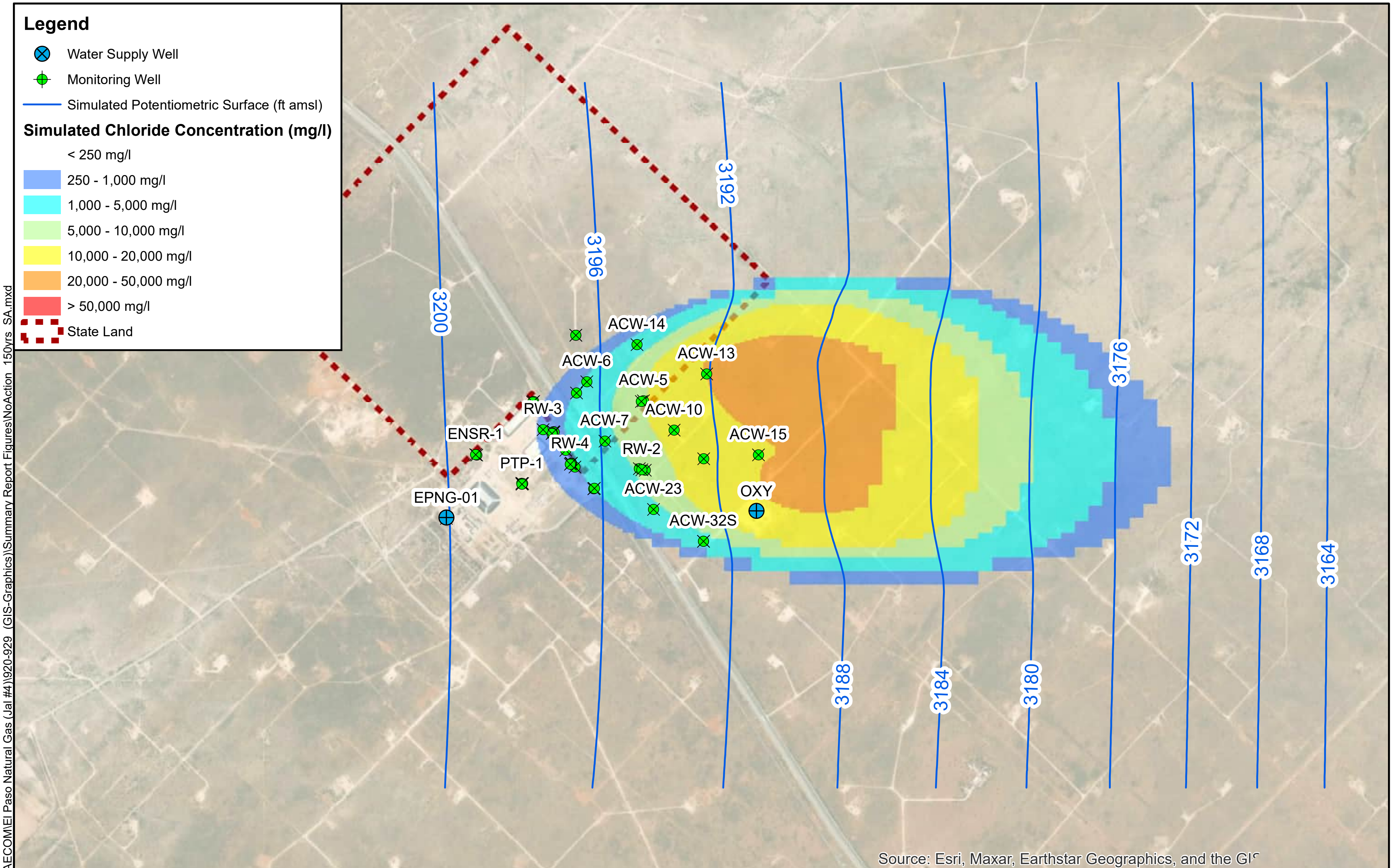
KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
After 100 Years - Natural Attenuation Scenario
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE
7-1



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References:
Aerial photo: USDA NAIP 2018

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DESIGNED BY:	DAE
CHECKED BY:	JZ
DATE:	11/29/2023
SCALE:	1:24,000

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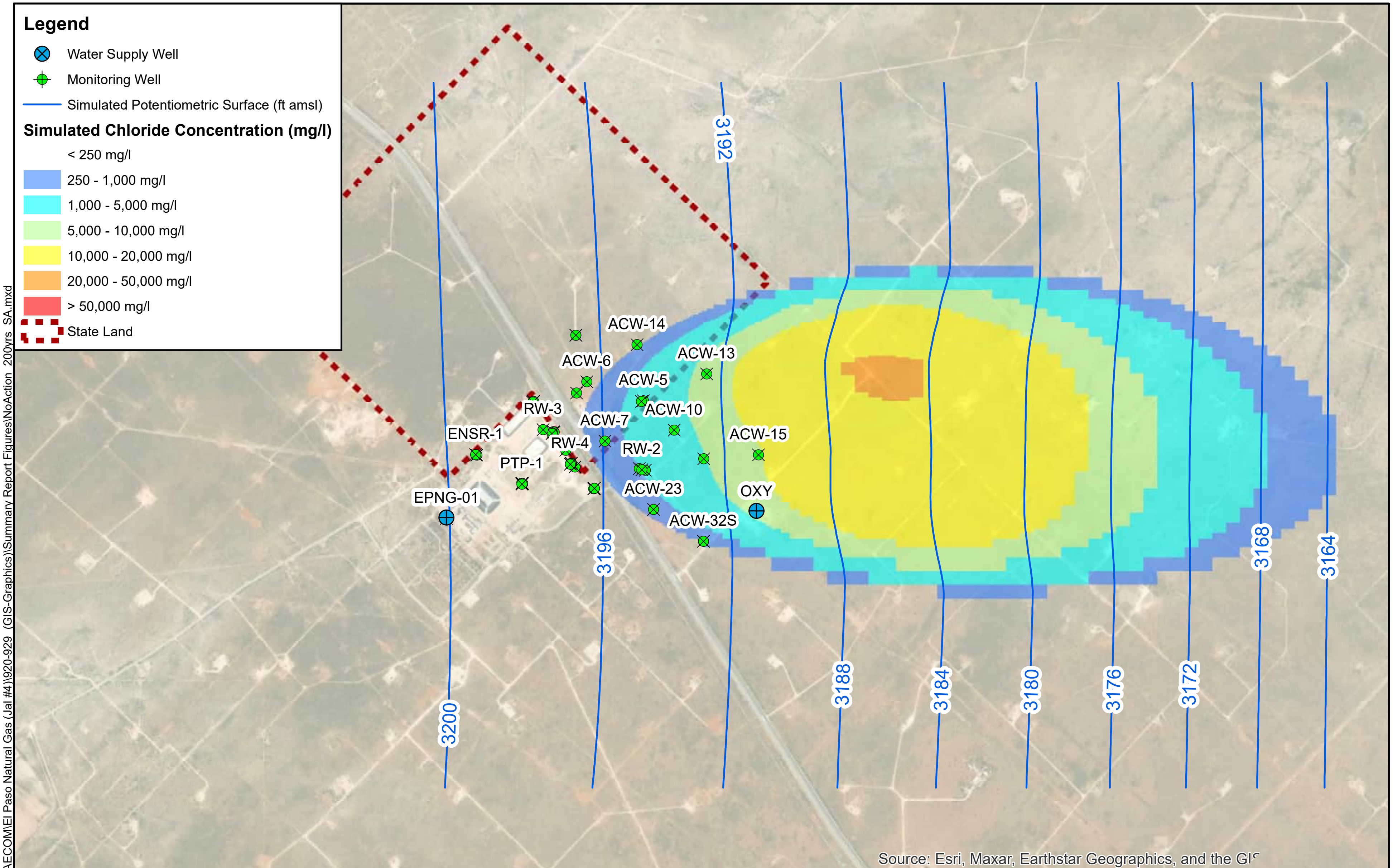
KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
After 150 Years - Natural Attenuation Scenario
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE
7-2



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1,000 500 0 500 1,000 Feet

References:
Aerial photo: USDA NAIP 2018

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DATE:	11/29/2023
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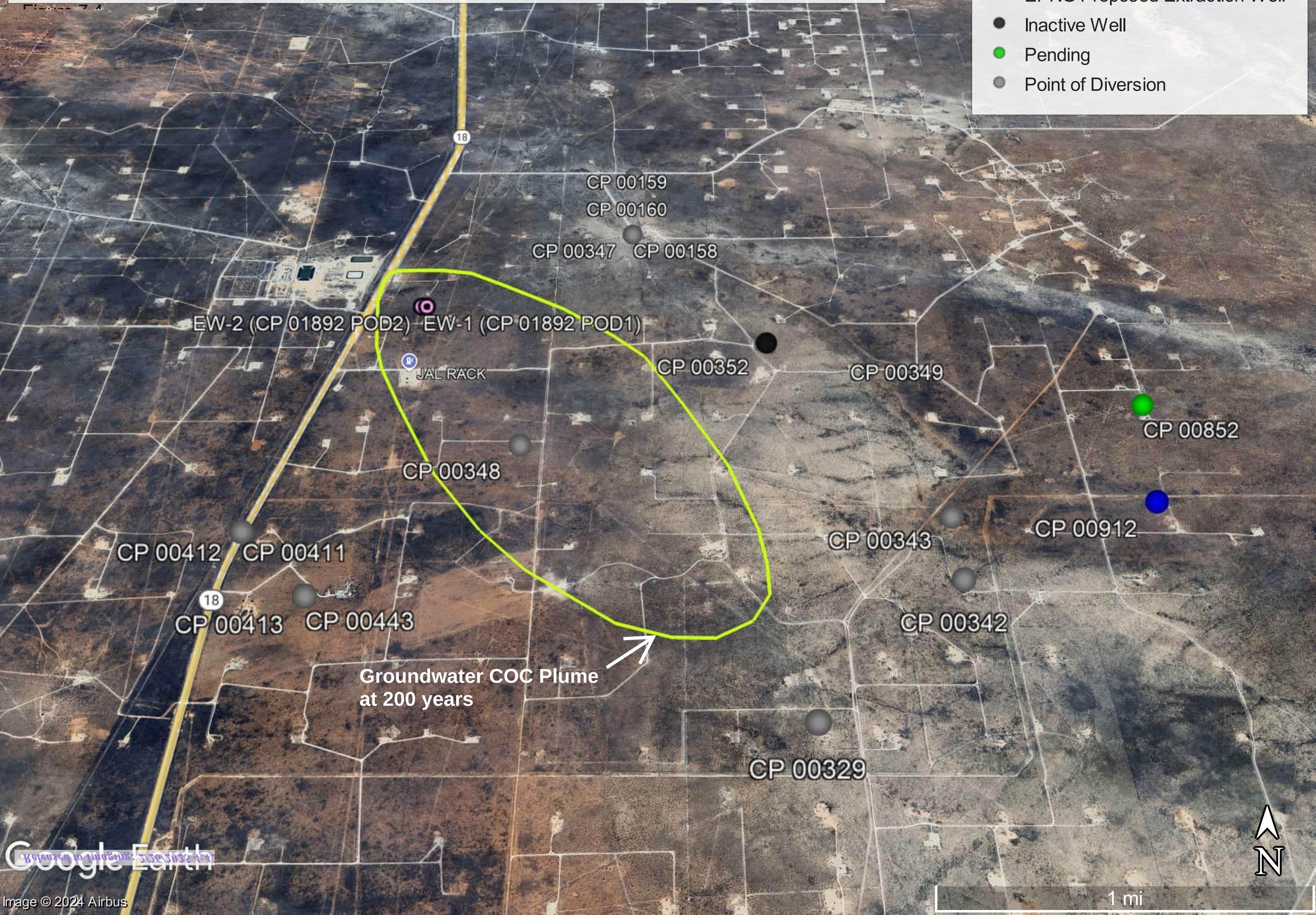
KINDER MORGAN INC.

Simulated Potentiometric Surface and Chloride Plume
After 200 Years - Natural Attenuation Scenario
Former EPNG Jal No. 4 Plant Lea County, New Mexico

FIGURE
7-3

Water Well Search Results for NMOSE Online Mapping Tool

Figure 7-4



Tables

Table 5-1
Sustainability Assessment
Weighting and Scoring of Remedial Alternatives

Pillar	Assessment Criteria	Criteria Description	Site- Specific Weighting	Justification of Weighting	Remedial Alternative* 1	Remedial Alternative* 2	Remedial Alternative* 3	Justification of Scores
Economic	Direct Economic Costs and Benefits	Readily quantifiable financial gains or losses associated with the project.	3	Lifetime project cost is a moderate concern.	1	2	5	Anticipated total lifetime cost. - Less is better.
Economic	Indirect Economic Costs and Benefits	Long-term or indirect costs and benefits to internal resource allocation, debt, legal costs, corporate reputation; changes in local land values and and area's economic performance.	1	The project has limited potential for indirect economic costs or benefits	1	3	5	Relative O&M costs assuming operation for 60 years, including waste disposal.
Economic	Employment and Employment Capital	Potential for employment and for enhancing employee skills and education.	1	Low applicability to this project.	1	2	1	Option 2 could create an opportunity for a part-time position, but this criteria is not applicable to alternatives 1 and 3.
Economic	Induced Economic Costs and Benefits	Positive or negative financial impacts that arise as a direct result of implementing sustainable practices or policies.	1	Low applicability to this project.	1	2	5	Primary metric is relative overall cost, including O&M.
Economic	Project Lifespan and Flexibility	Lifespan and ability to adapt to accommodate changing conditions; duration of benefit of the remediation.	5	Adaptability to changing conditions over time, or insulation of an alternative from changing conditions is of high importance.	1	2	5	Uncertainty of deep well injection availability for project lifespan. Evaporation pond is large investment with limited flexibility to meet change, but has potential for continued use.
Environmental	Impacts on Air	Negative impacts on air quality	3	Limited potential for criteria pollutants, HAPs, VOCs	2	2	5	Most impacts would occur during construction. Long-term pump use (electric). Minimal VOC impacts from pond due to low benzene concentrations.
Environmental	Impacts on Soil and Ground Conditions	Soil erosion, compaction, nutrient depletion, contamination levels, changes in soil structure, organic matter content, infiltration capacity, and potential for ground instability.	3	Pipeline or evaporation pond construction will affect ground conditions where they are built.	4	3	5	Short-term impacts from construction. Pond (25-75 acres) limits future use for at least 60 years. Sparsely populated area.
Environmental	Impacts on Groundwater and Surface Water	Depletion of water reserves through excessive pumping, changes in water quality due to pollution, effects on suitability of water for potable or other use, altered flow patterns in rivers and streams, potential for saltwater intrusion, land subsidence, and disruptions to aquatic ecosystems.	5	Potential for aquifer depletion is a significant concern	1	1	4	Aquifer depletion is a significant concern. Leaving impacted medium in place with ICs is a factor.
Environmental	Impacts on Ecology	Effects on the natural ecosystem, including changes to biodiversity, habitat disruption, species population fluctuations, and alterations to ecosystem functions.	3	Potential impacts of construction; possible long-term use of evaporation pond	3	1	5	There will be short-term impacts from construction. Pond may affect local fauna.
Environmental	Use of Natural Resources and Waste Generation	Use of Natural Resources: Amount and type of raw materials extracted form the environment to produce goods and services. Waste Generation: volume and composition of discarded materials produced.	5	Groundwater extraction approach removes water from the Ogallala aquifer permanently. Deep well disposal removes water from the ecosystem permanently.	1	1	5	Preference would be to treat water & return to aquifer for future use; injection well disposal & evaporation pond permanently remove water from aquifer.
Social	Impacts on Human Health and Safety	Potential positive or negative effects the project might have on the health and well-being of workers, communities, and consumers.	2	Only during construction phase & minimal O&M	2	2	5	Primary risk from construction; relatively short-term. With drilling prohibition, leaving medium in place is relatively low risk.
Social	Ethics and Equality	Extent to which social justice is addressed; avoiding the transfer of contamination impacts to future generations; are different groups treated equally in decision-making; upholding "polluter paid" principle.	2	Isolated area, few stakeholders. Long-term availability of water is a concern.	2	1	5	Permanent removal of water from aquifer with active options. Pond limits availability of land for other uses.
Social	Neighborhood and Locality	Impacts on local community during construction and operation of remedy; architectural and archeological conservation; options for future use of the site.	1	Isolated area, few neighbors	3	1	5	Sparsely populated area. Pipeline and Pond have construction impacts; Pond limits land use.
Social	Communities and Community Involvement	Impact of remediation works on public access to services; extent of community involvement in decision-making; transparency to local community.	1	Isolated area with limited interest from community	5	3	5	Limited interest from groundwater users in area. Equal opportunity for input. Pond limits future land use for extended time.
Social	Compliance, Uncertainty and Evidence	Compliance with policies, standards, and good practice; compliance with requests made by the community; extent to which remediation plans can cope with variation; validation and verification of remediation process.	5	Compliance and resilliancy against changing conditions are high priority.	2	3	4	All options comply with regulations. ICs leave contamination in place, but removal does not substantively improve aquifer conditions. Pipeline is vulnerable to deepwell availability. Pond has limited flexibility to cope with variation.

* Alternative 1: Deep Well Injection; Alternative 2: Evaporation Pond; Alternative 3: Alternative Abatement Standards and Institutional Controls

Assessment Criteria Weighting: 1 = Low Importance, 5 = Highest Importance, Weightings between 1 and 5 allow for a graduated scale
Technology Scores:
1 = Remedial alternative addresses the sustainability criteria to a very low degree
5 = Remedial alternative addresses the sustainability criteria to a high degree
Scores between 1 and 5 allow for a graduated scale

Table 6-1
Predicted Chloride, TDS and Benzene Concentrations at Years 2043 and 2053
Groundwater Modeling Results for Natural Attenuation Scenario

Predicted Chloride Concentrations at Years 2043 and 2053																		
Date	Time (Years)	ACW-04	ACW-09	ACW-10	ACW-11	ACW-12	ACW-13	ACW-14	ACW-15	ACW-16	ACW-17	ACW-18	ACW-20	ACW-23	ACW-24	ACW-25	ACW-30D	ACW-32D
12/31/2021	Baseline	58,784	10,472	23,194	56,126	4,490	392	6,440	66	3,725	32,273	52,528	55,657	2,064	65,900	42,239	0	0
12/31/2023	2	57,112	10,477	25,939	55,337	6,188	758	9,025	95	3,427	30,009	50,499	53,987	1,989	64,937	43,723	0	0
12/31/2043	22	41,939	8,543	37,011	44,764	25,207	16,426	28,813	3,981	1,418	13,026	30,047	39,631	398	54,555	47,382	463	770
12/31/2053	32	34,915	7,438	37,007	38,872	29,894	25,189	32,762	9,952	910	8,187	21,558	33,495	82	48,400	45,527	433	3,772

Predicted TDS Concentrations at Years 2043 and 2053																		
Date	Time (Years)	ACW-04	ACW-09	ACW-10	ACW-11	ACW-12	ACW-13	ACW-14	ACW-15	ACW-16	ACW-17	ACW-18	ACW-20	ACW-23	ACW-24	ACW-25	ACW-30D	ACW-32D
12/31/2024	Baseline	78,022	8,802	15,204	43,407	4,037	1,601	21,421	497	42,769	54,224	79,593	3,591	66,359	86,021	39,813	41,941	9
12/31/2043	19	64,990	9,282	30,110	46,824	14,323	14,672	42,117	2,719	23,995	37,534	63,583	56,842	2,937	74,444	50,775	48,414	79
12/31/2053	29	58,919	9,375	33,729	45,005	19,824	22,945	47,099	5,534	17,129	29,912	56,596	51,881	2,955	68,920	51,587	47,274	416

Predicted Benzene Concentrations at Years 2043 and 2053																		
Date	Time (Years)	ACW-04	ACW-09	ACW-10	ACW-11	ACW-12	ACW-13	ACW-14	ACW-15	ACW-16	ACW-17	ACW-18	ACW-20	ACW-23	ACW-24	ACW-25	ACW-30D	ACW-32D
12/31/2024	Baseline	0.047	0.011	0.000	0.015	0.000	0.000	0.000	0.000	0.015	0.021	0.023	0.044	0.000	0.026	0.003	0.002	0.000
12/31/2043	19	0.012	0.006	0.000	0.006	0.000	0.000	0.000	0.000	0.003	0.006	0.005	0.014	0.000	0.008	0.003	0.001	0.000
12/31/2053	29	0.006	0.004	0.000	0.003	0.000	0.000	0.000	0.000	0.001	0.003	0.003	0.007	0.000	0.004	0.002	0.000	0.000

Note: The 2021 concentrations shown above represent the baseline output for the calibrated model. The predicted concentrations for 20 years and 30 years into the future are the model outputs for those specified dates. Benzene and TDS were not incorporated into the model until 2024 and the data shown above represent the model output for those two COCS.

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

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

CONDITIONS

Action 435883

CONDITIONS

Operator:	
El Paso Natural Gas Company, L.L.C 1001 Louisiana Street Houston, TX 77002	OGRID: 7046
	Action Number: 435883
	Action Type: [IM-SD] Incident File Support Doc (ENV) (IM-BNF)

CONDITIONS

Created By	Condition	Condition Date
michael.buchanan	None	2/26/2025