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August 27, 2021

Ms. Nancy McDuffie  
New Mexico Environment Department  
Ground Water Quality Bureau  
121 Tijeras Avenue NE  
Albuquerque, New Mexico 87102

Dear Ms. McDuffie:

On behalf of Doña Ana Dairies, Inc., EA Engineering, Science, and Technology, Inc., PBC is submitting this Quarterly Groundwater Monitoring Report for the dairies located in Mesquite, Vado, and Anthony, New Mexico. The report discusses the quarterly groundwater sampling event conducted to fulfill requirements of the Stage 2 Abatement Plan for Doña Ana Dairies.

Please let me know if you have any questions regarding the information provided in this report.

Sincerely,

A handwritten signature in black ink that reads "Gina Mullen".

Gina Mullen  
Project Manager

A handwritten signature in blue ink that reads "Jay Snyder".

Jay Snyder  
Senior Hydrogeologist

Enclosure

Cc: Linda Armstrong, Doña Ana Dairies (electronic)  
File



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QUARTERLY GROUNDWATER  
MONITORING REPORT  
DOÑA ANA DAIRIES  
MESQUITE, NEW MEXICO

Prepared for:

Doña Ana Dairies  
Mesquite, New Mexico

Prepared by:

EA Engineering, Science,  
and Technology, Inc., PBC  
320 Gold Avenue SW, Suite 1300  
Albuquerque, New Mexico 87102

August 2021

EA Project No. 1464108.02

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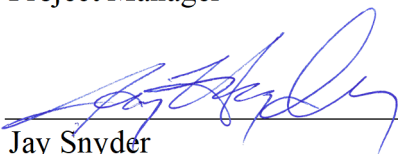
EA Engineering, Science,  
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Gina Mullen  
Project Manager

August 27, 2021

Date



Jay Snyder  
Senior Hydrogeologist

August 27, 2021

Date

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## 1.0 INTRODUCTION

On behalf of Doña Ana Dairies (Dairies), EA Engineering, Science, and Technology, Inc., PBC (EA) has prepared this Quarterly Monitoring Report for Doña Ana Dairies located south of Las Cruces, New Mexico (Figure 1). The report was completed in accordance with the *Stage 2 Abatement Plan* and the *Sampling and Analysis Plan, Doña Ana Dairies, Doña Ana County, New Mexico* dated November 7, 2013, and August 11, 2008, respectively, and the Conceptual Work Plan (CWP) dated February 1, 2008. All were prepared to satisfy requirements stated in the New Mexico Administrative Code (NMAC), Title 20, Chapter 6, Part 2, Sections 4106 through 4110 (20.6.2.4106 – 20.6.2.4110 NMAC). The Sampling and Analysis Plan was approved by the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) on September 25, 2008. On March 25, 2015, the stipulated agreement to additional requirements to the Dona Ana Dairies Stage 2 Abatement Plan was agreed upon by NMED, the Dairies, and the Rio Valle Concerned Citizens. The Stage 2 Abatement Plan was approved by NMED by Final Order on April 10, 2015. Document references are provided in Section 5.0.

### 1.1 Objective and Monitoring Scope

The objective of this monitoring program is to satisfy the requirements set forth in the Stage 2 Abatement Plan and the Stipulated Agreement and to satisfy the requirements set forth in 20.6.2.4110 NMAC.

The following work was performed to meet the objectives of the monitoring program:

- Representatives from D&H Petroleum and Environmental Services, Inc. (D&H) gauged discharge plan (DP) monitoring wells, abatement plan (AP) monitoring wells, and Anthony Waste Water Treatment Plant (WWTP) wells from May 3 through May 5, 2021.
- From May 6, 2021 through May 21, 2021, D&H representatives collected groundwater samples from all AP and DP wells that contained sufficient water. Organ Dairy wells were sampled by Glorieta Geosciences, Inc. (Glorieta) on May 4, 2021. Well DAD-06 was the only AP well that was dry. The samples were analyzed for nitrate, chloride, total dissolved solids (TDS), and total Kjeldhal nitrogen (TKN). Field parameters including specific conductance, pH, temperature, oxidation reduction potential (ORP), and dissolved oxygen were monitored and recorded on field forms during sampling.

### 1.2 Background

In correspondence dated April 7, 2006, NMED required a Stage 1 Abatement Plan for 13 dairies in Doña Ana County, based on analytical results from DP monitoring of on-site compliance monitoring wells that showed concentrations of nitrate, chloride and TDS exceeding ground water standards promulgated in New Mexico Water Quality Control Commission (NMWQCC) Regulations (20.6.2.3103 NMAC). On October 30, 2006, the Dairies notified NMED that they had reached an agreement to work as a group and submit a joint response to NMED's request (Doña Ana Dairies 2006). The Dona Ana Dairies consortium consisted of the 11 dairies until the

departure from the group by River Valley Dairy in April 2019 and Gonzalez Dairy in October 2020. As a result, the consortium currently consists of the following 9 dairies: Big Sky, Bright Star, Buena Vista 2, Del Oro, Dominguez, Dominguez 2, Mountain View, Organ, and Sunset.

On December 11, 2006, on behalf of the Doña Ana Dairies, Golder Associates Inc. (Golder) submitted a Stage 1 and 2 Abatement Plan Proposal to address impacts to groundwater in the area of the Dairies (Golder 2006). The first major deliverable in the Abatement Plan Proposal was an Existing Data Report (EDR) to bring together in one document historical data and practices of the constituent dairies.

The EDR, submitted on February 1, 2008 (Golder 2008a), was intended to satisfy the Dairies commitment for compilation and submission of existing data identified in the 2006 Doña Ana Dairies response to the NMED requirement for Stage I Abatement Plans. Section 9 of the EDR outlined data gaps identified during the preparation of the report, as well as the actions recommended. To facilitate the discussion of the path forward after the submittal of the EDR and concurrent with the EDR submission, a CWP was prepared. (Golder 2008b).

On July 15, 2008, the Dairies, Golder and NMED met (Golder 2008c). During that meeting, plume maps presented in the EDR (Golder 2008a), new monitoring data, and knowledge of well locations and groundwater chemistry results at adjacent DP-regulated facilities were used to identify data gaps with respect to ground water flow direction and plume delineation. The agreed upon data gaps yielded well locations (including contingency locations) recorded in the meeting minutes (Golder 2008c) and depicted in the Sampling and Analysis Plan (SAP) dated August 8, 2008 (Golder 2008d). The SAP outlined the details of the field operations to be implemented for completion of data gaps, such that a Site Investigation Report (§4106.C.6) and Stage 2 Abatement Plan (§4106.D) could be prepared.

Groundwater gauging was conducted concurrent to discussions with NMED at the Dairies for four quarters, February 2008, June 2008, September 2008, and December 2008, to determine the current and historical site groundwater gradient.

In May 2009, field work was conducted as outlined in the SAP and ten (10) AP monitoring wells (DAD-01 through DAD-10) were installed. In July 2009, the Site Investigation Report was submitted to the NMED.

On February 9, 2012, the Final Site Investigation Report was submitted to NMED. The report summarized field activities that occurred from October 10 through October 14, 2011, and November 10 through 18, 2011, during which eleven soil borings were advanced at the site and converted into monitoring wells DAD-12 through DAD-14, DAD-16 through DAD-22, and DP well 177-03A.

On August 16, 2012, soil boring/monitoring well DAD-15 was installed and on August 20, 2012, well DAD-15 was sampled. An addendum to the Final Site Investigation Report was submitted to NMED on September 7, 2012, which summarized DAD-15 field activities.

A Stage 2 Abatement Plan was submitted to NMED on March 13, 2013. Based on an NMED response in August 2013, a Revision to the Stage 2 Abatement Plan was submitted on November 7, 2013.

On March 25, 2015, the stipulated agreement to additional requirements to the Dona Ana Dairies Stage 2 Abatement Plan was agreed to by NMED, Dona Ana Dairies, and the Rio Valle Concerned Citizens. On April 10, 2015, the Stage 2 Abatement Plan with the stipulated agreement was approved by NMED by Final Order.

EA began implementation of the Stage 2 Abatement Plan and stipulated agreement as directed by the Final Order in December 2015. In order to meet objectives, four monitoring wells were installed (DAD-23 through DAD-26) and Del Oro Dairy discharge plan (DP) well 692-01 was plugged and abandoned. Details on implementation of these tasks are included in the *Stage 2 Implementation and Quarterly Groundwater Monitoring Report*, July 2016.

In accordance with the approved Stage 2 Abatement Plan and stipulated agreement, a baseline compound specific isotope analysis (CSIA) for nitrogen 14 and nitrogen 15 ( $^{15}\text{N}/^{14}\text{N}$  [ $\delta^{15}\text{N}$ ]) and total organic carbon (TOC) was completed for 16 wells in spring of 2016. Additionally, existing conditions concentrations were recalculated for the contaminants of concern. Results of these analyses are presented in the *Stage 2 Implementation and Quarterly Groundwater Monitoring Report*, July 2016. A five-year review containing results of repeated CSIA sampling and recalculated existing conditions concentrations was submitted to NMED in December 2020 (EA 2020).

A Stage 2 Abatement Plan Modification proposal was submitted to NMED on August 10, 2018, to address plume instability in the perched aquifer nitrate plume at Del Oro Dairy. Following discussions with NMED, a revised Stage 2 Abatement Plan Modification proposal was submitted on May 1, 2019. A public meeting to discuss the plan was held in Anthony, New Mexico on May 17, 2019. The Stage 2 Abatement Plan Modification proposal was revised based on additional input from NMED and the public and submitted on July 26, 2019. Public notice for the proposal was initiated on October 23, 2019 and closed on December 31, 2019. An addendum to the Stage 2 Abatement Plan Modification proposal was submitted on July 13, 2020. A revised addendum to the Stage 2 Abatement Plan Modification proposal was submitted on July 13, 2021 based on additional comments from the public.



## 2.0 GROUNDWATER MONITORING ACTIVITIES

Groundwater monitoring activities included gauging AP monitoring wells, DP monitoring wells for dairies that are a part of the DAD consortium, and Anthony WWTP monitoring wells. Groundwater samples were collected from AP monitoring wells and DP monitoring wells for dairies that are a part of the DAD consortium. The DAD consortium currently consists of the following dairies: Big Sky, Bright Star, Buena Vista 2, Del Oro, Dominguez, Dominguez 2, Mountain View, Organ, and Sunset. Groundwater samples were analyzed for nitrate, chloride, TDS, and TKN. The resulting data from this groundwater monitoring event are compiled and are presented below.

### 2.1 Well Gauging

From May 3 through May 5, 2021, representatives from D&H gauged DP monitoring wells, AP monitoring wells, and Anthony WWTP wells with an electronic water level indicator. Organ Dairy wells were gauged by Glorieta on May 4, 2021. Table 1 provides a summary of the groundwater gauging data collected from the monitoring network. Data obtained during gauging are shown on potentiometric surface maps included as Figures 2, 3, 4, and 5. Well gauging field forms are available in Appendix A.

### 2.2 Groundwater Sampling

D&H sampled all AP monitoring wells with sufficient water from May 28, 2021 through June 7, 2021. Well DAD-06 has been dry since August 2013 and was not sampled. The Stage 2 Abatement Plan proposal discusses plans for a drilling company to attempt to remove silt at the bottom of the well through redevelopment. Redevelopment will occur when the plan is approved. Groundwater sampling from AP wells was accomplished with new, disposable bailers. Three well casing volumes were purged unless the well contained insufficient water.

D&H sampled the DP wells from May 4, 2021, through May 21, 2021. Glorieta sampled Organ Dairy DP wells on May 4, 2021. Prior to sampling, all DP wells were purged of three well casing volumes, if practicable, by (1) hand-bailing with new, disposable bailers and twine, (2) pumping with a submersible pump and new polyethylene tubing, or (3) pumping with a dedicated pump and new polyethylene tubing. Due to a lower water table, several DP wells were dry or contained insufficient water for sampling.

The wells were sampled from historically clean to dirty to the extent possible to minimize cross-contamination potential. All non-dedicated or disposable equipment was decontaminated between wells with an Alconox™ solution to further ensure sample quality. All meters were calibrated and/or checked with standards in accordance with the manufacturer's specifications prior to daily use. Purge water was ground discharged.

When sufficient water was available, field parameters including specific conductance, temperature, pH, and ORP were monitored using a Myron L Ultrameter II and recorded on field forms. Dissolved oxygen was measured using a YSI 556 MPS. Dissolved oxygen and ORP were only measured in the first set of readings. Field parameters from August 2015 to present are summarized in Table 2. The sampling field forms are presented in Appendix A.

All groundwater samples were collected immediately after purging. Sampling was either accomplished by carefully pouring groundwater from the bailer into the sample containers or by pumping groundwater through new polyethylene tubing into the sample container. Sample containers were provided by Hall Environmental Analysis Laboratory, Inc. (Hall). Container size, type, sample preservatives, analytical methods, and holding times are specified in Table 3. All samples were preserved in accordance with method requirements, labeled, then immediately cooled to <6°C with ice and delivered under chain-of-custody to Hall in Albuquerque, New Mexico. All analytical laboratory reports are provided in Appendix B.

### 3.0 GROUNDWATER MONITORING RESULTS

#### 3.1 Hydraulic Gradient and Direction of Groundwater Flow

This quarter, groundwater was present beneath the site at depths ranging from 12.38 feet below top-of-casing (ft btoc) in Sunset well 257-03 to 132.96 ft btoc in Dominguez 2 well 42-12. Groundwater was encountered at shallower depths near the Mesquite Drain and at greater depths near I-10 where the topographic elevation increases.

AP monitoring well DAD-25 may have been completed in a perched aquifer, as groundwater elevations have consistently measured several feet higher than groundwater elevations in surrounding wells. As a result, this groundwater elevation has not been used in contouring for the central area potentiometric surface map.

Potentiometric surface maps were completed using the monitoring well gauging data for the northern, central, and southern portions (perched and regional aquifers) of the Dairies. Groundwater elevation data are provided in Table 1 and potentiometric surface maps are provided as Figures 2, 3, 4, and 5. Hydrographs were completed for select monitoring wells in each area and are provided in Appendix C. On average, regional aquifer groundwater elevations decreased by approximately one-half foot in the northern and southern areas. In the central area, groundwater elevations decreased an average of 0.7 foot. In the southern perched aquifer, groundwater elevations decreased by an average of 0.4 foot. Water levels in select monitoring wells in the southern perched aquifer are significantly higher than historical water levels as a result of a suspected water line leak located at the intersection of E O'Hara Road and Anthony Drive.

During the most recent gauging event, groundwater flow direction at the north and south ends of the northern area were to the southeast, but groundwater in the center of the northern area was flowing to the east-northeast. In the central region, groundwater flow direction was generally to the southeast. Flow direction in the southern regional aquifer was to the south. Flow direction in the southern perched aquifer is radiating out from the southwest corner of Del Oro Dairy to the west and south.

The hydraulic gradient across the Dairies in the regional aquifer was approximately 0.001 ft/ft and the hydraulic gradient in the perched aquifer in the southern area was approximately 0.005 ft/ft.

#### 3.2 Groundwater Field Parameters

Field parameters from the most recent monitoring event including specific conductance, pH, temperature, ORP, and dissolved oxygen were recorded on the sampling field forms (Appendix A) and are summarized in Table 2. Specific conductance, dissolved oxygen, and ORP trends for select wells are presented in Appendix D. Though dissolved oxygen and ORP measurements from wells containing a dedicated pump were recorded, these measurements are not considered representative of aquifer conditions. As noted in Section 2.2, dissolved oxygen and ORP are only recorded in the first set of readings. This is because hand bailing agitates the aquifer and the ORP and dissolved oxygen measurements are not considered representative once agitation begins.

### 3.3 Groundwater Analytical Results

#### 3.3.1 Abatement Plan Well Results

Groundwater analyte concentrations were below the 10 milligram per liter (mg/L) NMWQCC standard for nitrate as nitrogen in 10 of the 25 AP monitoring wells sampled. The following 15 AP wells had nitrate concentrations at or above the standard: DAD-01, DAD-07, DAD-08, DAD-09, DAD-11 (vertical delineation well), DAD-12 (vertical delineation well), DAD-13, DAD-14, DAD-15, DAD-19 (vertical delineation), DAD-20, DAD-21, DAD-22, DAD-23, and DAD-26.

Nitrate concentrations decreased or were stable in AP wells DAD-02, DAD-03, DAD-05, DAD-09, DAD-10, DAD-11 (vertical delineation well), DAD-12 (vertical delineation well), DAD-13, DAD-14, DAD-15, DAD-16, DAD-18 (vertical delineation well), DAD-20, DAD-22, and DAD-23, compared to the previous sampling event. The largest decrease in nitrate was observed in DAD-15 which decreased from 18 mg/L in March 2021 to 12 mg/L in June 2021. The largest increase was observed in DAD-21 which increased from 110 mg/L in March 2021 to 120 mg/L in May 2021. During this sampling event, nitrate concentrations in the AP wells ranged from 120 mg/L in well DAD-21 to below the laboratory RL of 1.0 mg/L in wells DAD-03, DAD-05, DAD-10, and DAD-16.

Both chloride and TDS concentrations equaled or exceeded their respective NMWQCC standards in most AP wells. Exceptions include wells DAD-02 and DAD-17, where chloride was below the 250 mg/L standard at a concentration of 230 mg/L and 180 mg/L, respectively. TDS was also below the standard of 1,000 mg/L at a concentration of 972 mg/L in well DAD-17. The highest chloride and TDS concentrations in the AP wells were found in well DAD-08, where respective concentrations were 2,000 mg/L and 5,040 mg/L.

Table 4 and Figures 6 through 9 present the analytical results for AP monitoring wells. Analytical laboratory reports are provided in Appendix B. Nitrate, chloride, and TDS concentration trends for select AP wells are presented by area in Appendix E.

#### 3.3.2 Dairy Results by Area

DP groundwater analytical results are presented in Table 5. Nitrate, chloride, and TDS concentration trends for the AP wells by area are presented in Appendix E. Analytical data for all sampled wells are plotted on Figures 6 through 9. Analytical laboratory reports are included in Appendix B. Discussions of upgradient/downgradient conditions that reflect current groundwater flow directions are discussed in Section 3.1. The following discussions summarize the results by area at the Dairies.

##### Northern Portion

Upgradient well 86/340-01 (located to the north) has been below the nitrate standard since February 2018; historically, concentrations in this well were consistently above the nitrate standard. Nitrate concentrations in upgradient well 70/86/340-01 (Northern Land Application area well) have historically been above the nitrate standard, but were below the standard in May

2021 with a concentration of 7.9 mg/L. The nitrate concentrations are below NMWQCC standard of 10 mg/L in the following additional wells: Organ Well 126-12, Dominguez Dairy 2 wells 42-02, 42-10, 42-11, 42-12, Dominguez Dairy well 624-02, and DAD-02. These wells define the extent of nitrate contamination, except to the east in the vicinity of DAD-01 and DAD-13 and to the west at Dominguez 624-10. The highest nitrate concentration in the northern portion was observed in Dominguez Dairy #2 well 42-06 with a concentration of 210 mg/L.

The chloride concentrations in DP wells were generally at or above the 250 mg/L standard in wells sampled within the northern portion of the Dairies. Exceptions include chloride detected below the standard at Northern Land Application Area well 86/340-01, Dominguez 2 well 42-08, and AP well DAD-02 at concentrations of 230 mg/L, 180 mg/L, and 230 mg/L, respectively. TDS concentrations were above the 1,000 mg/L standard in all wells sampled within the northern portion of the Dairies. The highest concentrations of chloride and TDS were observed in Northern Land Application area well 70-03 at concentrations of 1,800 mg/L and 4,760 mg/L, respectively.

### Central Portion

The highest nitrate concentration in the central portion was 67 mg/L, observed in Big Sky Dairy well 833-02. The upgradient extent of the central portion nitrate plume is defined by Buena Vista Dairy II well 74-03 where nitrate was not detected above the laboratory RL. The downgradient extent is defined by Las Cruces Community Farms (formerly McAnally Enterprises) well MW-4, with a below-standard concentration of 2.2 mg/L. Historically, the eastern cross-gradient extent of the plume was defined by wells DAD-07 and DAD-15. Nitrate in these wells exceeded the standard at a concentration of 18 mg/L and 12 mg/L, respectively. The western extent is defined by AP wells DAD-04 and DAD-16; nitrate concentrations remain below the standard in these wells.

Chloride and TDS concentrations were generally at or above standards in wells within the central portion of the Dairies. Chloride was below the standard in downgradient AP well DAD-17 at a concentration of 180 mg/L. TDS was below the standard in AP well DAD-17 at a concentration of 972 mg/L. The highest chloride and TDS concentrations were observed at AP well DAD-08 at 2,000 mg/L and 5,040 mg/L, respectively. Well DAD-08 is located east of Sunset Dairy, adjacent to an irrigation well that is no longer in use. Since 2018, concentrations of chloride have generally been stable and TDS concentrations have been decreasing.

Anomalously high TDS concentrations detected in Buena Vista Dairy II wells 74-01 and 74-02 in November 2020 samples are no longer present. Concentrations were within historical ranges in May 2021.

### Southern Portion – Regional and Perched Aquifers

Wells completed in the regional aquifer in the southern portion of the dairies include AP well DAD-10 and Del Oro wells 692-05 through 692-09 (Figure 8). All of the sampled wells in the regional aquifer were below the NMWQCC standard for nitrate except for Del Oro well 692-05 which had a concentration of 14 mg/L. Chloride concentrations were above the NMWQCC standard and ranged from 390 mg/L in AP well DAD-10 to 570 mg/L in Del Oro Dairy well 692-07. TDS ranged from 1,330 mg/L in AP well DAD-10 to 1,620 mg/L in Del Oro well

692-07.

Wells completed in the perched aquifer in the southern portion that are sampled on a quarterly basis by DAD include wells 692-02, 629-04, DAD-09, DAD-20, DAD-21, DAD-22, and DAD-26 (Figure 9). A water line located at the intersection of East O'Hara Road and Anthony Drive is suspected to be compromised and has impacted analyte concentrations in the perched aquifer. Based on groundwater elevation and groundwater concentration data, it is likely the water line started to leak before May 2019.

Nitrate was at or above the standard in monitoring wells in the perched aquifer except Del Oro well 692-02, which is located near the suspected water line leak. The highest concentration was detected at AP well DAD-21 with a concentration of 120 mg/L. The downgradient extent of the plume is not defined. A modified Abatement Plan proposal to address this has been submitted to NMED. Chloride concentrations ranged from 280 mg/L in Del Oro well 692-02 to 950 mg/L in AP well DAD-21. TDS in the perched aquifer ranged from 892 mg/L in Del Oro well 692-02 to 3,330 mg/L in AP well DAD-21.

#### 4.0 CONCLUSION AND RECOMMENDATIONS

This groundwater monitoring event included the gauging of all accessible DP and AP wells and sampling of all accessible wells that contained sufficient water. Based on the data collected, the following conclusions and recommendations are presented:

- Depth to groundwater ranged from 12.38 feet below top-of-casing (ft btoc) in Sunset well 257-03 to 132.96 ft btoc in Dominguez 2 well 42-12.
- All areas of the regional aquifer and the southern perched aquifer saw a decrease in groundwater elevations relative to February 2021.
- The groundwater flow direction in the northern area varied from southeast to east-northeast. In the central area, groundwater flowed generally to the southeast. Groundwater flow direction in the southern regional aquifer was to the south. Groundwater flow direction in the southern perched aquifer is radially west and south from Del Oro well 692-02 where there is a suspected water line leak. The hydraulic gradient across the Dairies in the regional aquifer was approximately 0.001 ft/ft and was approximately 0.005 ft/ft in the perched aquifer.
- Nitrate was below the NMWQCC standard of 10 mg/L in 10 of the 25 groundwater samples collected from the AP wells.
- Chloride and TDS generally remain at or above standards in wells upgradient of the northern, central, and southern portions of the plumes at the Dairies.
- A modified Abatement Plan proposal to address the nitrate plume at Del Oro Dairy has been submitted to NMED.
- When the Stage 2 Abatement Plan modification is approved, DAD-06 will be redeveloped to remove the silt that is in the bottom of the well so that groundwater can be collected for analysis.
- Elevated water levels in the southern perched aquifer are likely the result of a water line leak.
- Anomalously high TDS concentrations detected in Buena Vista Dairy II wells 74-01 and 74-02 in November 2020 samples are no longer present. Concentrations were within historical ranges in May 2021.

## 5.0 REFERENCES

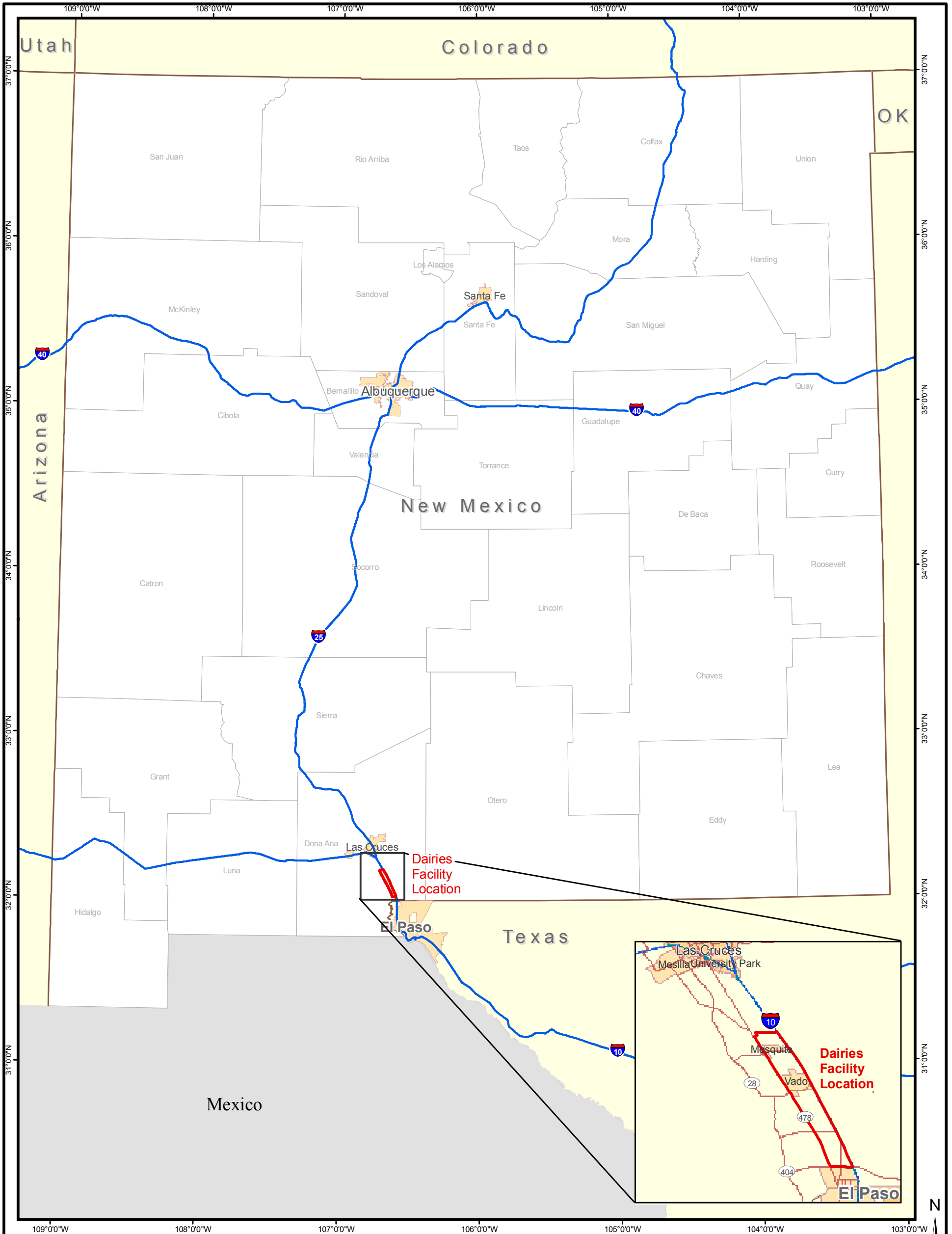
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**TABLES**

**(Provided in Electronic Format via CD Located on Front Cover of Report)**

## **FIGURES**

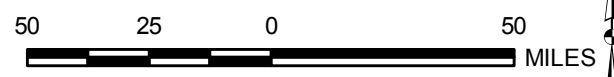


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 Facility Boundary

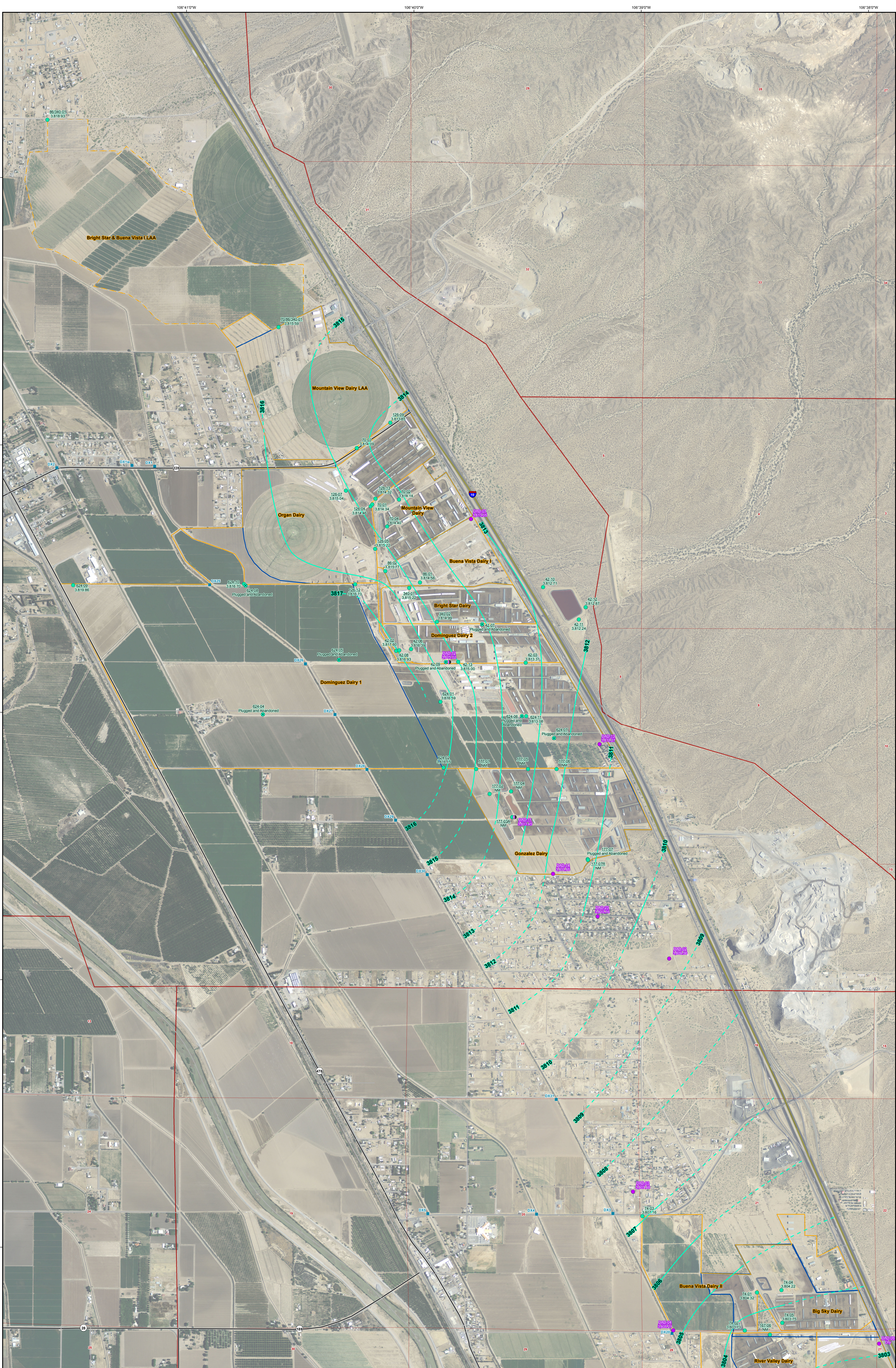
**REFERENCES**

Base Data: ESRI, 2008.



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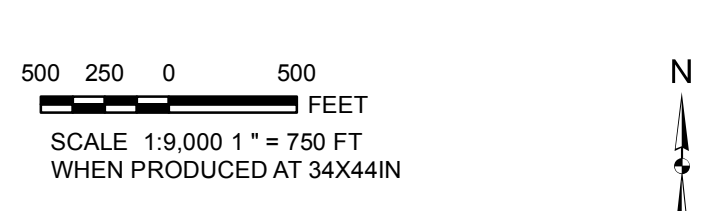
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REVIEW		<p><b>FIGURE 1</b></p>	



- LEGEND**
- Discharge Plan Well With Water Elevations (Feet MSL)
  - Abatement Plan Well With Water Elevations (Feet MSL)
  - Monitoring Well with Water Elevation (Feet MSL)
  - Discharge Plan Well - Plugged and Abandoned or Destroyed
  - Drain Crossing Location
  - Potentiometric Contour
  - Potentiometric Contour -
  - Interstate Highway
  - State Highway
  - Other Road
  - Land Owned by Dairies
  - Land Application on Non-Dairy
  - Stage 2 Abatement Plan
  - Public Land Survey System

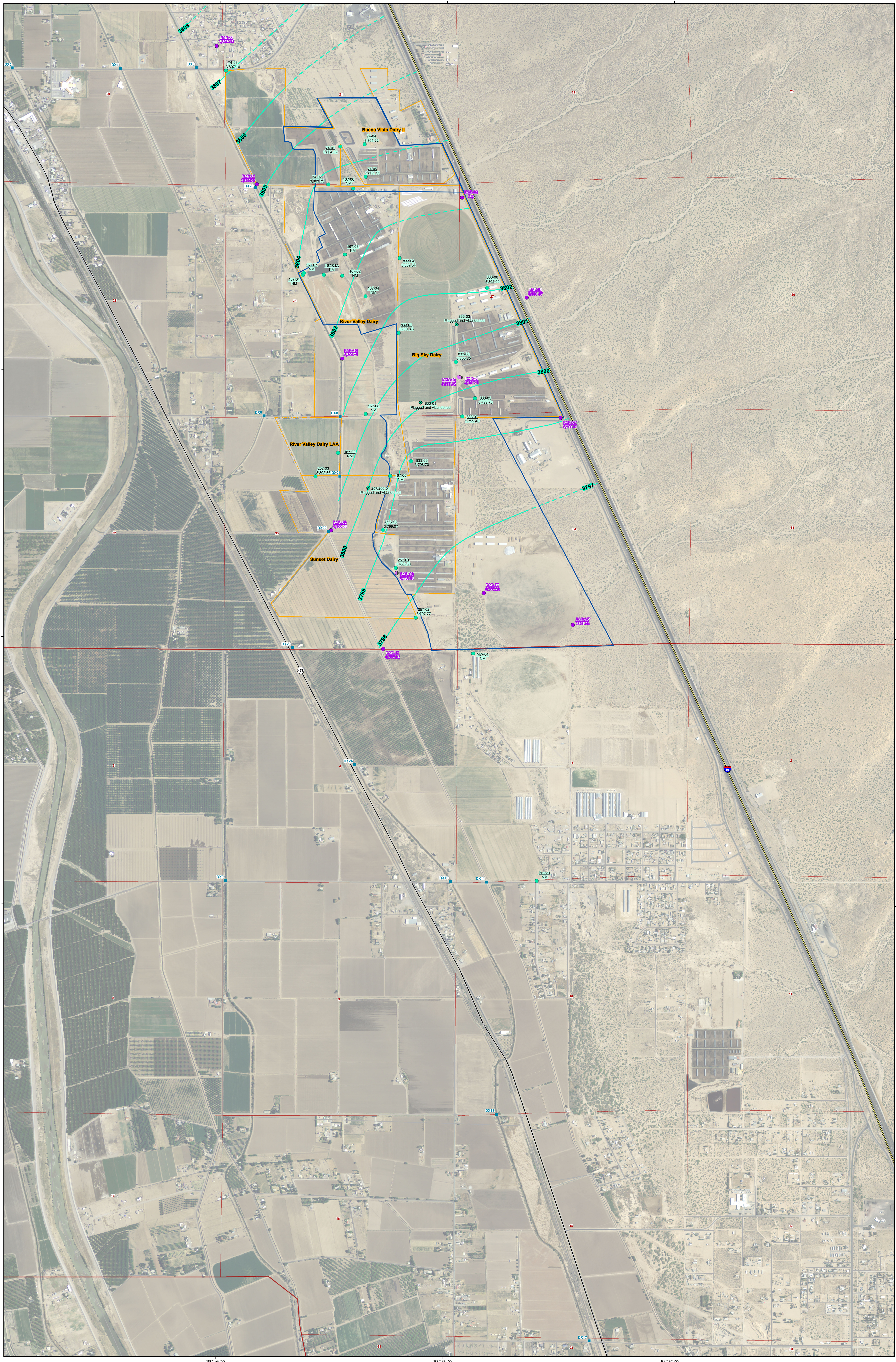
Note(s):  
 Feet MSL = Feet above mean sea level  
 NG = Not gauged

**REFERENCES**  
 Roads: Doña Ana County, 2001  
 Aerial Photography: NARP, 2011  
 PLSS: BLM, 2000  
 Projection: State Plane NAD 83 New Mexico Central (feet)



PROJECT		DOÑA ANA DAIRIES MESQUITE, NEW MEXICO	
DATE		POTENTIOMETRIC SURFACE MAP, MAY 2021, NORTHERN PORTION	
PROJECT NO.	DATE	SCALE	FIGURE 2

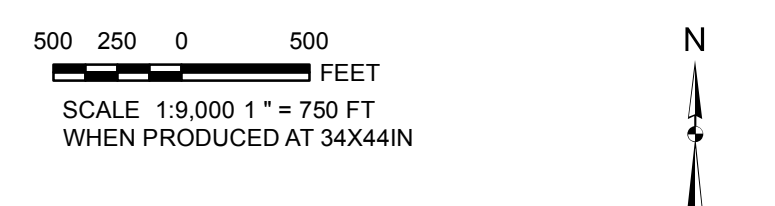
2021 0508 - P:\GIS\Projects\46103\DOA\Map\_Series\Map\_Series\_20210508.mxd - E:\MapSeries - 11.mxd



- LEGEND**
- Discharge Plan Well with Water Elevation (Feet MSL)
  - Abatement Plan Well With Water Elevations (Feet MSL)
  - Abatement Plan Vertical Delineation Well
  - Discharge Plan Well - Plugged and Abandoned
  - Drain Crossing Location
  - Potentiometric Contour
  - Potentiometric Contour - Assumed
  - Land Owned by Dairies
  - Land Application on Non-Dairy Property
  - Public Land Survey System

Note:  
 \* = Well not used in contouring  
 Feet MSL = Feet above mean sea level  
 NM = Not measured

**REFERENCES**  
 Roads: Doña Ana County, 2001  
 Aerial Photography: NARS, 2011  
 PLSS: BLM, 2000  
 Projection: State Plane NAD 83 New Mexico Central (feet)

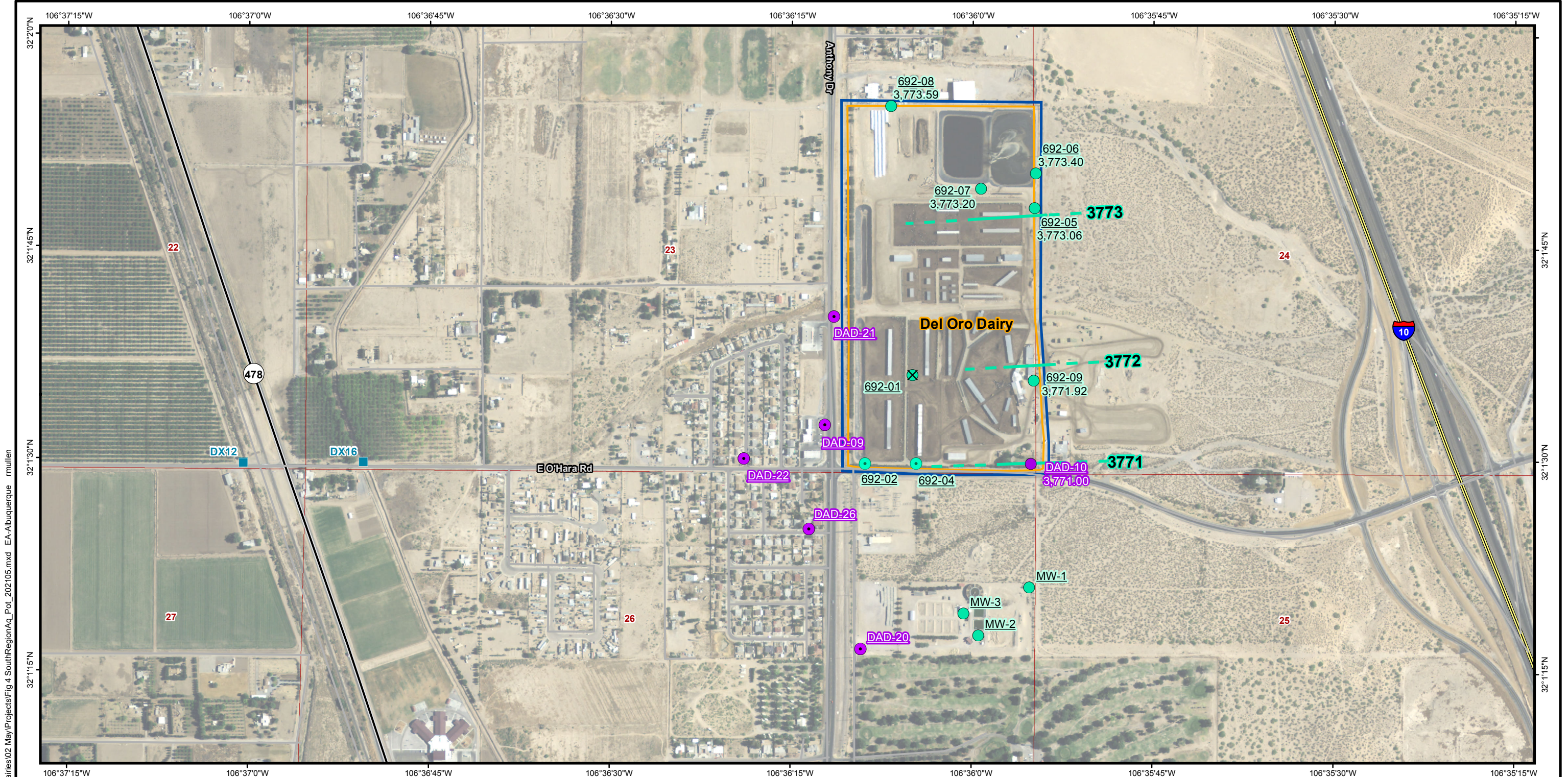


PROJECT: DOÑA ANA DAIRIES  
 MESQUITE, NEW MEXICO

MAP: POTENTIOMETRIC SURFACE MAP  
 MAY 2021, CENTRAL PORTION

PROJECT No.	1904000001	Scale:	AS SHOWN	1:9,000
DATE:	5/2021	DATE:	5/2021	DATE:
DRAWN BY:	...	CHECKED BY:	...	DATE:
DESIGNED BY:	...	APPROVED BY:	...	DATE:

**EA** FIGURE 3

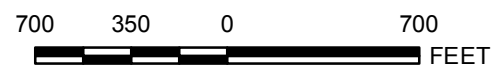


2021-07-08 P:\gis2\Commercial\1464108 Dona Ana Dairies\02 May\Projects\Fig 4 SouthRegionAq\_Pot\_202105.mxd EA-Albuquerque rmullen

**LEGEND:**

- Drain Crossing Location
  - Perched Aquifer Monitoring Well**
  - Abatement Plan Monitoring Well
  - Discharge Plan Monitoring Well
  - ⊗ Discharge Plan Well - Plugged and Abandoned
  - Regional Aquifer Monitoring Well**
  - Abatement Plan Well With Water Elevations (Feet Above Mean Sea Level)
  - Discharge Plan Well with Water Elevation (Feet Above Mean Sea Level)
  - Potentiometric Contour
  - - - Potentiometric Contour - Assumed
  - Land Owned by Dairies
  - Stage 2 Abatement Plan Area
  - Public Land Survey System
- \* Anomalous water level not used in contouring

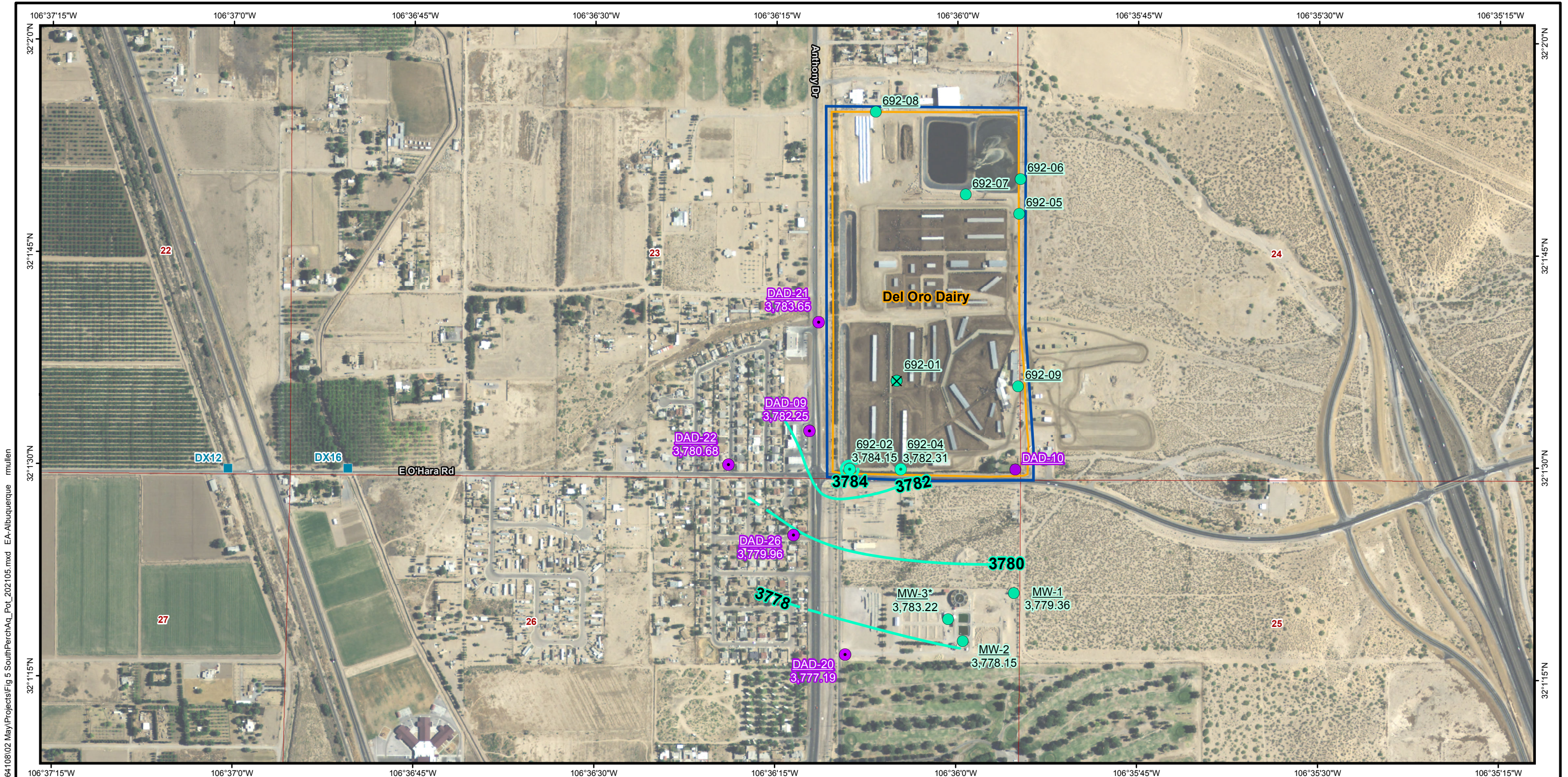
**REFERENCES**  
 Aerial Photography: NAIP, 2011  
 PLSS: BLM, 2000  
 Projection: State Plane NAD 83 New Mexico Central (feet)



SCALE 1:8,400 1" = 700 FT  
 WHEN PRODUCED AT 11X17IN



<b>DOÑA ANA DAIRIES MESQUITE, NEW MEXICO</b>			
<b>POTENTIOMETRIC SURFACE MAP MAY 2021, SOUTHERN PORTION REGIONAL AQUIFER</b>			
	PROJECT No. 1464108.02		Fig 4 SouthRegionAq_Pot.mxd
	DESIGN	NA	SCALE AS SHOWN
	GIS	RMM	REV 0
	CHECK		
	REVIEW		
			<b>FIGURE 4</b>

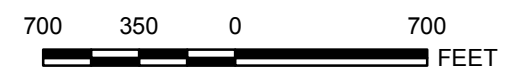


2021-08-23 P:\gis2\Commercial\Doña Ana Dairies - 1464108\02 May\Projects\Fig 5 SouthPerchAq\_Pot\_202105.mxd EA-Abuquerque rmlullen

**LEGEND:**

- Drain Crossing Location
- Perched Aquifer Monitoring Well**
- Abatement Plan Monitoring Well With Water Elevations (Feet Above Mean Sea Level)
- Discharge Plan Monitoring Well With Water Elevations (Feet Above Mean Sea Level)
- ✕ Discharge Plan Well - Plugged and Abandoned
- Regional Aquifer Monitoring Well**
- Abatement Plan Monitoring Well
- Discharge Plan Monitoring Well
- Potentiometric Contour
- - - Potentiometric Contour - Assumed
- Land Owned by Dairies
- Stage 2 Abatement Plan Area
- Public Land Survey System

**Note:**  
\* = Not used in contouring.



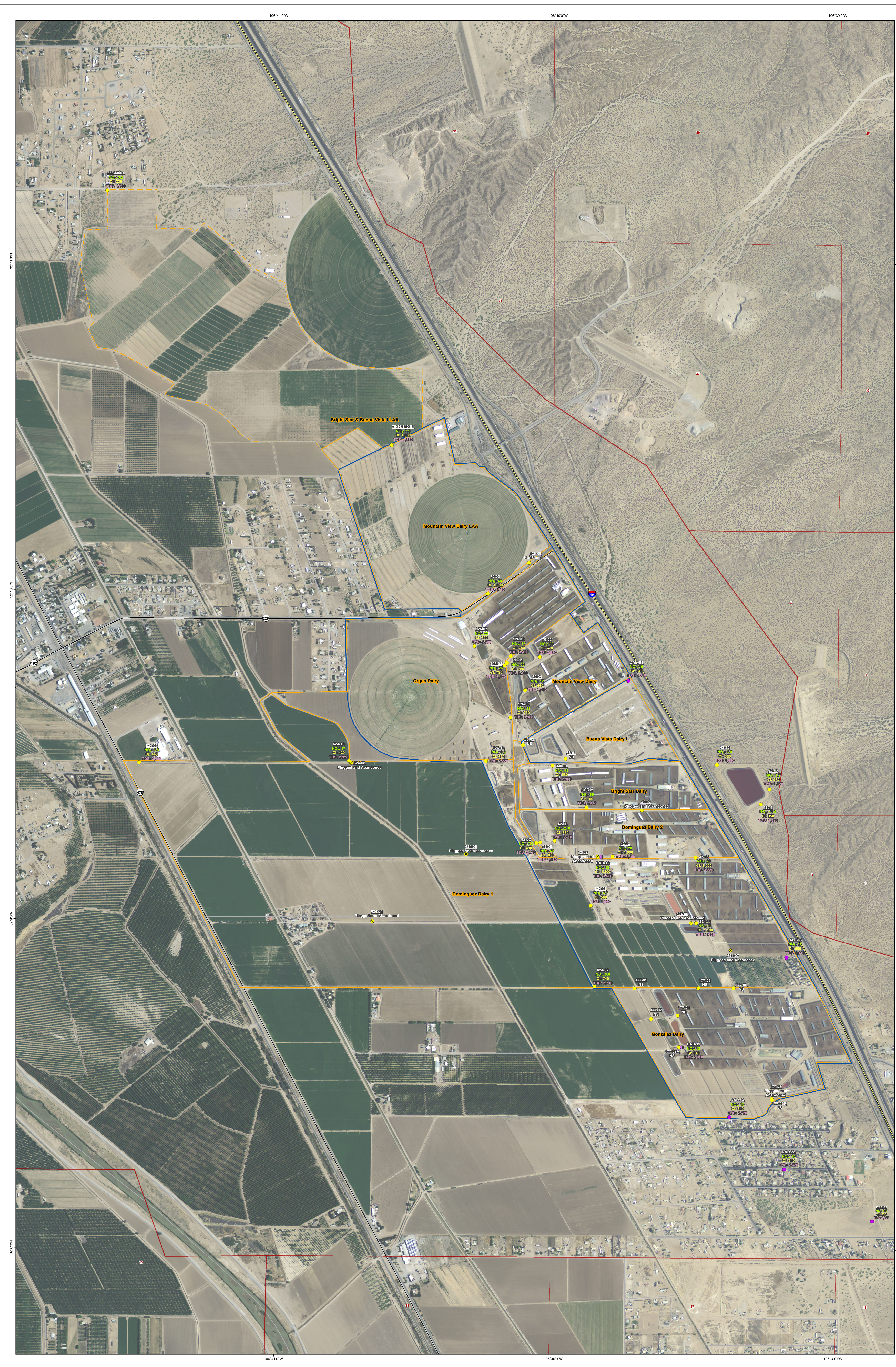
SCALE 1:8,400 1" = 700 FT  
WHEN PRODUCED AT 11X17IN



**REFERENCES**

Aerial Photography: NAIP, 2011  
PLSS: BLM, 2000  
Projection: State Plane NAD 83 New Mexico Central (feet)

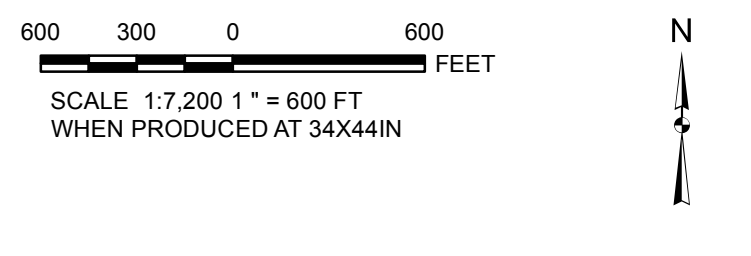
<b>PROJECT</b>			
<b>DOÑA ANA DAIRIES MESQUITE, NEW MEXICO</b>			
<b>TITLE</b>			
<b>POTENTIOMETRIC SURFACE MAP MAY 2021, SOUTHERN PORTION PERCHED AQUIFER</b>			
	PROJECT No. 1464108.02		SCALE AS SHOWN
	DESIGN	NA	REV 0
	GIS	RMM	
	CHECK		
REVIEW			<b>FIGURE 5</b>



- LEGEND:**
- Abatement Plan Monitoring Well
  - Discharge Plan Monitoring Well
  - Discharge Plan Monitoring Well, Plugged and Abandoned or Destroyed
  - Abatement Plan Vertical Delineation Monitoring Well
  - Interstate Highway
  - State Highway
  - Other Road
  - Land Owned by Dairies
  - Land Application on Non-Dairy Property
  - Stage 2 Abatement Plan Area
  - Public Land Survey System

**Notes:**  
 Units are in milligrams per liter.  
 Cl = Chloride  
 NO<sub>3</sub> = Nitrate as N  
 NS = Not Sampled  
 TDS = Total Dissolved Solids

**REFERENCES**  
 Roads: Doña Ana County, 2001  
 Aerial Photography: NAIP, 2011  
 PLSS: BLM, 2000  
 Projection: State Plane NAD 83 New Mexico Central (ft)



**DOÑA ANA DAIRIES**  
**MESQUITE, NEW MEXICO**

**GROUNDWATER ANALYTICAL RESULTS**  
**NORTHERN PORTION**

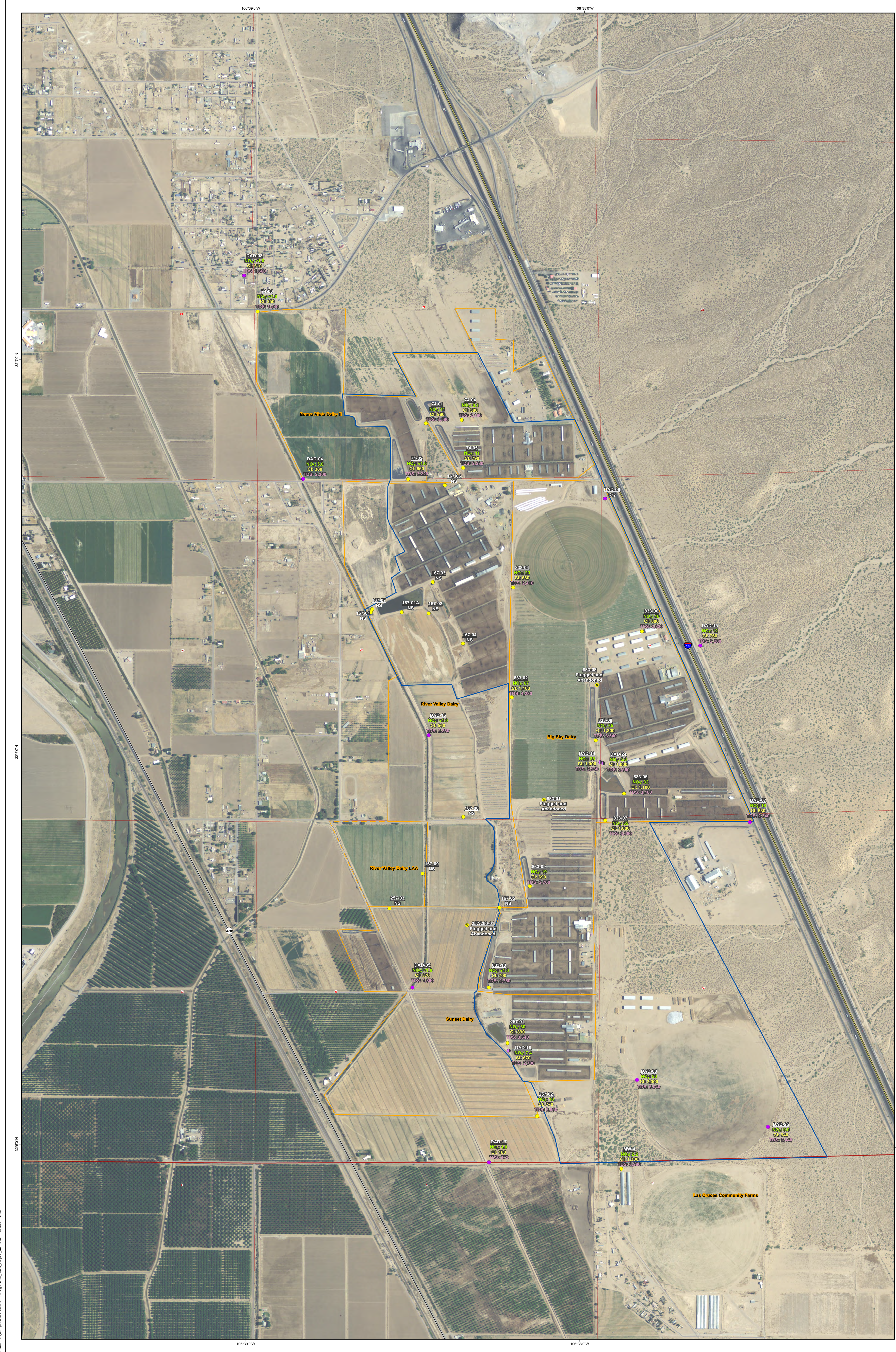
DATE: MAY 2021

**EA**

**FIGURE 6**

2021 05 20 11:45 AM C:\Users\jwheeler\Documents\20210520\1145\1145\_01.dwg

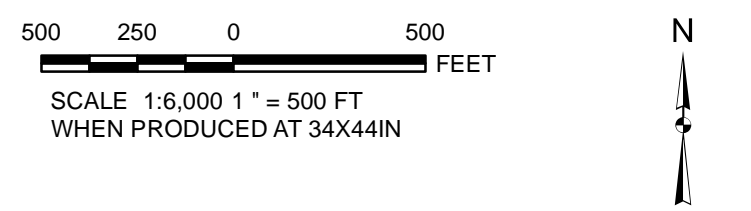




- LEGEND:**
- Abatement Plan Monitoring Well
  - Discharge Plan Monitoring Well
  - Discharge Plan Monitoring Well, Plugged and Abandoned
  - Abatement Plan Vertical Delineation Monitoring Well
  - Interstate Highway
  - State Highway
  - Other Road
  - Land Owned by Dairies
  - Land Application on Non-Dairy Property
  - Stage 2 Abatement Plan Area
  - Public Land Survey System

**Notes:**  
 Units are in milligrams per liter.  
 Cl = Chloride  
 NO<sub>3</sub> = Nitrate as N  
 NS = Not Sampled  
 TDS = Total Dissolved Solids

**REFERENCES**  
 Roads: Doña Ana County, 2011  
 Aerial Photography: NAIP, 2011  
 PLSS: BLM, 2000  
 Projection: State Plane NAD 83 New Mexico Central (feet)



PROJECT: DOÑA ANA DAIRIES  
 MESQUITE, NEW MEXICO

GROUNDWATER ANALYTICAL RESULTS  
 CENTRAL PORTION

DATE: MAY 2021

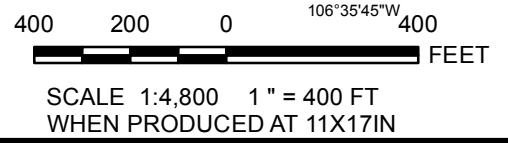
FIGURE 7

2021 0523 P:\Projects\104021001\104021001.dwg, Current, 2021/05/23 10:41:58 AM, 104021001.dwg

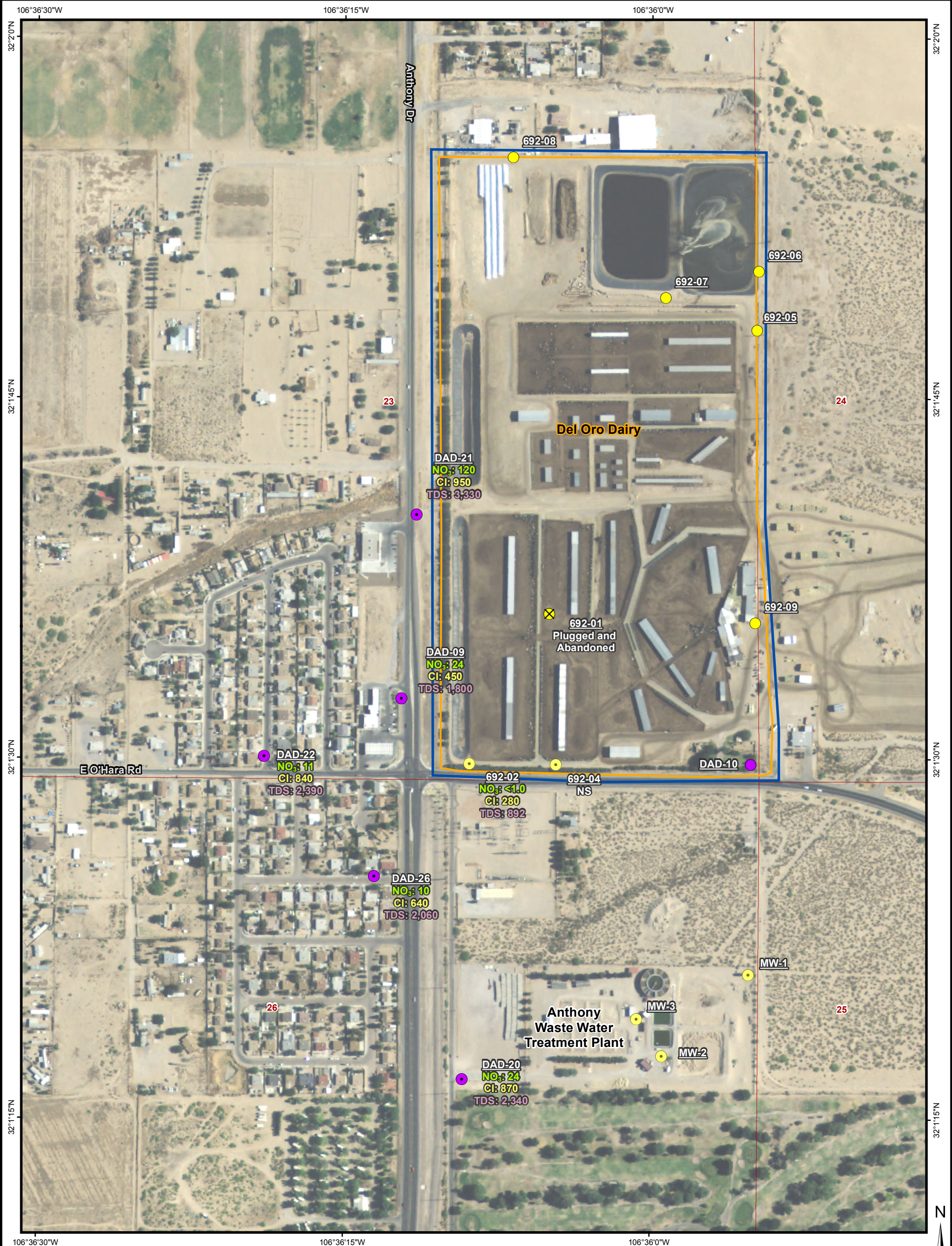


**LEGEND :**

- Dairy Irrigation/Supply Well
  - Abatement Plan Monitoring Well
  - Discharge Plan Monitoring Well
  - ✕ Discharge Plan Monitoring Well - Plugged and Abandoned
  - Abatement Plan Monitoring Well
  - Discharge Plan Monitoring Well
  - Land Owned by Dairies
  - Stage 2 Abatement Plan Area
  - Public Land Survey System
- Notes:**  
 Units are in milligrams per liter.  
 \* Result represents a composite sample from a water tank supplied by wells LRG-5820, LRG-5820-S, and LRG-5820-S-2.
- Cl = Chloride  
 NO<sub>3</sub> = Nitrate as N  
 TDS = Total Dissolved Solids
- REFERENCES**  
 Aerial Photography: NAIP, 2011  
 PLSS: BLM, 2000  
 Projection: State Plane NAD 83 New Mexico Central (feet)



<b>DOÑA ANA DAIRIES MESQUITE, NEW MEXICO</b>			
<b>GROUNDWATER ANALYTICAL RESULTS JUNE 2021 SOUTHERN PORTION, REGIONAL AQUIFER</b>			
<b>PROJECT</b>	PROJECT No. 1464107.04	Fig8SouthRegionAq_Analytical.mxd	
<b>DESIGN</b>	NA	<b>SCALE</b>	AS SHOWN
<b>GIS</b>	RM	<b>REV</b>	0
<b>CHECK</b>		<b>FIGURE 8</b>	
<b>REVIEW</b>			



**LEGEND:**

- Perched Aquifer Monitoring Well
  - Abatement Plan Monitoring Well
  - Discharge Plan Monitoring Well
  - ⊗ Discharge Plan Monitoring Well - Plugged and Abandoned
  - Regional Aquifer Monitoring Well
  - Abatement Plan Monitoring Well
  - Discharge Plan Monitoring Well
- Land Owned by Dairies
  - Stage 2 Abatement Plan Area
  - Public Land Survey System

**Notes:**  
Units are in milligrams per liter.

CI = Chloride  
mg/L = Milligram(s) per liter  
NO<sub>3</sub> = Nitrate as N  
TDS = Total Dissolved Solids

**REFERENCES**

Aerial Photography: NAIP, 2011  
PLSS: BLM, 2000  
Projection: State Plane NAD 83 New Mexico Central (feet)

SCALE 1:4,800 1" = 400 FT  
WHEN PRODUCED AT 11X17IN

<b>DOÑA ANA DAIRIES MESQUITE, NEW MEXICO</b>				
<b>GROUNDWATER ANALYTICAL RESULTS JUNE 2021 SOUTHERN PORTION, PERCHED AQUIFER</b>				
	PROJECT No. 1464108.02		<b>FIGURE 9</b>	
	DESIGN	NA		SCALE AS SHOWN
	GIS	RM		REV 0
	CHECK			
REVIEW				

**APPENDIX A**

**SAMPLING FIELD FORMS**

**(Provided in Electronic Format via CD Located on Front Cover of Report)**

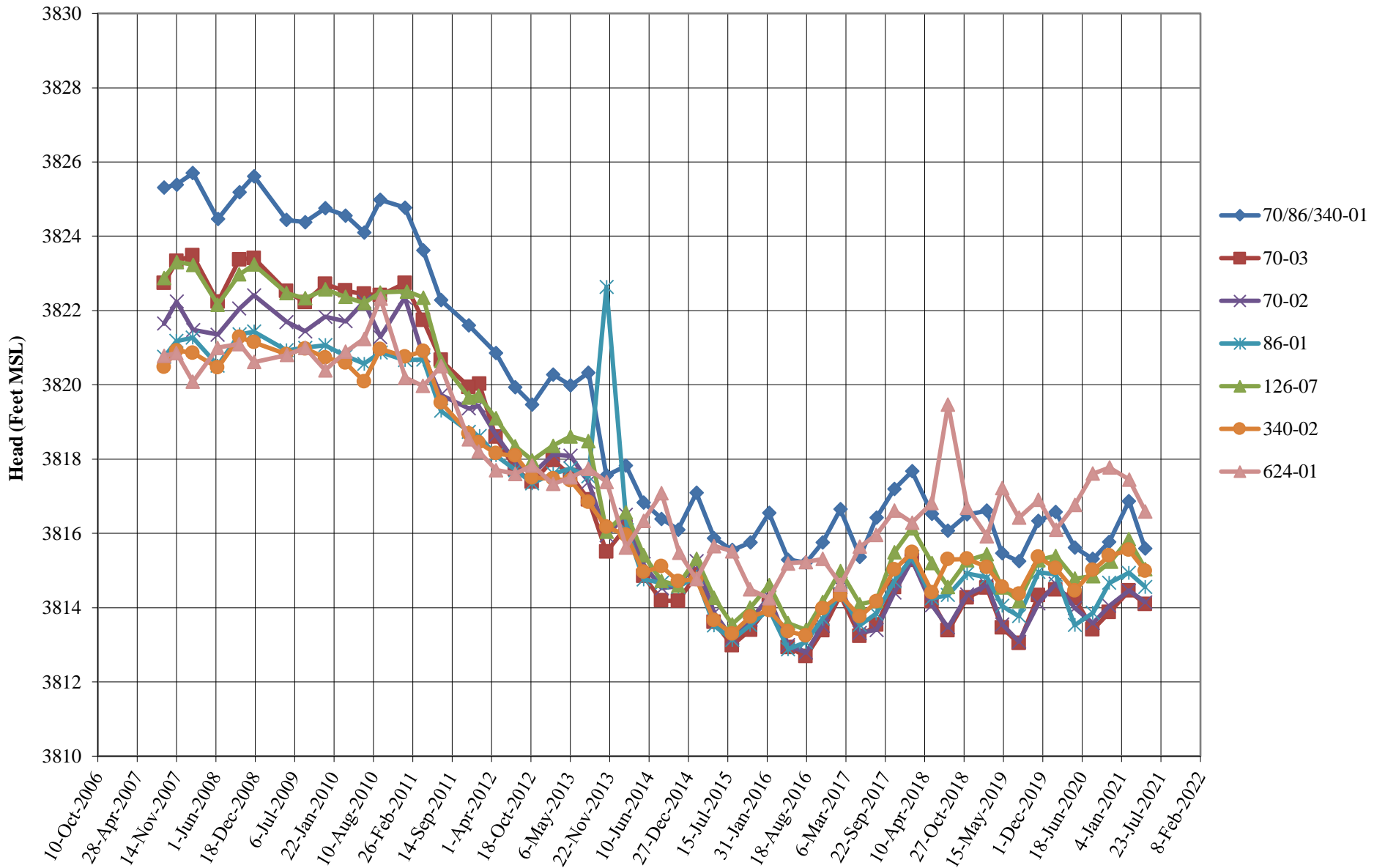
## **APPENDIX B**

### **ANALYTICAL LABORATORY REPORTS**

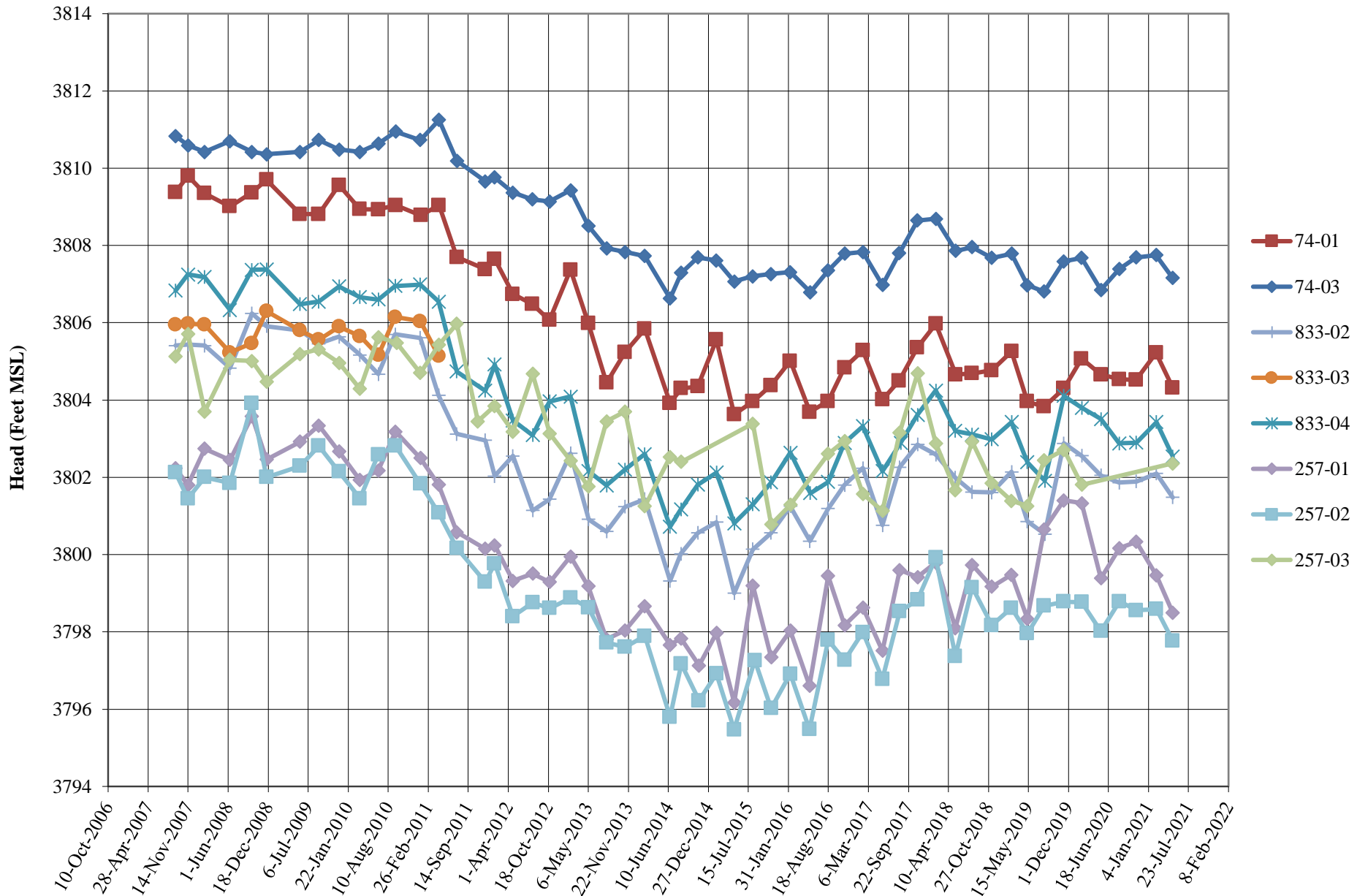
**(Provided in Electronic Format via CD Located on Front Cover of Report)**

**APPENDIX C**  
**HYDROGRAPHS BY AREA**

# HYDROGRAPHS FOR SELECT DP MONITORING WELLS NORTHERN PORTION DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO



## HYDROGRAPHS FOR SELECT DP MONITORING WELLS CENTRAL PORTION DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO

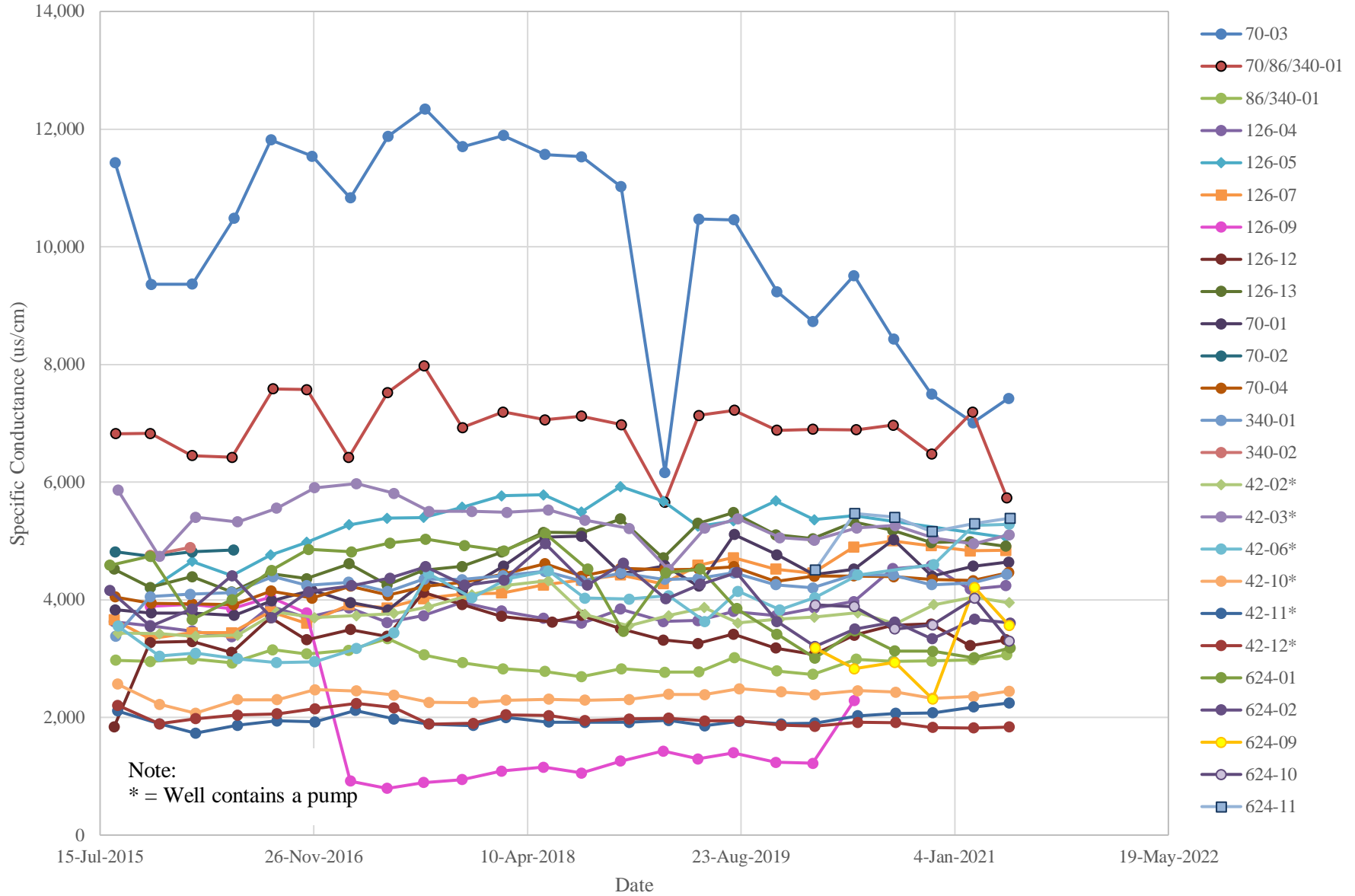




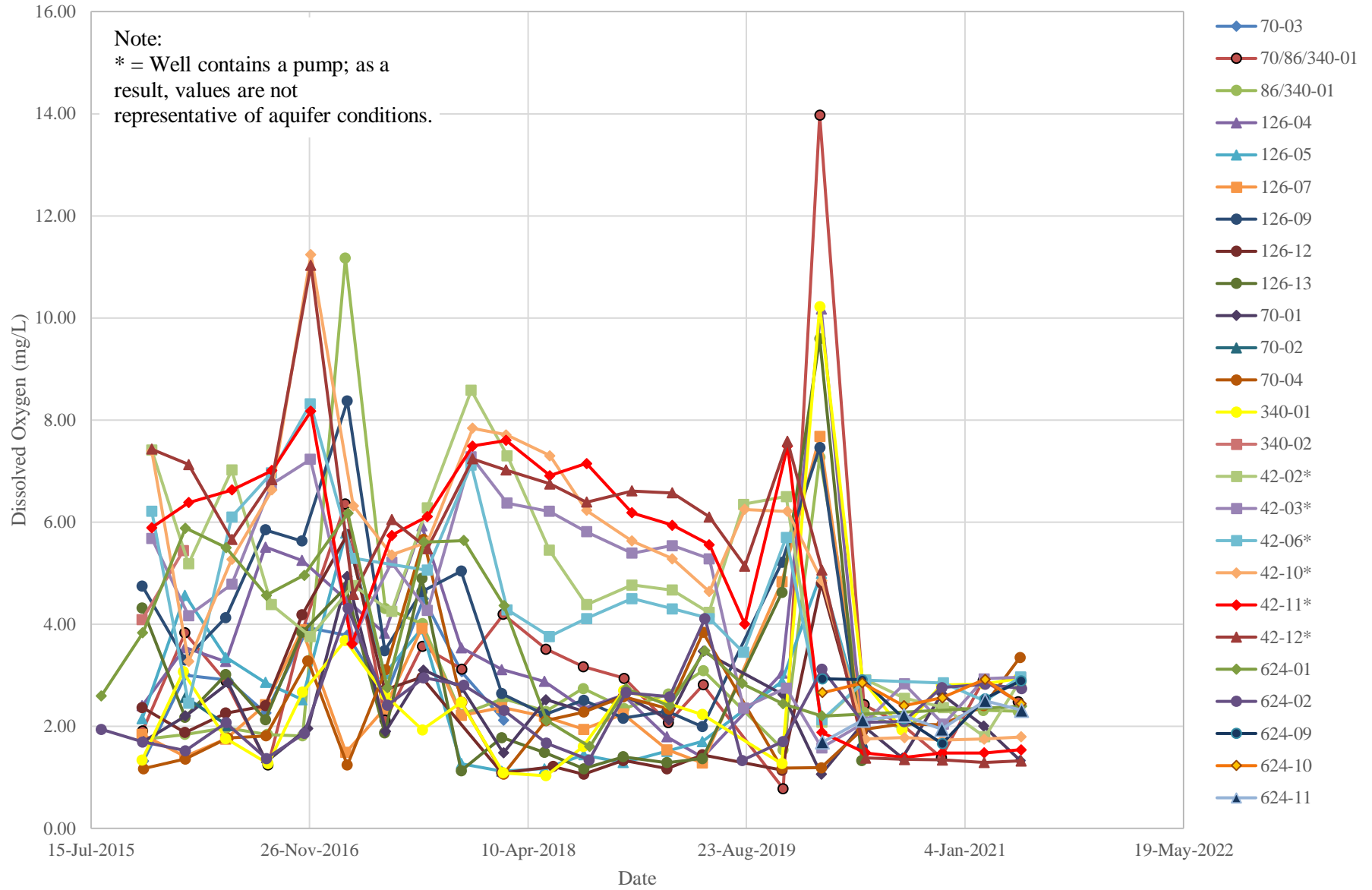


**APPENDIX D**  
**FIELD PARAMETER TRENDS BY AREA**

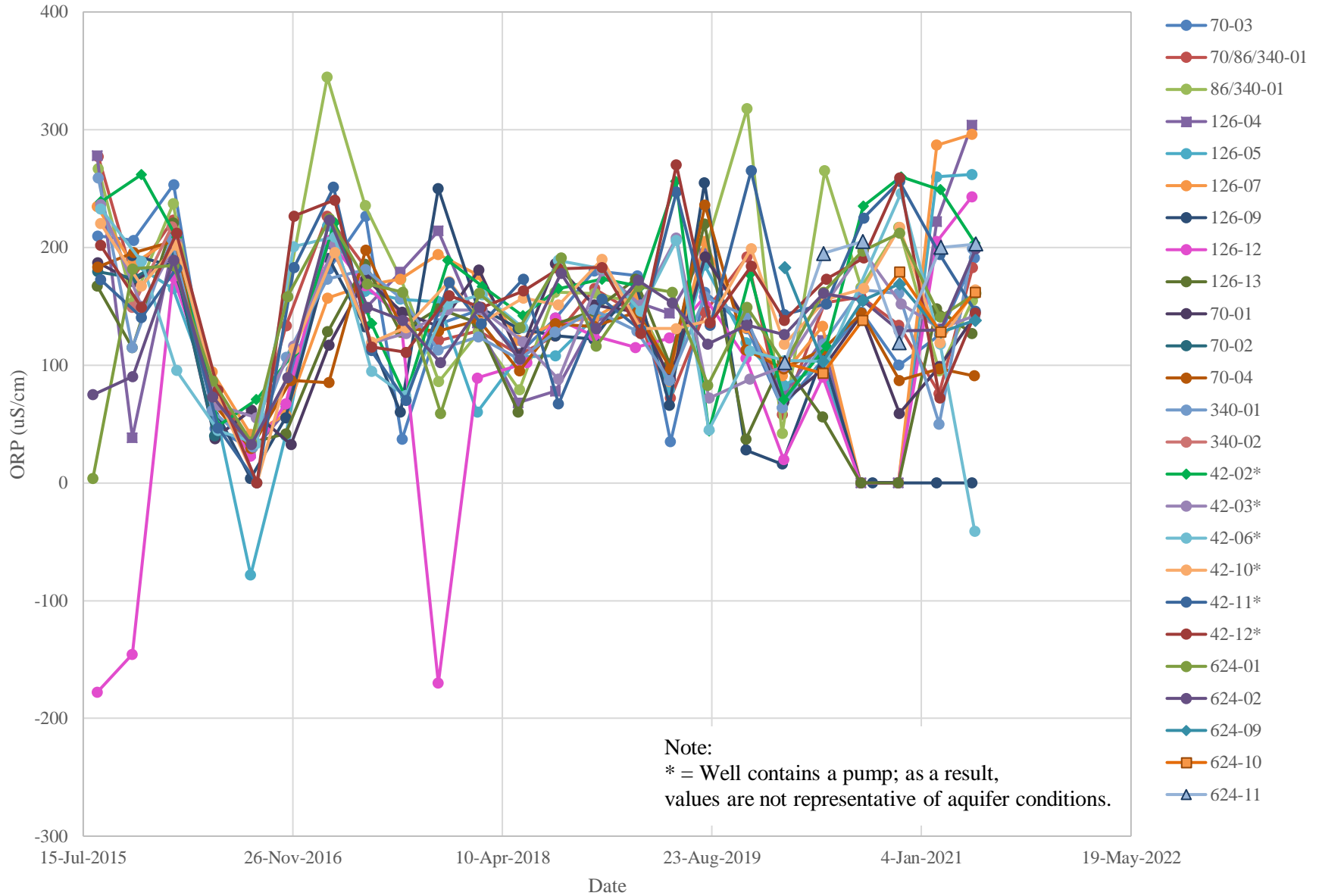
**SPECIFIC CONDUCTANCE TRENDS  
NORTHERN AREA DISCHARGE PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



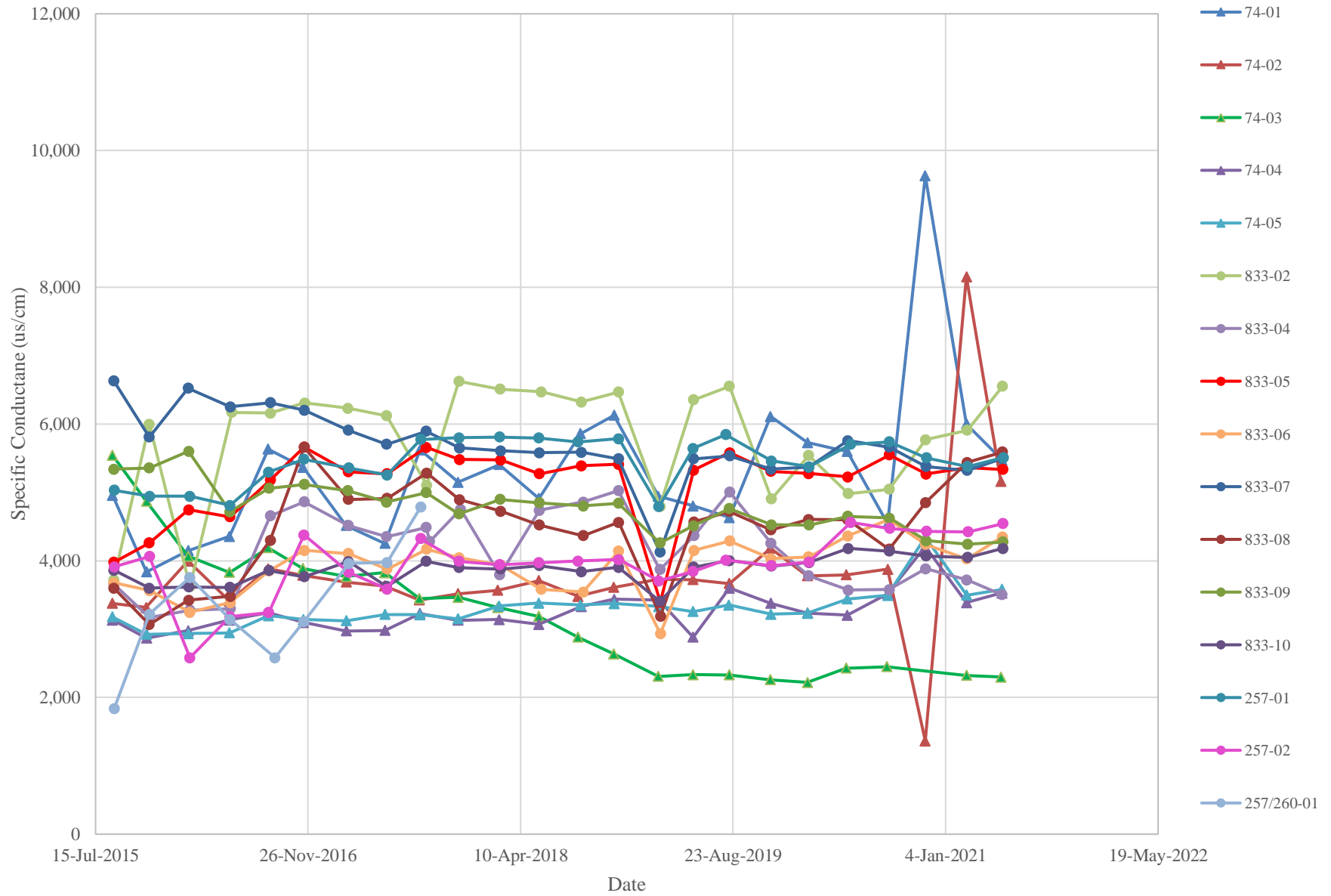
**DISSOLVED OXYGEN TRENDS  
NORTHERN AREA DISCHARGE PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



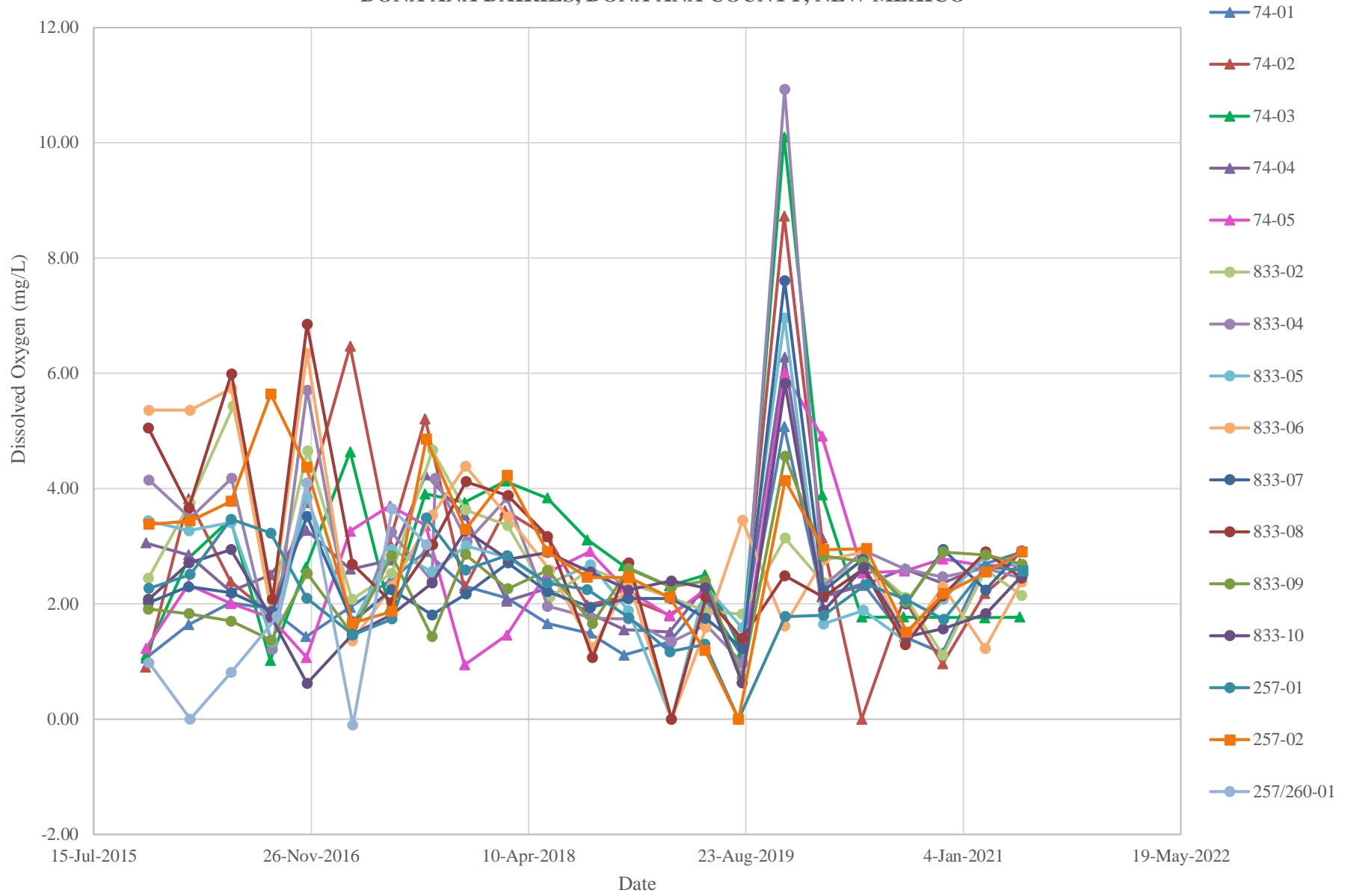
**OXIDATION-REDUCTION POTENTIAL TRENDS  
NORTHERN AREA DISCHARGE PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



SPECIFIC CONDUCTANCE TRENDS  
CENTRAL AREA DISCHARGE PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO



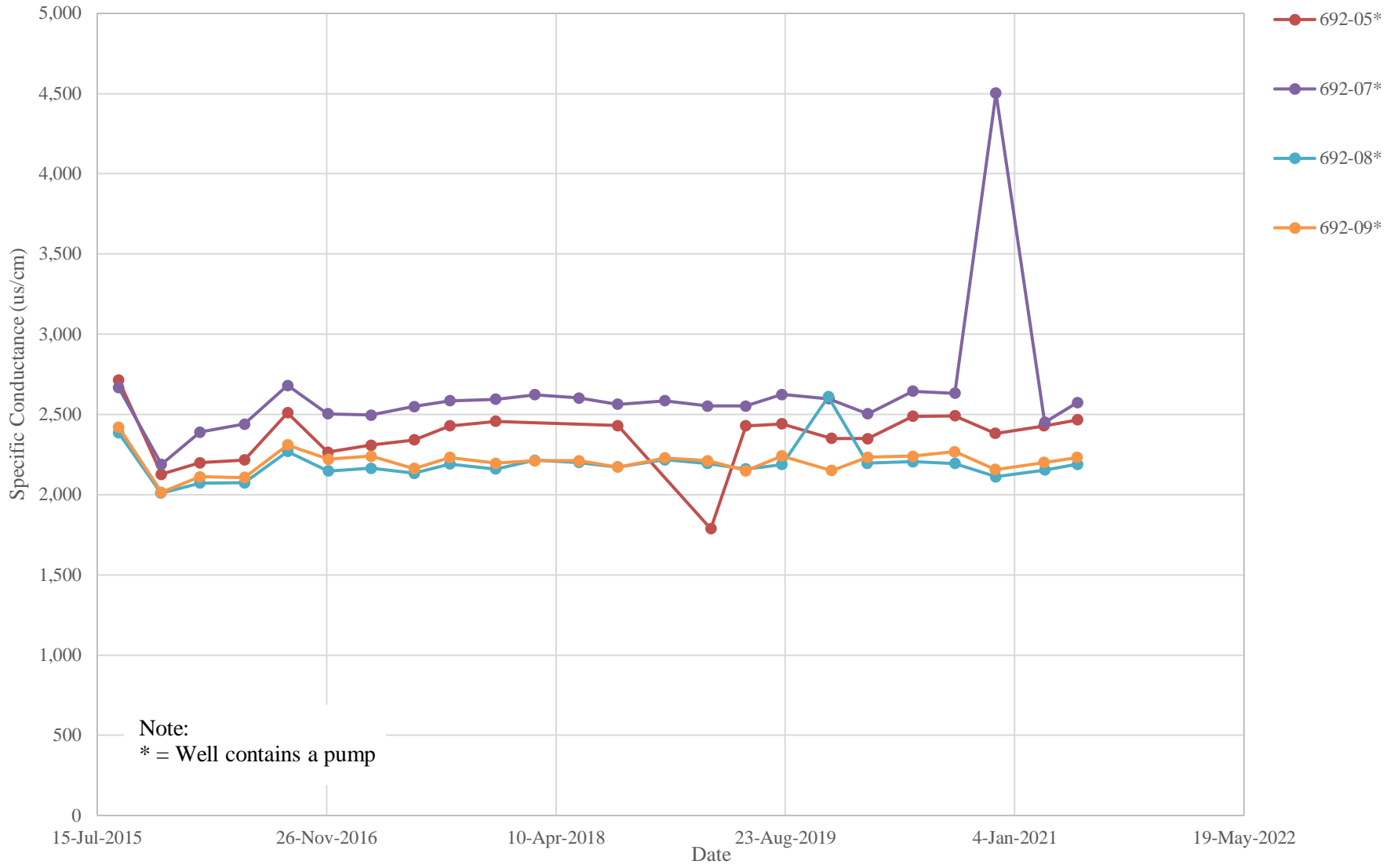
**DISSOLVED OXYGEN TRENDS**  
**CENTRAL AREA DISCHARGE PLAN MONITORING WELLS**  
**DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



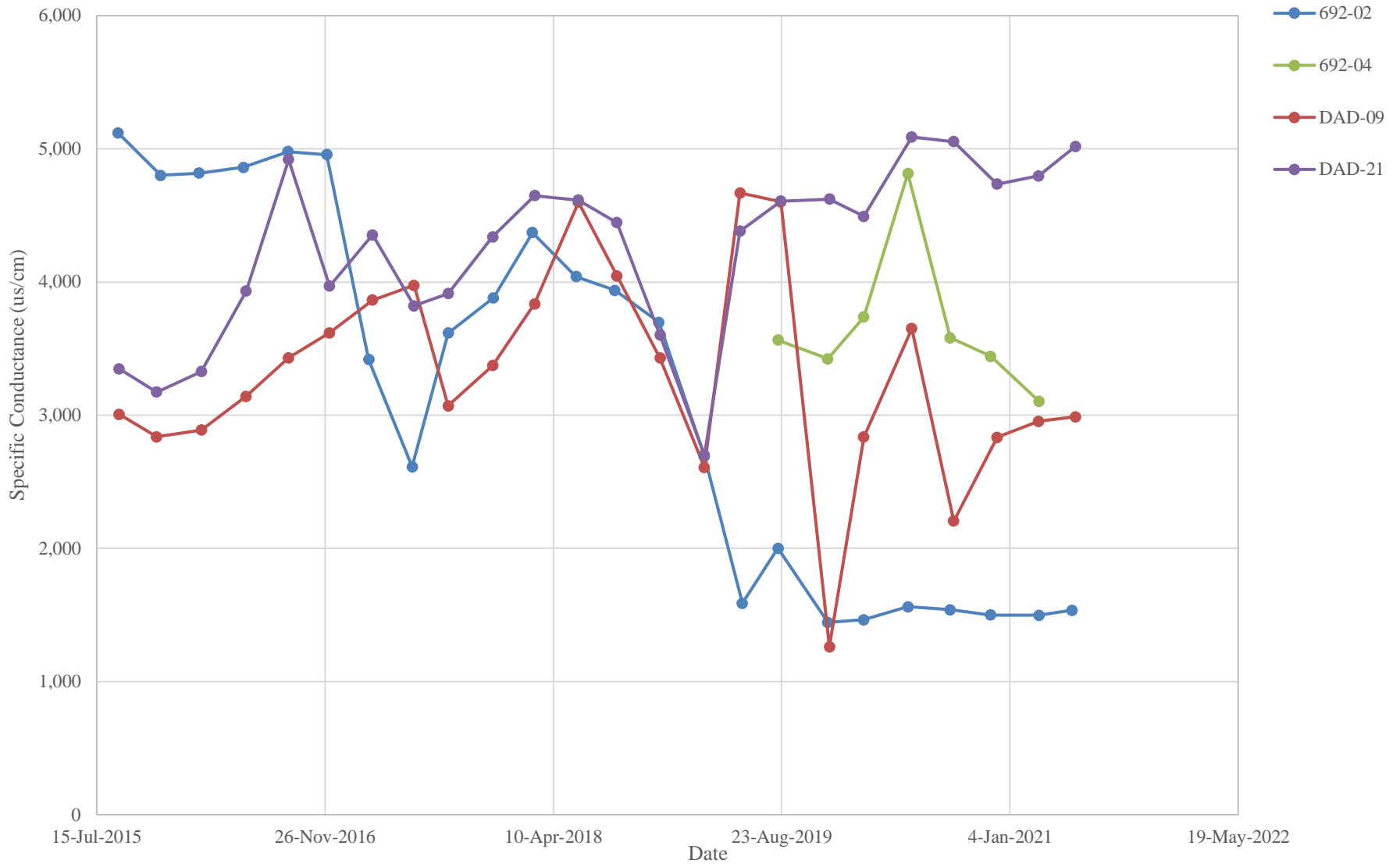




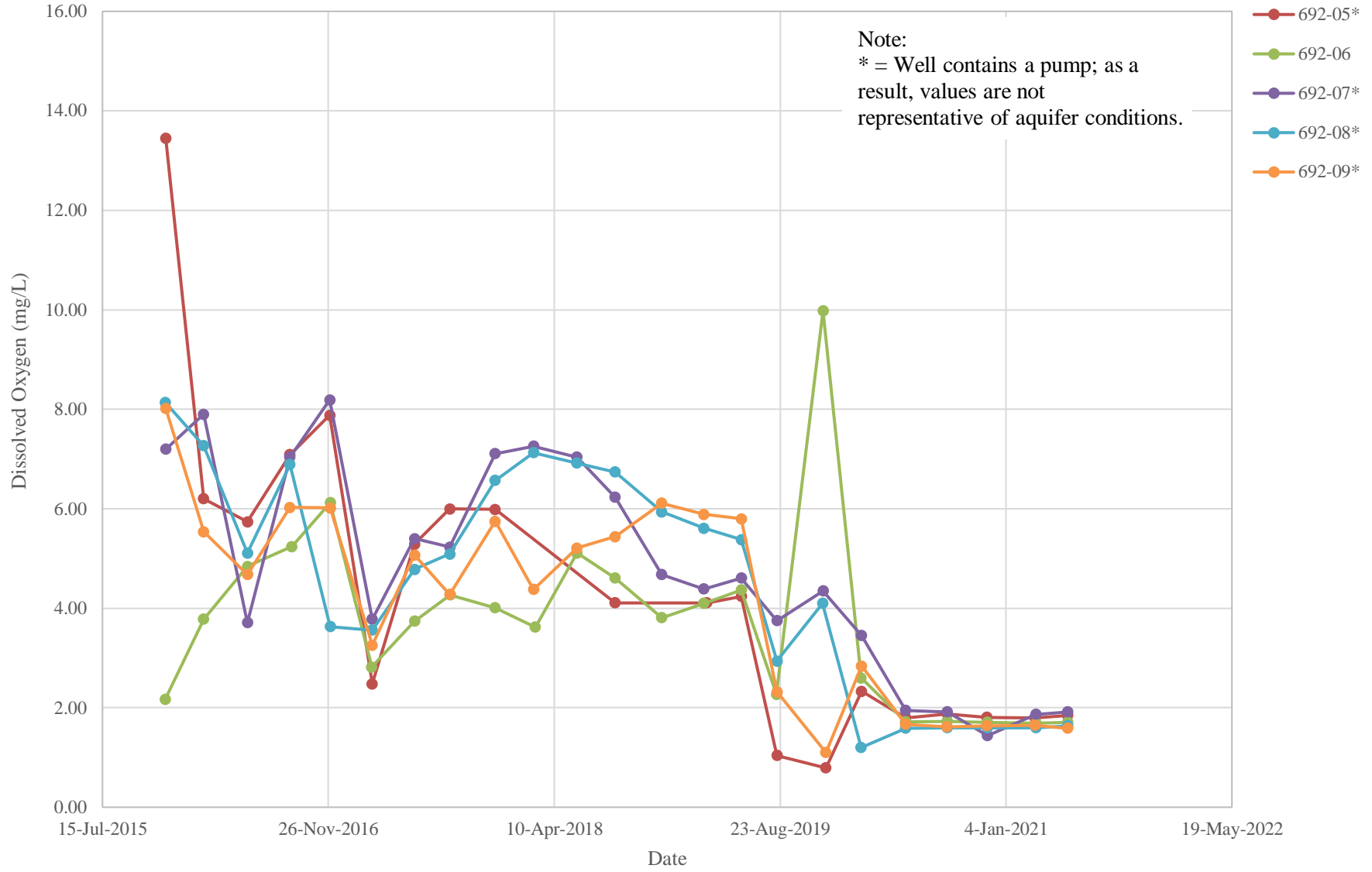
**SPECIFIC CONDUCTANCE TRENDS  
SOUTHERN AREA DISCHARGE PLAN MONITORING WELLS  
IN THE REGIONAL AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



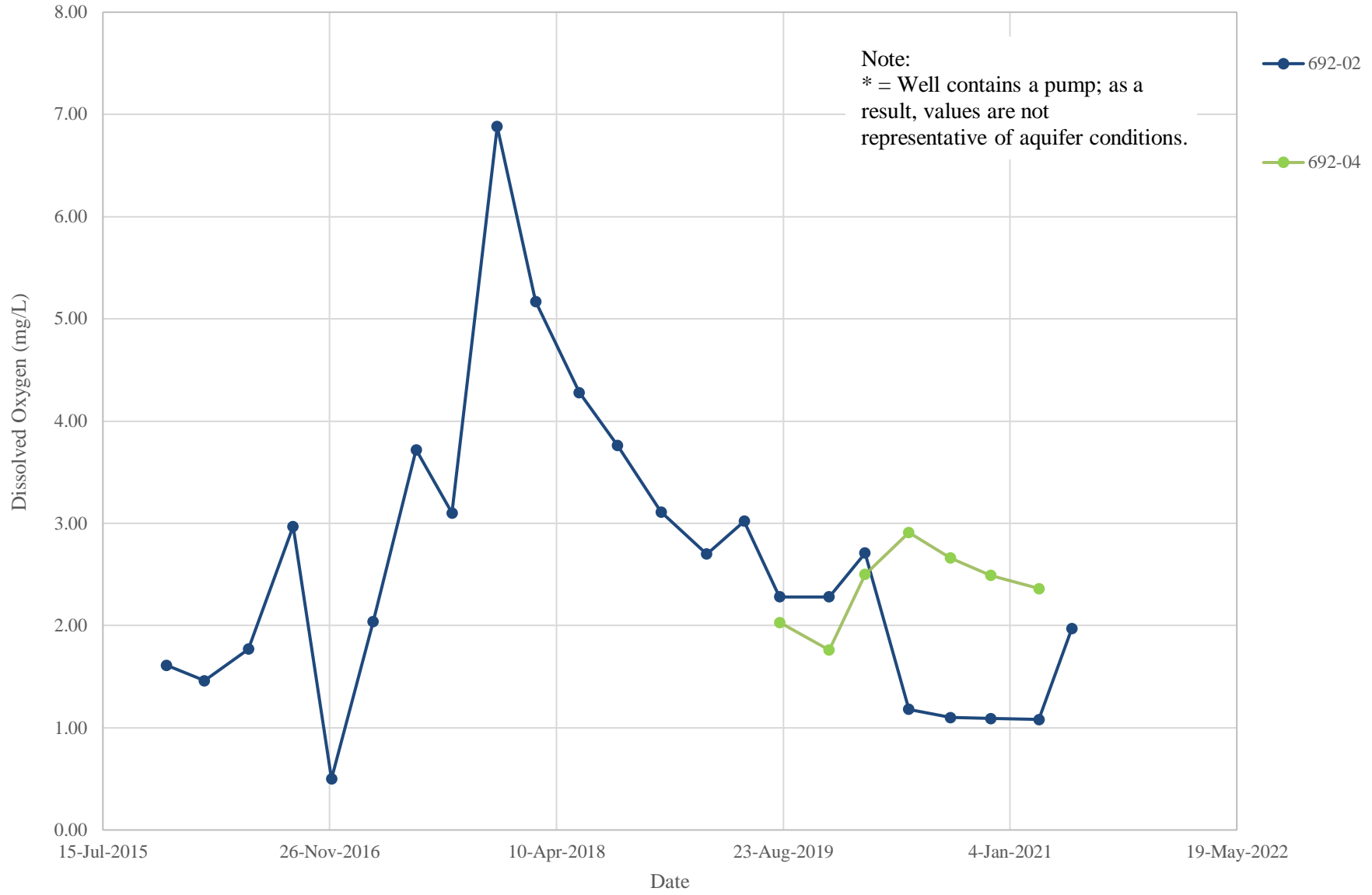
**SPECIFIC CONDUCTANCE TRENDS  
SOUTHERN AREA DISCHARGE PLAN MONITORING WELLS  
IN THE PERCHED AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



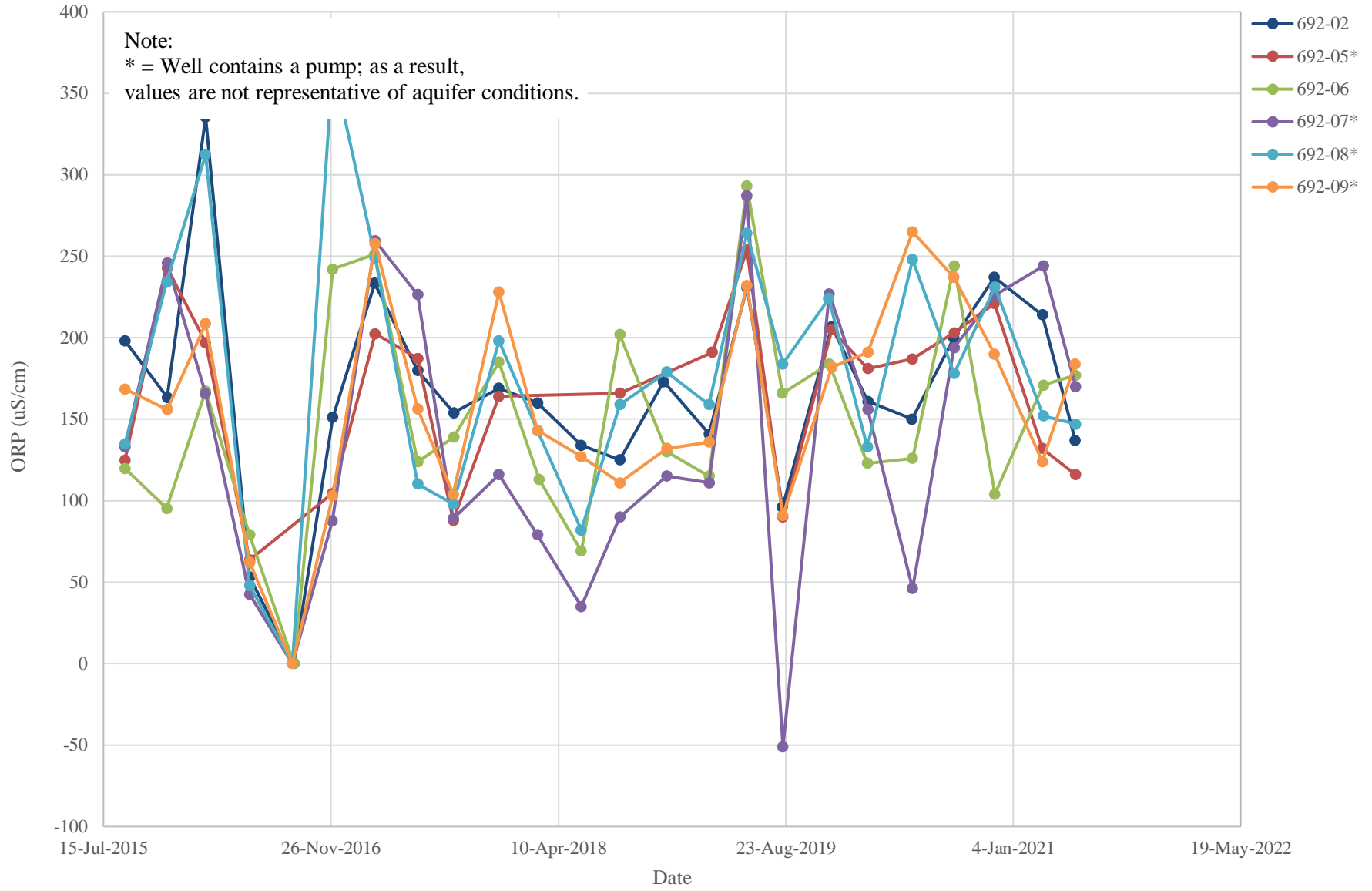
**DISSOLVED OXYGEN TRENDS  
SOUTHERN AREA DISCHARGE PLAN MONITORING WELLS  
IN THE REGIONAL AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



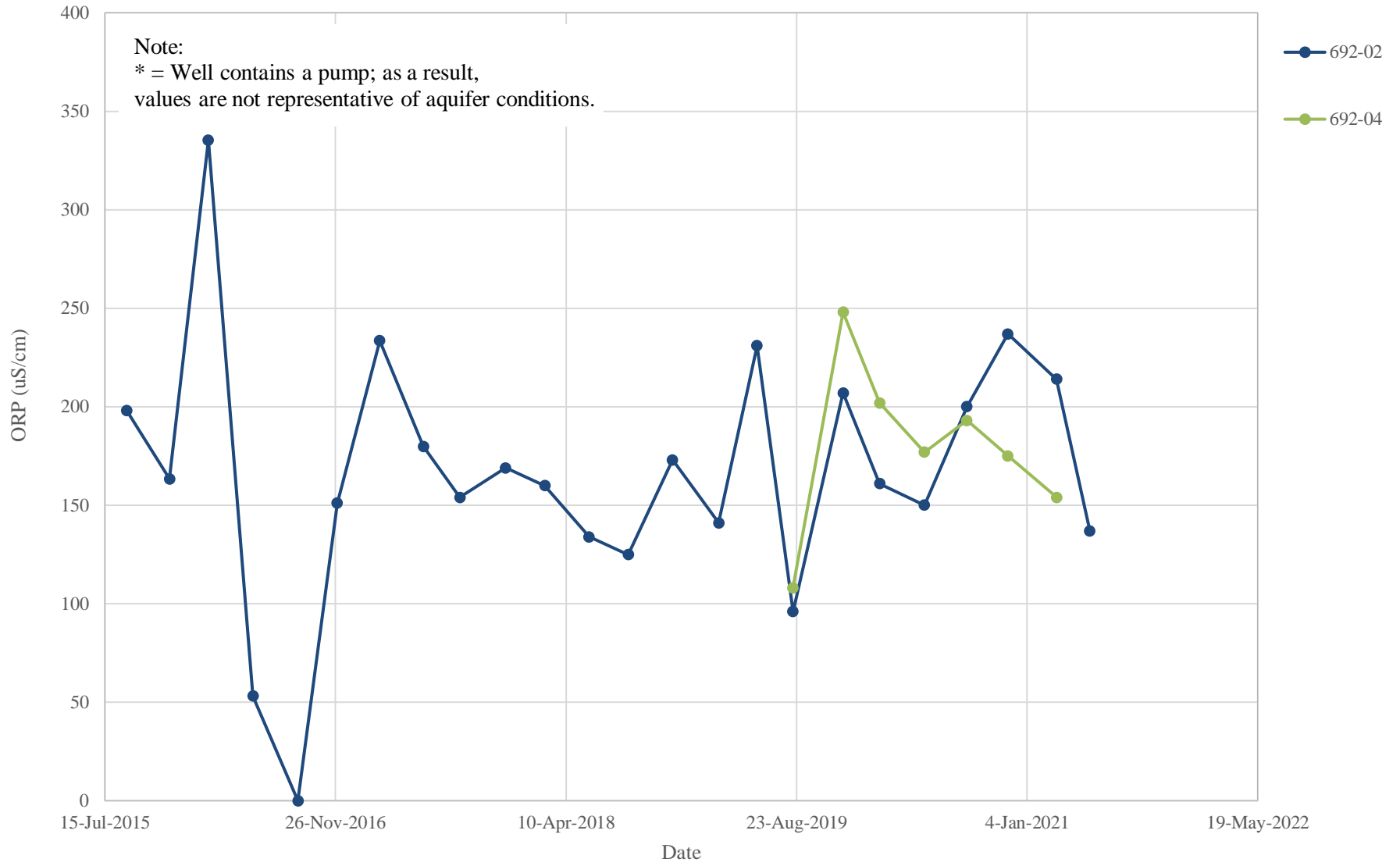
**DISSOLVED OXYGEN TRENDS**  
**SOUTHERN AREA DISCHARGE PLAN MONITORING WELLS**  
**DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



**OXIDATION-REDUCTION POTENTIAL TRENDS  
SOUTHERN AREA DISCHARGE PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



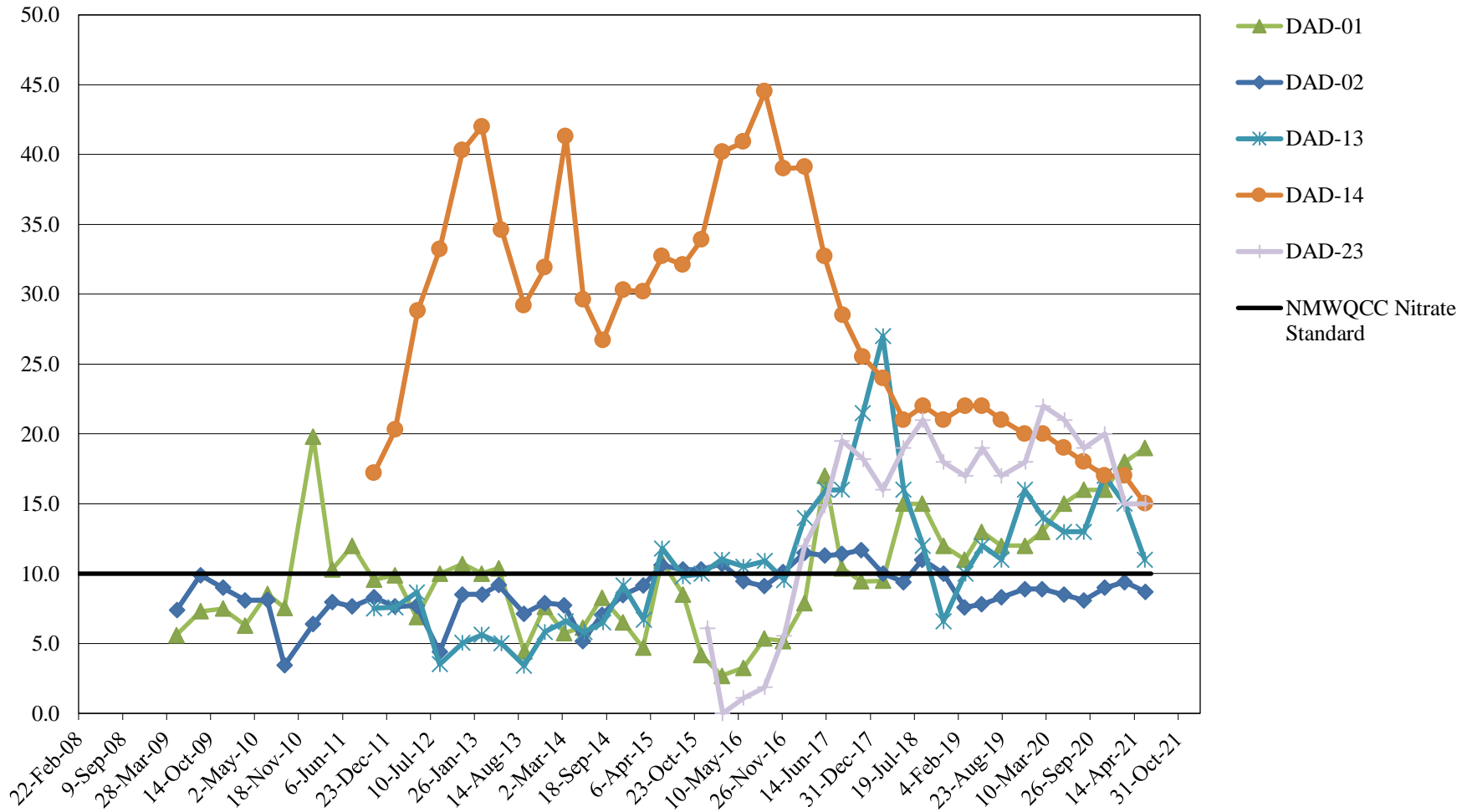
**OXIDATION-REDUCTION POTENTIAL TRENDS  
SOUTHERN AREA DISCHARGE PLAN MONITORING WELLS  
IN THE PERCHED AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



**APPENDIX E**

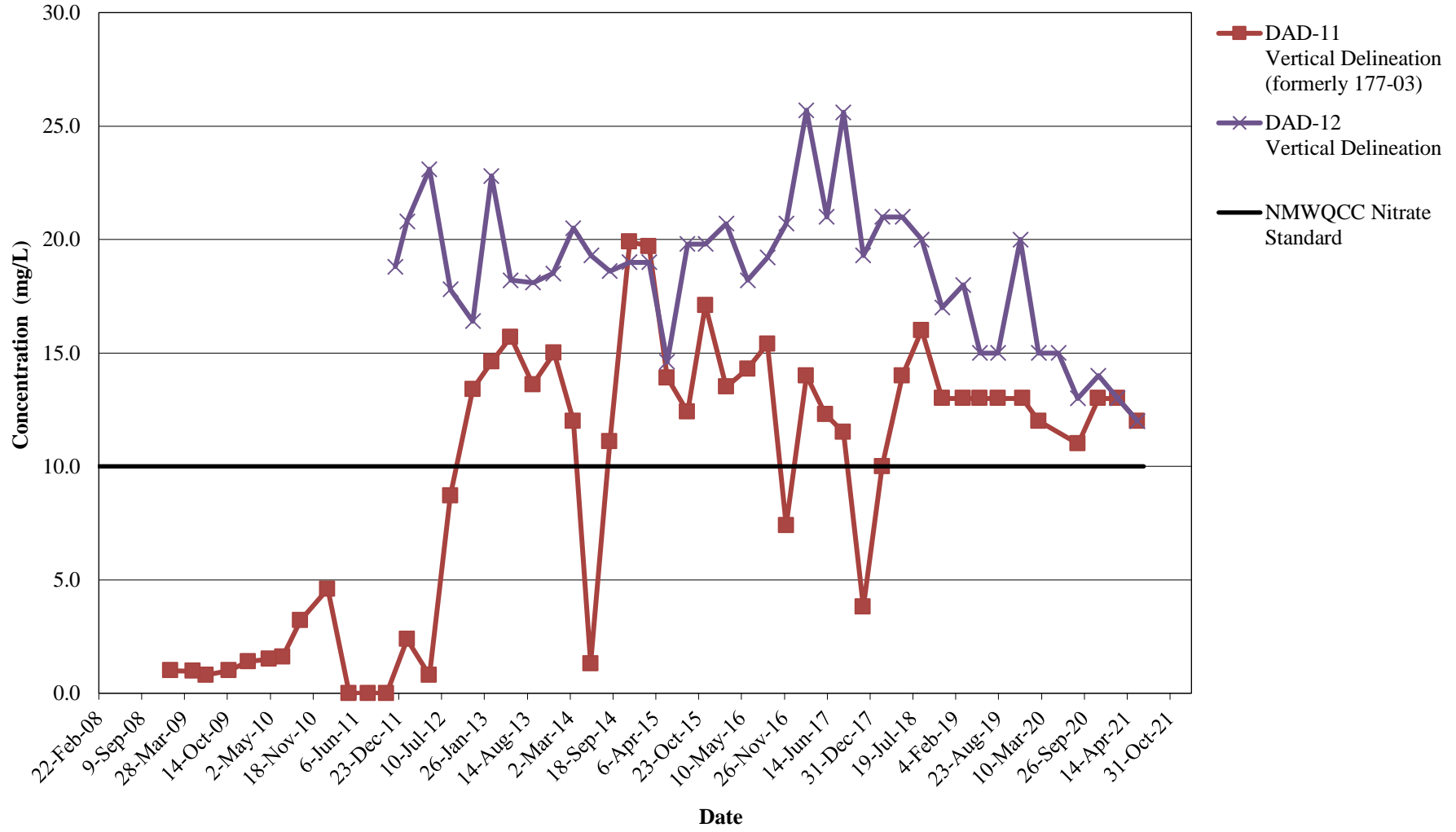
**CONCENTRATION TRENDS BY AREA -  
ABATEMENT PLAN WELLS**

**NITRATE CONCENTRATION TRENDS  
NORTHERN ABATEMENT PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**

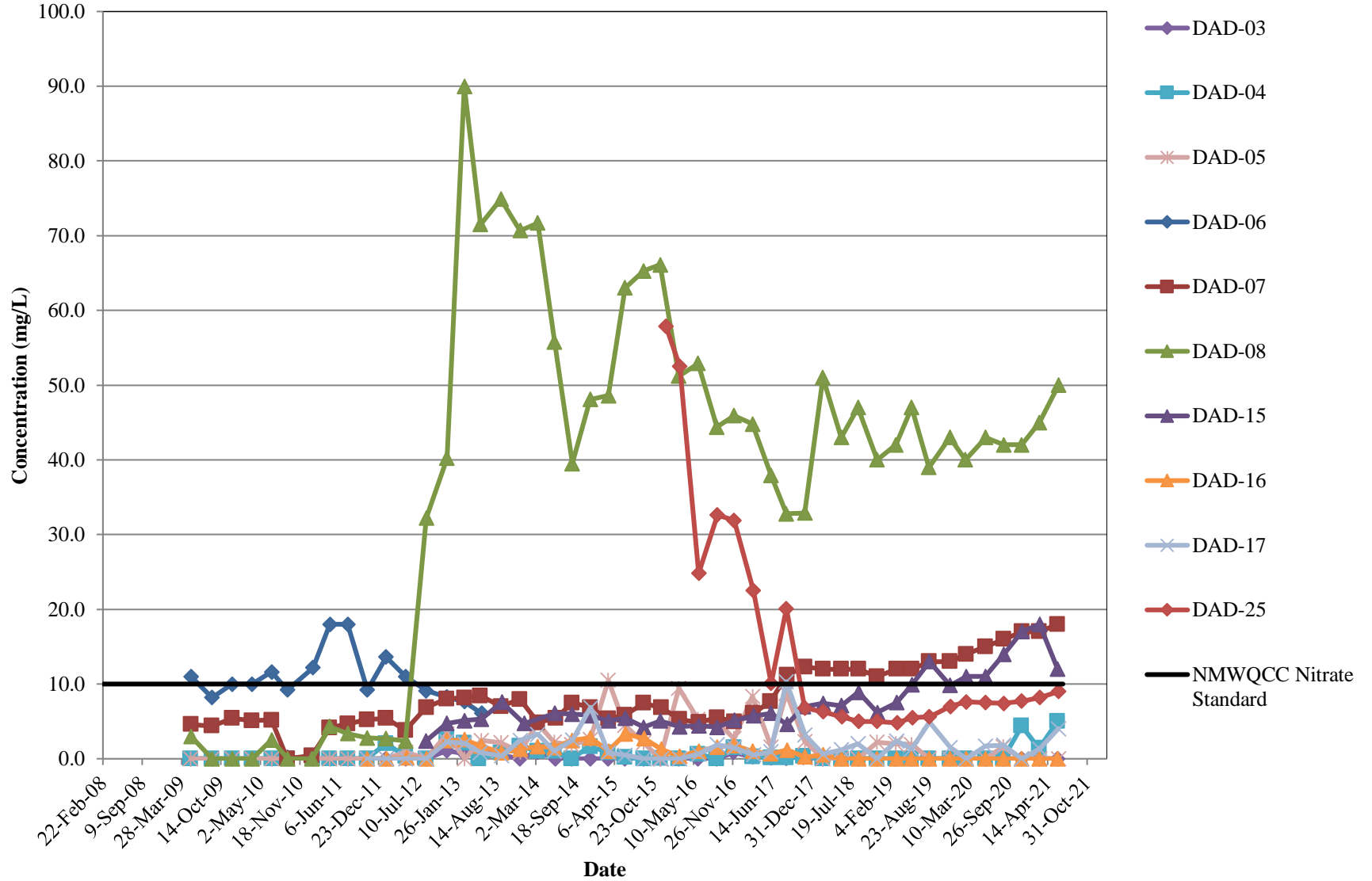




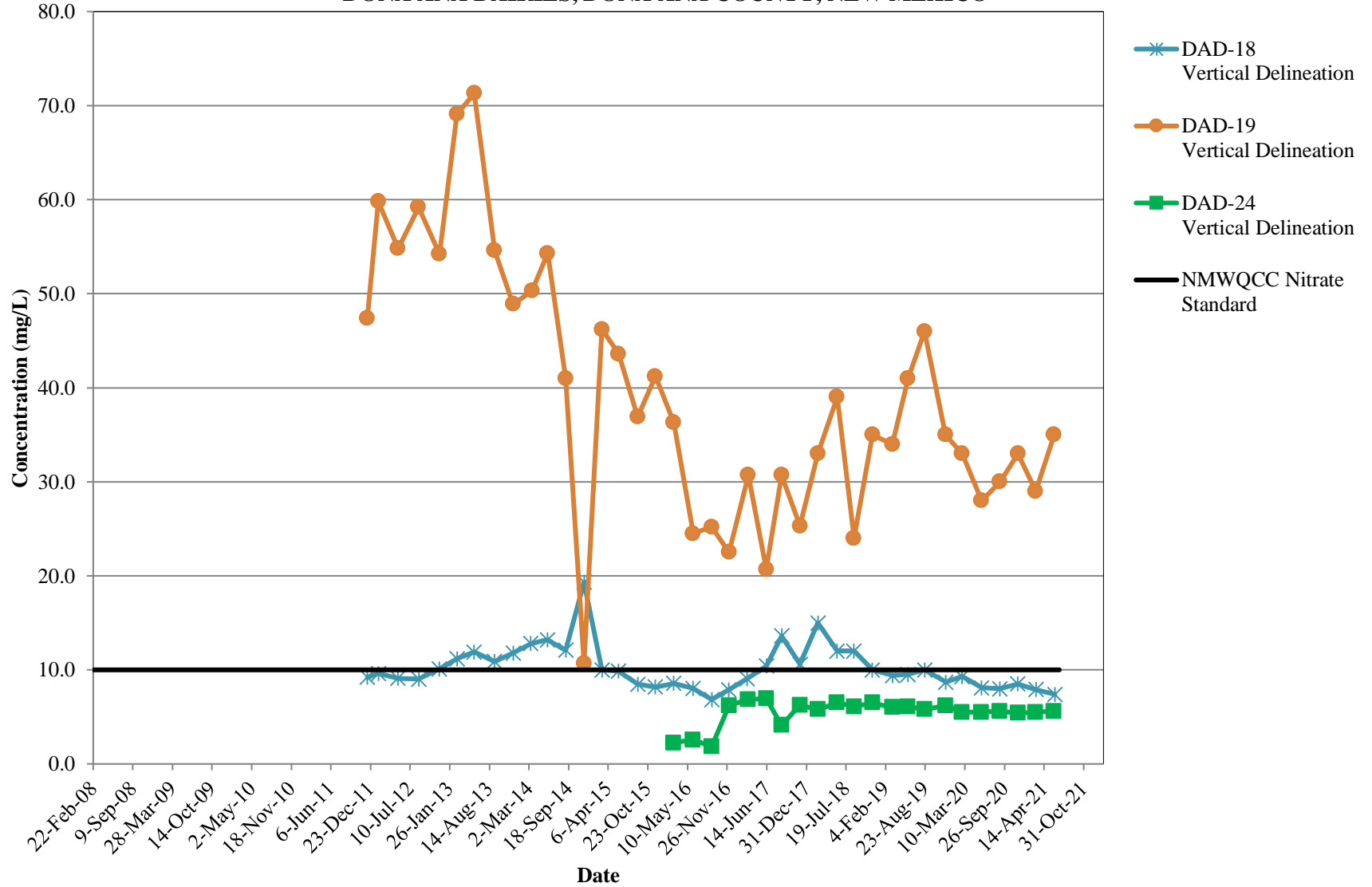
**NITRATE CONCENTRATION TRENDS  
 NORTHERN ABATEMENT PLAN MONITORING WELLS -  
 VERTICAL DELINEATION  
 DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



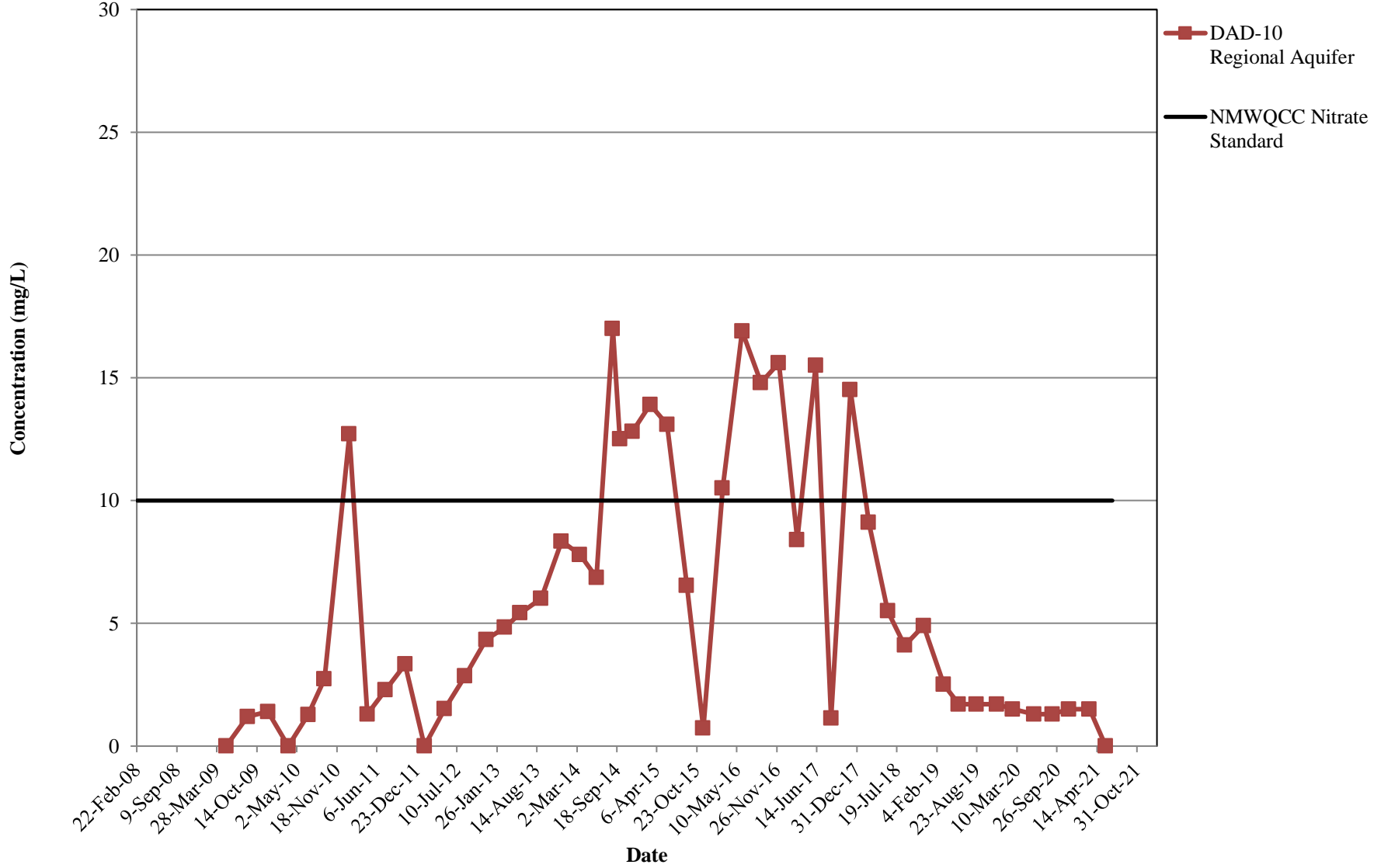
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CENTRAL ABATEMENT PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



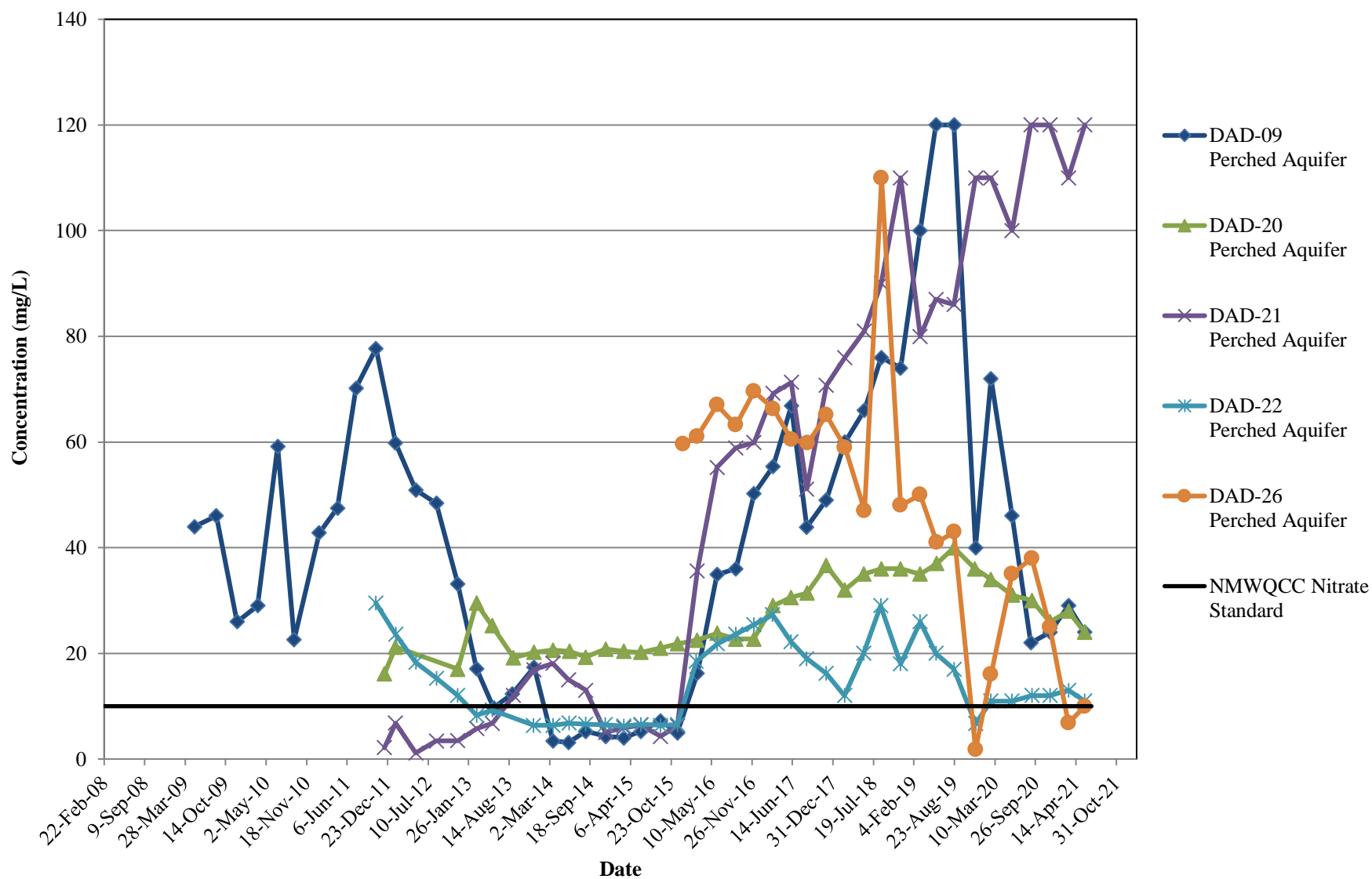
**NITRATE CONCENTRATION TRENDS  
CENTRAL ABATEMENT PLAN MONITORING WELLS -  
VERTICAL DELINEATION  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



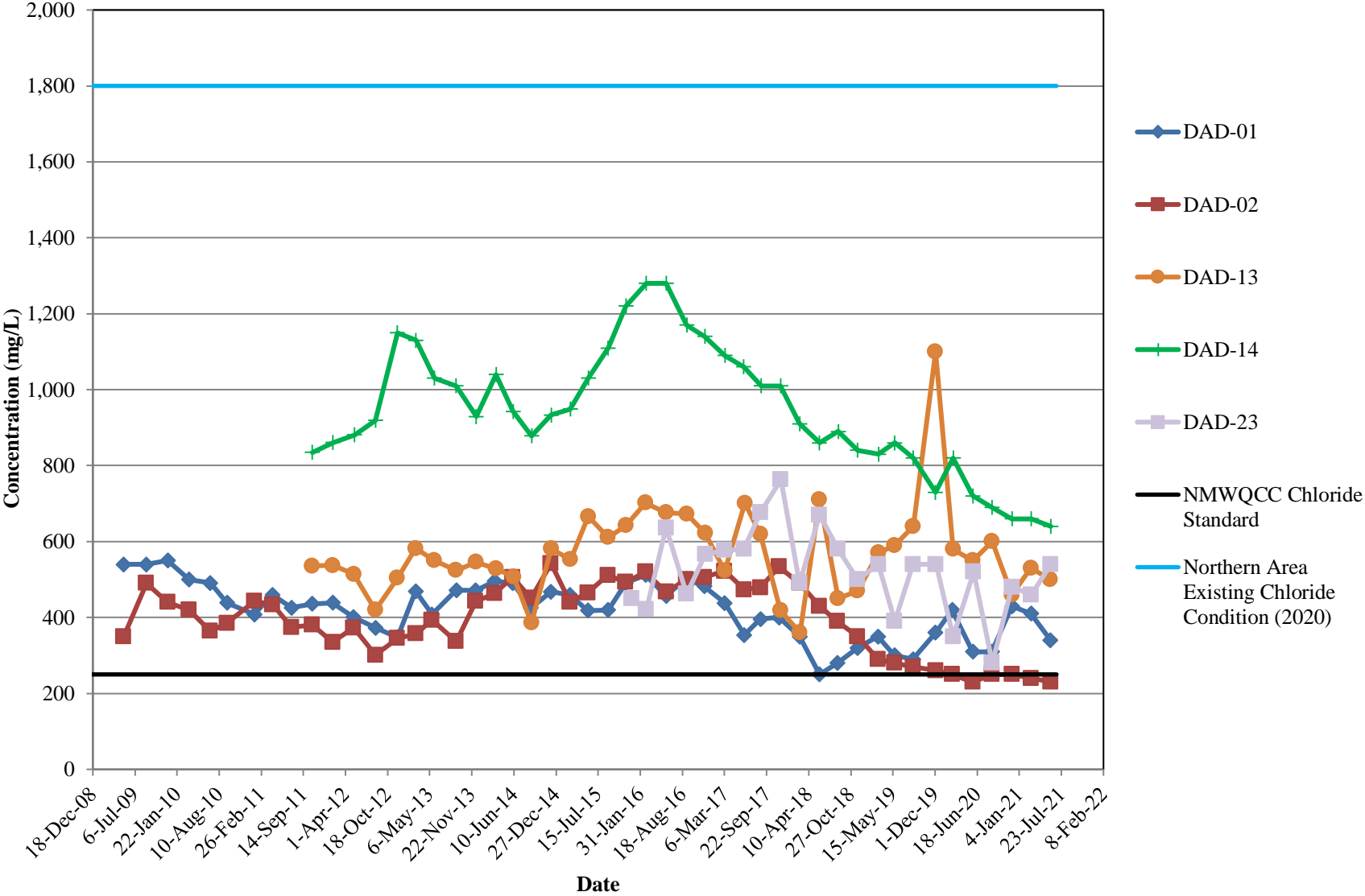
**NITRATE CONCENTRATION TRENDS  
SOUTHERN ABATEMENT PLAN MONITORING WELLS  
IN THE REGIONAL AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



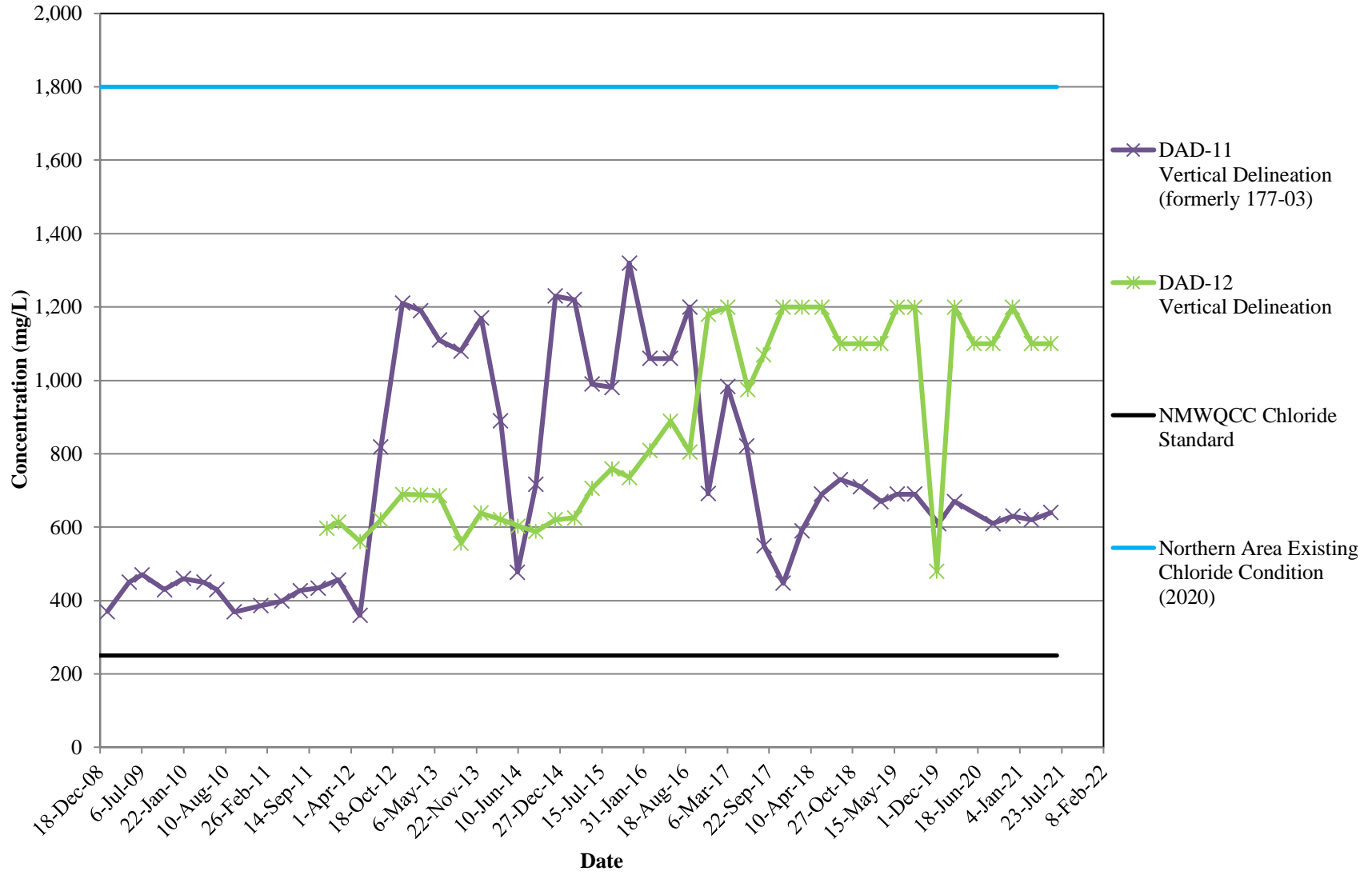
**NITRATE CONCENTRATION TRENDS  
SOUTHERN ABATEMENT PLAN MONITORING WELLS  
IN THE PERCHED AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



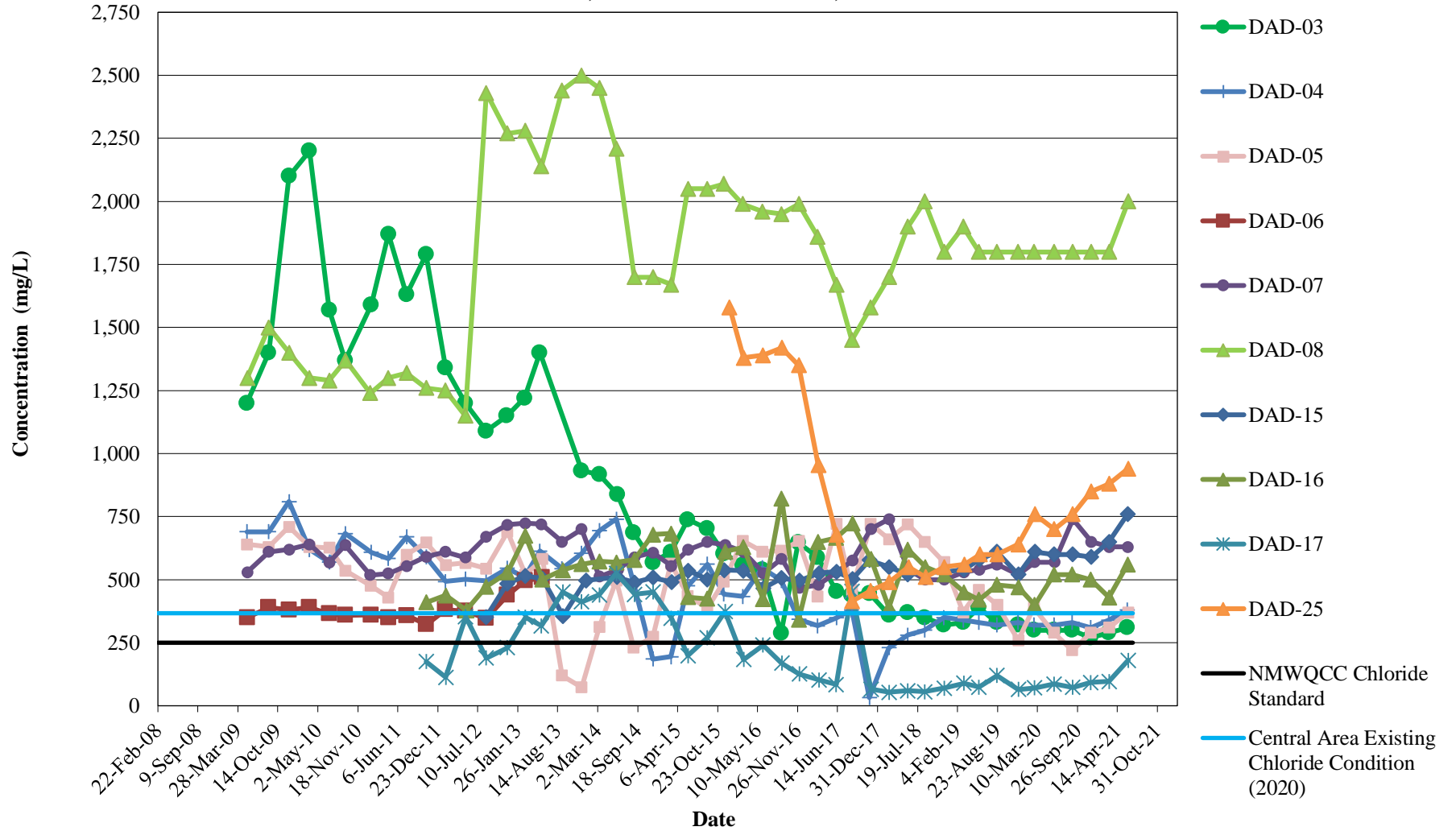
**CHLORIDE CONCENTRATION TRENDS  
NORTHERN ABATEMENT PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



**CHLORIDE CONCENTRATION TRENDS  
NORTHERN ABATEMENT PLAN MONITORING WELLS -  
VERTICAL DELINEATION  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**

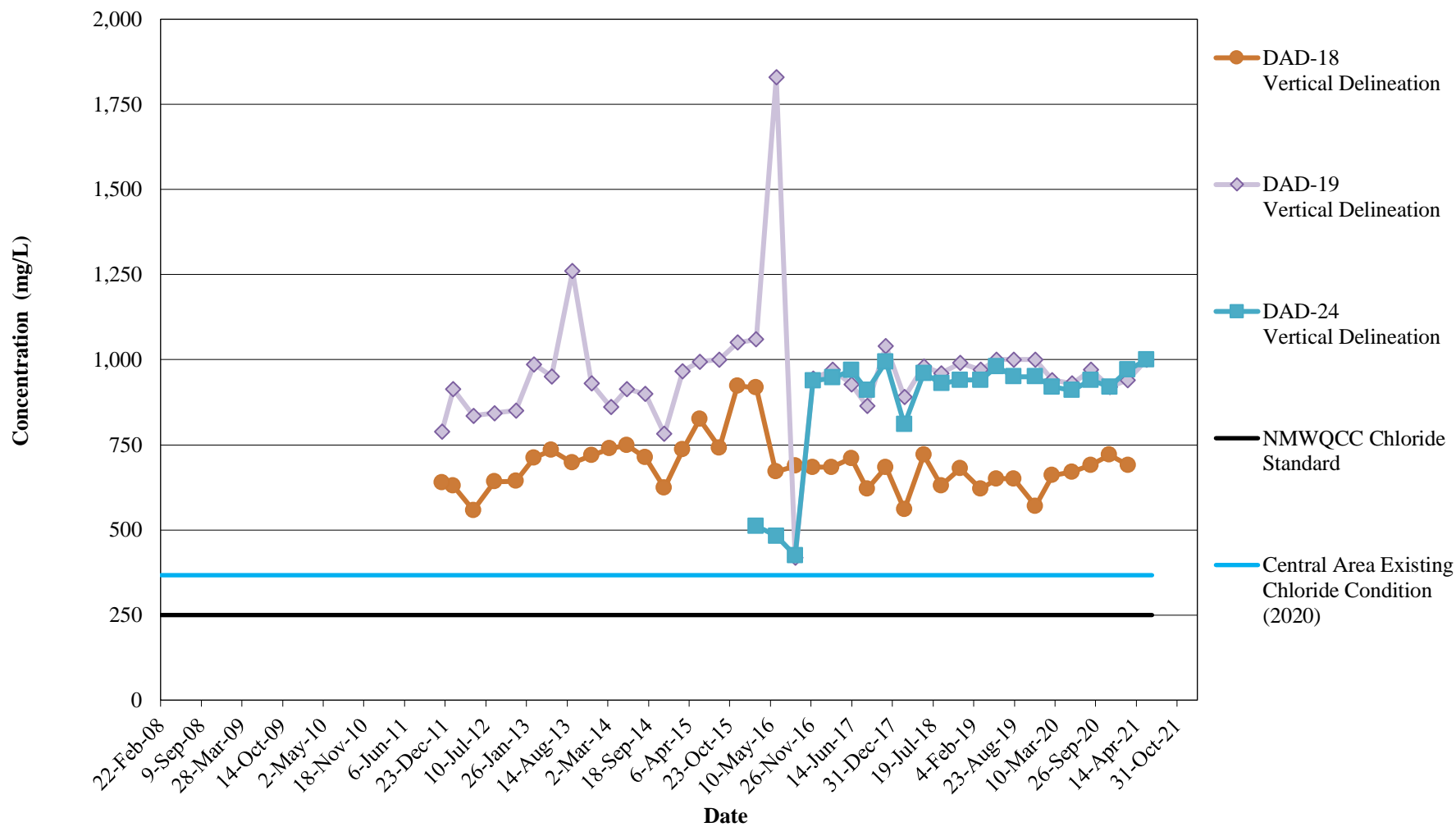


**CHLORIDE CONCENTRATION TRENDS  
CENTRAL ABATEMENT PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**

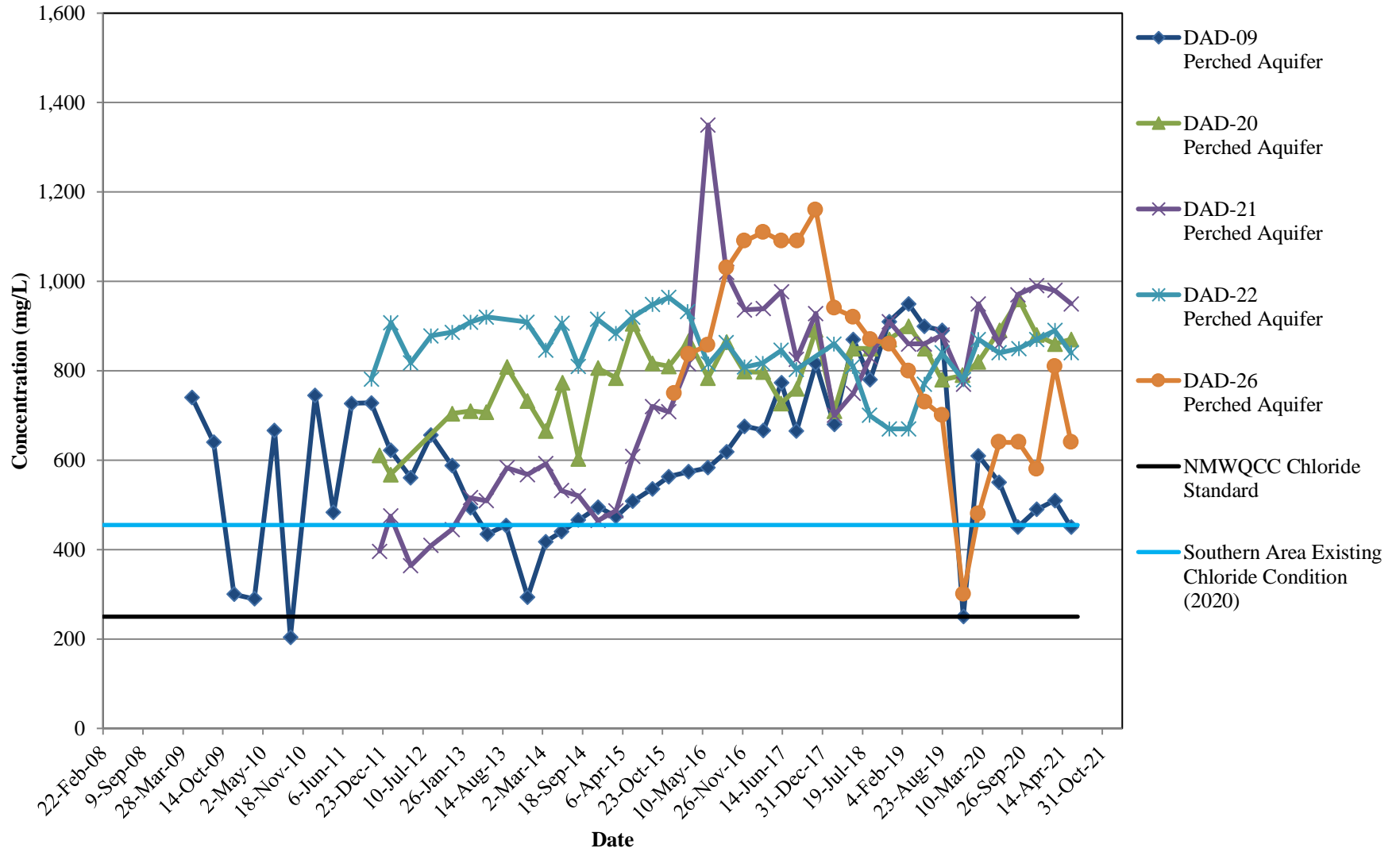




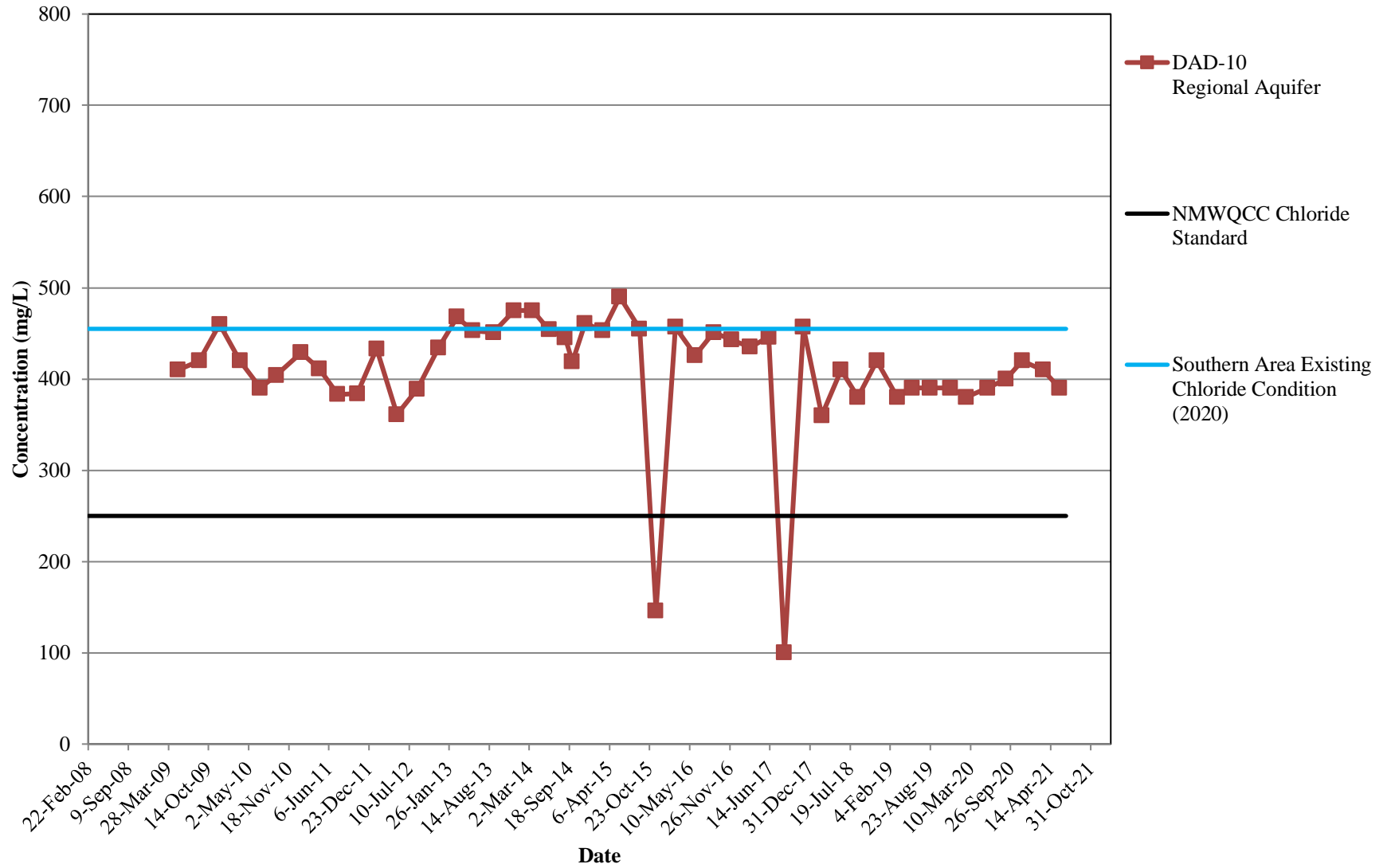
**CHLORIDE CONCENTRATION TRENDS  
CENTRAL ABATEMENT PLAN MONITORING WELLS -  
VERTICAL DELINEATION  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



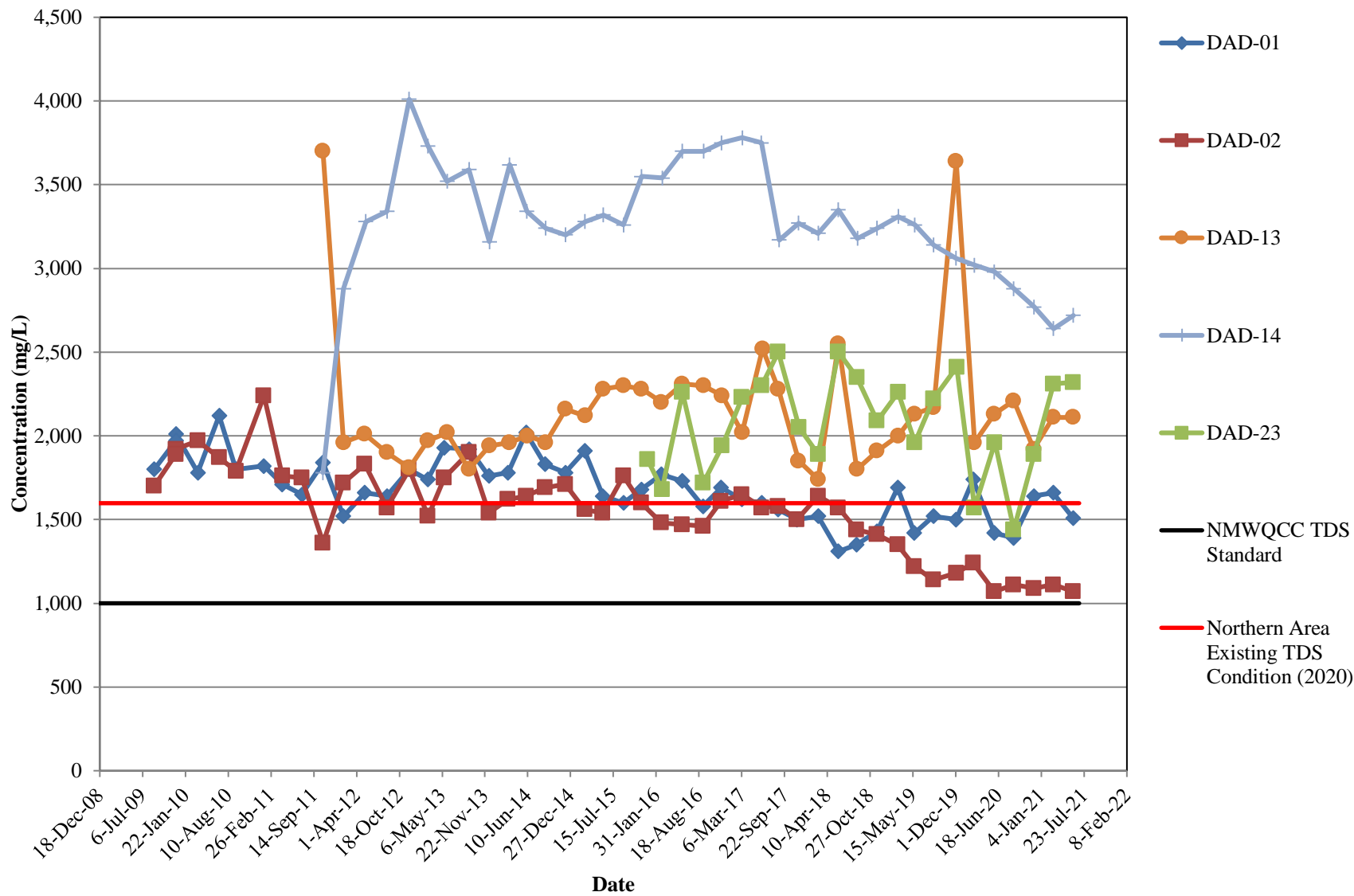
**CHLORIDE CONCENTRATION TRENDS  
SOUTHERN ABATEMENT PLAN MONITORING WELLS  
IN THE PERCHED AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



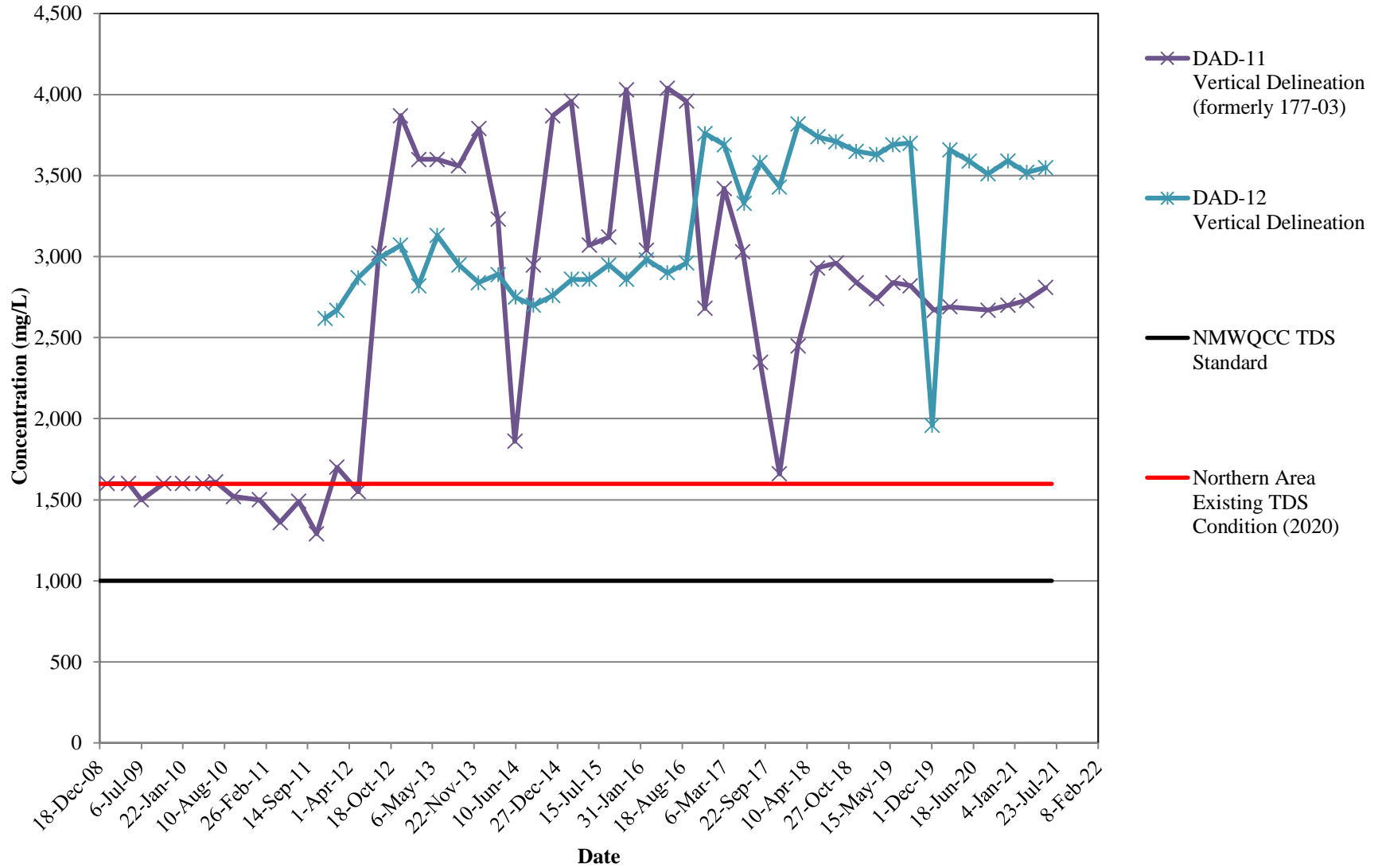
**CHLORIDE CONCENTRATION TRENDS  
SOUTHERN ABATEMENT PLAN MONITORING WELLS  
IN THE REGIONAL AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



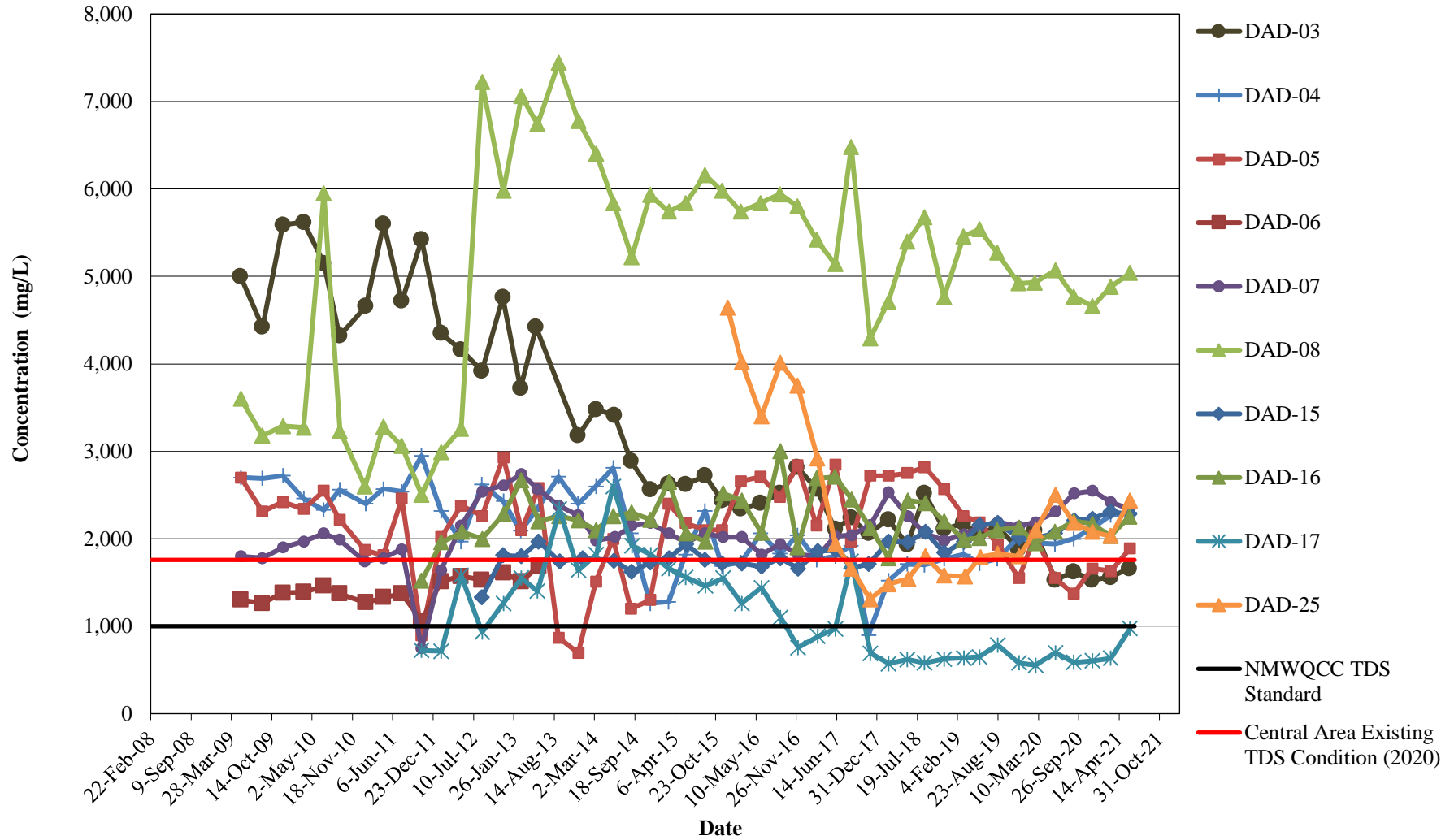
**TDS CONCENTRATION TRENDS  
NORTHERN ABATEMENT PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



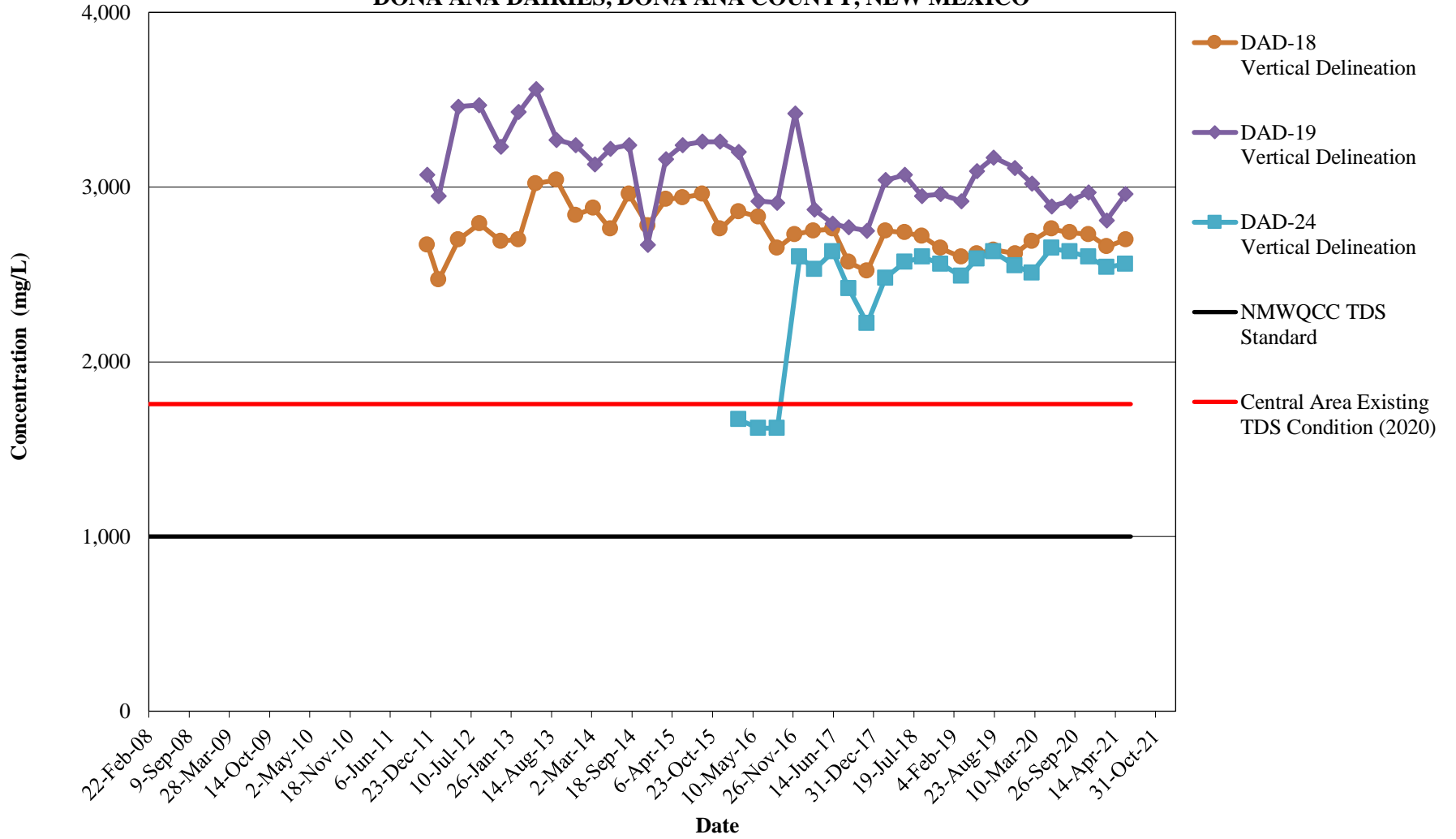
**TDS CONCENTRATION TRENDS  
 NORTHERN ABATEMENT PLAN MONITORING WELLS -  
 VERTICAL DELINEATION  
 DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



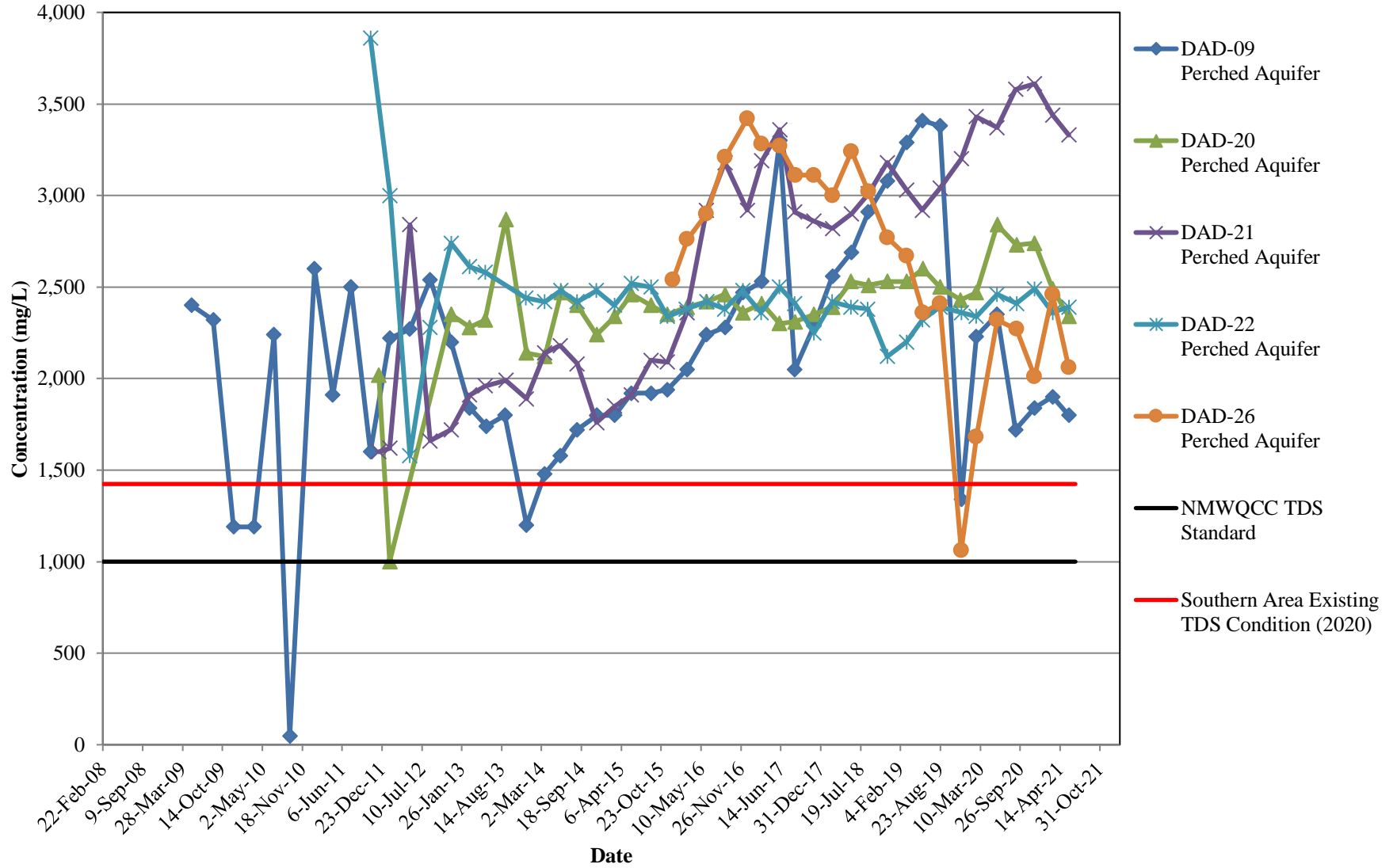
**TDS CONCENTRATION TRENDS  
CENTRAL ABATEMENT PLAN MONITORING WELLS  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



**TDS CONCENTRATION TRENDS  
CENTRAL ABATEMENT PLAN MONITORING WELLS -  
VERTICAL DELINEATION  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**



**TDS CONCENTRATION TRENDS  
SOUTHERN ABATEMENT PLAN MONITORING WELLS  
IN THE PERCHED AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**





**TDS CONCENTRATION TRENDS  
SOUTHERN ABATEMENT PLAN MONITORING WELLS  
IN THE REGIONAL AQUIFER  
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO**

