HF Sinclair

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January 31, 2023

Accepted as part of the record. Email between NMOCD and Mike Holder including letter issued for administratively incomplete ST2 AP sent electronically on 03/07/24

Dylan Fuge, Acting Director
State of New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, NM 87505

RE: TRANSMITTAL OF THE REVISED STAGE 2 ABATEMENT PLAN SUBMITTAL FOR THE REVERSE OSMOSIS (RO) REJECT DISCHARGE FIELDS, HF SINCLAIR NAVAJO REFINING LLC, ARTESIA, NM GW-028

Dear Mr. Fuge:

HFSinclair Navajo Refining LLC (HFSNR) submitted a Stage 2 Abatement Plan Work Plan for the Former Reverse Osmosis Discharge Reject Fields to the New Mexico Energy, Minerals and Natural Resource Department's Oil Conservation Division (OCD) on October 19, 2022. On December 5, 2022, OCD requested additional information for administrative completeness of the Work Plan. OCD requested that an amended document be submitted by January 4, 2023. Navajo requested an extension to submit the amended document no later than January 31, 2023 and received approval of the extension request from OCD on December 20, 2022.

This letter provides responses to the OCD comments and an amended document, titled *Stage 2 Abatement Plan – Former Reverse Osmosis Reject Discharge Fields,* has been prepared incorporating the responses. This letter and the Stage 2 Abatement Plan (AP) are being submitted electronically to OCD. Each comment from the December 5, 2022 letter is provided below with the response in italics font.

1. The Work Plan indicates that HollyFrontier is proposing to utilize phytoremediation (i.e., the use of plants to extract and remove pollutants from soil) to abate contamination from the vadose zone. However, the Work Plan does not address groundwater contamination at the site location. As per 20.6.2.4103.A NMAC, HollyFrontier must remediate all contaminants of concern that are above the WQCC standards in the groundwater such as Uranium, Boron, and Manganese, etc. HollyFrontier must include a section in the Work Plan to address the groundwater contamination.

   The current status of groundwater concentrations is discussed in the revised Stage 2 AP, which also addresses HFSNR's plans to remediate groundwater via the removal of COCs in shallow soils (i.e., source control), reduction of infiltration and transport, and monitored natural attenuation.

2. OCD is requesting that HollyFrontier amend and update Section 3.0 of the Work Plan accordingly. In this section, HollyFrontier references literature dating back to 1950 as

HF Sinclair Navajo Refining LLC
501 East Main, Artesia, NM 88210
575-748-3311 | HFSinclair.com

justification for the two plants selected for the phytoremediation. These plants are not native to the area and OCD believes that current literature offers better suggestions for the types of plants that would be the most effective for this type of abatement. During OCD's literature search, OCD found the following two native plants: Indiangrass (*Sorghastrum nutans*) and sunflowers, specifically the Maximilian sunflower (*Helianthus maximiliani*); these plants are hyperaccumulators and are capable of removing both heavy metals along with other inorganics from the soil.

Discussions between OCD and HFSNR occurred during a teleconference on December 9, 2022 and via email December 20, 2022. The Maximilian sunflower is not salt tolerant and OCD has agreed that it is not a candidate for phytoremediation of the former RO reject discharge fields. The revised Stage 2 AP includes two native species as part of the pilot study: Indiangrass (Sorghastrum nutans) and Western Wheatgrass (Pascopyrum smithii). These two native species will be tested along with the previously recommended plants. The results of the pilot study will be reported to OCD and final selection of an appropriate species (or multiple species) for long-term phytoremediation will be recommended in that report.

3. HollyFrontier needs to address in the Work Plan how fertilizers will be applied and managed given that fertilizers can pollute groundwater via leaching, especially nitrogen in the form of nitrate.

   The revised Stage 2 AP includes a plan to sample the soil prior to planting the test species. The results of the agronomic analyses will be used to develop a fertility management plan, which includes application of fertilizers at agronomic rates for the selected test species. Consideration will be given to the rate of application to minimize the potential for leaching of any applied nutrients. Groundwater monitoring performed during the pilot study will be used to confirm impacts from fertilization are minimized.

4. As part of the soil and water evaluation process, HollyFrontier must address in the Work Plan the disposal methods for the harvested/cut plants given the plants may contain high levels of inorganic constituents that are harmful if consumed by humans and/or wildlife.

   Disposal of harvested/cut plants is addressed in the revised Stage 2 AP in the phytoremediation study implementation section. HFSNR will contain harvested or cut plants outside the fields, then sample the material for COCs and any additional parameters required to characterize the material for off-site disposal. Harvested vegetation will be removed from the area and will not be allowed to be consumed by humans or livestock.

5. HollyFrontier needs to include in the Work Plan the 2021 and 2022 semiannual groundwater monitoring event tables (i.e., "Summary of Groundwater Analytical Results Screened Using CGWSLs").

   The revised Stage 2 AP includes a table of groundwater analytical results that includes the data collected for the Stage 1 Abatement Plan and results from the same wells from the period

immediately after the Stage 1 Abatement Plan was completed through the fall semiannual sampling event of 2022. Potentiometric surface maps and isopleth maps for groundwater COCs that are included in the annual groundwater monitoring reports have been provided as an appendix to the revised Stage 2 AP.

6. HollyFrontier must include in the Work Plan a public notification proposal meeting the requirements of Subsections B and C of 20.6.2.4108 NMAC.

   A discussion of public notification has been included in Section 5 of the revised Stage 2 AP and a draft public notification document has been included as Appendix C.

7. Per 20.6.2.4104.C NMAC, HollyFrontier must include in the Work Plan a Closure/Post Closure Plan for covering the estimated costs to conduct the actions required by the abatement plan. Note, HollyFrontier must submit within 30-days of OCD's acceptance of the Closure/Post Closure Plan the associated financial assurance.

   A discussion of financial assurance for closure/post-closure has been included in Section 6 of the revised Stage 2 AP and a cost estimate for the financial assurance plan has been included as Appendix D.

   If you have any questions or need additional information, please contact me at (575) 746-5487 or Mike Holder at (575) 308-1115.

Sincerely,

Kawika Tupou
Environmental Manager
HF Sinclair Navajo Refining

Cc: Leigh Barr, NM OCD
Shelly Wells, NM OCD
Jason Roberts, HFSNR
Mike Holder, HFS

STAGE 2 ABATEMENT PLAN

FORMER REVERSE OSMOSIS REJECT DISCHARGE FIELDS

HFSINCLAIR NAVAJO REFINING LLC

PROJECT NO.: 2367171004
DATE: JANUARY 31, 2023

WSP USA ENVIRONMENT & INFRASTRUCTURE INC.
125 MONTOYA ROAD
EL PASO, TEXAS 799324

T: 915-585-2472

WSP.COM

SIGNATURES

PREPARED BY

Paul Deutsch
Principal Scientist

APPROVED[1] BY

Brenda Barnes, PhD, PG
Lead Consultant, Senior Project Manager

[1] Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.#

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1 BACKGROUND

1.1 FACILITY DESCRIPTION

HFSinclair Navajo Refining LLC (HFSNR) owns and operates the Artesia Refinery (Refinery) which is located in the City of Artesia, New Mexico (**Figure 1**). The Refinery has been in operation since the 1920s, runs a predominant slate of Permian Basin crudes that are gathered in west Texas and southeast New Mexico, and can also source a variety of crude oils from Cushing, Oklahoma, including Canadian crudes. The Refinery serves markets in the southwestern United States and northern Mexico.

HFSNR utilizes reverse osmosis (RO) to remove minerals and salts from fresh water prior to use in the refining process. The fresh water is supplied from a blend of publicly supplied water from the City of Artesia and fresh groundwater obtained from the Refinery's water supply wells. The treated water (permeate stream) is used in the Refinery process while the RO reject stream cannot be used in the Refinery process as it contains concentrated salts and minerals that do not pass through the RO membranes. Prior to January 24, 2019, this concentrated RO reject stream was discharged to the surface of two fields located northeast of the Refinery operations area (**Figure 2**). The RO reject discharge fields are covered with native grass and discharged water was allowed to percolate or evaporate in those permitted areas. The discharge was performed under the jurisdiction of the State of New Mexico Energy, Minerals and Natural Resource Department Oil Conservation Division (OCD) in accordance with Discharge Permit GW-028 (Permit), which was initially issued in October 1991. The Permit has subsequently been modified and renewed several times with the most recent renewal issued in August 2022 (OCD 2022).

1.2 REGULATORY BACKGROUND

When OCD renewed the Permit in 2017 (OCD 2017), it included a requirement that discharge of RO reject discharge stream to the surface cease upon operational completion of a Class I disposal well, but not later than October 31, 2018. An extension to the October 31, 2018 deadline was requested and approved by OCD due to delays in operational completion of the Class I disposal well (OCD 2018). The renewed Permit required characterization and abatement of vadose zone and groundwater contamination due to the historical discharge of RO reject fluid. The Permit stipulated that a plan for characterization and abatement of such contamination should be submitted within 60 days after cessation of discharge of RO reject fluid. The disposal well became operational on January 16, 2019, and the discharge of RO reject to the fields was discontinued on January 24, 2019. A Stage 1 Abatement Plan (AP) was submitted on March 21, 2019 (Wood 2019a), amended on May 24, 2019 (Wood 2019b) per OCD requests, and approved by OCD via email on June 7, 2019.

Implementation of the Stage 1 AP began in July 2019, and the final report of the activities was submitted to OCD on November 19, 2020 (Wood 2020). The Stage 1 AP included the following activities:

- Soil moisture monitoring to evaluate the moisture level in the vadose zone beneath both fields
- Analysis of constituents of concern (COCs) in soil samples collected during the installation of the soil moisture probes in both fields
- Installation of additional monitoring wells upgradient of the North RO reject field and downgradient of both the North and South RO reject fields
- Collection of shallow groundwater samples on a quarterly basis, for four quarters, from monitoring wells located upgradient, within, and downgradient of both fields
- Evaluation of the soil moisture, soil analytical, and groundwater analytical data

The recommendations made in the final Stage 1 AP report included:

- Continued groundwater monitoring:
- Installation of additional downgradient wells:
  - One well approximately 350 feet northeast of MW-119 to provide downgradient monitoring of the North RO reject discharge field
  - One well approximately 1,000 feet east of RW-18A to provide additional downgradient monitoring of the South RO reject discharge field
- Semiannual gauging and sampling of the wells included in this study, with the addition of the two new wells recommended downgradient of MW-119 and RW-18A along with inclusion of MW-134 for additional downgradient monitoring of the South RO reject discharge field.
- Analysis of groundwater samples for the following analytes, at a minimum (additional analytes may be required for the facility-wide groundwater monitoring program):
  - Fluoride
  - Sulfate
  - Total Dissolved Solids (TDS) – for the South RO reject discharge field only
  - Uranium – for the South RO reject discharge field only
- Inclusion of the analytical data in the annual facility-wide monitoring report.
- Preparation and submittal of this Stage 2 Abatement Plan (Stage 2 AP) in accordance with NMAC 20.6.2.4106.D, following approval of this Stage 1 AP. The Stage 2 AP will evaluate remedial alternatives focused on removal of fluoride (and potentially other inorganics) from shallow soil and/or groundwater or removal of the potential infiltration pathway. The Stage 2 AP will be submitted within 60 days of receipt of approval of the Stage 1 AP.

OCD approved the Stage 1 AP in a letter dated August 22, 2022 (OCD 2022) and requested submittal of this Stage 2 AP within 60 days.

1.3 CURRENT STATUS

1.3.1 STATUS OF DISCHARGE

Discharge of RO reject to the fields was discontinued on January 24, 2019. The moisture probes remain in place but have not been operated following completion of the Stage 1 AP. Some vegetation is present on the fields, but no cultivation and or irrigation is being conducted. The vegetation in the fields has not been cut or removed following completion of the Stage 1 AP. The surrounding berms that prevented runoff from the fields remain in place and thus rainfall that falls within the fields either evaporates or infiltrates.

1.3.2 SOIL CONDITIONS

No additional soil samples have been collected following completion of the Stage 1 AP. Table 1 of the Stage 1 AP presented a summary of the soil analytical data and stated the following COCs were present in the soil samples within the two RO reject discharge fields above the Soil Screening Levels (SSLs) published by the New Mexico Environment Department in 2019:

- Arsenic (exceeded the soil-leaching-to-groundwater SSL)
- Cobalt (exceeded the soil-leaching-to-groundwater SSL)
- Iron (exceeded the soil-leaching-to-groundwater SSL)
- Manganese (exceeded the construction worker noncancer SSL)

Additionally, the following COCs were present in the soil leachate samples (analyzed by the Synthetic Precipitation Leaching Procedure) at concentrations above the Water Quality Control Commission (WQCC) standards found at NMAC 20.6.2.3103:

- Iron
- Fluoride
- Sulfate

Although the concentrations of Arsenic and Cobalt in soil exceed the soil-leaching-to-groundwater SSLs, the SPLP results are below the WQCC standards. Thus, no further action is recommended for these COCs in soil.

Based on the information presented in the Stage 1 AP, remediation is recommended for the following soil COCs:

- Iron
- Manganese
- Fluoride
- Sulfate

Evaluation of soil remediation alternatives is presented in Section 3 of this Stage 2 AP.

1.3.3 GROUNDWATER CONDITIONS

1.3.3.1 POTENTIOMETRIC SURFACE

The shallow groundwater mound that was present beneath the fields during the discharge of RO reject water has dissipated following cessation of the discharge. A copy of the semiannual potentiometric surface maps created using groundwater gauging data gathered after the Stage 1 AP was completed (fall of 2020 and for both the spring and fall of 2021) are provided in **Appendix A**. These maps were submitted in the annual groundwater monitoring reports (TRC 2021 and TRC 2022). The spring and fall 2022 potentiometric surface maps are also provided in **Appendix A** and will be submitted in the 2022 annual groundwater monitoring report required to be submitted to OCD no later than June 15, 2023.

1.3.3.2 GROUNDWATER CONCENTRATIONS

The monitoring wells evaluated in the Stage 1 AP remain in place and those wells that were previously included in the facility-wide monitoring program have continued to be sampled and analyzed for COCs included in that program. However, monitoring wells MW-140 through MW-143 have not been sampled since June of 2020 as they are not currently included in the facility-wide monitoring program, as stated in the Stage 1 AP.

A copy of the isopleth maps generated using groundwater sampling data obtained after the Stage 1 AP was completed (fall of 2020 and for both the spring and fall of 2021) and submitted in annual groundwater monitoring reports (TRC 2021 and TRC 2022) are provided in **Appendix A**. Spring and fall 2022 isopleth maps are also provided in **Appendix A** and will be submitted in the 2022 annual groundwater monitoring report required to be submitted to OCD no later than June 15, 2023. The isopleth maps provided include only those COCs that are included in the facility-wide monitoring plan that were also addressed in the Stage 1 AP, which are:

- Arsenic
- Chloride
- Fluoride
- Sulfate
- TDS
- Nitrate/Nitrite

OCD clarified that the future groundwater monitoring associated with the former RO reject discharge fields must include the COCs that exceed the WQCC standards and that the alternate standards proposed for select COCs in the Stage 1 AP are not approved.

Table 1 contains analytical data for total and dissolved metals and water quality parameters that were evaluated in the Stage 1 AP, for the period of 2019 through 2022, compared to the current WQCC standards. This table is similar to Table 4 of the Stage 1 AP, with the addition of data from the five subsequent sampling events. The total metals concentrations are provided for comparison purposes; however, the dissolved metals concentrations were used in the determination of COCs to be addressed in this Stage 2 AP. It should be noted that groundwater samples have historically been analyzed for Nitrate and Nitrite combined but the WQCC standards have been defined separately for Nitrate and Nitrite. The lower standard for Nitrite of 1.0 mg/L was used for the screening presented in **Table 1**.

Plots of concentration versus time for the COCs evaluated during the Stage 1 AP have been updated and are provided in **Appendix B**. The plots are divided by field (North or South) and are grouped into wells located upgradient, within, and downgradient of the fields. The plots are very similar to the plots provided in the Stage 1 AP with the addition of data collected between the end of the Stage 1 AP and 2022, and the revision of the Nitrate/Nitrite screening standard.

The data presented in **Table 1** and the plots provided **Appendix B** indicate the following:

- Dissolved Arsenic was reported at concentrations above the WQCC standard in two samples from MW-29 (upgradient of the South RO reject discharge field) but has not been reported at concentrations above the standard in any of the wells located within the two fields since October 2019. No further action is recommended for dissolved Arsenic in groundwater beneath the RO reject discharge fields. Arsenic is included in the facility-wide groundwater monitoring program and will continue to be analyzed under that program.
- Dissolved Boron is not included in the facility-wide monitoring program for any well except MW-55 (upgradient of the North RO reject discharge field) and thus little data is available since October 2020. Additional monitoring of dissolved Boron is recommended prior to determining if further action is required.
- Dissolved Cobalt concentrations from the samples collected from the wells associated with both RO reject discharge fields were all below the WQCC standard. No further action is recommended for dissolved Cobalt in groundwater beneath the RO reject discharge fields.
- Dissolved Iron is not detectable in the majority of the samples collected from wells associated with both RO reject discharge fields. The sample collected from MW-29 (upgradient of the South RO reject discharge field) in October 2019 contained dissolved Iron above the WQCC standard; however, the four subsequent samples collected from this well were either not detectable for dissolved Iron or contained a concentration below the standard. No further action is recommended for dissolved Iron in groundwater beneath the RO reject discharge fields.
- Dissolved Lead concentrations from the samples collected from the wells associated with both RO reject discharge fields were all below the WQCC standard. No further action is recommended for dissolved Lead in groundwater beneath the RO reject discharge fields.
- Dissolved Manganese concentrations in MW-29 and MW-56 (upgradient of the South RO reject discharge field), MW-114 (within the South RO reject discharge field), and MW-125 (downgradient of the South RO reject discharge field) are above the WQCC standard. Concentrations of dissolved Manganese in the wells within and downgradient of the North RO reject discharge field are below the WQCC standard. Additional evaluation is recommended to determine if further action is required.
- Dissolved Uranium is not included in the facility-wide monitoring program for any well except MW-55 (upgradient of the North RO field) and thus little data is available since October 2020. Concentrations of Uranium reported in the samples collected in 2021 and 2022 from MW-55 have decreased and are below the WQCC standard. Additional monitoring of dissolved Uranium is recommended prior to determining if further action is required.
- Chloride concentrations generally appear to be decreasing in samples collected from wells within the two fields and in MW-55, which is upgradient of the North RO reject discharge field. The concentrations of Chloride appear to be increasing in samples collected from MW-29 and appear to be decreasing in samples collected from MW-56, both of which are upgradient of the South RO reject discharge field. Chloride remains a COC within groundwater beneath the fields.
- Fluoride concentrations generally appear to be decreasing in samples collected from wells within both fields. Fluoride remains a COC within groundwater beneath the fields.

- Nitrate/Nitrite concentrations generally appear to be decreasing in samples collected from wells within both fields, with only one well (MW-118 inside the North RO reject discharge field) containing a concentration above the WQCC standard for Nitrite. None of the reported concentrations exceed the WQCC standard for Nitrate. Future samples will be analyzed for Nitrate and Nitrite separately. Nitrite remains a COC within groundwater beneath the fields.
- Sulfate and TDS exceed the respective WQCC standards in more than one of the samples collected from one or more of the wells located upgradient, within, and downgradient of the two RO reject discharge fields between the cessation of discharge and the fall 2022 sampling event. Concentrations of Sulfate and TDS generally appear to be stable or decreasing slightly in samples collected from wells within the two fields. Sulfate and TDS remain COCs within groundwater beneath the fields.

A statistical evaluation of the groundwater concentrations of COCs recommended for further evaluation (Chloride, Fluoride, Nitrite, Sulfate, TDS, Boron, Manganese, and Uranium) was performed to determine whether there is a statistically significant trend in concentrations following the cessation of discharge of the RO reject stream to the fields. The statistical evaluation software ProUCL 5.2 (EPA 2022) was used to perform Mann-Kendall trend analyses of the data. **Table 2** presents a summary of the statistical evaluation of the concentrations reported between 2019 and 2021. **Appendix B** contains printouts from the ProUCL program for each well and each analyte.

1.3.3.3 *GROUNDWATER REMEDIATION RECOMMENDATIONS*

Soil remediation (phytoremediation) is proposed to reduce the mass of COCs in the shallow soil, thus removing or reducing the potential for leaching of soil COCs into shallow groundwater. Additionally, the phytoremediation will also uptake water from the shallow soil to further reduce infiltration and thus leaching of soil COCs to groundwater. Natural attenuation of groundwater COCs will continue to occur as the soil remediation progresses.

The following recommendations for groundwater are based on the current data and the updated evaluations presented in this section:

- Dissolved Boron has inadequate data to determine statistically significant trends for the period of 2019 through 2022 since this COC is not included in the facility-wide monitoring program for most of the wells. However, the most recent concentrations of dissolved Boron in the wells within both fields were below the WQCC standard. Semiannual monitoring of dissolved Boron in wells within and downgradient of the fields is recommended for a period of three (3) years to confirm natural attenuation of this COC.
- Dissolved Manganese is not currently present at concentrations above the WQCC standard in wells associated with the North RO reject discharge field. Dissolved Manganese is present at concentrations above the WQCC standard in MW-29 (upgradient of South RO reject discharge field) and MW-114 (near the former discharge point into the South RO reject discharge field). Dissolved Manganese concentrations are an order of magnitude below the standard in wells MW-115 and MW-116 (within the South RO reject discharge field). Semiannual monitoring of dissolved Manganese in wells within and downgradient of the fields is recommended for a period of three (3) years to confirm natural attenuation of this COC.
- Dissolved Uranium has inadequate data to determine statistically significant trends for the period of 2019 through 2022 since this COC is not included in the facility-wide monitoring program for most of the wells. Semiannual monitoring of dissolved Uranium in wells within and downgradient of the fields is recommended for a period of three (3) years to confirm natural attenuation of this COC.
- Chloride concentrations in wells associated with the North RO reject discharge field are statistically decreasing, except for MW-117 (near the former discharge point). Chloride concentrations in wells associated with the South RO reject discharge field show no statistically significant trend, but the concentrations from wells within the field show an overall decrease in concentrations. Natural attenuation of Chloride appears to be occurring in groundwater beneath the fields; however, recent increases in Chloride upgradient of the South RO reject discharge field appear to have resulted in a recent increase in Chloride in MW-114. Semiannual monitoring of Chloride in wells associated with the fields is recommended to evaluate natural attenuation following implementation of soil remediation and source removal.

- Fluoride concentrations in wells associated with both fields show either a decreasing or no statistically significant trend. Semiannual monitoring of Fluoride in wells associated with the fields is recommended to evaluate natural attenuation following implementation of soil remediation and source removal.
- Nitrate/Nitrite concentrations in wells associated with both fields are currently below the WQCC standard for Nitrite with the exception of the most recent concentration reported for MW-118 (within the North RO reject discharge field). No statistically significant trends were determined for the period of 2019 to 2022 with the exception of MW-55 (upgradient of the North RO reject discharge field), which has a decreasing trend. Semiannual monitoring of Nitrite and Nitrate, separately, in wells associated with the fields is recommended to confirm natural attenuation following implementation of soil remediation and source removal.
- Sulfate concentrations in wells associated with both fields show either a decreasing or no statistically significant trend. Semiannual monitoring of Sulfate in wells associated with the fields is recommended to evaluate natural attenuation following implementation of soil remediation and source removal.

- TDS concentrations in wells associated with both fields show either a decreasing or no statistically significant trend. Semiannual monitoring of TDS in wells associated with the fields is recommended to evaluate natural attenuation following implementation of soil remediation and source removal.

1.4 STAGE 2 ABATEMENT PLAN

Section 2 of this Stage 2 AP provides detailed information regarding the installation of additional downgradient monitoring wells recommended by the Stage 1 AP and approved by OCD as well as the future groundwater monitoring plan for wells associated with the RO reject discharge fields. The groundwater monitoring results will be used to evaluate the effectiveness of soil remediation and natural attenuation of groundwater COCs.

Section 3 summarizes an evaluation of remediation alternatives to address both soil and groundwater. The recommended remediation approach includes phytoremediation of shallow soils through the use of vegetation to reduce infiltration and remove COCs from the soil, which should enhance the natural attenuation of inorganic COCs in groundwater beneath the fields. Section 3 provides details on implementation of a phytoremediation pilot study to select a plant species most likely to meet the remediation goals, including development of irrigation and fertilization schedules to enhance vegetation health. The pilot study will be performed throughout both fields. Following completion of the pilot study, recommendations will be made to amend the Stage 2 AP, as necessary.

Section 4 provides a schedule for implementation of the Stage 2 AP and reports that will be submitted under this plan.

Section 5 includes a public notification proposal, as required by NMAC 20.6.2.4108.B and NMAC 20.6.2.4108.C.

Section 6 provides a financial assurance plan to conduct the actions described in this Stage 2 AP, as required by NMAC 20.6.2.4104.C.

2 WELL INSTALLATION AND MONITORING PLAN UPDATES

This section described the locations and methods for installation of additional monitoring wells described in the Stage 1 AP as well as the changes to the facility-wide monitoring program required.

2.1 WELL INSTALLATION AND SAMPLING PROCEDURES

2.1.1 WELL LOCATIONS

The Stage 1 AP recommended the installation of two additional shallow groundwater monitoring wells, as follows:

- One well approximately 350 feet northeast of MW-119 to provide downgradient of the North RO reject discharge field
- One well approximately 1,000 feet east of RW-18A to provide additional downgradient monitoring of the South RO reject discharge field

Figure 3 shows the recommended locations for these two wells. The actual locations of the wells will depend on subsurface utility clearance. If subsurface utilities require the location to be moved beyond a 50-foot radius of the planned location, OCD will be notified prior to well installation.

2.1.2 WELL INSTALLATION PROCEDURES

The installation of monitoring wells will be performed by a driller licensed in New Mexico, using hollow-stem drilling methods. The driller will be directed by an experienced geologist or environmental scientist.

2.1.2.1 WELL CONSTRUCTION METHODS

The monitoring wells will be installed within the shallow saturated zone. The depth of the wells is anticipated to be between 20 to 30 ft bgs, based on previously installed monitoring wells in the area. The minimum diameter of the borings will be approximately 8 inches to allow for the installation of 2-inch diameter PVC well casings. Each monitoring well will consist of a bottom cap, a section of 0.010-inch slotted well screen, and solid casing extending to the surface. The well screens for these monitoring wells will extend to 5 ft above the observed capillary zone. If no obvious capillary zone is present, the well screen will extend to within 5 ft of the ground surface. Well materials, including end caps, casings, and screens, will have threaded connections. Well construction materials will be kept wrapped in original packaging or plastic sheeting until used.

The monitoring well casings will be extended from the top of the well screen to 3 ft above the ground surface. An 8/16-grade sand pack will be placed in the annular space to three feet above the screened interval, and a 2-ft bentonite seal placed on top of the sand pack. A grout seal will be placed from the bentonite seal to the surface. The wells will be completed with locking steel protective casings set into a 4-ft by 4-ft by 4-inch thick concrete pad. Protective bollards will be placed around the wells, as deemed necessary by HFSNR and as space allows. The concrete pads will be approximately one inch higher than the surrounding surface and the concrete will be sloped from the protective casings to the surrounding surface. A locking J-plug cap will be placed in the casings inside the protective casing.

An experienced geoscientist or environmental scientist will observe the installation and construction of the monitoring wells, and will record measurements of various well dimensions, including distance from the ground surface to the:

- Bottom of the well
- Top of the sand pack

- Top of the bentonite seal
- Top of the screen
- Top of the well casing

The field measurements will be included in the field logbook and on the final well completion logs. The wells will be surveyed as described below.

2.1.2.2 WELL DEVELOPMENT

The monitoring wells will be developed through bailing and/or pumping to remove fine-grained materials accumulated in the sand pack and well casing until the bottom of the well casing can be reached. Conductivity, pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), turbidity, and temperature of the purged groundwater will be monitored throughout the development process using a multi-parameter water meter. The development process will be considered complete after at least 4 of the 6 parameters stabilize (i.e., less than 10 percent variation between three consecutive readings) and at least three well casing volumes are removed. The measurements and equipment used to make the measurements will be recorded in the field logbook. Equipment will be calibrated following the manufacturer's recommendations and the calibration results will be recorded in the field logbook.

The volume of purged fluids will be recorded in the field logbook. Fluids produced during development will be collected and disposed of in the refinery wastewater treatment system, upstream of the oil-water separator.

Following well development, the depth to water and total depth of each well will be measured from the top of casing and will be recorded in the field logbook. Depth to water will be measured using a battery-operated water level meter. Although no phase-separated hydrocarbons (PSH) are expected to be present in these locations, if PSH is observed during well installation or development, the depth to water and PSH will be measured using a battery-operated oil/water interface probe. The model of meter(s) used will be recorded in the field logbook.

2.1.3 GROUNDWATER SAMPLE COLLECTION PROCEDURES

2.1.3.1 SAMPLE LOCATIONS

Groundwater samples will then be collected semiannually, during the routine facility-wide monitoring events, the from the following wells:

- North RO Reject Discharge Field:
  - Upgradient: MW-55, MW-140, MW-141
  - Within Field: MW-117, MW-118, MW-119
  - Downgradient: MW-142, MW-143, new well northeast of MW-119 (well number to be determined)
- South RO Reject Discharge Field:
  - Upgradient: MW-29, MW-40, MW-56
  - Within Field: MW-114, MW-115, MW-116
  - Downgradient: MW-125, RW-18A, MW-144, new well east of RW-18A (well number to be determined)

The locations of the monitoring wells associated with the former RO reject discharge fields are shown in **Figure 3**.

Low-flow sampling procedures, as described in the NMED Position Paper "Use of Low-Flow and Other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring" (NMED 2001), will be used to collect the groundwater sample. Low-flow purging will be continued until the field measurements of at least 4 of the 6 water quality parameters, including conductivity, pH, DO, ORP, turbidity, and temperature, stabilize (less than 10 percent variation for three consecutive readings). Equipment used to monitor water quality parameters will be calibrated following the manufacturer's recommendations, and the type (make and model) of equipment used and the calibration results will be recorded in the field logbook. Purge parameter readings will be documented in the field sampling logbook and will be included in the well installation report.

Dedicated tubing will be used in each well to prevent the potential for cross-contamination. Following completion of purging, groundwater samples will be collected directly into the laboratory-provided sample

containers. Disposable filters will be used to collect samples that will be analyzed for dissolved metals. The samples that do not require field filtering will be collected first, then the filter will be attached to the tubing to collect the dissolved metals sampled. The filters will be removed from the tubing prior to placing it into the well casing. Used filters will be disposed of as trash in appropriate containers within the refinery.

Sample containers will be labeled and placed into appropriate containers (coolers) with ice for shipment to the analytical laboratory under proper chain of custody.

2.1.3.2 GROUNDWATER ANALYTICAL METHODS

The groundwater samples will be analyzed for the following COCs and methods for the purposes of the Stage 2 AP:

- Dissolved (field-filtered) metals by Methods 6010 or 6020:
  - Boron
  - Manganese
  - Uranium
- Chloride by Method 300 or 9056
- Fluoride by Method 300 or 9056
- Nitrate by Method 300 or 9056
- Nitrite by Method 300 or 9056
- Sulfate by Method 300 or 9056
- TDS by Method 2540

Additional analyses will be included as required for the facility-wide monitoring program.

The laboratory will be provided the screening standards for groundwater samples and will make every possible attempt to maintain method detection limits that are less than or equal to the screening standards. It should be noted that this may not be possible if a sample contains constituents at concentrations high enough to require sample dilution.

2.1.3.3 GROUNDWATER QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Quality assurance/quality control (QA/QC) samples will be collected to monitor the validity of the groundwater sample collection procedures. The following samples will be collected for QA/QC purposes:

- Field duplicates will be collected at a rate of 10 percent, or 1 field duplicate for every 10 groundwater samples, with a minimum of 1 field duplicate sample to be collected during the implementation of this work plan. Field duplicates will be analyzed for the same constituents as the parent sample.
- Equipment blanks will be collected from non-dedicated sampling apparatus at a frequency of 5 percent, or 1 equipment blank for every 20 groundwater samples collected, with a minimum of one equipment blank per day. Equipment blank samples will be analyzed for the same constituents as the sample associated with the equipment blank (sample collected immediately prior to the equipment blank). When dedicated sampling materials are used, such as dedicated tubing, no equipment blank samples are required.
- Trip blanks will not be required for the RO reject discharge fields groundwater monitoring since none of the COCs included volatile organic compounds (VOCs).

2.2 GROUNDWATER MONITORING PLAN

The facility-wide groundwater monitoring work plan will be updated to reflect the groundwater sampling outlined in Section 2.1. Groundwater samples will be collected and analyzed semiannually as described in Section 2.1.3 for a period of at least 3 years to determine if the COC concentrations continue to attenuate following cessation of discharge of the RO reject stream to the fields.

3 EVALUATION OF REMEDIATION ALTERNATIVES

As stated above, the primary goal of this Stage 2 AP is to evaluate and select an appropriate method to reduce or minimize the migration of inorganic COCs from the shallow soils within the former RO reject discharge fields to the shallow groundwater. The removal or minimization of migration of inorganic COCs from the shallow soils should enhance the natural attenuation of COCs in groundwater. Shallow soil COCs include Iron, Manganese, Fluoride, and Sulfate.

3.1 POTENTIAL REMEDIATION ALTERNATIVES

There are limited remediation alternatives that will minimize leaching of inorganic chemicals through the unsaturated zone. These alternatives include soil stabilization or certain phytotechnology mechanisms, that either reduce infiltration by evapotranspiration, extract the chemicals by phytoextraction, or sequester the chemical in the roots of the plant. Other alternatives that would meet the remediation goal include installing an impervious cover and solidification of the soil; however, because of the size of the former RO reject discharge fields and feasibility of implementation, neither of these alternatives are currently being considered.

3.1.1 SOIL STABILIZATION

The Stage 1 AP concluded that fluoride was the COC of most concern based on the concentrations reported in the soil samples analyzed using the synthetic precipitation leaching procedure (SPLP) and groundwater concentrations. Thus, soil stabilization of fluoride was also considered as a remediation alternative. Fluoride in soil is primarily associated with the soil colloid or clay fraction and its mobility in soil is highly dependent on the soil's sorption capacity, which varies with pH, the types of sorbents present, and soil salinity. The clay and organic carbon content as well as the pH of soil are primarily responsible for the retention of fluoride in soils. In soils, fluoride is predominantly combined with aluminum or calcium. Fluoride forms its most stable bonds with iron, aluminum, and calcium. Labile fluoride is held by soil components that contain these elements, including clay minerals, calcium and magnesium compounds, and iron and aluminum compounds (Omueti and Jones 1977). Macintire (Macintire 1950) also reported that some soils, especially those with relatively high calcium content, were very effective in fixing fluoride. The soil within the fields is alkaline in nature with a high calcium content and elevated iron concentrations. Thus, soil stabilization does not appear to be a feasible remediation alternative.

3.1.2 PHYTOTECHNOLOGY MECHANISMS

The natural physiological processes of plants are the basis for the various phytotechnology mechanisms that can serve as remediation alternatives for the former RO reject discharge fields. Certain species of vegetation have the capability to take up and transpire, and thereby remove, significant volumes of surface water, soil pore water and/or groundwater. This mechanism is termed phytohydraulics. The vertical migration of water from the surface downward can be limited by the water interception capacity of the aboveground canopy and subsequent evapotranspiration through the root system. As this water is consumed by the plants, dissolved contaminants can be sequestered in the roots (phytosequestration) or taken up into the plant through the roots and translocate the contaminants to the aboveground shoots or leaves of the plant (phytoextraction). For contaminants to be extracted by plants, the constituent must be dissolved in the soil water and come into contact with the plant roots through the transpiration stream. Thus, phytoremediation is considered a preferred remediation alternative.

As the phytoremediation proceeds, the concentrations of COCs in the soil and soil pore water will decrease and the potential for leaching of COCs to groundwater will also decrease. Natural attenuation of COCs in groundwater should then occur and the concentrations of COCs in the groundwater should return to similar levels observed in upgradient (background) groundwater.

3.2 PHYTOREMEDIATION PILOT STUDY DESIGN

Although a preliminary phytoremediation study was performed with the results included in the Stage 1 AP report, that study was limited and did not provide enough data to design a full phytoremediation plan. This section describes a stepwise approach to designing a phytoremediation pilot study including performing specific agronomic soil analysis to assist in species selection, as well as amendment and fertilizer needs, and provides further evaluation of potential species and provides details of additional pilot study activities that will be conducted prior to implementation of the full-scale remediation.

3.2.1 SOIL AND SITE SUITABILITY

The initial step in designing the phytoremediation pilot study will be to collect appropriate soil data to evaluate the plant growth conditions of the fields. There are limited data on the agronomic quality of the soil in the former RO reject discharge fields; therefore, additional soil information will be collected to help with species selection and evaluate the plant growth potential of the soil. Previous investigations of the RO fields have provided limited data on the soil profile from the surface through the capillary fringe. Soil samples are needed at specific depths (0–1, 1–2, and 2–4 feet) and will be used to assess the agronomic characteristics of the site soils. The results of these analyses will also assist in designing a fertility management program for the pilot study.

Samples will be collected from three locations in each of the two former RO reject discharge fields at the three specified depths. The three samples from a specific depth will be composited and a composite sample will be submitted for laboratory analysis. Thus, each field will have three soil samples (composite from each depth interval) that will be submitted to an agricultural laboratory for the following agronomic analysis:

- Soil Organic Matter – Method S-9.20
- Soil pH – Method S-2.20
- Cation Exchange Capacity – Method S-10.10
- Soil Nitrate-Nitrogen – Method S-3.10
- Extractable Soil Phosphorus and Soil Bases
  - Potassium, Calcium, Magnesium and Sodium - – Method S-5.11
  - Phosphorus – Method S-4.40
  - Soil Micronutrient
  - Zinc, Manganese, Iron, Copper, and Boron - – Method S-6.12
  - Soil Chloride – Method S-12.10
- Extractable Aluminum – Method S-15.10
- Extractable Soil Sulfate-Sulfur – Method S - 11.10
- Soil Ammonium Nitrogen – Method S-3.50
- Saturated Paste Extraction
  - Saturation Percentage – Method S-1.00
  - Saturation Paste Chloride Method S-1.40
  - Saturation Paste Boron – Method S-1.50
  - Saturation Paste Calcium, Magnesium, Sodium and SAR– Method S-1.60
  - Saturation Paste Soluble Salts – Method S-1.20

The six soil samples will be analyzed for the above constituents using methods approved and monitored by **North American Proficiency Testing Program** for agricultural analysis of soils.

The analytical results will be discussed with the agronomic experts familiar with soils in Eddy County to assist with development of the fertility management plan.

3.2.2 POTENTIAL SPECIES

The second step in the design process is to identify potential species that are suitable based on soil characteristics and meet the criteria for phytoremediation at the site. The historic average annual rainfall in Artesia is about 11.3 inches and the average annual evapotranspiration is reported at 75 inches with most of the evapotranspiration occurring during the April to November frost free season. Candidate species should have natural water use that exceeds the annual rainfall of the area. Several species have been identified as potential candidates for including in the phytoremediation pilot study. Selection criteria are based on the plant's ability to:

- reduce infiltration into the soil profile by interception,
- have water use that exceeds evapotranspiration from rainfall,
- sequester soil COCs or transport chemicals dissolved in the pore water into the aboveground biomass of the plant through transpiration, and
- are native or will effectively grow in the Artesia, New Mexico area.

Potential candidate species include:

- Sudan Grass
- Western Wheat Grass
- Indian Grass
- Tall Wheat Grass

Additional species may be evaluated based on the results of the soil chemical analysis performed as the initial step in the design process and consultation with local agronomic experts.

3.2.3 PILOT STUDY PLOT DESIGN

Assuming the candidate species are suitable based on soil characteristics, the pilot study design will be finalized including a fertility management plan. The fertility management plan will consist of applying fertilizers at agronomic rates for the selected species. Agronomic rates are based on the actual reported plant uptake of specific plant nutrients including nitrogen, phosphorus and potassium and will also consider timing of applications to minimize potential for leaching of applied nutrients. The pilot study will consist of testing two of the candidate species in the North RO reject discharge fields and the remaining two in the South RO reject discharge field. If other species are identified during the evaluation process, they will be added in proportion to each of the fields. The North RO reject discharge field is approximately 25.3 acres and the South RO reject discharge field is approximately 28.9 acres in size.

3.2.3.1 IRRIGATION WATER SUPPLY

The selected species will require addition of water during the growing season to maintain a vegetative cover that will minimize infiltration and maximize sequestration of soil COCs. As an example, irrigated sorghum and Sudan grass grown as part of a performance test at the New Mexico Agricultural Service Center in Artesia required about an additional 28 inches of irrigation water during the growing season to produce a 2-cutting crop. Native species may require less water. Irrigation requirements for these species will be monitored by the soil moisture probes installed in the field (see Section 3.2.3.2).

The refinery obtains water from a mixture of water supply wells and the City of Artesia public water. Both the city water and the water supply wells will be evaluated as potential irrigation water sources, as needed. A sample of the potential irrigation water source(s) will be analyzed for the following:

- pH (field equipment)
- Electrical Conductivity (field equipment)
- TDS by Method 2540
- Alkalinity by Method 2320
- Carbonate
- Bicarbonate
- Anions by Method 300 or 9056

- Chloride
- Fluoride
- Sulfate-Sulfur
- Nitrate (as Nitrogen) by Method 300 or 9056
- Dissolved Metals by Method 6010 or 6020:
- Boron
- Calcium
- Copper
- Iron
- Magnesium
- Manganese
- Potassium
- Sodium
- Zinc

The results of the water sampling will be used to determine the best water source for irrigation during the pilot study. A different source may be used for the two different fields, depending on availability and method selected to apply irrigation water.

3.2.3.2 *FINAL DESIGN*

The pilot study design will be finalized based on the results of soil and water analysis described above. The agronomic data will provide information on nutrient needs and soil and water constraints. The final design will include general plans and specifications for site preparation including removal of existing vegetation (if needed), planting guidelines, and management protocols that need to be implemented once the pilot study plots are established. The final design will also include details on the irrigation system that will be used during the pilot study.

Existing soil moisture probes installed during the Stage 1 AP will be evaluated to determine if they are still functioning. These probes will be used and if needed, additional soil moisture probes will be installed, to monitor soil moisture and electrical conductivity (EC) at multiple depths in the soil profile. The number of probes and locations for the probes will be determined based on the evaluation of the existing probes. The data will be used to evaluate the need for irrigation and to monitor soil moisture changes with depth over time. The Stage 1 AP soil moisture probes were placed at depths of 2, 5, and 10 feet bgs at each location. If additional probes (or replacement probes) need to be installed, a hand auger or a direct-push rig will be used to advance a boring to a depth of 10 feet bgs at each location, then the probes will be placed at the desired depth according to the manufacturer's installation instructions. Each probe will be attached to a solar-powered data logger, and data will be automatically downloaded at regular intervals.

Soil moisture probes will remain in place throughout the pilot study as well as during implementation of the full-scale phytoremediation, and data will continue to be collected to evaluate the vadose zone moisture.

3.3 PHYTOREMEDIATION PILOT STUDY IMPLEMENTATION

A local agricultural contractor will be retained to install and manage the plots. Plans and specifications developed as part of the final design will provide details as to the plant material, planting techniques including compost and fertilizer requirements, irrigation design, and follow up maintenance. It should be noted that after the system is implemented, ongoing operation, maintenance, and monitoring will be conducted to ensure the vegetation develops vigorous and deep root systems.

The following activities will be conducted throughout the pilot study:

- Weekly monitoring during the growing season. Monitoring inspections will include evaluation of plant health and growth characteristics, pests, and weed competition. These activities will be performed by field technicians trained to perform the specific monitoring tasks, with periodic oversight by a certified crop advisor or agronomist to address growth issues or pest and disease issues.

- Pest monitoring and weed control since pests can decimate a crop, and weeds provide unnecessary competition for water and nutrients that are important for plant growth.
- Periodic fertilization based on soil analysis. At a minimum, fertilization will be performed annually. Irrigation water will be accounted for when assessing annual fertility needs. Liquid fertilizers may be applied through the irrigation system or granular material may be broadcast on the surface, depending on the fertilization requirements.
- Irrigation will be required to establish the vegetation and during growing season when soil moisture content drops below the ideal range for the species. The level of irrigation oversight will be dependent on the selected water source and the type of irrigation system selected.
- Evaluation of plant growth will be conducted to determine if or when the plants need to be harvested or cut back. Vegetation that is harvested or cut will be removed from the fields and contained, then representative samples will be collected for analysis of soil and groundwater COCs. The vegetation will be characterized for offsite disposal and will not be used as food for humans or livestock.

4 SCHEDULE AND REPORTING

4.1 SCHEDULE

In order to maximize the growing season, the phytoremediation pilot study will be scheduled such that the planting phase will begin in the spring. The following is a tentative schedule for the pilot study:

- February 28, 2023: OCD approval of Stage 2 AP received assumed
- March 31, 2023: collect soil and water samples for laboratory analyses; install monitoring wells and moisture probes
- March 1 to May 31, 2023: finalize pilot study design based on laboratory analytical results and prepare detailed implementation specifications to include irrigation system selection, and maintenance guidelines
- April to May 31, 2023: select implementation contractor, prepare fields including installation of moisture probes (as needed), confirm seed sources
- June 2023: plant pilot study species
- June to October 2023: operate and maintain pilot study
- October 2023: harvest / cut plants from both fields, plant winter crop on field where Sudan grass was tested
- November 2023 to February 2024: finalize full scale phytoremediation design and schedule for implementation

Adjustments to the schedule may be required and any changes will be communicated to OCD.

4.2 REPORTING

Status reports will be prepared for submittal to OCD throughout the phytoremedation pilot study. The reports will include:

- Quarterly status reports, beginning in July 2023, to describe the activities completed during the previous three months.
- Final pilot study design, to be submitted prior to implementation of the pilot study.
- Final report of pilot study, to be submitted within 90 days of the completion of the pilot study. The final report will include recommendations for the full-scale phytoremediation system.

5 PUBLIC NOTIFICATION

A draft public notification is provided in **Appendix C**. The draft public notification includes the information required by NMAC 20.2.4108.B and NMAC 20.2.4108.C. HFSNR will issue the public notification upon approval by OCD.

6 FINANCIAL ASSURANCE PLAN FOR CLOSURE/POST-CLOSURE CARE

The Stage 2 AP activities outlined above and the associated financial assurance cost estimates meet the requirements of NMAC 20.2.4104.C. **Appendix D-1** provides a financial assurance summary cost estimate for the activities described in this Stage 2 AP.

Cost estimates for the tasks to be performed during 2023, which include installation of monitoring wells and moisture probes, as well as the phytoremediation pilot study, are detailed in Appendix D-2 and D-4. The cost estimate for groundwater monitoring assumes the post-closure groundwater monitoring program will continue for 30 years and is detailed in Appendix D-3. A detailed cost estimate for years 2 and 3 of the phytoremediation implementation program is included as Appendix D-5.

HFSNR will provide the financial assurance for closure and post-closure activities within 30 days of OCD approval of this Stage 2 AP. The Stage 2 AP and financial assurance estimates are subject to change pending the results of the phytoremediation pilot study and groundwater monitoring results.

REFERENCES

- Macintire 1950. WH Mcintire, in “Air versus soil as channels for fluoric contamination of vegetation in two Tennessee locates”. Edited by McCabe, LC. pp. 53-58 of Proceedings of U.S. technical conference on air pollution, Interdepartmental committee on air pollution – Washington D.C. 1950.
- NMED 2001. Use of Low-Flow and Other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring, Position Paper. October 30, 2001.
- OCD 2017. Discharge Permit GW-028. May 25, 2017.
- OCD 2018. Discharge Permit GW-028 Modification, December 14, 2018.
- OCD 2022. Discharge Permit GW-028. August 16, 2022.
- Omueti and Jones 1977. Omueti. J. A. I. and Jones, R. L. Fluoride adsorption by Illinois soils. Journal of Soil Sciences. 28:564-572. 1977.
- TRC 2021. 2020 Annual Groundwater Report. February 26, 2021.
- TRC 2022. 2021 Annual Groundwater Report. February 28, 2022.
- Wood 2019a. Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields Discharge Permit GW-028. March 21, 2019.
- Wood 2019b. Amendment of the March 2019 Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields. May 24, 2019.
- Wood 2020. Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Final Report. November 19, 2020.

TABLES

Table 1 - Summary of Groundwater Analytical Results Screened Using WQCC Standards

Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan Work Plan

					Total Metals							Dissolved Metals						
Analyte Group:																		
Analyte:					Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:					0.01	0.75	0.05	1.0	0.015	0.2	0.03	0.01	0.75	0.05	1.0	0.015	0.2	0.03
CGWSL Source:					WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH	WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH
Location	**Well**	**Event**	**Date**	**Type**														
North RO Field																		
Upgradient	MW-55	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00615	**1.07**	<0.000260	0.0207 J	<0.0020 BJU	0.132	**0.0513**	0.00595	**1.00**	<0.000260	<0.0141	<0.0020 BJU	0.126	**0.0504**
			Oct-19	FD	0.00618	**1.03**	<0.000260	0.0288 J	<0.000240	0.133	**0.0511**	0.00605	**1.01**	<0.000260	<0.0141	<0.0020 BJU	0.128	**0.0528**
		Stage 1 AP Quarter 3	Jan-20	N														
			Jan-20	FD														
		Stage 1 AP Quarter 4	Jun-20	N	0.00608	**0.992**	<0.000477	<0.0458	<0.00249	0.142	**0.0548**	0.00663	**0.951**	<0.000477	<0.0458	<0.00249	0.148	**0.0549**
		2nd Semiannual 2020	Oct-20	N	0.00684	0.695	<0.000477	0.0508 J	<0.00249	0.168	**0.0364**							
		1st Semiannual 2021	Apr-21	N	0.00683	0.631	0.000304 J	<0.0281	0.00103 J	0.185	**0.0314**	0.00628	0.644	0.000223 J	<0.0281	0.00144 J	0.171	0.0292
		2nd Semiannual 2021	Sep-21	N	0.00611	0.608	0.000311 J	<0.0281	<0.000849	**0.202**	0.0272							
		1st Semiannual 2022	Apr-22	N	0.00633	0.55	0.000316 J	<0.0281	<0.000849	**0.211**	0.0201	0.00679	0.555	0.000849 J	<0.0281	<0.000849	**0.206**	0.0188
		2nd Semiannual 2022	Oct-22	N	0.0055	0.449	0.00341	<0.0281	<0.000849	**0.35**	0.0215							
	MW-140	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00241	0.412	<0.000260	0.224	<0.0020 BJU	0.102	**0.0318**	0.00247	0.395	<0.000260	<0.0141	<0.0020 BJU	0.0975	**0.0325**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00262	0.468	<0.000477	<0.0458	<0.00249	0.0636	**0.0359**	0.00265	0.445	<0.000477	<0.0458	<0.00249	0.00615	**0.0348**
			Jun-20	FD	0.00252	0.460	<0.000477	<0.0458	<0.00249	0.0678	**0.0323**	0.00273	0.442	<0.000477	<0.0458	<0.00249	0.0564	**0.0336**
		2nd Semiannual 2020	Oct-20	-														
		1st Semiannual 2021	Apr-21	-														
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	-														
		2nd Semiannual 2022	Oct-22	-														
	MW-141	Stage 1 AP Quarter 1	Jul-19	N														
			Jul-19	FD														
		Stage 1 AP Quarter 2	Oct-19	N	0.00389	0.215	0.000333 J	0.132	<0.0020 BJU	0.00939	0.0280	0.00360	0.218	0.000308 J	0.0159 J	<0.000240	0.00925	0.0288
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00310 B J	0.196 J	<0.000477	<0.0458	<0.00249	0.00205 J	0.0244	0.00297	0.200 J	<0.000477	<0.0458	<0.00249	0.00132 J	0.0259
		2nd Semiannual 2020	Oct-20	-														
		1st Semiannual 2021	Apr-21	-														
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	-														
		2nd Semiannual 2022	Oct-22	-														
In Field	MW-117	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.0025	0.145 J	<0.000260	0.0611 J	<0.000240	<0.0050 BJU	0.0176	0.00243	0.147 J	<0.000260	0.0195 J	<0.000240	<0.0050 BJU	0.0172
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00248	0.143 J	<0.000477	0.261	<0.00249	0.00392 J	0.0152 J	0.00246	0.131 J	<0.000477	<0.0458	<0.00249	0.00158 J	0.0160 J
		2nd Semiannual 2020	Oct-20	N	0.00255			0.132	<0.00249	0.00353 J								
		1st Semiannual 2021	Apr-21	N	0.0026			0.112	0.00109 J	0.00472 J		0.00263			<0.0281	<0.000849	0.00408 J	
		2nd Semiannual 2021	Sep-21	N	0.00286			0.144	0.00213	0.00367 J								
		1st Semiannual 2022	Apr-22	N	0.00285			<0.0281	<0.000849	0.00412 J		0.00353			<0.0281	<0.000849	0.00305 J	
		2nd Semiannual 2022	Oct-22	N	0.00265			0.0455 J	<0.000849	0.00419 J								
	MW-118	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00871	0.352	<0.000260	0.127	<0.000240	<0.0050 BJU	**0.0371**	0.00863	0.366	<0.000260	<0.0141	<0.0020 BJU	<0.0050 BJU	**0.0370**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00753	0.381	<0.000477	0.137	<0.00249	0.00167 J	**0.0360**	0.00787	0.399	<0.000477	<0.0458	<0.00249	<0.00132	**0.0390**
		2nd Semiannual 2020	Oct-20	N	0.0077			0.249	<0.00249	0.00273 J								
		1st Semiannual 2021	Apr-21	N	0.00732			0.0458 J	<0.000849	<0.000704		0.00732			<0.0281	<0.000849	<0.000704	
		2nd Semiannual 2021	Sep-21	N	0.00641			0.0652 J	<0.000849	0.00119 J								
		1st Semiannual 2022	Apr-22	N	0.00634			0.117	<0.000849	0.00124 J		0.00614			0.0339 J	<0.000849	<0.000704	
		2nd Semiannual 2022	Oct-22	N	0.00621			0.0611 J	<0.000849	0.00142 J								

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					Total Metals							Dissolved Metals						
Analyte Group:																		
Analyte:					Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:					0.01	0.75	0.05	1.0	0.015	0.2	0.03	0.01	0.75	0.05	1.0	0.015	0.2	0.03
CGWSL Source:					WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH	WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH
Location	**Well**	**Event**	**Date**	**Type**														
	MW-119	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00430	0.334	0.000429 J	0.805	<0.0020 BJU	0.0188	**0.0322**	0.00388	0.338	<0.000260	0.0215 J	<0.0020 BJU	0.00524	**0.0325**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00376	0.482	<0.000477	<0.0458	<0.00249	0.00633	**0.0451**	0.00384	0.457	<0.000477	<0.0458	<0.00249	0.00643	**0.0467**
		2nd Semiannual 2020	Oct-20	N	0.00451			0.0836 J	<0.00249	0.0114 B								
		1st Semiannual 2021	Apr-21	N	0.00449			0.276	<0.000849	0.0119		0.00435			<0.0281	<0.000849	0.00426 J	
		2nd Semiannual 2021	Sep-21	N	0.00343			0.0477 J	<0.000849	0.00435 J								
		1st Semiannual 2022	Apr-22	N	0.00442			0.206	<0.000849	0.0144		0.00393			<0.0281	<0.000849	0.00231 J	
		2nd Semiannual 2022	Oct-22	N	0.00414			0.0524 J	<0.000849	0.00497 J								
Downgradient	MW-142	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00364	0.381	0.000744 J	**1.55**	<0.0020 BJU	0.0257	**0.0371**	0.00317	0.380	0.000525 J	0.0160 J	<0.000240	0.0177	**0.0369**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00327	0.430	<0.000477	<0.0458	<0.00249	0.0140	**0.0410**	0.00336	0.402	<0.000477	<0.0458	<0.00249	0.0130	**0.0401**
		2nd Semiannual 2020	Oct-20	-														
		1st Semiannual 2021	Apr-21	-														
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	-														
		2nd Semiannual 2022	Oct-22	-														
	MW-143	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00338	**0.870**	0.00239	0.419	<0.0020 BJU	0.109	**0.0491**	0.00336	**0.848**	0.00248	0.0249 J	<0.0020 BJU	0.107	**0.0484**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00339	**0.865**	0.000864 J	<0.0458	<0.00249	0.0511	**0.0468**	0.00318	**0.839**	0.000816 J	<0.0458	<0.00249	0.0432	**0.0473**
		2nd Semiannual 2020	Oct-20	-														
		1st Semiannual 2021	Apr-21	-														
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	-														
		2nd Semiannual 2022	Oct-22	-														
South RO Field																		
Upgradient	MW-29	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	**0.0157**	**1.33**	<0.000260	**4.37**	0.00892	**0.579 V**	0.0190	**0.0143**	**1.26**	<0.000260	**4.05**	<0.0020 BJU	**0.574 V**	0.0189
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00746	**1.10**	<0.000477	<0.0458	<0.00249	**0.234**	0.00789 J	0.00674	**1.10**	<0.000477	<0.0458	<0.00249	**0.229**	0.00811 J
			Jun-20	FD	0.00772	**1.12**	<0.000477	0.0704 J	<0.00249	**0.223**	<0.00754	0.00735	**1.06**	<0.000477	<0.0458	<0.00249	**0.214**	0.00779 J
		2nd Semiannual 2020	Oct-20	N	**0.017**			0.294	<0.00249	**0.233 V**								
		1st Semiannual 2021	Apr-21	N	**0.0433**			**1.62**	0.00137 J	**0.414**		**0.0165**			0.217	<0.000849	**0.456**	
		2nd Semiannual 2021	Sep-21	N	**0.104**			**25.5**	0.00119 J	**1.4**								
		1st Semiannual 2022	Apr-22	N	**0.011**			0.801	<0.000849	**0.385**		0.00923			0.373	<0.000849	**0.381**	
		2nd Semiannual 2022	Oct-22	N	**0.103**			**12.9**	0.00265	**1.16**								
	MW-40	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00106 J	0.311	<0.000260	0.270 J	<0.0020 BJU	0.0233	0.000622 J	0.000851 J	0.292	<0.000260	0.0179 J	<0.0020 BJU	0.0238	0.000544 J
			Oct-19	FD	0.000878 J	0.300	<0.000260	0.135 J	<0.0020 BJU	0.0239	0.000602 J	0.000829 J	0.305	<0.000260	0.0236 J	<0.0020 BJU	0.0243	0.000538 J
		Stage 1 AP Quarter 3	Jan-20	N														
			Jan-20	FD														
		Stage 1 AP Quarter 4	Jun-20	N	<0.000735	0.315	<0.000477	0.145	<0.00249	0.0255	<0.00754	<0.000735	0.308	<0.000477	<0.0458	<0.00249	0.0266	<0.00754
		2nd Semiannual 2020	Oct-20	-														
		1st Semiannual 2021	Apr-21	-														
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	-														
		2nd Semiannual 2022	Oct-22	-														

Table 1 - Summary of Groundwater Analytical Results Screened Using WQCC Standards

Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan Work Plan

					Total Metals							Dissolved Metals						
Analyte Group:																		
Analyte:					Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:					0.01	0.75	0.05	1.0	0.015	0.2	0.03	0.01	0.75	0.05	1.0	0.015	0.2	0.03
CGWSL Source:					WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH	WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH
Location	**Well**	**Event**	**Date**	**Type**														
	MW-56	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00515	0.284	0.00698	<0.0141	<0.0020 BJU	**0.306**	0.0178	0.00524	0.269	0.00699	<0.0141	<0.0020 BJU	**0.304**	0.0173
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00552	0.253	0.00786	<0.0458	<0.00249	**0.302**	0.0172 J	0.00521	0.259	0.00813	<0.0458	<0.00249	**0.295**	0.0175 J
		2nd Semiannual 2020	Jun-20	N	0.00529			<0.0489	<0.00249	**0.302**		0.00665			<0.0489	<0.00249	**0.342**	
		1st Semiannual 2021	Apr-21	N	0.00529			<0.0281	0.00105 J	**0.287**		0.00538			<0.0281	0.00128 J	**0.274**	
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	N	0.00501			0.0459 J	<0.000849	**0.219**		0.00541			<0.0281	<0.000849	**0.207**	
		2nd Semiannual 2022	Oct-22	-														
In Field	MW-114	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00295	0.118 J	0.00643	<0.0141	<0.000240	**1.03**	0.0107	0.00286	0.122 J	0.00604	<0.0141	<0.0020 BJU	**0.972**	0.0108
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00353	0.121 J	0.00618	<0.0458	<0.00249	**0.959**	0.00950 J	0.00364	0.109 J	0.00583	<0.0458	<0.00249	**0.927**	0.00917 J
		2nd Semiannual 2020	Oct-20	N	0.004			<0.0489	<0.00249	**0.925**								
		1st Semiannual 2021	Apr-21	N	0.00459			0.34	<0.000849	**0.834**		0.00460			<0.0281	<0.000849	**0.889**	
		2nd Semiannual 2021	Sep-21	N	0.00483			<0.0281	<0.000849	**0.842**								
		1st Semiannual 2022	Apr-22	N	0.00377			<0.0281	<0.000849	**0.695**		0.00388			<0.0281	<0.000849	**0.746**	
		2nd Semiannual 2022	Oct-22	N	0.00529			<0.0281	<0.000849	**0.89**								
	MW-115	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00443	**0.780**	0.00109 J	0.286	<0.0020 BJU	0.155	**0.0793**	0.00405	**0.767**	0.000362 J	<0.0141	<0.0020 BJU	0.120	**0.0825**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00400	0.520	<0.000477	<0.0458	<0.00249	0.125	**0.0953**	0.00430	0.564	<0.000477	<0.0458	<0.00249	0.109	**0.0947**
		2nd Semiannual 2020	Oct-20	N	0.00435			<0.0489	<0.00249	0.0983								
		1st Semiannual 2021	Apr-21	N	0.00467			<0.140	<0.000849	0.0602		0.00407			<0.0281	<0.000849	0.0444	
		2nd Semiannual 2021	Sep-21	N	0.00433			<0.0281	<0.000849	0.0334								
		1st Semiannual 2022	Apr-22	N	0.00444			<0.0281	<0.000849	0.0593		0.00458			<0.0281	<0.000849	0.0405	
		2nd Semiannual 2022	Oct-22	N	0.00533			<0.0281	<0.000849	0.0465								
	MW-116	Stage 1 AP Quarter 1	Jul-19	N														
			Jul-19	FD														
		Stage 1 AP Quarter 2	Oct-19	N	0.00314	0.215	0.00231	0.0285 J	<0.000240	0.00834	0.0268	0.00323	0.205	0.00233	<0.0141	<0.000240	0.00748	0.0271
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00292	0.227	0.00240	0.0746 J	<0.00249	0.0128	0.0273	0.00290	0.220	0.00254	<0.0458	<0.00249	0.00781	0.0287
		2nd Semiannual 2020	Oct-20	N	0.00300			0.0902 J	<0.00249	0.015 B								
		1st Semiannual 2021	Apr-21	N	0.00289			0.366	<0.000849	0.0199		0.00311			<0.0281	<0.000849	0.0105	
		2nd Semiannual 2021	Sep-21	N	0.00306			0.0549 J	<0.000849	0.0227								
		1st Semiannual 2022	Apr-22	N	0.00296			0.0323 J	<0.000849	0.0366		0.00283			<0.0281	<0.000849	0.0308	
		2nd Semiannual 2022	Oct-22	N	0.00373			0.0502 J	<0.000849	0.0916								
Downgradient	MW-125	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00363	0.519	0.00633	0.0167 J	<0.000240	**0.418**	**0.0383**	0.00362	0.509	0.00526	<0.0141	<0.000240	**0.399**	**0.0382**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00357	0.519	0.00760	<0.0458	<0.00249	**0.413**	**0.0351**	0.00342	0.498	0.00557	<0.0458	<0.00249	**0.389**	**0.0365**
		2nd Semiannual 2020	Oct-20	N	0.00367			<0.0489	<0.00249	**0.43**								
		1st Semiannual 2021	Apr-21	N	0.00388			0.0682 J	<0.000849	**0.444**		0.0033			<0.0281	<0.000849	**0.402**	
		2nd Semiannual 2021	Sep-21	N	0.00331			<0.0281	<0.000849	**0.413**								
		1st Semiannual 2022	Apr-22	N	0.00343			<0.0281	<0.000849	**0.387**		0.00371			<0.0281	<0.000849	**0.411**	
		2nd Semiannual 2022	Oct-22	N	0.00348			<0.0281	<0.000849	**0.408**								

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Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan Work Plan

					Total Metals							Dissolved Metals						
Analyte Group:																		
Analyte:					Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:					0.01	0.75	0.05	1.0	0.015	0.2	0.03	0.01	0.75	0.05	1.0	0.015	0.2	0.03
CGWSL Source:					WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH	WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH
Location	**Well**	**Event**	**Date**	**Type**														
	MW-144	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00338	0.216	0.000788 J	0.468	<0.0020 BJU	0.0365	0.0180	0.00320	0.211	0.000698 J	<0.0141	<0.0020 BJU	0.0272	0.0185
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00361	0.237	0.000816 J	<0.0458	<0.00249	0.0216	0.0168 J	0.00375	0.224	0.000874 J	<0.0458	<0.00249	0.0170	0.0187 J
		2nd Semiannual 2020	Oct-20	-														
		1st Semiannual 2021	Apr-21	-														
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	-														
		2nd Semiannual 2022	Oct-22	-														
	RW-18A	Stage 1 AP Quarter 1	Jul-19	N														
		Stage 1 AP Quarter 2	Oct-19	N	0.00281	0.675	<0.000260	0.556	<0.0020 BJU	0.00933	**0.0583**	0.00271	0.648	<0.000260	0.0519 J	<0.0020 BJU	0.00668	**0.0566**
		Stage 1 AP Quarter 3	Jan-20	N														
		Stage 1 AP Quarter 4	Jun-20	N	0.00258	0.542	<0.000477	<0.00458	<0.00249	0.00320 J	**0.0527**	0.00280	0.506	<0.000477	<0.00458	<0.00249	0.00265 J	**0.0565**
		2nd Semiannual 2020	Oct-20	-														
		1st Semiannual 2021	Apr-21	-														
		2nd Semiannual 2021	Sep-21	-														
		1st Semiannual 2022	Apr-22	-														
		2nd Semiannual 2022	Oct-22	-														

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Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan Work Plan

Analyte Group:					**General Chemistry**											
Analyte:					Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:					--	250	1.6	--	1.0	--	--	600	--	--	--	1,000
CGWSL Source:					--	WQCC Dom	WQCC HH	--	WQCC HH[a]	--	--	WQCC Dom	--	--	--	WQCC Dom
Location	**Well**	**Event**	**Date**	**Type**												
North RO Field																
Upgradient	MW-55	Stage 1 AP Quarter 1	Jul-19	N	492	**498**	**1.83**	364	**1.65**	1.11	247	**2,100**	446	<2.71	446	**4,680**
		Stage 1 AP Quarter 2	Oct-19	N	418	**514**	1.53	312	0.469	<1.00 BJU	237	**1,570**	489	<2.71	489	**3,390**
			Oct-19	FD	413	**523**	**1.67**	305	0.453	<1.00 BJU	235	**1,590**	496	<2.71	496	**3,350**
		Stage 1 AP Quarter 3	Jan-20	N	435	**562**	**1.73**	311	0.302	1.32	237	**1,570**	492	<2.71	492	**2,820**
			Jan-20	FD	428	**552**	**1.72**	304	0.289	0.961 J	235	**1,540**	495	<2.71	495	**3,480**
		Stage 1 AP Quarter 4	Jun-20	N	411	**600**	**1.66**	302	0.0746 J	0.804 J	243	**1,340**	553	<8.45	553	**3,910**
		2nd Semiannual 2020	Oct-20	N	333	**505**	1.3		<0.0500	0.842 JB	228	**949**				**3,010**
		1st Semiannual 2021	Apr-21	N	293	**463**	**1.62**		0.0762 J	0.683 J	244	**781**				**2,130**
		2nd Semiannual 2021	Sep-21	N	282	**448**	1.58		<0.0500	0.644 J	199	**770**				**2,520**
		1st Semiannual 2022	Apr-22	N	232	**408**	1.2		0.055 J	0.64 JB	228	**685**				**2,120**
		2nd Semiannual 2022	Oct-22	N	291	**348**	1.44 J		<0.0500	0.679 J	191	**1,020**				**2,230**
	MW-140	Stage 1 AP Quarter 1	Jul-19	N	659	**293**	**1.82**	241	**15.5**	39.6	168	**2,430**	295	<2.71	295	**3,970**
		Stage 1 AP Quarter 2	Oct-19	N	639	**310**	1.44	240	**9.29**	45.2	170	**2,220**	311	<2.71	311	**3,390**
		Stage 1 AP Quarter 3	Jan-20	N	637	**310**	**1.79**	235	**10.3**	58.3	172	**2,190**	304	<2.71	304	**3,180**
		Stage 1 AP Quarter 4	Jun-20	N	624	**305**	**1.66**	231	**9.65**	50.3	180	**2,020**	331	<8.45	331	**3,900**
			Jun-20	FD	628	**305**	**1.74**	227	**10.3**	49.5	177	**2,150**	330	<8.45	330	**3,500** J
		2nd Semiannual 2020	Oct-20	-												
		1st Semiannual 2021	Apr-21	-												
		2nd Semiannual 2021	Sep-21	-												
		1st Semiannual 2022	Apr-22	-												
		2nd Semiannual 2022	Oct-22	-												
	MW-141	Stage 1 AP Quarter 1	Jul-19	N	593	**288**	**1.95**	168	**9.36**	4.27	57.5	**1,770**	229	<2.71	229	**2,660**
			Jul-19	FD	607	**285**	**1.83**	171	**9.53**	4.20	57.7	**1,680**	227	<2.71	227	**2,900**
		Stage 1 AP Quarter 2	Oct-19	N	632	**284**	**3.02**	163	**9.71**	8.52	69.4	**1,690**	223	<2.71	223	**2,880**
		Stage 1 AP Quarter 3	Jan-20	N	597	**275**	**2.35**	157	**8.54**	5.37	58.5	**1,570**	224	<2.71	224	**2,250**
		Stage 1 AP Quarter 4	Jun-20	N	617	**290**	**2.87**	158	**7.60**	6.06	60.7	**1,520**	229	<8.45	229	**3,260**
		2nd Semiannual 2020	Oct-20	-												
		1st Semiannual 2021	Apr-21	-												
		2nd Semiannual 2021	Sep-21	-												
		1st Semiannual 2022	Apr-22	-												
		2nd Semiannual 2022	Oct-22	-												
In Field	MW-117	Stage 1 AP Quarter 1	Jul-19	N	597	**284**	**3.40**	268	0.191	6.54	107	**2,230**	344	<2.71	344	**3,740**
		Stage 1 AP Quarter 2	Oct-19	N	583	**305**	**3.02**	264	0.395	6.81	108	**2,260**	344	<2.71	344	**3,490**
		Stage 1 AP Quarter 3	Jan-20	N	584	**285**	**3.28**	263	0.593	7.34	114	**1,990**	344	<2.71	344	**2,650** J3 J
		Stage 1 AP Quarter 4	Jun-20	N	584	**290**	**3.41**	265	**2.37**	6.97	131	**2,010**	365	<8.45	365	**3,350** J
		2nd Semiannual 2020	Oct-20	N	587	**271**	**3.25**		**4.05**	6.68	133	**2,030**				**3,870** J3
		1st Semiannual 2021	Apr-21	N	663	**304**	**2.89**		**5.55**	5.49	147	**2,290**				**4,080**
		2nd Semiannual 2021	Sep-21	N	614	**325** B	**2.66**		**1.76**	5.98	144	**1,910**				**4,020**
		1st Semiannual 2022	Apr-22	N	571	**365**	**3.03**		**1.82**	5.39	169	**2,140**				**3,830**
		2nd Semiannual 2022	Oct-22	N	507	248	**2.89**		0.53	4.52	163	**1,730**				**2,960**
	MW-118	Stage 1 AP Quarter 1	Jul-19	N	600	**301**	**6.16**	378	**1.02**	5.31	146	**2,860**	360	<2.71	360	**4,180**
		Stage 1 AP Quarter 2	Oct-19	N	585	**274**	**4.39**	389	**1.80**	4.15	167	**2,480**	365	<2.71	365	**4,240**
		Stage 1 AP Quarter 3	Jan-20	N	585	**313**	**5.75** J	382	**1.90**	4.79	160	**2,910**	354	<2.71	354	**3,630**
		Stage 1 AP Quarter 4	Jun-20	N	585	**290**	**5.63**	403	**2.27**	4.01	168	**2,630**	364	<8.45	364	**4,350** J
		2nd Semiannual 2020	Oct-20	N	558	**262**	**5.06**		**2.03**	3.07 B	178	**2,600**				**4,640**
		1st Semiannual 2021	Apr-21	N	575	241	**4.51**		**2.29**	2.85	192	**2,880**				**4,840**
		2nd Semiannual 2021	Sep-21	N	568	**253** B	**4.12**		**2.06**	2.38	186	**2,720**				**4,770**
		1st Semiannual 2022	Apr-22	N	562	**265**	**4.4**		**2.25**	2.09	186	**3,180**				**4,750**
		2nd Semiannual 2022	Oct-22	N	588	245	**4.36**		**1.94**	2.04	202	**2,630**				**4,440**

Table 1 - Summary of Groundwater Analytical Results Screened Using WQCC Standards

Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan Work Plan

					General Chemistry											
Analyte:					Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:					--	250	1.6	--	1.0	--	--	600	--	--	--	1,000
CGWSL Source:					--	WQCC Dom	WQCC HH	--	WQCC HH[a]	--	--	WQCC Dom	--	--	--	WQCC Dom
Location	**Well**	**Event**	**Date**	**Type**												
	MW-119	Stage 1 AP Quarter 1	Jul-19	N	623	**443**	**2.79**	288	0.308	1.71	243	**2,570**	319	<2.71	319	**3,980**
		Stage 1 AP Quarter 2	Oct-19	N	625	**388**	**2.36**	304	0.174	1.39	217	**2,330**	331	<2.71	331	**3,820**
		Stage 1 AP Quarter 3	Jan-20	N	619	**356**	**2.09**	301	0.115	0.964 J	206	**2,440**	334	<2.71	334	**3,860**
		Stage 1 AP Quarter 4	Jun-20	N	636	**341**	**1.70**	350	0.184	0.781 J	206	**2,590**	356	<8.45	356	**3,940** J
		2nd Semiannual 2020	Oct-20	N	641	**298**	1.39		0.106	0.832 JB	200 V	**2,490**				**4,420**
		1st Semiannual 2021	Apr-21	N	620	**278**	1.49		0.237	0.69 J	189 V	**2,580**				**4,400**
		2nd Semiannual 2021	Sep-21	N	607	**282** B	**1.70**		0.314	0.786 J	192	**2,320**				**4,360**
		1st Semiannual 2022	Apr-22	N	585	**294**	**1.88**		**1.430**	0.684 J	186	**2,730**				**3,520**
		2nd Semiannual 2022	Oct-22	N	582	**263**	**1.69**		0.107	0.724 J	183	**2,140**				**3,930**
Downgradient	MW-142	Stage 1 AP Quarter 1	Jul-19	N	633	**380**	**2.22**	311	0.159	1.74	195	**2,610**	334	<2.71	334	**4,580**
		Stage 1 AP Quarter 2	Oct-19	N	645	**369**	**1.87**	304	0.0910 J	1.84	188	**2,280**	343	<2.71	343	**4,000**
		Stage 1 AP Quarter 3	Jan-20	N	629	**363**	**2.07**	301	0.0950 J	1.46	183	**2,350**	338	<2.71	338	**4,090**
		Stage 1 AP Quarter 4	Jun-20	N	642	**360**	**2.25**	332	0.108	1.16 J	189	**2,430**	356	<8.45	356	**4,020** J
		2nd Semiannual 2020	Oct-20	-												
		1st Semiannual 2021	Apr-21	-												
		2nd Semiannual 2021	Sep-21	-												
		1st Semiannual 2022	Apr-22	-												
		2nd Semiannual 2022	Oct-22	-												
	MW-143	Stage 1 AP Quarter 1	Jul-19	N	583	**264**	1.54	430	0.0980 J	1.78	233	**3,170**	328	<2.71	328	**4,870**
		Stage 1 AP Quarter 2	Oct-19	N	550	**296**	1.2	446	0.127	1.22 B	220	**2,970**	333	<2.71	333	**4,500**
		Stage 1 AP Quarter 3	Jan-20	N	525	**263**	**1.71**	422	0.056 J	1.19	209	**2,830**	329	<2.71	329	**4,070**
		Stage 1 AP Quarter 4	Jun-20	N	536	**278**	**1.82**	443	<0.0500	0.936 J	214	**2,770**	348	<8.45	348	**4,100** J
		2nd Semiannual 2020	Oct-20	-												
		1st Semiannual 2021	Apr-21	-												
		2nd Semiannual 2021	Sep-21	-												
		1st Semiannual 2022	Apr-22	-												
		2nd Semiannual 2022	Oct-22	-												
South RO Field																
Upgradient	MW-29	Stage 1 AP Quarter 1	Jul-19	N	578	**383**	**2.00**	446	<0.985	2.48	384	**3,300**	503	<2.71	503	**4,820**
		Stage 1 AP Quarter 2	Oct-19	N	527	**354**	**1.84**	345	<0.0197	2.43	376	**2,480**	577	<2.71	577	**3,910**
		Stage 1 AP Quarter 3	Jan-20	N	416 O1V	**344**	**1.86**	298 O1V	0.021 JP1	2.46	358 O1V	**2,010**	542	<2.71	542	**3,330**
		Stage 1 AP Quarter 4	Jun-20	N	375	**395**	**1.70**	285	<0.0500	2.10	361	**1,700**	564	<8.45	564	**3,980**
			Jun-20	FD	379	**397**	**1.74**	292	<0.0500	1.95 J	369	**1,780**	563	<8.45	563	**3,360** J
		2nd Semiannual 2020	Oct-20	N	336	**418**	1.47		<0.0500	1.9 J	333 V	**1,430**				**3,530**
		1st Semiannual 2021	Apr-21	N	379	**457**	**1.83**		0.105	2.06	330	**1,580**				**3,730**
		2nd Semiannual 2021	Sep-21	N	590	**502**	1.47		0.0504 J	2.77	328	**2,170**				**4,180**
		1st Semiannual 2022	Apr-22	N	378	**571**	**1.68**		<0.0500	2.14	317	**1,720**				**3,190**
		2nd Semiannual 2022	Oct-22	N	461	**631**	**1.62**		<0.0500	2.52	358	**1,670**				**3,130**
	MW-40	Stage 1 AP Quarter 1	Jul-19	N	588	87.7	**1.93**	205	<1.97	2.54	104	**1,730**	309	<2.71	309	**2,580**
		Stage 1 AP Quarter 2	Oct-19	N	435 V	68.2	**2.18**	198 V	0.033 J	2.11	98.7 V	**1,570**	299	<2.71	299	**2,610**
			Oct-19	FD	428	67.1	**2.29**	195	<0.0197	1.91	97.6	**1,910**	294	<2.71	294	**2,410**
		Stage 1 AP Quarter 3	Jan-20	N	380	94.1 J	**3.38** J	196	<0.0394 UJ	1.81	95.4	**1,770**	320	<2.71	320	**2,370**
			Jan-20	FD	376	83.8	**1.85**	192	0.658 J	1.60	95.3	**1,540**	325	<2.71	325	**2,620**
		Stage 1 AP Quarter 4	Jun-20	N	365	91.2	1.56	190	< 0.0500	1.59 J	93.9	**1,410**	376	< 8.45	376	**2,500**
		2nd Semiannual 2020	Oct-20	-												
		1st Semiannual 2021	Apr-21	-												
		2nd Semiannual 2021	Sep-21	-												
		1st Semiannual 2022	Apr-22	-												
		2nd Semiannual 2022	Oct-22	-												

Table 1 - Summary of Groundwater Analytical Results Screened Using WQCC Standards

Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan Work Plan

Analyte Group:					General Chemistry													
Analyte:					Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS	
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
CGWSL:					--	250	1.6	--	1.0	--	--	600	--	--	--	1,000	
CGWSL Source:					--	WQCC Dom	WQCC HH	--	WQCC HH[a]	--	--	WQCC Dom	--	--	--	WQCC Dom	
Location	**Well**	**Event**	**Date**	**Type**													
	MW-56	Stage 1 AP Quarter 1	Jul-19	N	525	**273**	1.20	268	<0.0197	2.21	184	**2,180**	375	<2.71	375	**3,430**	
		Stage 1 AP Quarter 2	Oct-19	N	508	**286**	1.1	261	<0.0197	2.07	155	**1,890**	363	<2.71	363	**3,120**	
		Stage 1 AP Quarter 3	Jan-20	N	493	**256**	1.2	248	<0.0197	2.40	150	**1,840**	343	<2.71	343	**2,850**	
		Stage 1 AP Quarter 4	Jun-20	N	504	209	1.11	254	< 0.0500	1.91	153	**1,840**	351	<8.45	351	**3,040**	
		2nd Semiannual 2020	Jun-20	N	496	219	1.08		<0.0500	1.7 J	142	**1,990**				**3,520**	
		1st Semiannual 2021	Apr-21	N	484	211	1.19		0.252	1.8 J	140	**1,740**				**2,860**	
		2nd Semiannual 2021	Sep-21	-													
		1st Semiannual 2022	Apr-22	N	388	193	1.15		<0.0500	1.55 J	121	**1,400**				**2,020**	
		2nd Semiannual 2022	Oct-22	-													
In Field	MW-114	Stage 1 AP Quarter 1	Jul-19	N	604	219	**2.10**	239	0.375	3.08	137	**2,320**	377	<2.71	377	**3,000**	
		Stage 1 AP Quarter 2	Oct-19	N	611	**252**	1.50	234	0.613	2.83	136	**2,170**	376	<2.71	376	**3,650**	
		Stage 1 AP Quarter 3	Jan-20	N	606	239	**2.15**	225	0.785	3.25	133	**1,980**	370	<2.71	370	**2,710**	
		Stage 1 AP Quarter 4	Jun-20	N	587	241	**2.27**	211	0.471	2.64	128	**1,780**	407	<8.45	407	**2,920**	
		2nd Semiannual 2020	Oct-20	N	528	233	**2.07**		0.110	2.37 B	119	**1,590**				**3,300**	
		1st Semiannual 2021	Apr-21	N	532	180 B	**1.98**		0.110	2.46	118	**1,410**				**2,960**	
		2nd Semiannual 2021	Sep-21	N	466	227	**2.32**		<0.0500	2.26	109	**1,380**				**2,820**	
		1st Semiannual 2022	Apr-22	N	380	114	**2.75**		<0.0500	1.89 J	97.1	**1,320**				**2,080**	
		2nd Semiannual 2022	Oct-22	N	467	**408**	**2.25**		<0.0500	2.09	158	**1,170**				**2,670**	
	MW-115	Stage 1 AP Quarter 1	Jul-19	N	477	**254**	**2.33**	451	<0.0197	0.765 J	217	**2,940**	410	<2.71	410	**4,510**	
		Stage 1 AP Quarter 2	Oct-19	N	444	**270**	**2.04**	405	0.145	0.608 BJ	195	**2,390**	417	<2.71	417	**3,870**	
		Stage 1 AP Quarter 3	Jan-20	N	437	**286**	**2.12**	411	0.793	0.812 J	191	**2,250**	406	<2.71	406	**3,670**	
		Stage 1 AP Quarter 4	Jun-20	N	476	**392**	**2.16**	429	**3.78**	0.681 J	181	**2,260**	432	<8.45	432	**4,740**	
		2nd Semiannual 2020	Oct-20	N	467	**406**	**1.73**		**3.99**	<0.534	179	**2,350**				**4,590**	
		1st Semiannual 2021	Apr-21	N	508	**357** B	1.54		**3.56**	0.552 J	212	**2,240**				**4,560**	
		2nd Semiannual 2021	Sep-21	N	466	**357**	**1.75**		**1.85**	0.547 J	215	**2,170**				**4,330**	
		1st Semiannual 2022	Apr-22	N	437	**342**	1.57		**1.60**	0.516 J	219	**2,220**				**4,070** Q	
		2nd Semiannual 2022	Oct-22	N	433	**306**	**1.85**		0.49	0.363 J	251	**1,870**				**3,390**	
	MW-116	Stage 1 AP Quarter 1	Jul-19	N	576	**265**	**2.01**	289	0.371	2.10	189	**2,550**	341	<2.71	341	**3,700**	
			Jul-19	FD	570	**266**	**2.00**	289	0.35	2.01	189	**2,570**	346	<2.71	346	**3,490**	
		Stage 1 AP Quarter 2	Oct-19	N	567	**309**	**1.99**	282	0.403	1.71	187	**2,380**	336	<2.71	336	**3,490**	
		Stage 1 AP Quarter 3	Jan-20	N	550	**278**	**1.89**	273	0.409	1.53	180	**2,270**	332	<2.71	332	**3,570**	
		Stage 1 AP Quarter 4	Jun-20	N	572	**321**	**1.75**	297	0.528	1.29 J	188	**2,140**	341	<8.45	341	**4,020** J	
		2nd Semiannual 2020	Oct-20	N	550	**260**	1.53		0.476	1.14 JB	176	**1,920**				**4,040**	
		1st Semiannual 2021	Apr-21	N	588	**278** B	1.52		0.636	1.39 J	186	**2,080**				**4,000**	
		2nd Semiannual 2021	Sep-21	N	542	**283** B	1.38		0.709	1.03 J	174	**1,940**				**3,860**	
		1st Semiannual 2022	Apr-22	N	534	**320** B	1.56		0.505	1.09 J	164	**2,300**				**4,010**	
		2nd Semiannual 2022	Oct-22	N	573	**321**	1.57		0.313	1.03 J	167	**1,910**				**3,980**	
Downgradient	MW-125	Stage 1 AP Quarter 1	Jul-19	N	557	**298**	1.26	392	0.587	1.67	231	**2,750**	407	<2.71	407	**4,380**	
		Stage 1 AP Quarter 2	Oct-19	N	553	**327**	1.08	390	0.544	1.47	229	**2,810**	406	<2.71	406	**3,920**	
		Stage 1 AP Quarter 3	Jan-20	N	545	**291**	1.24	381	0.388	1.89	226	**2,560**	398	<2.71	398	**4,200**	
		Stage 1 AP Quarter 4	Jun-20	N	545	**278**	1.12	392	0.215	1.49 J	231	**2,500**	421	<8.45	421	**4,080** J	
		2nd Semiannual 2020	Oct-20	N	541	**271**	1.1		0.0919 J	1.42 JB	221	**2,270**				**4,350**	
		1st Semiannual 2021	Apr-21	N	549	**261** B	0.983		0.155	1.36 J	224	**2,300**				**4,440**	
		2nd Semiannual 2021	Sep-21	N	519	**271** B	1.06		0.0618 J	1.32 J	213	**2,210**				**4,370**	
		1st Semiannual 2022	Apr-22	N	473	**273**	1.07		<0.0500	1.19 J	189	**2,360**				**3,330** Q	
		2nd Semiannual 2022	Oct-22	N	486	**261**	1.42 J		<0.0500	1.06 J	206	**2,100**				**7,840**	

Table 1 - Summary of Groundwater Analytical Results Screened Using WQCC Standards

Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan Work Plan

Analyte Group:					**General Chemistry**									
Analyte:					Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS
Units:					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:					--	250	1.6	--	1.0	--	--	600	--	--	--	1,000
CGWSL Source:					--	WQCC Dom	WQCC HH	--	WQCC HH[a]	--	--	WQCC Dom	--	--	--	WQCC Dom
Location	**Well**	**Event**	**Date**	**Type**												
	MW-144	Stage 1 AP Quarter 1	Jul-19	N	787	222	**2.57**	220	0.290	2.36	137	**2,360**	344	<2.71	344	**3,740**
		Stage 1 AP Quarter 2	Oct-19	N	687	**274**	**2.36**	235	0.201	1.71	143	**2,530**	313	<2.71	313	**3,330**
		Stage 1 AP Quarter 3	Jan-20	N	648	245	**2.47**	225	0.26	1.63	139	**2,300**	309	<2.71	309	**3,930**
		Stage 1 AP Quarter 4	Jun-20	N	647	**257**	**2.64**	238	0.401 J	1.36 J	142	**2,120**	324	<8.45	324	**3,500** J
		2nd Semiannual 2020	Oct-20	-												
		1st Semiannual 2021	Apr-21	-												
		2nd Semiannual 2021	Sep-21	-												
		1st Semiannual 2022	Apr-22	-												
		2nd Semiannual 2022	Oct-22	-												
	RW-18A	Stage 1 AP Quarter 1	Jul-19	N	521	247	**2.10**	375	0.256	0.884 J	126	**3,090**	293	<2.71	293	**4,150**
		Stage 1 AP Quarter 2	Oct-19	N	525	235	**2.07**	384	0.258	<1.00 BJU	124	**2,750**	298	<2.71	298	**3,740**
		Stage 1 AP Quarter 3	Jan-20	N	503	214	**2.18**	379	0.228	0.854 J	119	**2,660**	290	<2.71	290	**3,830**
		Stage 1 AP Quarter 4	Jun-20	N	525	228	**2.13**	369	0.549	0.900 J	136	**2,320**	325	<8.45	325	**3,660** J
		2nd Semiannual 2020	Oct-20	-												
		1st Semiannual 2021	Apr-21	-												
		2nd Semiannual 2021	Sep-21	-												
		1st Semiannual 2022	Apr-22	-												
		2nd Semiannual 2022	Oct-22	-												

Notes and Abbreviations

	The sample for this event was not analyzed for this analyte.
"--"	CGWSL not available for this analyte
X	Reported concentration equal to X was above the CGWSL
<X	Analyte was not detected at reporting limit equal to X. If italicized, reporting limit is greater than CGWSL.
a	Nitrate/Nitrite combined results are compared to the lower WQCC HH standard for Nitrite.
CGWSL	Critical Groundwater Screening Level
CGWSL Source	Critical Groundwater Screening Level Source
EPA	United States Environmental Protection Agency
EPA MCL	EPA Maximum Contaminant Level
FD	Field Duplcate
mg/L	milligrams per Liter
N	Normal
NMAC	New Mexico Administrative Code
WQCC	New Mexico Water Quality Control Commission
WQCC Dom	Groundwater standard for domestic exposure from 20.6.2.3103.B NMAC
WQCC HH	Groundwater standard for human health exposure from 20.6.2.3103.A NMAC
WQCC Irr	Groundwater standard for irrigation use from 20.6.2.3103.C NMAC

Lab Footnotes

B	Analyte reported in associated method blank
J	Reported value is an estimate.
V	Sample concentration too high to evaluate accurate spike recoveries
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
J3	The associated batch QC was outside the established quality control range for precision.

Data Validation Qualifier

U	Result qualified as not detected at the reporting limit. See data validation report for more detail.

Table 2 - Summary of Mann-Kendall Statistical Evaluation of COC Concentrations in Groundwater

Reverse Osmosis Reject Discharge Fields Stage 2 Abatement Plan

Field	Well	Dissolved Boron (WQCC = 0.75 mg/L)			Dissolved Manganese (WQCC = 0.2 mg/L)			Dissolved Uranium (WQCC = 0.03 mg/L)		
		2019-2022 Trend		Most Recent Concentration (mg/L)	2019-2022 Trend		Most Recent Concentration (mg/L)	2019-2022 Trend		Most Recent Concentration (mg/L)
		Slope	MK Eval		Slope	MK Eval		Slope	MK Eval	
North	MW-55 (upgradient)	neg	decreasing	0.555	pos	increasing	0.206	neg	no sig trend	0.0188
	MW-117 (discharge)	inadequate data		0.131	pos	no sig trend	0.00305	inadequate data		0.0160
	MW-118 (mid)	inadequate data		0.399	inadequate detections		<0.000704	inadequate data		0.0390
	MW-119 (dg inside field)	inadequate data		0.457	neg	no sig trend	0.00231	inadequate data		0.0467
South	MW-29 (upgradient)	inadequate data		1.06	neg	no sig trend	0.381	inadequate data		0.00790
	MW-56 (upgradient)	inadequate data		0.259	neg	decreasing	0.207	inadequate data		0.01750
	MW-114 (discharge)	inadequate data		0.109	neg	no sig trend	0.746	inadequate data		0.00917
	MW-115 (mid)	inadequate data		0.564	neg	decreasing	0.0405	inadequate data		0.09470
	MW-116 (dg inside field)	inadequate data		0.220	pos	increasing	0.0308	inadequate data		0.02870

Field	Well	Chloride (WQCC = 250 mg/L)			Fluoride (WQCC = 1.6 mg/L)			Nitrate/Nitrite (WQCC* = 1.0 mg/L)			Sulfate (WQCC = 600 mg/L)			TDS (WQCC = 1,000 mg/L)		
		2019-2022 Trend		Most Recent Concentration (mg/L)	2019-2022 Trend		Most Recent Concentration (mg/L)	2019-2022 Trend		Most Recent Concentration (mg/L)	2019-2022 Trend		Most Recent Concentration (mg/L)	2019-2022 Trend		Most Recent Concentration (mg/L)
		Slope	MK Eval		Slope	MK Eval		Slope	MK Eval		Slope	MK Eval		Slope	MK Eval	
North	MW-55 (upgradient)	neg	decreasing	348	neg	decreasing	1.44	neg	decreasing	<0.0500	neg	decreasing	1,020	neg	decreasing	2,230
	MW-117 (discharge)	pos	no sig trend	248	neg	no sig trend	2.89	pos	no sig trend	0.527	neg	no sig trend	1,730	pos	no sig trend	2,960
	MW-118 (mid)	neg	decreasing	245	neg	decreasing	4.36	pos	no sig trend	1.94	pos	no sig trend	2,630	pos	increasing	4,440
	MW-119 (dg inside field)	neg	decreasing	263	neg	no sig trend	1.69	pos	no sig trend	0.107	neg	no sig trend	2,140	neg	no sig trend	3,930
South	MW-29 (upgradient)	pos	increasing	631	neg	no sig trend	1.62	pos	no sig trend	<0.0500	neg	decreasing	1,670	neg	decreasing	3,130
	MW-56 (upgradient)	neg	decreasing	193	neg	no sig trend	1.15	inadequate detections		<0.0500	neg	decreasing	1,400	neg	decreasing	2,020
	MW-114 (discharge)	pos	no sig trend	408	pos	no sig trend	2.25	neg	no sig trend	<0.0500	neg	decreasing	1,170	neg	decreasing	2,670
	MW-115 (mid)	pos	no sig trend	306	neg	no sig trend	1.85	neg	no sig trend	0.492	neg	decreasing	1,870	neg	no sig trend	3,390
	MW-116 (dg inside field)	pos	no sig trend	321	neg	decreasing	1.57	neg	no sig trend	0.313	neg	decreasing	1,910	pos	no sig trend	3,980

Notes and Definitions

* the lower WQCC standard for Nitrite of 1.0 mg/L was used for screening combined Nitrate/Nitrite

(dg inside field) = well is located hydraulically downgradient but within the field

(discharge) = well is located near the former discharge point within the field

(mid) = well is located near the middle of the field hydrualically

(upgradient) = well is located hydraulically upgradient of the field

inadequate data = too few sample results are available to perform a statistically valid evaluation

inadequate detections = too few detectable results are available to perform a statistically valid evaluation

mg/L = milligrams per liter

MK Eval = Mann-Kendall Trend Evaluation, using ProUCL 5.1 software from EPA

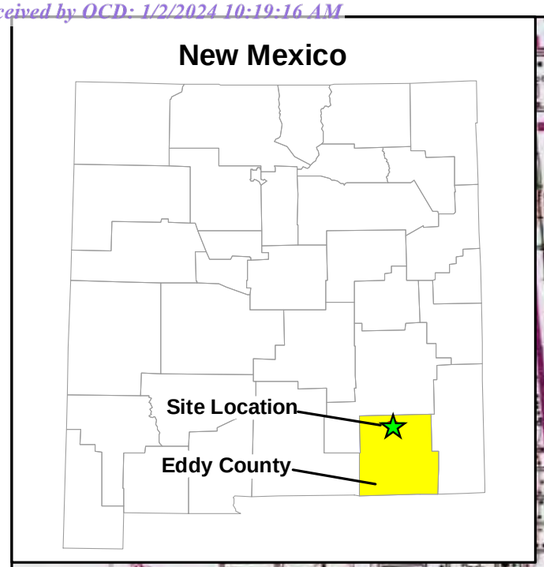
neg = the linear regression line shows a negative slope

no sig trend = no statitistically significant trend is present

pos = the linear regression line shows a positive slope

WQCC = groundwater standard published by the New Mexico Water Quality Control Commission

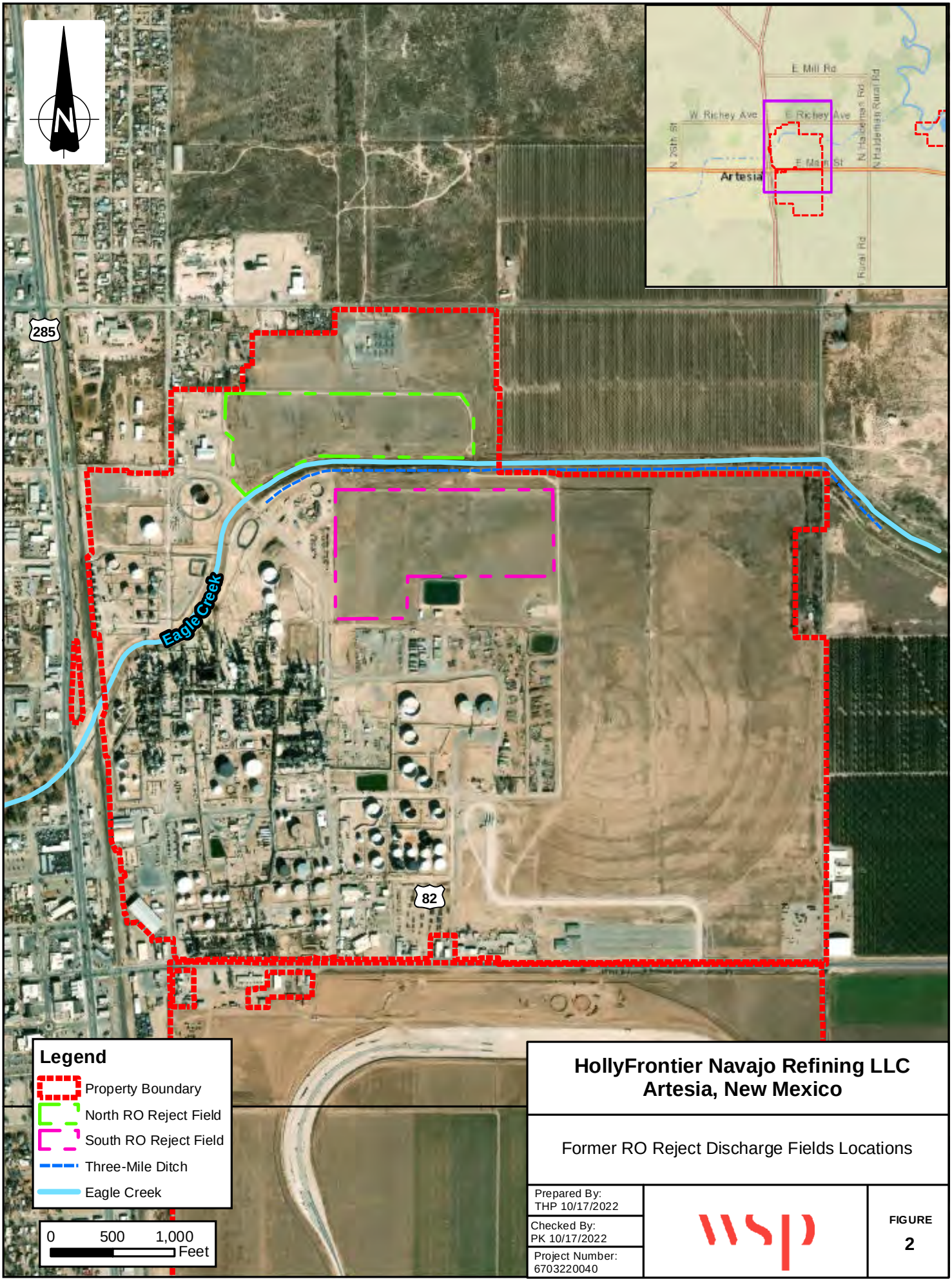
FIGURES



HollyFrontier Navajo Refining LLC
Artesia, New Mexico

Site Location

Prepared by / Date:	Checked by / Date:	Figure:
THP / Date: 10/17/2022	PK / Date: 10/17/2022	1



HollyFrontier Navajo Refining LLC
Artesia, New Mexico

Former RO Reject Discharge Fields Locations

Prepared By: THP 10/17/2022	wsp	FIGURE 2
Checked By: PK 10/17/2022		
Project Number: 6703220040		

G:\Holly Frontier Navajo\mxds\8_10_2022\RO Reject Field Locations.mxd - tyeodore.parks - 10/17/2022 - 2:18:24 PM

MP1
MW-142
MW-119
MW-141
MW-118
MP2
MP3
MW-143
MP4
THREE-MILE DITCH
MW-140
MW-117
MW-56
MW-144
MW-55
MW-115
MP5
MW-116
MP6
RW-18A
MW-29
MW-125
MP8
MW-40
MP7
MW-114

Legend

- Property Boundary
- South RO Reject Discharge Field
- North RO Reject Discharge Field
- Moisture Probes
- Monitoring Well
- Former Discharge Point
- Proposed Well

0 500 1,000 Feet

GRAPHIC SCALE

HollyFrontier Navajo Refining LLC
Artesia, New Mexico

Former RO Reject Discharge
Fields Monitoring Well and
Soil Moisture Probe Locations

Prepared By: THP 10/18/2022	FIGURE 3
Checked By: PK 10/18/2022	
Project Number: 6703220040	

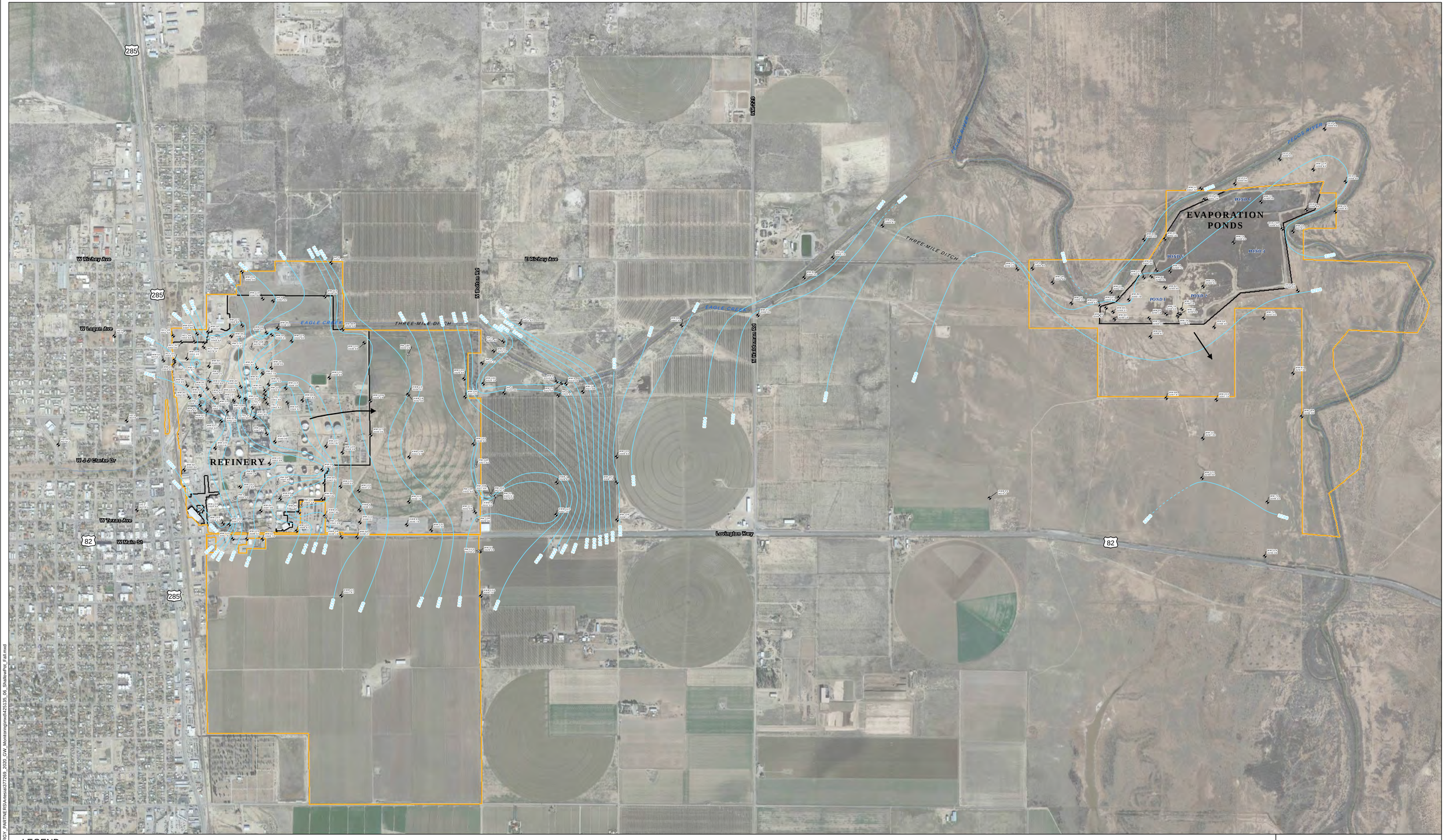
DB: ALB PM: PK
Path: G:\Holly Frontier Navajo\mxd\8_10_2022\RO Monitoring Well & Soil Moisture Probe Locations.mxd: 10/18/2022: 11:06:29 AM

APPENDIX

A

SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE MAPS AND CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAPS FOR CONSTITUENTS OF CONCERN:

- FALL 2020
- SPRING 2021
- FALL 2021
- SPRING 2022
- FALL 2022



LEGEND

- MONITORING WELL
- RECOVERY WELL
- GROUNDWATER FLOW DIRECTION
- SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE CONTOURS - DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL)
- GROUNDWATER ELEVATION DEPRESSED LOCALLY DUE TO RECOVERY PUMP
- FENCELINE
- HFNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- 3337.67 GROUNDWATER ELEVATION (FEET)

N
W E
S

0 800 1,600
Feet

1 IN = 800 FT

NOTE:
1. GROUNDWATER ELEVATION WAS NOT MEASURED BECAUSE WELL IS NOT IN GAUGING PROGRAM, WELL COULD NOT BE LOCATED, OR WELL WAS DAMAGED.
2. WELL WAS DRY AT TIME OF GAUGING.
3. GROUNDWATER ELEVATION NOT MEASURED DUE TO PUMP INSTALLED IN WELL.
4. GROUNDWATER ELEVATION NOT AVAILABLE DUE TO PSH IN WELL TO TOTAL DEPTH.
5. GROUNDWATER ELEVATION NOT USED IN POTENTIOMETRIC SURFACE CONTOURING

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 12/29/2019.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\377269_2020_GW_Monitoring\mxd\425135_06_ShallowPot_Fall.mxd

SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE MAP 2020 SECOND SEMIANNUAL EVENT

2020 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MHORN	SAVED: 2/4/2021	MXD: 425135_06_ShallowPot_Fall

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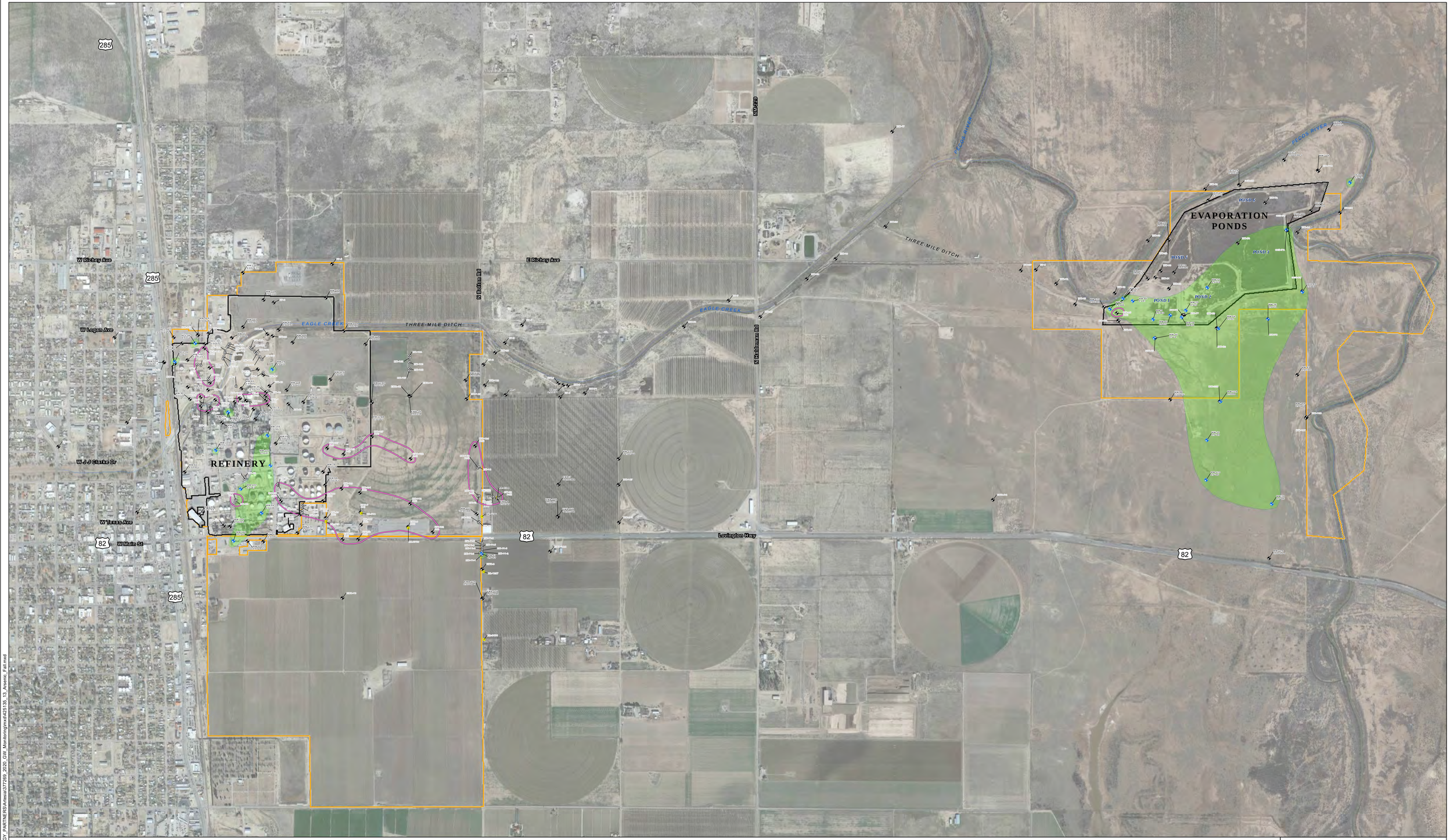
FIGURE 6



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 0.0249 ARSENIC CONCENTRATION
- < .00368 ARSENIC NOT DETECTED ABOVE METHOD DETECTION LIMIT
- MW-19 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥0.03 FEET THICK)
- ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.01 mg/L)
- FENCELINE
- HFNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 3/12/2016.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\377269_2020_GW_Monitoring\mxd\425135_13_Arsenic_Fall.mxd

ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2020 SECOND SEMIANNUAL EVENT

2020 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MHORN	SAVED: 2/4/2021	MXD: 425135_13_Arsenic_Fall

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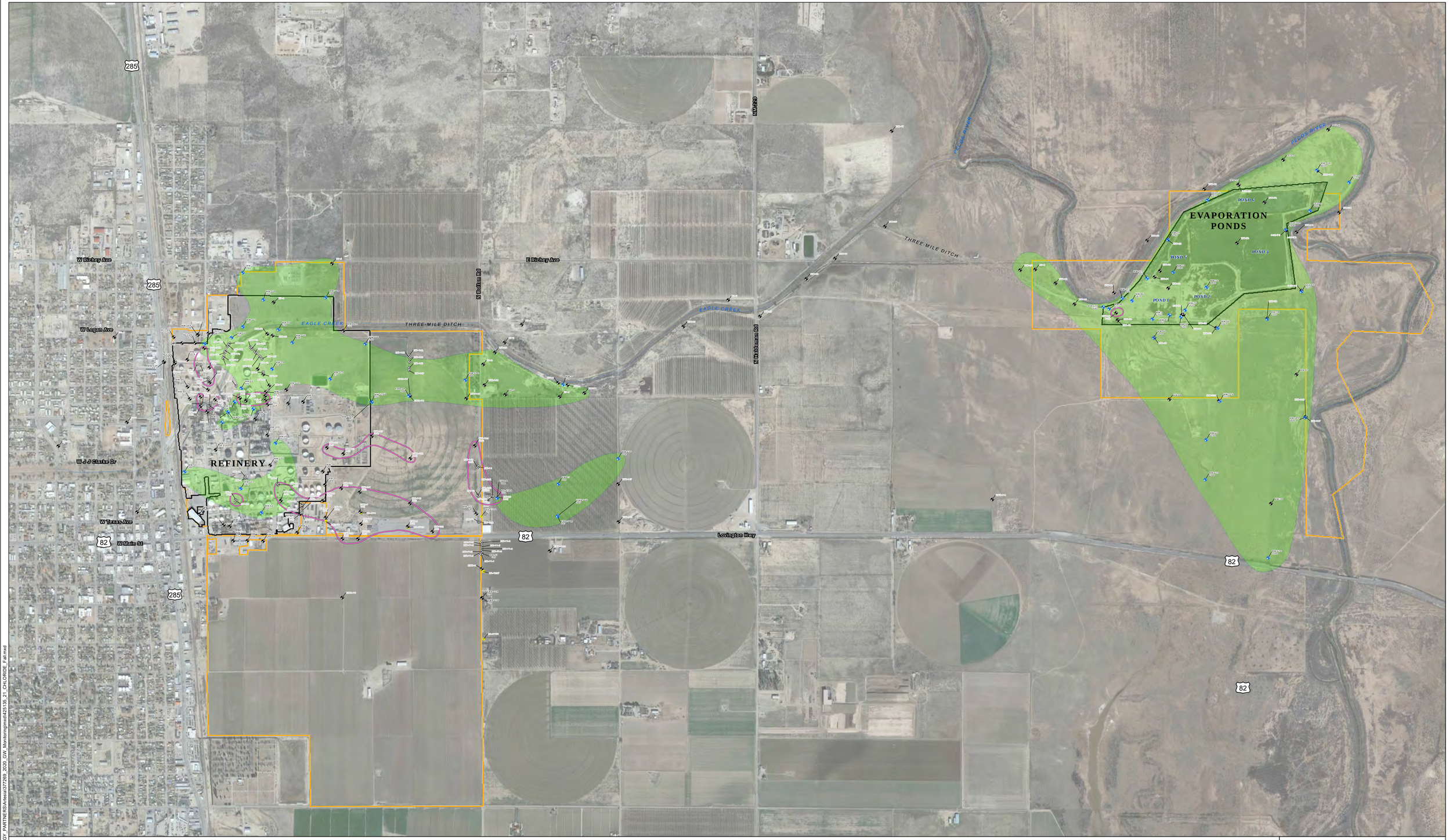
FIGURE 13



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

188 CHLORIDE CONCENTRATION

KWB-13 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 250 mg/L)

FENCELINE

HFNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 12/29/2019.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\377269_2020_GW_Monitoring\mxd\425135_21_CHLORIDE_Fall.mxd

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2020 SECOND SEMIANNUAL EVENT

2020 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MHORN	SAVED: 2/3/2021	MXD: 425135_21_CHLORIDE_Fall

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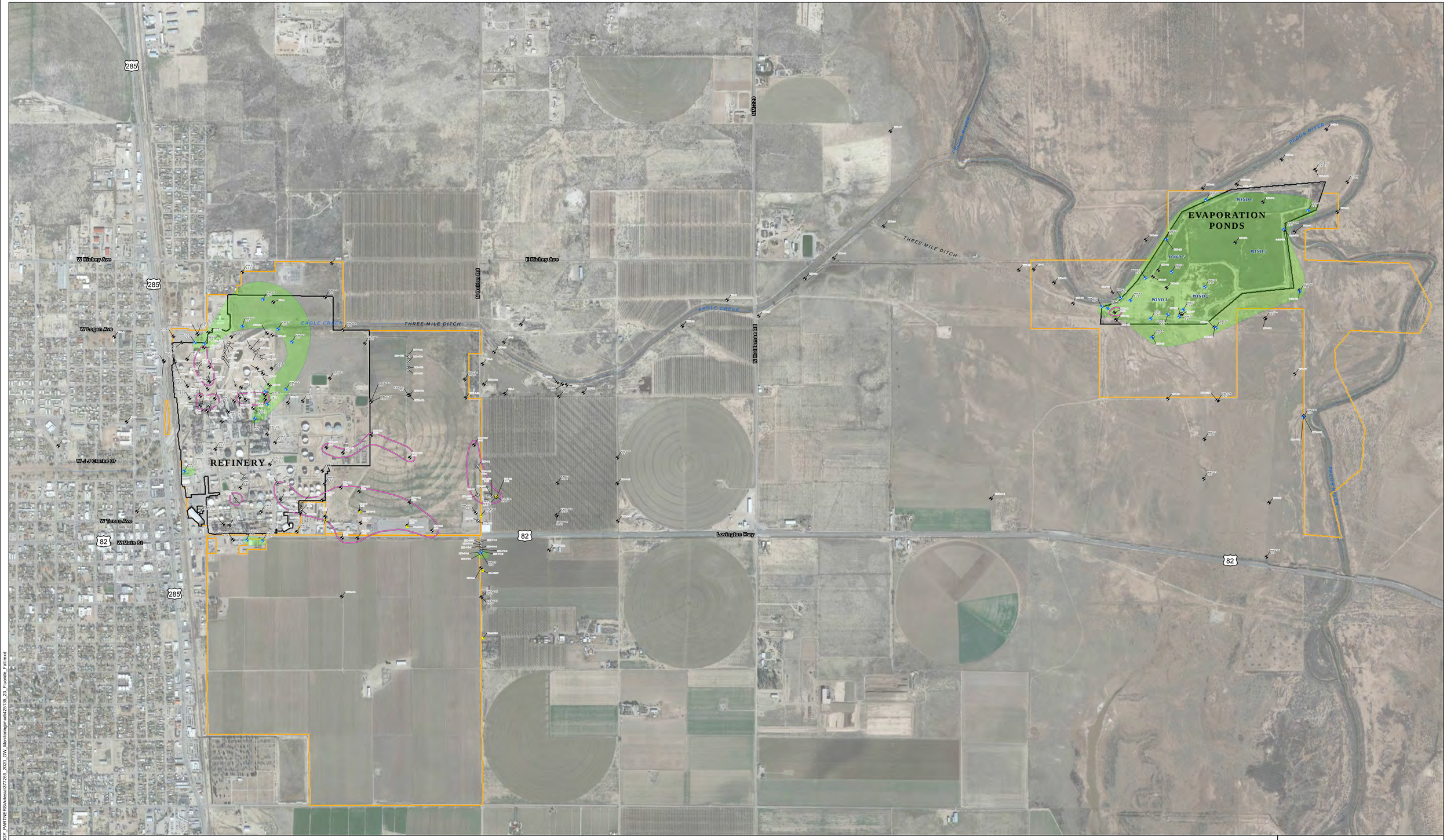
FIGURE 21



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

1.73 FLUORIDE CONCENTRATION

MW-112 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1.6 mg/L)

FENCELINE

HFNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 12/29/2019.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\372\99_2020_GW_Monitoring\mxd\425135_23_Fluoride_Fall.mxd

FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2020 SECOND SEMIANNUAL EVENT

2020 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MHORN	SAVED: 2/3/2021	MXD: 425135_23_Fluoride_Fall

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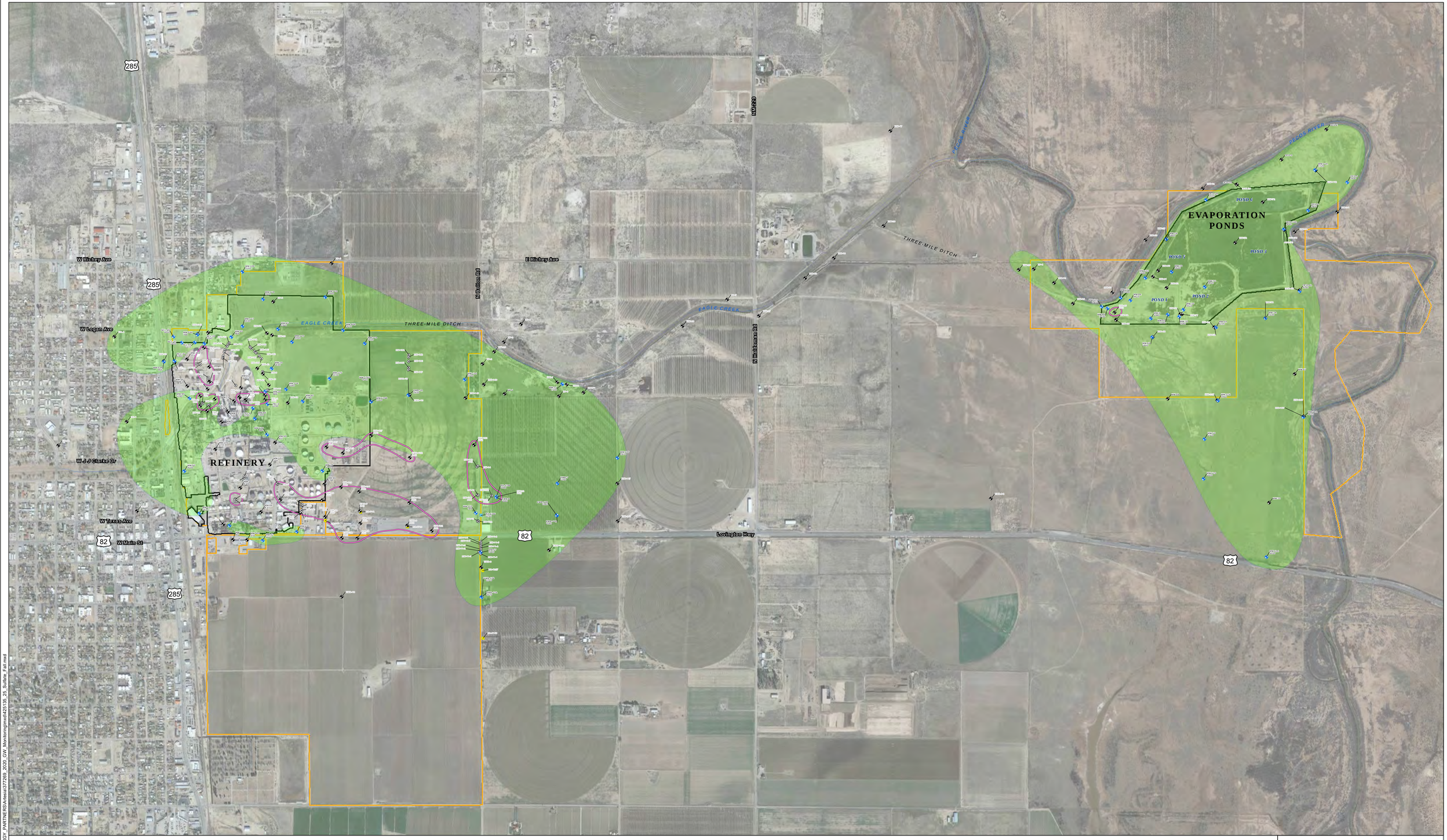
PH:512-329-6080

FIGURE 23



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL

980 SULFATE CONCENTRATION

MW-103 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 600 mg/L)

FENCELINE

HFNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 12/29/2019.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\377269_2020_GW_Monitoring\mxd\425135_25_Sulfate_Fall.mxd

SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2020 SECOND SEMIANNUAL EVENT

2020 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MHORN	SAVED: 2/3/2021	MXD: 425135_25_Sulfate_Fall

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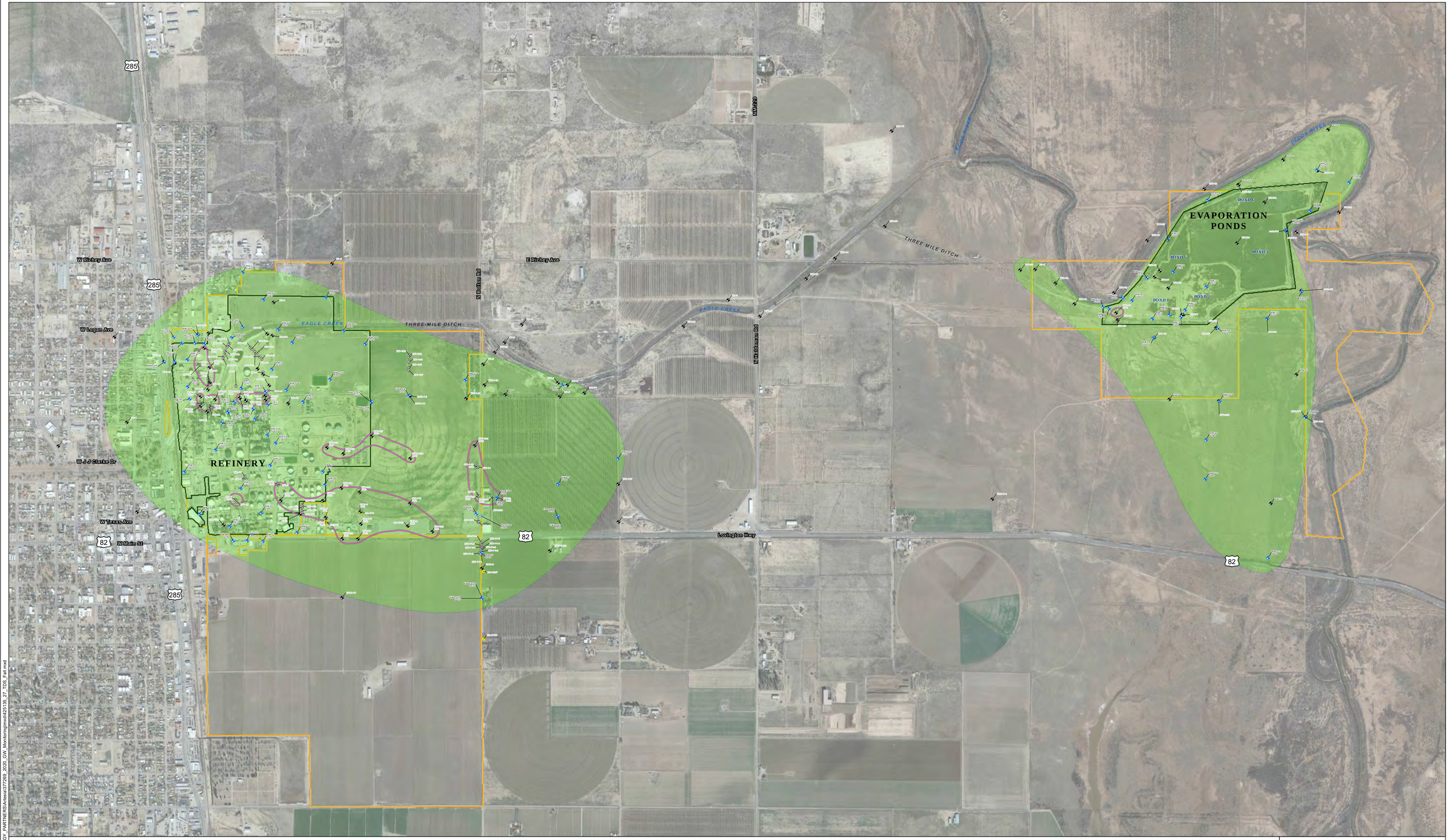
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 25



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL

2210 TOTAL DISSOLVED SOLIDS CONCENTRATION

MW-103 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1000 mg/L)

FENCELINE

HFNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 12/29/2019.

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2020 SECOND SEMIANNUAL EVENT

2020 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MHORN	SAVED: 2/3/2021	MXD: 425135_27_TDS_Fall

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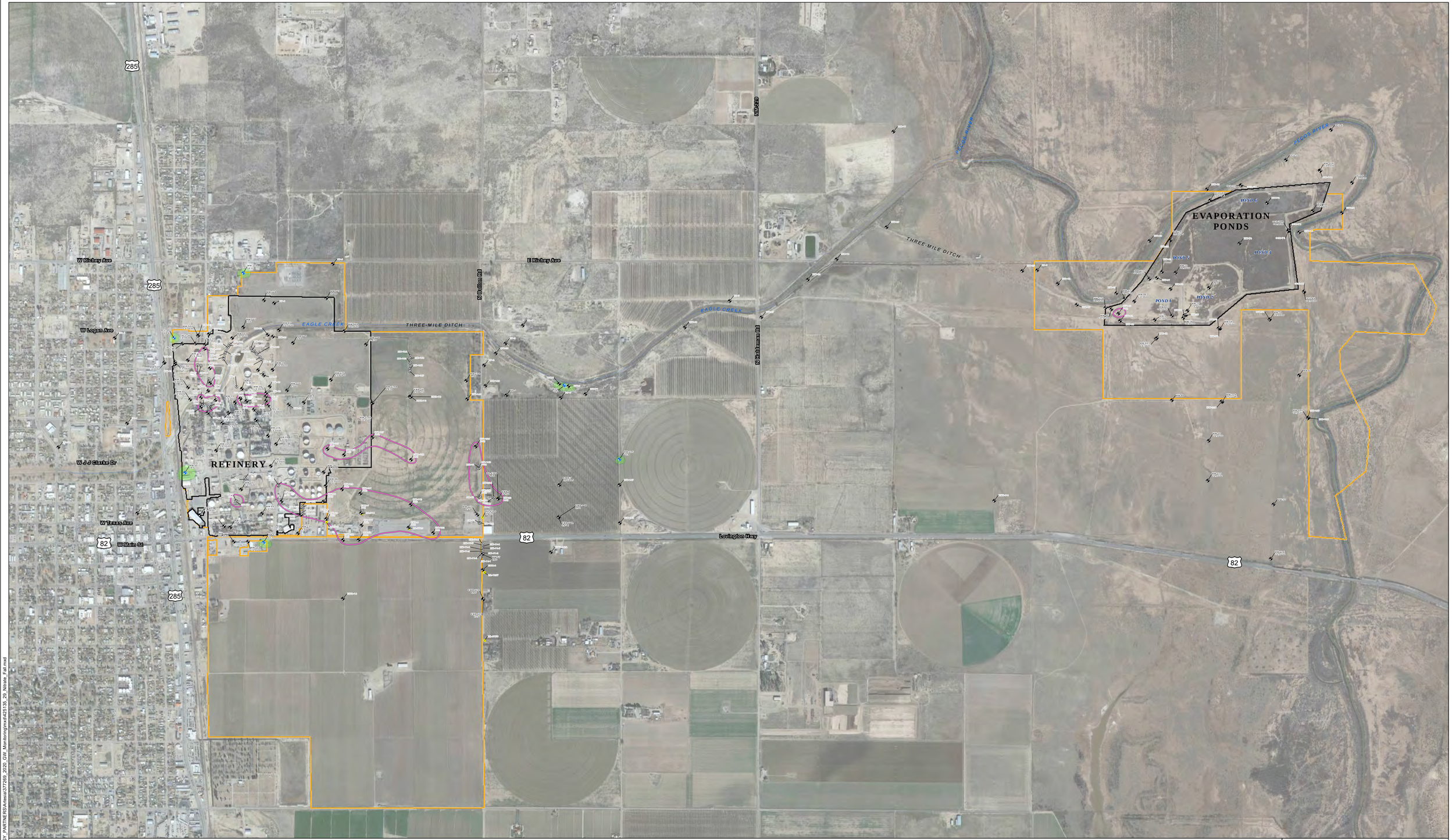
FIGURE 27

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\377269_2020_GW_Monitoring\mxd\425135_27_TDS_Fall.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 3.99 NITRATE/NITRITE CONCENTRATION
- < 0.394 NITRATE/NITRITE NOT DETECTED ABOVE METHOD DETECTION LIMIT
- MW-103 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 10 mg/L)
- FENCELINE
- HFNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 12/29/2019.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\377269_2020_GW_Monitoring\mxd\425135_29_Nitrate_Fall.mxd

NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2020 SECOND SEMIANNUAL EVENT

2020 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MHORN	SAVED: 2/3/2021	MXD: 425135_29_Nitrate_Fall

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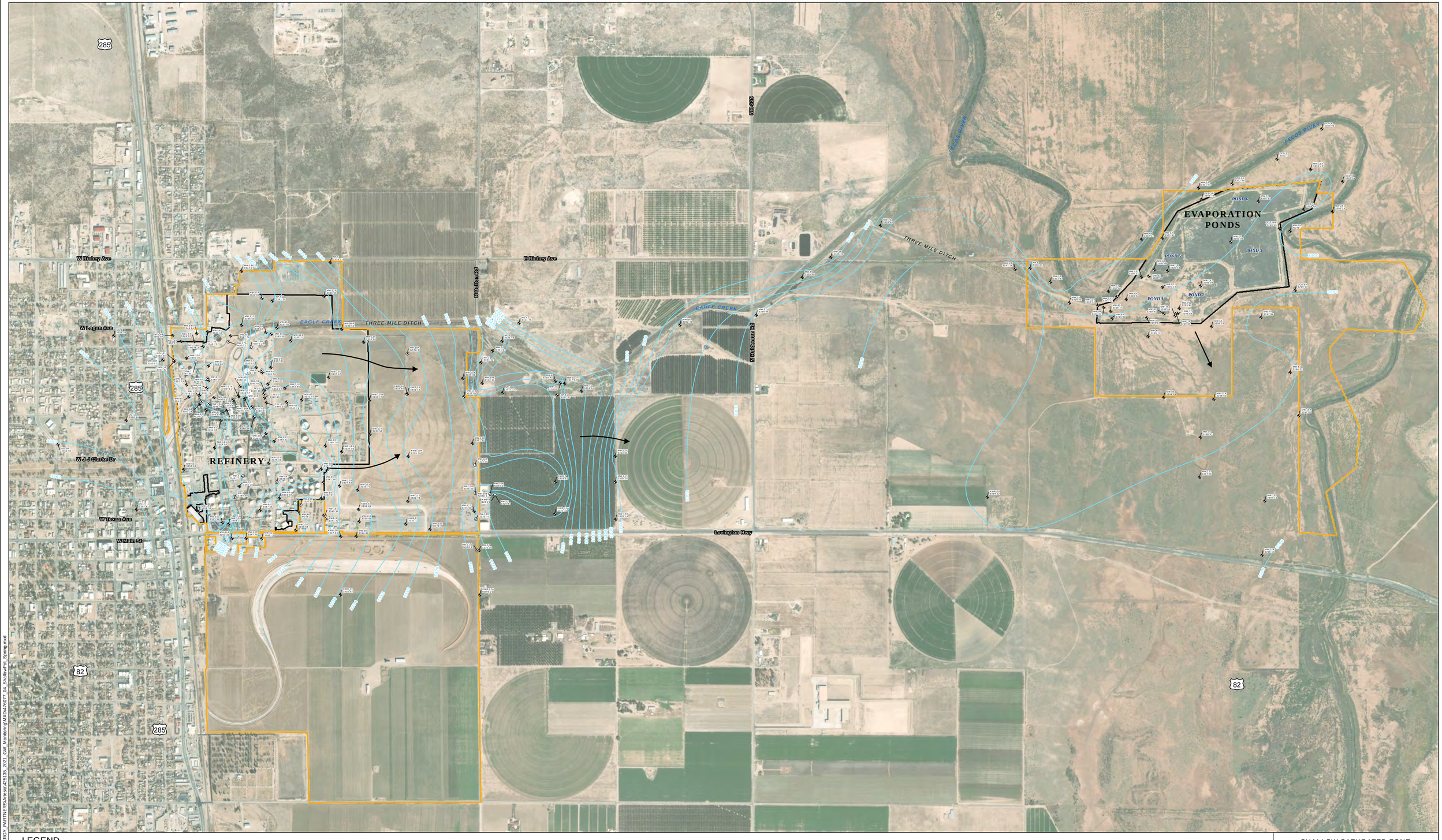
FIGURE 29



LEGEND

- MONITORING WELL
- RECOVERY WELL
- GROUNDWATER FLOW DIRECTION
- SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE CONTOURS (FEET ABOVE MEAN SEA LEVEL)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- 3335.92 GROUNDWATER ELEVATION (FEET)

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NOTE:
1. GROUNDWATER ELEVATION WAS NOT MEASURED BECAUSE WELL IS NOT IN GAUGING PROGRAM, WELL COULD NOT BE LOCATED, OR WELL WAS DAMAGED.
2. WELL WAS DRY AT TIME OF GAUGING.
3. ONLY PSH PRESENT IN THE WELL.
4. GROUNDWATER ELEVATION NOT MEASURED DUE TO PUMP IN WELL.

NEW MEXICO

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 3/12/2016.

Document Path: S:\L-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\476077_04_Monitoring\MXD\476077_04_ShallowPot_Spring.mxd

SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE MAP 2021 FIRST SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 2/2/2022	MXD: 476077_04_ShallowPot_Spring

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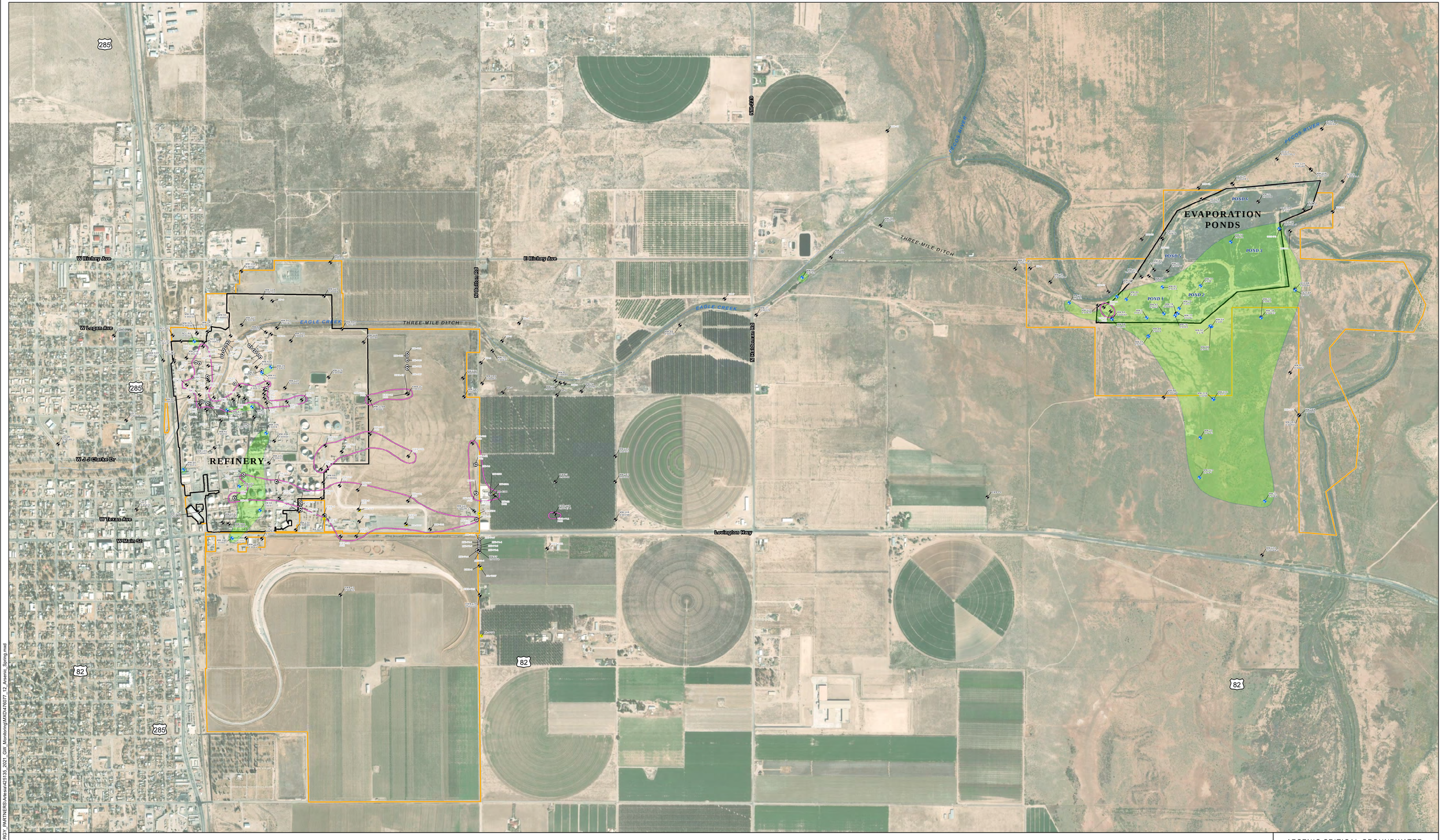
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 4



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

- 0.0151 ARSENIC CONCENTRATION
- MW-97 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥0.03 FEET THICK)
- ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.01 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_12_Arsenic_Spring.mxd

ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 FIRST SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 2/2/2022	MXD: 476077_12_Arsenic_Spring

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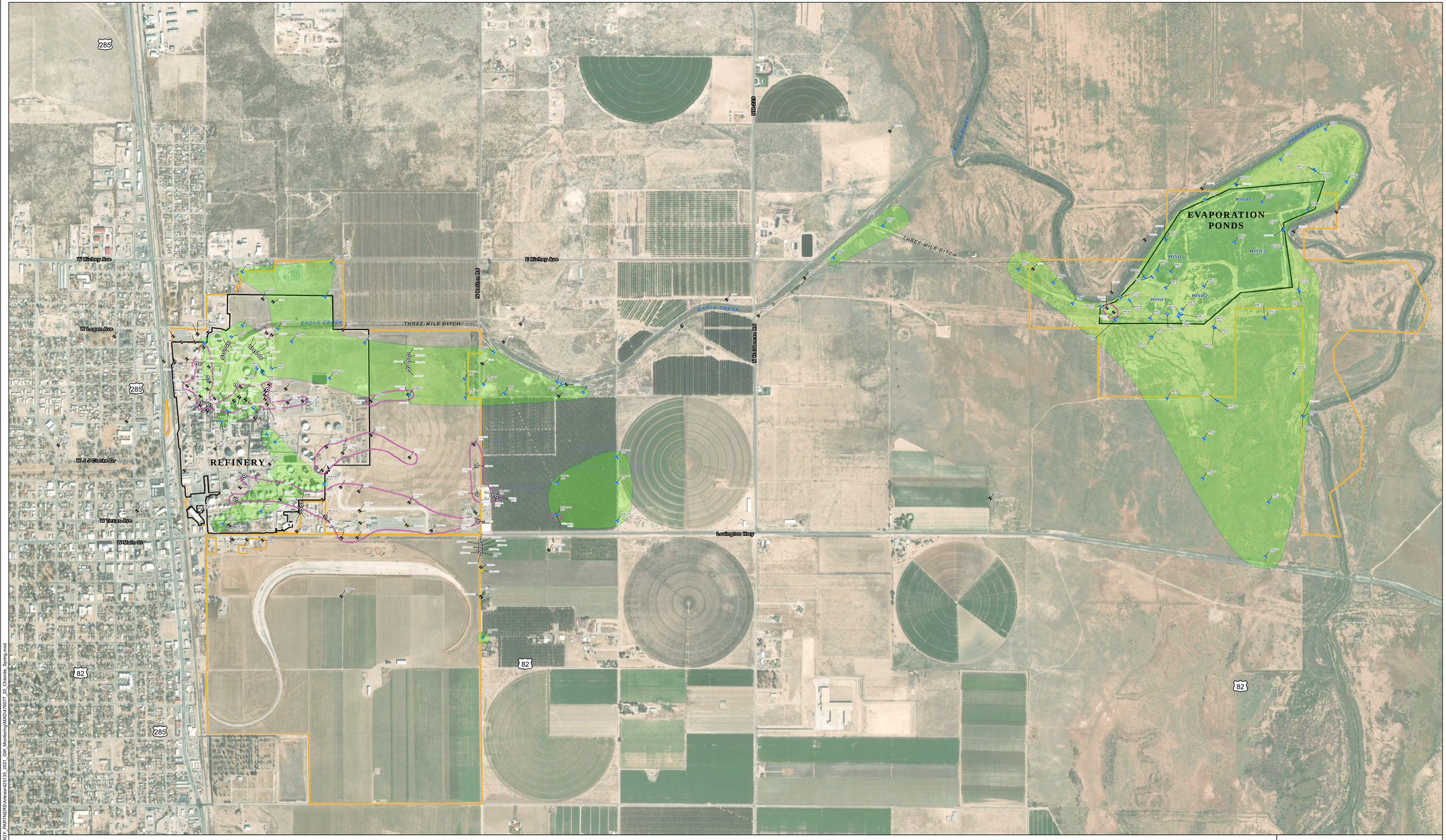
FIGURE 12



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

242 CHLORIDE CONCENTRATION

MW-128 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 250 mg/L)

FENCELINE

NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_20_Chloride_Spring.mxd

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 FIRST SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 2/2/2022	MXD: 476077_20_Chloride_Spring

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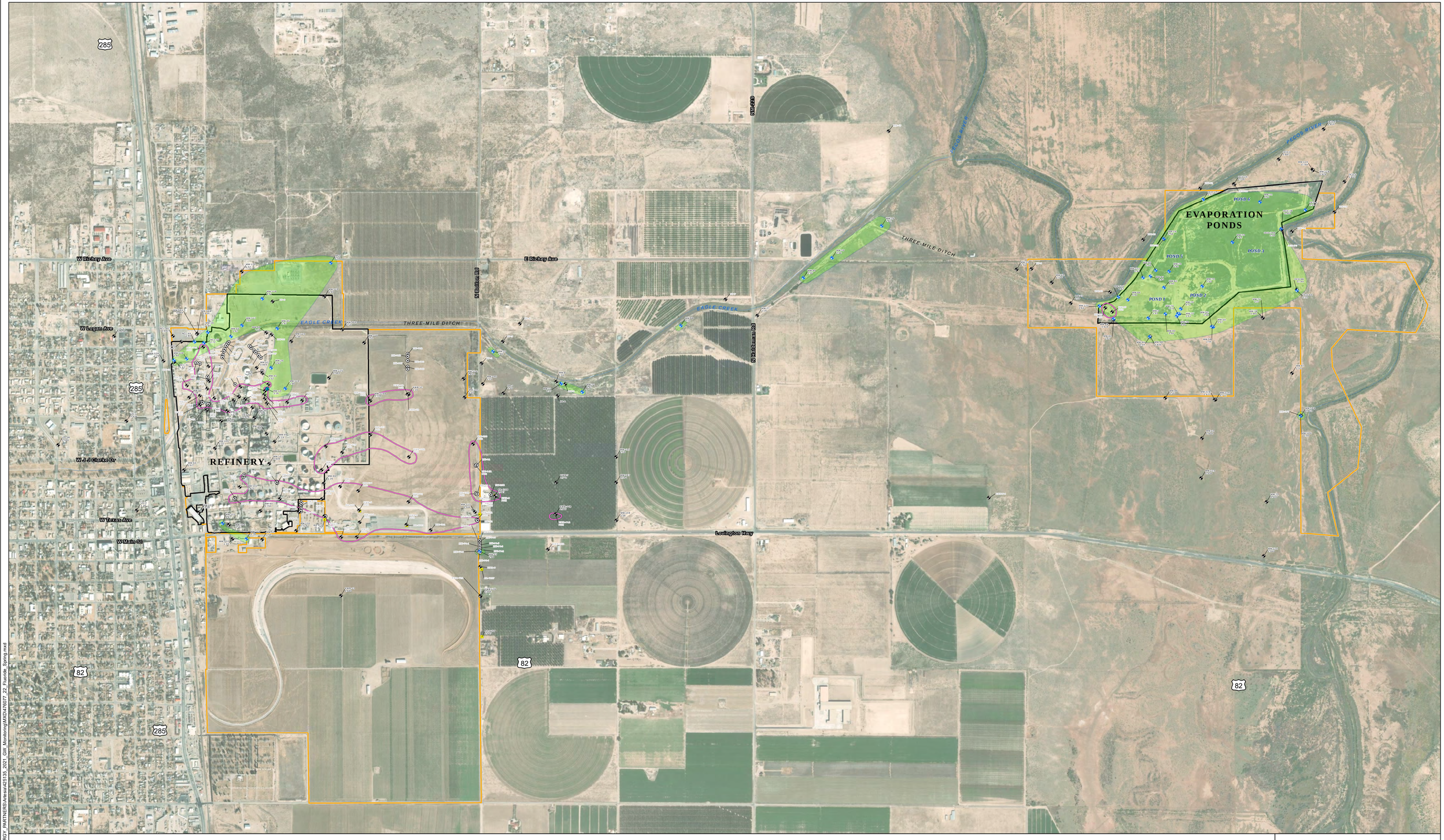
FIGURE 20



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

- 2.89 FLUORIDE CONCENTRATION
- MW-97 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1.6 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 FIRST SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 2/2/2022	MXD: 476077_22_Fluoride_Spring

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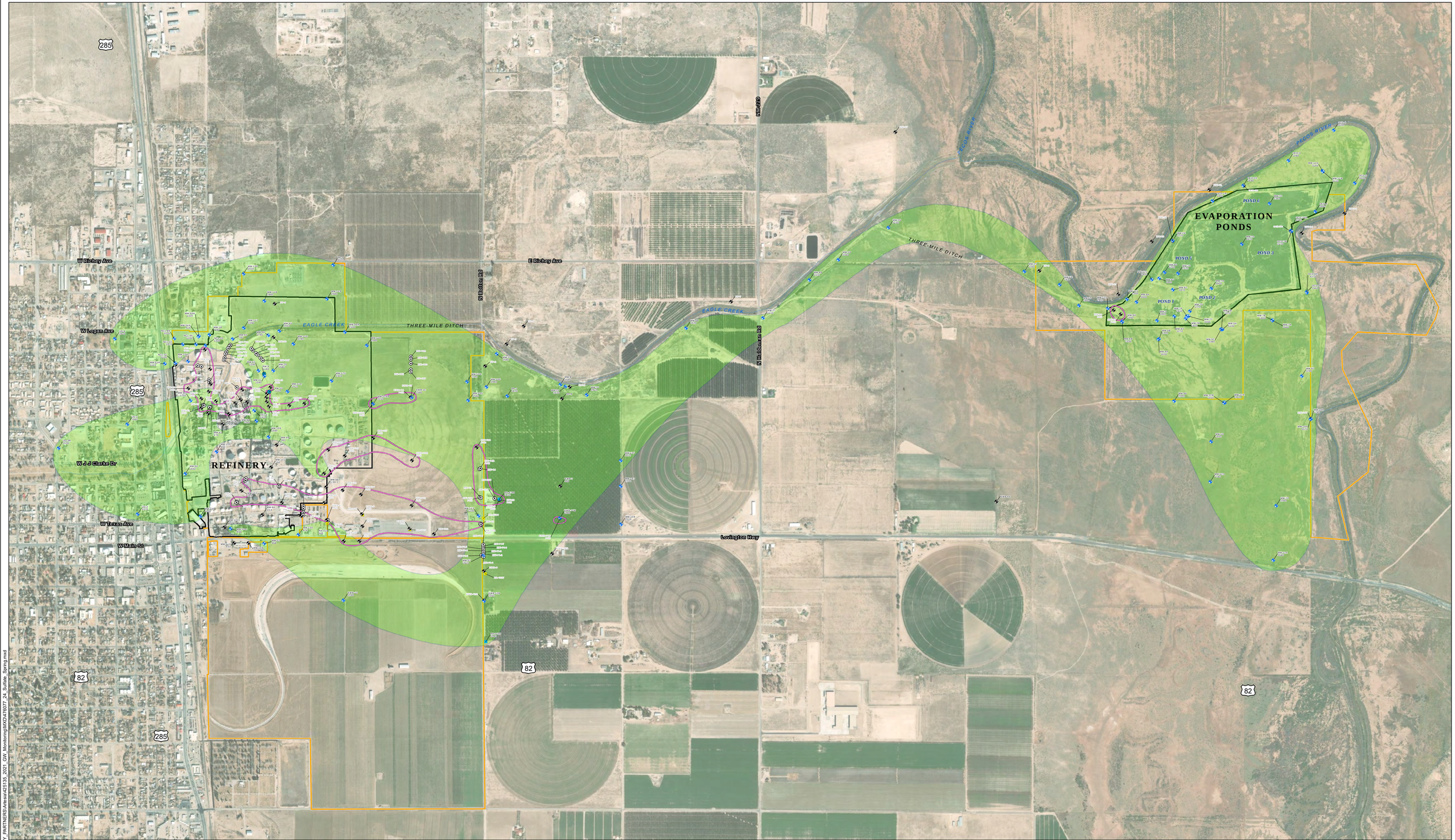
FIGURE 22

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_22_Fluoride_Spring.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

- 958 SULFATE CONCENTRATION
- MW-97 WELL NOT SAMPLED
- < 0.0774 SULFATE NOT DETECTED ABOVE METHOD DETECTION LIMIT
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 600 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

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SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 FIRST SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/28/2022	MXD: 476077_24_Sulfate_Spring

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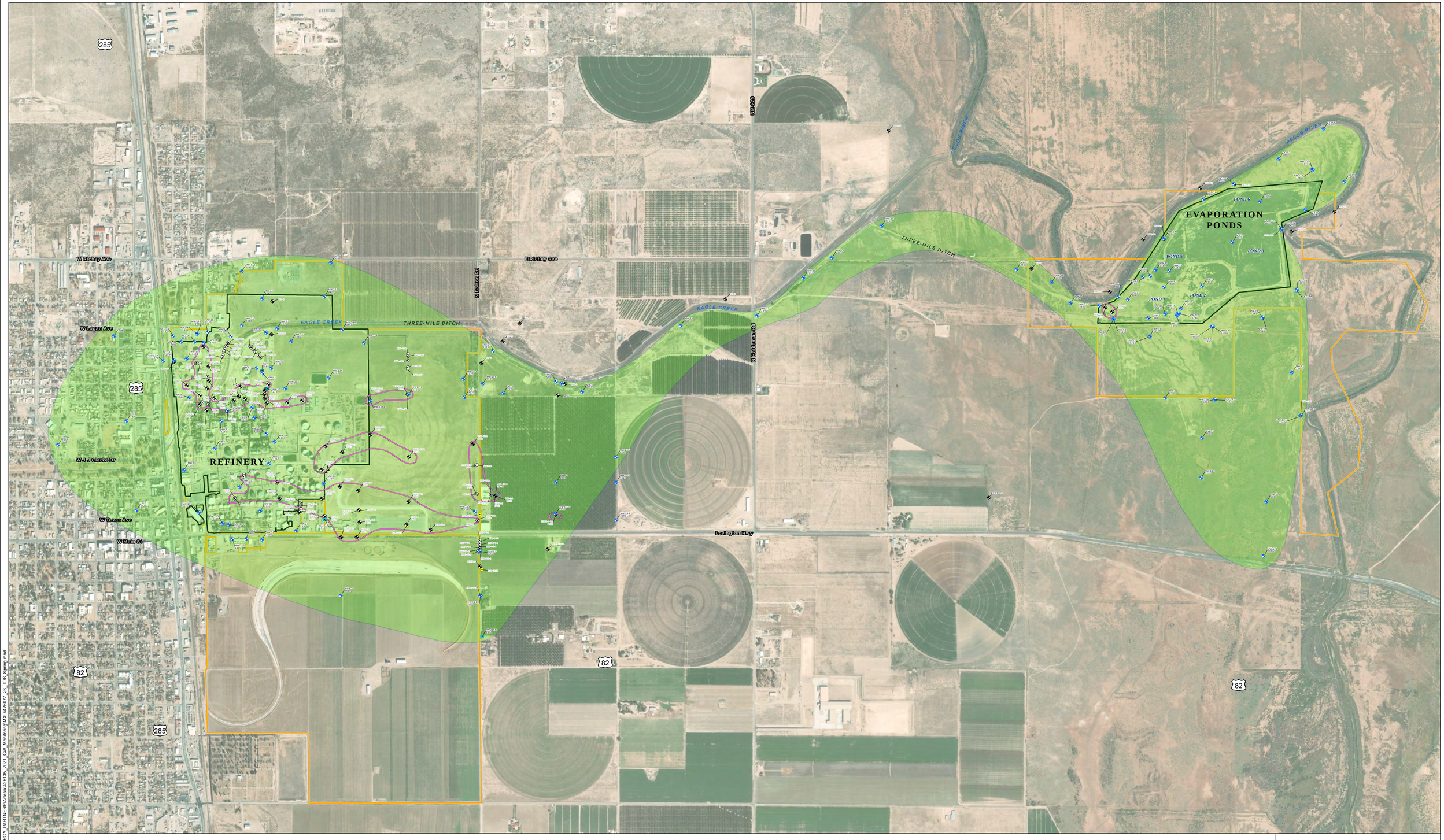
FIGURE 24



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

1340 TOTAL DISSOLVED SOLIDS CONCENTRATION
MW-19 WELL NOT SAMPLED
PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1000 mg/L)
FENCELINE
NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
PHASE-SEPARATED HYDROCARBON (PSH)

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 750 1,500
Feet

1 IN = 800 FT

NEW MEXICO

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2021 FIRST SEMIANNUAL EVENT
2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/28/2022	MXD: 476077_26_TDS_Spring

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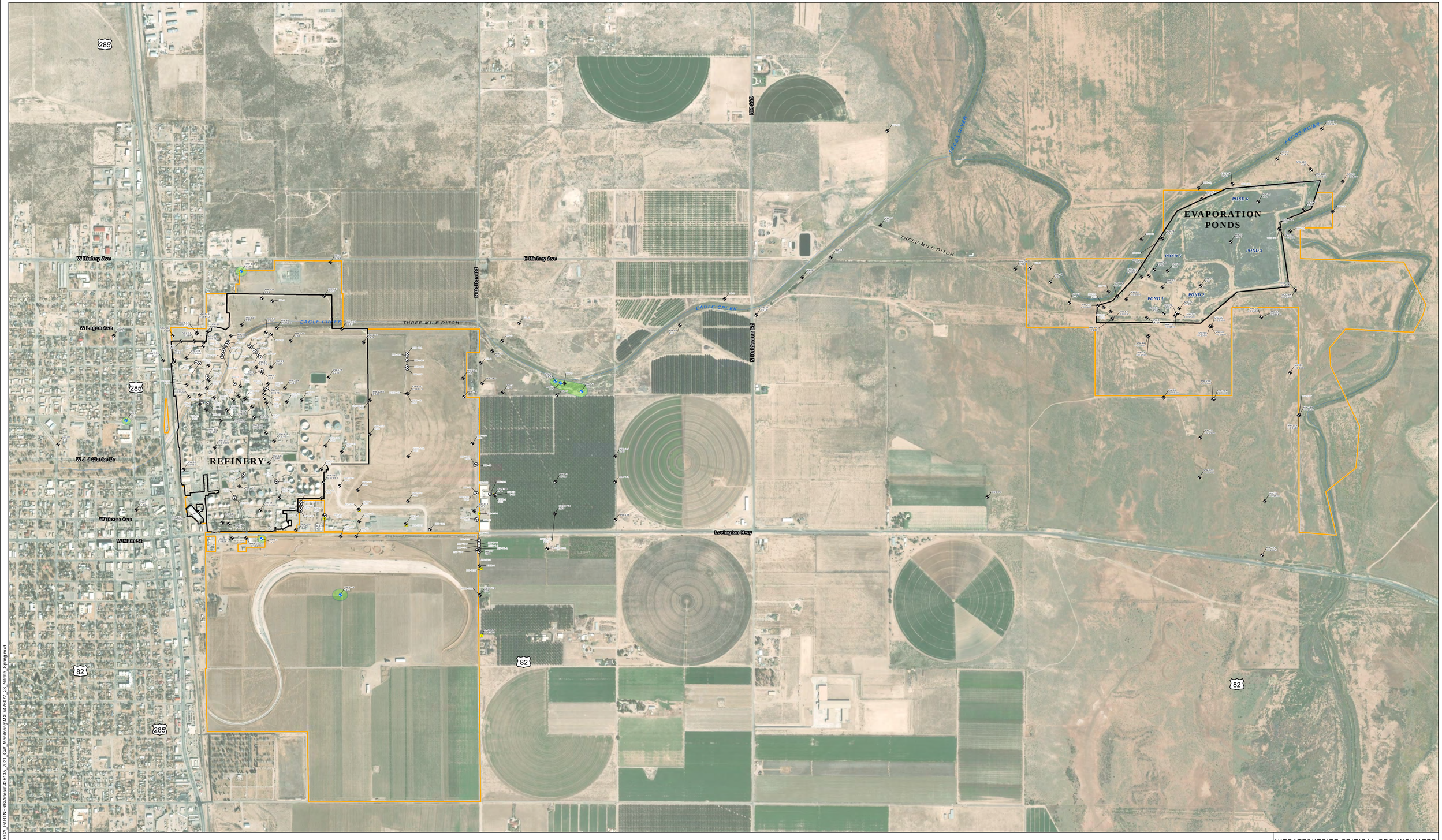
FIGURE 26

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_26_TDS_Spring.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 11.0 NITRATE/NITRITE CONCENTRATION
- < 0.197 NITRATE/NITRITE NOT DETECTED ABOVE METHOD DETECTION LIMIT
- MW-19 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 10 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_28_Nitrate_Spring.mxd

NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 FIRST SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 2/2/2022	MXD: 476077_28_Nitrate_Spring

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SUITE 250
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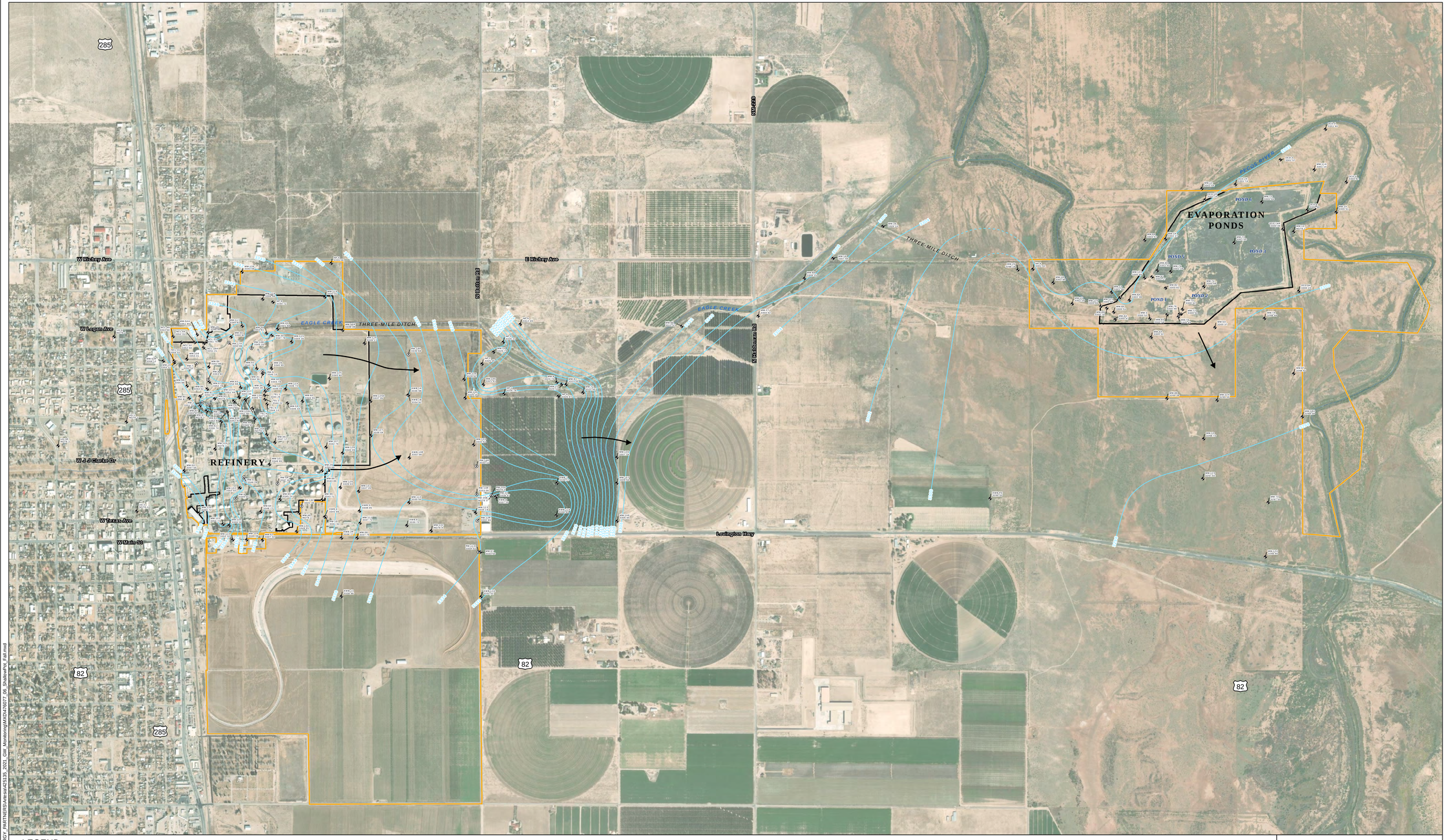
FIGURE 28



LEGEND

- MONITORING WELL
- RECOVERY WELL
- GROUNDWATER FLOW DIRECTION
- SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE CONTOURS - DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- 3349.57 GROUNDWATER ELEVATION (FEET)

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

N
W E
S

0 800 1,600
Feet

1 IN = 800 FT

NOTE:
1. GROUNDWATER ELEVATION WAS NOT MEASURED BECAUSE WELL IS NOT IN GAUGING PROGRAM, WELL COULD NOT BE LOCATED, OR WELL WAS DAMAGED.
2. WELL WAS DRY AT TIME OF GAUGING.
3. GROUNDWATER ELEVATION NOT USED IN POTENTIOMETRIC SURFACE CONTOURING.
4. GROUNDWATER ELEVATION NOT MEASURED DUE TO PUMP IN WELL.

SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE MAP 2021 SECOND SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 2/2/2022	MXD: 476077_06_ShallowPot_Fall

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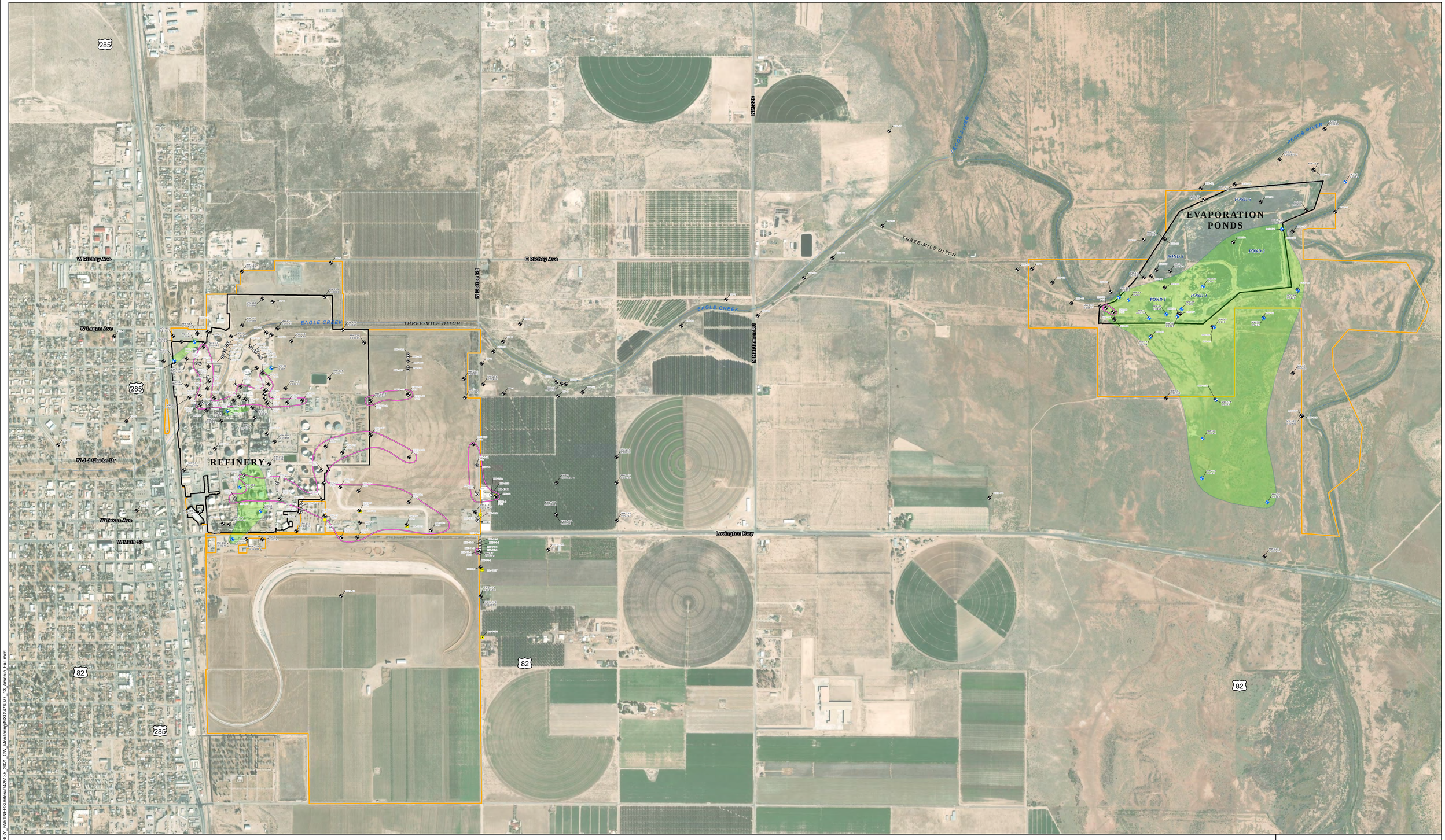
FIGURE 6

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\MXD\476077_06_ShallowPot_Fall.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 0.0144 ARSENIC CONCENTRATION
- MW-105 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.01 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_13_Arsenic_Fall.mxd

ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 SECOND SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/28/2022	MXD: 476077_13_Arsenic_Fall

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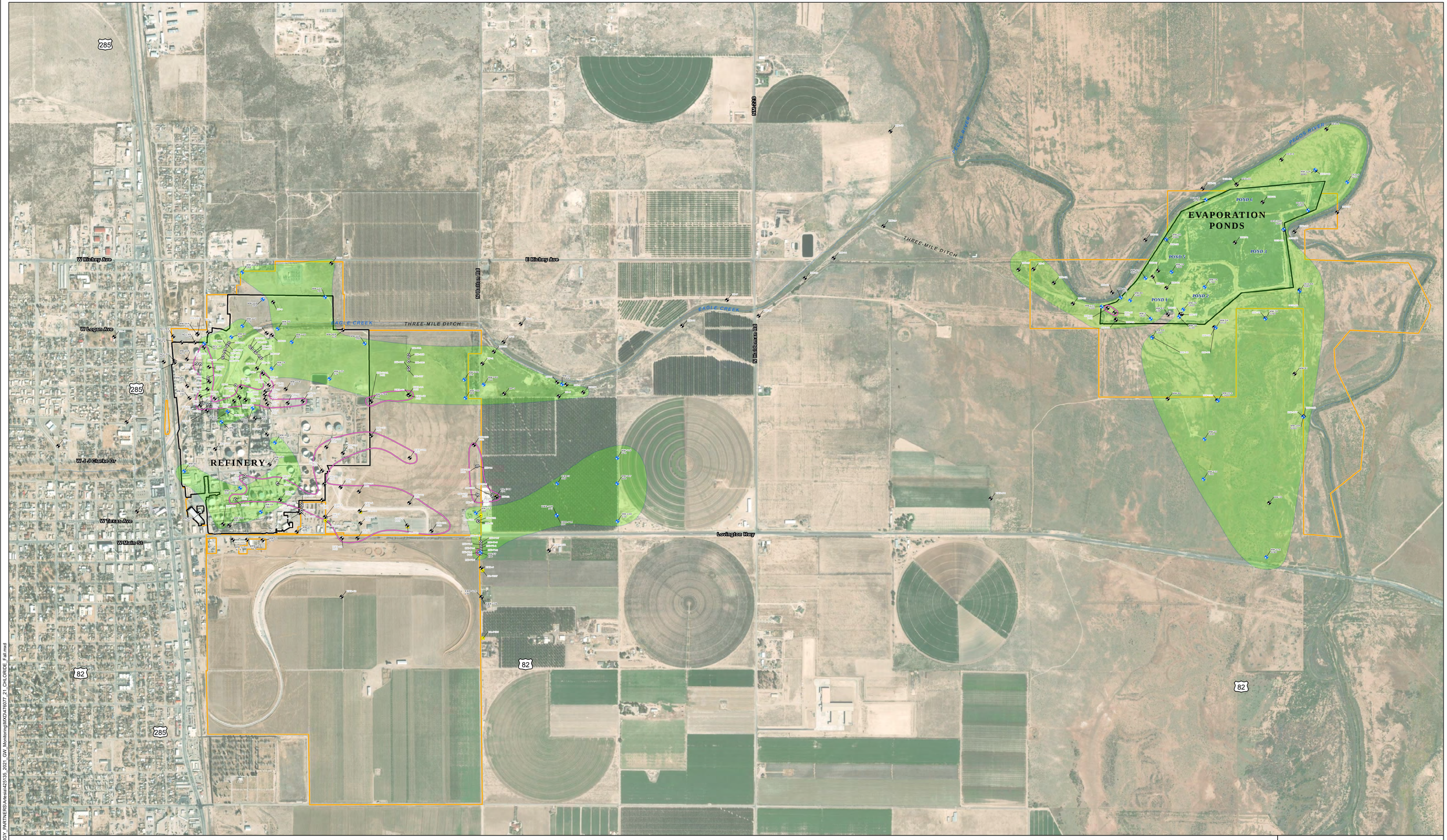
FIGURE 13



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

179 CHLORIDE CONCENTRATION

MW-106 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 250 mg/L)

FENCELINE

NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_21_CHLORIDE_Fall.mxd

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 SECOND SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/28/2022	MXD: 476077_21_CHLORIDE_Fall

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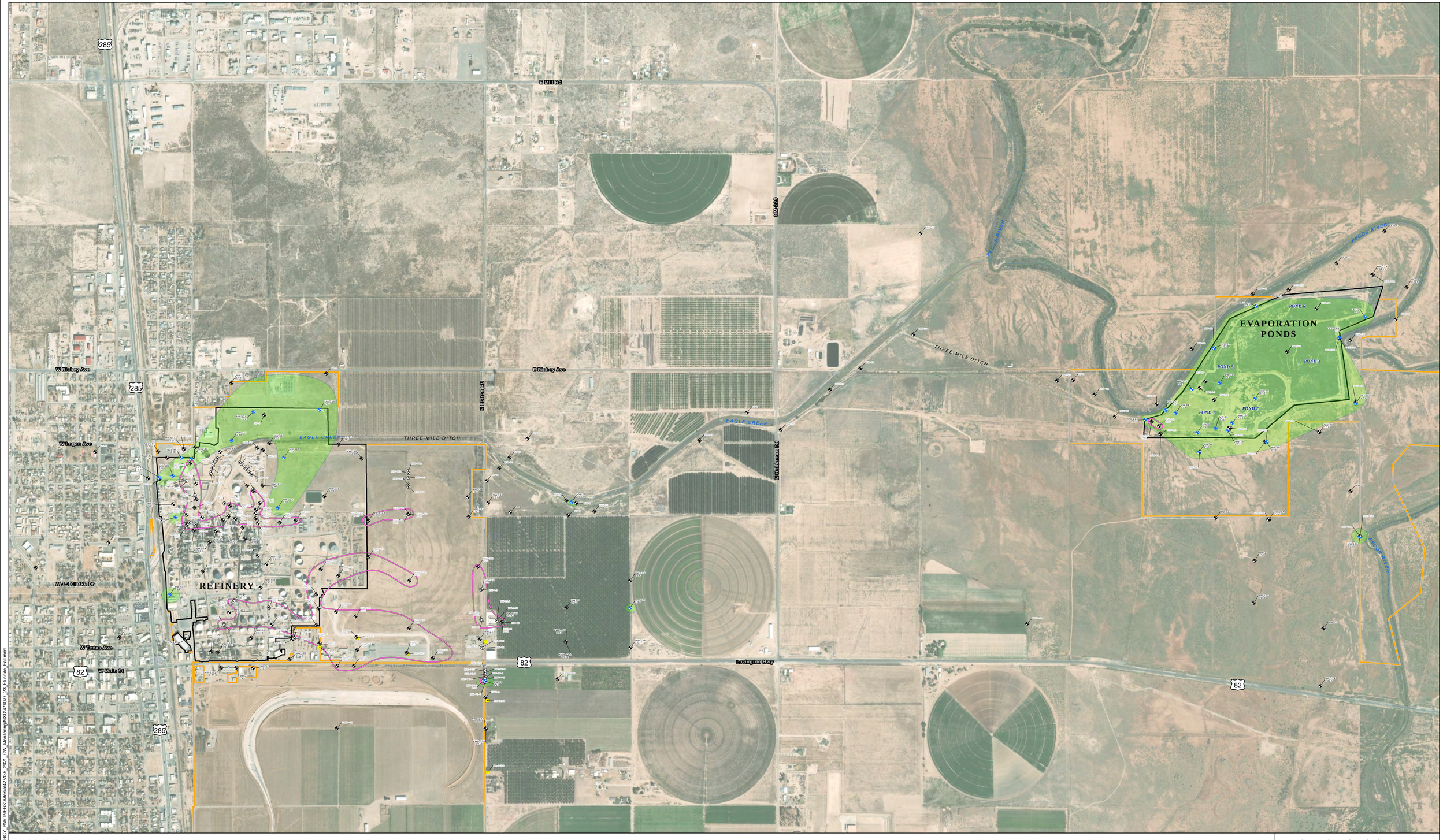
FIGURE 21



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 1.84 FLUORIDE CONCENTRATION
- MW-30 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1.6 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

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FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 SECOND SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/31/2022	MXD: 476077_23_Fluoride_Fall

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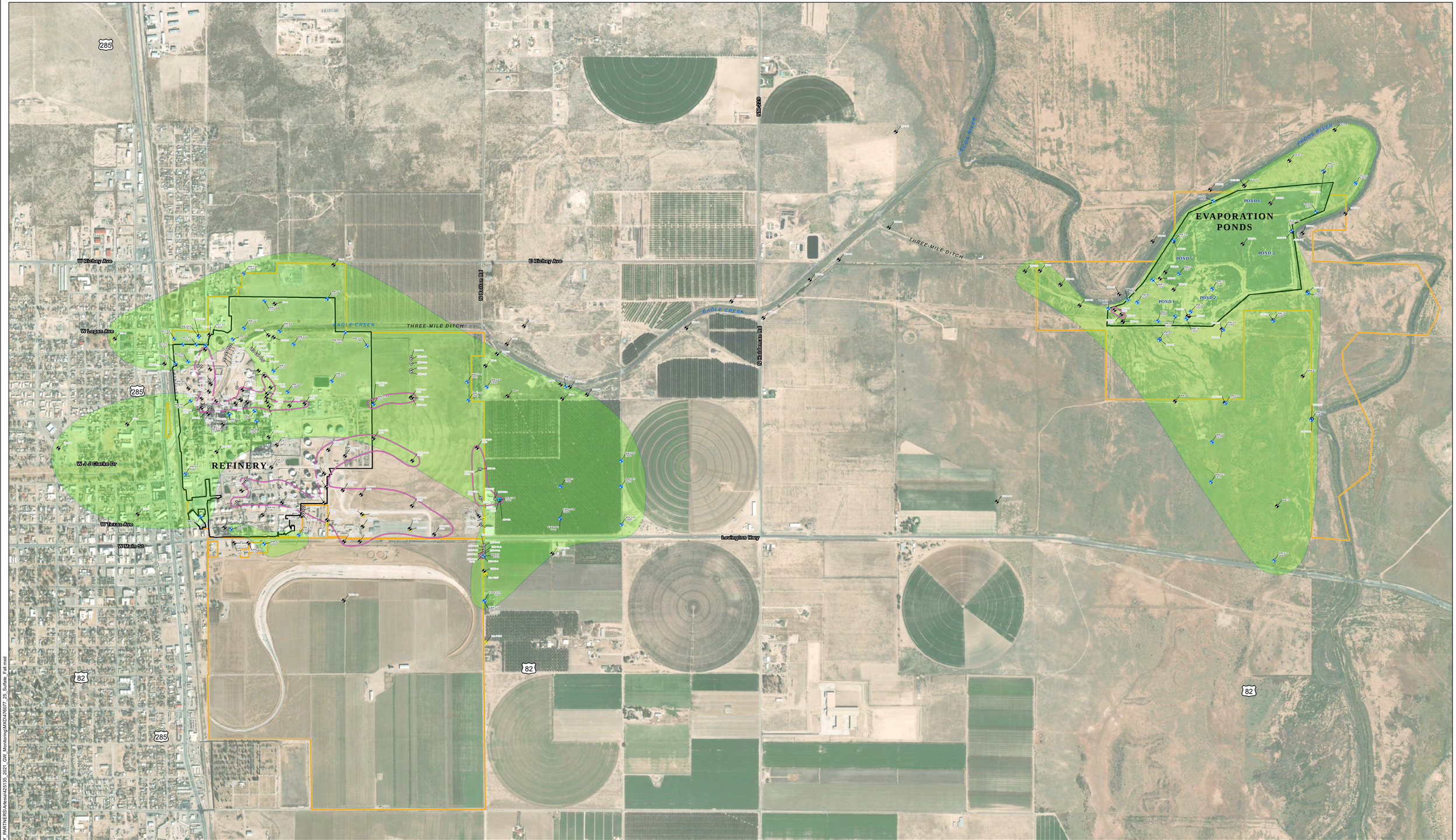
FIGURE 23



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL

- 834 SULFATE CONCENTRATION
- MW-105 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 600 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 SECOND SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/28/2022	MXD: 476077_25_Sulfate_Fall

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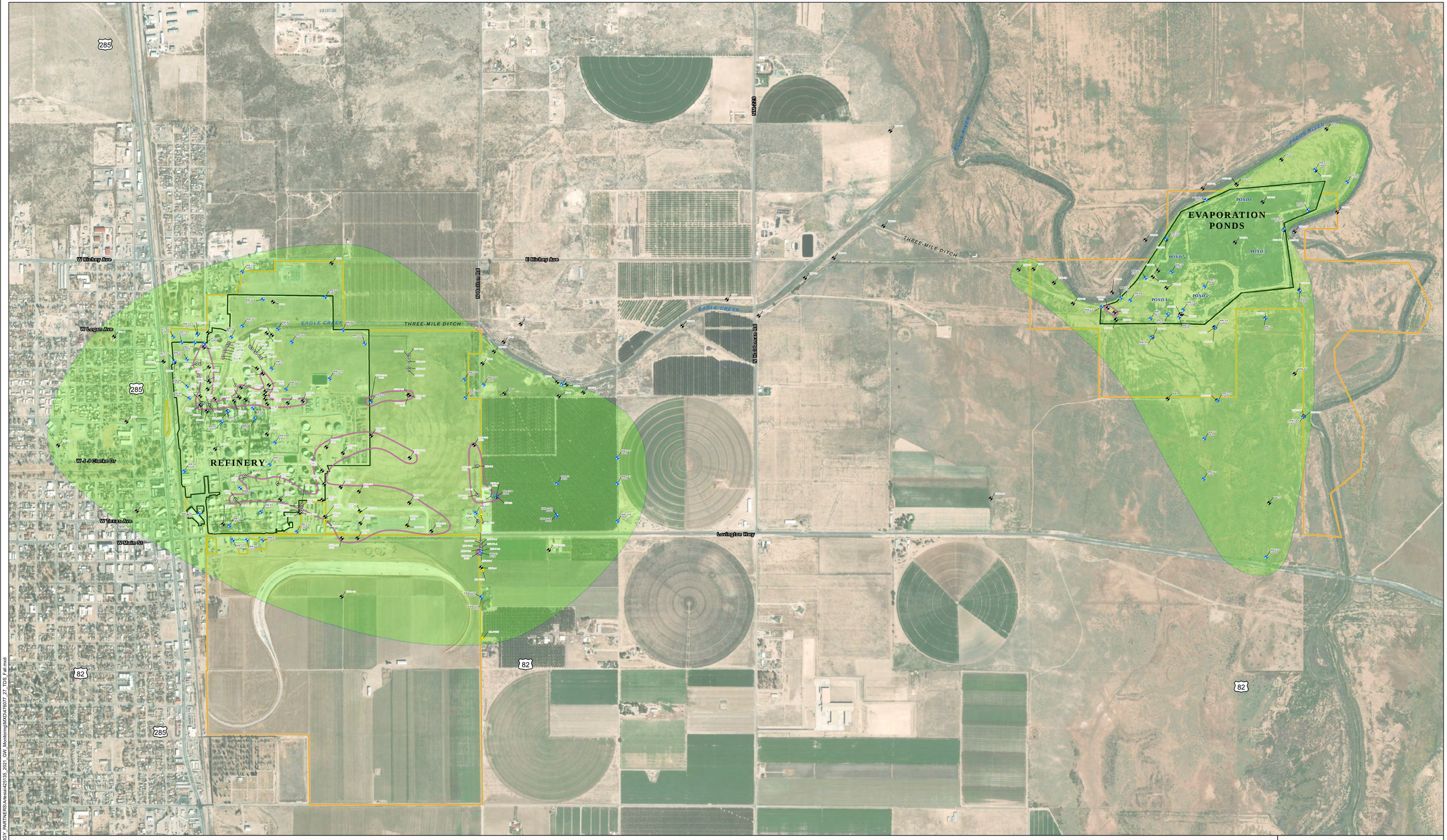
FIGURE 25

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_25_Sulfate_Fall.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

- 2020 TOTAL DISSOLVED SOLIDS CONCENTRATION
- MW-105 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1000 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2021 SECOND SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/28/2022	MXD: 476077_27_TDS_Fall

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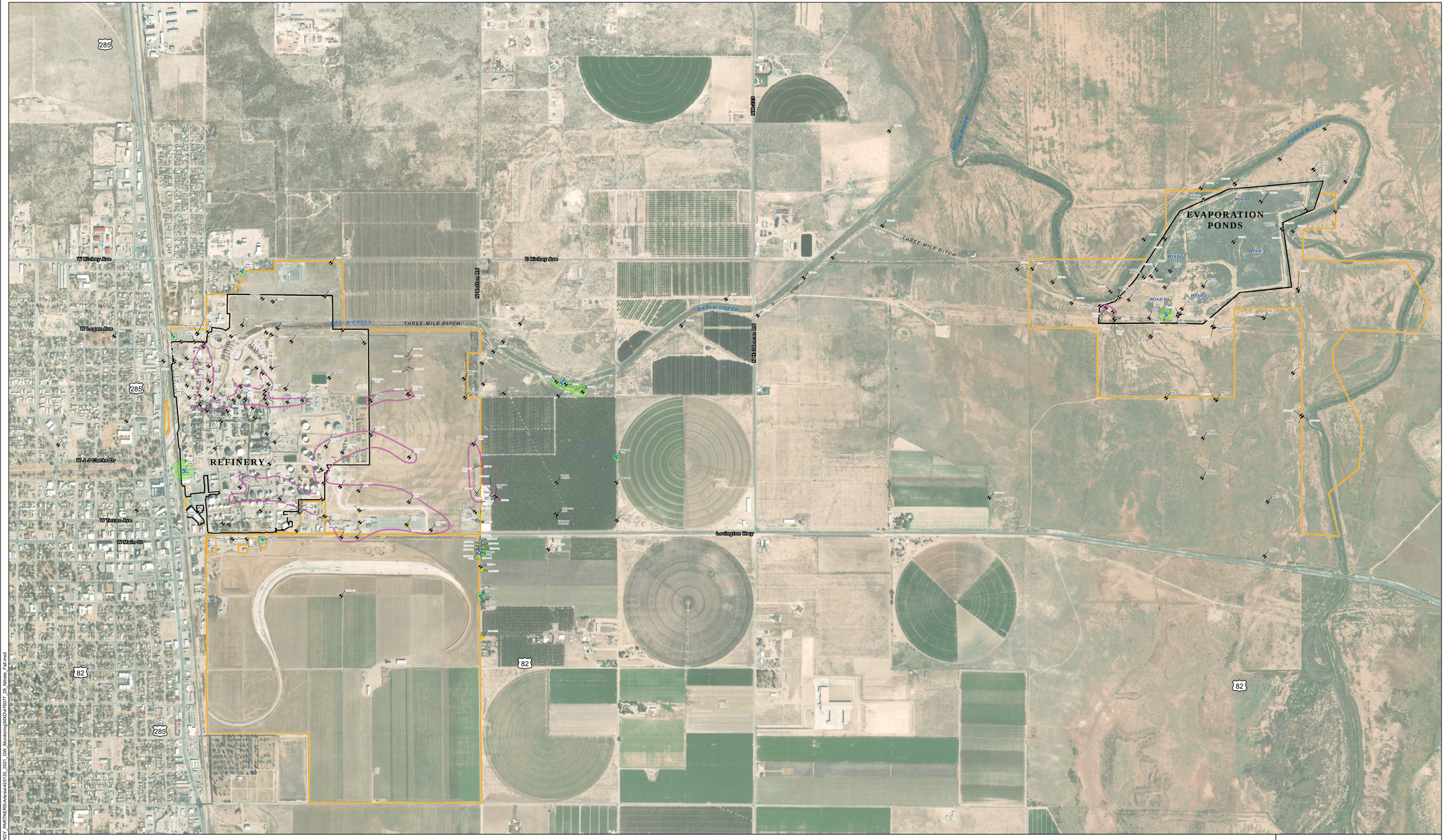
FIGURE 27

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\476135_2021_GW_Monitoring\MXD\476077_27_TDS_Fall.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 1.85 NITRATE/NITRITE CONCENTRATION
- < 0.394 NITRATE/NITRITE NOT DETECTED ABOVE METHOD DETECTION LIMIT
- MW-105 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 10 mg/L)
- FENCELINE
- NAVAJO PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (10/1/20)

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\425135_2021_GW_Monitoring\MXD\476077_29_Nitrate_Fall.mxd

NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2021 SECOND SEMIANNUAL EVENT

2021 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 2/2/2022	MXD: 476077_29_Nitrate_Fall

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FIGURE 29

DRAFT

EAGLE CREEK

PECOS RIVER

285

82

LEGEND

- MONITORING WELL
- RECOVERY WELL
- GROUNDWATER FLOW DIRECTION
- SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE CONTOURS - DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL)
- FENCELINE
- HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- 3337.25 GROUNDWATER ELEVATION (FEET)

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NOTE:

1. GROUNDWATER ELEVATION WAS NOT MEASURED BECAUSE WELL IS NOT IN GAUGING PROGRAM, WELL COULD NOT BE LOCATED, WELL WAS DAMAGED, OR WELL COULD NOT BE ACCESSED.
2. WELL WAS DRY AT TIME OF GAUGING.
3. GROUNDWATER ELEVATION NOT MEASURED DUE TO PUMP IN WELL.
4. GROUNDWATER ELEVATION NOT USED IN POTENTIOMETRIC SURFACE CONTOURING.

NEW MEXICO

SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE MAP 2022 FIRST SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/30/2023	MXD: 527024_04_ShallowPot_Spring

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SUITE 250
AUSTIN, TX 78752
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FIGURE 4

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\470077_2022_GW_Monitoring\mxd\527024_04_ShallowPot_Spring.mxd

DRAFT

REFINERY

EVAPORATION PONDS

POND 5

POND 4

POND 3

POND 2

POND 1

EAGLE CREEK

THREE-MILE DITCH

PECOS RIVER

N Dal Paso

N Baldwin Rd

E Richey Ave

W Richey Ave

W Logan Ave

W Texas Ave

W Main St

W J Clarke Dr

Lovington Hwy

NM-529

285

82

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

- 0.00394 ARSENIC CONCENTRATION
- < .00368 ARSENIC NOT DETECTED ABOVE METHOD DETECTION LIMIT
- MW-19 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥0.03 FEET THICK)
- ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.01 mg/L)
- FENCELINE

- HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

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ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 FIRST SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/30/2023	MXD: 527024_12_Arsenic_Spring

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505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 12

DRAFT

EVAPORATION PONDS

REFINERY

W Richey Ave

W Logan Ave

W J d Clarke Dr

W Texas Ave

W Main St

E Richey Ave

N Eddy Rail Rd

N Haldeman Rd

Lovington Hwy

285

82

NM-529

PECOS RIVER

THREE-MILE DITCH

EAGLE CREEK

POND 1

POND 2

POND 3

POND 4

POND 5

POND 6

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

133 CHLORIDE CONCENTRATION

MW-19 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 250 mg/L)

FENCELINE

HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 FIRST SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/30/2023	MXD: 527024_20_Chloride_Spring

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 20

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LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL
- 3.03 FLUORIDE CONCENTRATION
- MW-19 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1.6 mg/L)
- FENCELINE
- HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N E S W

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 FIRST SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/26/2023	MXD: 527024_22_Fluoride_Spring

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505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 22

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DRAFT

REFINERY

EVAPORATION PONDS

POND 1

POND 2

POND 3

POND 4

POND 5

POND 6

EAGLE CREEK

THREE-MILE DITCH

PECOS RIVER

N Eddy Rd

N Haldeman Rd

E Richey Ave

W Richey Ave

W Logan Ave

W Texas Ave

W Main St

W J Clarke Dr

Lovington Hwy

285

82

NM-529

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

2350 SULFATE CONCENTRATION

< 0.0774 SULFATE NOT DETECTED ABOVE METHOD DETECTION LIMIT

MW-19 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 600 mg/L)

FENCELINE

HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

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SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 FIRST SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/30/2023	MXD: 527024_24_Sulfate_Spring

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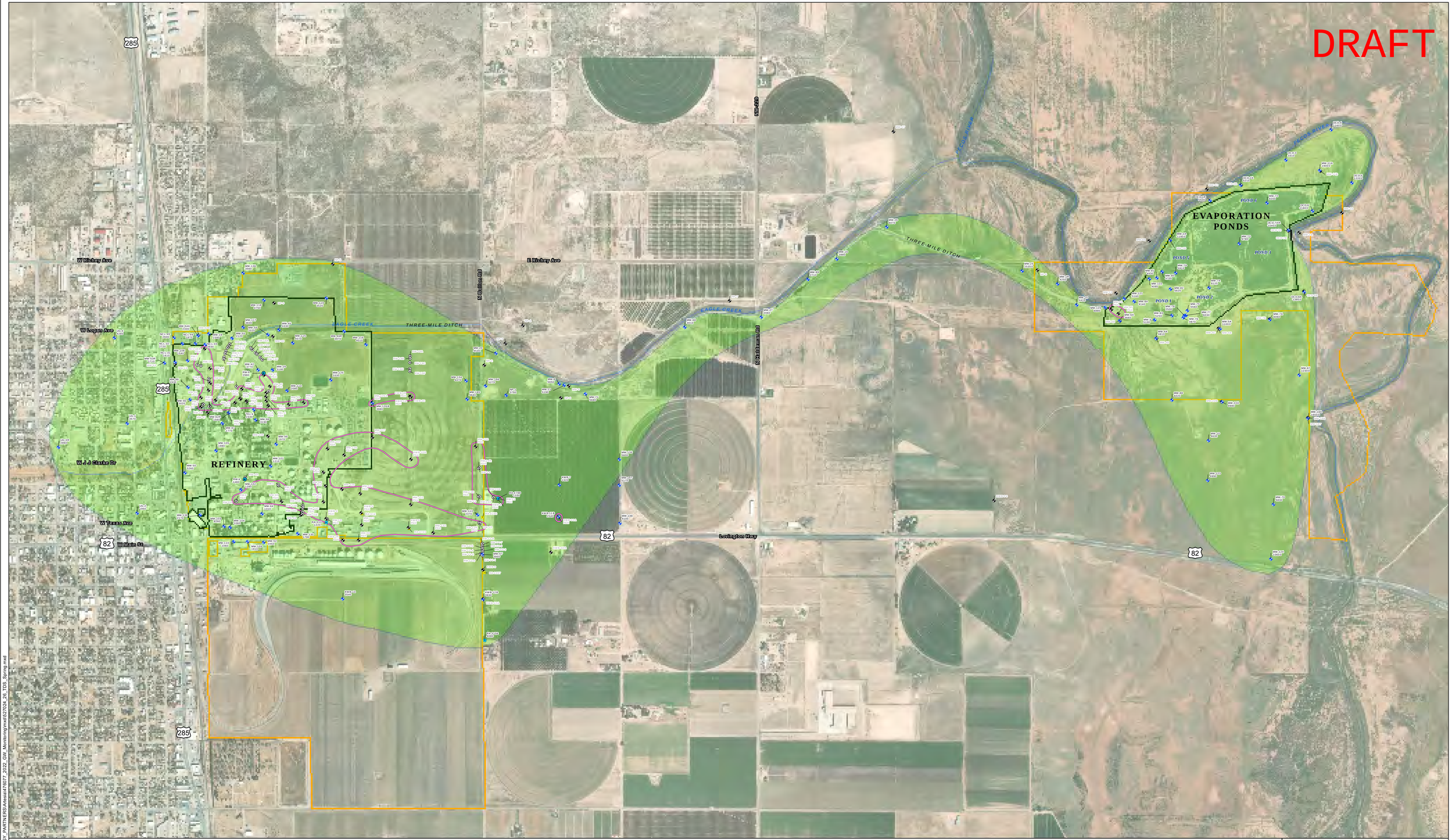
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 24

DRAFT



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

1780 TOTAL DISSOLVED SOLIDS CONCENTRATION

MW-19 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1000 mg/L)

FENCELINE

HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600

Feet

1 IN = 800 FT

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP

2022 FIRST SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/30/2023	MXD: 527024_26_TDS_Spring

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 26

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DRAFT

EVAPORATION PONDS

REFINERY

W Richey Ave

E Richey Ave

W Logan Ave

W Texas Ave

W Main St

W J Clarke Dr

N Eddison Rd

N Haddaway Rd

Lovington Hwy

285

82

NM-529

EAGLE CREEK

THREE-MILE DITCH

PECOS RIVER

POND 5

POND 4

POND 3

POND 2

POND 1

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

15.7 NITRATE/NITRITE CONCENTRATION

< 0.197 NITRATE/NITRITE NOT DETECTED ABOVE METHOD DETECTION LIMIT

MW-19 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 10 mg/L)

FENCELINE

HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

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NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 FIRST SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/30/2023	MXD: 527024_28_Nitrate_Spring

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505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 28

DRAFT

REFINERY

EVAPORATION PONDS

POND 3

POND 4

POND 5

POND 1

POND 2

EAGLE CREEK

THREE MILE DITCH

PECOS RIVER

N Eddy Rd

N Haldeman Rd

E Richey Ave

W Richey Ave

W Logan Ave

W J J Clarke Dr

W Texas Ave

W Main St

Lovington Hwy

285

82

LEGEND

- MONITORING WELL
- RECOVERY WELL
- GROUNDWATER FLOW DIRECTION
- SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE CONTOURS - DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL)
- FENCELINE
- HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- 3337.67 GROUNDWATER ELEVATION (FEET)

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NOTE:

1. GROUNDWATER ELEVATION WAS NOT MEASURED BECAUSE WELL IS NOT IN GAUGING PROGRAM, WELL COULD NOT BE LOCATED, WELL WAS DAMAGED, OR WELL COULD NOT BE ACCESSED.
2. WELL WAS DRY AT TIME OF GAUGING.
3. GROUNDWATER ELEVATION NOT MEASURED DUE TO PUMP IN WELL.
4. GROUNDWATER ELEVATION NOT USED IN POTENTIOMETRIC SURFACE CONTOURING.

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\170077_2022_GW_Monitoring\mxd\62\2024_06_ShallowPot_Fall.mxd

SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE MAP 2022 SECOND SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/30/2023	MXD: 527024_06_ShallowPot_Fall

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SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 6

DRAFT

EVAPORATION PONDS

REFINERY

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 0.00533 ARSENIC CONCENTRATION
- < .00368 ARSENIC NOT DETECTED ABOVE METHOD DETECTION LIMIT
- MW-19 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥0.03 FEET THICK)
- ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.01 mg/L)
- FENCELINE
- HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

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ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 SECOND SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/24/2023	MXD: 527024_13_Arsenic_Fall

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SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 13

DRAFT

REFINERY

EVAPORATION PONDS

POND 5

POND 4

POND 3

POND 1

POND 2

EAGLE CREEK

THREE-MILE DITCH

PECOS RIVER

N Halagueno Rd

N Halfaman Rd

E Richey Ave

W Richey Ave

W Logan Ave

W J J Clarke Dr

W Texas Ave

W Main St

Lovington Hwy

285

82

NM-529

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

141 CHLORIDE CONCENTRATION

KWB-13 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 250 mg/L)

FENCELINE

HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NEW MEXICO

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 SECOND SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/24/2023	MXD: 527024_21_CHLORIDE_Fall

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505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 21

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DRAFT

REFINERY

EVAPORATION PONDS

POND 4

POND 3

POND 1

POND 2

THREE-MILE DITCH

EAGLE CREEK

PECOS RIVER

W Richey Ave

E Richey Ave

W Logan Ave

W J J Clarke Dr

W Texas Ave

W Main St

N Eddy Rd

N Haldeman Rd

Lovington Hwy

285

82

NM-529

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

- 1.99 FLUORIDE CONCENTRATION
- MW-112 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1.6 mg/L)
- FENCELINE
- HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

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FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 SECOND SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/26/2023	MXD: 527024_23_Fluoride_Fall

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SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE
23

DRAFT

EVAPORATION PONDS

REFINERY

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL

370 SULFATE CONCENTRATION

MW-103 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 600 mg/L)

FENCELINE

HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

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SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 SECOND SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/26/2023	MXD: 527024_25_Sulfate_Fall

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PH:512-329-6080

FIGURE 25

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL
- 1790 TOTAL DISSOLVED SOLIDS CONCENTRATION
- MW-103 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1000 mg/L)
- FENCELINE
- HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)
- PHASE-SEPARATED HYDROCARBON (PSH)

AERIAL IMAGERY SOURCE: GOOGLE EARTH PRO AND THEIR DATA PARTNERS, 12/09/2019.

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N E S W

0 800 1,600
Feet

1 IN = 800 FT

NEW MEXICO

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2022 SECOND SEMIANNUAL EVENT
2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE | SAVED: 1/27/2023 | MXD: 527024_27_TDS_Fall

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SUITE 250
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FIGURE 27

Document Path: S:\1-PROJECTS\HOLLY_ENERGY_PARTNERS\Artesia\476077_2022_GW_Monitoring\mxd\527024_27_TDS_Fall.mxd

DRAFT

REFINERY

EVAPORATION PONDS

POND 5

POND 4

POND 3

POND 1

POND 2

EAGLE CREEK

THREE-MILE DITCH

PECOS RIVER

N Halagueno Rd

E Richey Ave

W Richey Ave

W Logan Ave

W Texas Ave

W Main St

W J J Clarke Dr

Lovington Hwy

285

82

NM-529

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

11.1 NITRATE/NITRITE CONCENTRATION

< 0.394 NITRATE/NITRITE NOT DETECTED ABOVE METHOD DETECTION LIMIT

MW-103 WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 10 mg/L)

FENCELINE

HFSNR PROPERTY BOUNDARY (FENCELINE SHOWN WHERE COINCIDENT)

PHASE-SEPARATED HYDROCARBON (PSH)

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 800 1,600

Feet

1 IN = 800 FT

NEW MEXICO

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY 1/31/2022.

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NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP 2022 SECOND SEMIANNUAL EVENT

2022 ANNUAL GROUNDWATER REPORT
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MJAGOE	SAVED: 1/31/2023	MXD: 527024_29_Nitrate_Fall

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 29

APPENDIX

B

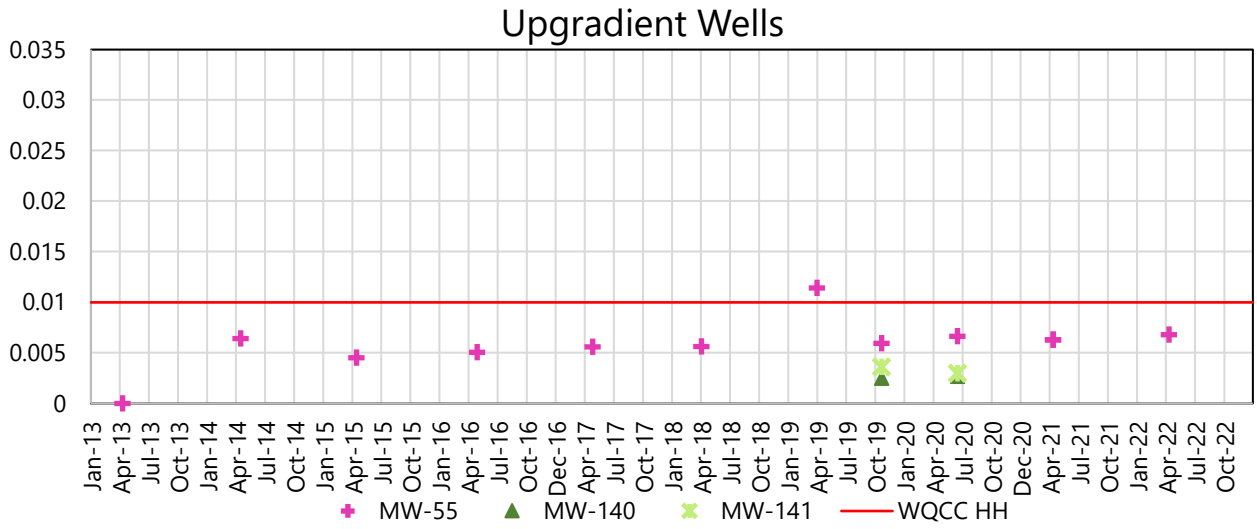
TREND PLOTS OF COCS 2013-2022
PROUCL MANN-KENDALL STATISTICAL
EVALUATION OF COCS 2013-2022

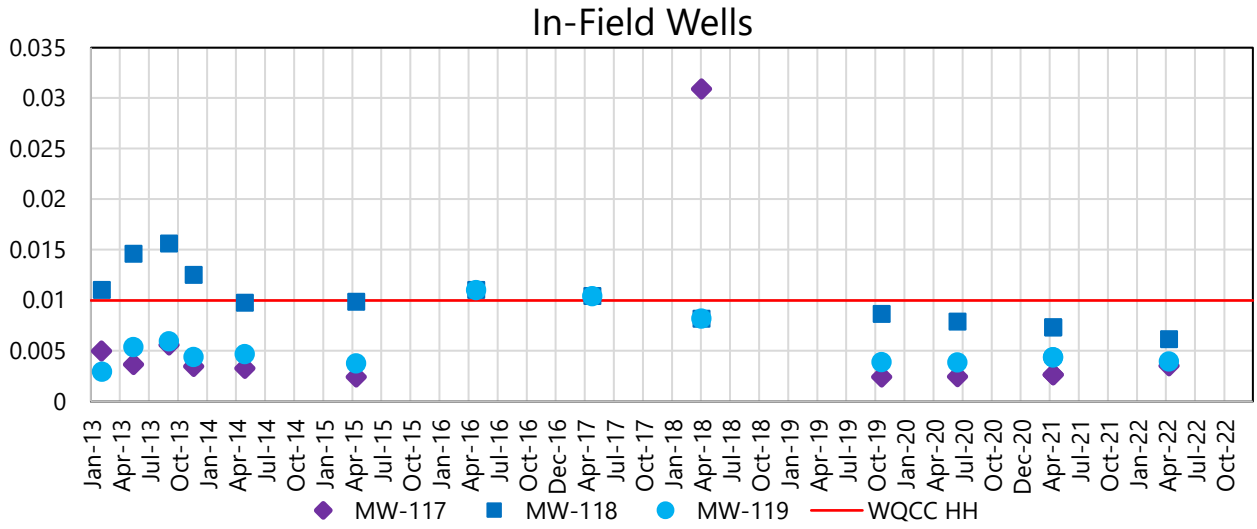
APPENDIX B1

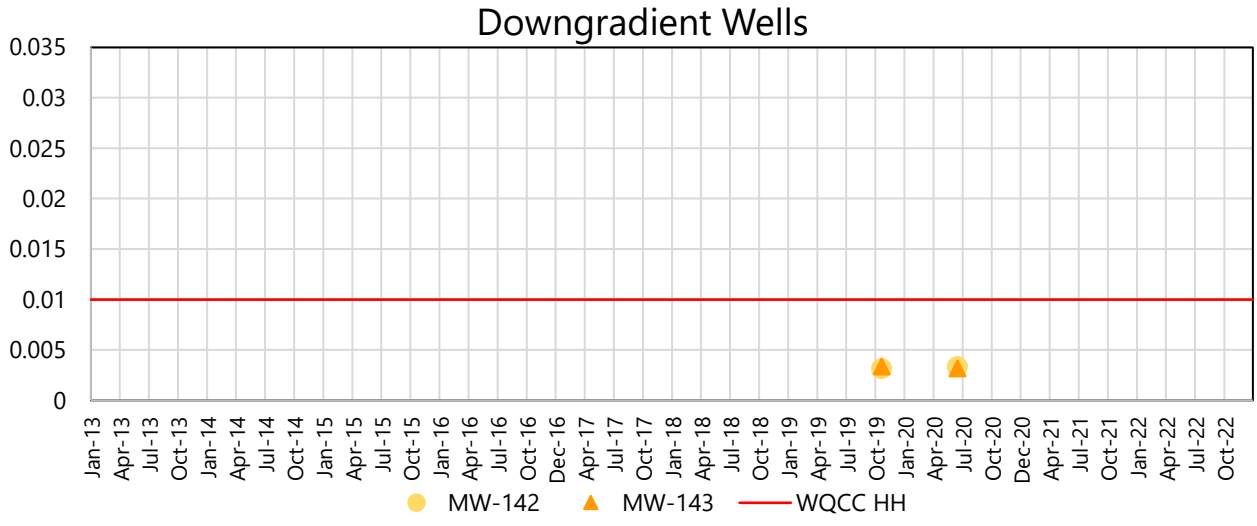
TREND PLOTS OF COCS 2013-2019

APPENDIX B1A

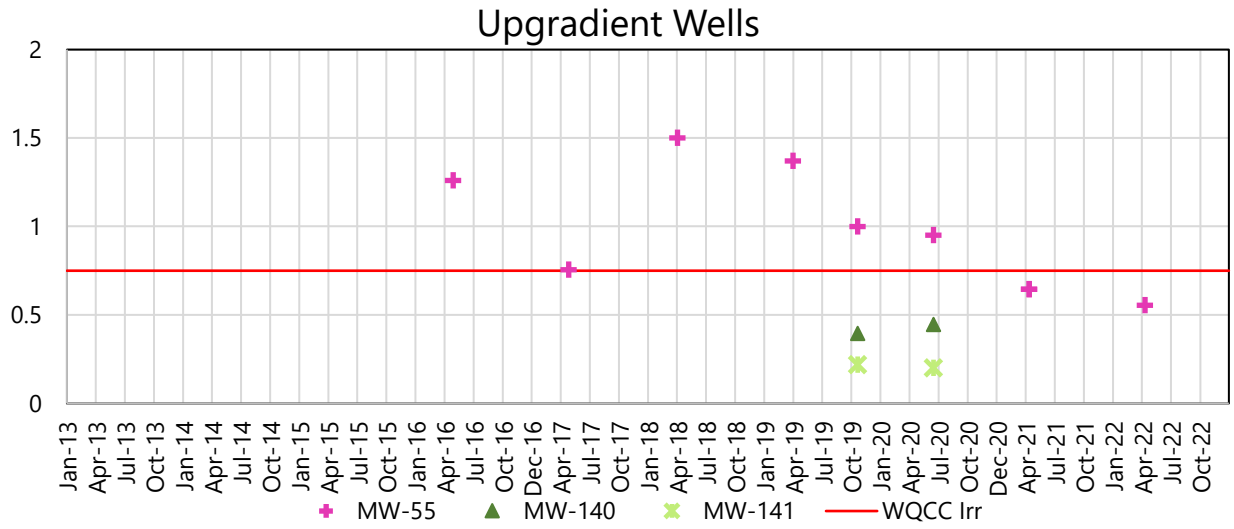
NORTH RO REJECT DISCHARGE FIELD TREND PLOTS

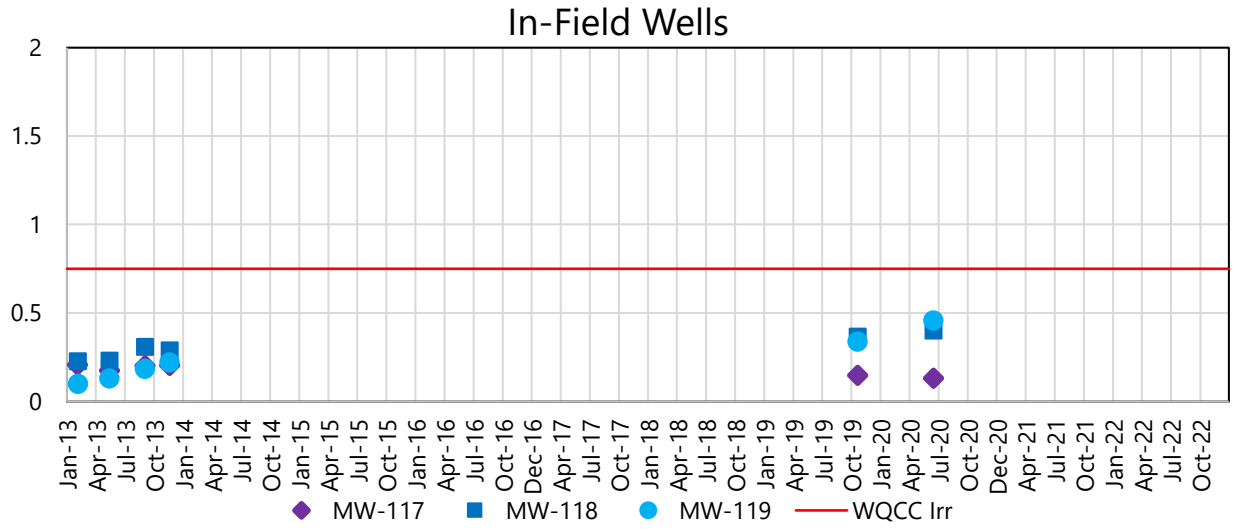


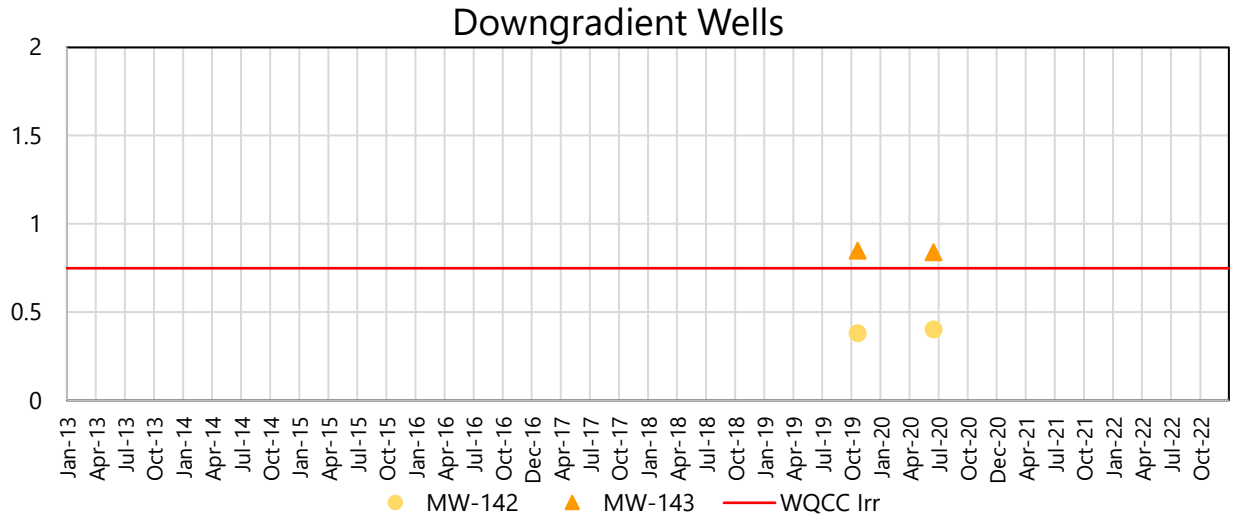




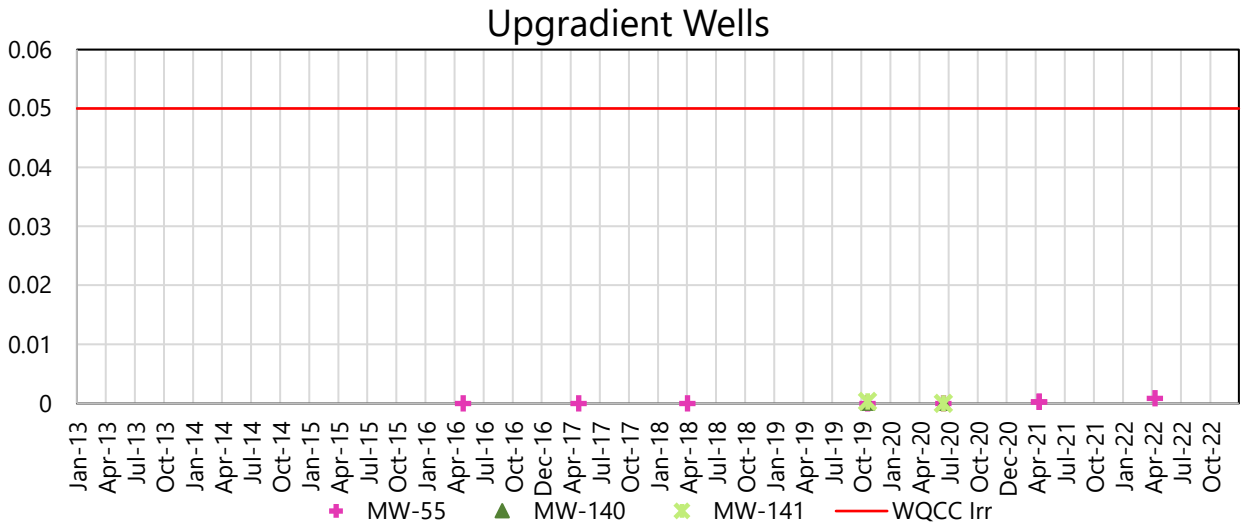
NORTH RO REJECT FIELD TRENDS - ARSENIC, DISSOLVED

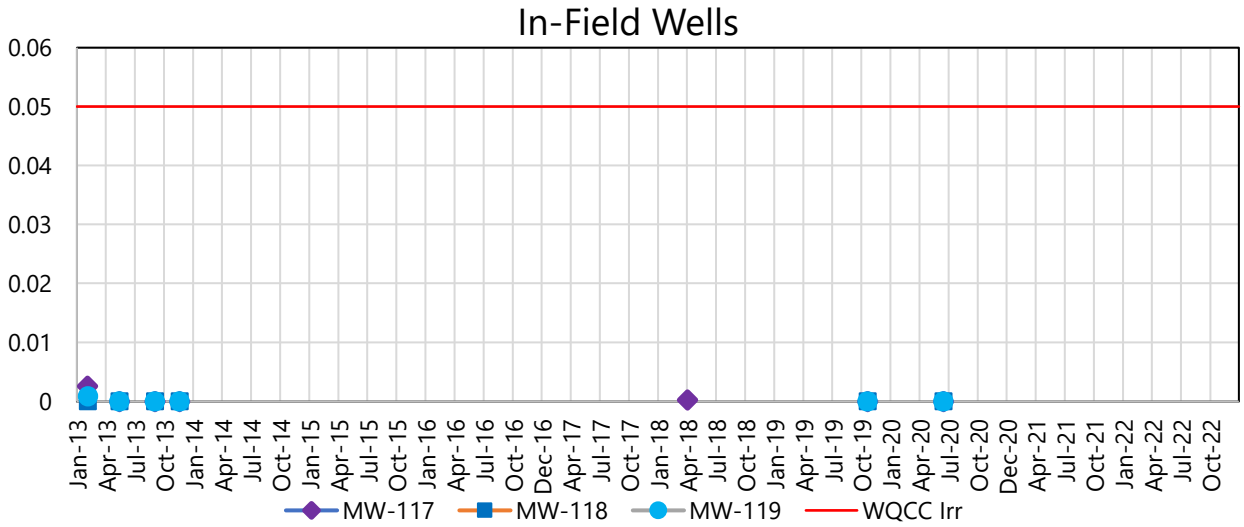


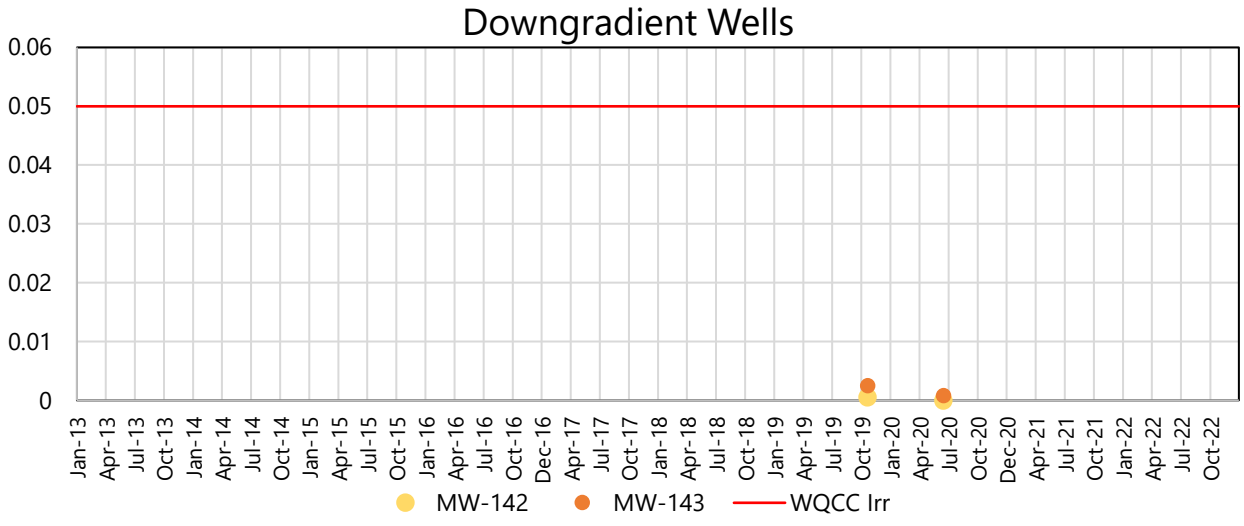




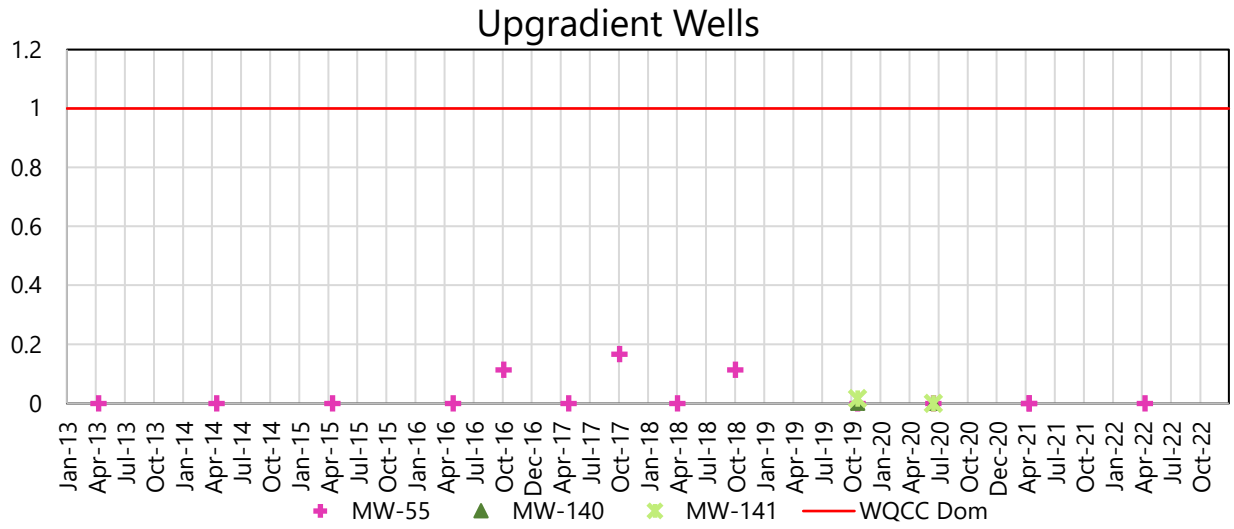
NORTH RO REJECT FIELD TRENDS - BORON, DISSOLVED

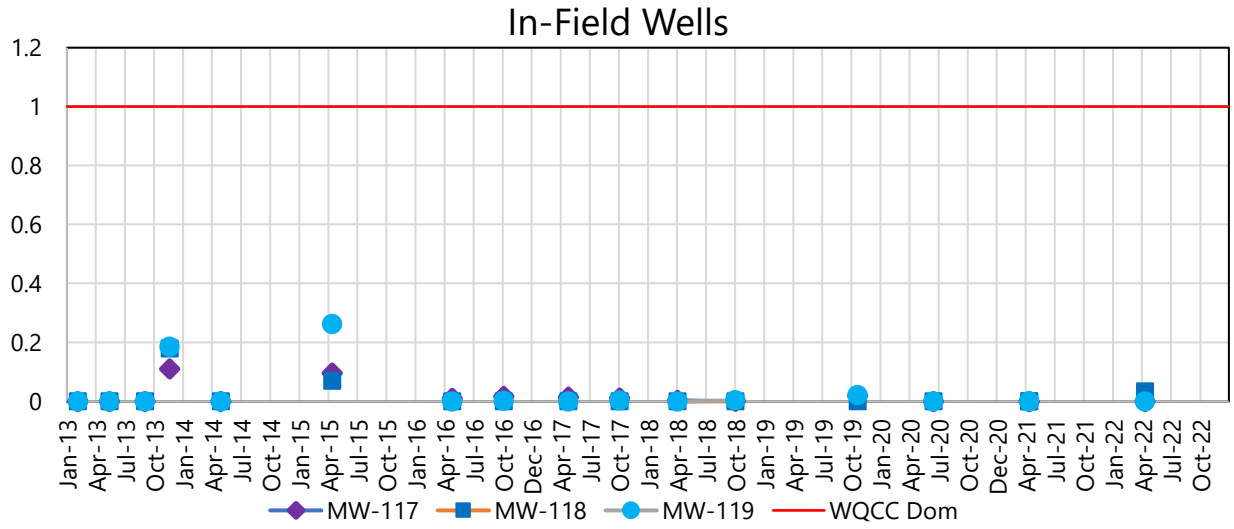


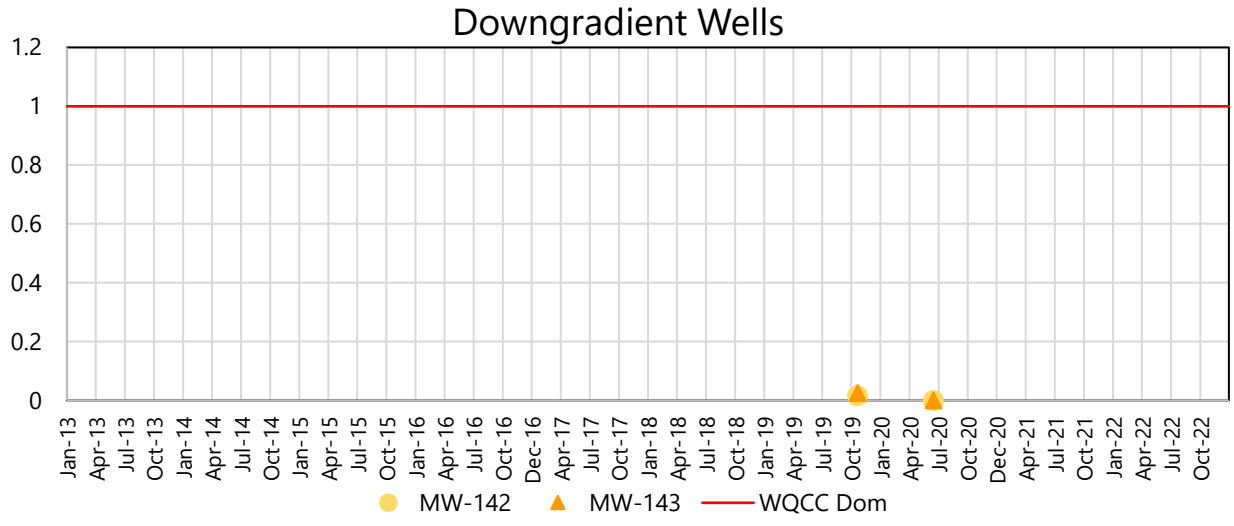




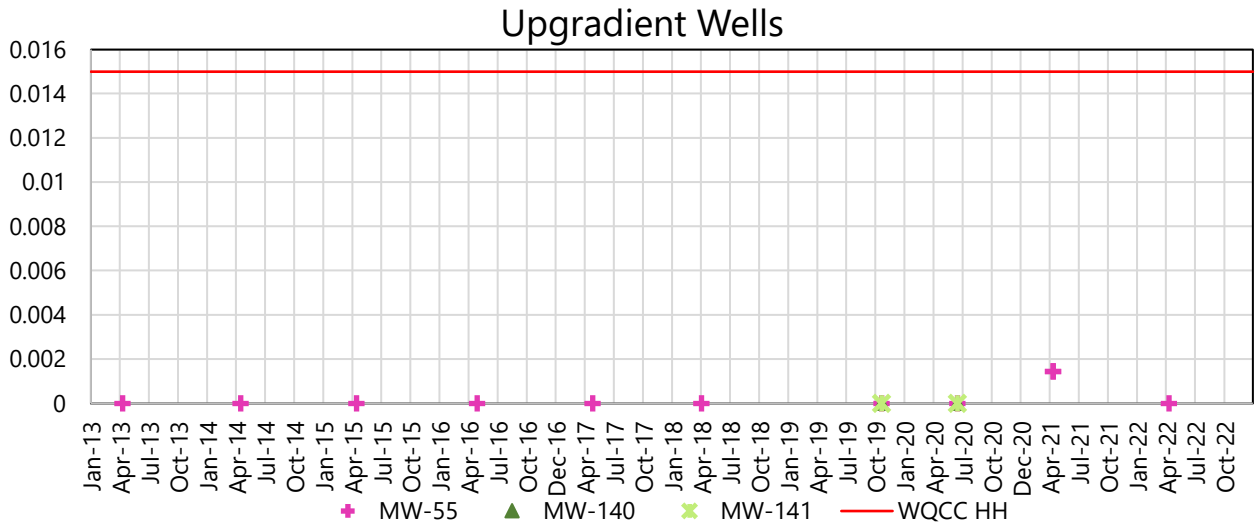
NORTH RO REJECT FIELD TRENDS - COBALT, DISSOLVED

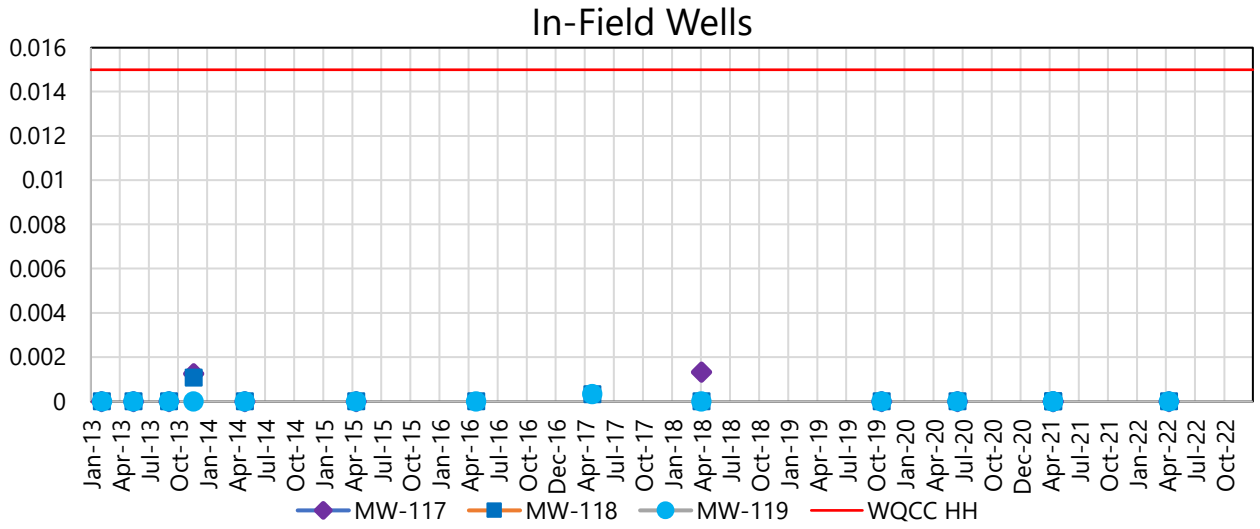


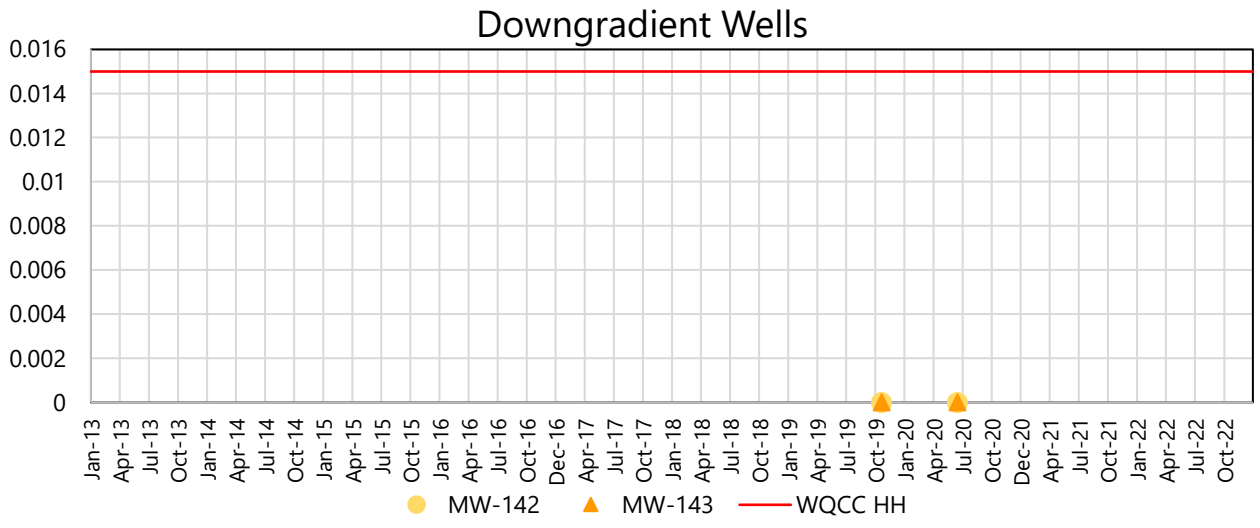




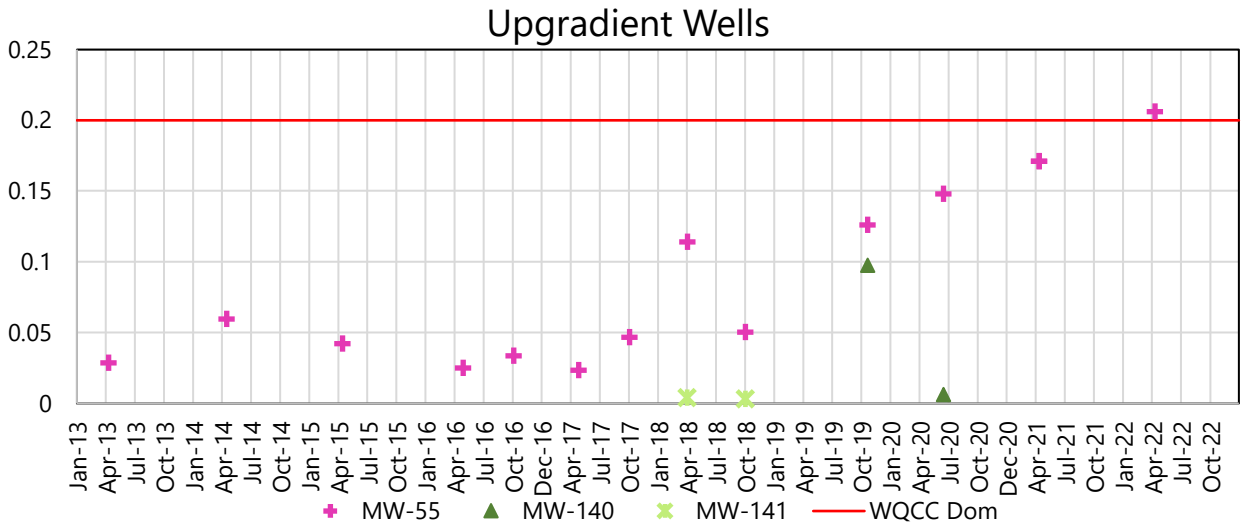
NORTH RO REJECT FIELD TRENDS - IRON, DISSOLVED

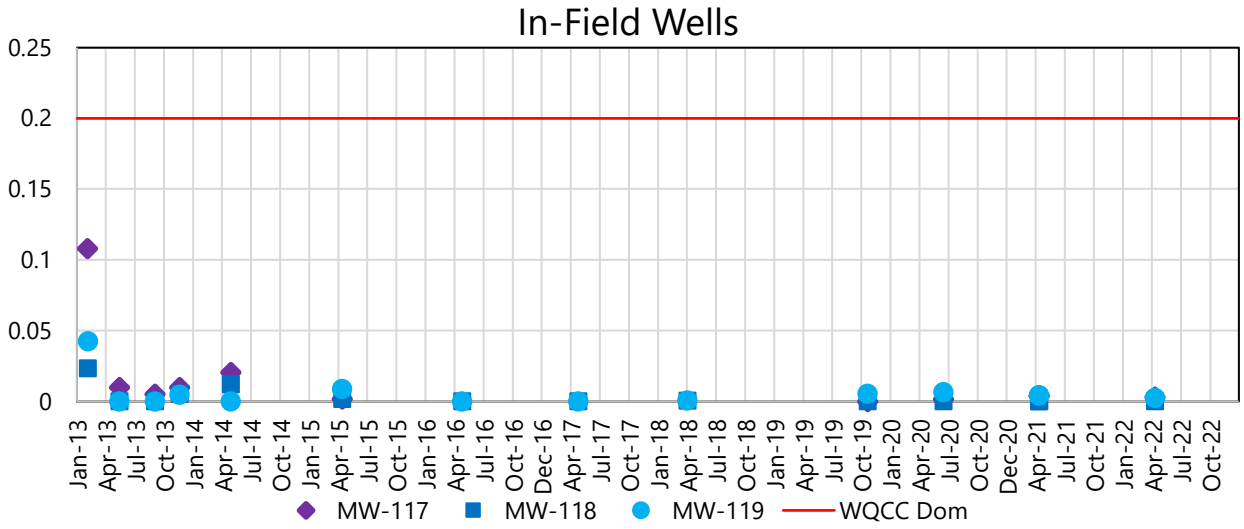


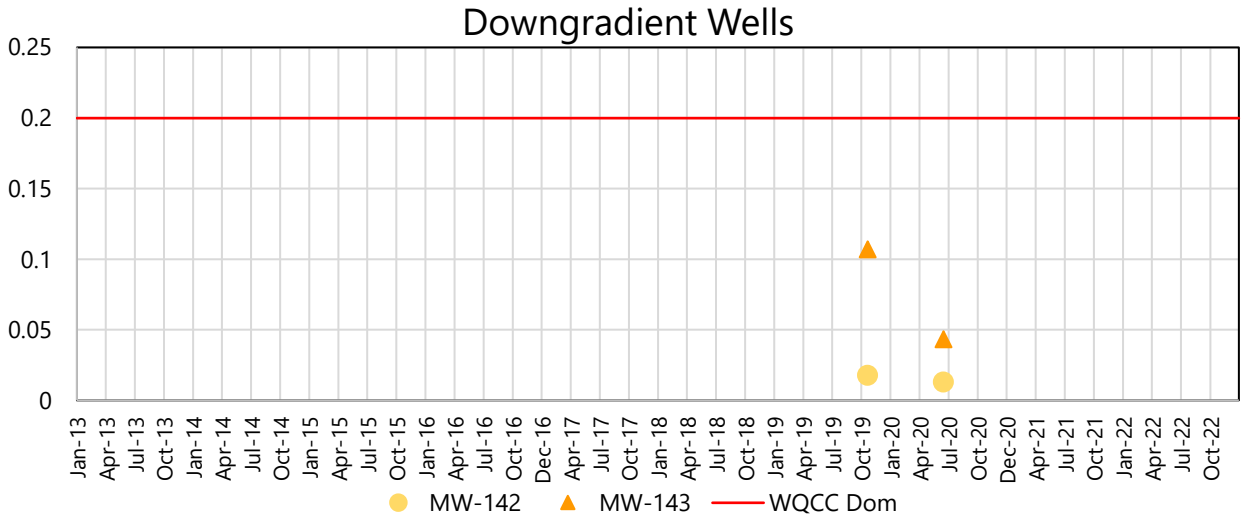




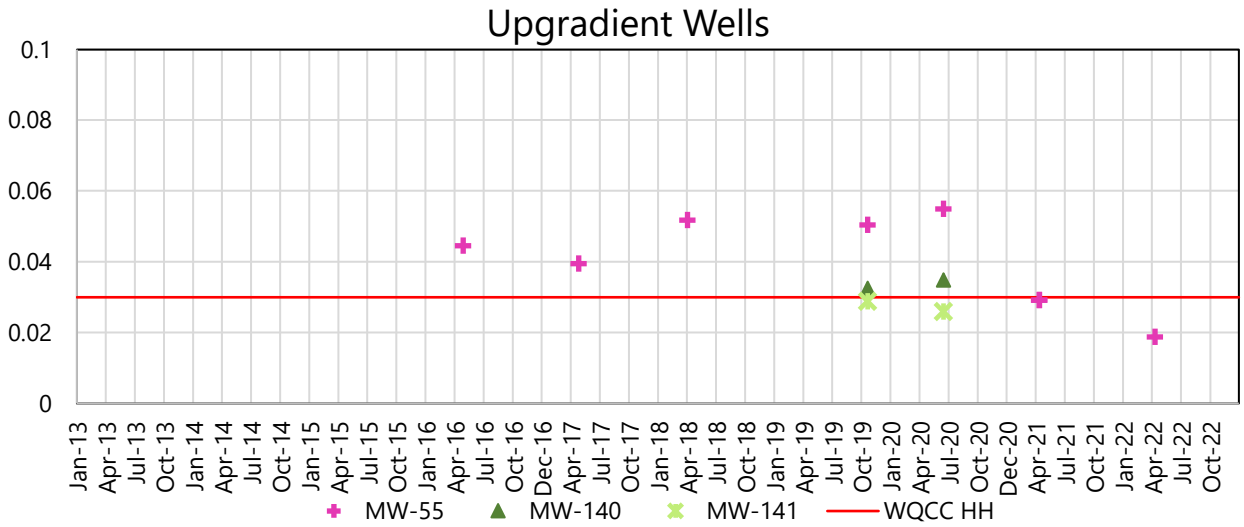
NORTH RO REJECT FIELD TRENDS - LEAD, DISSOLVED

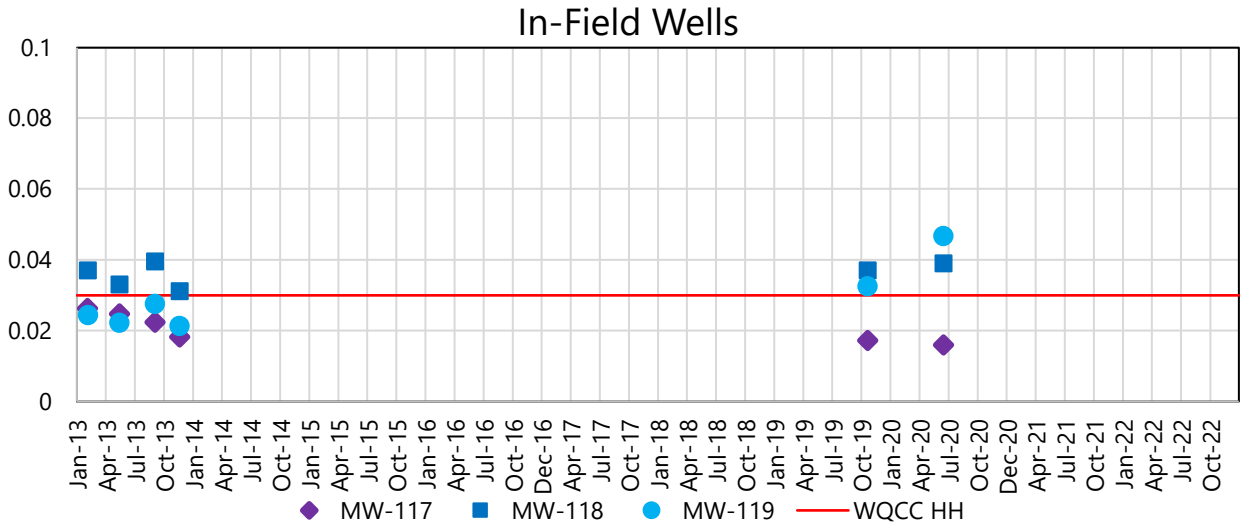


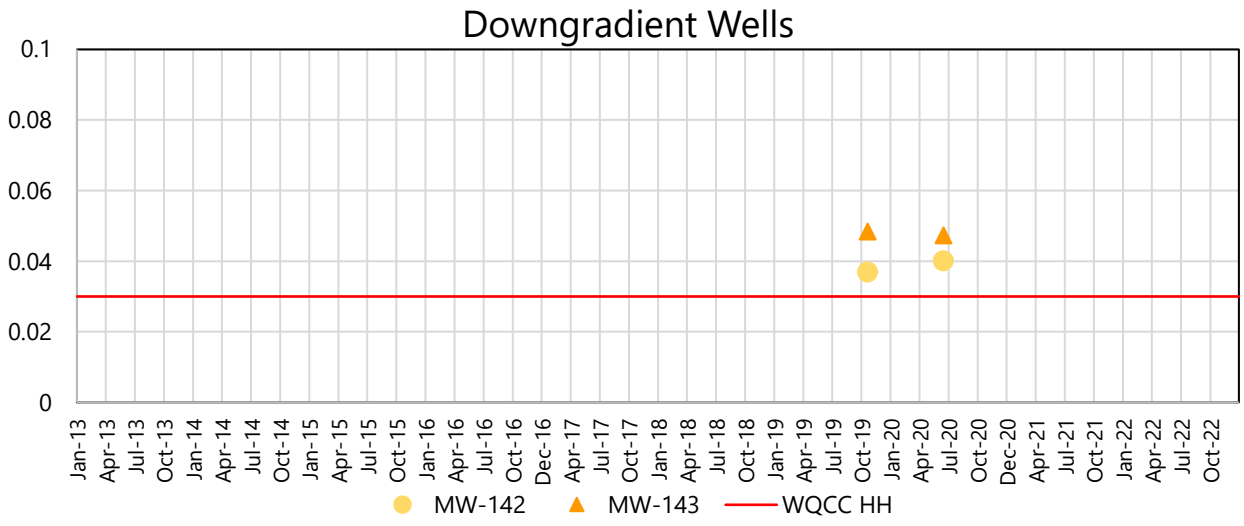




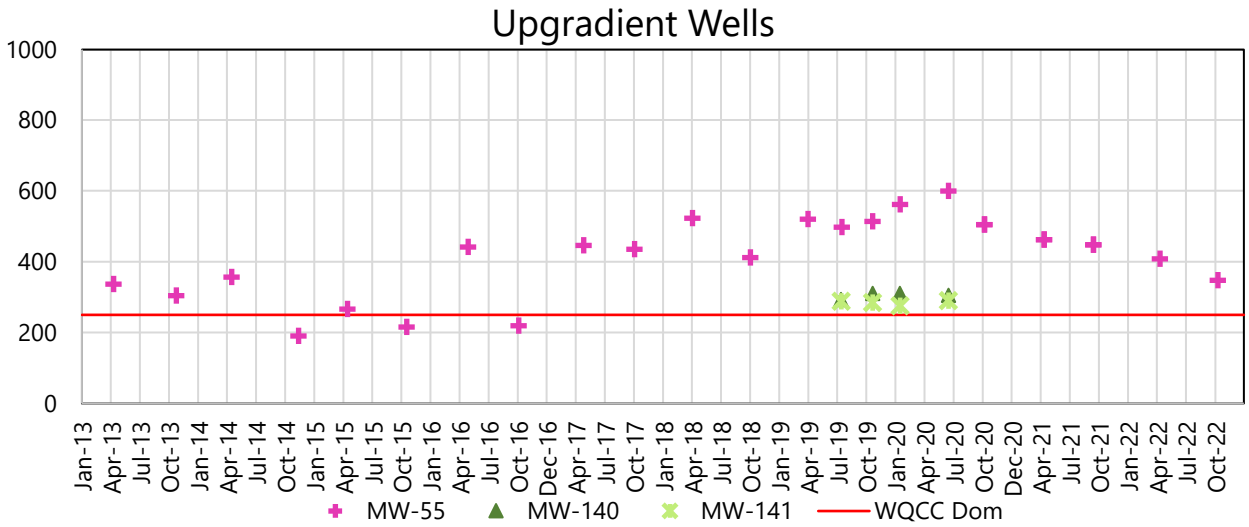
NORTH RO REJECT FIELD TRENDS - MANGANESE, DISSOLVED

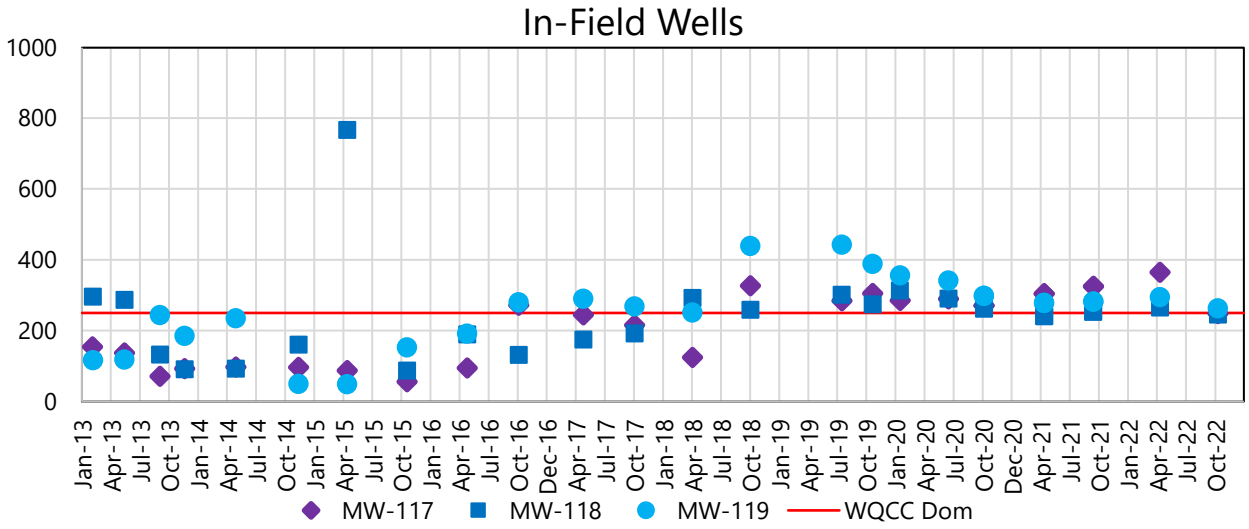


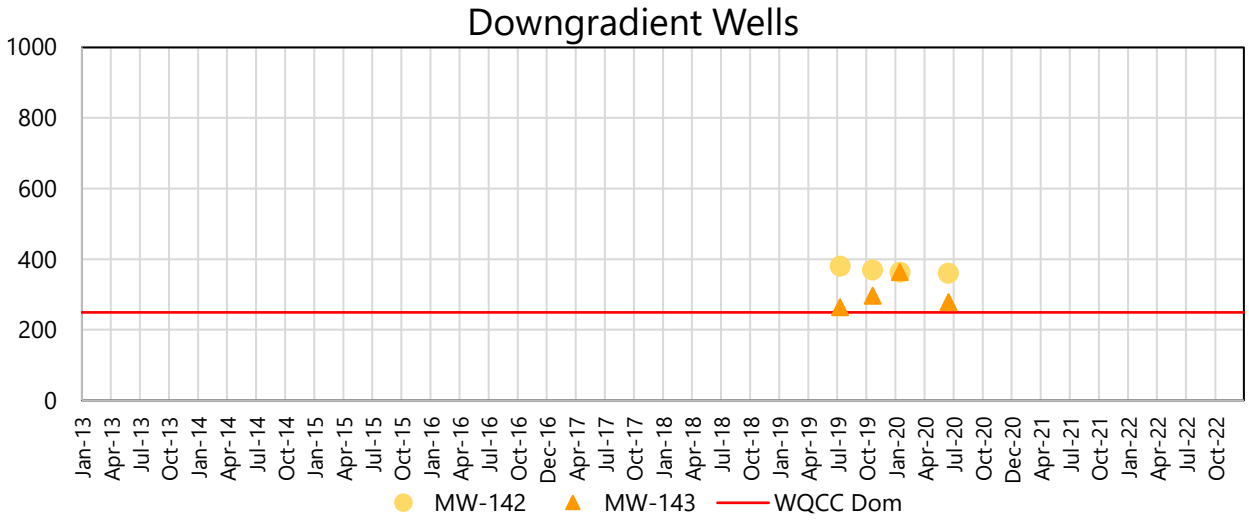




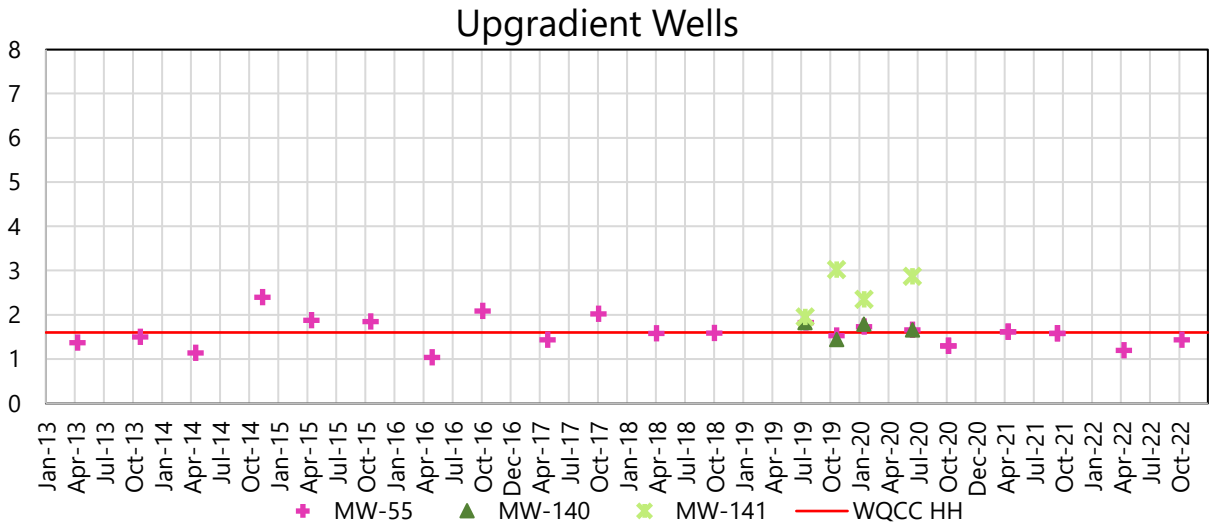
NORTH RO REJECT FIELD TRENDS - URANIUM, DISSOLVED

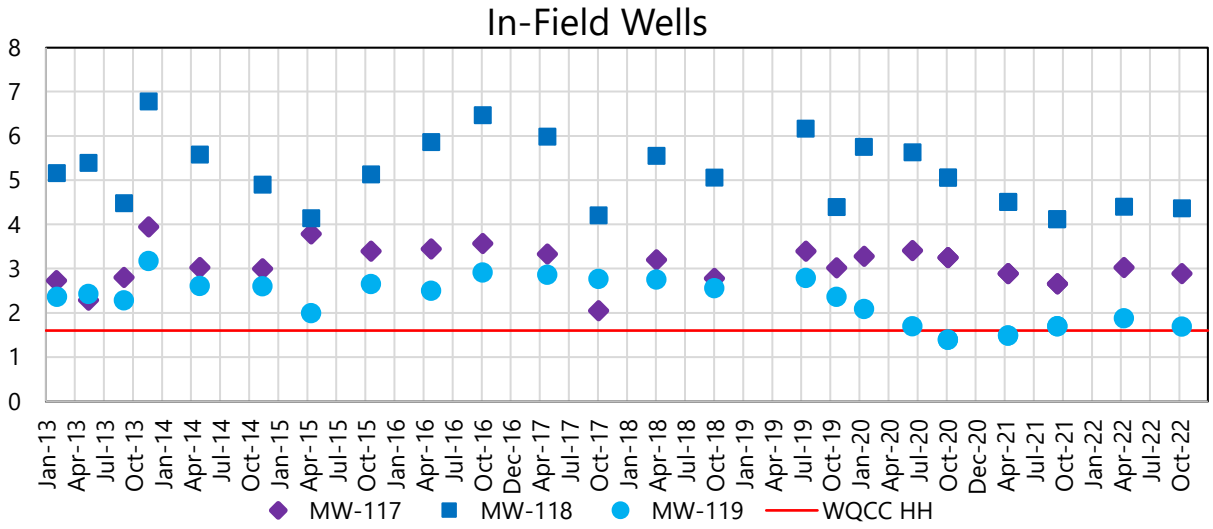


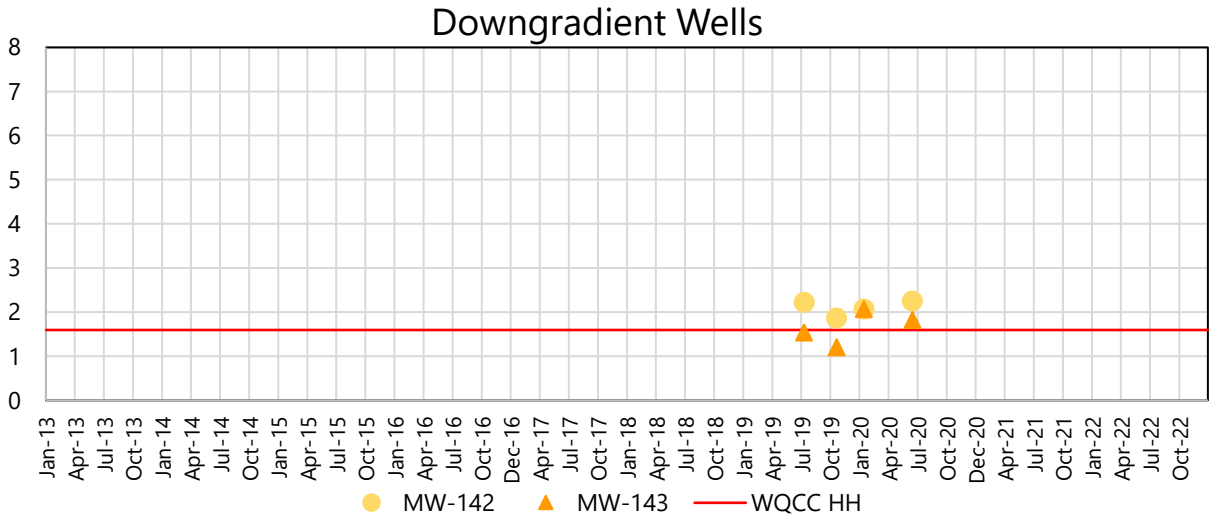




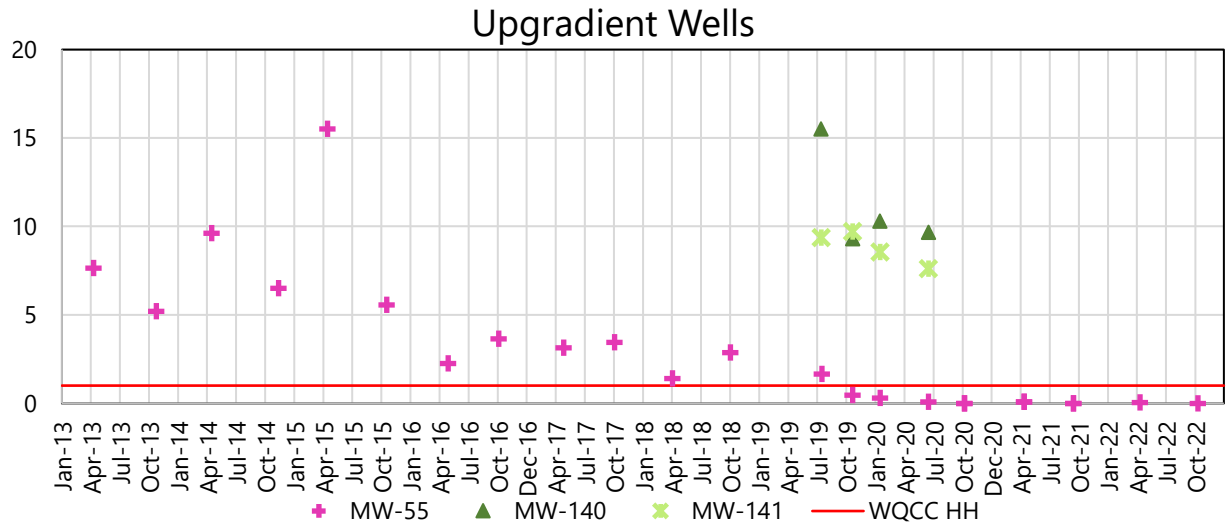
NORTH RO REJECT FIELD TRENDS - CHLORIDE

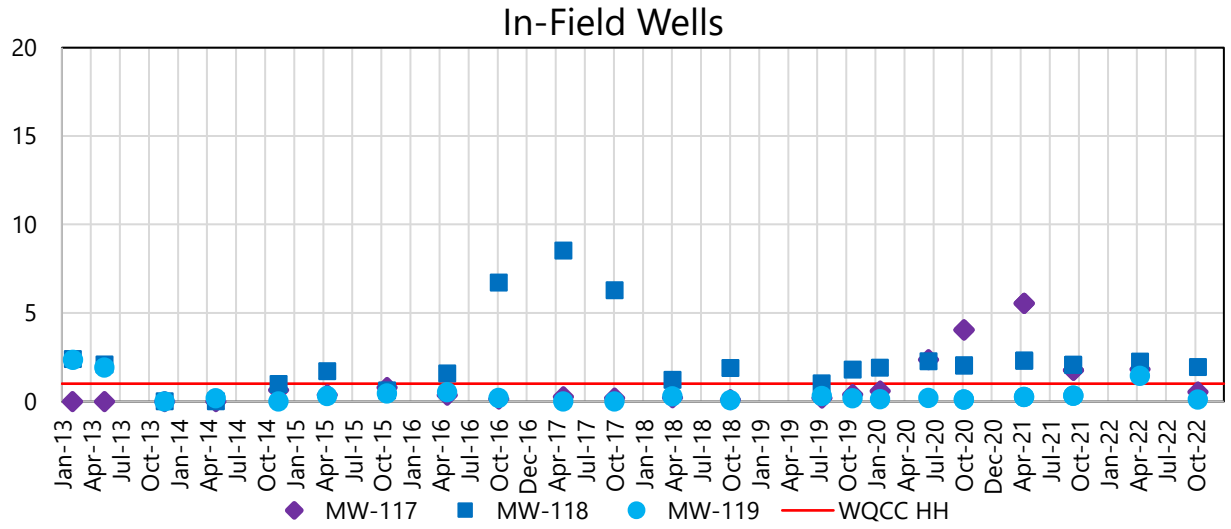


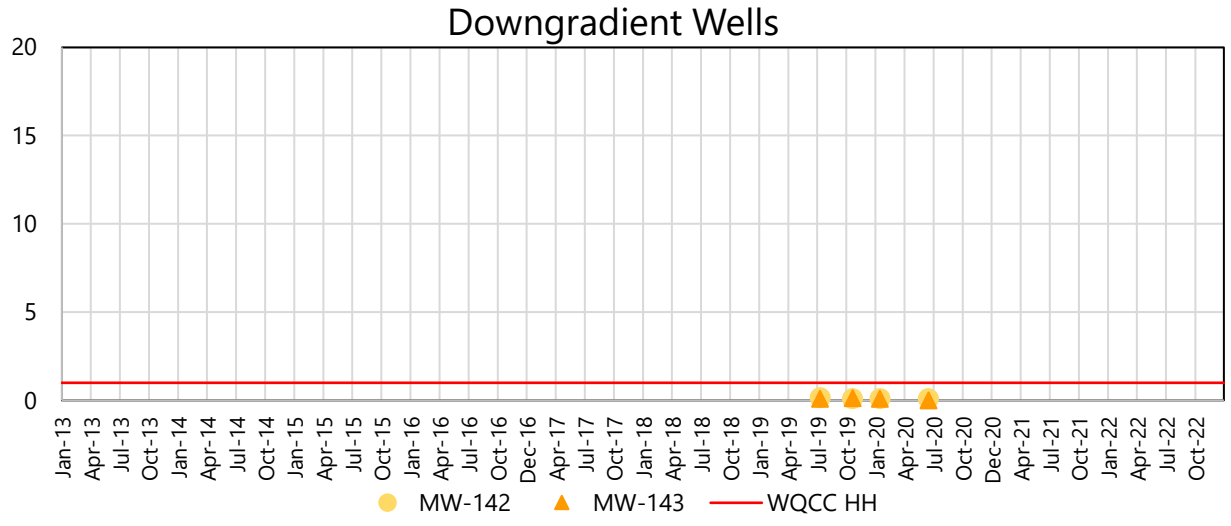




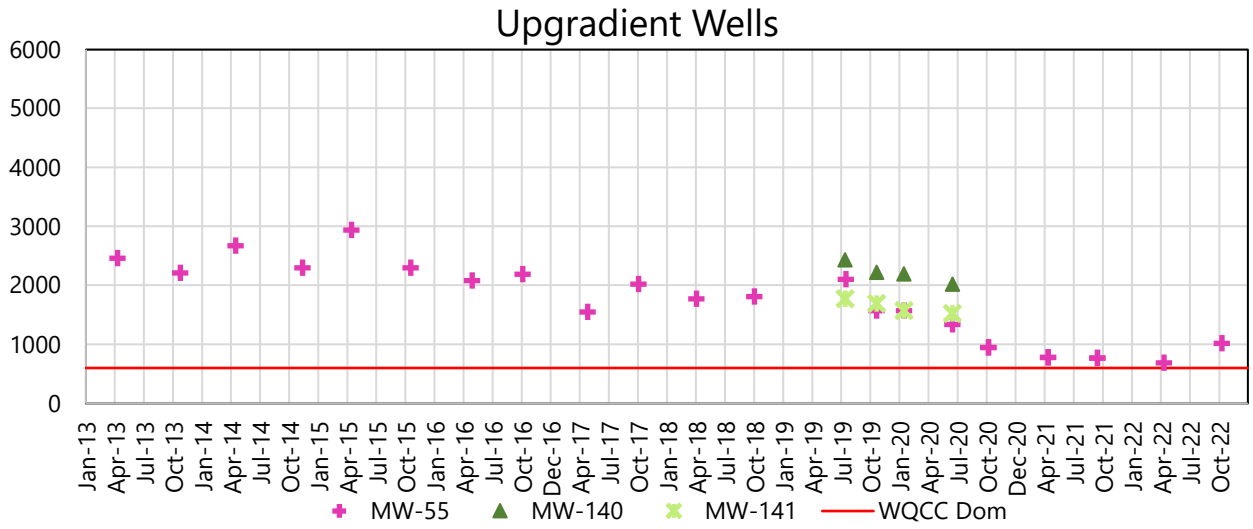
NORTH RO REJECT FIELD TRENDS - FLUORIDE

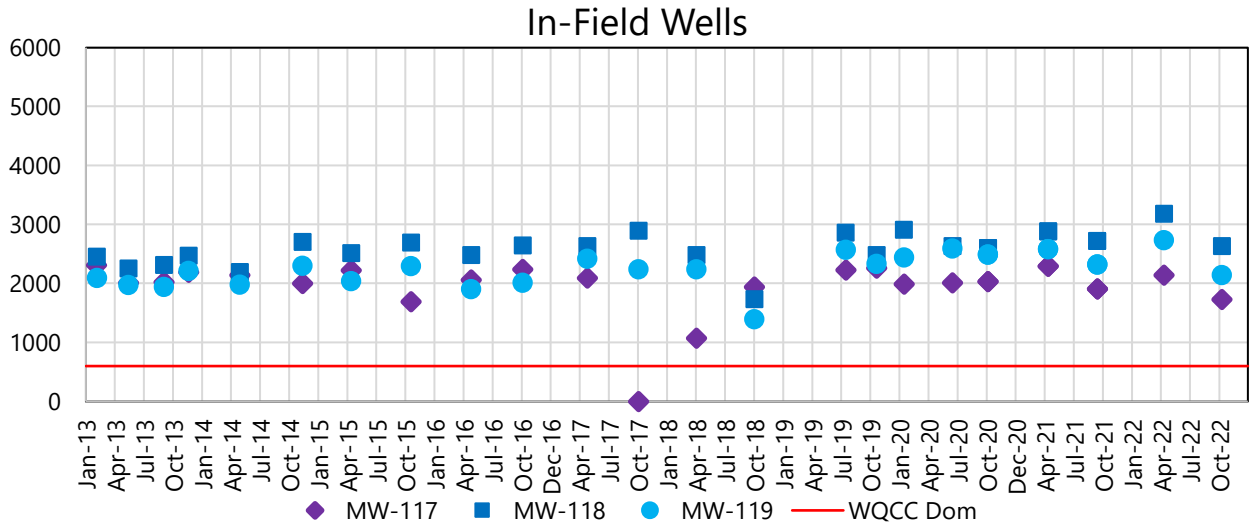


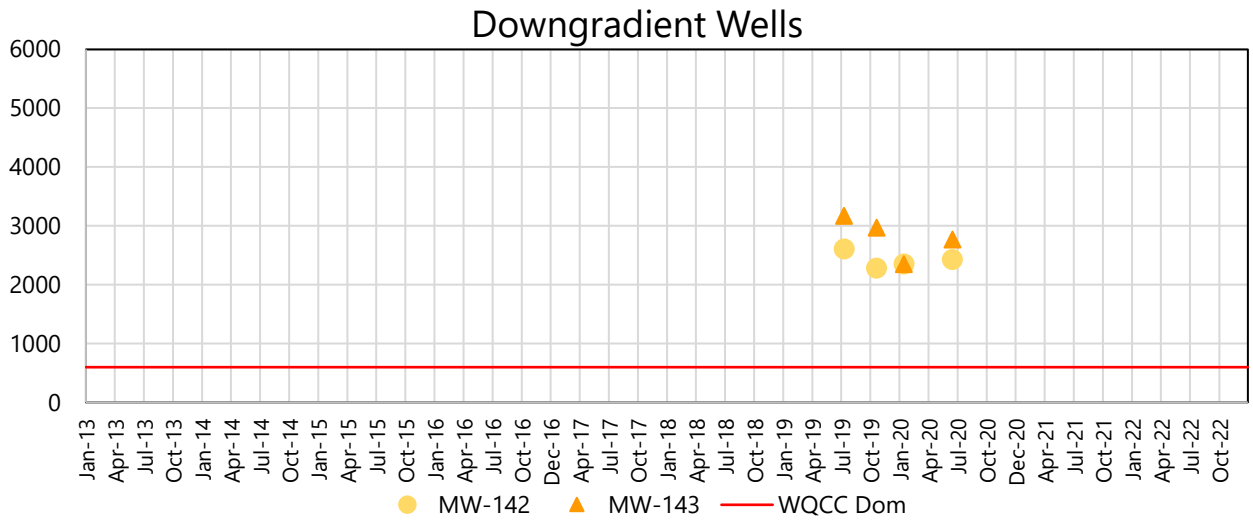




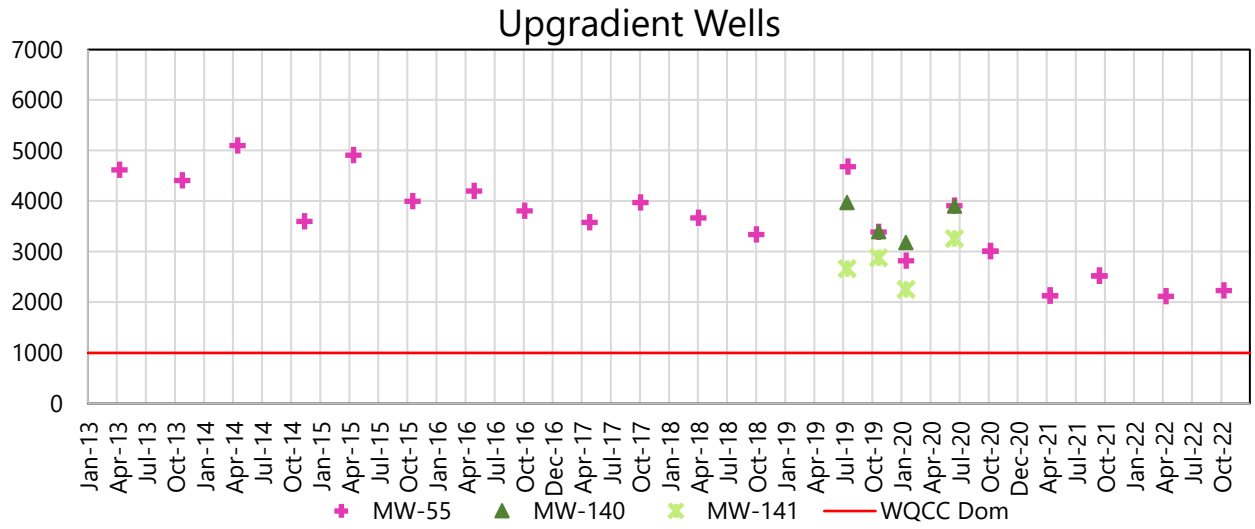
NORTH RO REJECT FIELD TRENDS - NITRATE/NITRITE

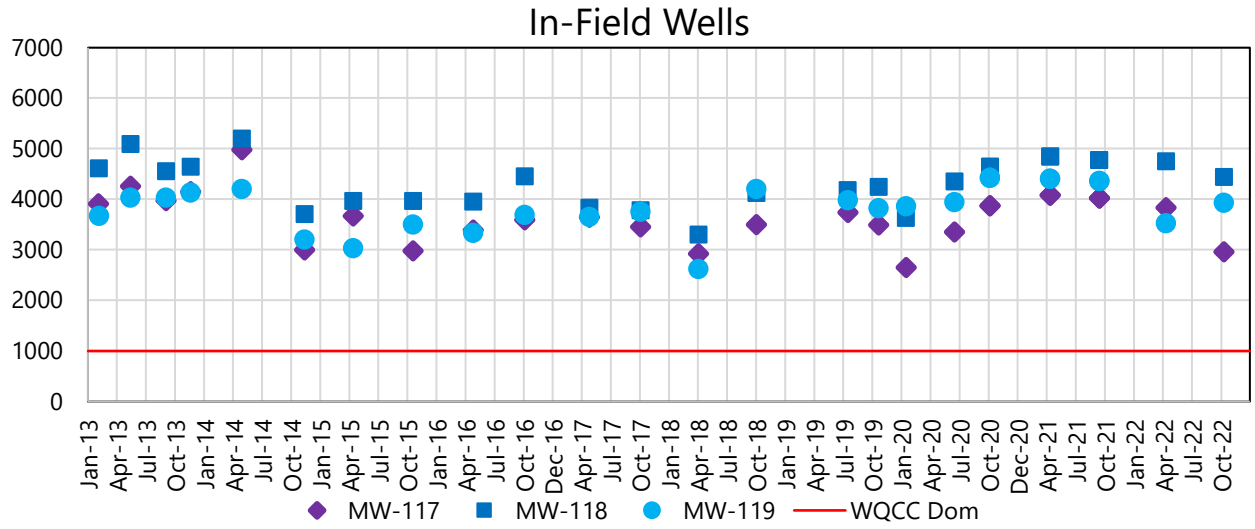


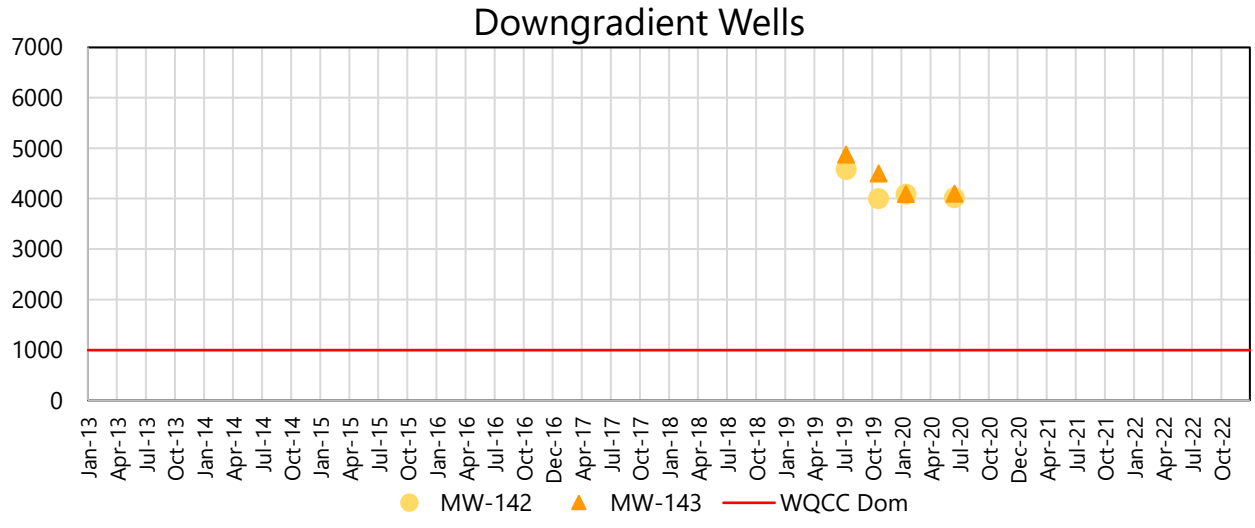




NORTH RO REJECT FIELD TRENDS - SULFATE



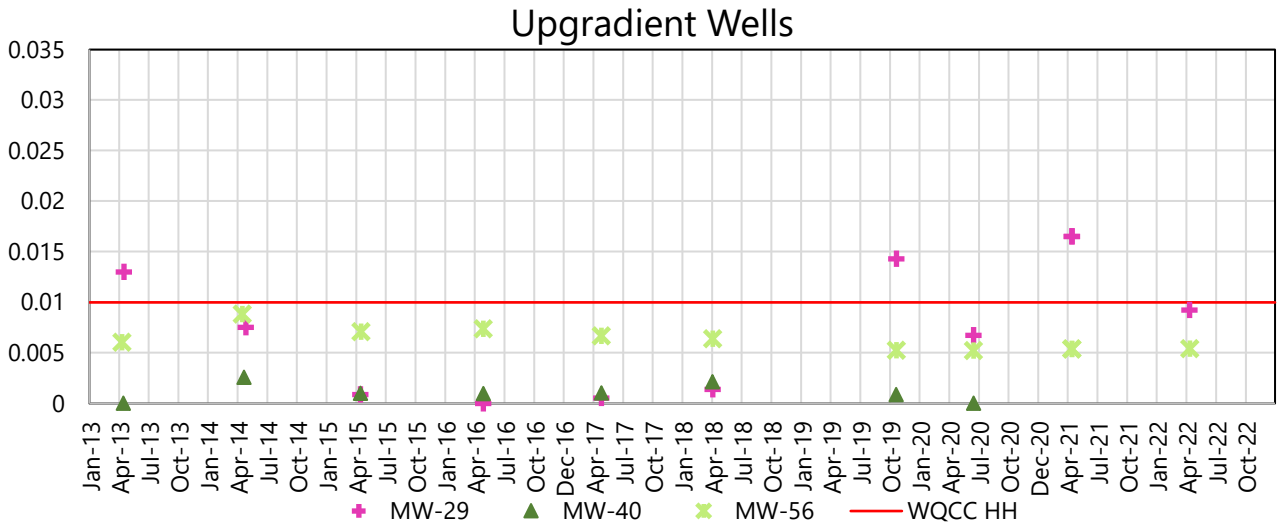


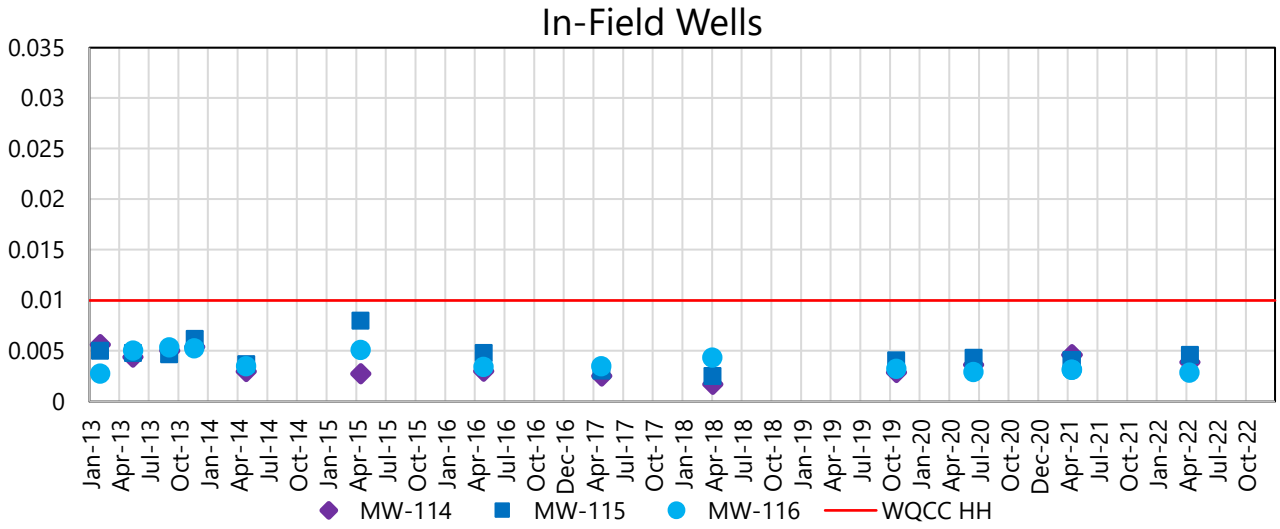


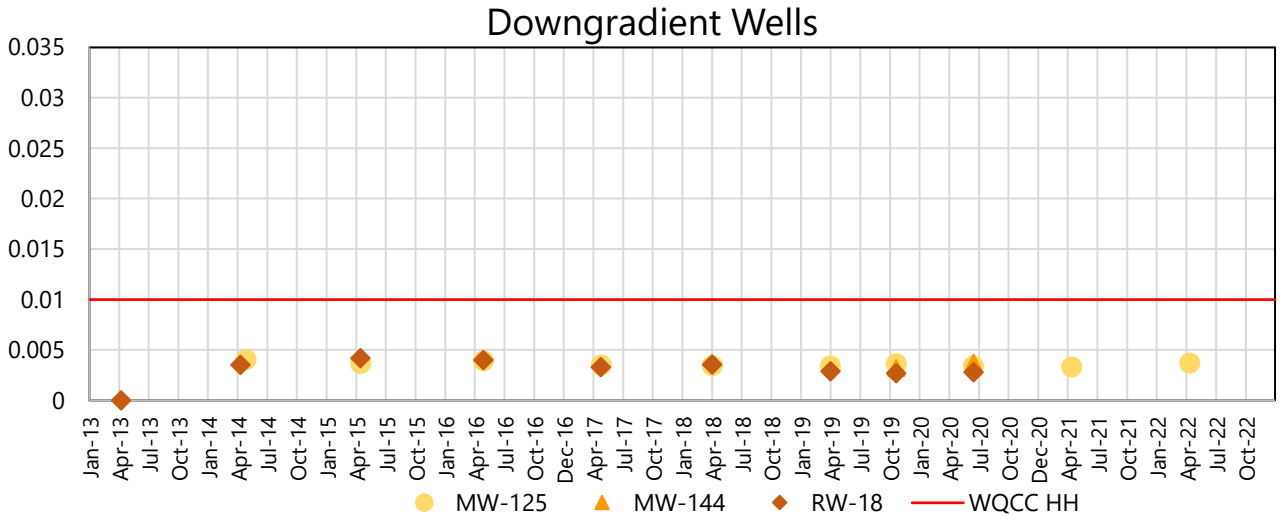
NORTH RO REJECT FIELD TRENDS - TDS

APPENDIX B1B

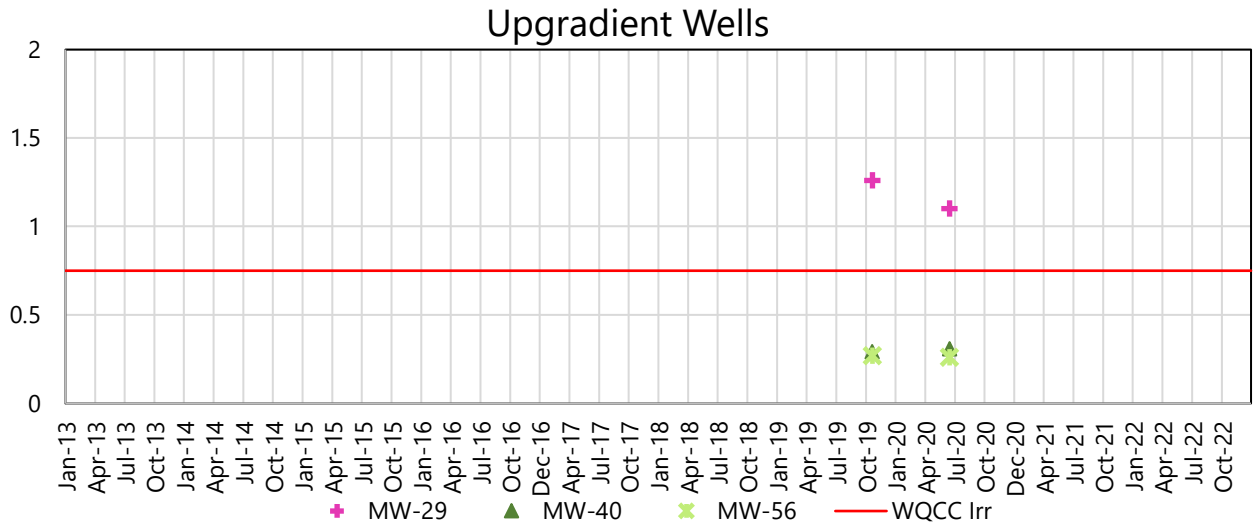
SOUTH RO REJECT DISCHARGE FIELD TREND PLOTS

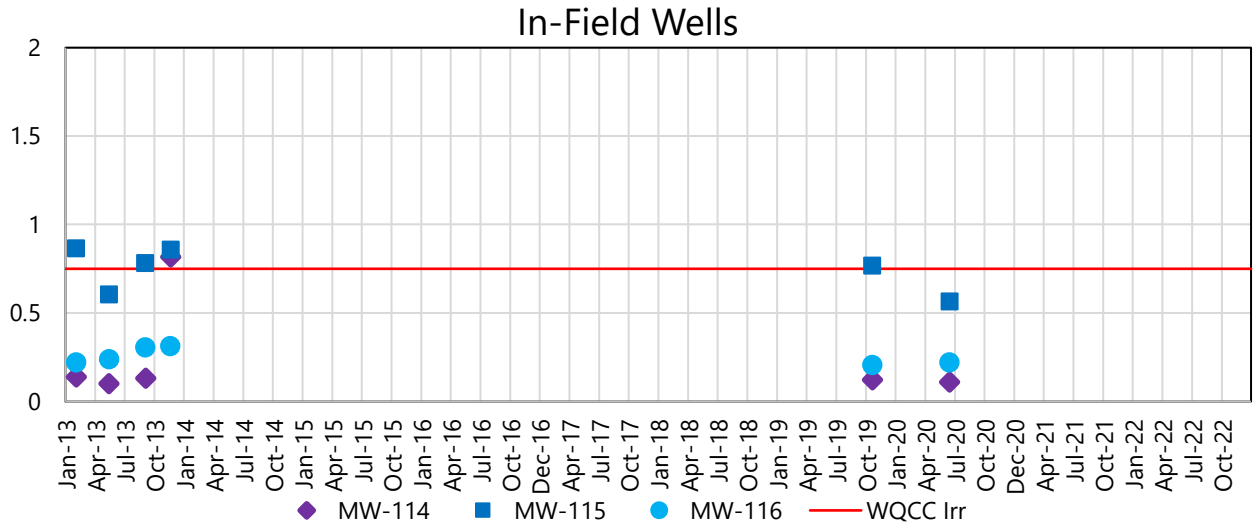


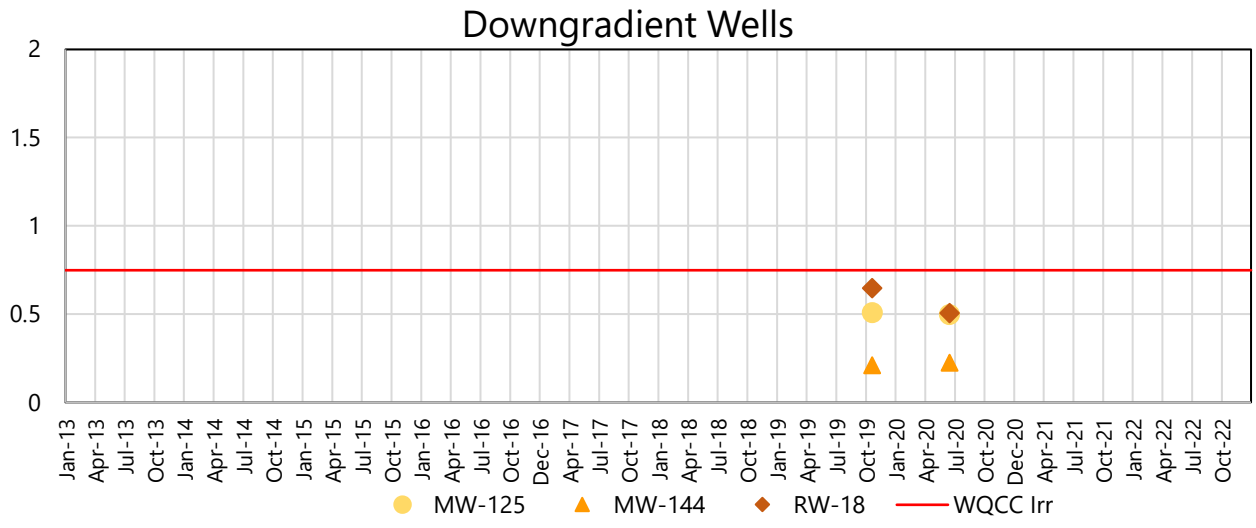




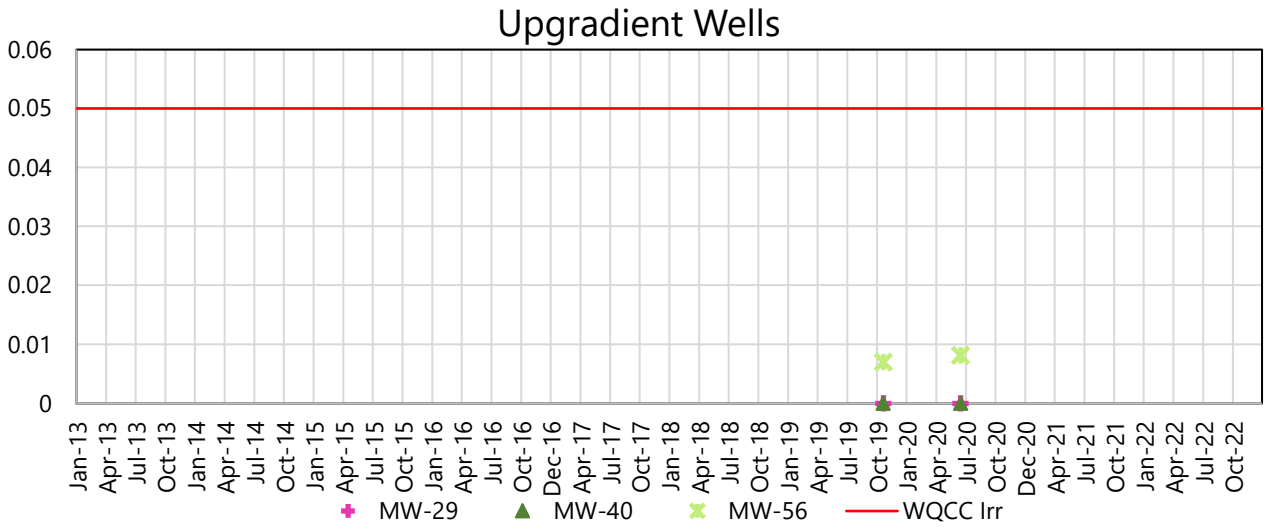
SOUTH RO REJECT FIELD TRENDS - ARSENIC, DISSOLVED

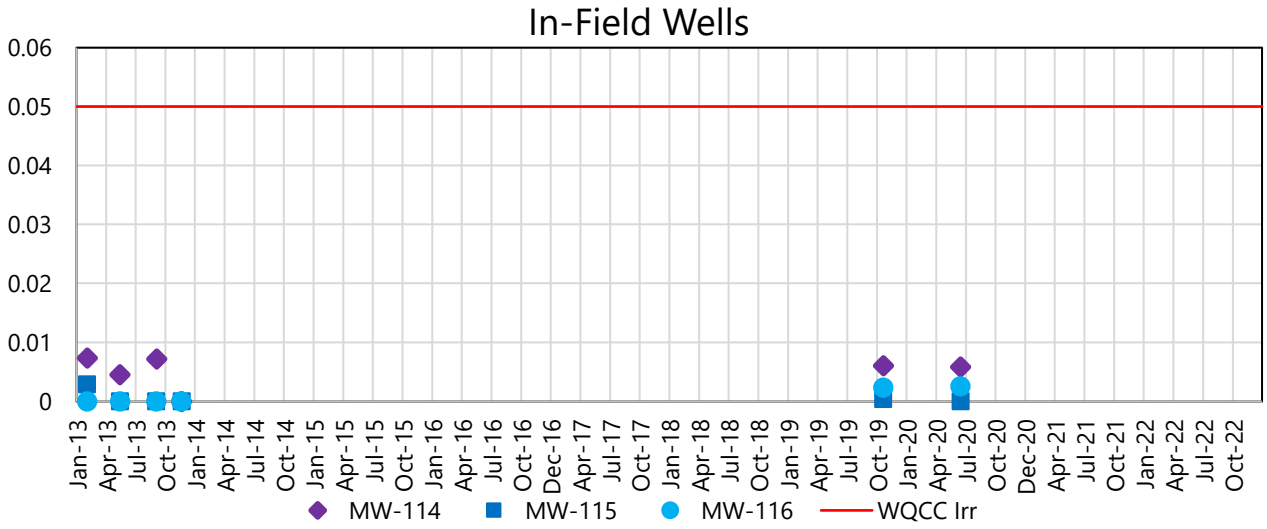


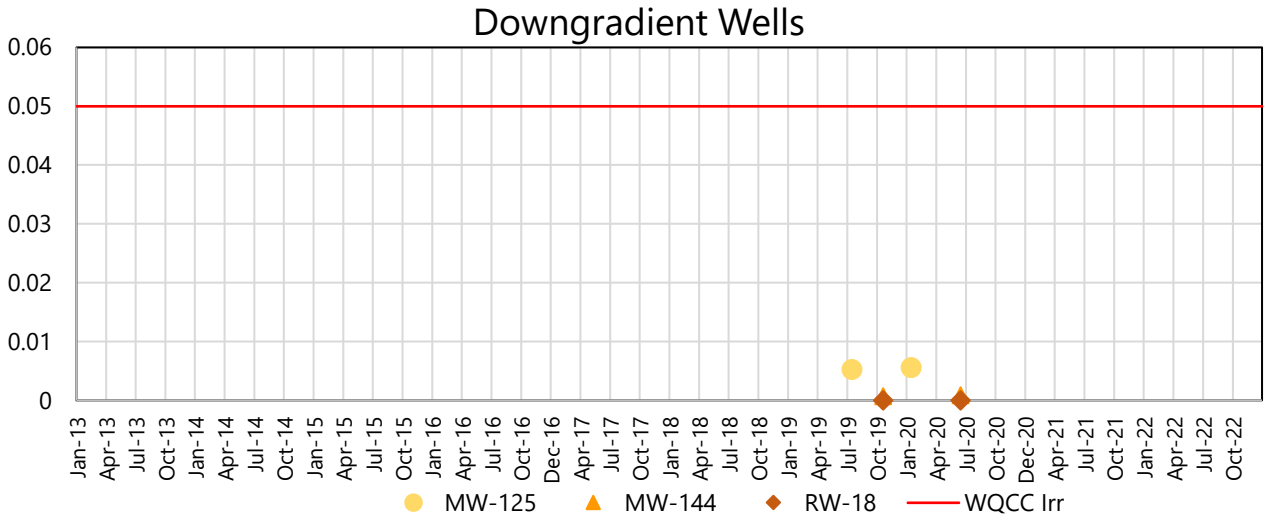




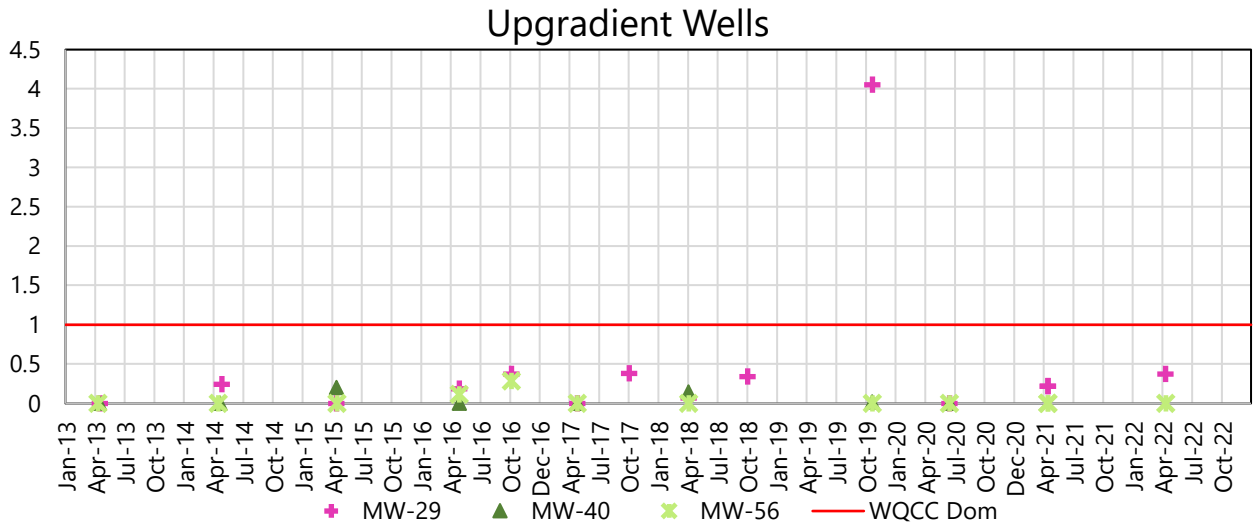
SOUTH RO REJECT FIELD TRENDS - BORON, DISSOLVED

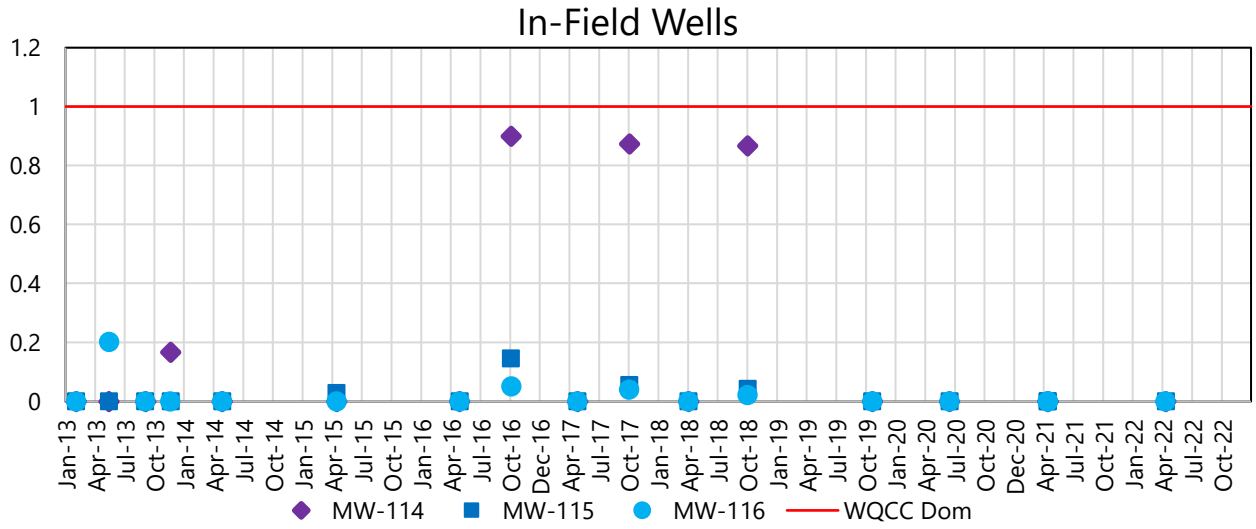


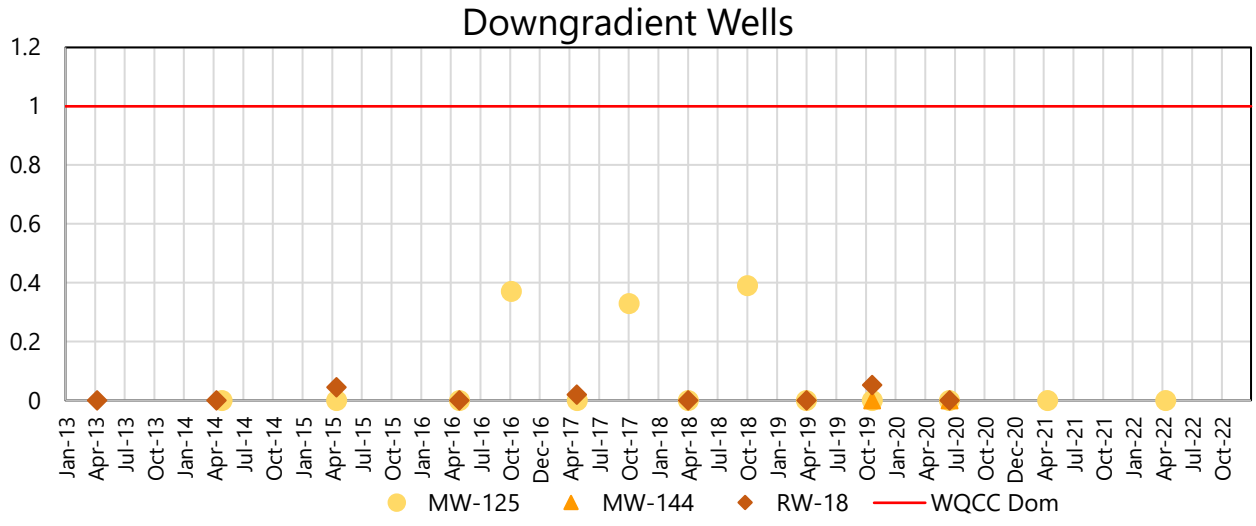




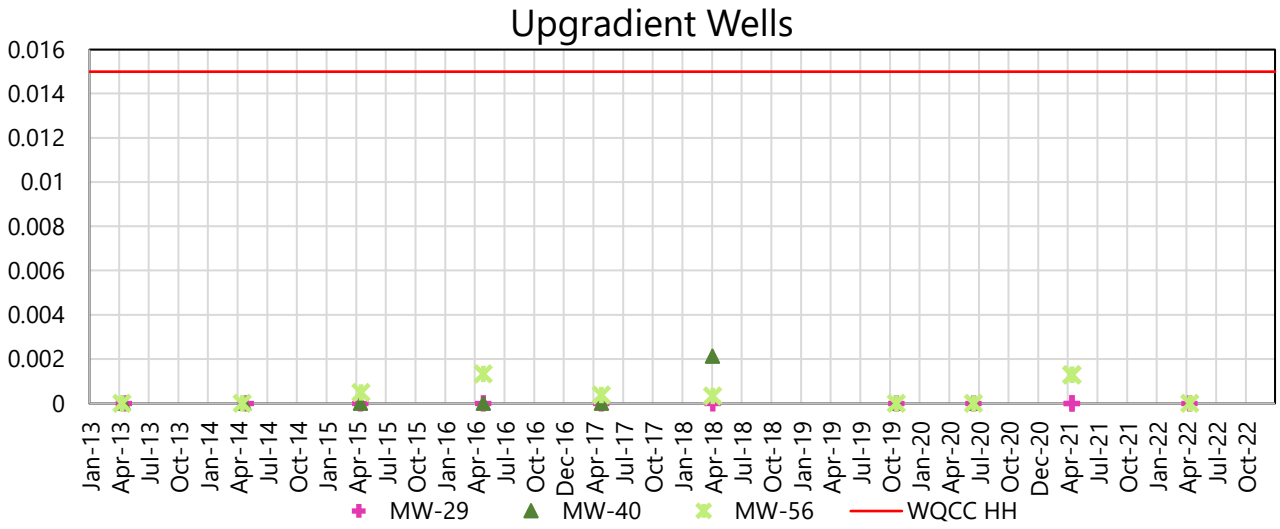
SOUTH RO REJECT FIELD TRENDS - COBALT, DISSOLVED

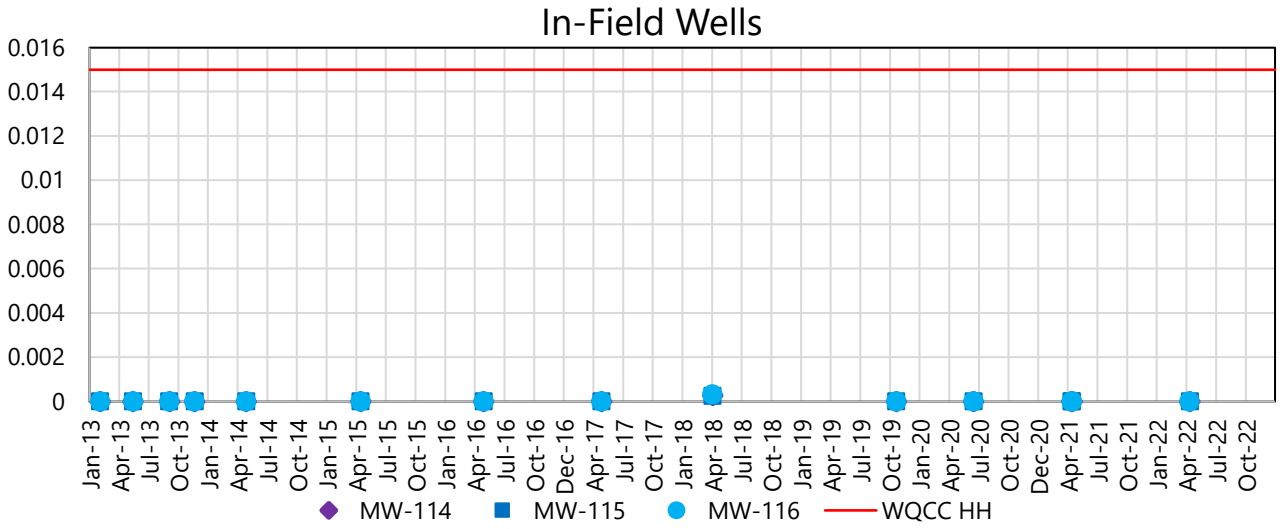


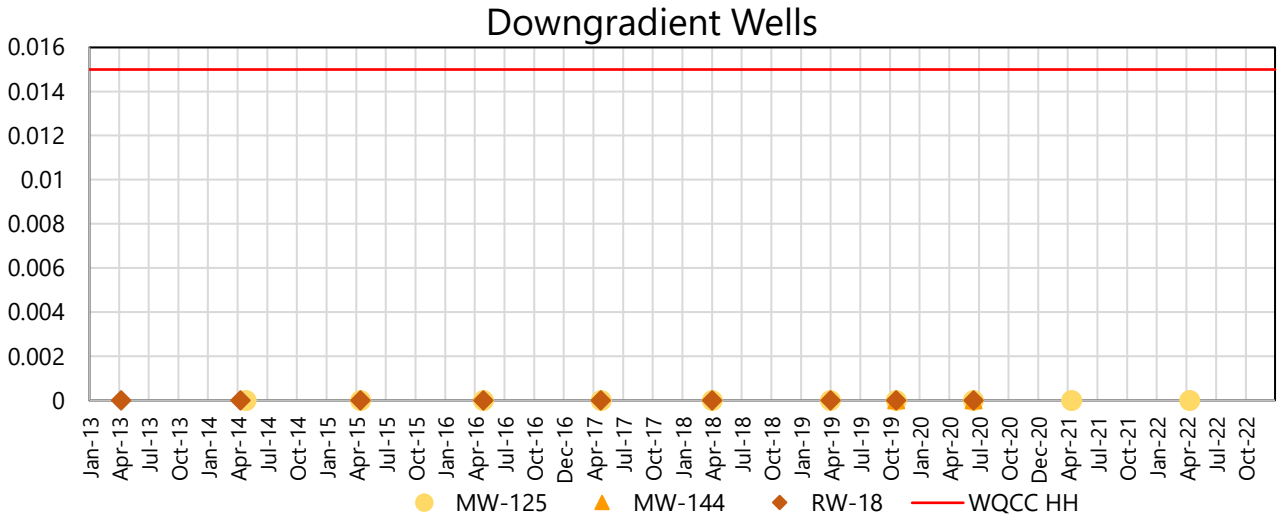




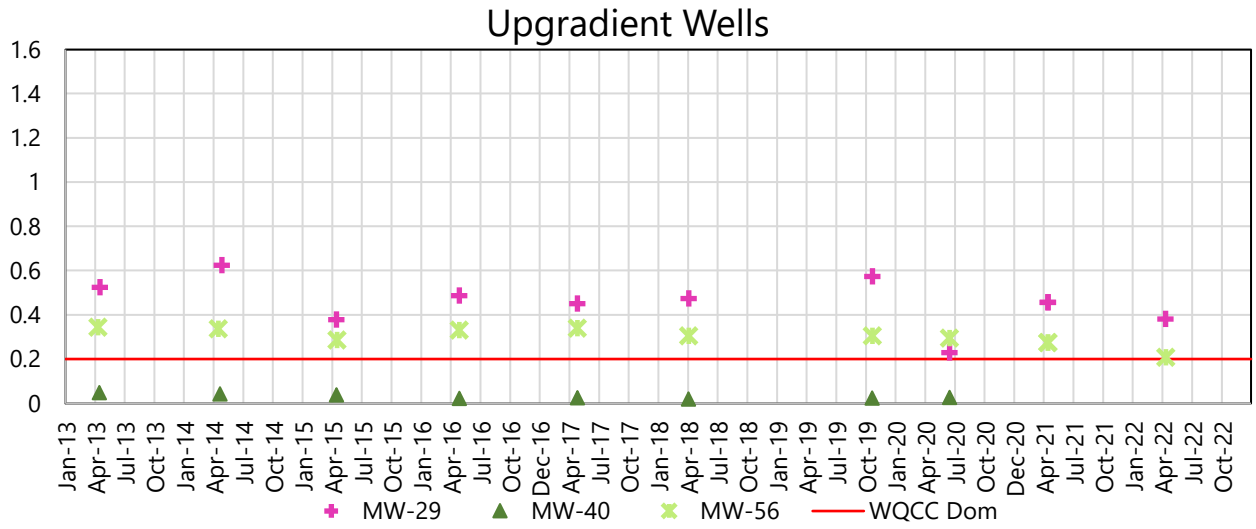
SOUTH RO REJECT FIELD TRENDS - IRON, DISSOLVED

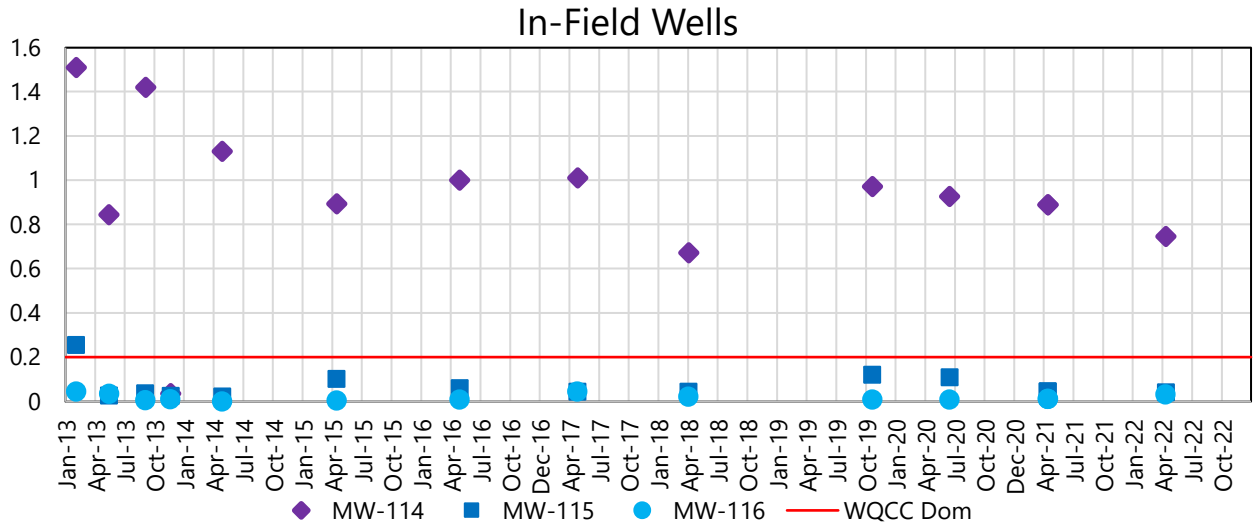


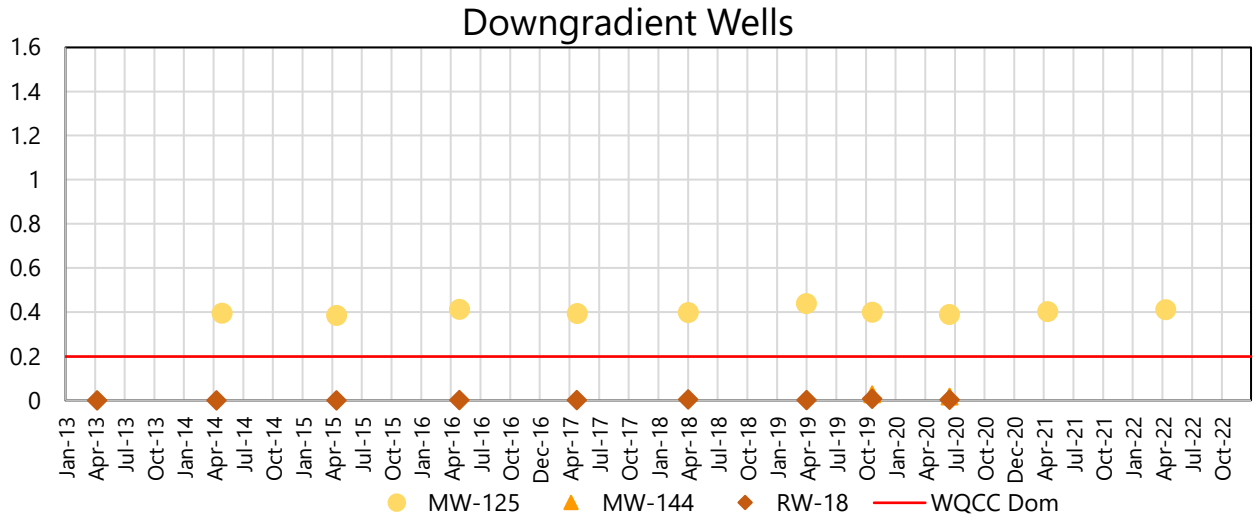




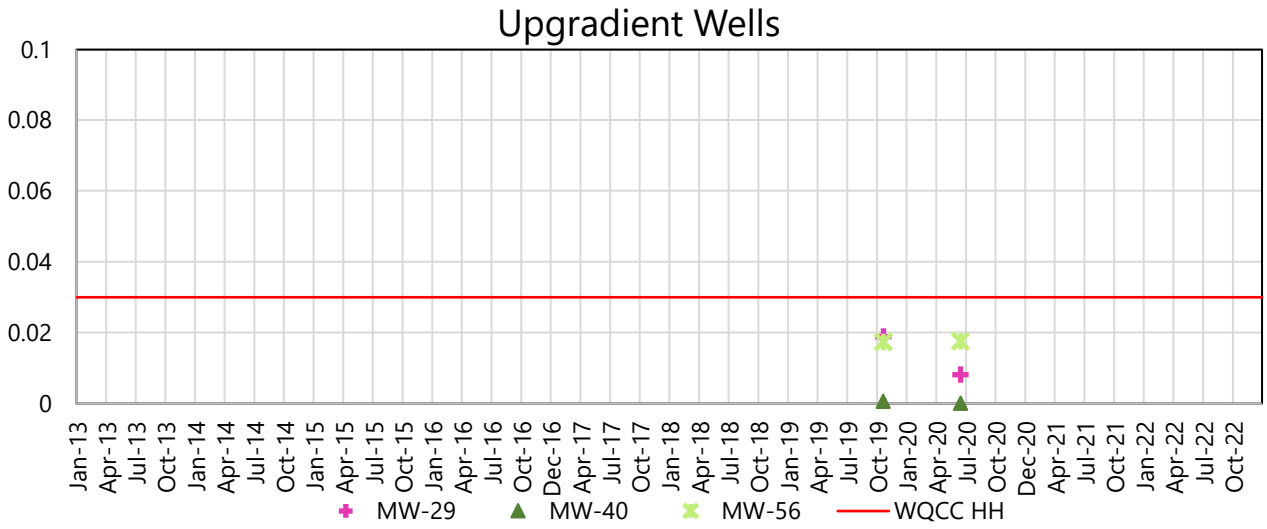
SOUTH RO REJECT FIELD TRENDS - LEAD, DISSOLVED

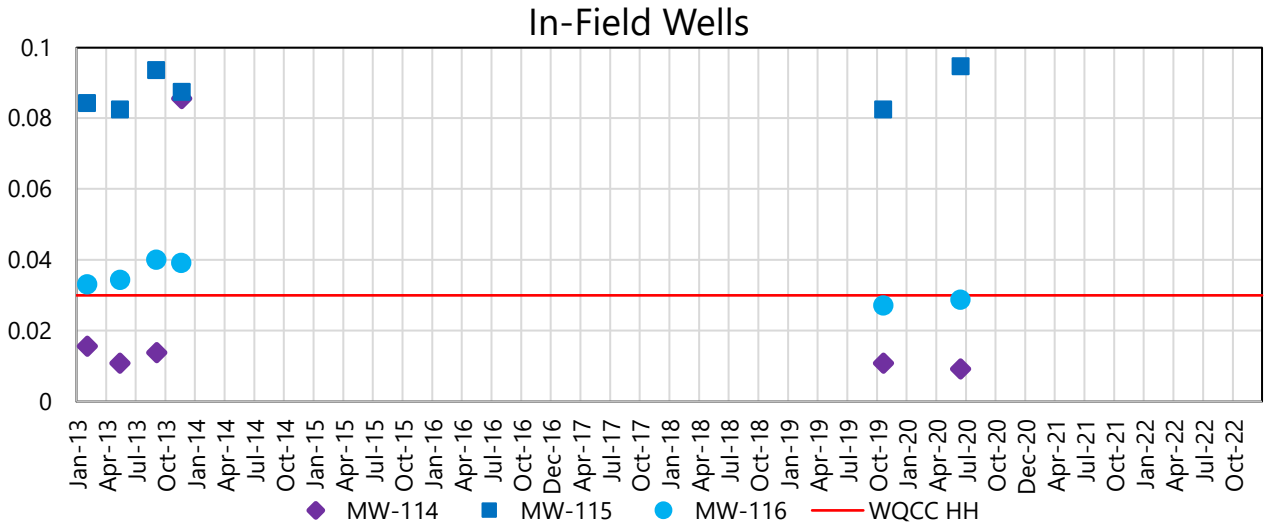


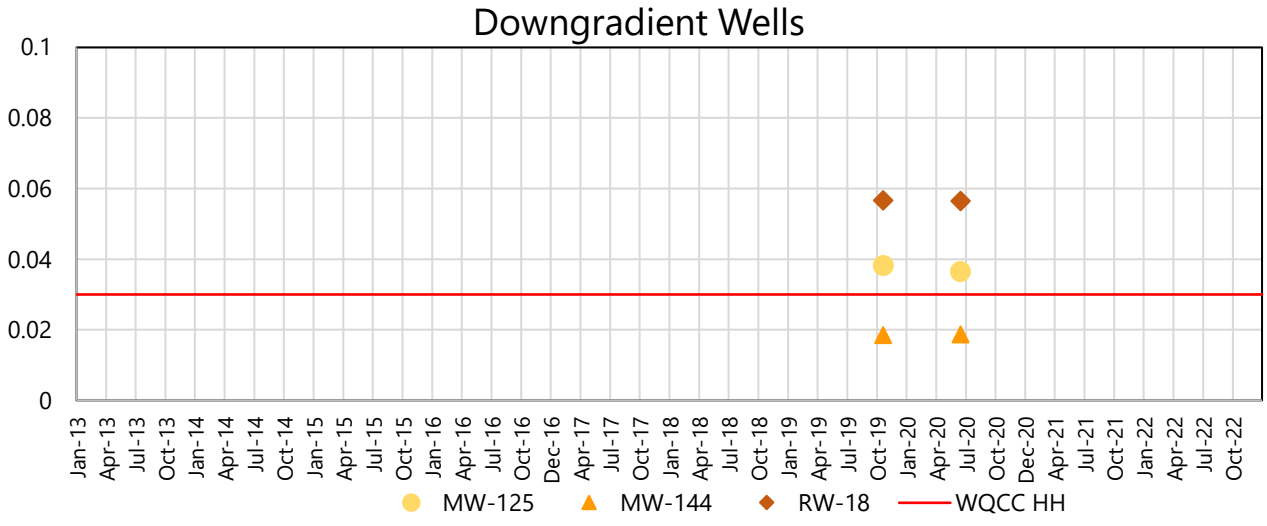




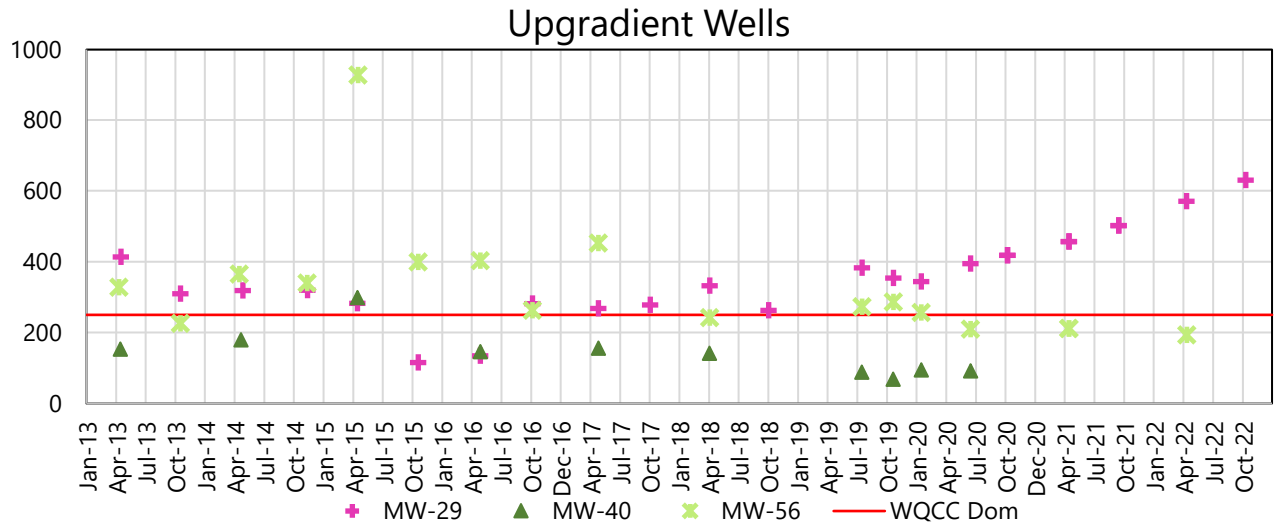
SOUTH RO REJECT FIELD TRENDS - MANGANESE, DISSOLVED

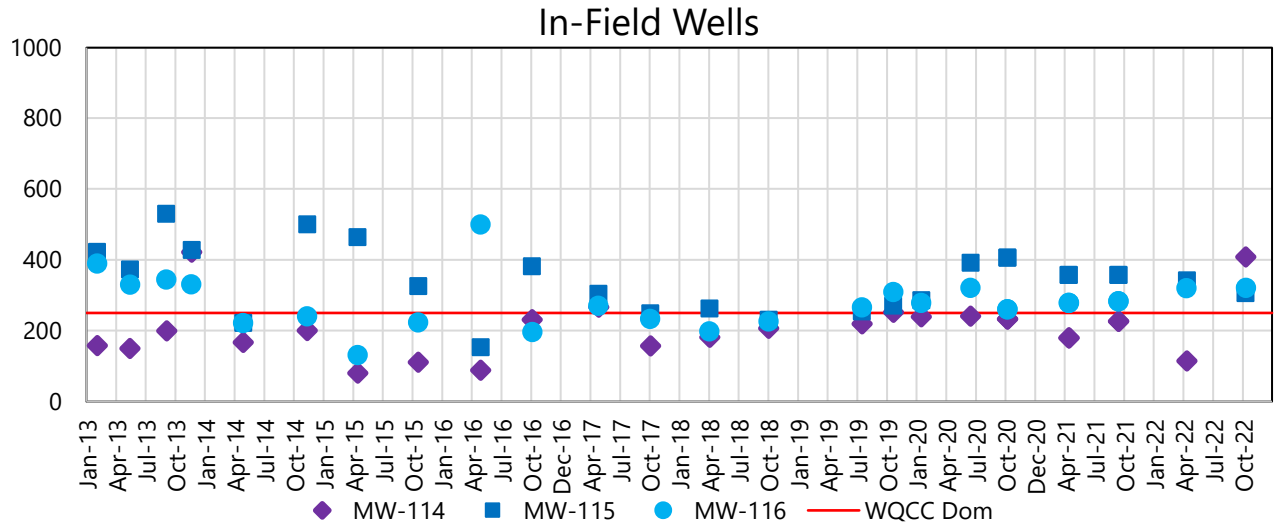


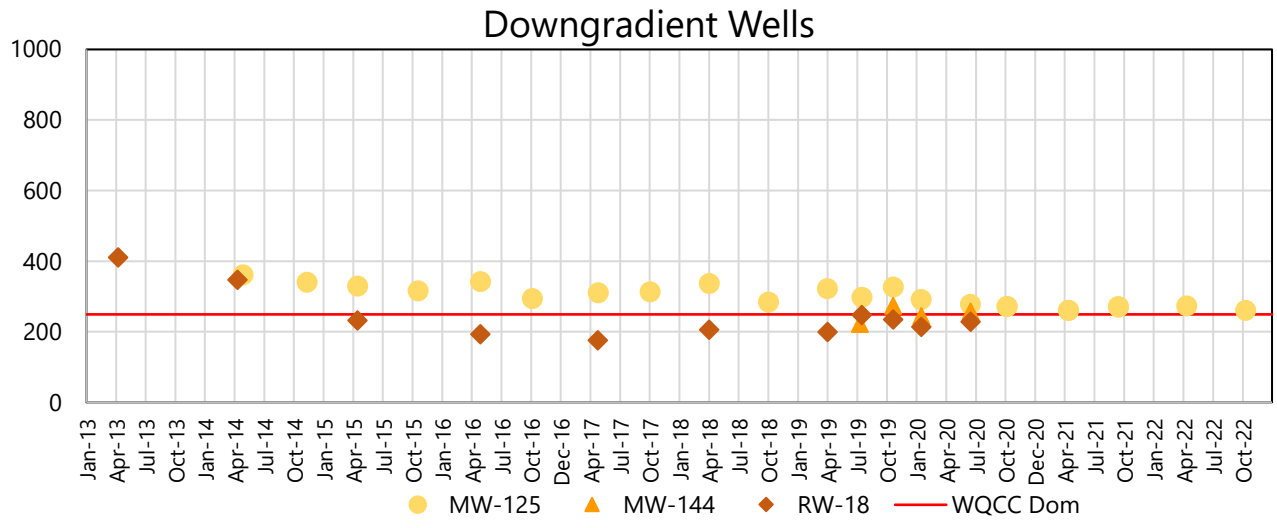




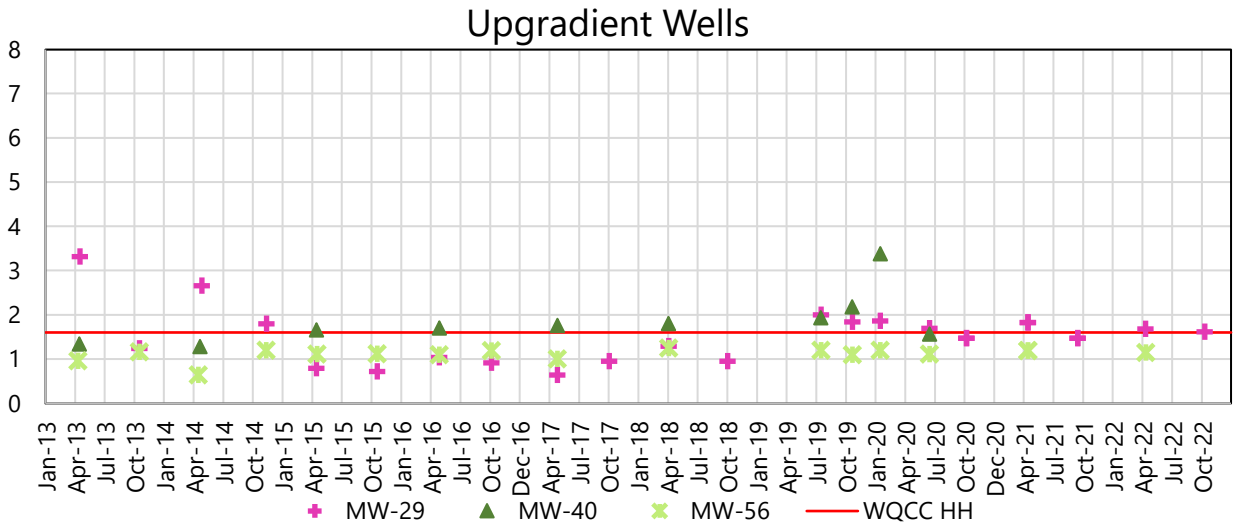
SOUTH RO REJECT FIELD TRENDS - URANIUM, DISSOLVED

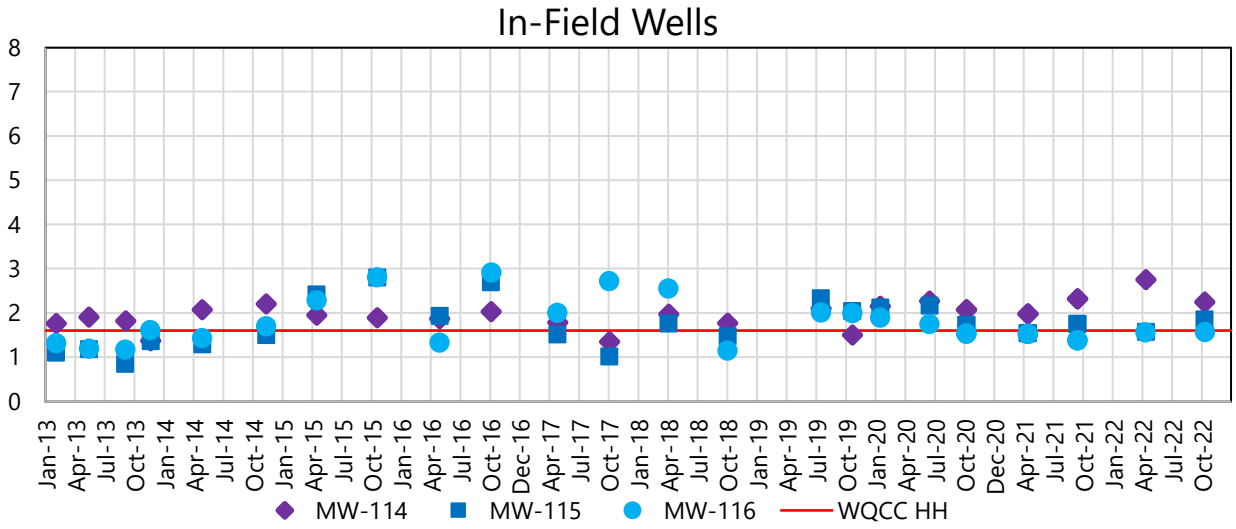


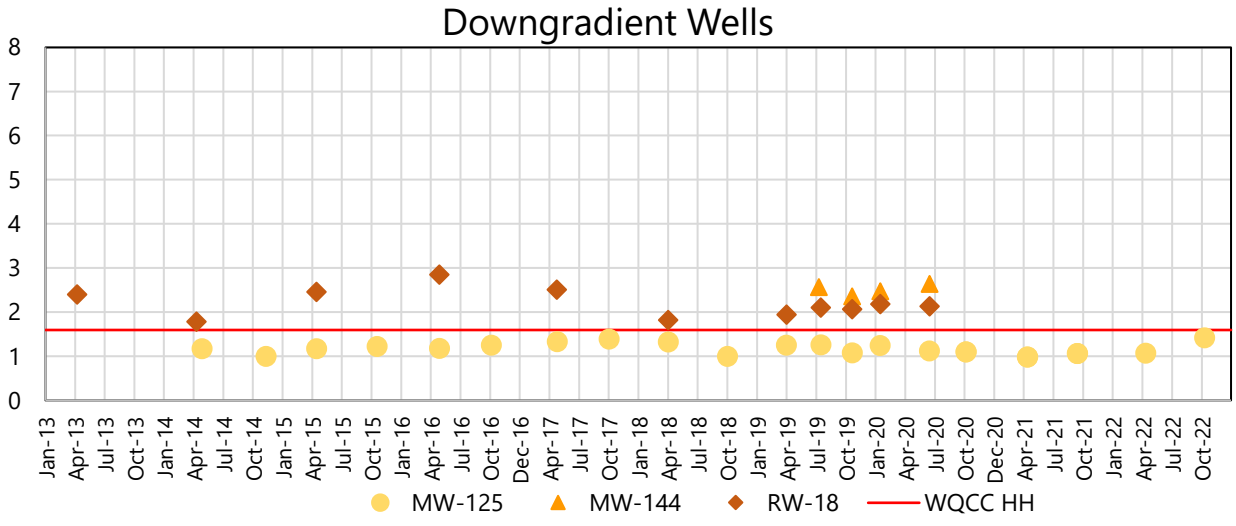




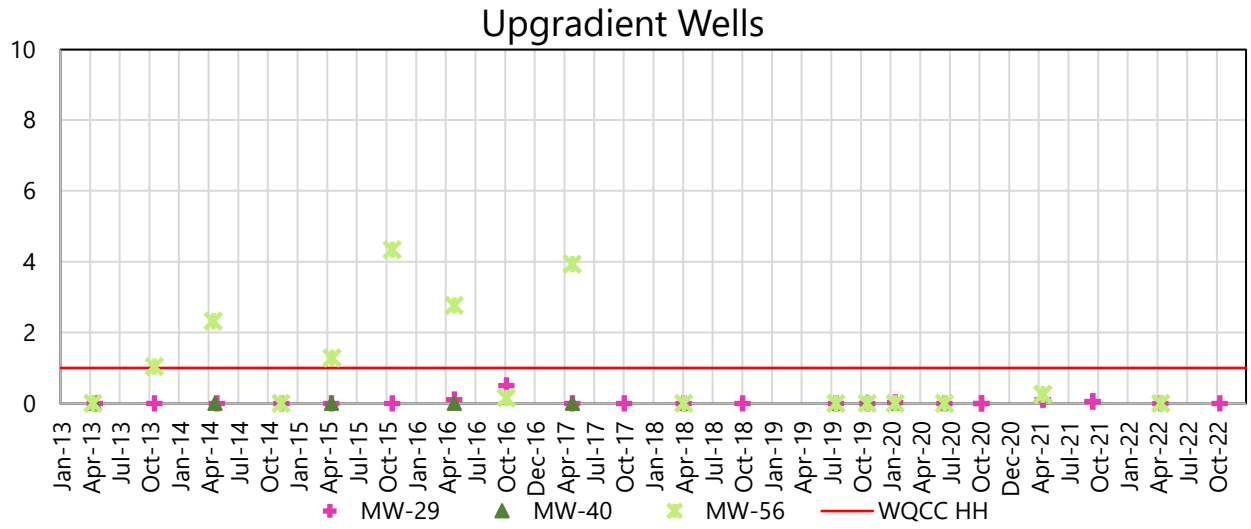
SOUTH RO REJECT FIELD TRENDS - CHLORIDE

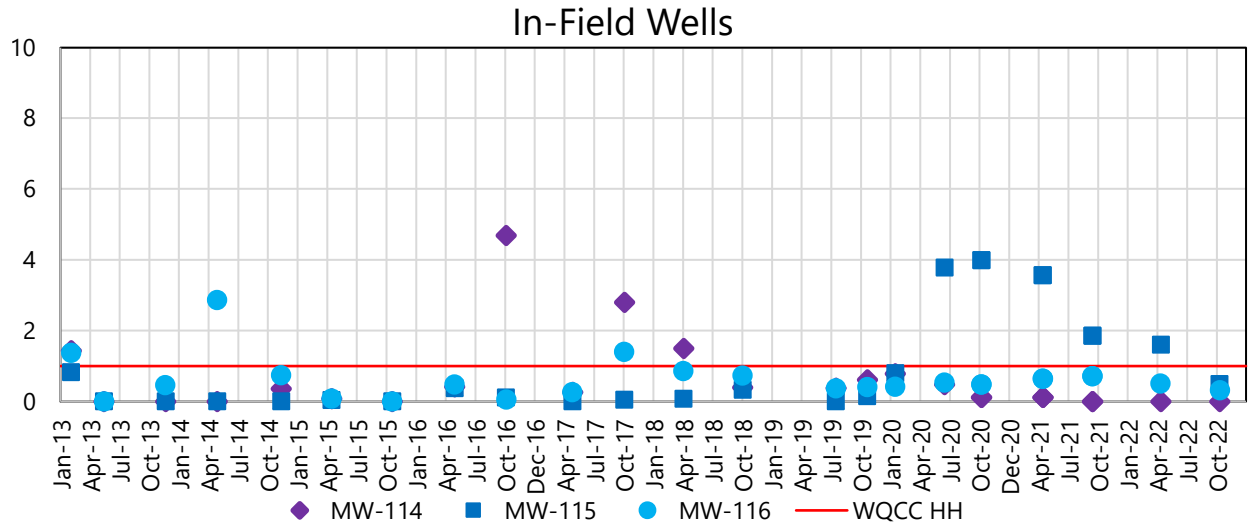


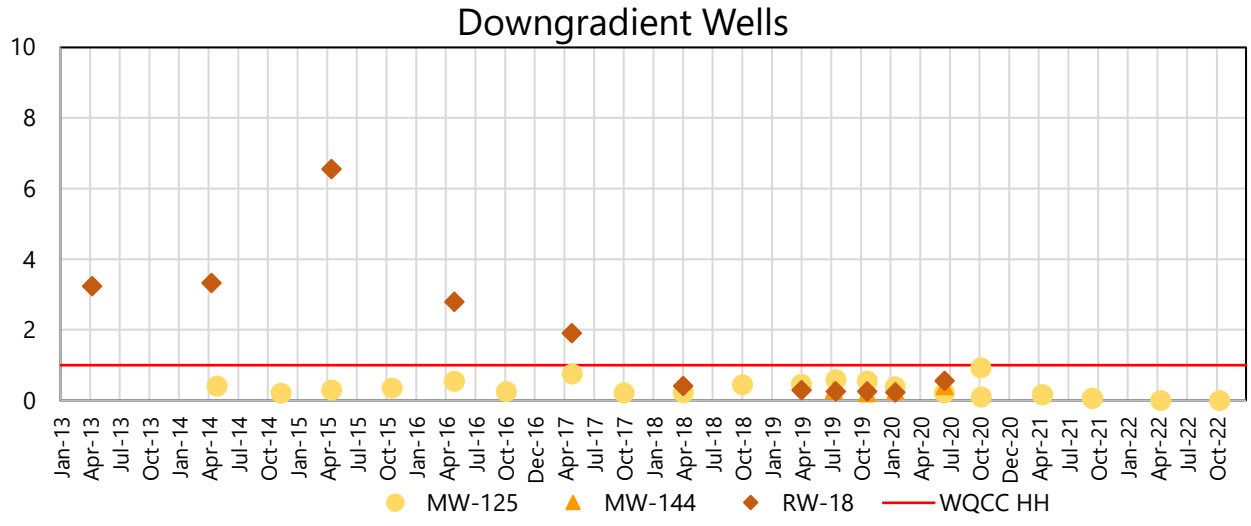




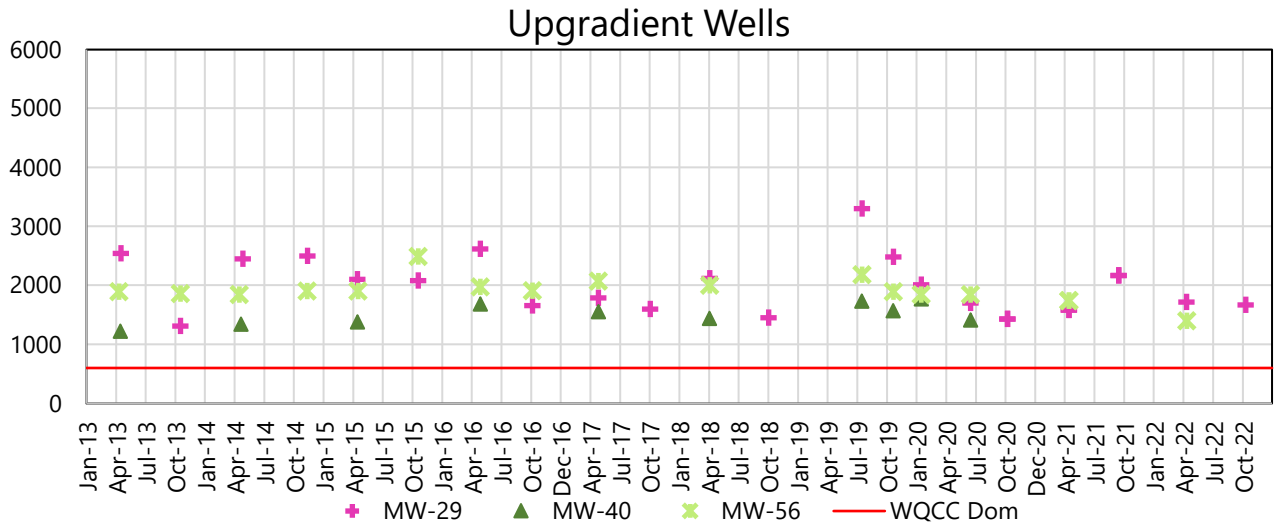
SOUTH RO REJECT FIELD TRENDS - FLUORIDE

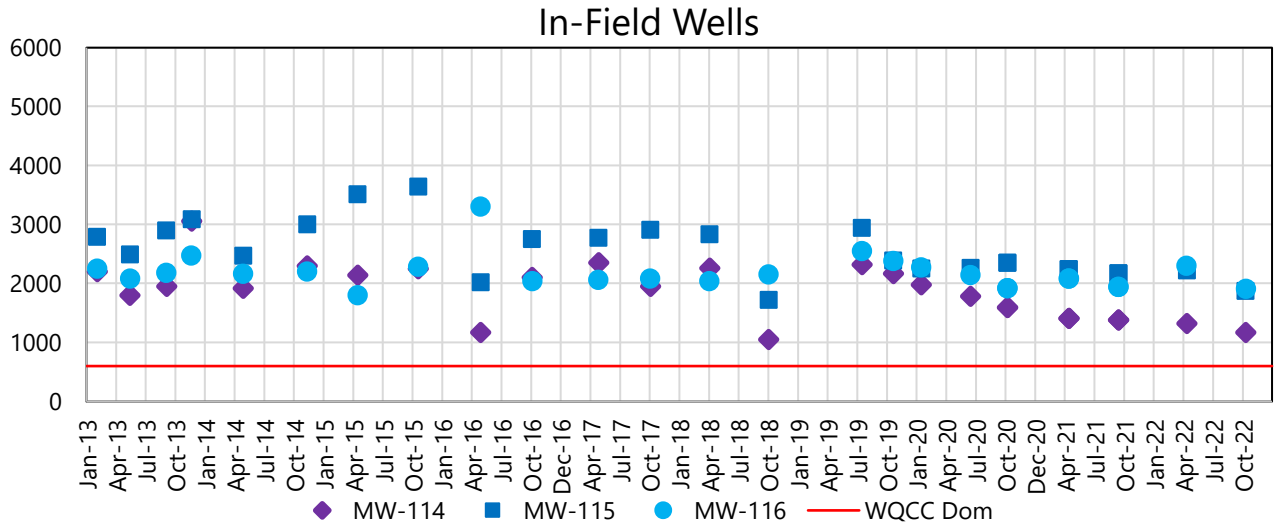


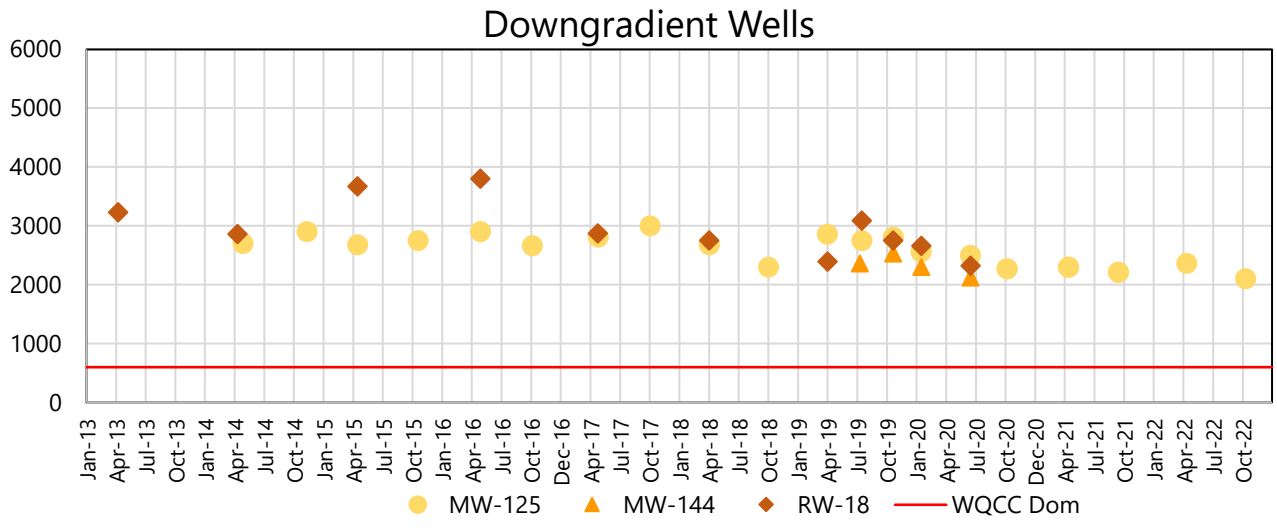




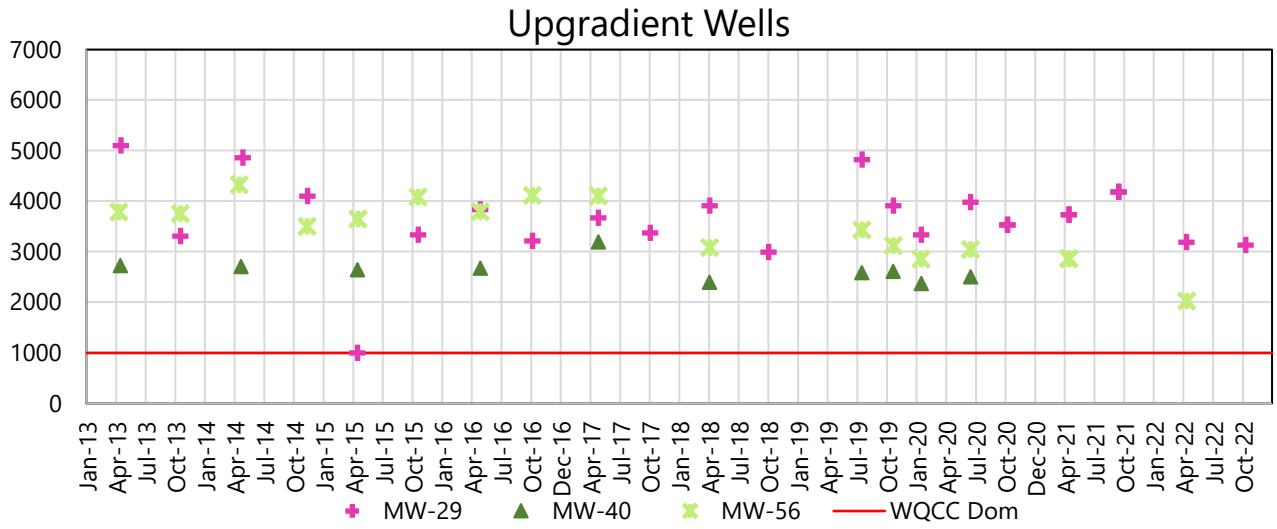
SOUTH RO REJECT FIELD TRENDS - NITRATE/NITRITE

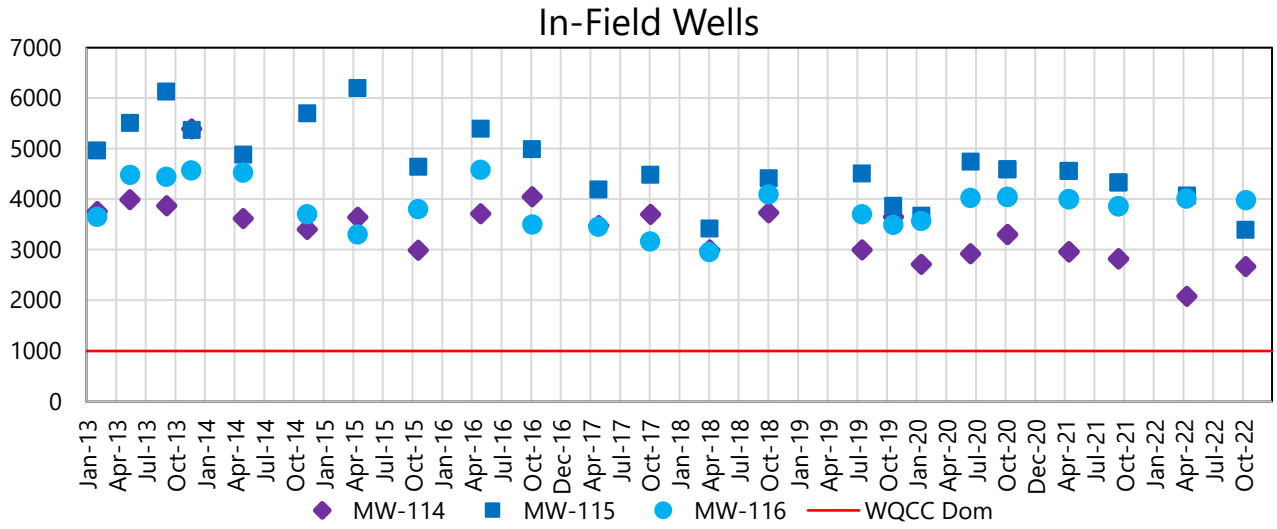


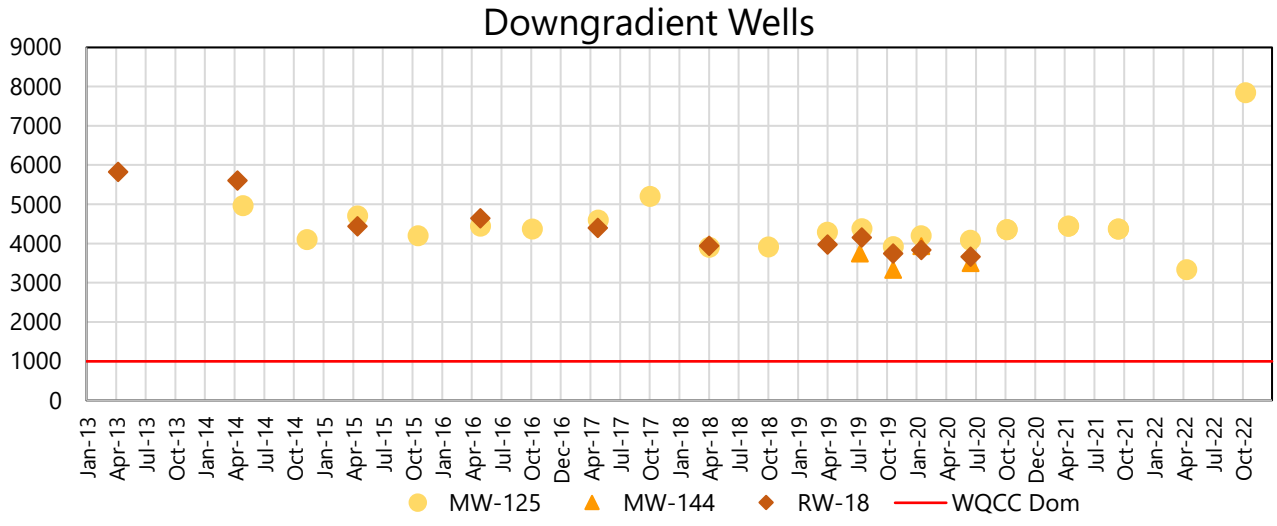




SOUTH RO REJECT FIELD TRENDS - SULFATE







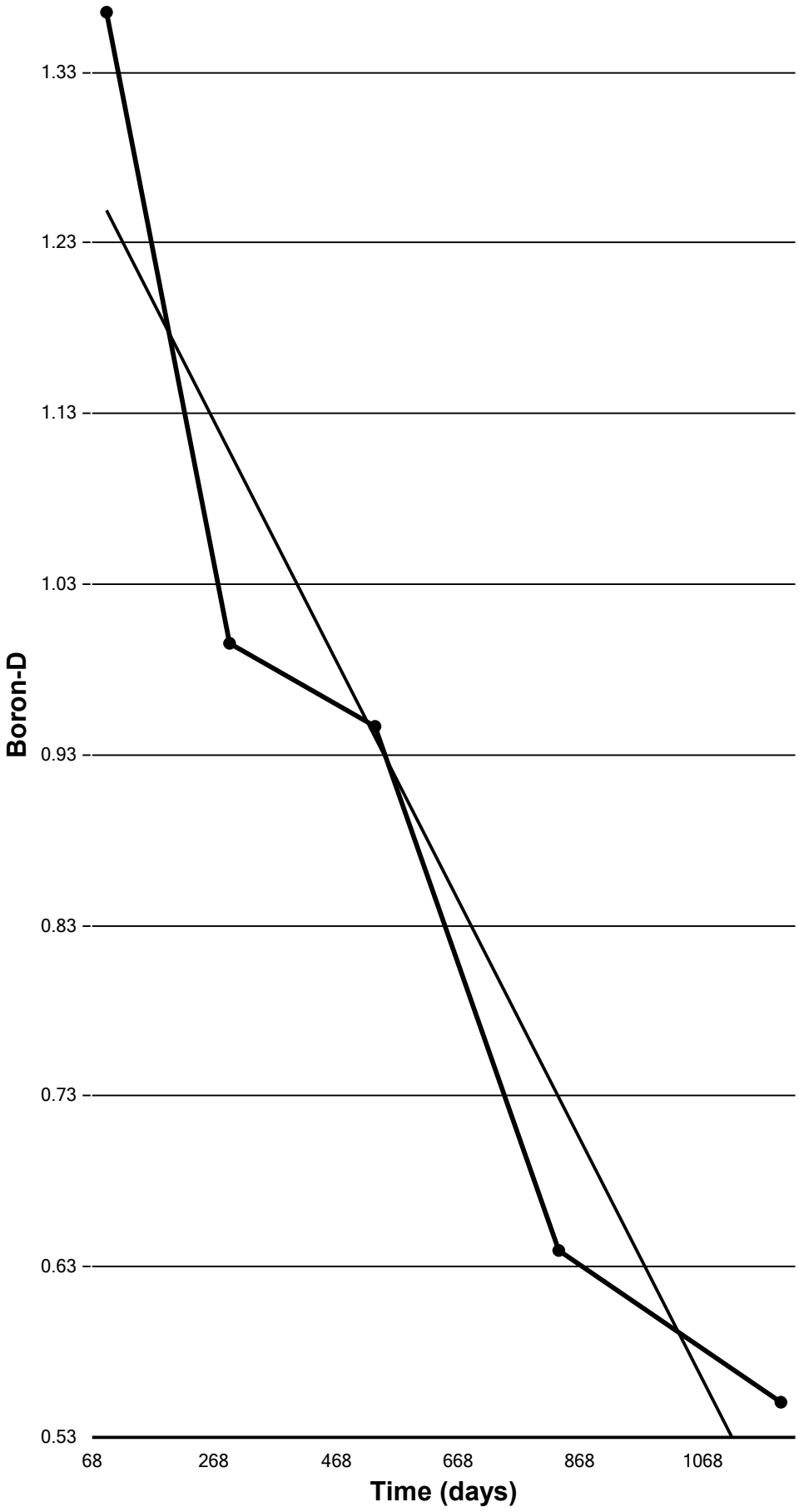
SOUTH RO REJECT FIELD TRENDS - TDS

APPENDIX B2

ProUCL MANN-KENDALL STATISTICAL EVALUATION OF COCs 2019-2022

APPENDIX B2A

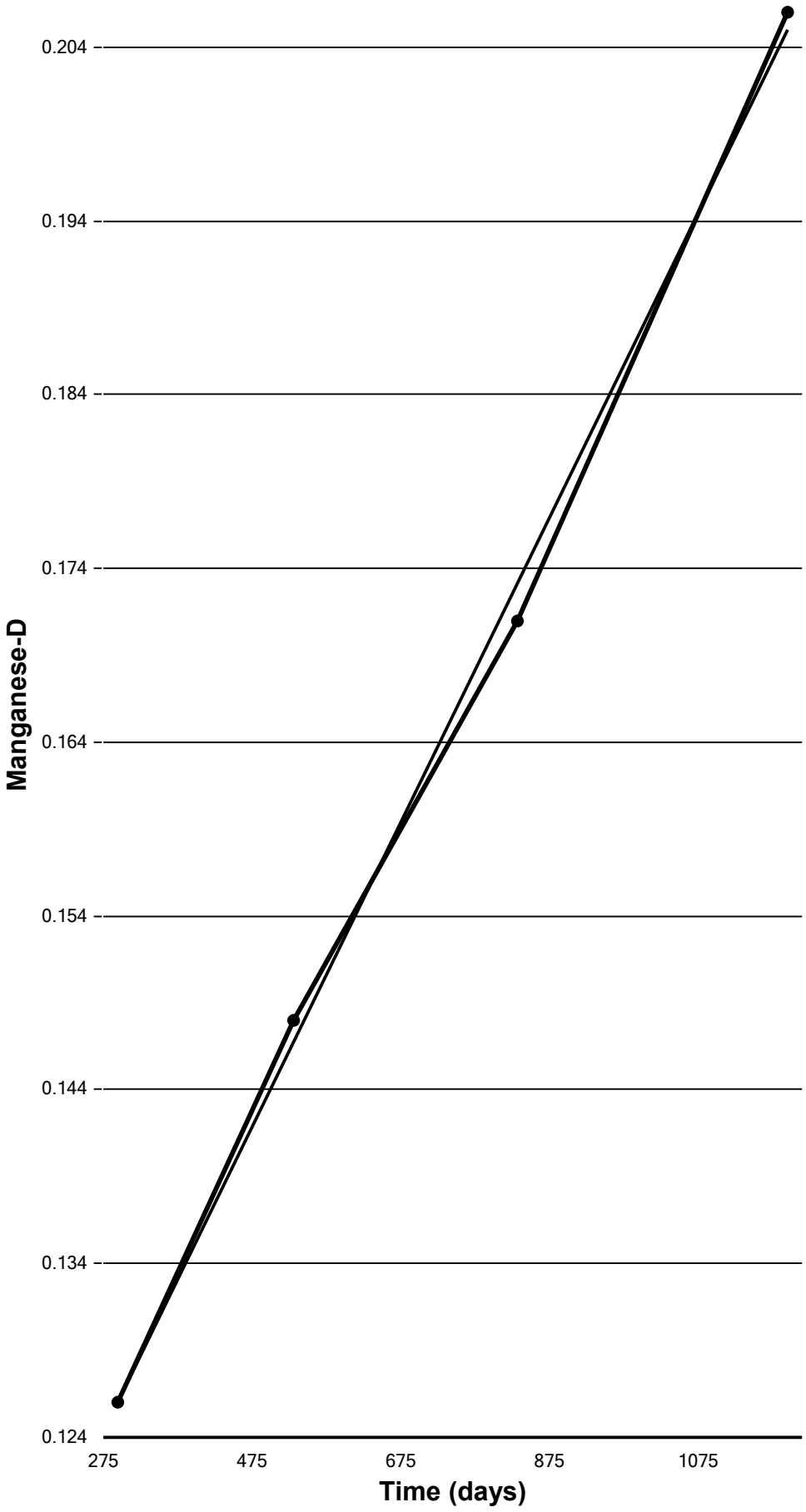
MANN-KENDALL STATISTICAL EVALUATION
MW-55



Mann-Kendall Trend Analysis	
n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	-2.2045
M-K Test Value (S)	-10
Tabulated p-value	0.0080
Approximate p-value	0.0137

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0007
OLS Regression Intercept	1.3177

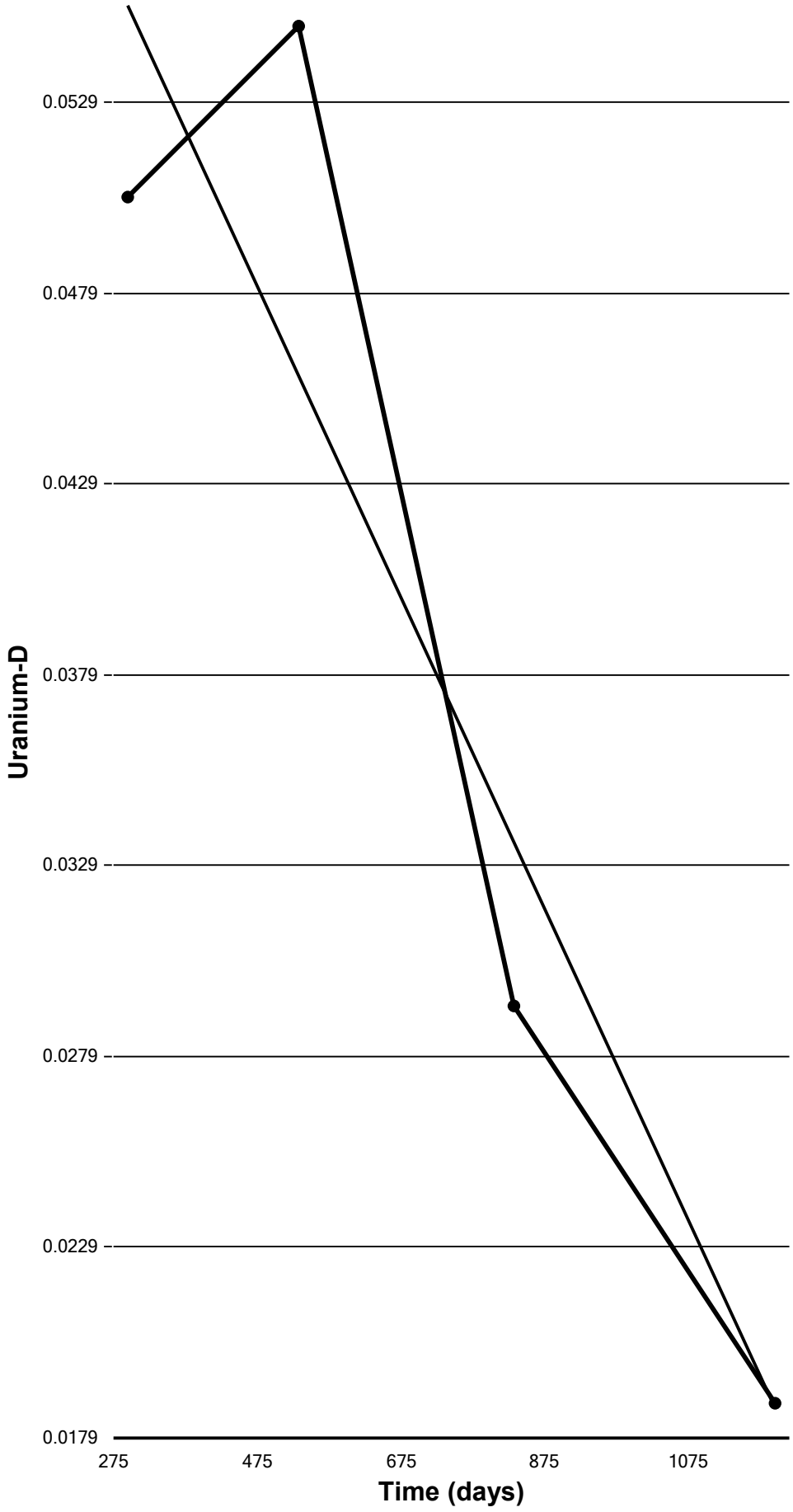
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	1.6984
M-K Test Value (S)	6
Tabulated p-value	0.0420
Approximate p-value	0.0447

OLS Regression Line (Blue)	
OLS Regression Slope	0.0001
OLS Regression Intercept	0.1003

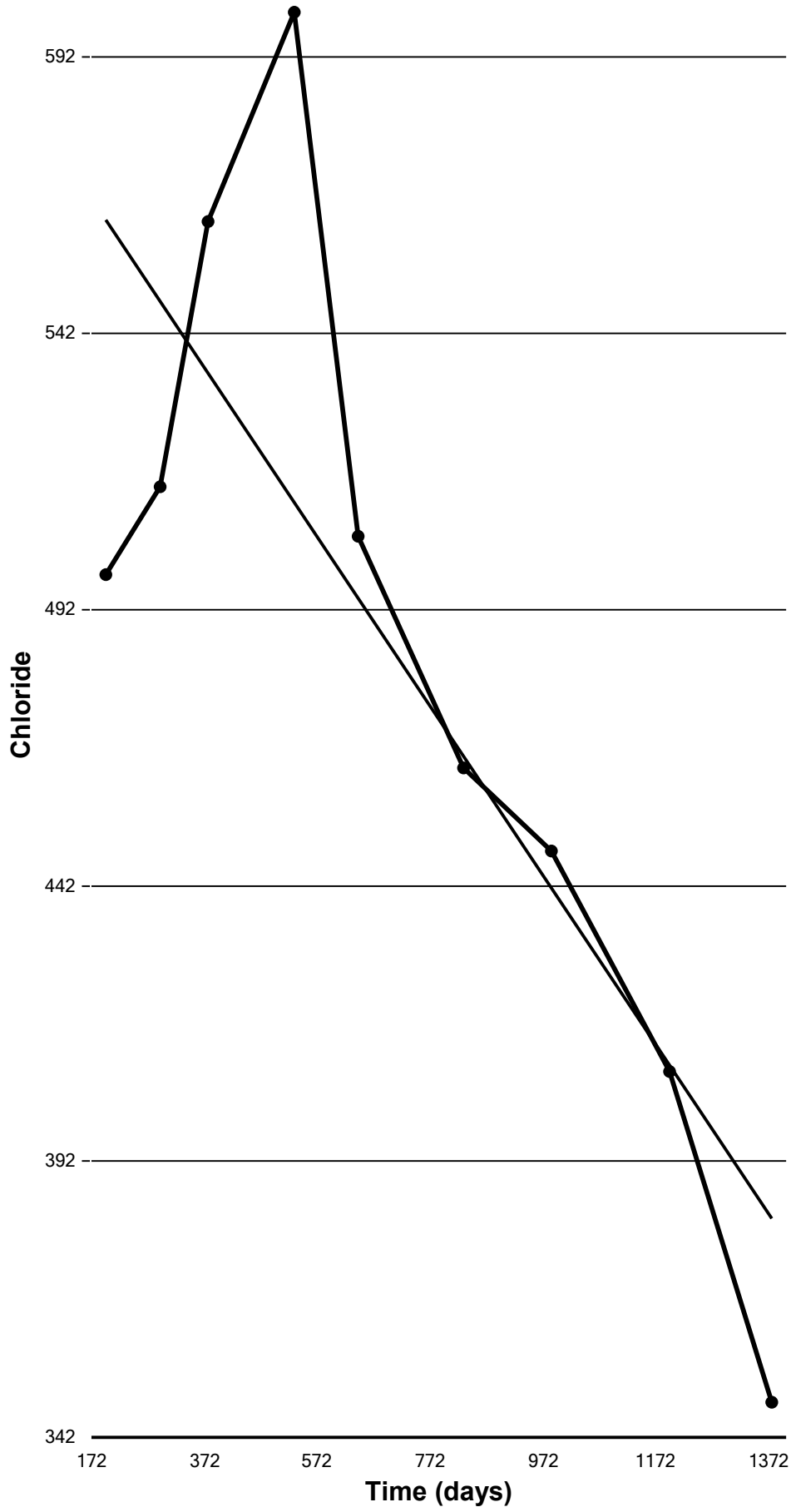
Statistically significant evidence of an increasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	-1.0190
M-K Test Value (S)	-4
Tabulated p-value	0.1670
Approximate p-value	0.1541

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0674

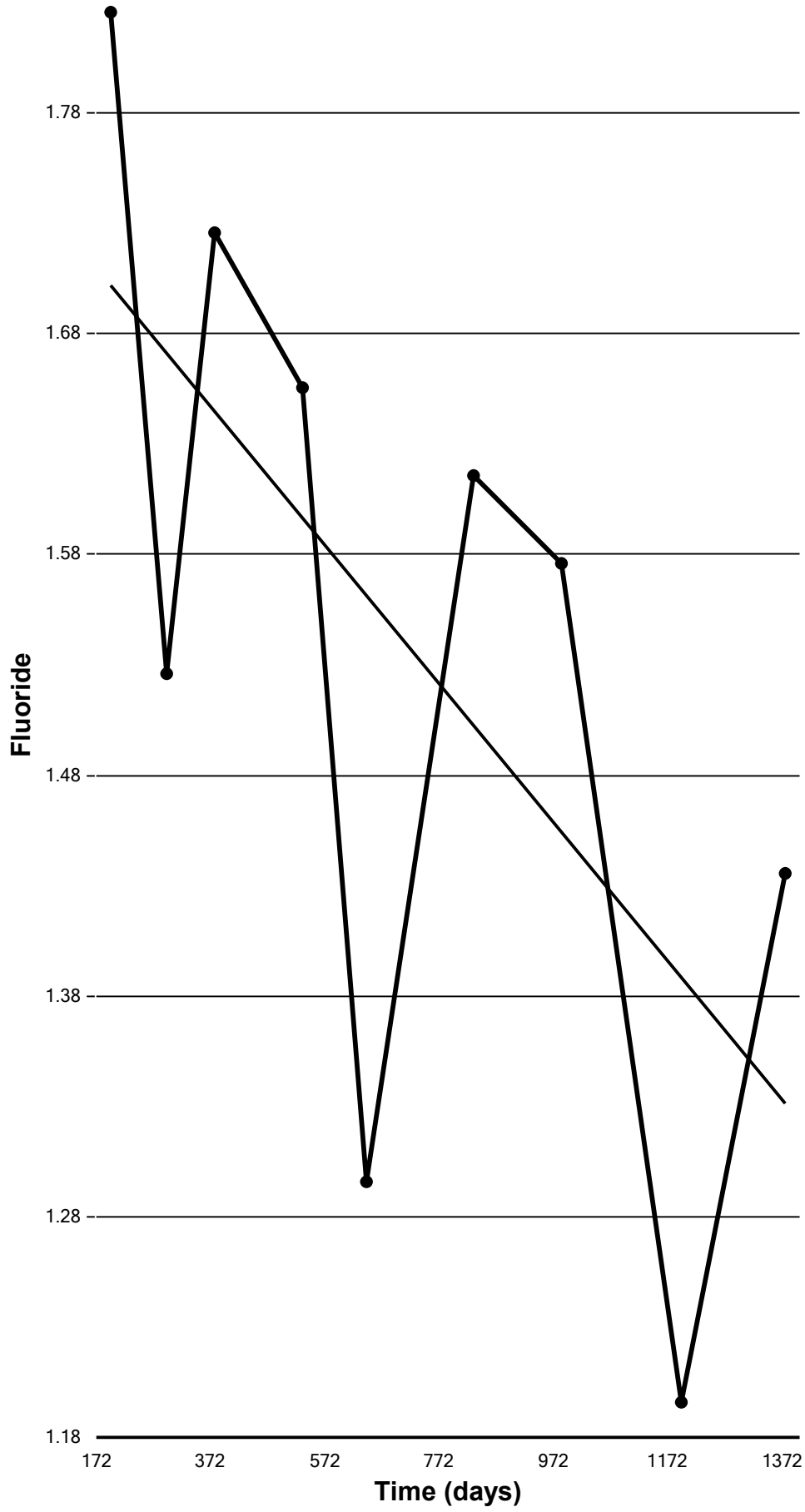
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-2.1894
M-K Test Value (S)	-22
Tabulated p-value	0.0120
Approximate p-value	0.0143

OLS Regression Line (Blue)	
OLS Regression Slope	-0.1532
OLS Regression Intercept	592.5632

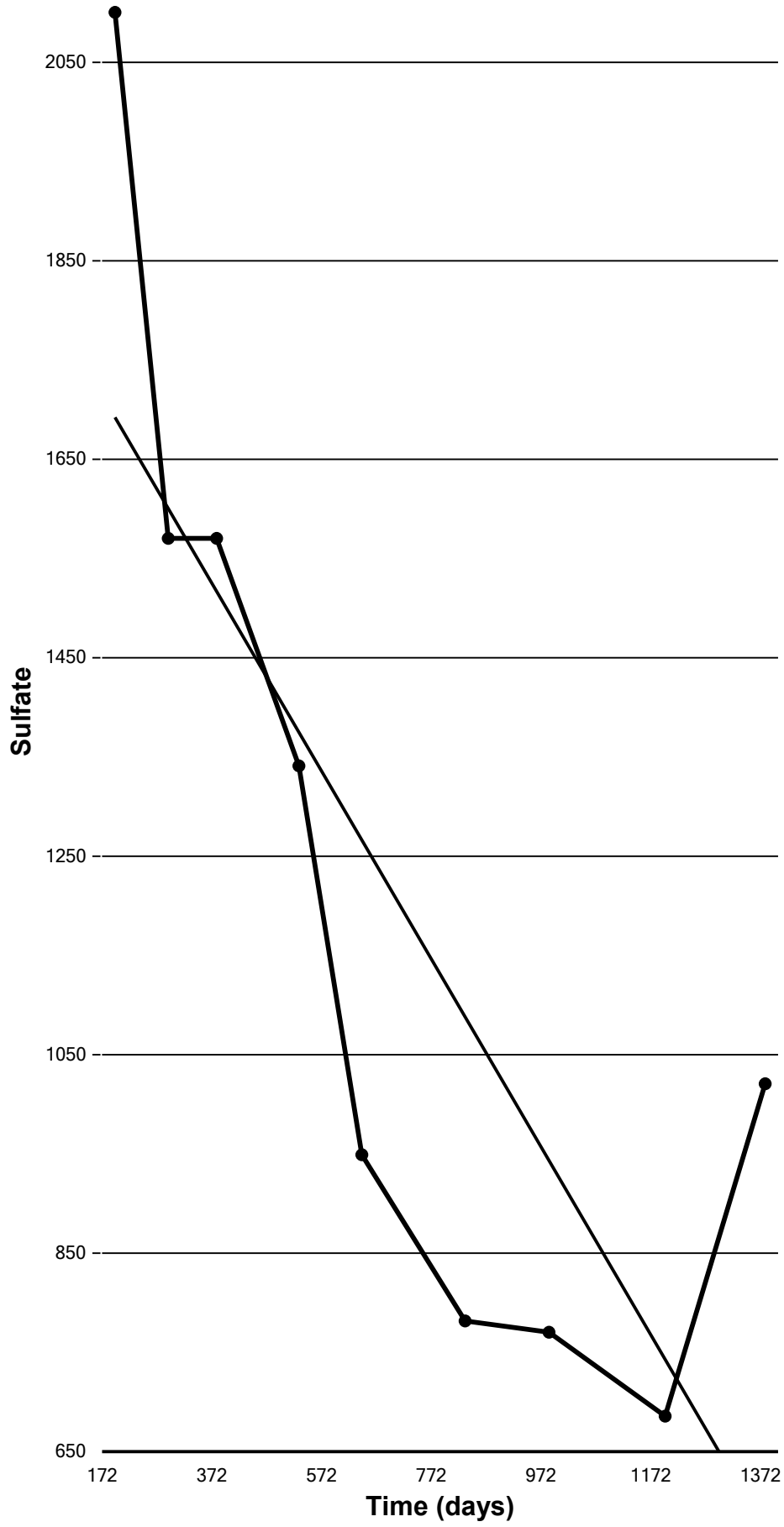
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-1.9809
M-K Test Value (S)	-20
Tabulated p-value	0.0220
Approximate p-value	0.0238

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0003
OLS Regression Intercept	1.7674

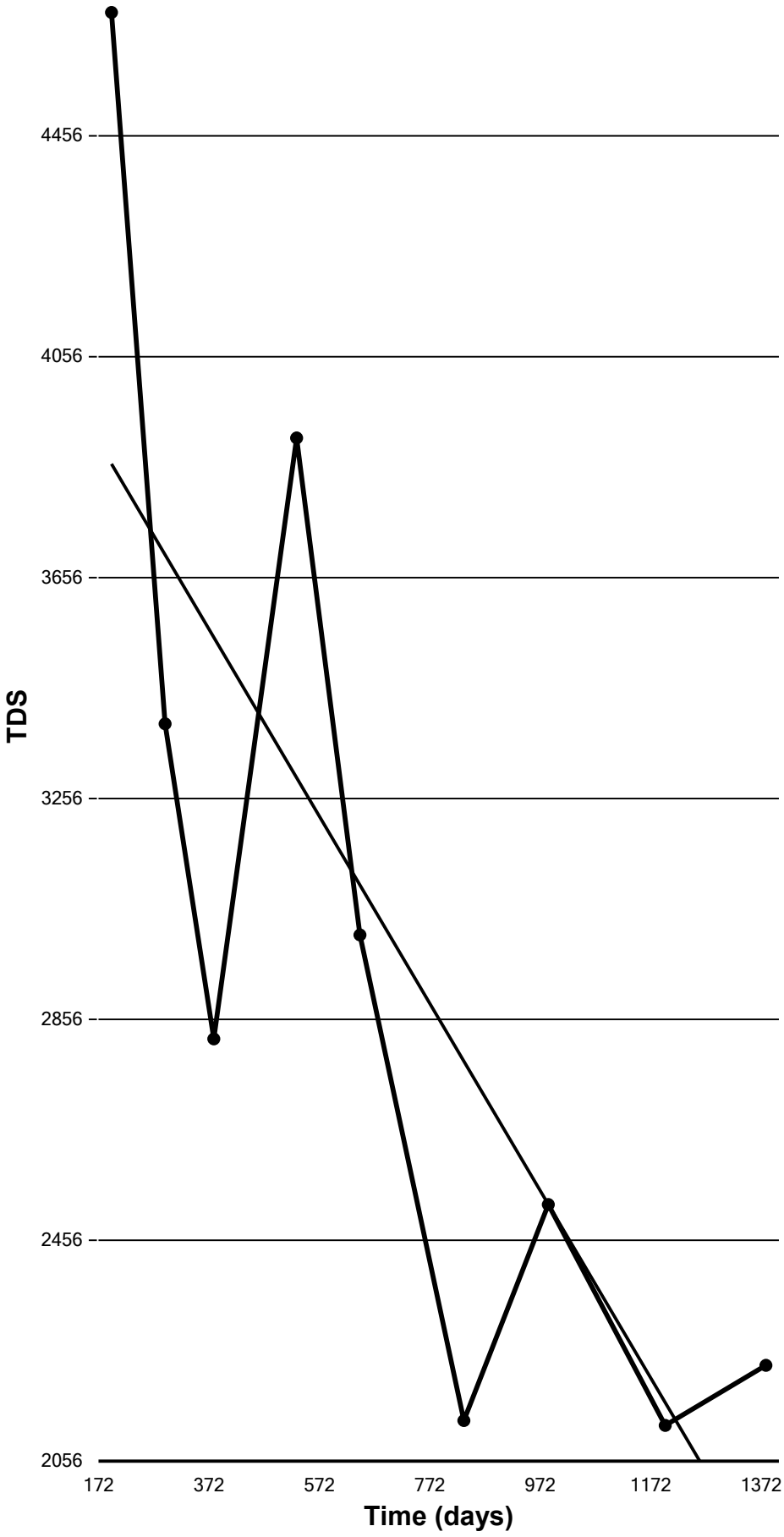
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	-2.7255
M-K Test Value (S)	-27
Tabulated p-value	0.0030
Approximate p-value	0.0032

OLS Regression Line (Blue)	
OLS Regression Slope	-0.9490
OLS Regression Intercept	1,877.8338

Statistically significant evidence of a decreasing trend at the specified level of significance.



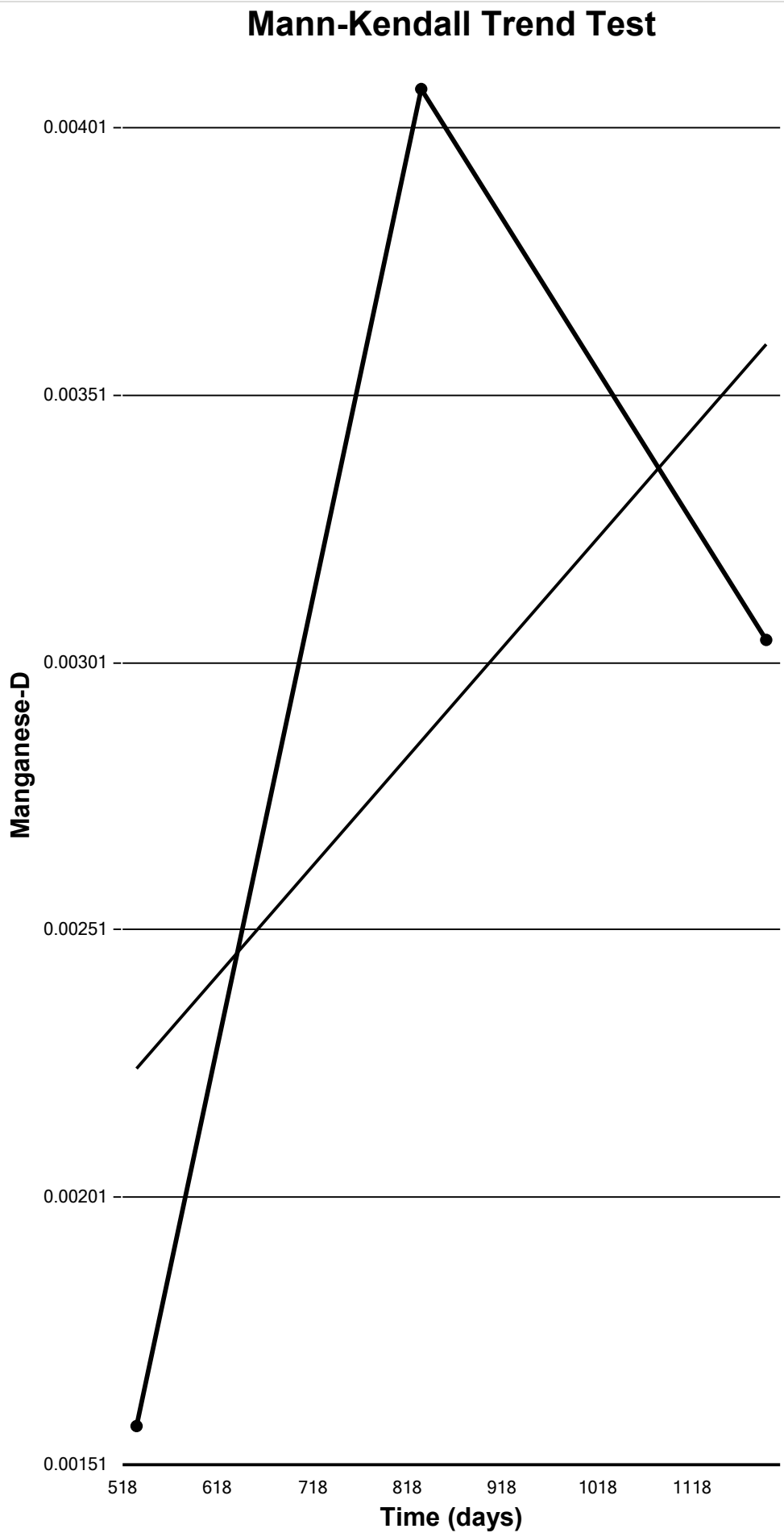
Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-2.3979
M-K Test Value (S)	-24
Tabulated p-value	0.0060
Approximate p-value	0.0082

OLS Regression Line (Blue)	
OLS Regression Slope	-1.7018
OLS Regression Intercept	4,197.3673

Statistically significant evidence of a decreasing trend at the specified level of significance.

APPENDIX B2B

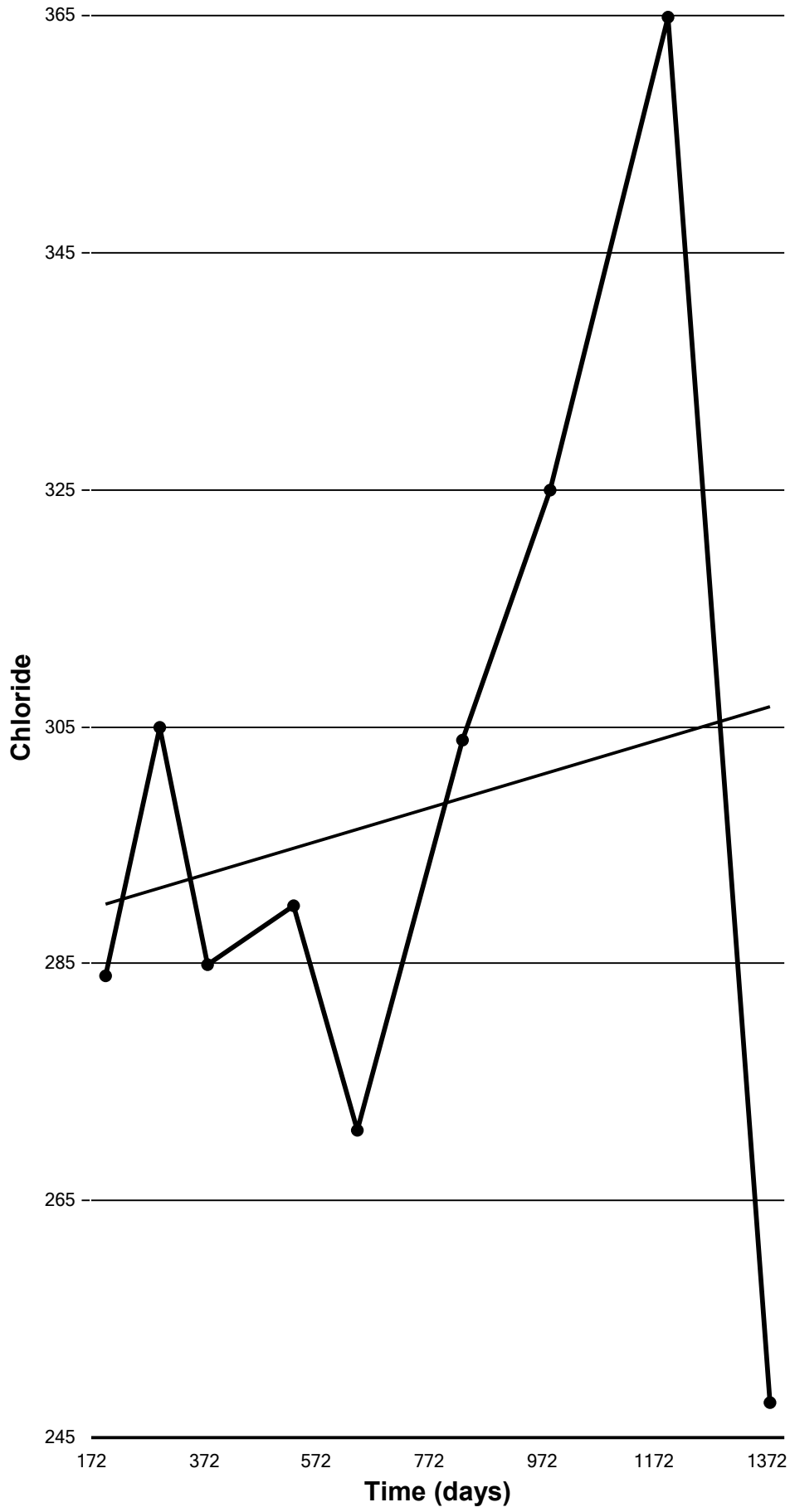
MANN-KENDALL STATISTICAL EVALUATION
MW-117



Mann-Kendall Trend Analysis	
n	3
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	1.9149
Standardized Value of S	0.0000
M-K Test Value (S)	1
Tabulated p-value	
Approximate p-value	0.5000

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0012

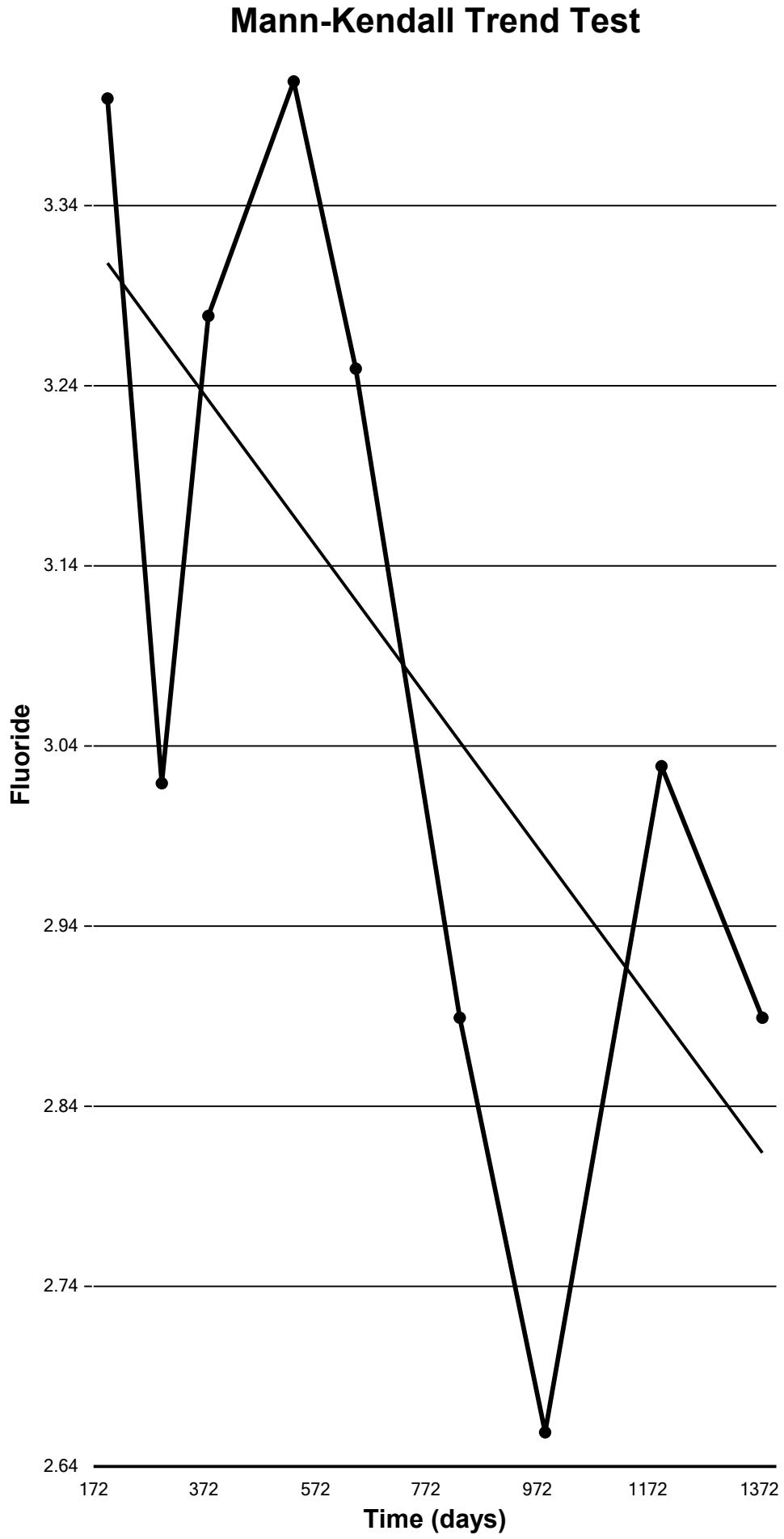
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	0.5213
M-K Test Value (S)	6
Tabulated p-value	0.3060
Approximate p-value	0.3011

OLS Regression Line (Blue)	
OLS Regression Slope	0.0141
OLS Regression Intercept	287.3232

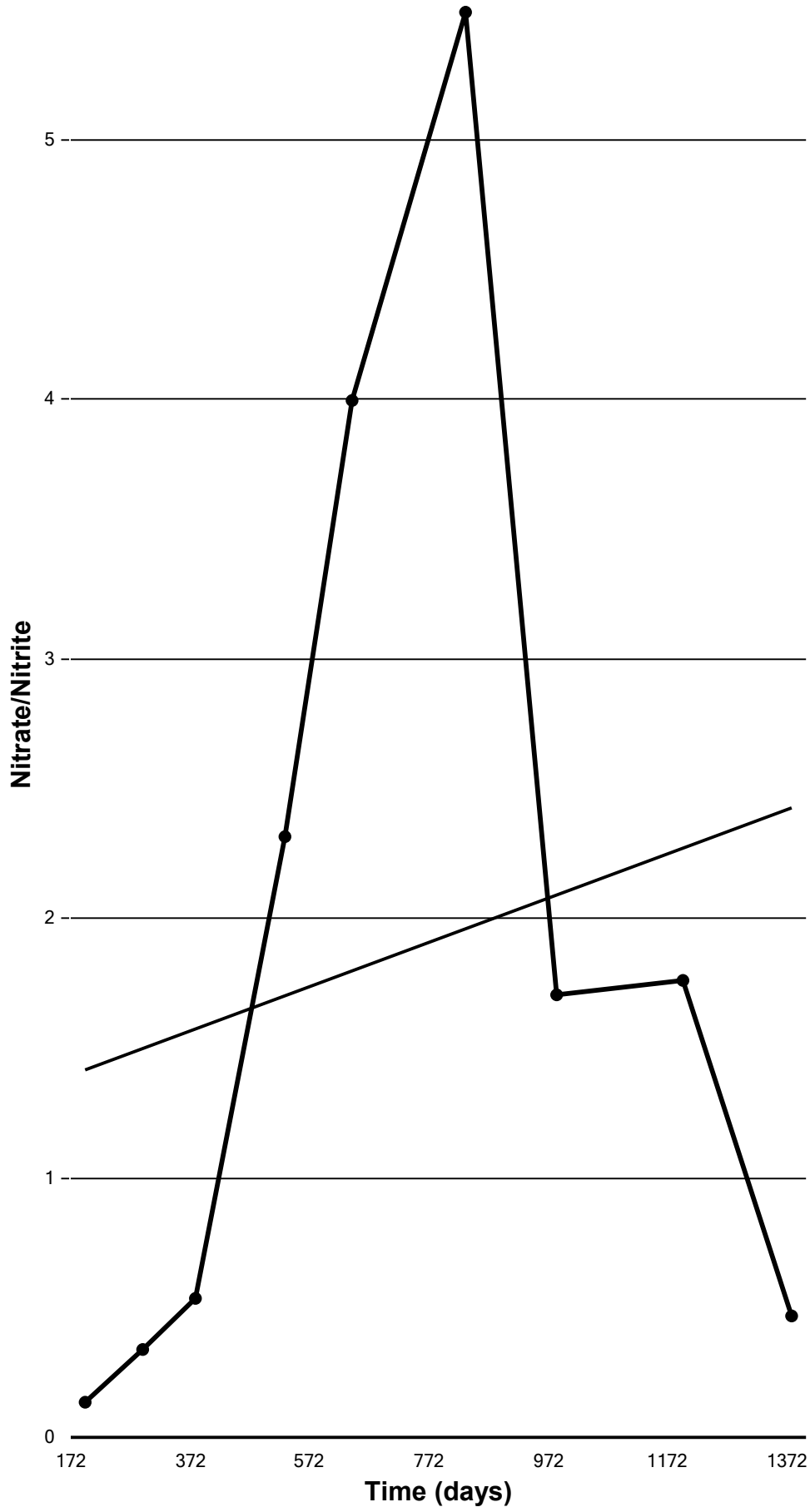
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	-1.6773
M-K Test Value (S)	-17
Tabulated p-value	0.0600
Approximate p-value	0.0467

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0004
OLS Regression Intercept	3.3912

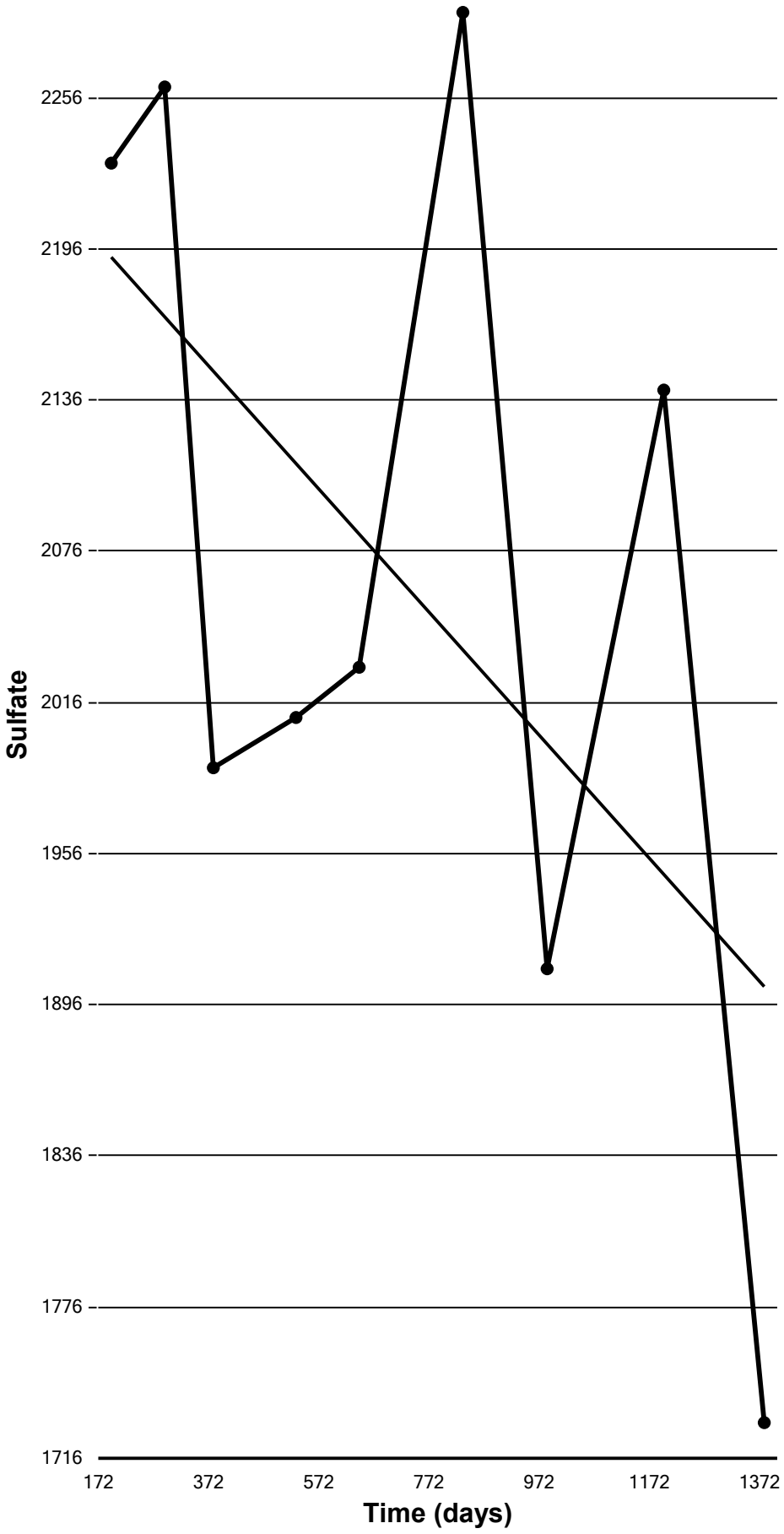
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	1.1468
M-K Test Value (S)	12
Tabulated p-value	0.1300
Approximate p-value	0.1257

OLS Regression Line (Blue)	
OLS Regression Slope	0.0009
OLS Regression Intercept	1.3054

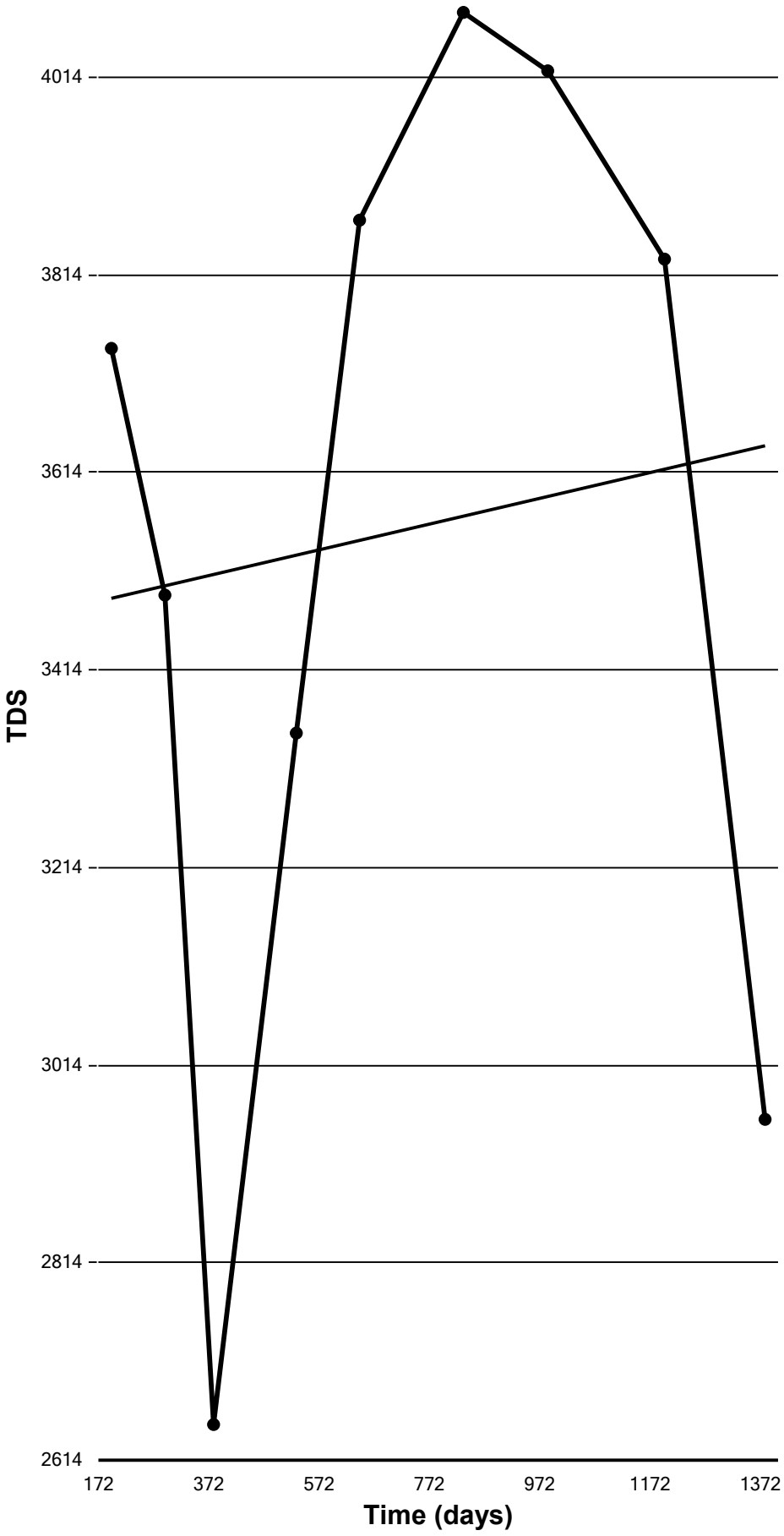
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-0.9383
M-K Test Value (S)	-10
Tabulated p-value	0.1790
Approximate p-value	0.1740

OLS Regression Line (Blue)	
OLS Regression Slope	-0.2444
OLS Regression Intercept	2,240.5377

Insufficient statistical evidence of a significant trend at the specified level of significance.



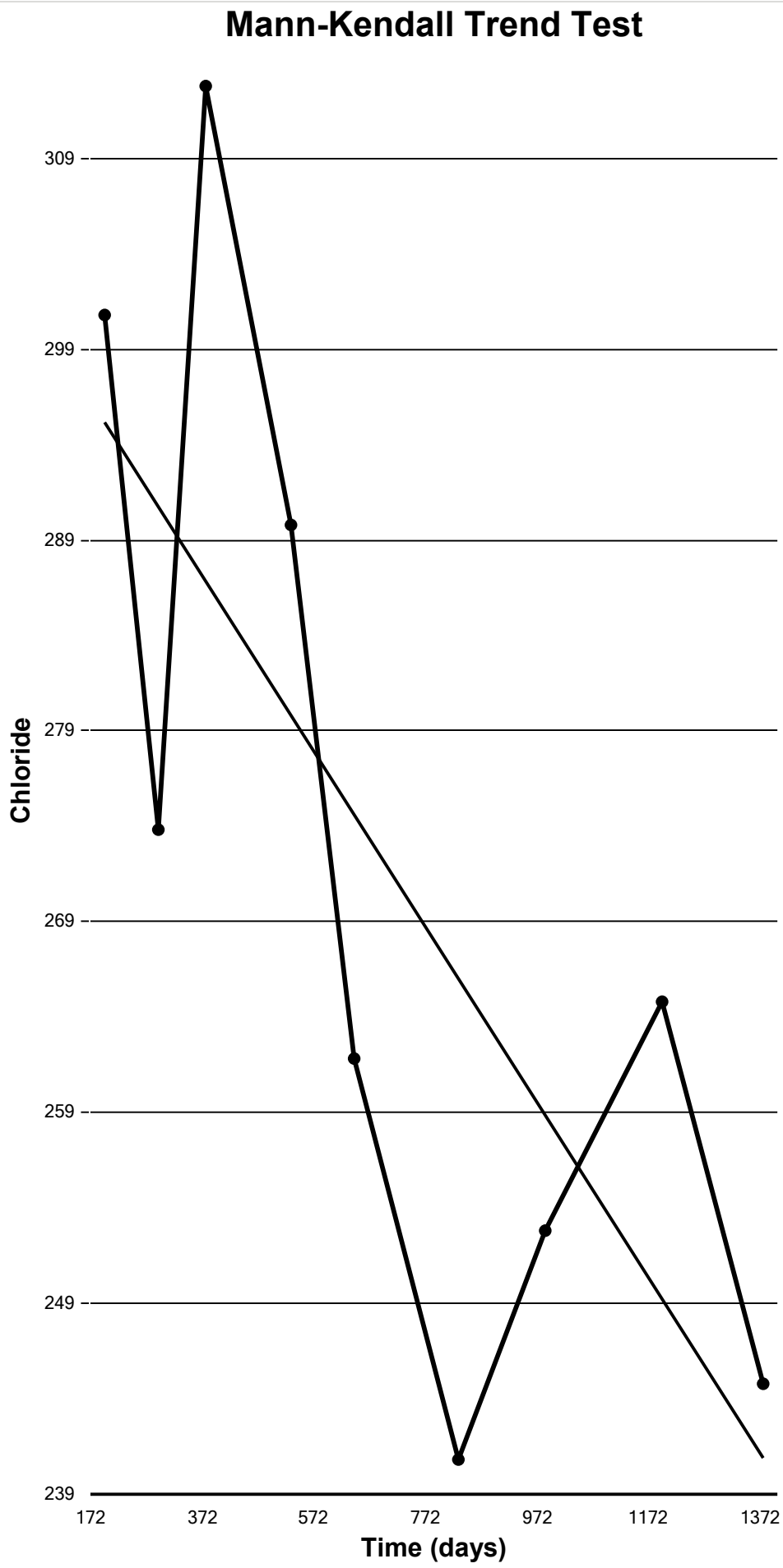
Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	0.3128
M-K Test Value (S)	4
Tabulated p-value	0.3810
Approximate p-value	0.3772

OLS Regression Line (Blue)	
OLS Regression Slope	0.1295
OLS Regression Intercept	3,461.7496

Insufficient statistical evidence of a significant trend at the specified level of significance.

APPENDIX B2C

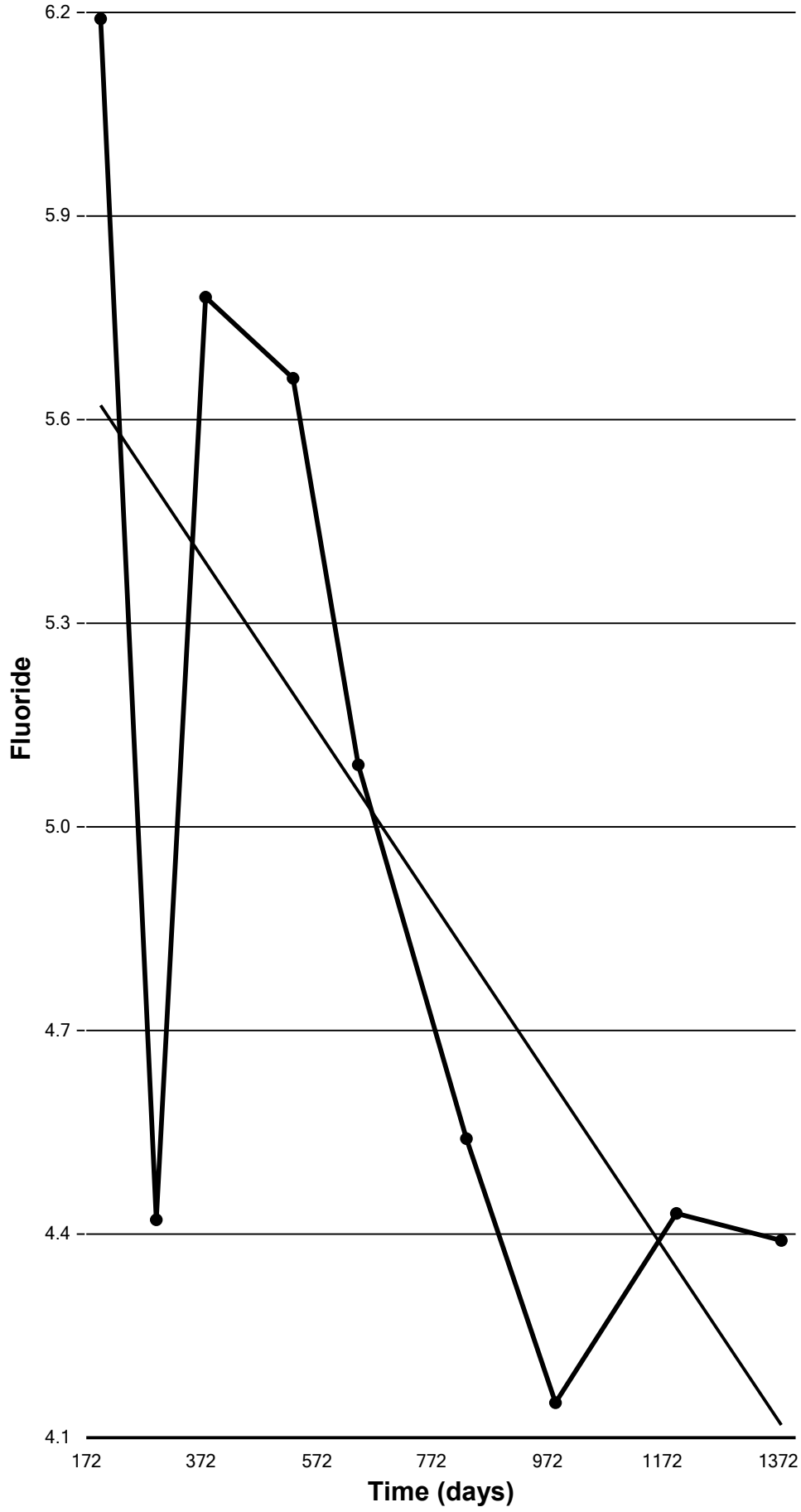
MANN-KENDALL STATISTICAL EVALUATION
MW-118



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-1.9809
M-K Test Value (S)	-20
Tabulated p-value	0.0220
Approximate p-value	0.0238

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0459
OLS Regression Intercept	304.4153

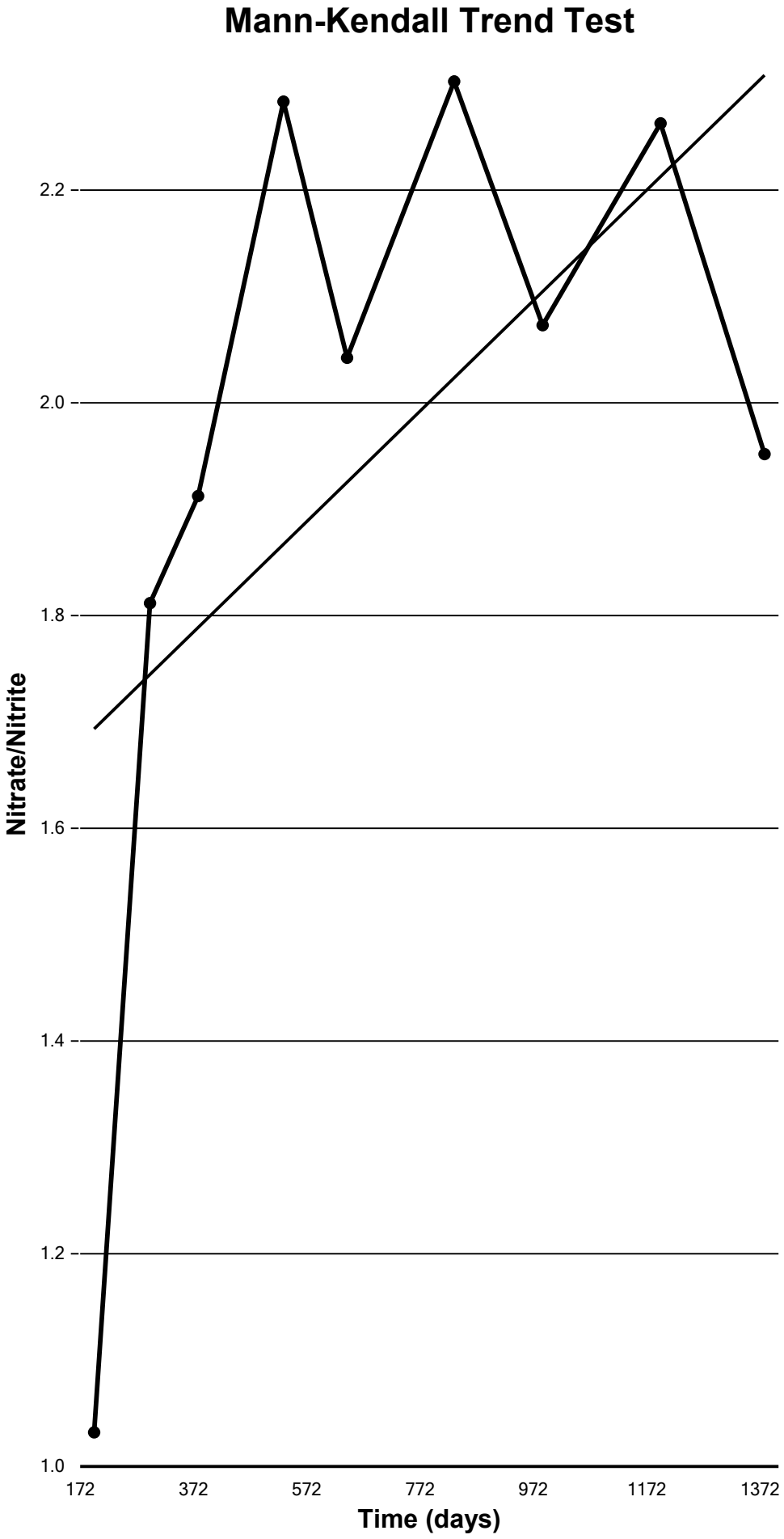
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-2.1894
M-K Test Value (S)	-22
Tabulated p-value	0.0120
Approximate p-value	0.0143

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0013
OLS Regression Intercept	5.8412

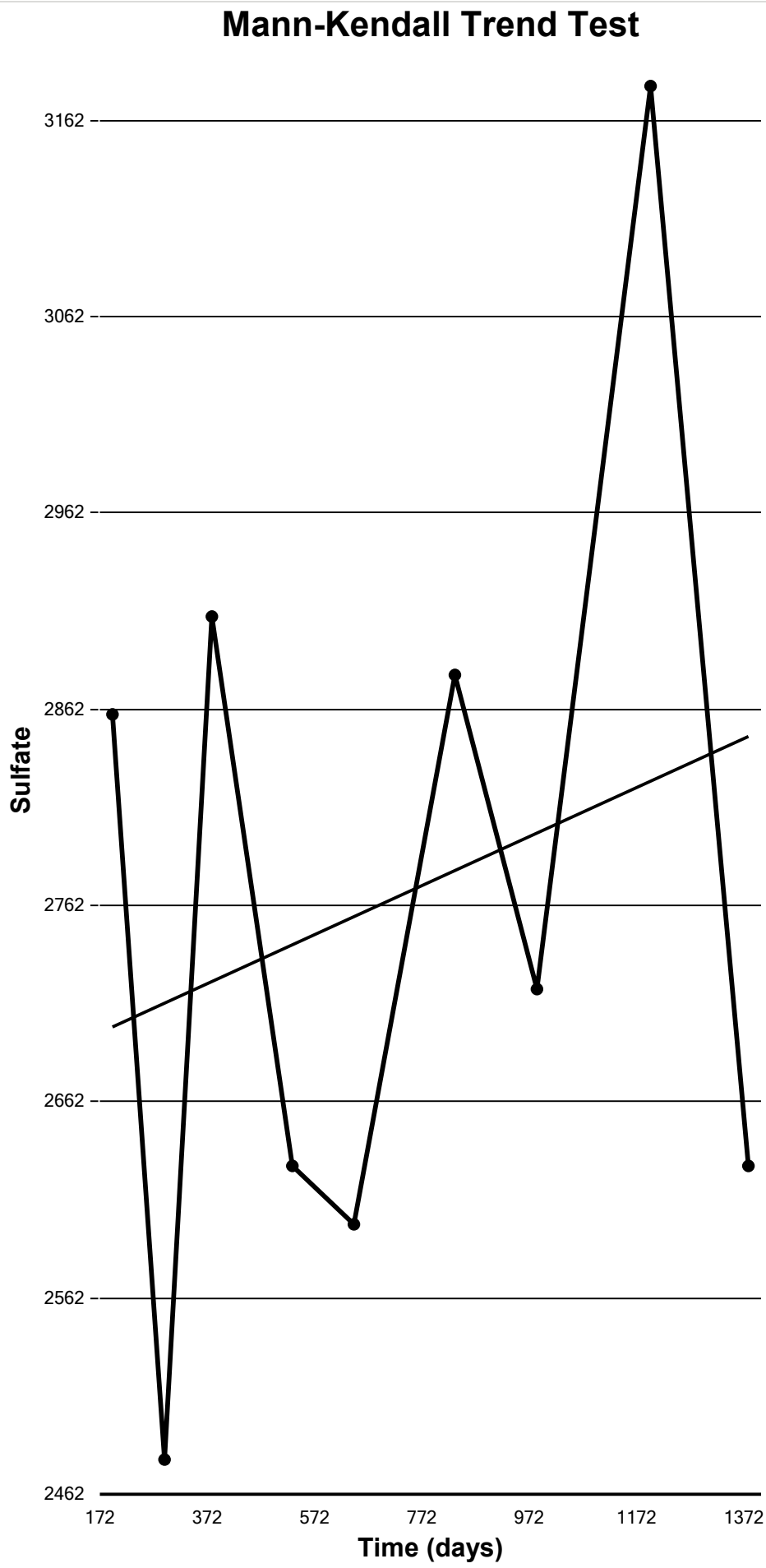
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	1.5639
M-K Test Value (S)	16
Tabulated p-value	0.0600
Approximate p-value	0.0589

OLS Regression Line (Blue)	
OLS Regression Slope	0.0005
OLS Regression Intercept	1.5791

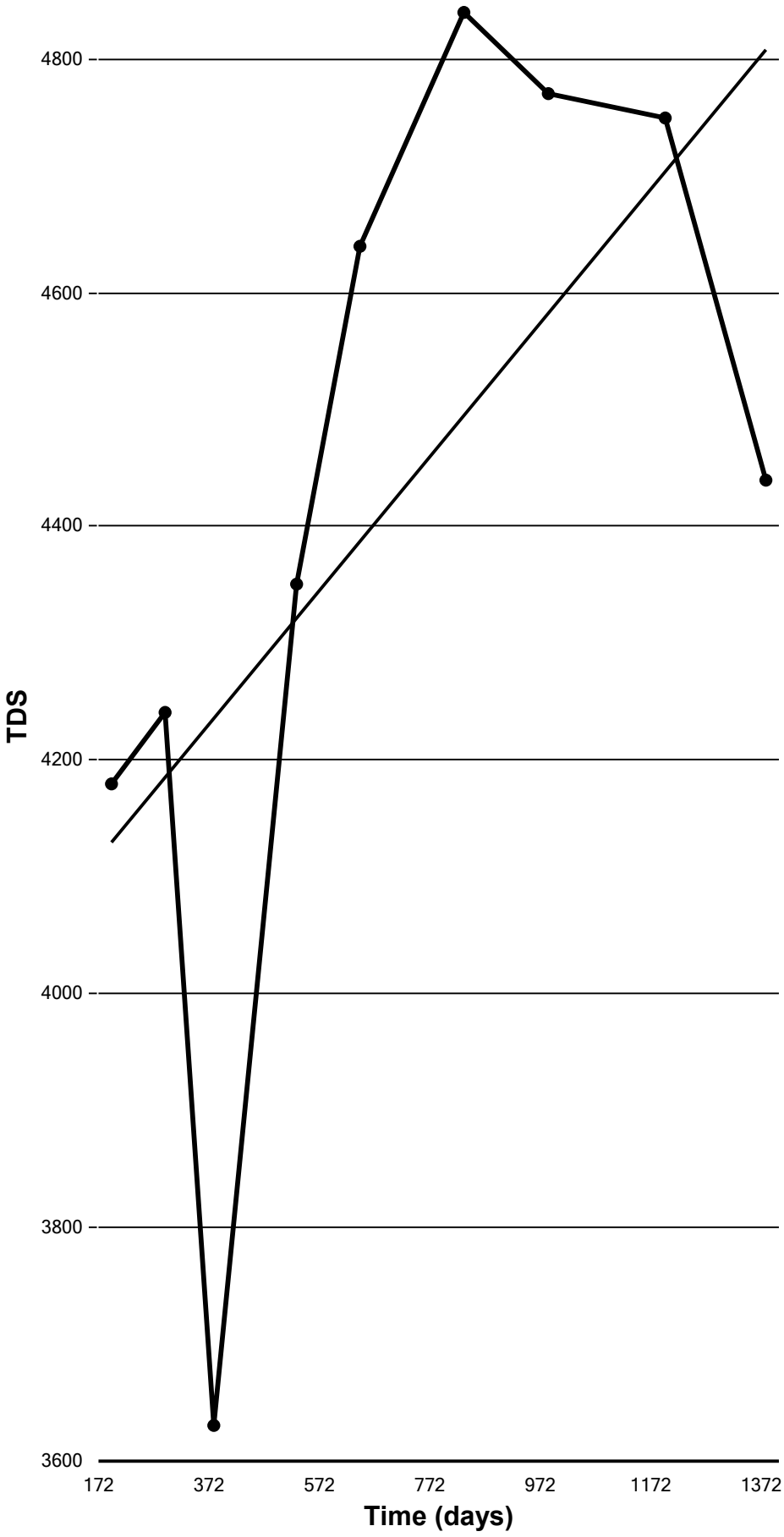
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	0.4193
M-K Test Value (S)	5
Tabulated p-value	0.3810
Approximate p-value	0.3375

OLS Regression Line (Blue)	
OLS Regression Slope	0.1255
OLS Regression Intercept	2,675.7238

Insufficient statistical evidence of a significant trend at the specified level of significance.



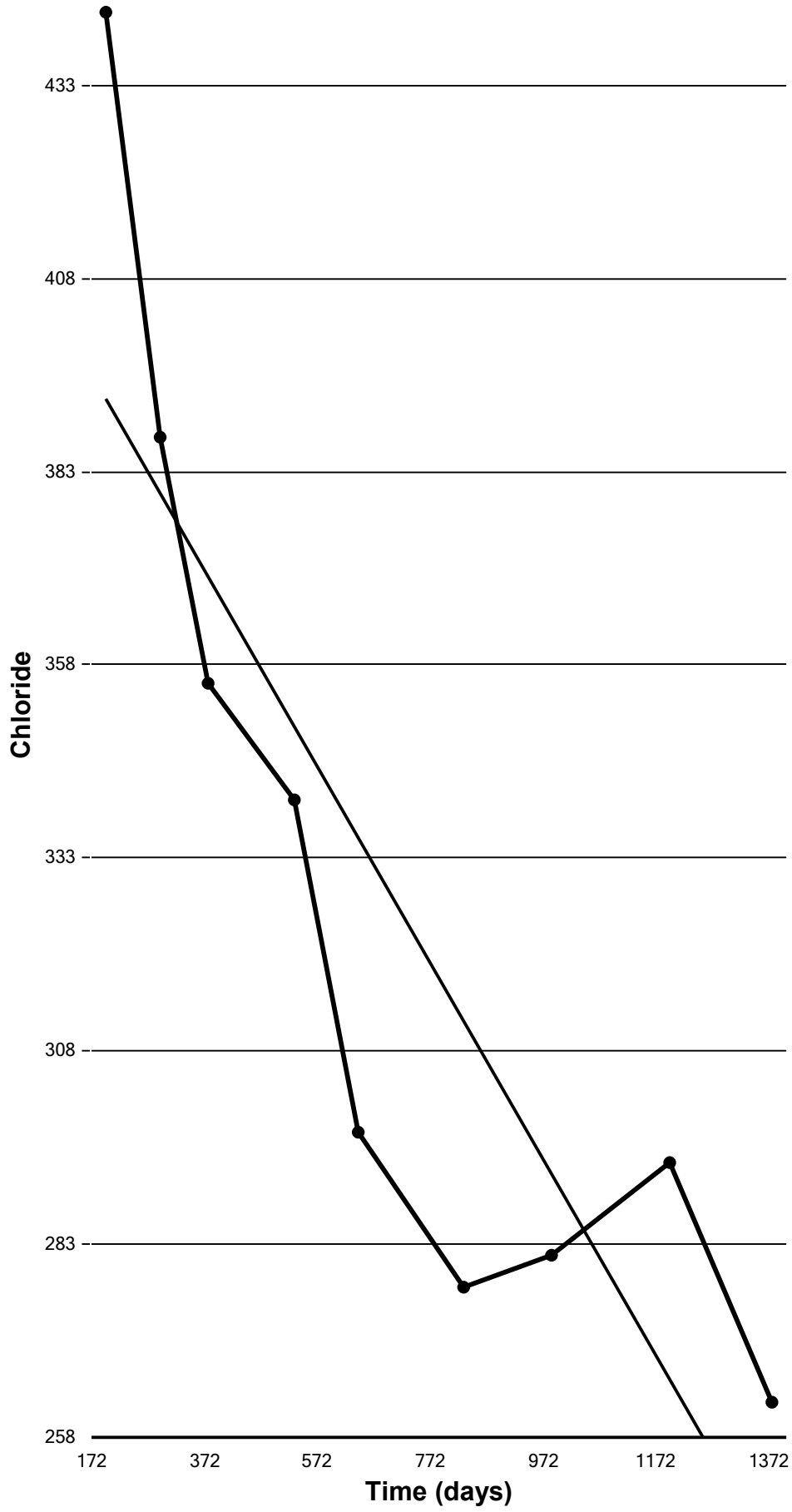
Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	1.7724
M-K Test Value (S)	18
Tabulated p-value	0.0380
Approximate p-value	0.0382

OLS Regression Line (Blue)	
OLS Regression Slope	0.5739
OLS Regression Intercept	4,015.8437

Statistically significant evidence of an increasing trend at the specified level of significance.

APPENDIX B2D

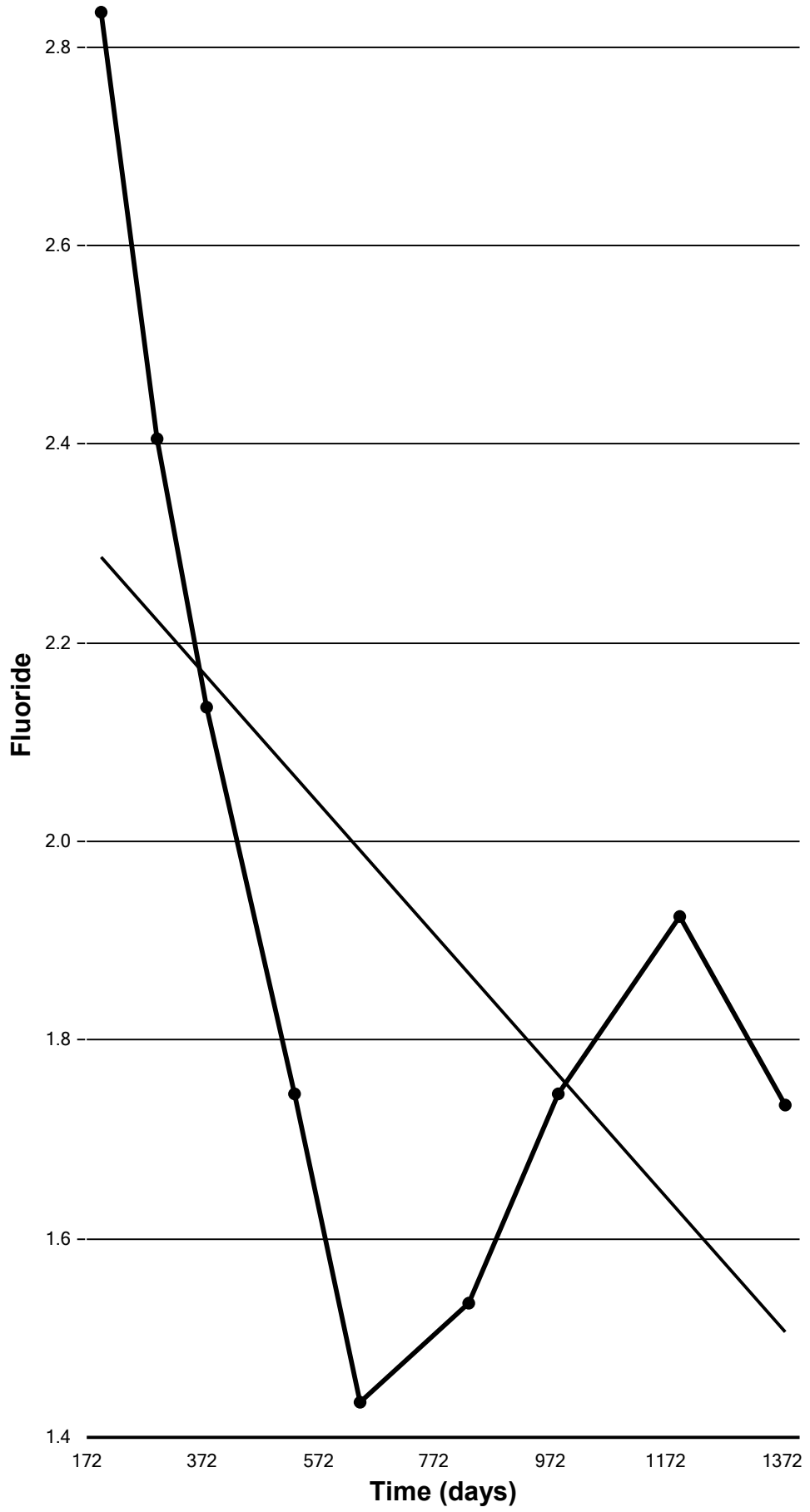
MANN-KENDALL STATISTICAL EVALUATION
MW-119



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-3.0235
M-K Test Value (S)	-30
Tabulated p-value	0.0000
Approximate p-value	0.0012

OLS Regression Line (Blue)	
OLS Regression Slope	-0.1270
OLS Regression Intercept	417.9263

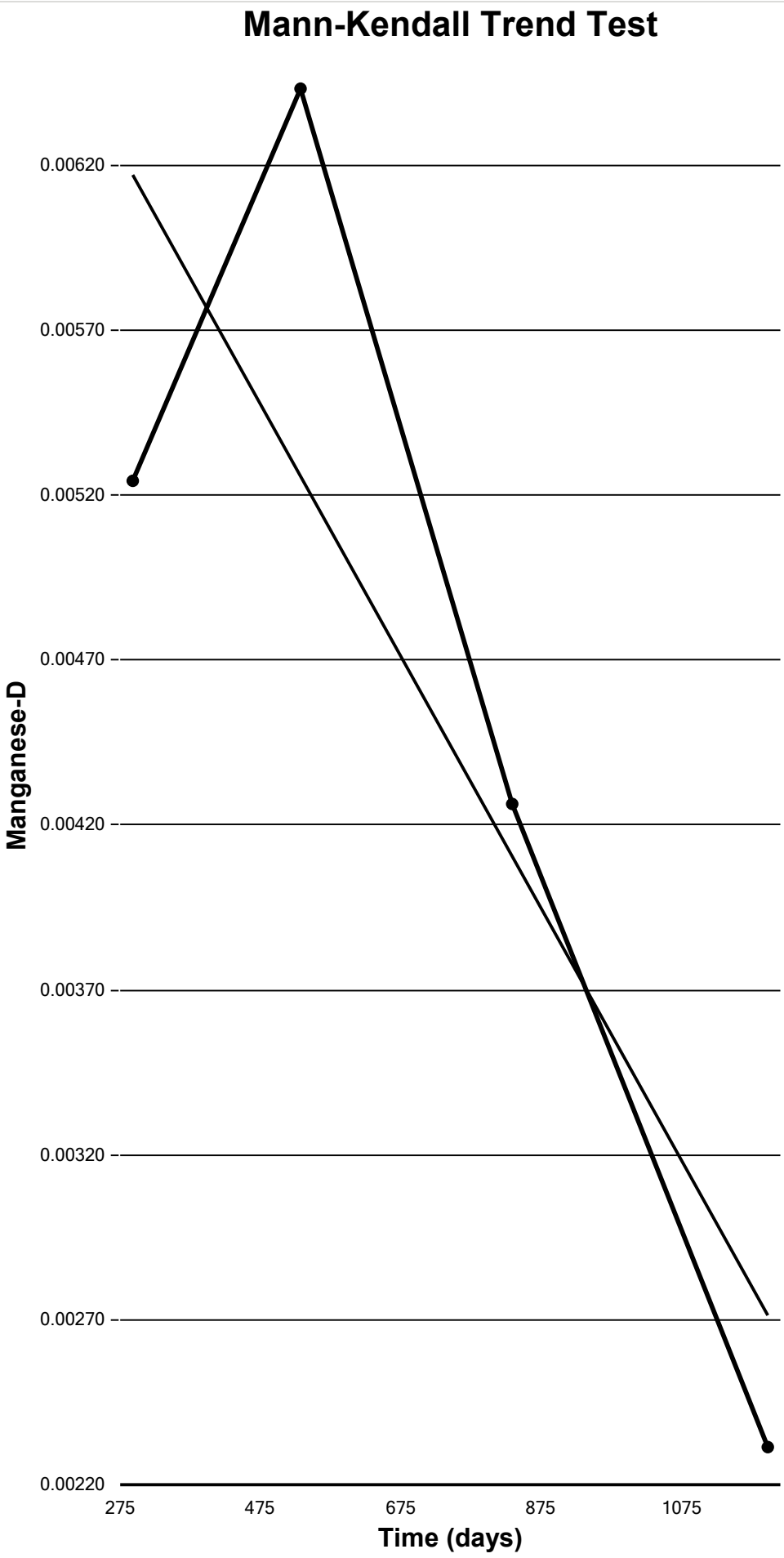
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	-1.6773
M-K Test Value (S)	-17
Tabulated p-value	0.0600
Approximate p-value	0.0467

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0007
OLS Regression Intercept	2.3721

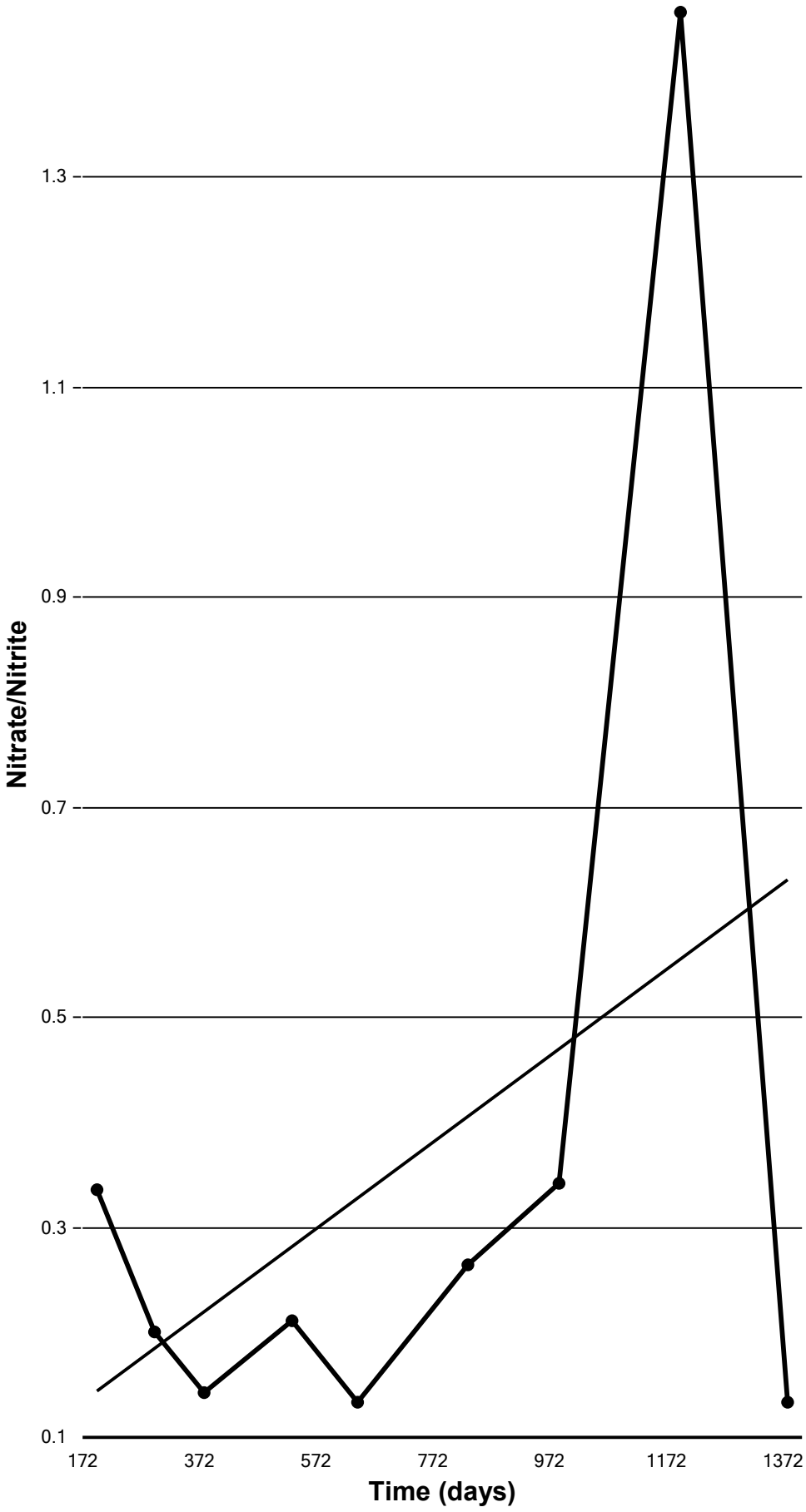
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	-1.0190
M-K Test Value (S)	-4
Tabulated p-value	0.1670
Approximate p-value	0.1541

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	0.0073

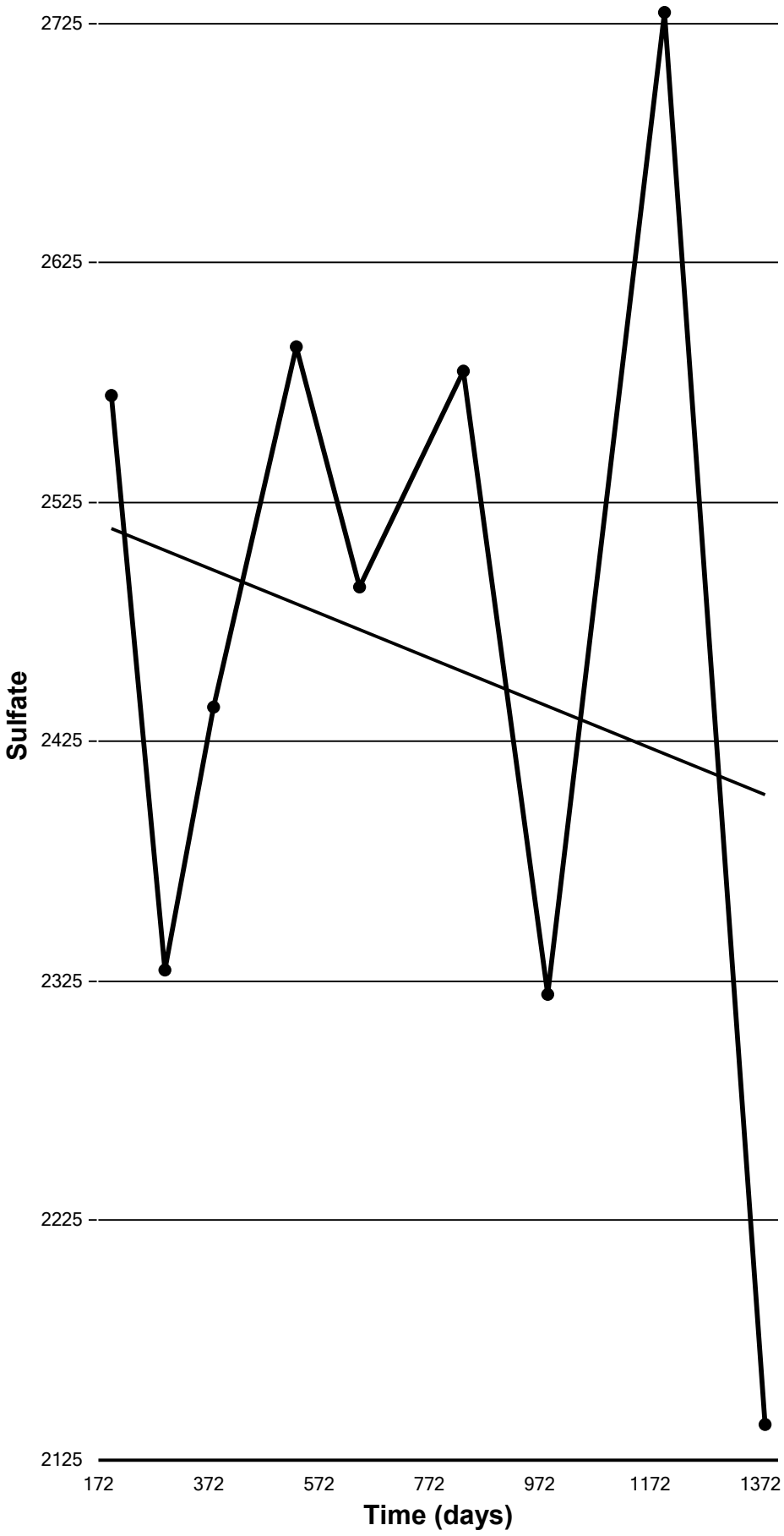
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	0.3128
M-K Test Value (S)	4
Tabulated p-value	0.3810
Approximate p-value	0.3772

OLS Regression Line (Blue)	
OLS Regression Slope	0.0004
OLS Regression Intercept	0.0360

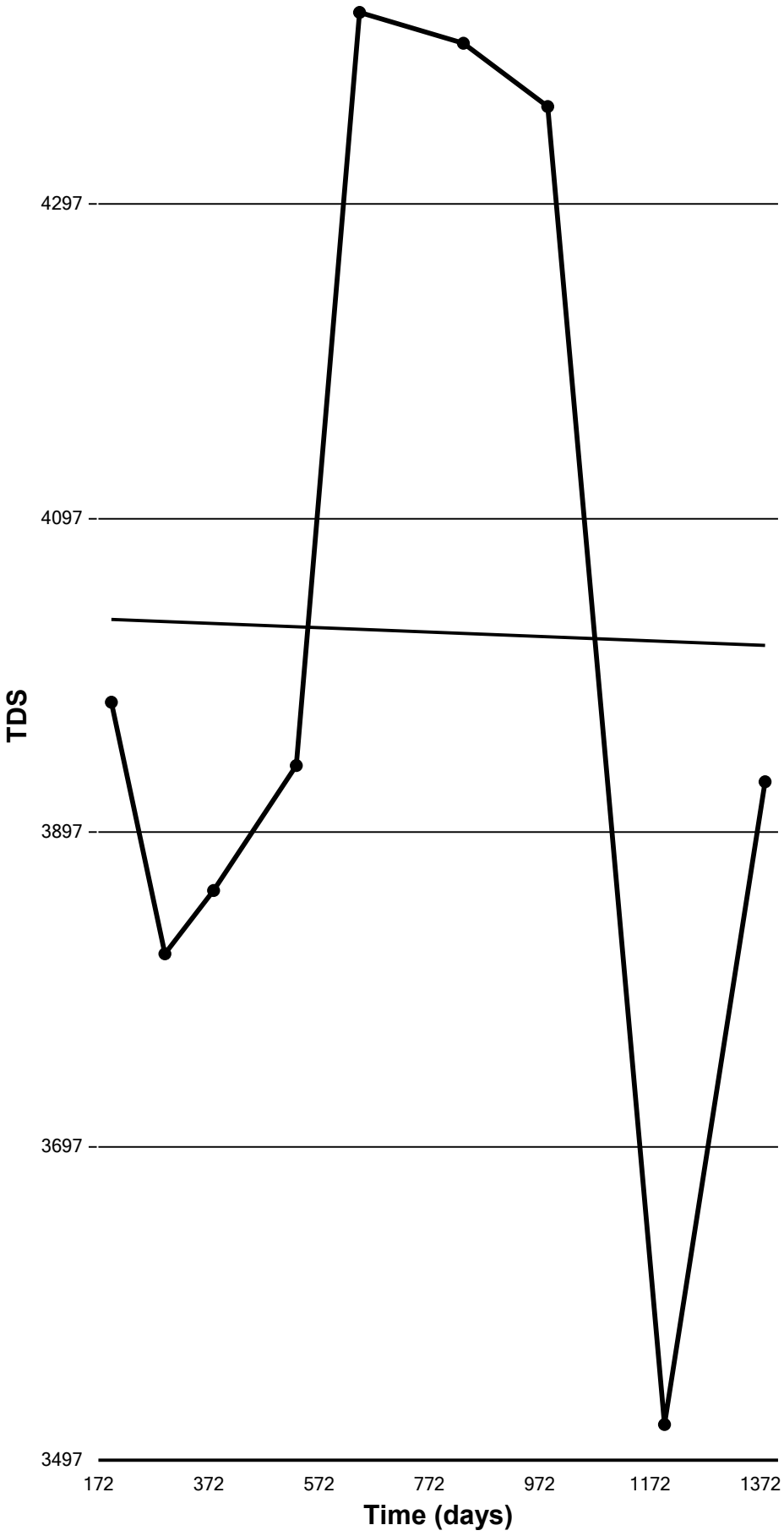
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-0.1043
M-K Test Value (S)	-2
Tabulated p-value	0.4600
Approximate p-value	0.4585

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0941
OLS Regression Intercept	2,532.9414

Insufficient statistical evidence of a significant trend at the specified level of significance.



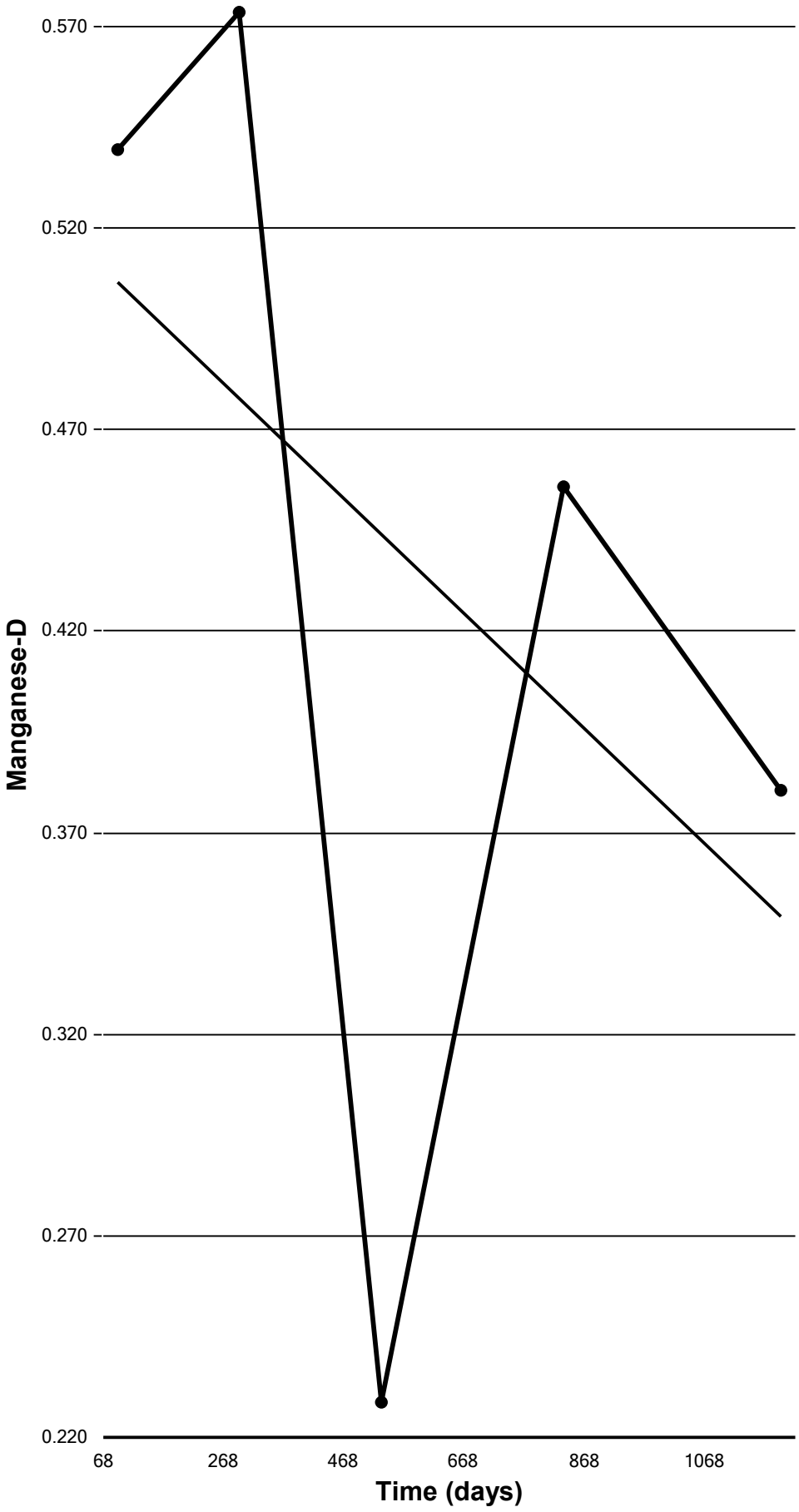
Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	
M-K Test Value (S)	0
Tabulated p-value	0.5400
Approximate p-value	

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0138
OLS Regression Intercept	4,035.4305

Insufficient statistical evidence of a significant trend at the specified level of significance.

APPENDIX B2E

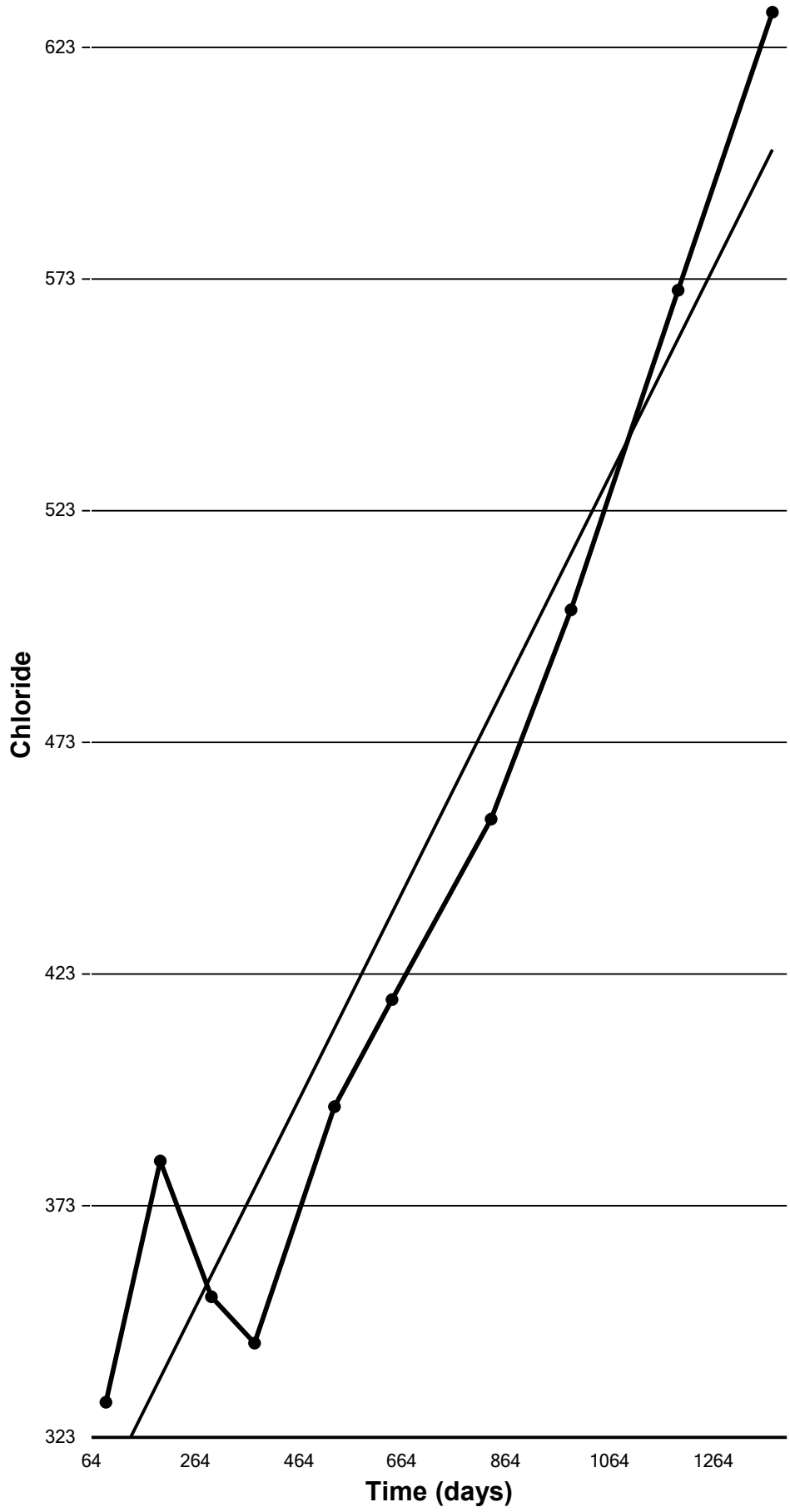
MANN-KENDALL STATISTICAL EVALUATION
MW-29



Mann-Kendall Trend Analysis	
n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	-0.7348
M-K Test Value (S)	-4
Tabulated p-value	0.2420
Approximate p-value	0.2312

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0001
OLS Regression Intercept	0.5199

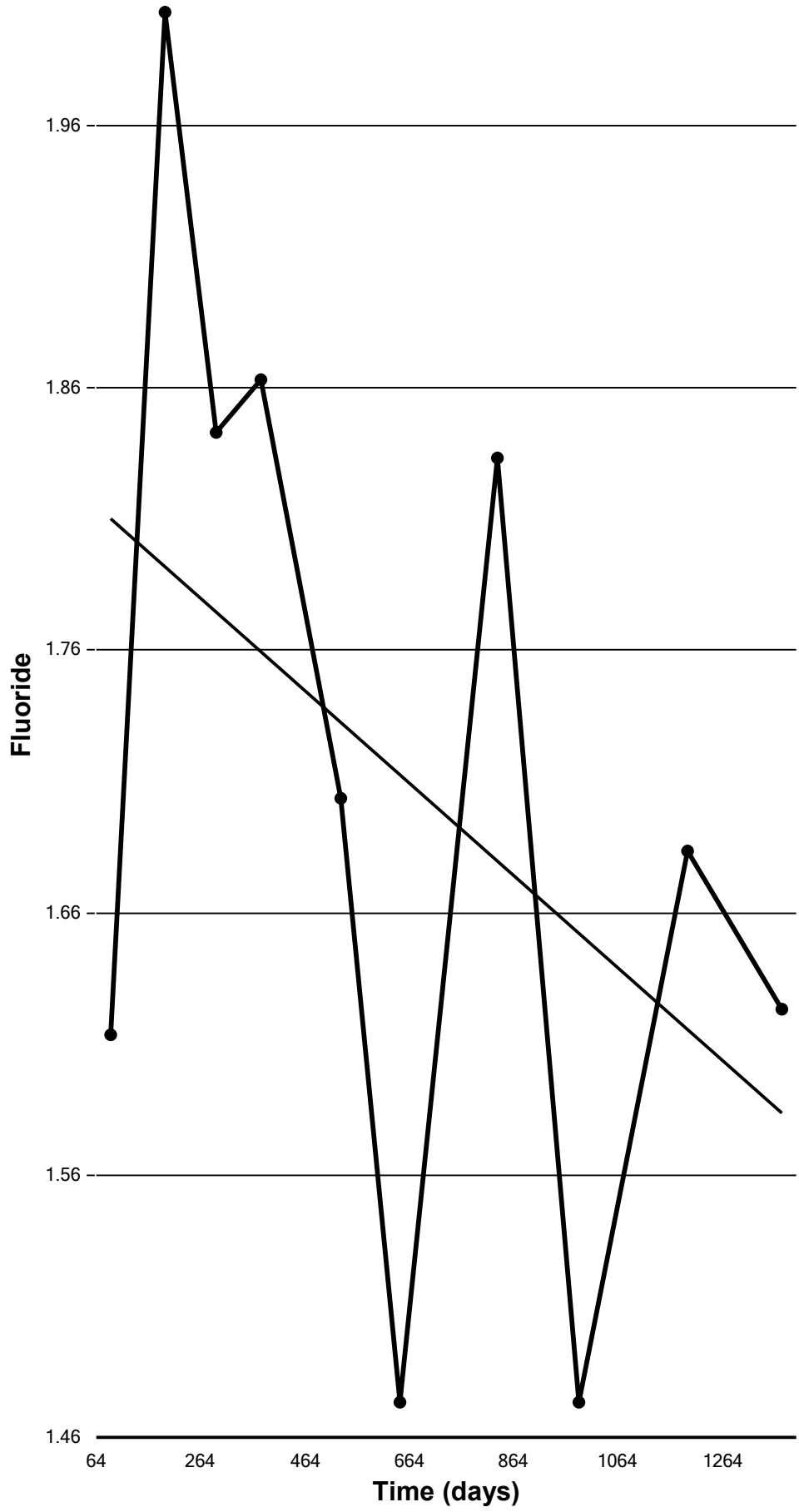
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	3.3988
M-K Test Value (S)	39
Tabulated p-value	0.0000
Approximate p-value	0.0003

OLS Regression Line (Blue)	
OLS Regression Slope	0.2244
OLS Regression Intercept	291.8941

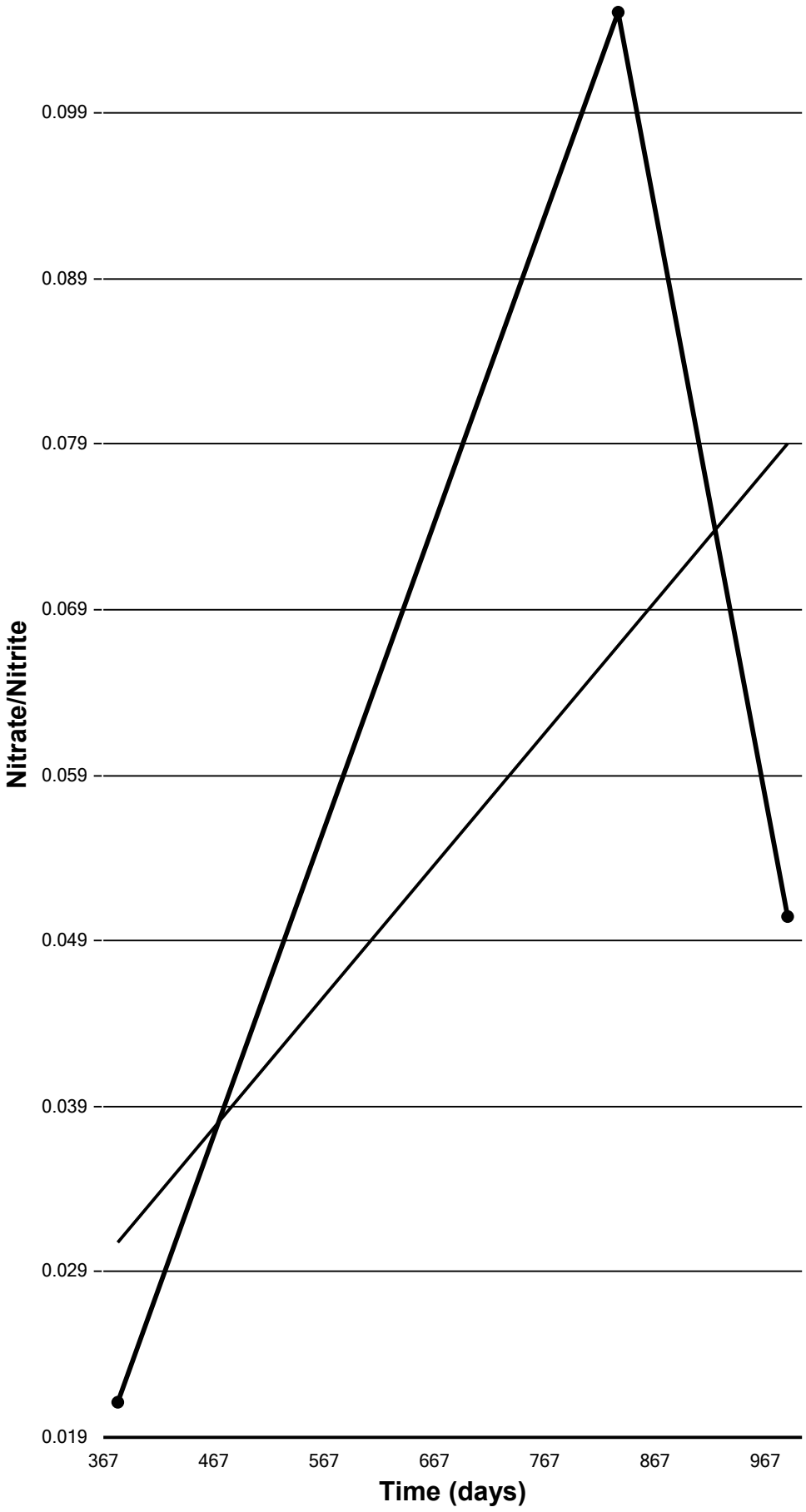
Statistically significant evidence of an increasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1355
Standardized Value of S	-1.3470
M-K Test Value (S)	-16
Tabulated p-value	0.0780
Approximate p-value	0.0890

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0002
OLS Regression Intercept	1.8230

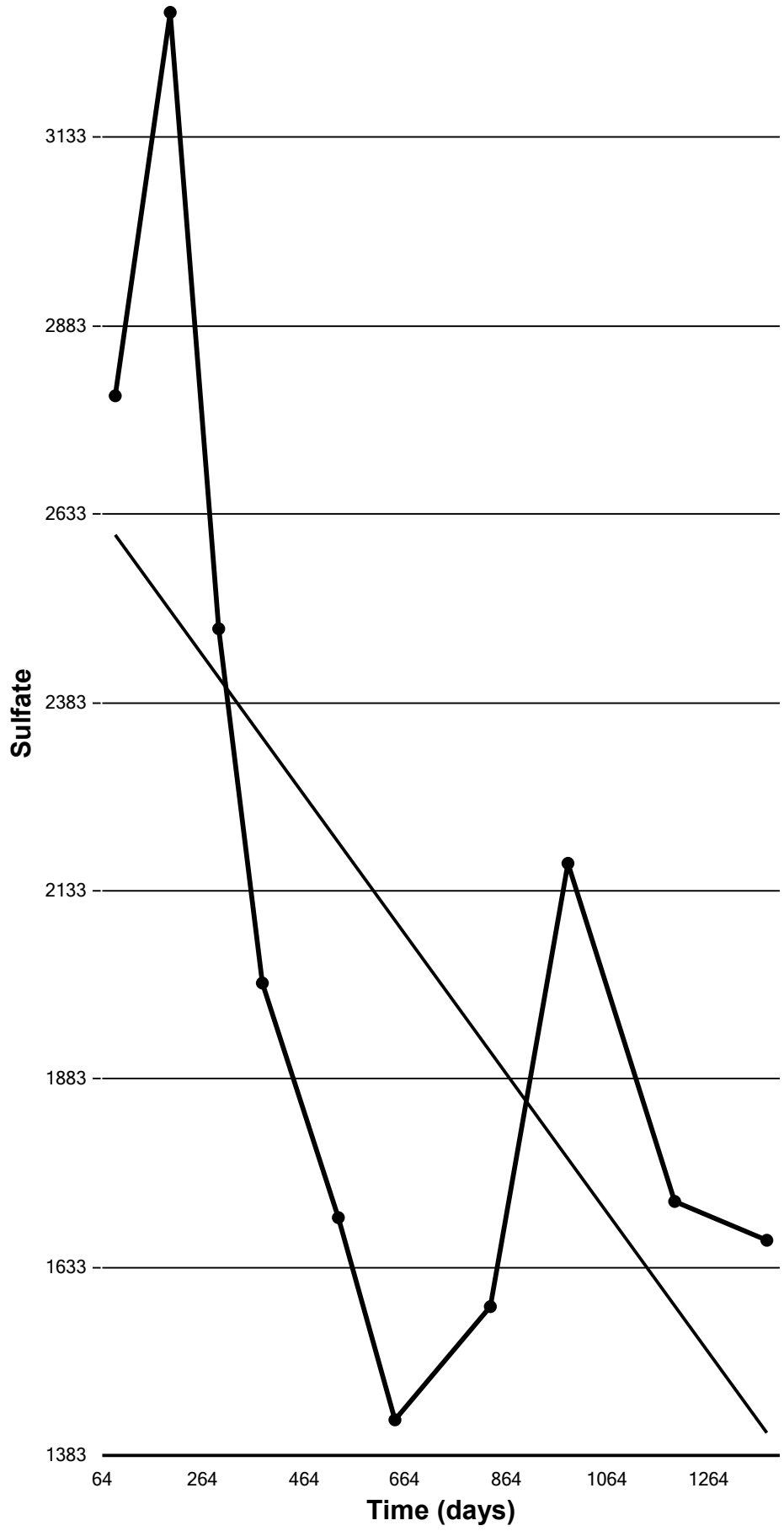
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	3
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	1.9149
Standardized Value of S	0.0000
M-K Test Value (S)	1
Tabulated p-value	
Approximate p-value	0.5000

OLS Regression Line (Blue)	
OLS Regression Slope	0.0001
OLS Regression Intercept	0.0005

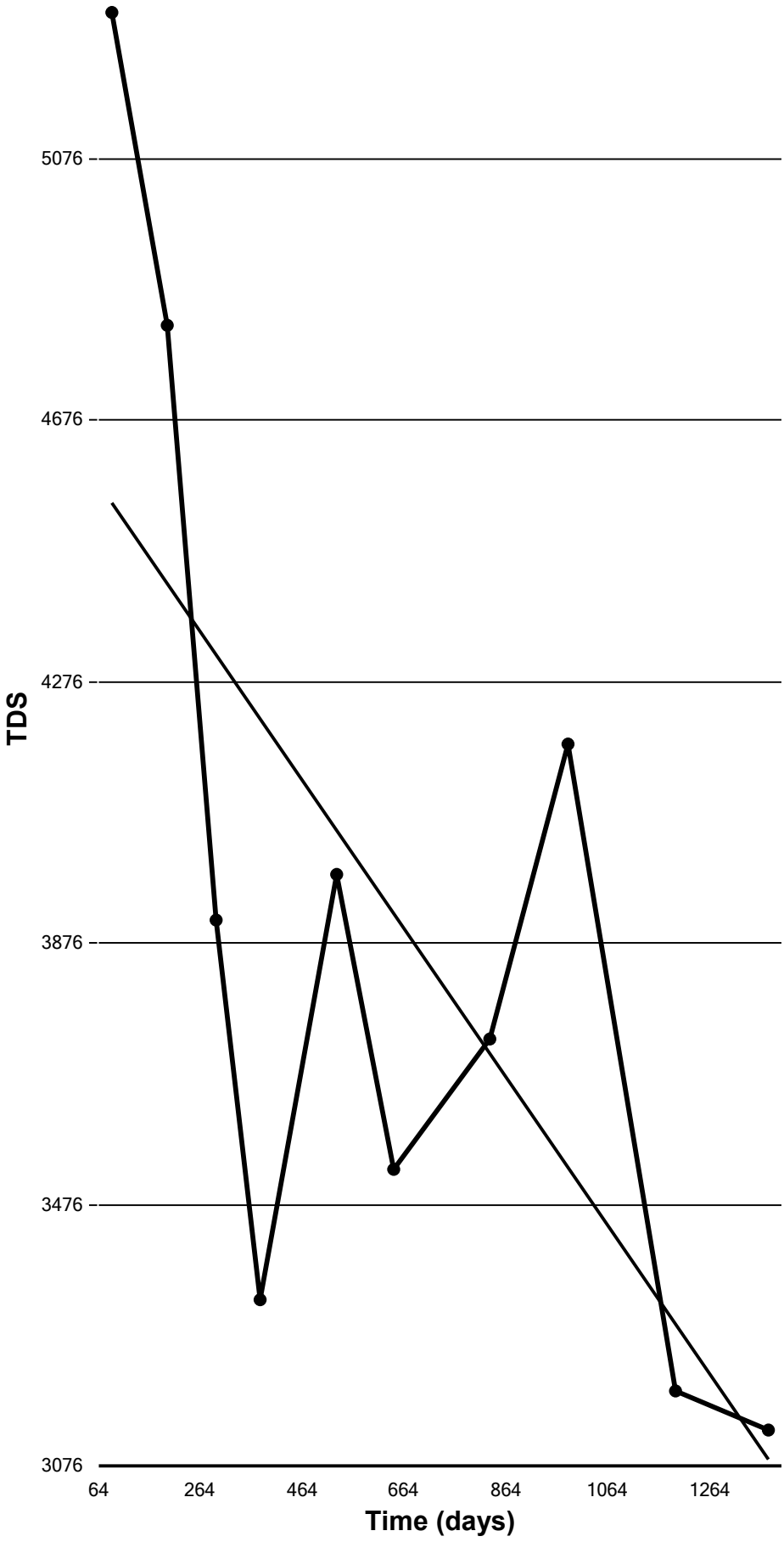
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	-1.9677
M-K Test Value (S)	-23
Tabulated p-value	0.0230
Approximate p-value	0.0245

OLS Regression Line (Blue)	
OLS Regression Slope	-0.9255
OLS Regression Intercept	2,690.0122

Statistically significant evidence of a decreasing trend at the specified level of significance.



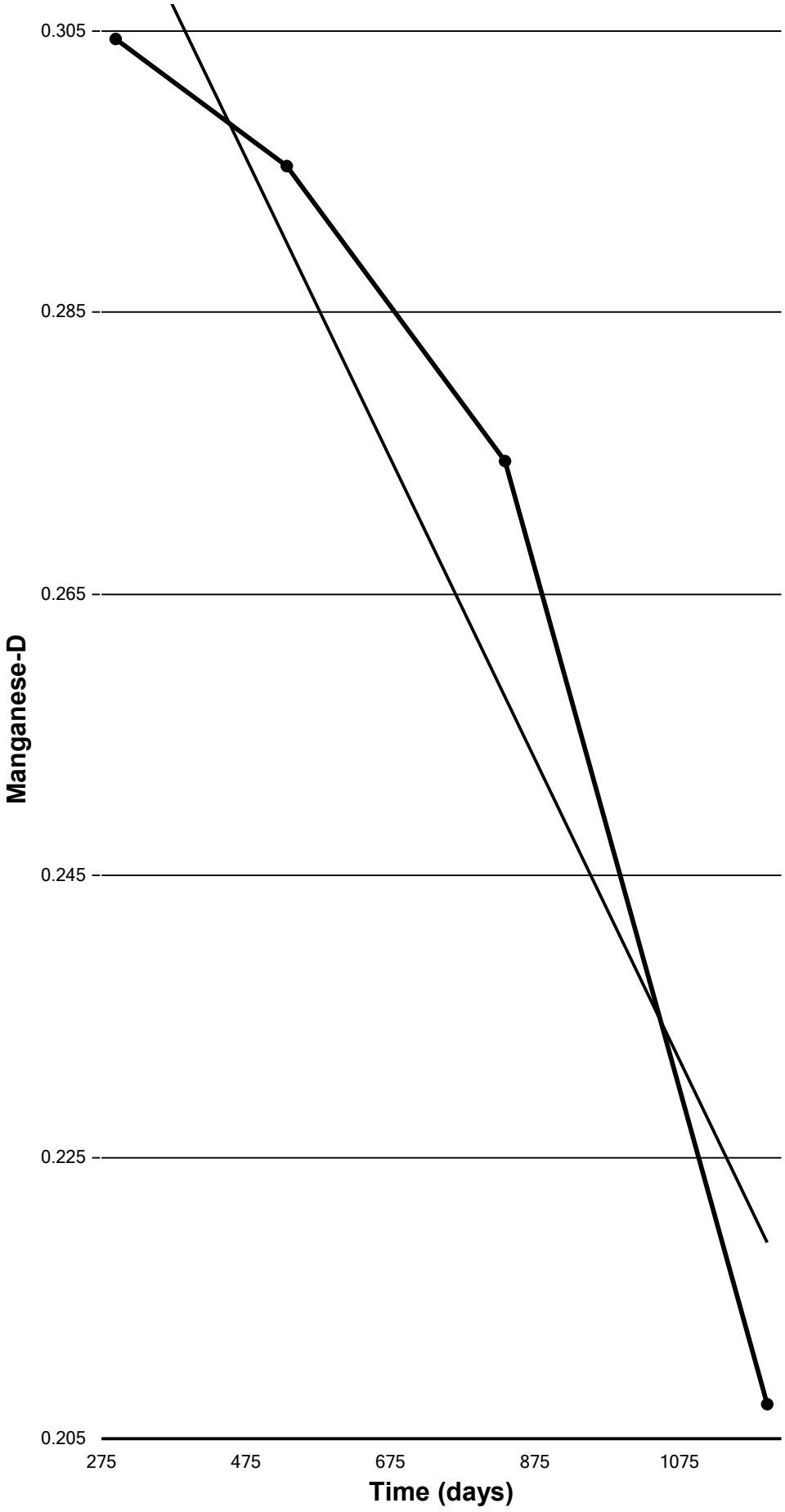
Mann-Kendall Trend Analysis	
n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	-2.1466
M-K Test Value (S)	-25
Tabulated p-value	0.0140
Approximate p-value	0.0159

OLS Regression Line (Blue)	
OLS Regression Slope	-1.1365
OLS Regression Intercept	4,652.9424

Statistically significant evidence of a decreasing trend at the specified level of significance.

APPENDIX B2F

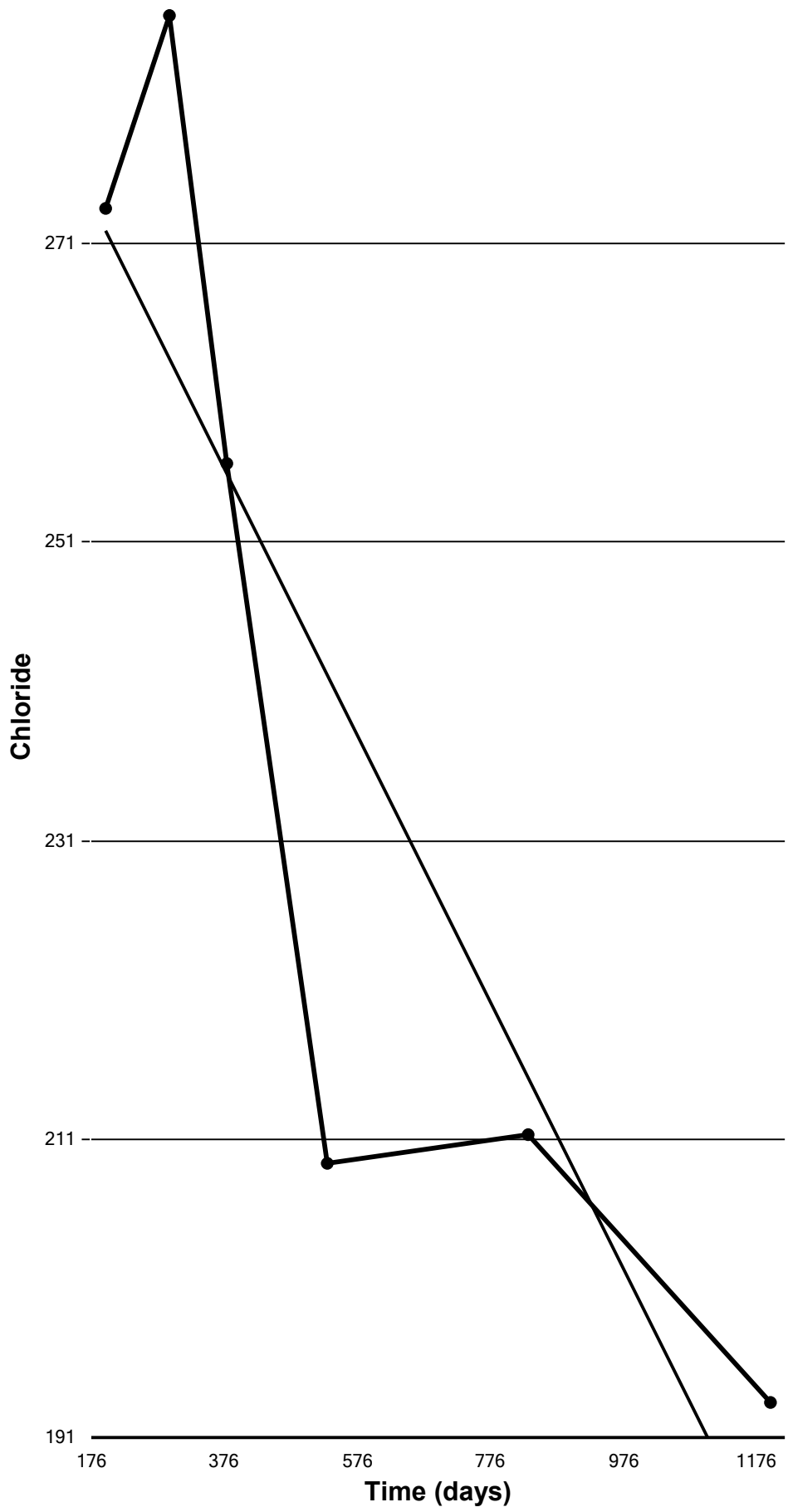
MANN-KENDALL STATISTICAL EVALUATION
MW-56



Mann-Kendall Trend Analysis	
n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	-1.6984
M-K Test Value (S)	-6
Tabulated p-value	0.0420
Approximate p-value	0.0447

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0001
OLS Regression Intercept	0.3462

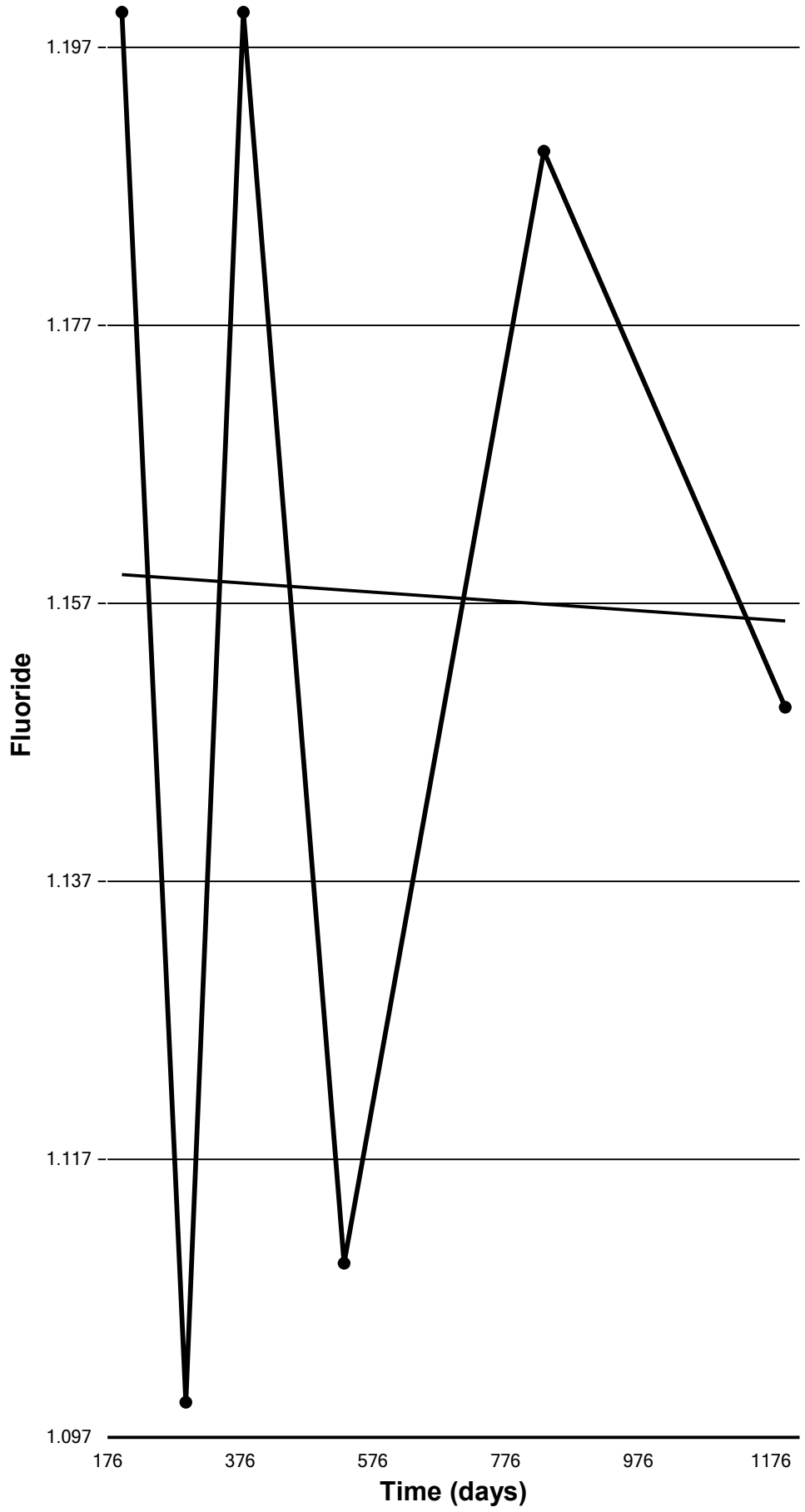
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-1.8787
M-K Test Value (S)	-11
Tabulated p-value	0.0280
Approximate p-value	0.0301

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0893
OLS Regression Intercept	289.1167

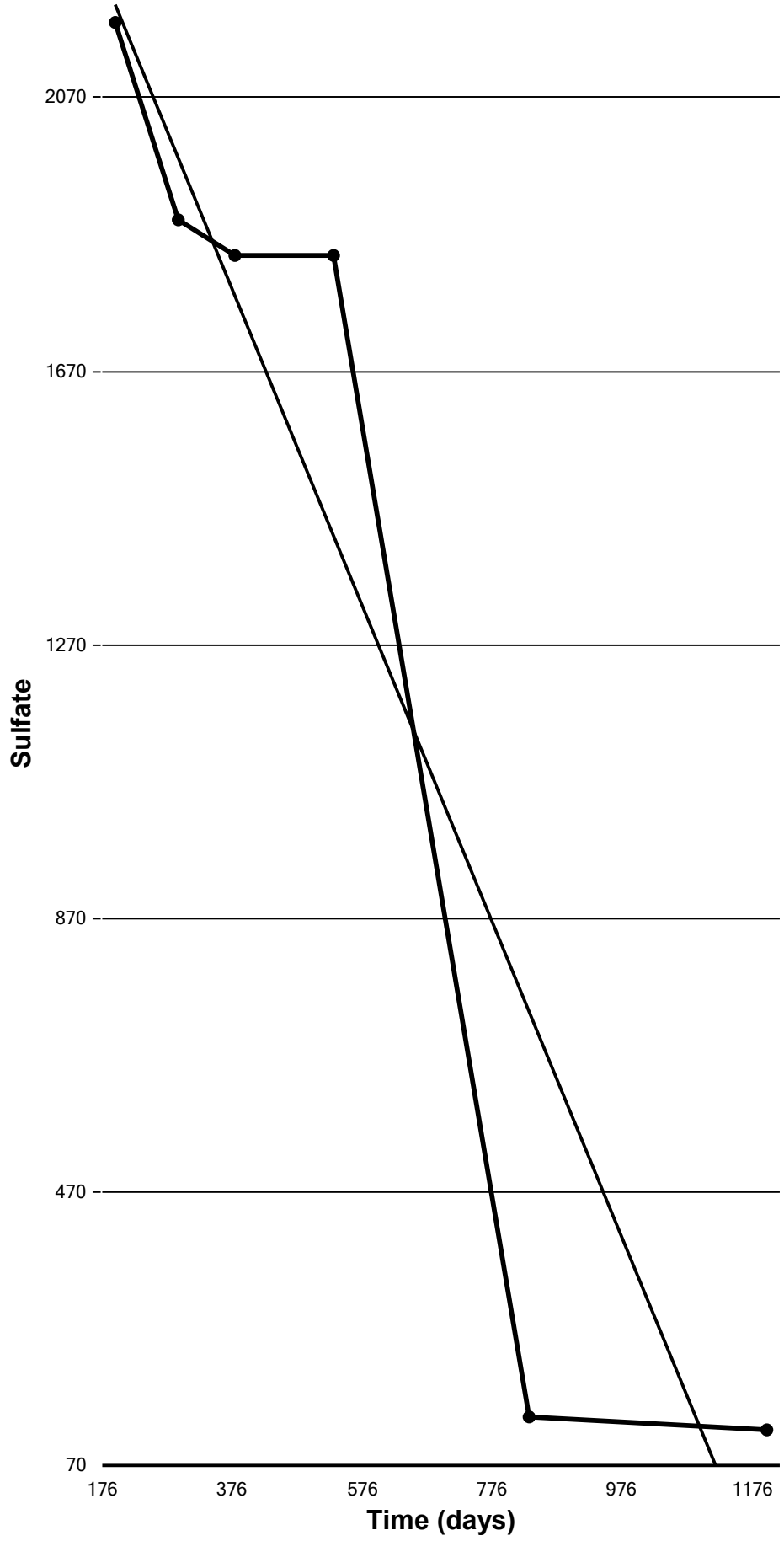
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.2281
Standardized Value of S	-0.1913
M-K Test Value (S)	-2
Tabulated p-value	0.3600
Approximate p-value	0.4242

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	1.1602

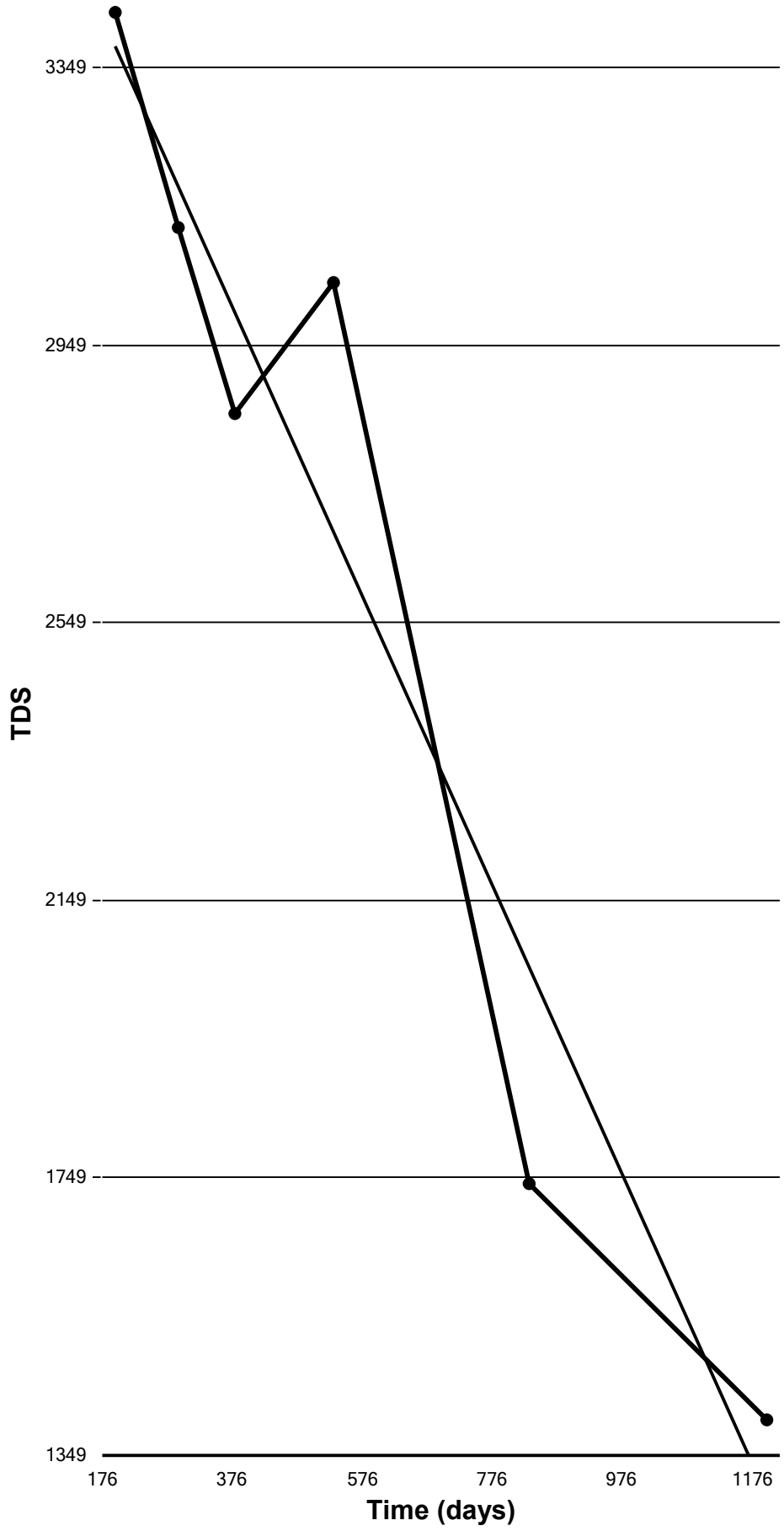
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.2281
Standardized Value of S	-2.4865
M-K Test Value (S)	-14
Tabulated p-value	0.0010
Approximate p-value	0.0064

OLS Regression Line (Blue)	
OLS Regression Slope	-2.3175
OLS Regression Intercept	2,661.9222

Statistically significant evidence of a decreasing trend at the specified level of significance.



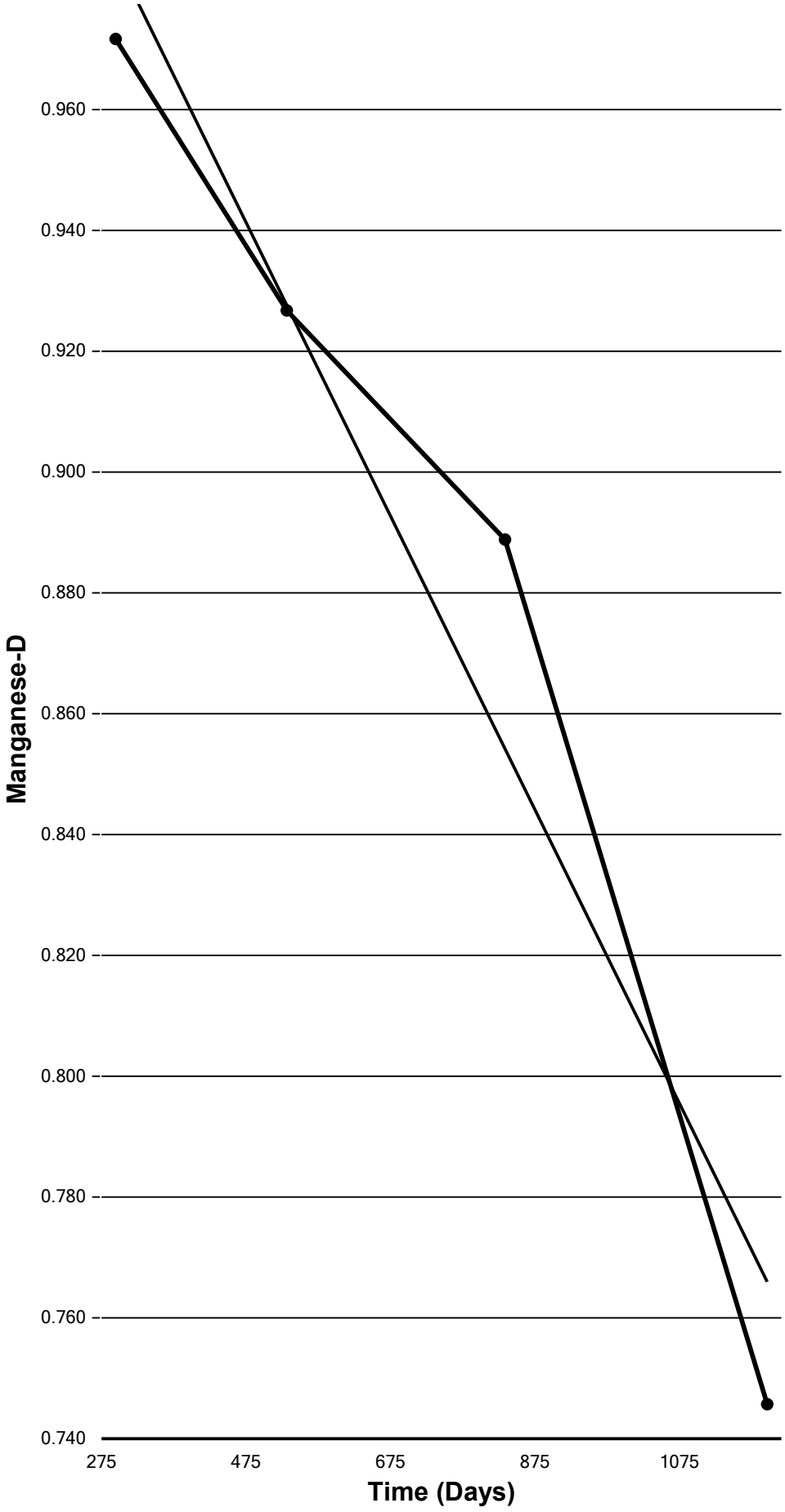
Mann-Kendall Trend Analysis	
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-2.2544
M-K Test Value (S)	-13
Tabulated p-value	0.0080
Approximate p-value	0.0121

OLS Regression Line (Blue)	
OLS Regression Slope	-2.0895
OLS Regression Intercept	3,792.8856

Statistically significant evidence of a decreasing trend at the specified level of significance.

APPENDIX B2G

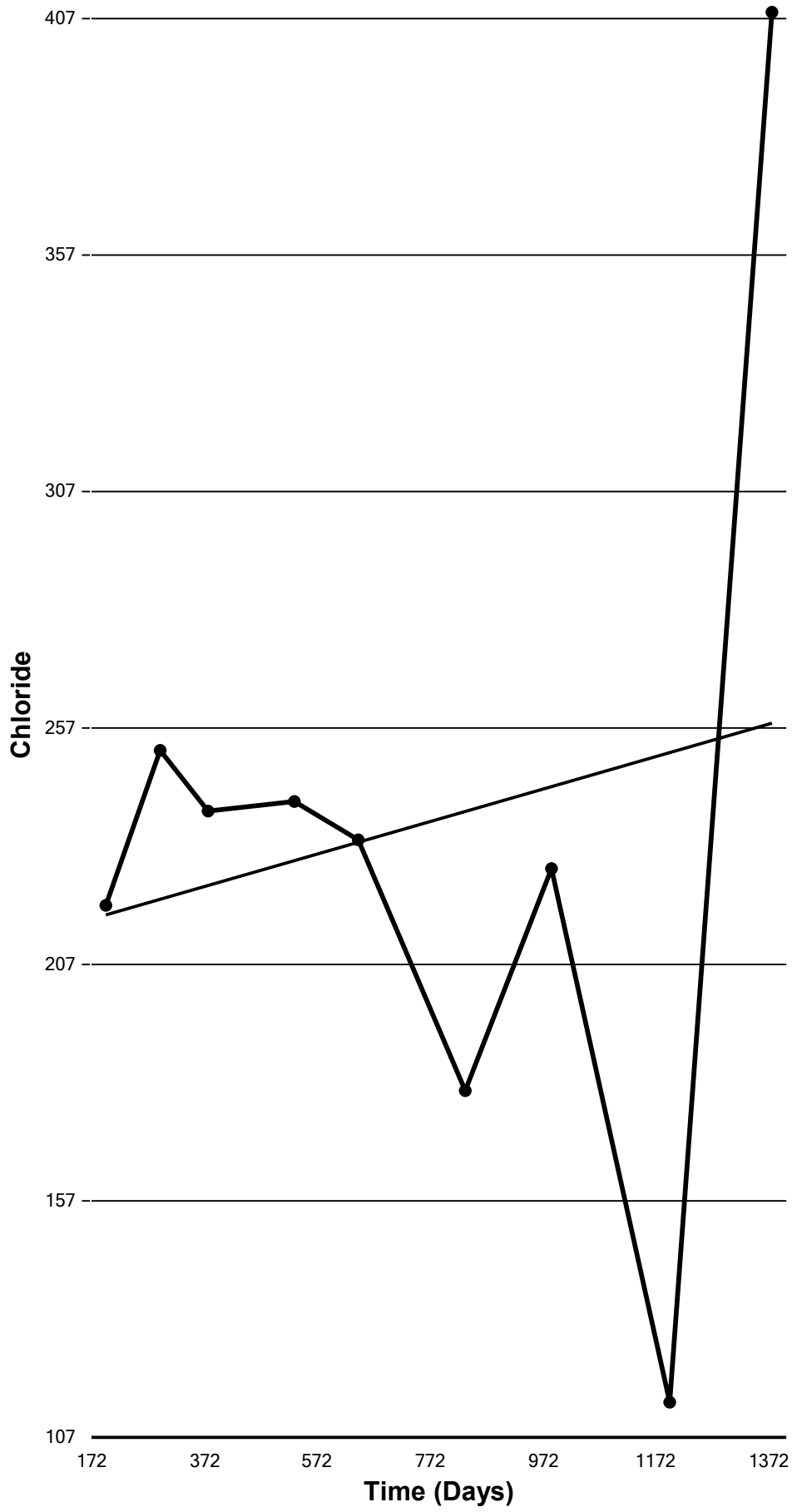
MANN-KENDALL STATISTICAL EVALUATION
MW-114



Mann-Kendall Trend Analysis	
n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	-1.6984
M-K Test Value (S)	-6
Tabulated p-value	0.0420
Approximate p-value	0.0447

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0002
OLS Regression Intercept	1.0566

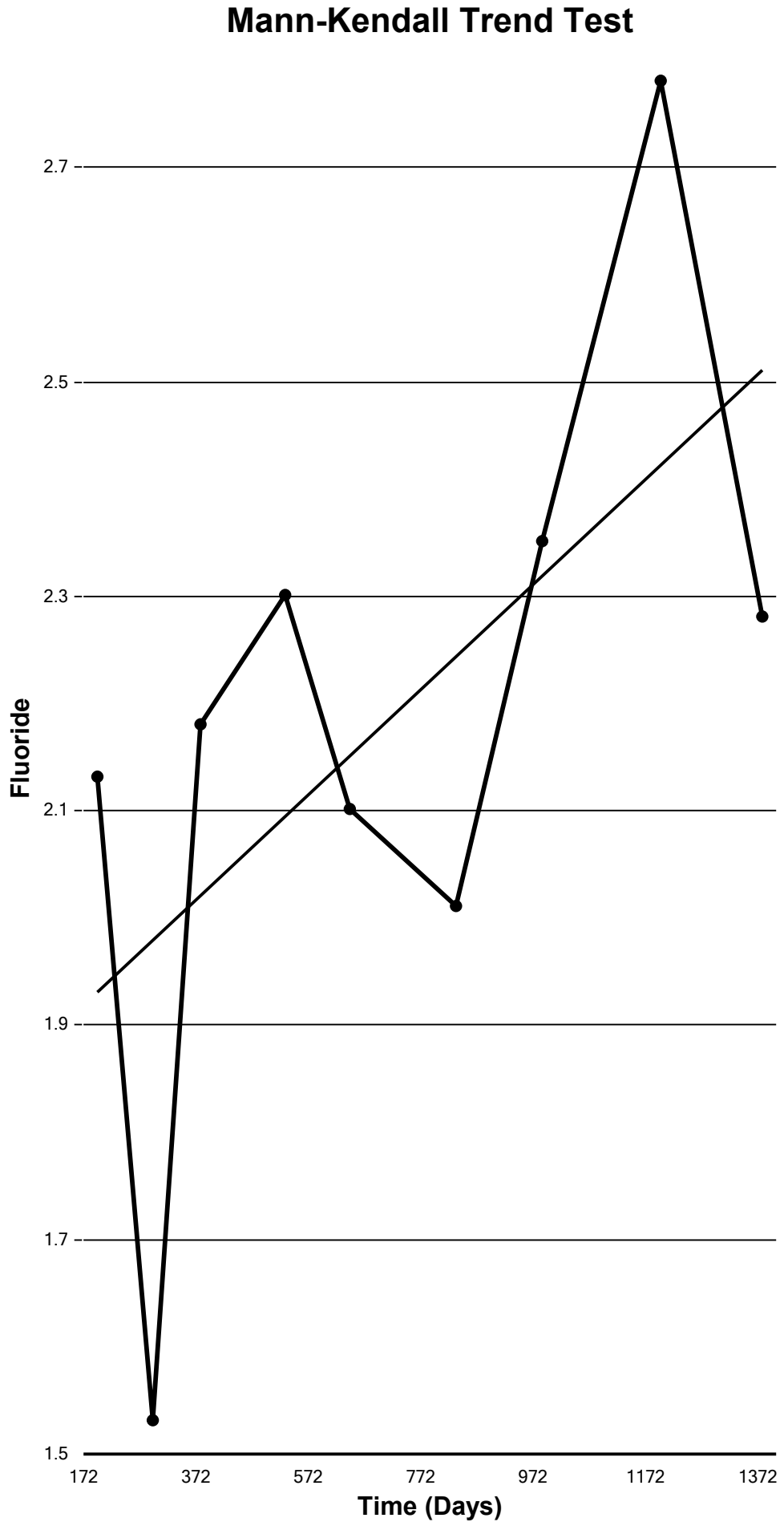
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-0.5213
M-K Test Value (S)	-6
Tabulated p-value	0.3060
Approximate p-value	0.3011

OLS Regression Line (Blue)	
OLS Regression Slope	0.0343
OLS Regression Intercept	210.2393

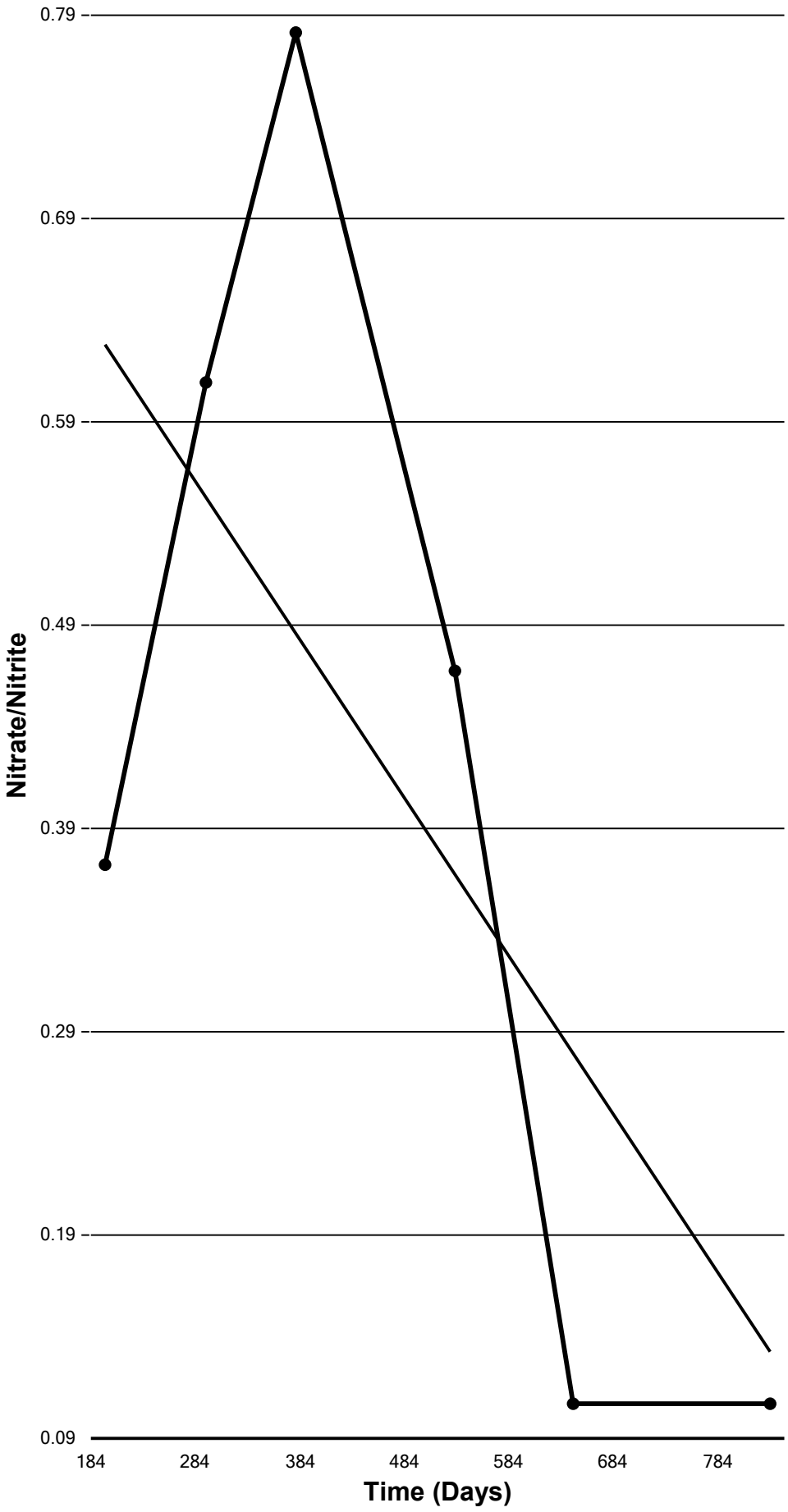
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	1.3553
M-K Test Value (S)	14
Tabulated p-value	0.0900
Approximate p-value	0.0877

OLS Regression Line (Blue)	
OLS Regression Slope	0.0005
OLS Regression Intercept	1.8037

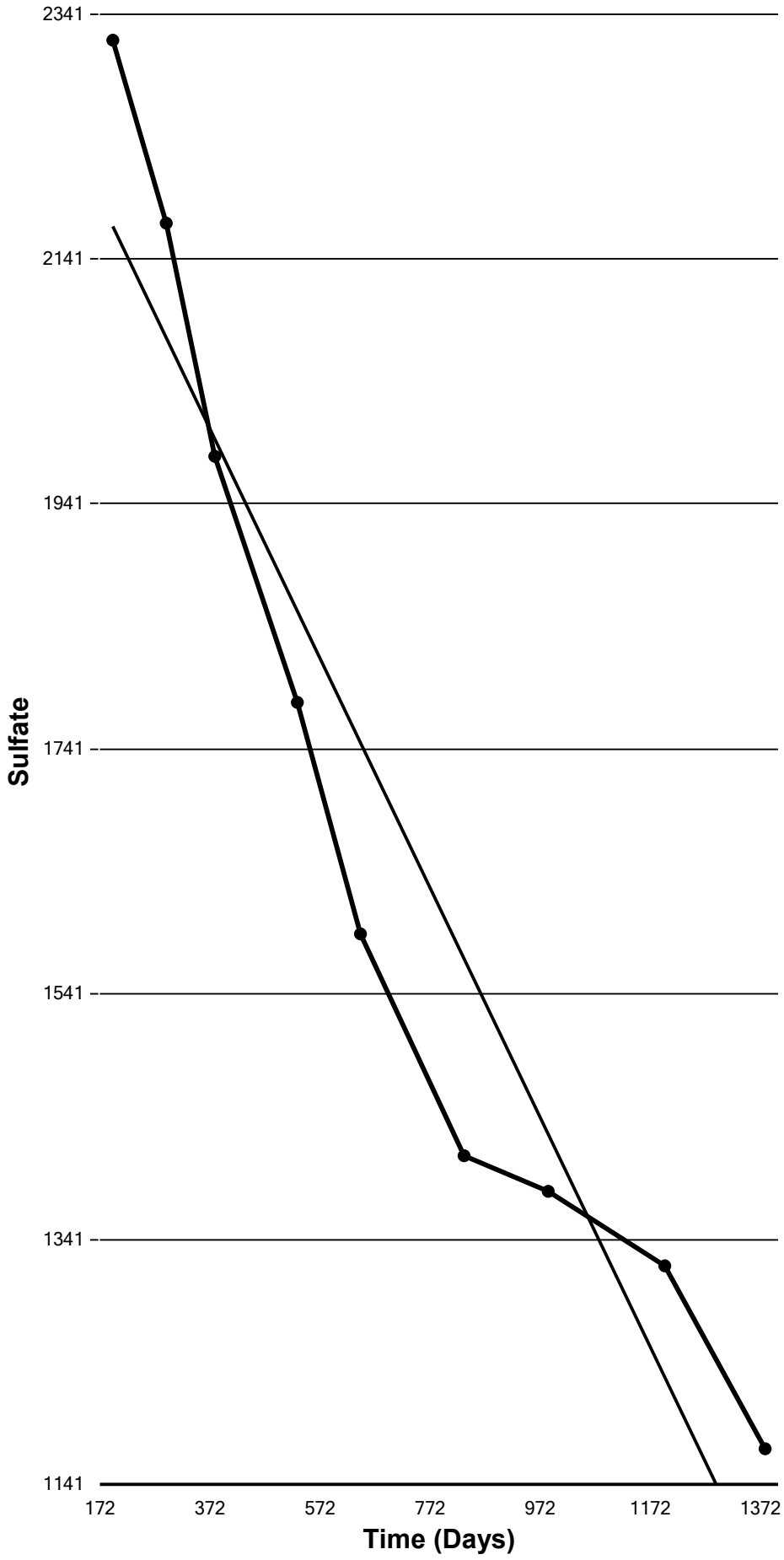
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.2281
Standardized Value of S	-0.9564
M-K Test Value (S)	-6
Tabulated p-value	0.1360
Approximate p-value	0.1694

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0008
OLS Regression Intercept	0.7845

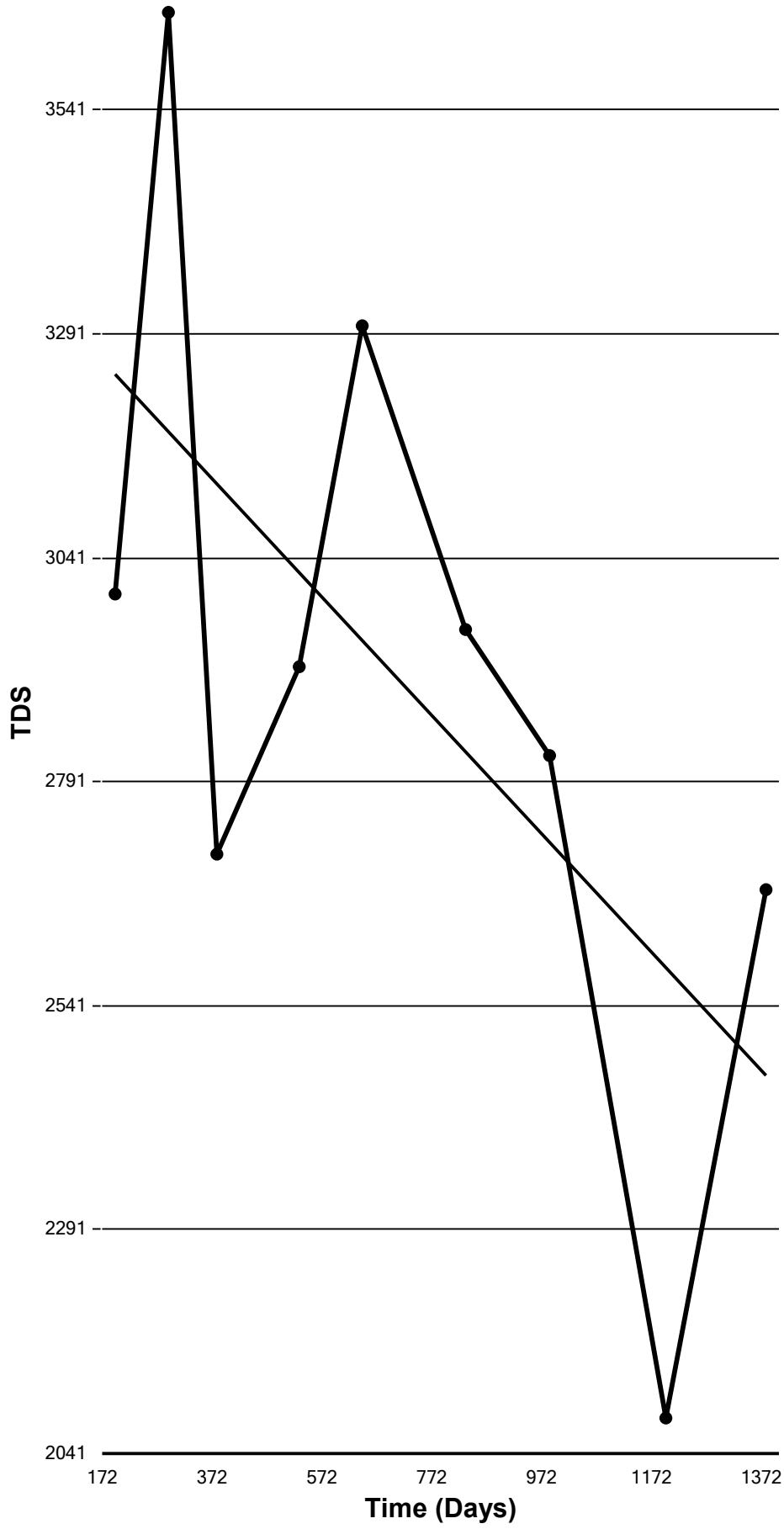
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-3.6490
M-K Test Value (S)	-36
Tabulated p-value	0.0000
Approximate p-value	0.0001

OLS Regression Line (Blue)	
OLS Regression Slope	-0.9397
OLS Regression Intercept	2,353.0244

Statistically significant evidence of a decreasing trend at the specified level of significance.



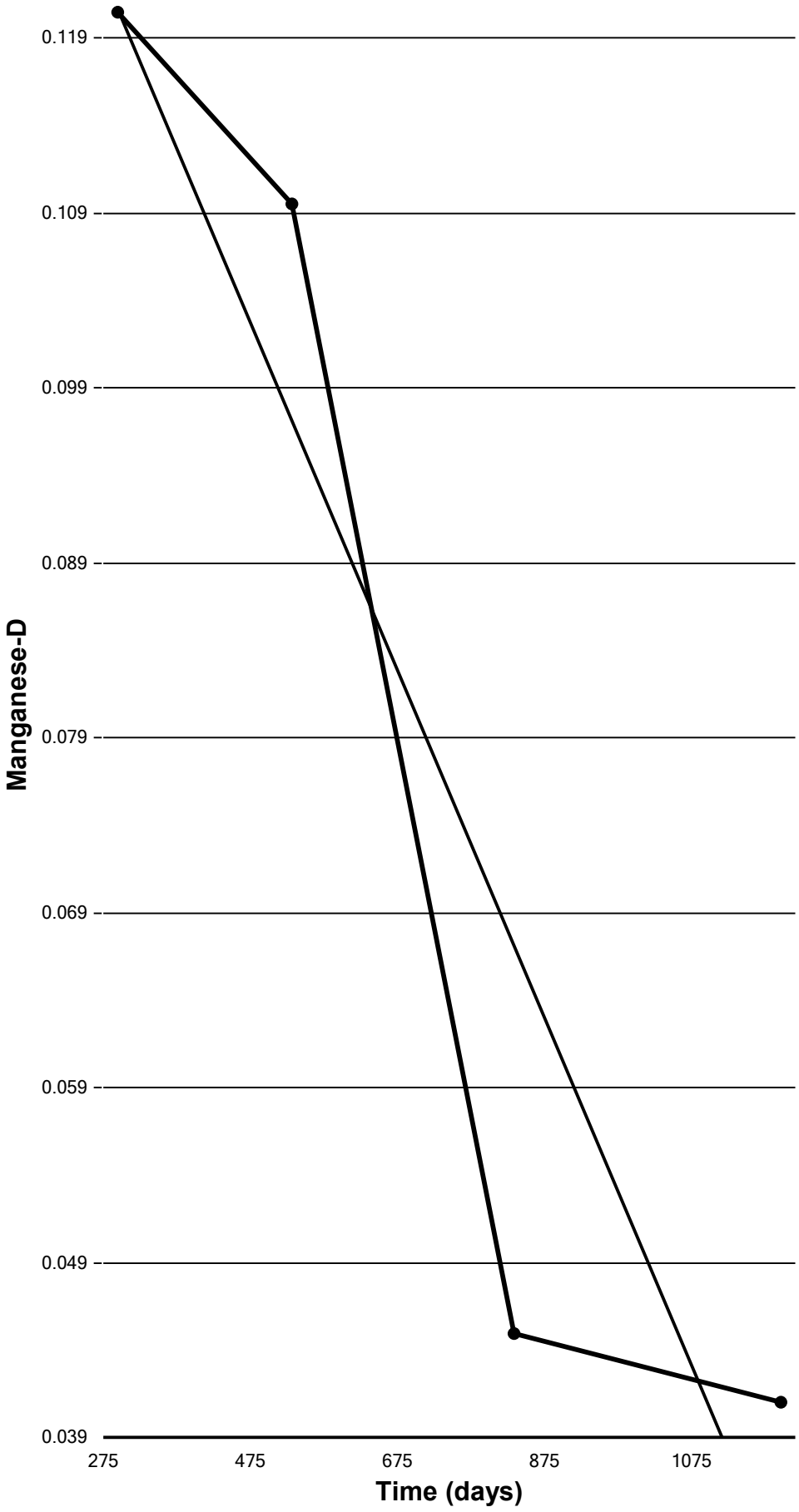
Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-1.7724
M-K Test Value (S)	-18
Tabulated p-value	0.0380
Approximate p-value	0.0382

OLS Regression Line (Blue)	
OLS Regression Slope	-0.6617
OLS Regression Intercept	3,375.0647

Statistically significant evidence of a decreasing trend at the specified level of significance.

APPENDIX B2H

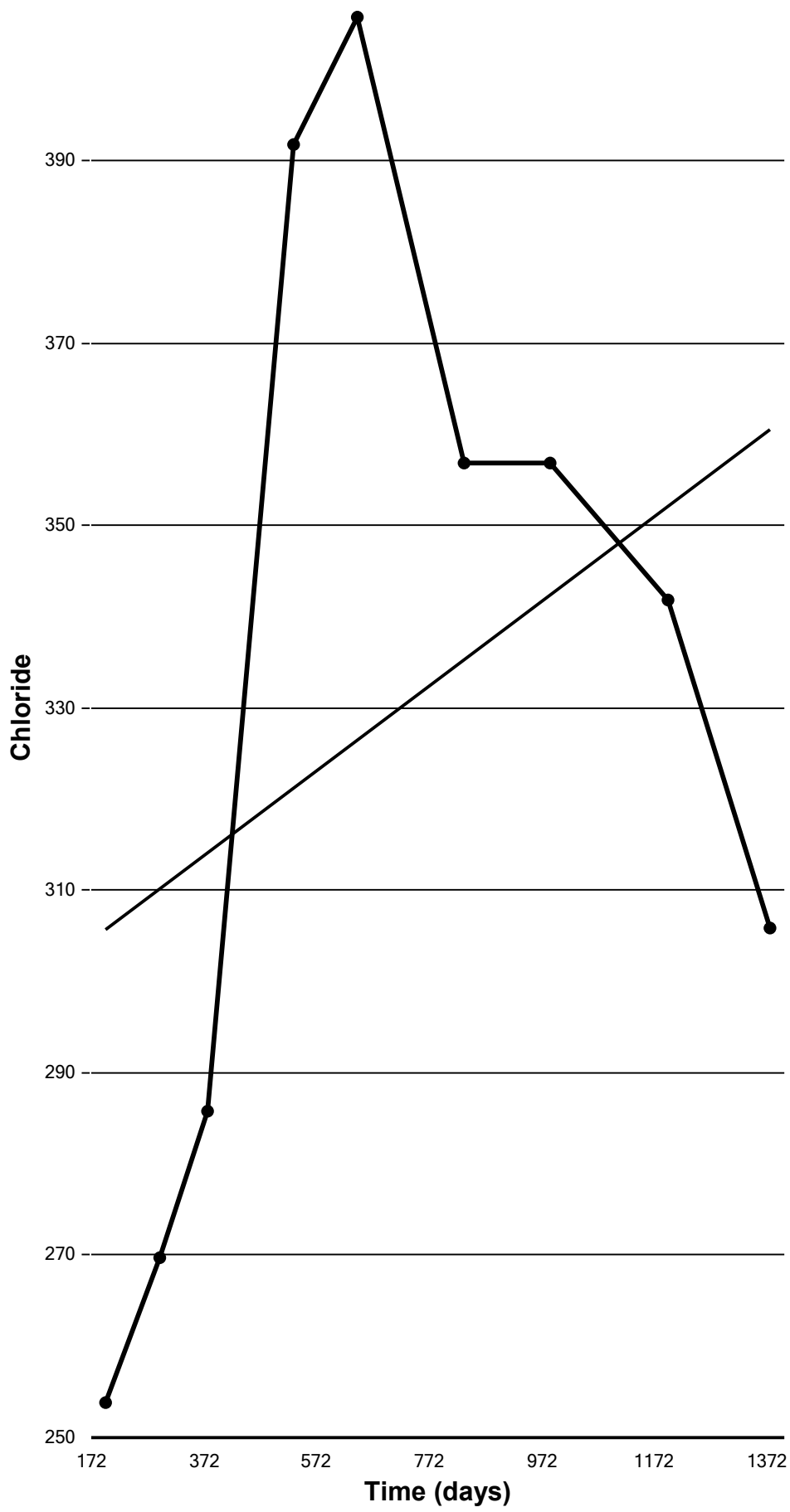
MANN-KENDALL STATISTICAL EVALUATION
MW-115



Mann-Kendall Trend Analysis	
n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	-1.6984
M-K Test Value (S)	-6
Tabulated p-value	0.0420
Approximate p-value	0.0447

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0001
OLS Regression Intercept	0.1494

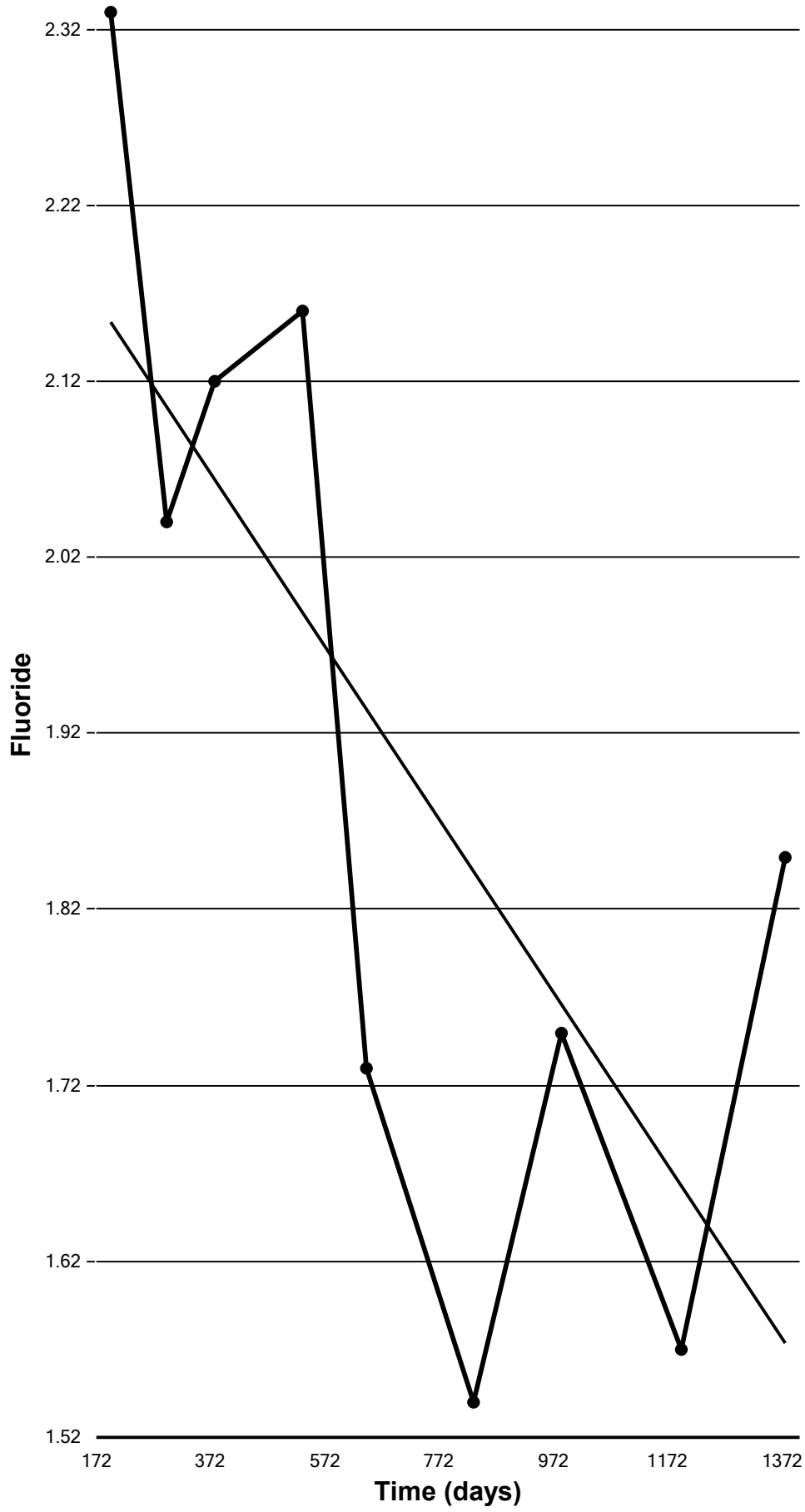
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	0.8386
M-K Test Value (S)	9
Tabulated p-value	0.2380
Approximate p-value	0.2008

OLS Regression Line (Blue)	
OLS Regression Slope	0.0465
OLS Regression Intercept	296.7226

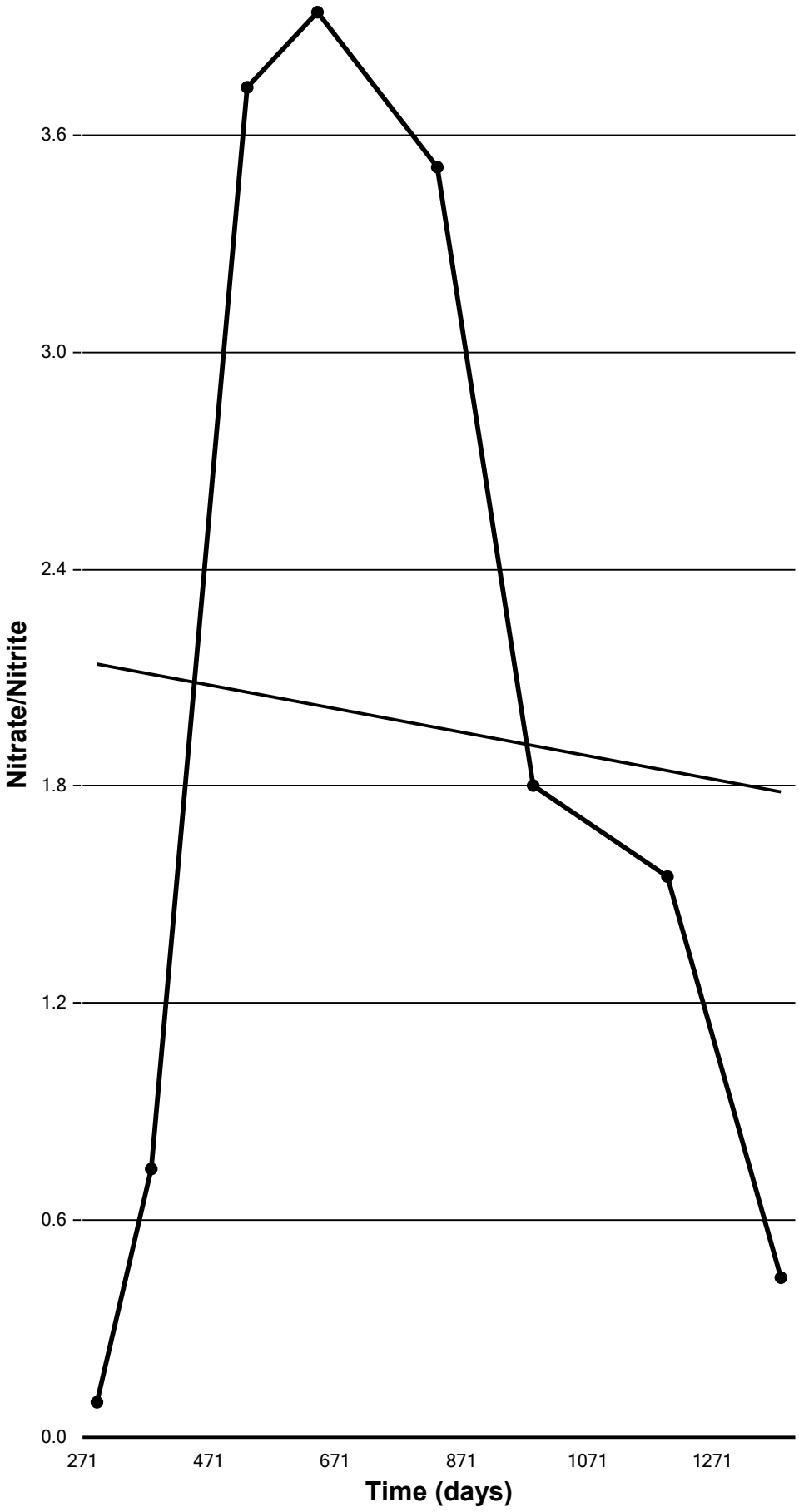
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-1.5639
M-K Test Value (S)	-16
Tabulated p-value	0.0600
Approximate p-value	0.0589

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0005
OLS Regression Intercept	2.2507

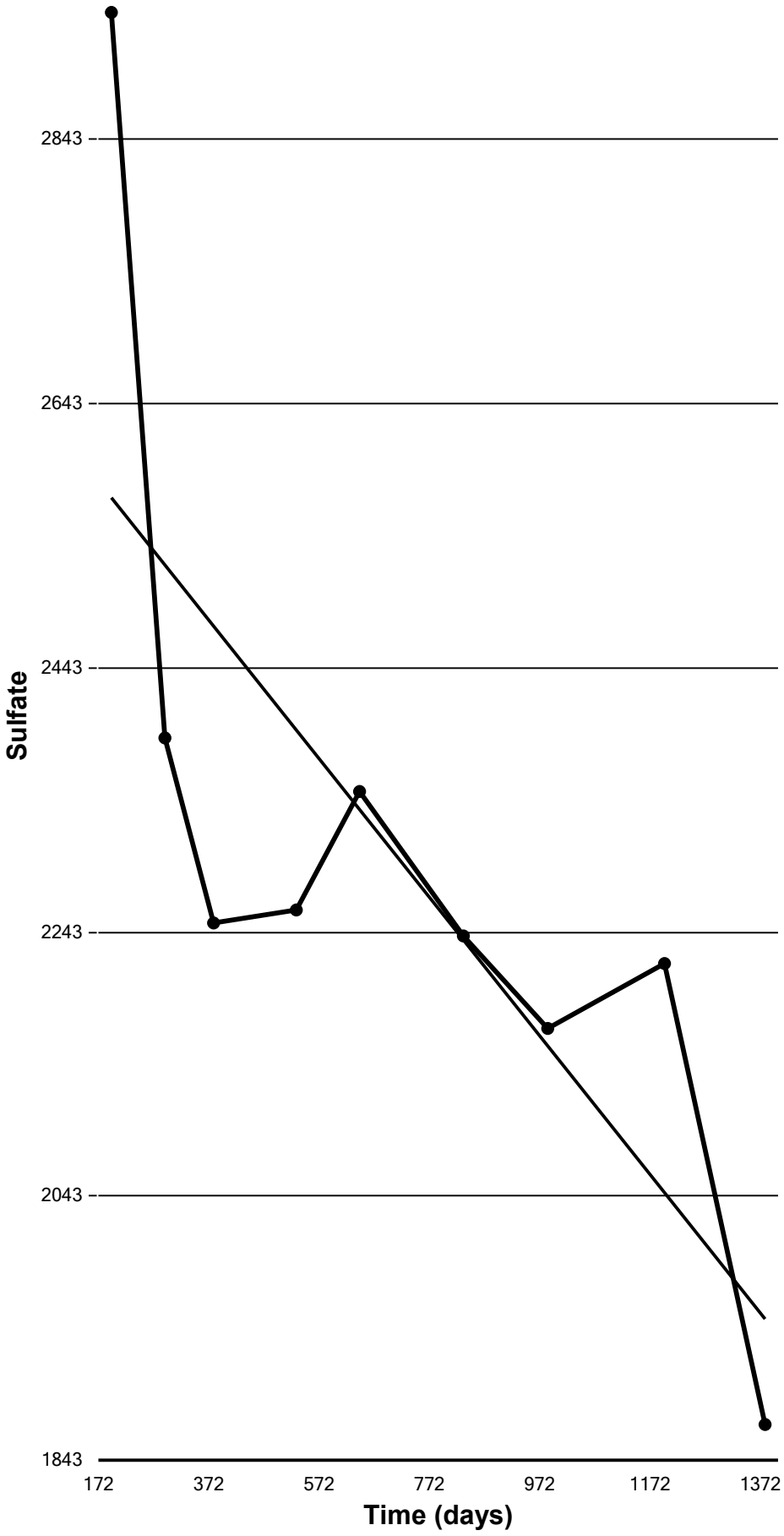
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	8
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	8.0829
Standardized Value of S	-0.1237
M-K Test Value (S)	-2
Tabulated p-value	0.4520
Approximate p-value	0.4508

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0003
OLS Regression Intercept	2.2804

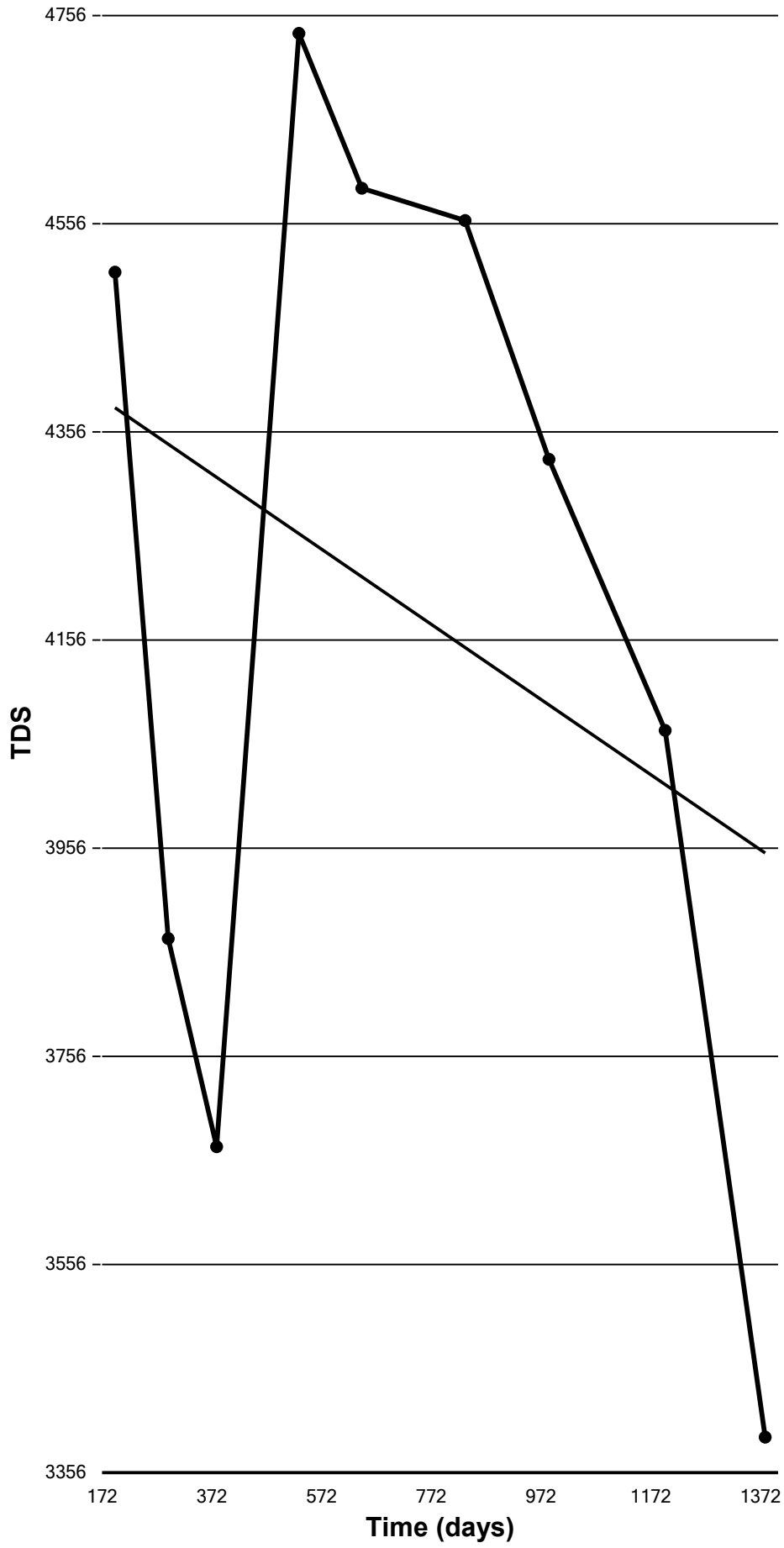
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-2.8149
M-K Test Value (S)	-28
Tabulated p-value	0.0010
Approximate p-value	0.0024

OLS Regression Line (Blue)	
OLS Regression Slope	-0.5267
OLS Regression Intercept	2,676.1064

Statistically significant evidence of a decreasing trend at the specified level of significance.



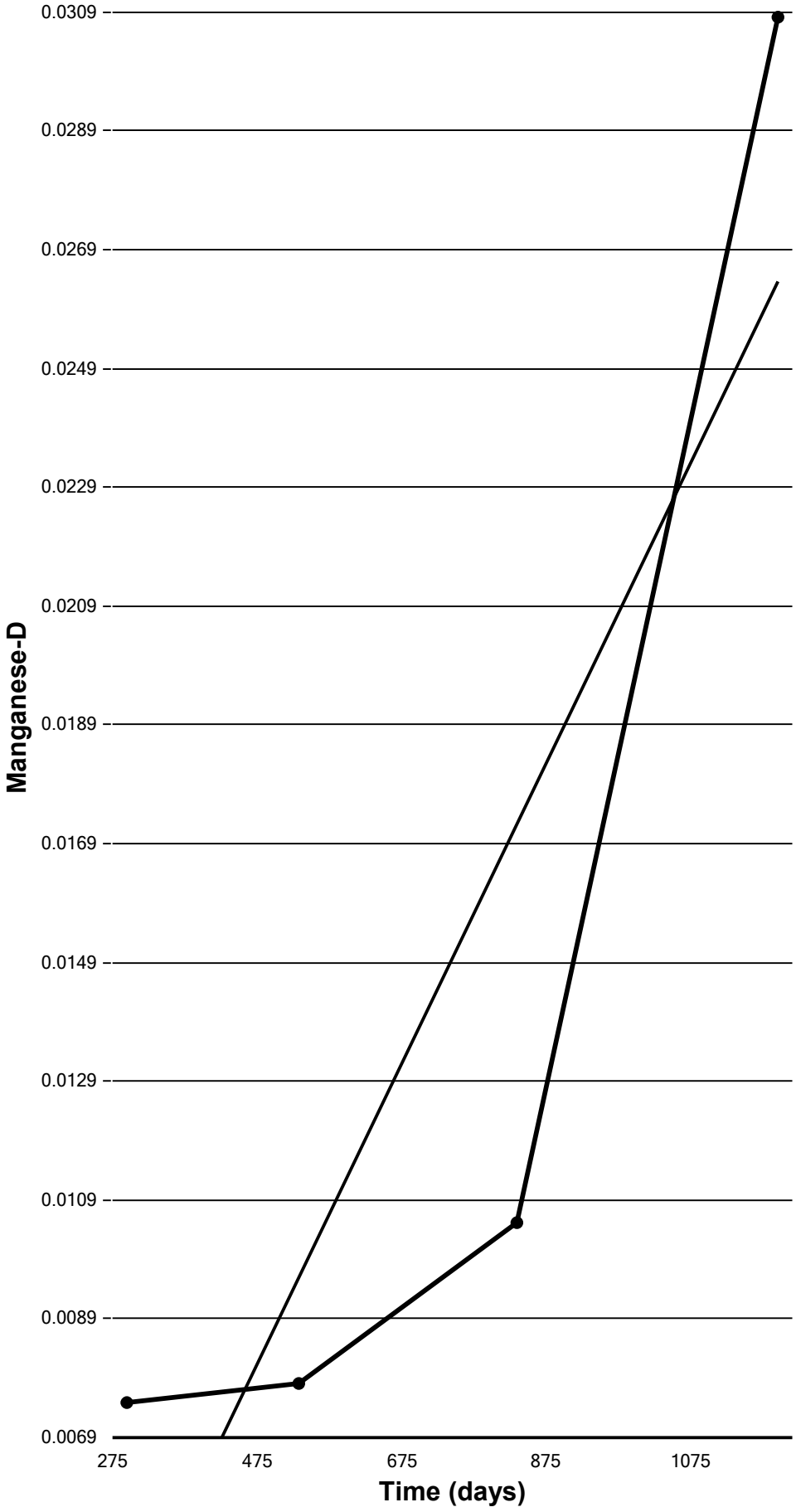
Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-0.9383
M-K Test Value (S)	-10
Tabulated p-value	0.1790
Approximate p-value	0.1740

OLS Regression Line (Blue)	
OLS Regression Slope	-0.3626
OLS Regression Intercept	4,451.9107

Insufficient statistical evidence of a significant trend at the specified level of significance.

APPENDIX B2I

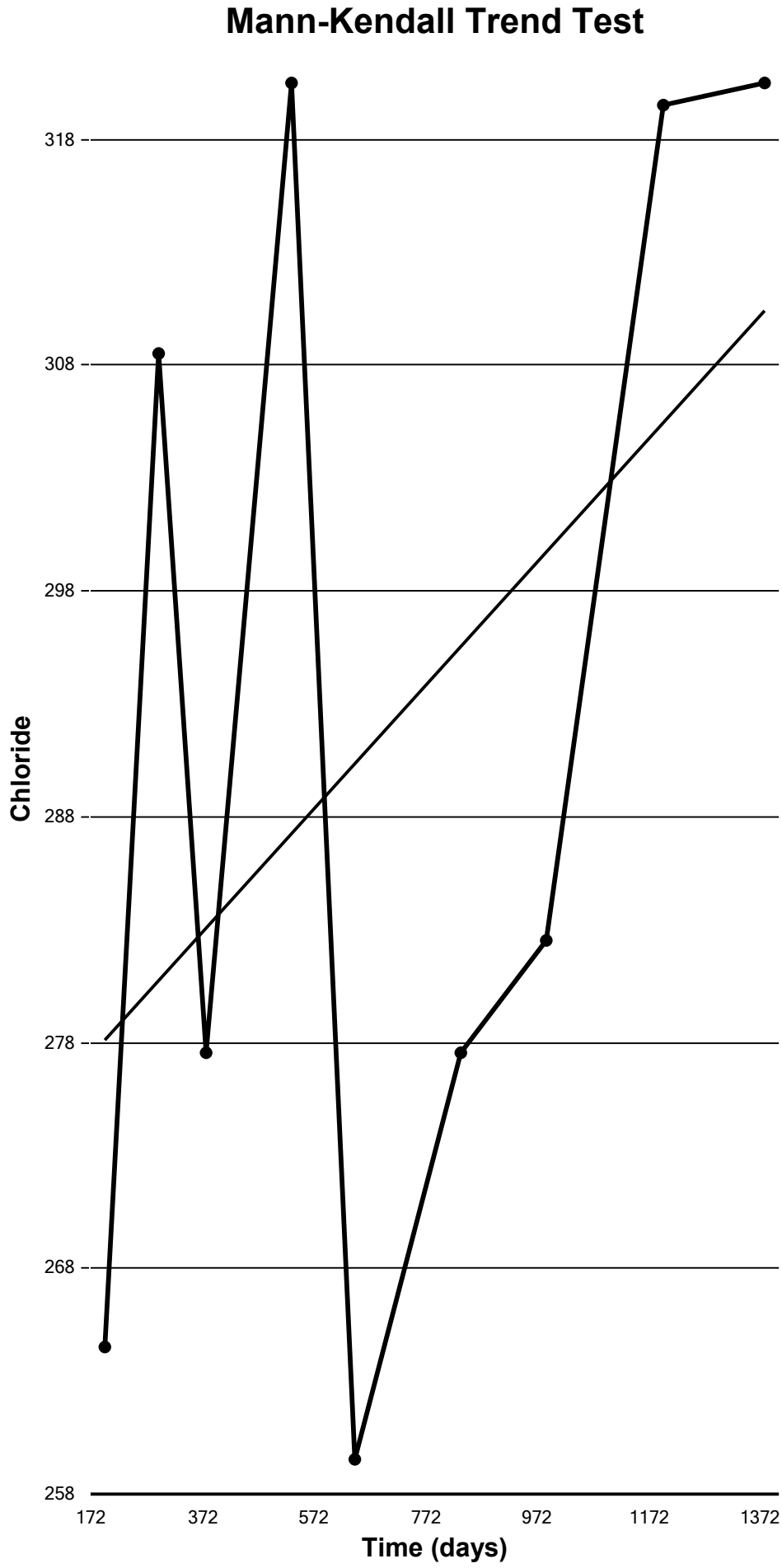
MANN-KENDALL STATISTICAL EVALUATION
MW-116



Mann-Kendall Trend Analysis	
n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	1.6984
M-K Test Value (S)	6
Tabulated p-value	0.0420
Approximate p-value	0.0447

OLS Regression Line (Blue)	
OLS Regression Slope	0.0000
OLS Regression Intercept	-0.0039

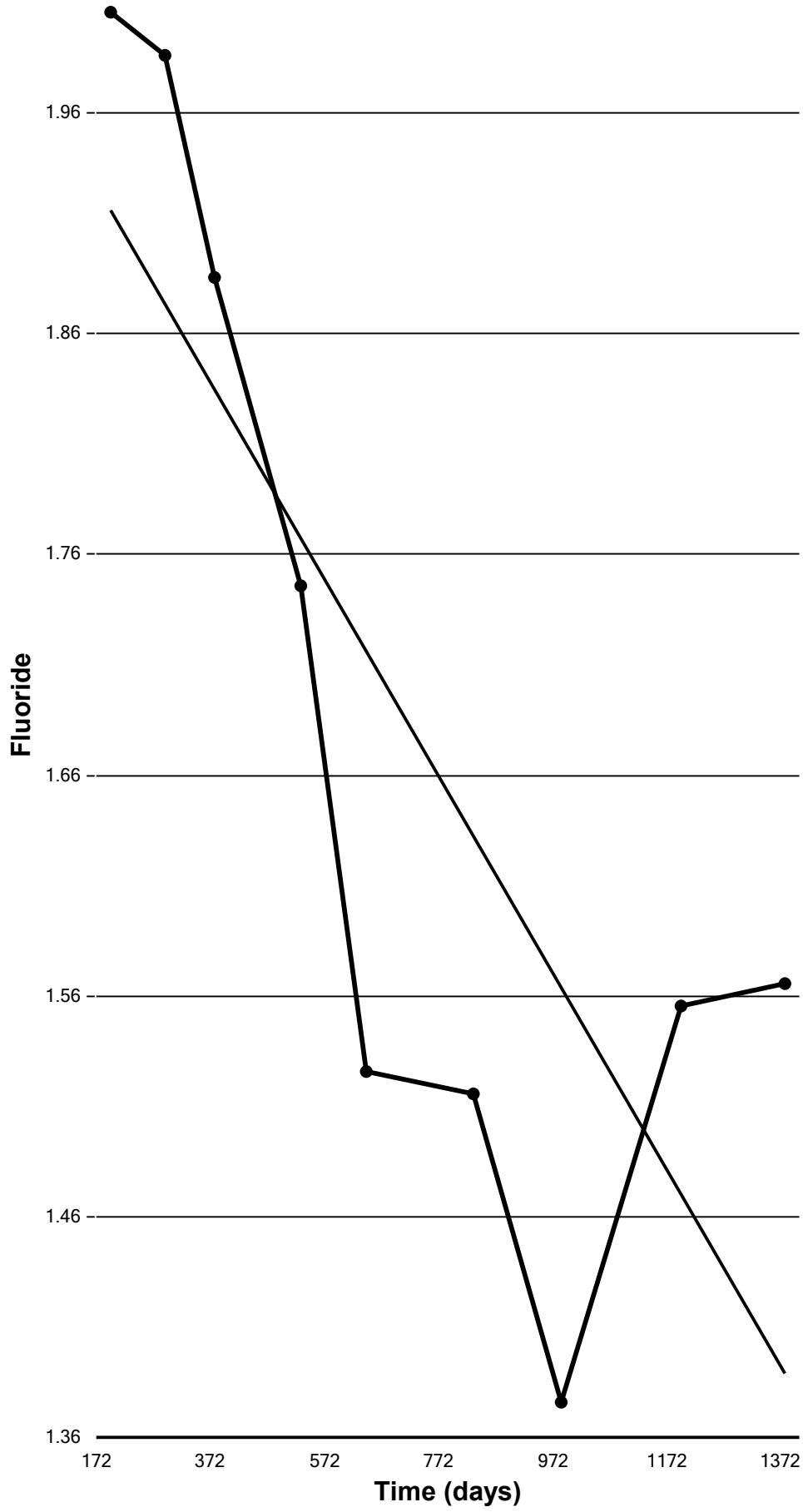
Statistically significant evidence of an increasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.4868
Standardized Value of S	1.3703
M-K Test Value (S)	14
Tabulated p-value	0.0900
Approximate p-value	0.0853

OLS Regression Line (Blue)	
OLS Regression Slope	0.0273
OLS Regression Intercept	273.2178

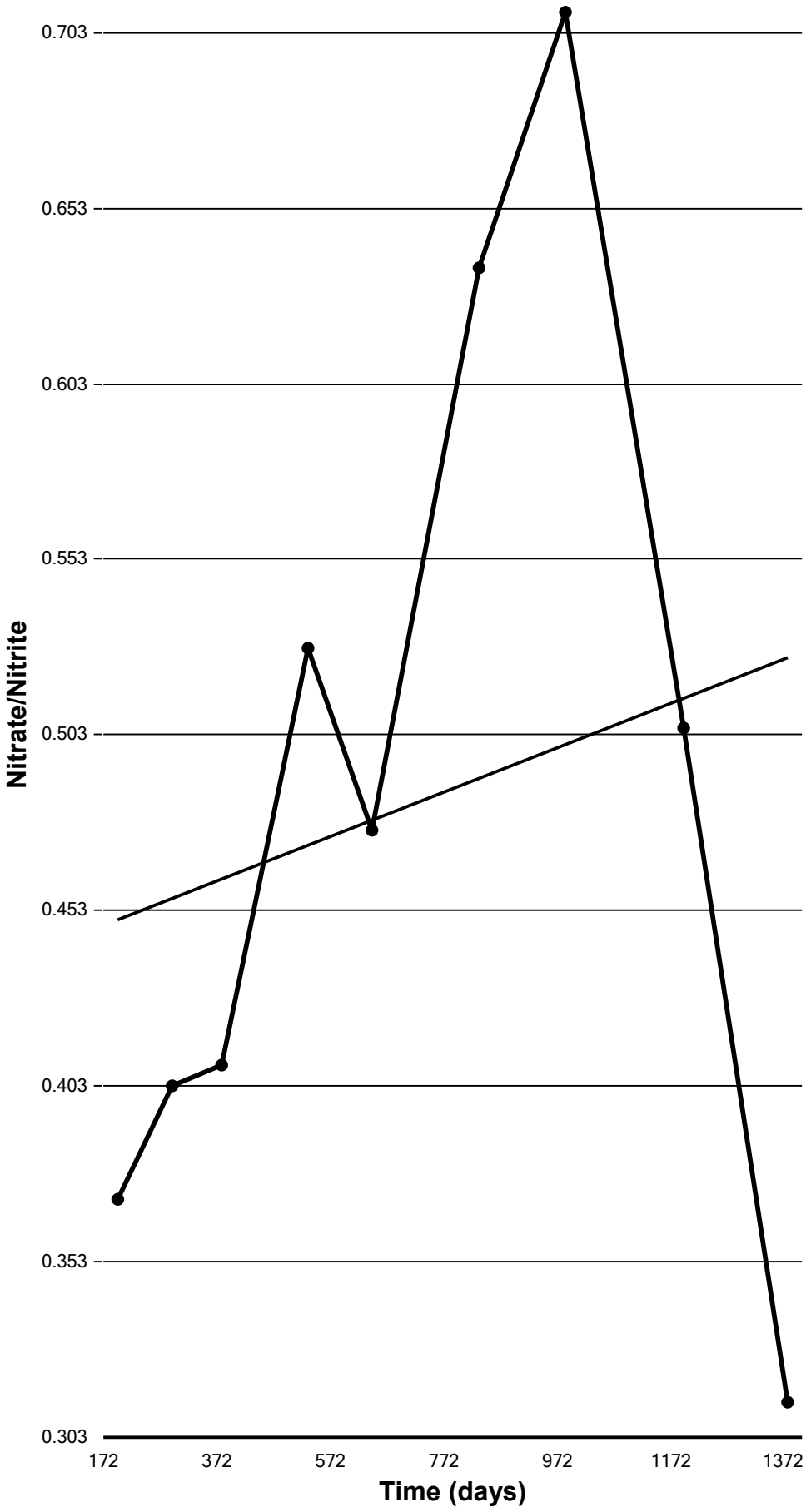
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-2.1894
M-K Test Value (S)	-22
Tabulated p-value	0.0120
Approximate p-value	0.0143

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0004
OLS Regression Intercept	2.0082

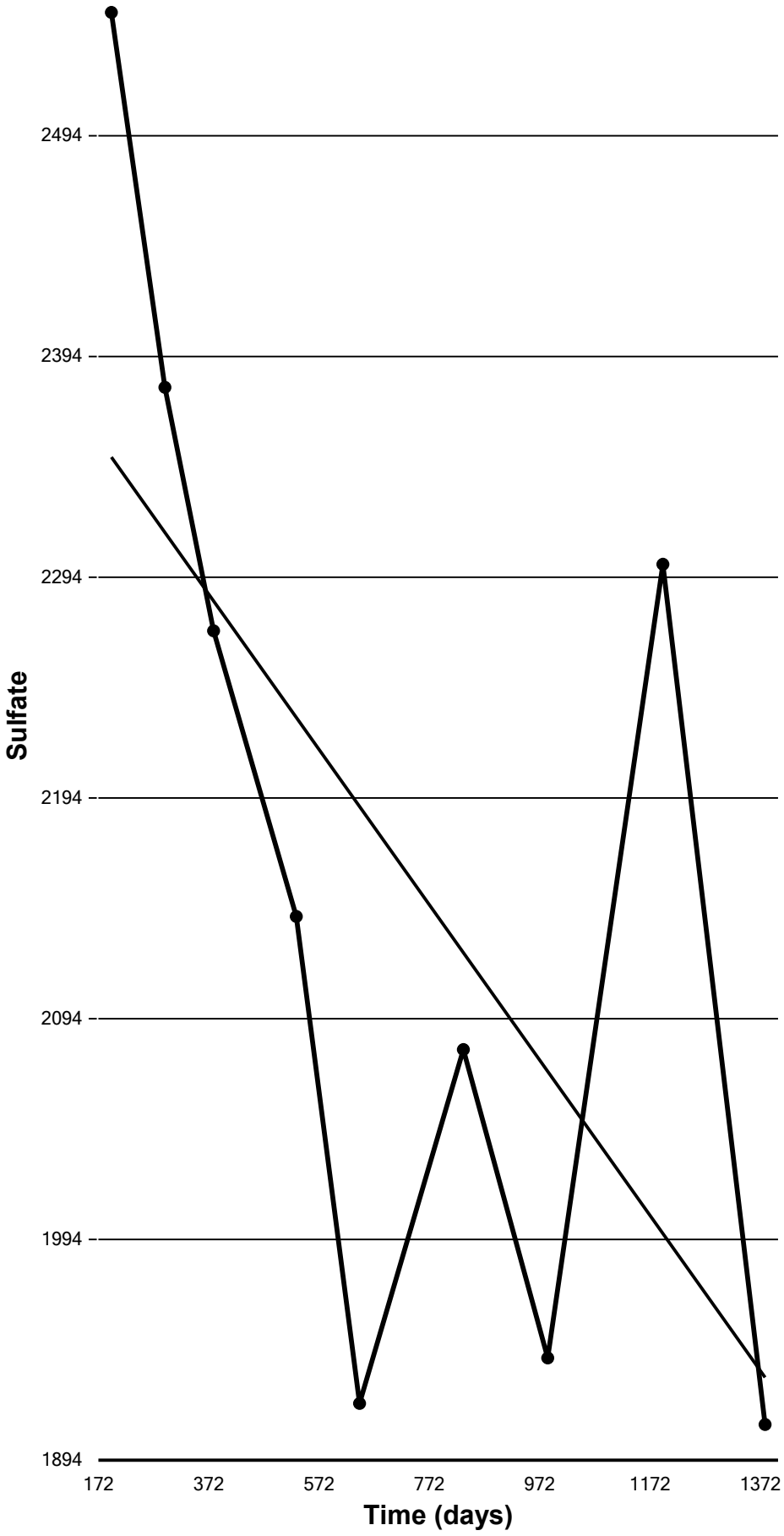
Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	1.1468
M-K Test Value (S)	12
Tabulated p-value	0.1300
Approximate p-value	0.1257

OLS Regression Line (Blue)	
OLS Regression Slope	0.0001
OLS Regression Intercept	0.4380

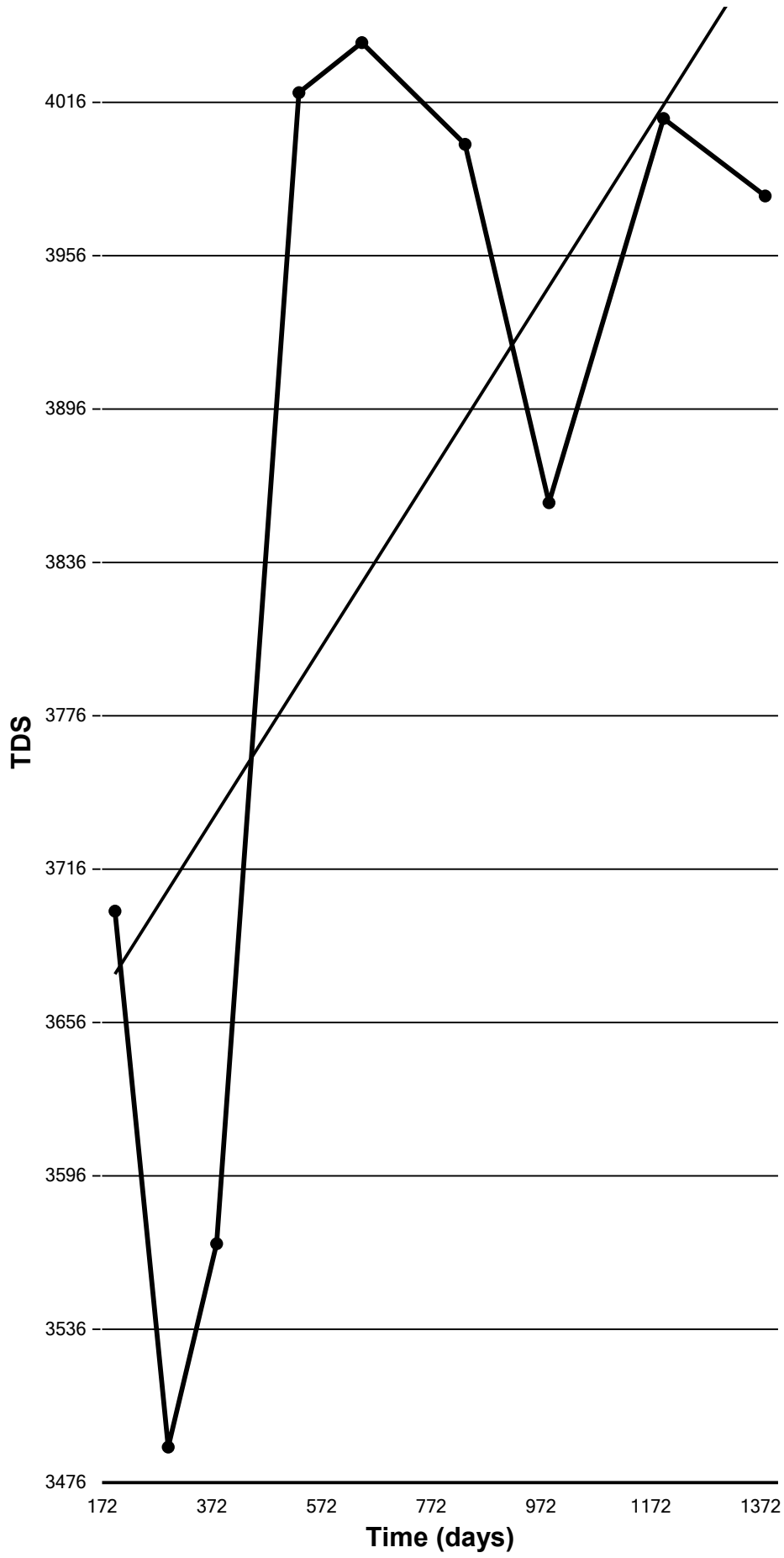
Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-2.1894
M-K Test Value (S)	-22
Tabulated p-value	0.0120
Approximate p-value	0.0143

OLS Regression Line (Blue)	
OLS Regression Slope	-0.3527
OLS Regression Intercept	2,418.1415

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis	
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	0.9383
M-K Test Value (S)	10
Tabulated p-value	0.1790
Approximate p-value	0.1740

OLS Regression Line (Blue)	
OLS Regression Slope	0.3406
OLS Regression Intercept	3,608.3096

Insufficient statistical evidence of a significant trend at the specified level of significance.

APPENDIX

C

DRAFT PUBLIC NOTIFICATION

PUBLIC NOTICE

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.4108 NMAC), the following Stage 2 Abatement Plan has been submitted to the Permitting Group of the New Mexico Oil Conservation Division ("OCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 469-7520 or E-mail: Shelly.Wells@state.nm.us.

HFSinclair Navajo Refining LLC (HFSNR), PO Box 159, Artesia, NM has submitted a Stage 2 Abatement Plan (AP) to the Permitting Group of the OCD for the Former Reverse Osmosis (RO) Reject Discharge Fields at the Artesia Refinery. The exact location of the facility is at latitude and longitude decimal degrees: 32.853099°, -104.389493° Datum: NAD83. To aid in locating this facility, the approximate location is 501 E Main St in Artesia, NM, Eddy County. The Former RO Reject Discharge Fields are located north, northeast and east of the intersection of E Logan Avenue and Navajo Road in Artesia.

HFSNR utilizes RO to remove minerals and salts from fresh water prior to use in the refining process. The fresh water is supplied from a blend of publicly supplied water from the City of Artesia and fresh groundwater obtained from the Refinery's water supply wells. The treated water (permeate stream) is used in the Refinery process while the RO reject stream cannot be used in the Refinery process as it contains concentrated salts and minerals that do not pass through the RO membranes. Prior to January 24, 2019, this concentrated RO reject stream was discharged to the surface of two fields located northeast of the Refinery operations area. The RO reject discharge fields are covered with native grass and discharged water was allowed to percolate or evaporate in those permitted areas. The discharge was performed under the jurisdiction of the OCD in accordance with Discharge Permit GW-028, which was initially issued in October 1991. The Permit has subsequently been modified and renewed several times with the most recent renewal issued in August 2022.

The Stage 2 AP includes remedial alternatives focused on removal of select inorganic compounds from shallow soil and/or groundwater or removal of the potential infiltration pathway. The Stage 2 AP includes the installation of two additional shallow groundwater monitoring wells, semiannual groundwater monitoring for a period of at least 3 years, and the design and implementation of a phytoremediation pilot study of the RO Reject Discharge Fields to reduce concentrations of select inorganic compounds in soil and groundwater. It is anticipated that the tasks associated with the Stage 2 AP will be completed during the period between February 2023 and February 2024, depending on receipt of OCD approval. The Stage 2 AP addresses well installation (including construction and development), groundwater monitoring, potential remediation alternatives, details regarding the phytoremediation pilot study design and implementation, a proposed schedule, reporting and a financial assurance for closure/post-closure plan.

The OCD has determined the Stage 2 Plan is complete. The OCD will accept comments and statements of interest regarding this work plan and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list may contact the OCD Permitting Group at the address given above. The permit may be viewed at the Artesia OCD office located at 506 W. Texas, Artesia, New Mexico 88210 between 8:00 a.m. and 4:00 p.m., Monday through Friday, or at the OCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the Stage 2 AP may contact the OCD at the address given above. Prior to ruling on any proposed permit, the Director shall allow a period of at least sixty (60) days after the date of publication of this notice, during which interested persons may submit comments or request that OCD hold a public meeting or hearing. Requests for a hearing shall set forth the reasons why a meeting or hearing should be held. A hearing will be held if the Director determines there is a significant public interest. If no hearing is held, the Director will approve the proposed work plan based on information available, including all comments received. If a public hearing is held, the Director will approve or disapprove the proposed work plan based on information in the plan and information submitted at the hearing.

Para obtener mas informaci6n sobre esta solicitud en español, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo Mexico), Oil Conservation

Division (Depto. Conservación Del Petró1eo), 1220 South St. Francis Drive, Santa Fe, New Mexico (Contacto: Shelly Wells, (505) 469-7520).

Given under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this XXst day of XX 2023.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

Adrienne Sandoval, Director

APPENDIX

D

COST ESTIMATE FOR FINANCIAL ASSURANCE PLAN

APPENDIX D-1
Cost Estimate for Financial Assurance
Former RO Reject Discharge Fields
HFSNR Artesia, New Mexico

Task	Description		Estimated Cost
1	**Monitor Well/Probe Installation**		
	Additional Well Installation (Year 1)		$59,418
	Moisture Probe Installation (Year 1)		$37,796
		Subtotal	**$97,214**
2	**Groundwater Monitoring (30 years Post-Closure)**		$1,575,681
		Subtotal	**$1,575,681**
3	**Phytoremediation Pilot Study (Year 1)**		
	Soil Sampling and Analysis		$8,415
	Irrigation Source Evaluation		$7,347
	Field Preparation		$8,953
	Plant Test Species		$39,516
	Phyto Pilot Study Monitoring		$40,716
	PM & Reporting		$34,491
		Subtotal	**$139,439**
4	**Phytoremediation Implementation (Years 2 & 3 combined)**		
	Additional Planting		$63,222
	Phyto Monitoring		$46,904
	PM & Reporting		$56,910
		Subtotal	**$167,036**
	TOTAL FINANCIAL ASSURANCE ESTIMATE		**$1,882,156**

APPENDIX D-2
Cost Estimate for Financial Assurance - Task 1: Monitor Well/Probe Installation - Year 1
Former RO Reject Discharge Fields
HFSNR Artesia, New Mexico

Scope and Assumptions

Two additional 2-inch diamater shallow groundwater monitoring wells will be installed during 2023 to depths between 20 to 30 feet below ground surface.

- One well approximately 350 feet northeast of MW-119 to provide downgradient of the North RO reject discharge field
- One well approximately 1,000 feet east of RW-18A to provide additional downgradient monitoring of the South RO reject discharge field

During 2023, existing soil moisture probes installed during the Stage 1 AP will be evaluated to determine if they are still functioning. Two additional soil moisture probe nests (one in each field) will be installed in 2023. Soil moisture probes will remain in place throughout the pilot study as well as during implementation of the full-scale phytoremediation, and data will continue to be collected to evaluate the vadose zone moisture and electrical conductivity (EC).

Cost Estimate

Item: Monitor Well Installation		**Cost**
Labor:		
	On-site Tasks (Well Installation)	$3,830
	Off-site Tasks (Project Management)	$4,634
Expenses:		
	Drilling Subcontractor	$43,050
	Other Direct Costs (i.e. Travel, Equipment)	$3,895
	NMGRT	$4,009
	Subtotal	**$59,418**

Item: Moisture Probe Installation		**Cost**
Labor:		
	On-site Tasks (Probe Installation)	$1,811
	Off-site Tasks (Project Management)	$4,634
Expenses:		
	Drilling Subcontractor	$21,024
	Other Direct Costs (i.e. Travel, Equipment)	$7,900
	NMGRT	$2,427
	Subtotal	**$37,796**
	TOTAL	**$97,214**

APPENDIX D-3
Cost Estimate for Financial Assurance - Task 2: Groundwater Monitoring - 30 Years
Former RO Reject Discharge Fields
HFSNR Artesia, New Mexico

Scope and Assumptions

Groundwater samples will be collected and analyzed semiannually during the routine facility-wide monitoring events for a period of 30 years to determine if the COC concentrations continue to attenuate following cessation of discharge of the RO reject stream to the fields. The following wells will be sampled.

- North RO Reject Discharge Field:
  - Upgradient: MW-55, MW-140, MW-141
  - Within Field: MW-117, MW-118, MW-119
  - Downgradient: MW-142, MW-143, new well northeast of MW-119 (well number to be determined)
- South RO Reject Discharge Field:
  - Upgradient: MW-29, MW-40, MW-56
  - Within Field: MW-114, MW-115, MW-116
  - Downgradient: MW-125, RW-18A, MW-144, new well east of RW-18A (well number to be determined)

Groundwater samples will be analyzed for the following COCs and methods:

- Dissolved (field-filtered) metals by Methods 6010 or 6020:
  - Boron
  - Manganese
  - Uranium
- Chloride by Method 300 or 9056
- Fluoride by Method 300 or 9056
- Nitrate by Method 300 or 9056
- Nitrite by Method 300 or 9056
- Sulfate by Method 300 or 9056
- TDS by Method 2540

Cost Estimate

Item: Groundwater Monitoring - 30 Years		Cost
Labor:		
	Off-site Tasks (Data, Reporting and Project Management)	$24,541
Expenses:		
	Groundwater Monitoring Subcontractor	$14,226
	Laboratory	$11,708
	NMGRT	$2,048
	Annual Total	**$52,523**
	TOTAL FOR 30 YEARS (2023-2052)	**$1,575,681**

APPENDIX D-4
Cost Estimate for Financial Assurance - Task 3: Phytoremediation Pilot Study - Year 1
Former RO Reject Discharge Fields
HFSNR Artesia, New Mexico

Scope and Assumptions

A stepwise approach to the Pilot Study is anticipated. Subtasks include performing agronomic soil analysis to confirm site suitability and assist in species selection, as well as amendment and fertilizer needs, evaluate potential species, and evaluate the irrigation water supply to be used. Additional subtasks will include field preparation, planting, irrigation and harvesting of the test species, monitoring, and reporting during Year 1.

- Soil samples will be collected from three locations in each of the two fields and will be submitted to an agricultural laboratory for agronomic analysis (6 samples total).
- Potential candidate species including Sudan Grass, Western Wheat Grass, Indian Grass and Tall Wheat Grass will be tested during the Pilot Study.
- The available irrigation water supply will be sampled and analyzed for suitability prior to planting.
- A local agricultural contractor will be retained to install and manage the plots. Plans and specifications developed as part of the final design will provide details as to the plant material, planting techniques including compost and fertilizer requirements, irrigation design, and follow up maintenance. It should be noted that after the system is implemented, ongoing operation, maintenance, and monitoring will be conducted to ensure the vegetation develops vigorous and deep root systems
- A Monitoring Program will be implemented, to include inspections for plant health and growth, pests and weeds; periodic local agricultural contractor will be retained to install and manage the plots. Plans and specifications developed as part of the final design will provide details as to the plant material, planting techniques including compost and fertilizer requirements, irrigation design, and follow up maintenance. It should be noted that after the system is implemented, ongoing operation, maintenance, and monitoring will be conducted to ensure the vegetation develops vigorous and deep root systems
- Reporting will consist of the following:
  - Quarterly status reports to describe the activities completed during the previous three months.
  - Final pilot study design to be submitted prior to implementation of the pilot study.
  - Final report of pilot study to be submitted within 90 days of the completion of the pilot study.

Cost Estimate

Item: Soil Sample Collection and Analysis		**Cost**
Labor:		
	On-site Tasks (Sampling)	$1,811
	Off-site Tasks (Data Evaluation, Reporting and Project Management)	$4,665
Expenses:		
	Laboratory	$1,260
	Other Direct Costs (i.e. Travel, Equipment)	$405
	NMGRT	$274
	Subtotal	**$8,415**

Item: Irrigation Source Evaluation		**Cost**
Labor:		
	On-site Tasks (Sampling)	$1,502
	Off-site Tasks (Data Evaluation, Reporting and Project Management)	$4,336
Expenses:		
	Laboratory	$709
	Other Direct Costs (i.e. Travel, Equipment)	$580
	NMGRT	$220
	Subtotal	**$7,347**

Item: Field Preparation		**Cost**
Expenses:		
	Ag Subcontractor and Irrigation Setup	$8,295
	NMGRT	$658
	Subtotal	**$8,953**

APPENDIX D-4
Cost Estimate for Financial Assurance - Task 3: Phytoremediation Pilot Study - Year 1
Former RO Reject Discharge Fields
HFSNR Artesia, New Mexico

Cost Estimate (continued)

Item: Plant Test Species		**Cost**
Labor:		
	Off-site Tasks (Coordination, Reporting and Project Management)	$7,905
Expenses:		
	Agricultural Subcontractor	$29,295
	NMGRT	$2,316
	Subtotal	**$39,516**

Item: Phyto Pilot Study Monitoring		**Cost**
Labor:		
	On-site Tasks (Inspections, Sampling and Monitoring)	$21,216
	Off-site Tasks (Data, Reporting and Project Management)	$5,103
Expenses:		
	Laboratory	$583
	Other Direct Costs (i.e. Travel, Equipment)	$11,205
	NMGRT	$2,609
	Subtotal	**$40,716**

Item: Reporting		**Cost**
Labor:		
	Off-site Tasks (Data Evaluation, Reporting and Project Management)	$34,491
	Subtotal	**$34,491**

	TOTAL	**$139,439**

APPENDIX D-5
Cost Estimate for Financial Assurance - Task 4: Phytoremediation Implementation (Years 2 & 3)
Former RO Reject Discharge Fields
HFSNR Artesia, New Mexico

Scope and Assumptions

Years 2 and 3 of the Phytoremediation Implementation will consist of planting and harvesting, monitoring and reporting.

- Assume 1 planting event per field per year (however, the Sudan Grass plot will be replanted each winter since it is an annual species)
- Assume 1 fertilizer application event per field per year
- Assume weekly irrigation from April through October. Total of 3 acre feet of water per field. Assume $25 per acre foot
- Assume 2 harvest operatons per year

Cost Estimate

Item: Additional Planting (one year)		**Cost**
	Agricultural Subcontractor	$29,295
	NMGRT	$2,316
	Subtotal	**$31,611**
Item: Phyto Pilot Study Monitoring (one year)		
Labor:		
	On-site Tasks (Inspections and Sampling)	$4,387
Expenses:		
	Laboratory	$7,308
	Other Direct Costs (i.e. Travel, Equipment)	$10,359
	NMGRT	$1,398
	Subtotal	**$23,452**
Item: Reporting (one year)		
Labor:		
	Off-site Tasks (Data Evaluation, Reporting and Project Management)	$28,455
	Subtotal	**$28,455**
	Annual Total	**$83,518**
	TOTAL FOR 2 YEARS (2024-2025)	**$167,036**

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 298774

CONDITIONS

Operator:	OGRID:
HF Sinclair Navajo Refining LLC ATTN: GENERAL COUNSEL Dallas, TX 75201	15694
	Action Number: 298774
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
michael.buchanan	Accepted as part of the record. Email between NMOCD and Mike Holder including letter issued for administratively incomplete ST2 AP sent electronically on 03/07/24	3/22/2024