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March 30, 2021

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**RE: 2020 Annual Monitoring Report / Performance Review, In Accordance with Nuclear Regulatory Commission Docket No. 40-8903, License No. SUA 1471, and New Mexico Environment Department DP-200 Ground Water Discharge Plan**

Mr. Linton and Ms. Winton:

Pursuant to US Nuclear Regulatory Commission License SUA-1471, Docket 40-8903, License Condition 35(E) and in accordance with the ground water discharge permit DP-200 issued by the New Mexico Environment Department, please find below a hyperlink to the Annual Performance Report for 2020 for Homestake's Grants Reclamation Project.

<https://app.box.com/s/6gglm4i2lu777w6co6a0sdot0p3u1elc>

An updated groundwater monitoring plan for the GRP was approved in November 2019 (ML19217A353) and Tables 2-1 and 2-2 in the new plan outlines the water quality sampling frequency and parameters monitored. This plan was followed for the 2020 GRP monitoring.

With respect to the well monitoring requirements outlined in Table 2 in the November 2019 plan, all wells were sampled for the number of planned samples except for the following wells. San Andres monitoring wells 806R, 955 and 991 were sampled only once instead of the planned semiannual sampling in 2020 and well 943M was sampled three times instead of the planned quarterly sampling due to COVID-19 restrictions. Well 949 was not sampled due to the lack of a sampling agreement with the owner, and Well Deep #1R was sampled only once instead of quarterly due to the well not being in operation in 2020.

Thank you for your time and attention on this matter. If you have any questions, please contact me via e-mail at [bbingham@homestakeminingcoca.com](mailto:bbingham@homestakeminingcoca.com) or via phone at 505.290.8019.

Respectfully,

A handwritten signature in blue ink, reading "Brad R. Bingham".

**Brad R. Bingham**

Closure Manager

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**2020 ANNUAL MONITORING REPORT / PERFORMANCE REVIEW  
FOR  
HOMESTAKE'S GRANTS PROJECT  
PURSUANT TO  
NRC LICENSE SUA-1471 AND DISCHARGE PLAN DP-200**

**FOR:**

**U.S. NUCLEAR REGULATORY COMMISSION  
AND  
NEW MEXICO ENVIRONMENT DEPARTMENT**

**BY:**

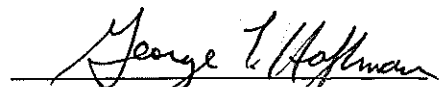
**HOMESTAKE MINING COMPANY OF CALIFORNIA  
GRANTS, NEW MEXICO**

**AND**

**HYDRO-ENGINEERING, LLC  
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## **1.0 EXECUTIVE SUMMARY AND INTRODUCTION**

### **1.1 EXECUTIVE SUMMARY**

Homestake Mining Company of California (HMC) manages a groundwater restoration program as defined by Nuclear Regulatory Commission (NRC) License SUA-1471, and New Mexico Environment Department (NMED), DP-200 permit. The groundwater remediation has been ongoing since 1977 and has changed dynamically through the course of over four decades.

The groundwater corrective action program (CAP) was updated and submitted to the regulatory agencies in November of 2020 (Homestake 2020). The alternatives analysis presented in that report effectively showed that future groundwater remediation at the site is in impracticable and will require institutional controls in order to be protective of human health. The report proposed that groundwater remediation continue to remain in compliance with license SUA-1471 until Alternative Concentration Limits (ACLs) were approved by NRC.

A groundwater collection area (see yellow shaded area on [Figure 2.1-1](#), Page [2.1-15](#)) has been established and is bounded by a down-gradient perimeter of injection/infiltration wells and trenches. Alluvial groundwater that flows beneath the tailings enters this collection area. All groundwater in the alluvial aquifer that is within the collection area is eventually captured by the collection well system. Once ACLs are approved by the agencies, the site is to be transferred to the U.S. Department of Energy, which will have the responsibility for long-term site care and maintenance.

The data reported within this document represent the results of the monitoring program during 2020. This is a yearly reporting requirement. A similar report has been submitted to the agencies each year since 1983 (see footnote list in [Section 1.2](#) and references in [Section 9.0](#)).

The restoration program is designed to reduce target contaminant concentrations from the groundwater by flushing the alluvial and Chinle aquifers with deep-well supplied fresh water or treated water produced from the reverse osmosis (R.O.) plant or the zeolite treatment system. A series of collection wells is used to collect the contaminated water, which is currently pumped to the R.O. plant or zeolite for treatment.

Historically, the contaminants are found in two different aquifer systems. The aquifer system of primary concern is the alluvial system, which averages approximately 100 feet in depth, and extends generally north to south encompassing the San Mateo alluvial aquifer. In addition, a

second aquifer system is found within the Chinle formation underlying the San Mateo alluvium. It is comprised of three separate aquifers designated as the Upper, Middle and Lower Chinle aquifers. The Updated Corrective Action Program (CAP, Homestake 2020) and Hydro-Engineering 2003b & 2010b reports should be reviewed for details of the geologic setting and aquifer conditions on the site. Three cross sections are included that present the hydrologic setting at the Grants site and their locations are shown on [Figure 1.1-1](#). [Figure 1.1-2](#) presents a typical cross section which is located from within the On-Site area and extends to the south-southwest into southern Felice Acres area (see [Figure 1.1-1](#) for location of the typical cross section also). This typical cross section shows the alluvial aquifer relative to the three Chinle aquifers and shows the Upper and Middle Chinle aquifers subcropped with the alluvium. [Figure 1.1-3](#) presents Cross-section B-B' which shows the alluvial, Upper and Middle Chinle aquifers just south of the Large Tailings Pile (LTP) and through the Small Tailings Pile (STP). A second cross-section (D-D') that runs from Section 3 in the southwest through the LTP is presented in [Figure 1.1-4](#). The township and range for the land sections referenced are described in Section 1.2. The Upper and Middle Chinle aquifers subcrop beneath the alluvial system near the project site. Slight to moderately elevated concentrations of constituents of concern have been observed in the Upper, Middle and Lower Chinle aquifers near their subcrops with the overlying alluvial system.

The restoration program, as described above, is made up of injection and collection well systems. The restoration systems were operated at reduced rates during 2020 to reduce the volume of water requiring evaporation. A mixture of R.O. product water, zeolite treated and/or fresh water pumped from deep wells is injected in a series of wells or infiltration trenches arranged to form a continuous injection line across the site. The injection line creates a hydraulic barrier that results in containment of the contaminants within the collection area. The contaminated groundwater is pumped and collected from a series of wells within the collection area. The collected aquifer water from On-site is pumped to the R.O. plant. The On-site collection is near the LTP and is located to the north of where Cross-section B-B' runs between wells CW-6 and CW-4. This collection would also be south of the LTP on Cross-section D-D'. Starting in 2016, the Off-site collection water was processed through the zeolite system and the treated water flows to the PTT prior to being used for injection water. Collection and injection started in the northeast portion of Section 3 with the R well field and Felice Acres with mainly the Q and Y well fields. The R well field is in the Middle

Chinle subcrop area and the collection is occurring from both the alluvial and Middle Chinle aquifers. The Q and Y well fields are completed in the alluvial and Middle Chinle aquifers, respectively, just north of the Middle Chinle subcrop area. The injection also occurs in both the alluvial and Middle Chinle aquifers. The R well field is located east of well CW-29 on Cross-section D-D' and selected wells in the well field were operated most of the last half of 2020 at reduced rates.

The Q and Y wellfields also operated during this period. Saturated alluvium exists above the Middle Chinle aquifer in this location. Timing of restoration of the alluvial aquifer in the R area is important to restoration of the Middle Chinle down gradient of this area. Collection and injection started in the center portion of Section 28 in the North Off-site area with the H well field. Wells in the H well field are completed only in the alluvial aquifer and the collection is occurring from wells located west of well CW-32 on left side of Cross-section B-B'. Wells in the H well field were operated some of the last half of 2020 with the collection water treated through the zeolite system.

In the years from 1977 to the present, the combination of injection wells and the up-gradient collection system has continued the withdrawal of the contaminated groundwater plume up-gradient of the current hydraulic barrier which assists in aquifer restoration by reducing contaminant concentrations to or below site standard levels. Selenium concentrations are used to present the progress that has been made in the groundwater restoration program. Selenium was the parameter of most concern in the early years of the corrective action program. [Figure 1.1-5](#) presents the alluvial selenium concentrations for 1976 prior to the start of the corrective action program for the Grants site. The well locations with selenium measurements in 1976 are shown on the figure. The red pattern in this figure shows where selenium concentrations were greater than 5 mg/L in 1976 in the Large and Small Tailings Pile areas. The blue pattern shows where concentrations are above 1 mg/L but less than 5 mg/L with areas On-site and in Broadview Acres. The detached zone of higher concentrations in the Broadview Acres area was caused by faster migration through the Upper Chinle aquifer that entered the alluvial aquifer in the Broadview Acres area. The cyan color shows where concentrations were between 0.32 and 1.0 mg/L in 1976. The 1988 alluvial selenium concentration patterns are presented in [Figure 1.1-6](#) and show that selenium concentration had been restored in all of the subdivisions by 1988 (wells symbols show locations of selenium measurements in 1988). [Figures 1.1-7](#) and [1.1-8](#) give the selenium patterns for 1999 and 2009, respectively, showing only a small area in the tailings area in 1999 with selenium concentrations above 5 mg/L

while no measured concentrations are above this level in 2009. The area in Section 3 with elevated selenium concentration in 1999 was restored prior to 2009. [Figure 1.1-9](#) gives the selenium patterns for 2014 which shows slightly larger patterns in the LTP area and a smaller pattern in the L area than those in 2009. Selenium patterns for 2020 are presented in [Figure 1.1-10](#) and show that selenium only exceeds the site standard in the tailings area and north of the L area which is located southeast of the STP.

Uranium became the most important parameter for restoration at the Grants site after significant restoration of selenium concentration and with the establishment of new uranium standards in the mid 2000's. [Figure 1.1-11](#) presents the 1976 alluvial uranium concentrations with the red pattern showing where concentrations exceeded 10 mg/L in the area of the LTP and STP and in the western portion of Broadview Acres. Well symbols show where uranium concentrations were measured in 1976. The elevated concentrations in Broadview Acres migrated through the Upper Chinle aquifer to this area and were then conveyed to the alluvial aquifer near the Upper Chinle subcrop. This figure also shows additional area in Broadview and Murray Acres where concentrations exceeded 1.0 and 0.5 mg/L levels in 1976. The cyan color shows where concentrations exceed 0.16 mg/L in 1976. [Figure 1.1-12](#) shows the uranium concentrations that existed in the alluvial aquifer in 1988 with concentrations of 0.16 to 0.5 mg/L still present in Broadview and Felice Acres and concentrations above 1 mg/L in the northeast portion of Murray Acres. Uranium concentrations in the On-site area near the LTP and STP were greater than 10 mg/L. The uranium concentrations in 1999 were below the site standard in all of Broadview Acres except the southern portion of the subdivision where concentrations were slightly above the site standard (see [Figure 1.1-13](#)). Well symbols are shown on this figure where uranium measurements were made in 1999. Uranium concentrations in a small area in the northeast portion of Murray Acres also exceeded the site standard in 1999, but the maximum concentration in this area was reduced to below 1.0 mg/L. Uranium concentrations in southern Felice Acres and the northeast portion of Section 3 exceeded 1 mg/L in 1999. Concentrations exceeded 0.5 mg/L in the central portion of Section 28 in the North Off-site area while the area of concentrations exceeding the site standard extended down to the west-center portion of Section 33. The 2009 uranium concentration patterns are presented in [Figure 1.1-14](#) and show that concentrations in southern Felice Acres and the northeast portion of Section 3 have been reduced to below 0.5 mg/L. By 2009, the area of



concentrations greater than the site standard that extended into west-central portion of Section 33 was pulled back approximately one mile to the western portion of Section 28. Some increase in uranium concentrations in the Felice Acres and in Section 27 were observed in 2014 (see [Figure 1.1-15](#)) due to the reduction and ceasing of irrigation prior to 2014. The On-site area of concentrations above 0.16 mg/L is fairly similar in 2009 and 2014. The 2020 uranium concentration patterns are presented in [Figure 1.1-16](#) and show the extent of the uranium concentration greater than 0.16 mg/L in Section 28 was reduced from 2014 to 2020. The restoration of the area in the northeast portion of Murray Acres was maintained in 2020.

The uranium concentrations for five different years are presented for the Upper Chinle aquifer in [Figures 1.1-17](#) through [1.1-21](#) (see locations of well symbols on these figures which show where concentrations were measured during the year). Collection in the Upper Chinle aquifer is mainly south of the Collection ponds in or near the Upper Chinle subcrop and this area is shown on Cross-section B-B' in the area of well CW-4.

[Figures 1.1-22](#) through [1.1-26](#) show a sequence of uranium concentration mapping for the Middle Chinle aquifer and the measured concentrations showed some improvement in the South Felice Acres area with no area of concentrations above 0.5 mg/L in 2020. Collection in the Middle Chinle in 2020 was mainly in the R and Y well fields in the South Off-site area and in one well west of the West Fault in the On-site collection. The hydrologic setting is shown on Cross-section D-D' where the Middle Chinle sandstone subcrops with saturated alluvium in the R well field area.

The elevated uranium concentrations in the Lower Chinle aquifer were first defined in 1996 and are presented in [Figure 1.1-27](#). The locations where uranium concentrations were measured are shown on each of these figures with a well symbol. The collection of water for irrigation from the Lower Chinle reduced the higher concentrations in 1999 (see [Figure 1.1-28](#)) to lower levels in 2009 (see [Figure 1.1-29](#)). [Figures 1.1-30](#) and [1.1-31](#) give similar maps for the Lower Chinle aquifer for 2014 and 2020.

An average of 268 gallons per minute (gpm) was pumped into the On-site alluvial treated and/or fresh-water injection systems in 2020. An additional 65 gpm of treated and/or fresh water was injected into the On-site Upper and Middle Chinle aquifer systems. An average rate of 205 gpm of R.O. product water was pumped to the PTT and mixed with zeolite treated water and/or fresh water prior to injection into the groundwater in 2020. Production of significant quantities of R.O.

product water started in July of 1999 with consistent operation from 2000 through 2020 except during equipment repair periods or during treatment plant upgrade or expansion.

In 2020, the average collection rate for the On-site alluvial aquifer was 145 gpm. No collection for re-injection of alluvial aquifer water was done in 2020. The On-Site Upper Chinle aquifer collection program consisted of pumping wells CE2, CE5, CE6, CE11, CE12, CE15 and CE19 at an average composite rate of 123 gpm in 2020. An average rates of 4.1 gpm were pumped from the LTP toe drains.

Data relating to key constituents of concern at the site have been reviewed and statistically evaluated to determine upgradient site background water quality. These background water quality levels have been accepted by NRC, EPA and NMED; the NRC and NMED have set site standards based on the background water quality and accordingly amended the Radioactive Material license and DP-200 to reflect those standards. It should be noted that these site standards are utilized throughout this report for comparison purposes in discussing restoration progress.

Observed alluvial aquifer concentrations of key constituents at the Grants site were similar to those in previous years. The only areas where sulfate, TDS and chloride concentrations exceed the alluvial site standards are an area east of Valle Verde plus the large area in close proximity to the Large and Small Tailings Piles in the Grants Project area.

Uranium concentrations exceed the alluvial site standard of 0.16 mg/L within the collection area near the tailings. The main change in the uranium concentrations in the alluvial aquifer is the decline in concentrations on the north side of Evaporation Pond No. 2 (EP2). There is also one well in northern Felice Acres and several wells in southern Felice Acres subdivision with measured uranium concentrations exceeding the site standard. Groundwater withdrawal for treatment was used to further reduce uranium levels that exceed the standard in an area southwest of Felice Acres in Section 3, in Felice Acres and in Section 28. Collection of water from the one well located in Murray Acres was not done in 2020 due to the reduction of uranium concentrations in that area to below the site standard. Uranium concentrations in the northeast portion of Section 3 and South Felice acres were reduced in 2020 in the R and Q well fields.

Selenium concentrations also exceed the relevant site standard in the collection area near the LTP and southeast of the STP. None of the sampled subdivision wells contained selenium concentrations above the site standard.

None of the subdivision wells contain molybdenum concentrations above the site standard of 0.1 mg/L. The wells exhibiting elevated molybdenum concentrations are all located near the Large and Small Tailings Piles, to the southeast of the STP, and in an area in central Section 27. Migration of this constituent has been limited due to precipitation within the alluvial aquifer.

Nitrate concentrations are compared to the alluvial site standard of 12 mg/L. An area between the LTP and STP contains nitrate concentrations above the site standard and is likely caused by tailings seepage. The nitrate standard has typically been exceeded in one well in Section 34.

All radium values in the alluvial aquifer outside of the tailings perimeter were less than the site standard. This demonstrates that radium is only a constituent of concern under the LTP.

No vanadium concentrations exceeded the alluvial site standard in 2020 except for wells in the LTP and STP. Concentrations of this constituent have been adequately restored to below the site standard except in the immediate area of the LTP and STP.

Thorium-230 levels observed in 2020 were less than the site standard except for levels in the alluvium immediately under the LTP. The mobility of this constituent has been very limited and elevated activities only occur in close proximity to the tailings. However, the analytical results for this constituent vary significantly at the low observed levels that are approaching laboratory detection limits. With the potential for erratic analytical results, slightly higher values should not be considered significant until supported by additional monitoring. The monitoring records for thorium-230 indicate that it is a minor constituent of concern at the Grants site.

Treated water and/or fresh-water injection into Upper Chinle wells CW13 and 944, ([See Figure 5.1-2](#)), east of the East Fault, continued in 2020. This injection has maintained higher water levels in the Upper Chinle aquifer east of the East Fault.

Treated water and/or fresh-water injection continued in 2020 in Upper Chinle well CW5 just north of Broadview Acres. This injection has resulted in gradient reversal within the Upper Chinle, thereby forcing groundwater from this area back to the north toward the tailings piles. Collection from Upper Chinle well CE2 was initiated in 1999 and continued through 2020. Collection in Upper Chinle wells CE5, CE6, CE11 and CE12 was started in 2006. Collection from Upper Chinle well CE7 started in late 2010 while collection in wells CE15, CE15A and CE19

started in 2017. This collection is used in conjunction with injection well CW5 to reduce contaminant concentrations in this area.

All sulfate, chloride and TDS concentrations in the Upper Chinle aquifer are below the site standards except for samples from wells near or within the footprint of the LTP for all three constituents.

Uranium concentrations exceeded the Upper Chinle site standard in 2020 in numerous wells near the LTP and Collection ponds, in one Upper Chinle well north of Broadview Acres and in the southern portion of Felice Acres. The decline in uranium concentrations to below the site standard in Upper Chinle wells, 494, CE9 and CE15A, in the Broadview and Felice Acres areas was maintained in the Upper Chinle aquifer in 2020. .

Selenium concentrations in the Upper Chinle aquifer exceed the site standard in the mixing zone near the LTP and north of the Collection ponds. The site standards for selenium for the Upper Chinle mixing zone and the Upper Chinle non-mixing zone are 0.14 and 0.06 mg/L, respectively.

The concentrations of molybdenum exceeded the site standard in several wells near the tailings and south of the Collection Ponds, and in one well north of Broadview Acres in the Upper Chinle aquifer during 2020.

All nitrate concentrations observed in 2020 for the Upper Chinle mixing zone were less than the nitrate site standard except for a small area in the LTP area. This indicates that nitrate is not a constituent of concern in this aquifer.

All vanadium, radium-226 plus radium-228 and thorium-230 results for the Upper Chinle in 2020 were less than the corresponding site standards. This is consistent with the low observed concentrations in the overlying alluvial aquifer.

The direction and rate of groundwater flow in the Middle Chinle aquifer in 2020 is very similar to that of recent years. Fresh-water injection into well CW14 started in December of 1997. Fresh-water injection into wells CW30 and CW46 started in 2004 while injection into Middle Chinle well CW77 started in 2016. The fresh water is building up a mound of groundwater in this area, which will result in a reversal of the flow of Middle Chinle water back toward the alluvial subcrop. Well CW28 was added as a supply well for fresh-water injection in 2002 but was not used during 2020.

All sulfate concentrations in the Middle Chinle are less than the site standards in 2020. All TDS concentrations in the Middle Chinle aquifer are less than the standards except for one well in Murray Acres and wells located in Broadview and Felice Acres that are above the non-mixing zone background value. Chloride concentrations in the Middle Chinle aquifer did not exceed the site standard in 2020.

Uranium concentrations in the western portion of Felice Acres are above the mixing zone site standard due to the alluvial recharge to the Middle Chinle aquifer just south of Felice Acres, but the concentrations were reduced with the collection in this area during 2020. Uranium concentrations in Middle Chinle wells 493 and CW55 declined to near or below the non-mixing zone site standard. The uranium site standard is also exceeded in a few wells west of the West Fault but the levels in these wells were reduced in 2020 with the CW62 collection.

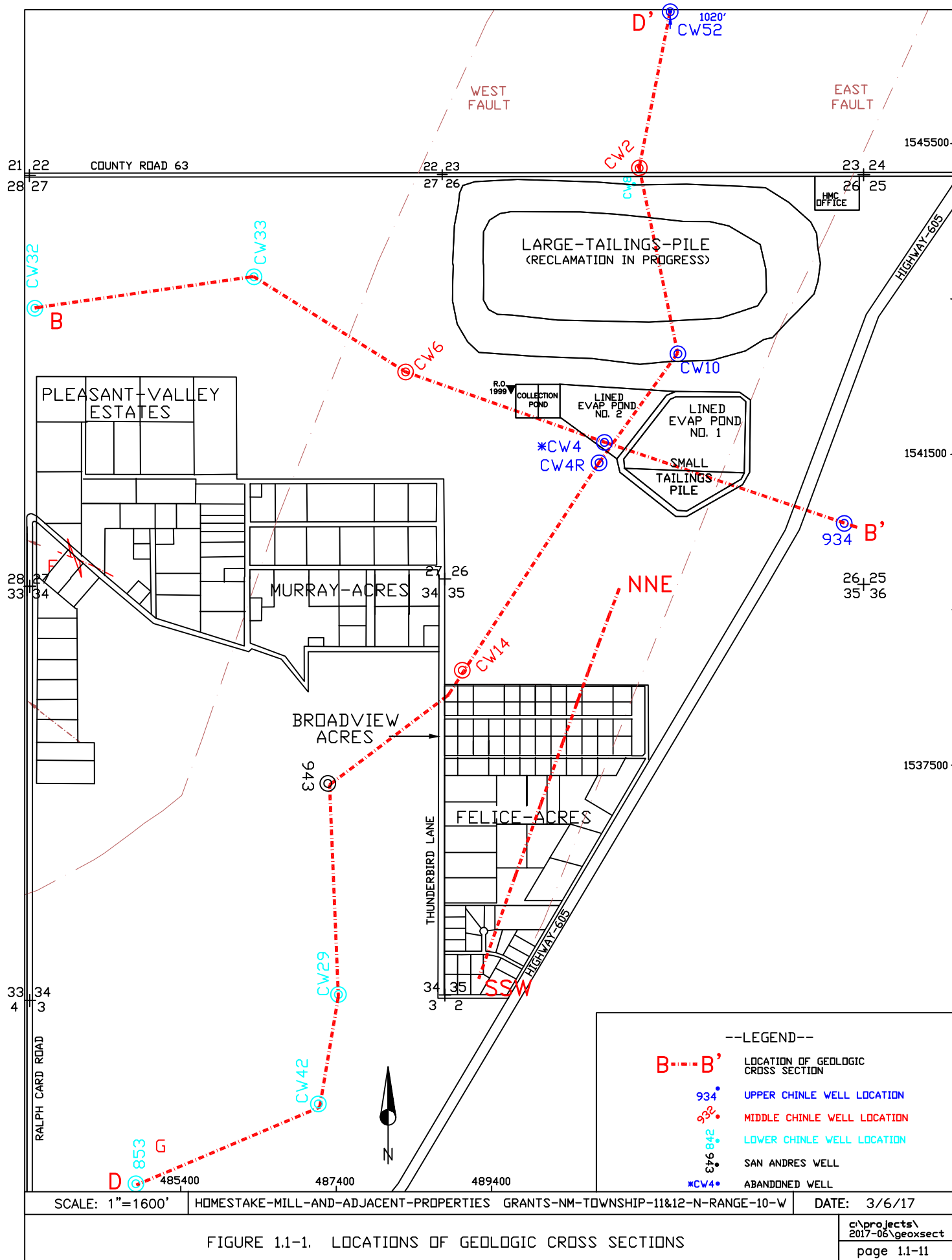
The non-mixing zone selenium site standard is slightly exceeded in well 493 in Felice Acres (See Figure 6.3-14A). The mixing zone selenium site standard is exceeded in collection well CW62 west of the West Fault but concentrations decreased in 2020. Molybdenum concentration in collection well CW62 west of the West Fault in the Middle Chinle aquifer is above the mixing zone standard of 0.10 mg/L.

Nitrate, radium, vanadium and thorium-230 concentrations in the Middle Chinle aquifer are below levels of concern for each of the constituents.

Concentrations of major constituents in the Lower Chinle aquifer generally increase in the down-gradient direction due to the slow movement of water in the fractured shale. All sulfate, TDS and chloride concentrations are less than the site standards except in far-down-gradient areas, where natural concentrations exceed the non-mixing zone site standard. These exceedances are a result of the limited background data for the far-down-gradient areas of the Lower Chinle aquifer, and there is a naturally occurring deterioration of Lower Chinle water quality in the down-gradient direction.

The uranium site standards in the Lower Chinle aquifer are exceeded in wells in Section 3. The wells where concentrations exceed the mixing zone site standard of 0.18 mg/L are located near the subcrop of the Lower Chinle aquifer with the alluvial aquifer. Concentrations in several non-mixing zone well exceed the site standard of 0.03 mg/L.

Concentrations of selenium do not exceed the standards in the two zones for the Lower Chinle aquifer. All molybdenum concentrations in the Lower Chinle aquifer are less than the site standard. None of the Lower Chinle nitrate concentrations exceed site standards or levels of concern. All radium, vanadium and thorium-230 concentrations in the Lower Chinle aquifer were at low levels in 2020.



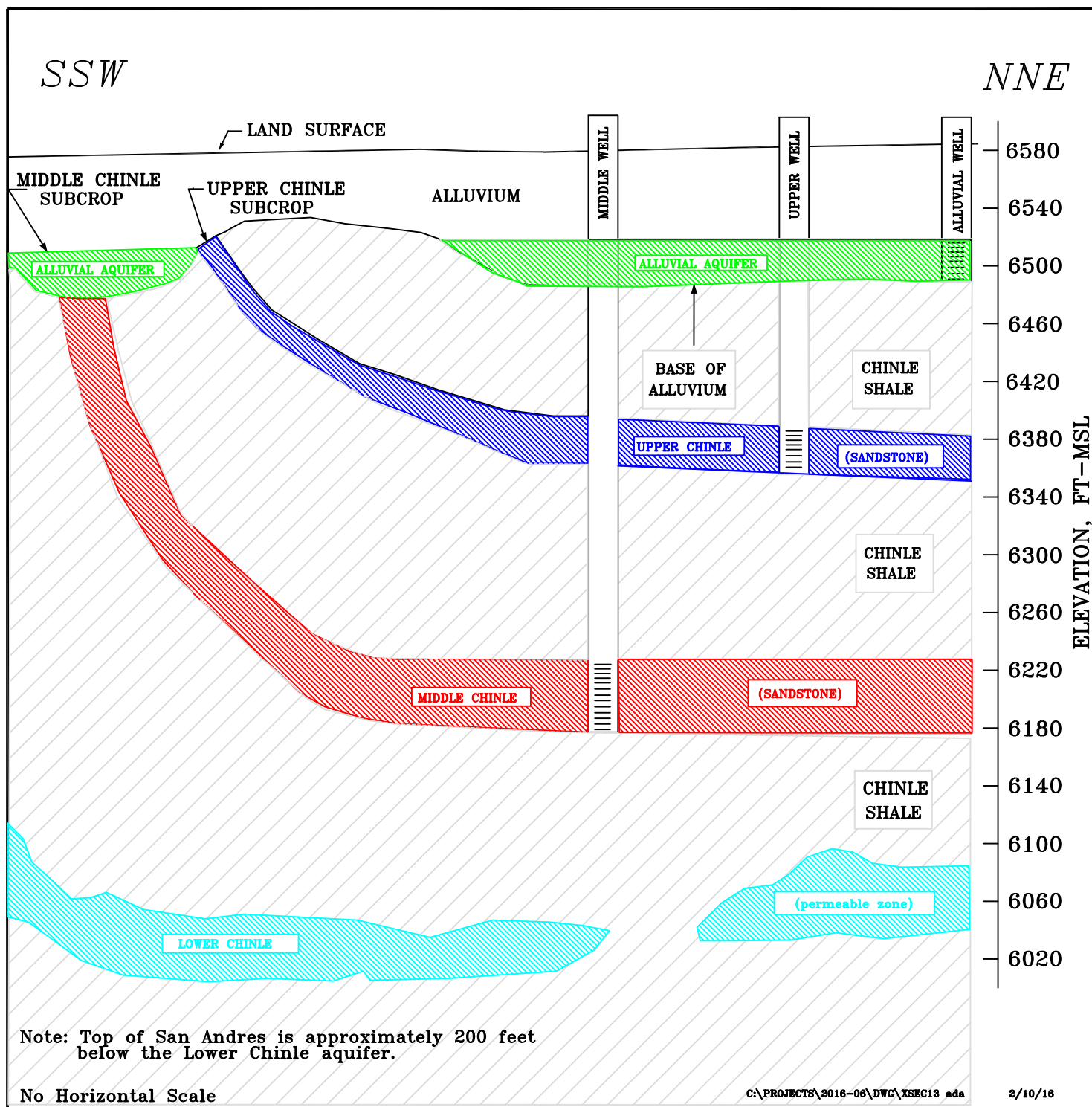
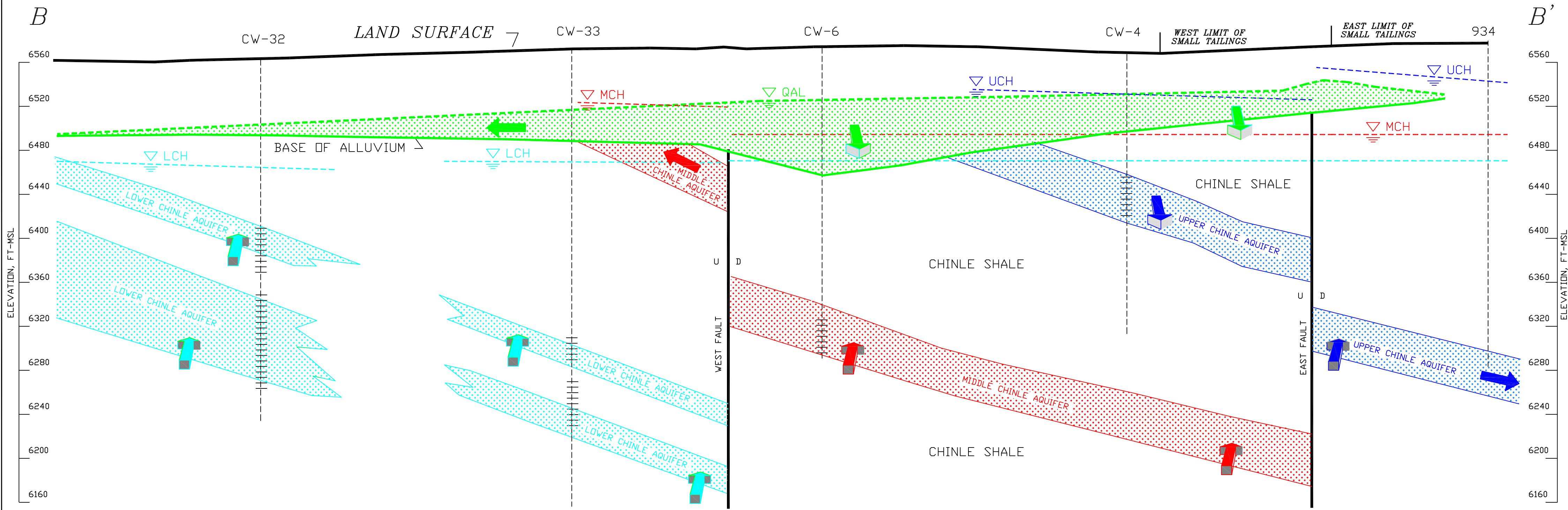













FIGURE 1.1-2. TYPICAL GEOLOGIC CROSS SECTION





LEGEND:		
FLOW-DIRECTION		
	INDICATES FLOW LATERALLY WITH PAGE	
	INDICATES FLOW INTO PAGE	
	INDICATES FLOW OUT OF PAGE	
ALLUVIAL		
	BASE	
	QAL WATER LEVEL ELEVATION (WLE)	
UPPLE CHINLE		
	LIMITS OF SANDSTONE	
	UCH WLE	
MIDDLE CHINLE		
	LIMITS OF SANDSTONE	
	MCH WLE	
LOWER CHINLE		
	LIMITS OF AQUIFER	
	LCH WLE	

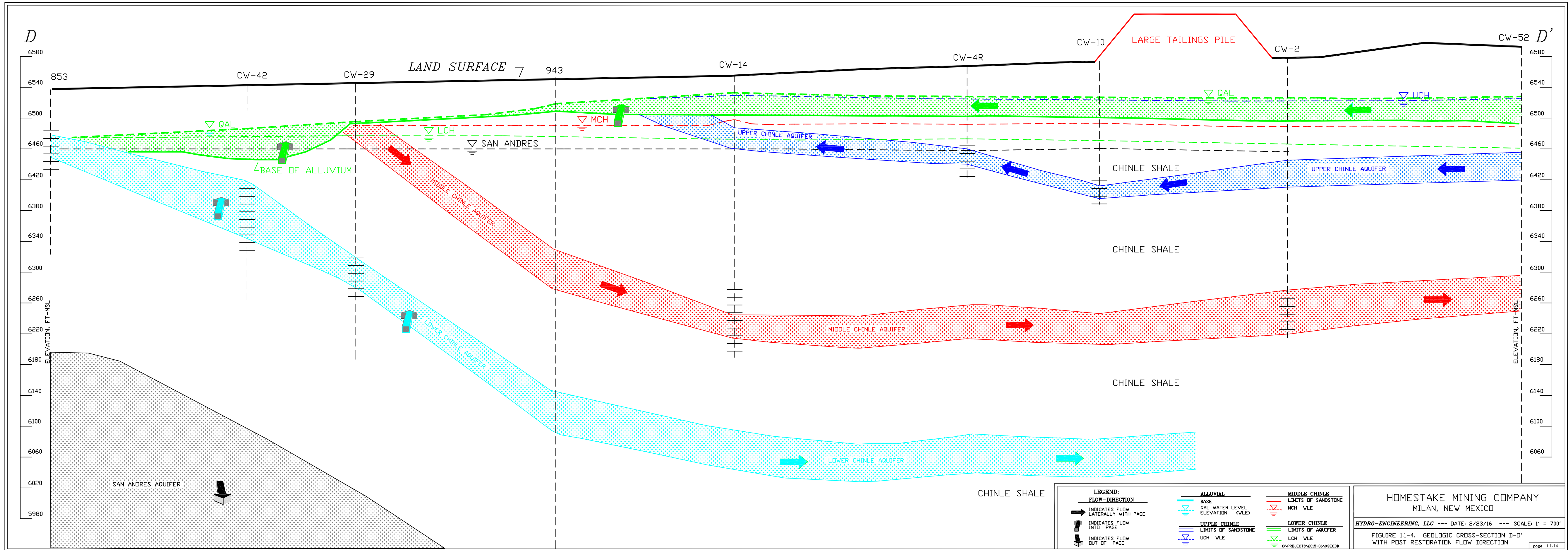
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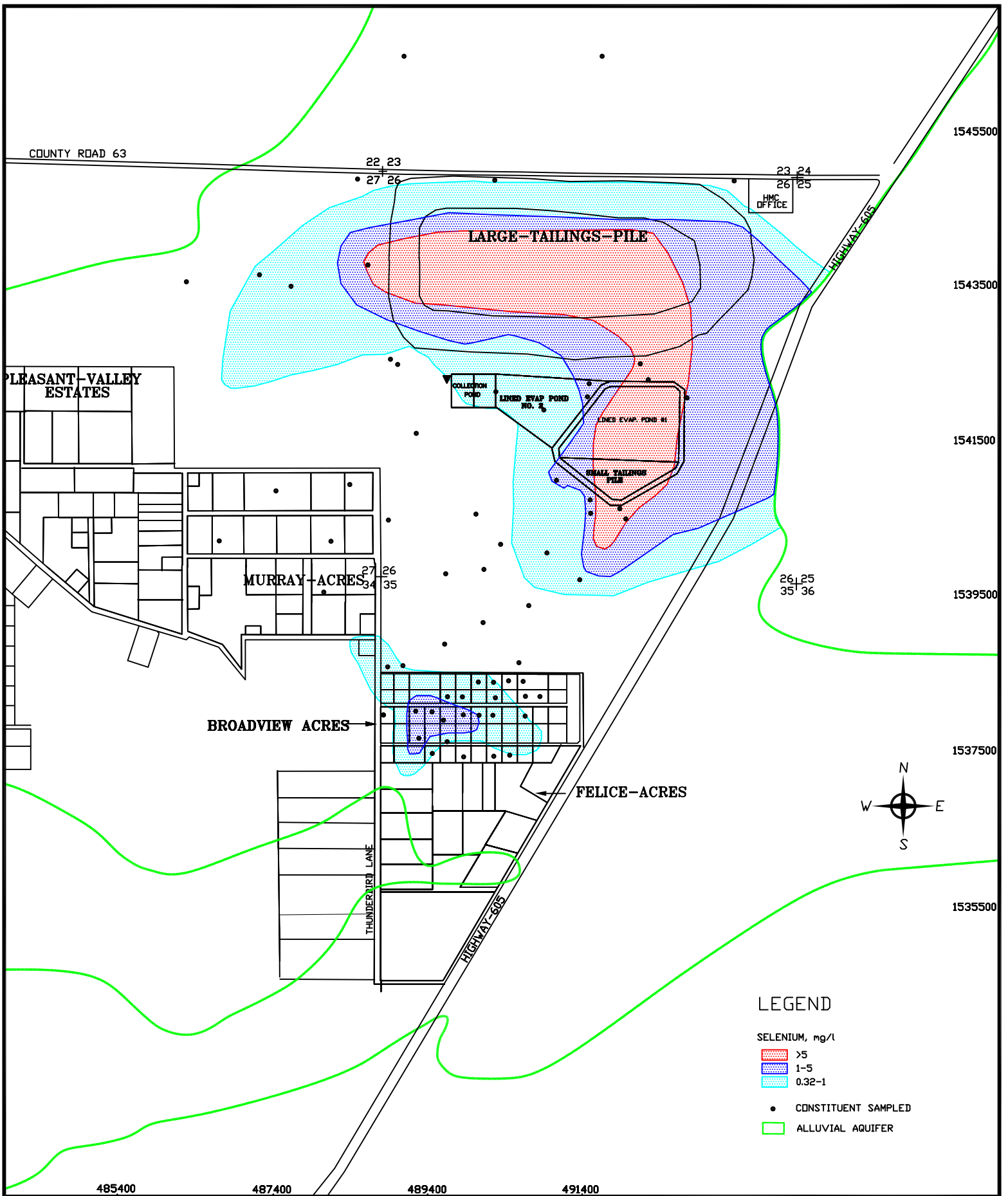
HOMESTAKE MINING COMPANY  
MILAN, NEW MEXICO

HYDRO-ENGINEERING, LLC ~~~ DATE: 3/17/15 ~~~ SCALE: 1' = 600'

FIGURE 1.1-3. GEOLOGIC CROSS-SECTION B-B'  
WITH POST RESTORATION FLOW DIRECTION

page 1.1-13



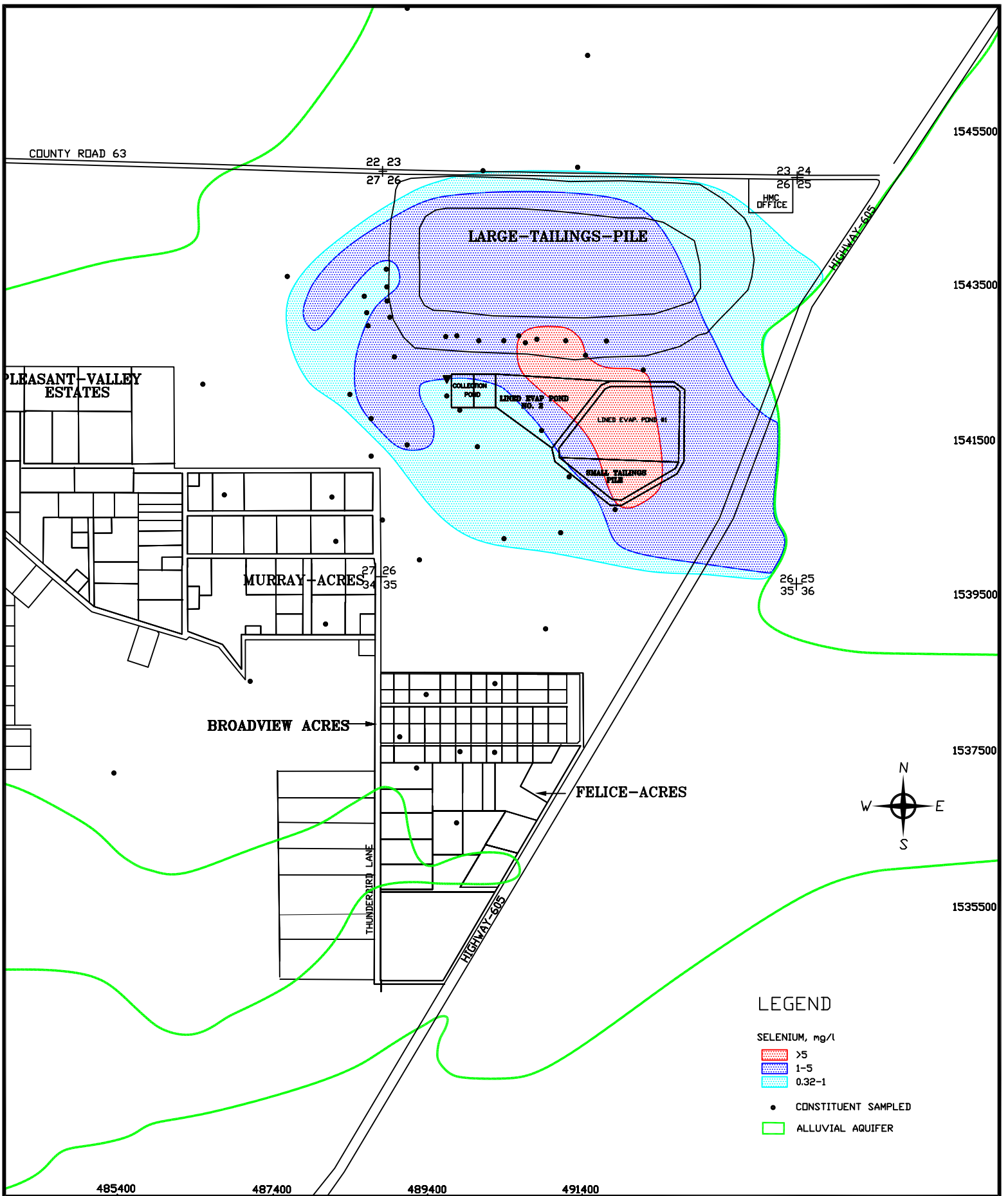


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DATE: 1/30/2020

FIGURE 1.1-5. ALLUVIAL SELENIUM CONCENTRATIONS, 1976



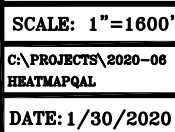
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DATE: 1/30/2020

FIGURE 1.1-6. ALLUVIAL SELENIUM CONCENTRATIONS, 1988





1.1-17

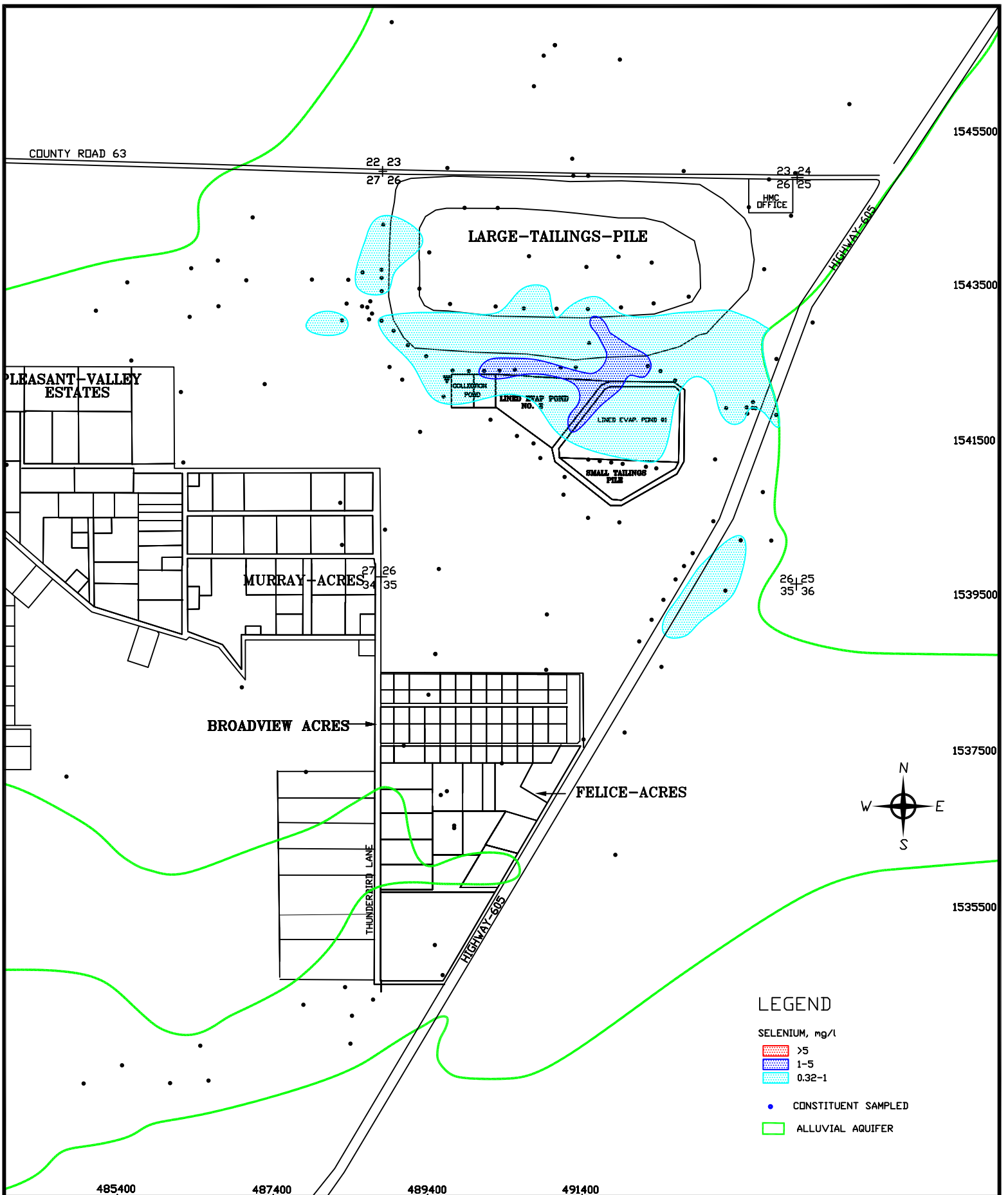
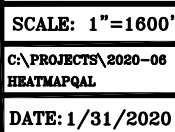


FIGURE 1.1-8. ALLUVIAL SELENIUM CONCENTRATIONS, 2009

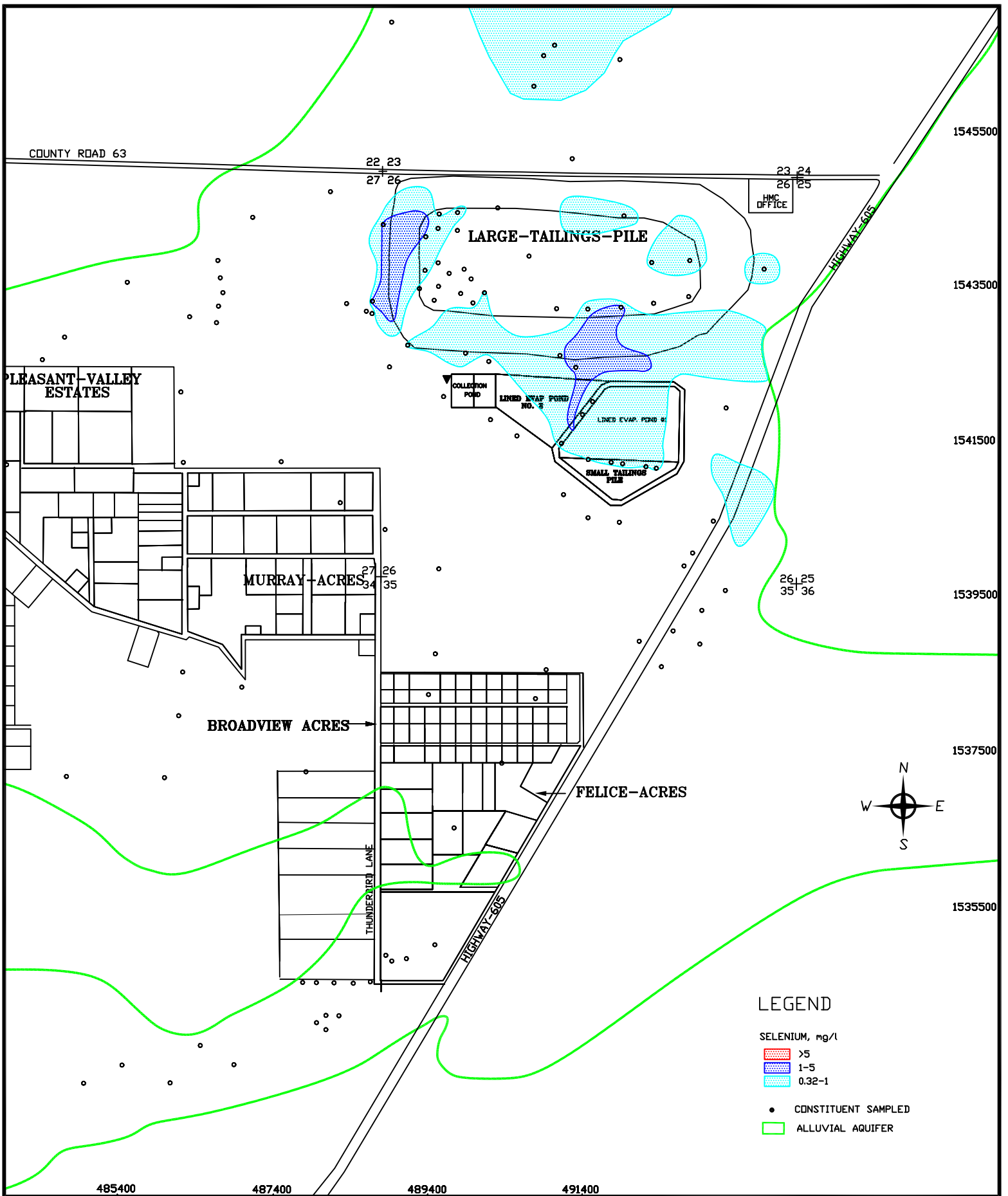
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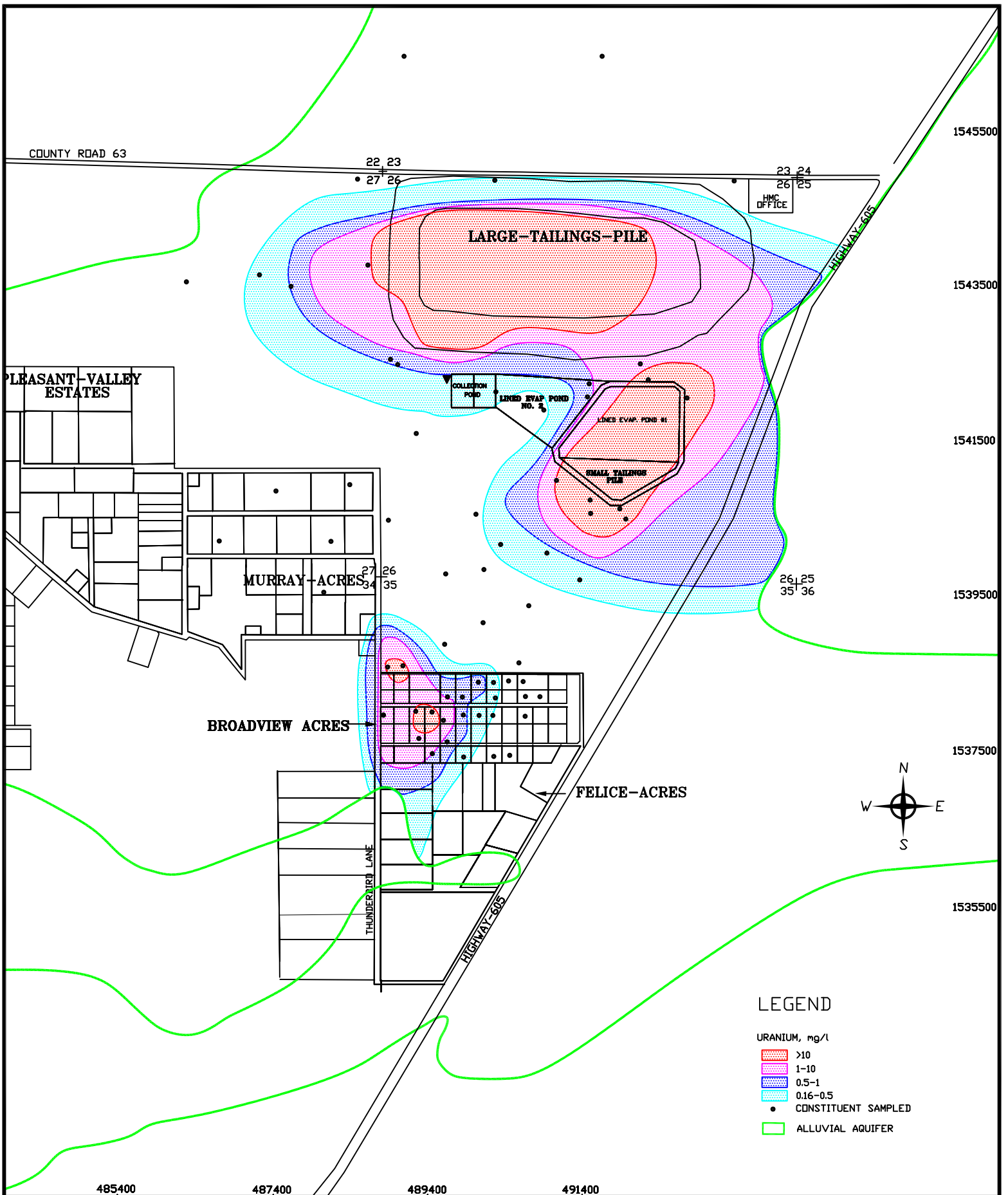
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FIGURE 1.1-10. ALLUVIAL SELENIUM CONCENTRATIONS, 2020





SCALE: 1"=1600'

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FIGURE 1.1-11. ALLUVIAL URANIUM CONCENTRATIONS, 1976

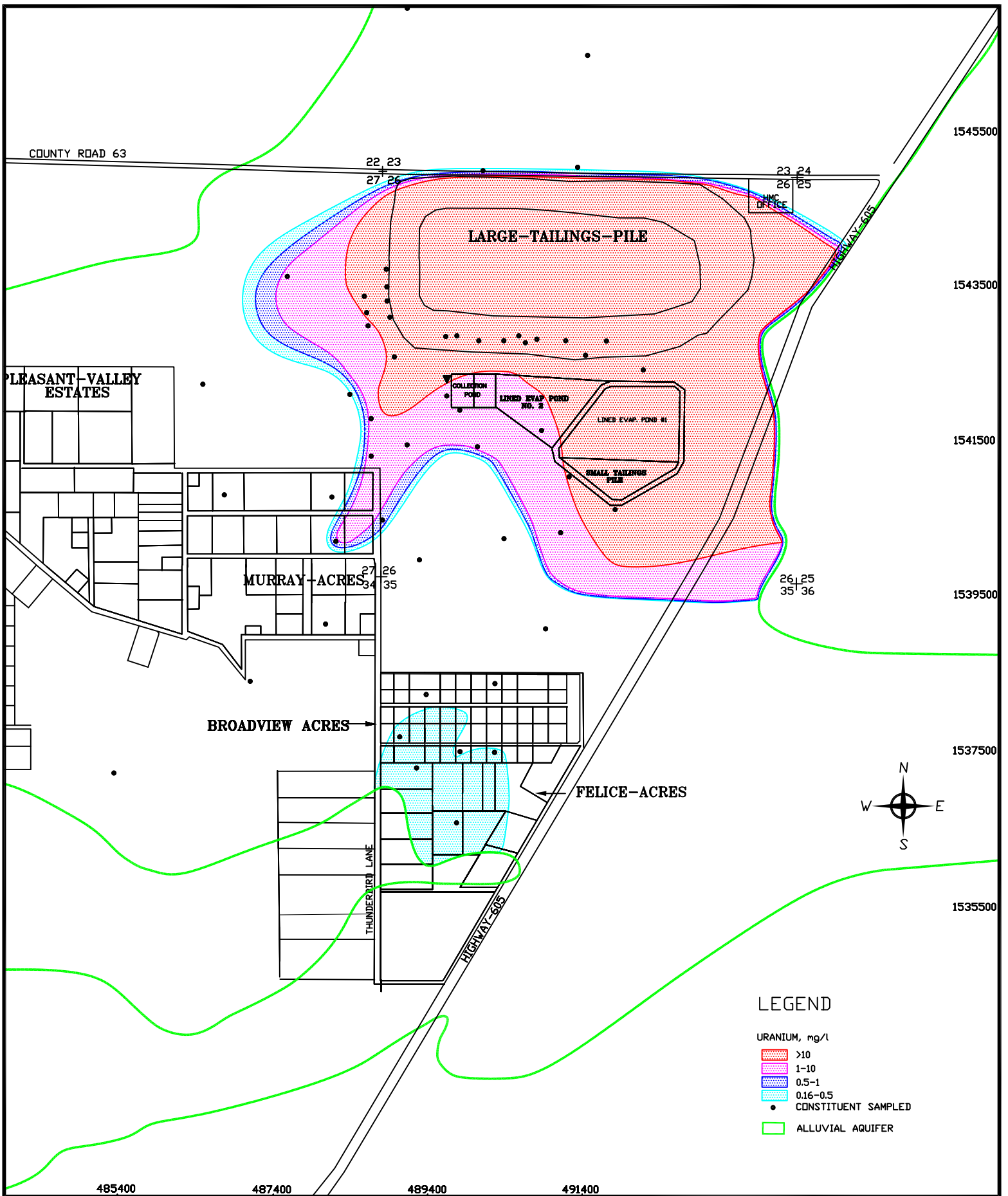
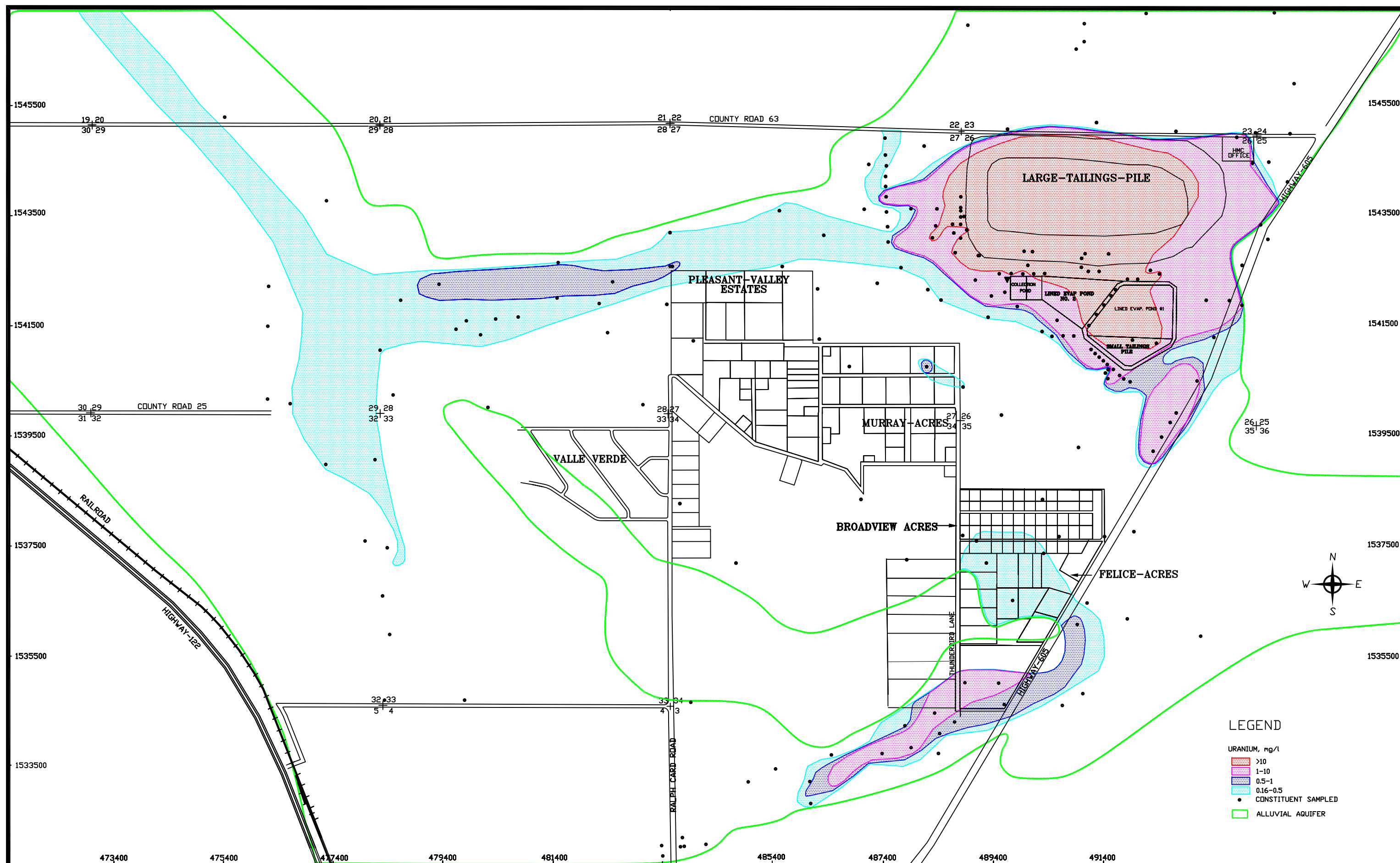


FIGURE 1.1-12. ALLUVIAL URANIUM CONCENTRATIONS, 1988



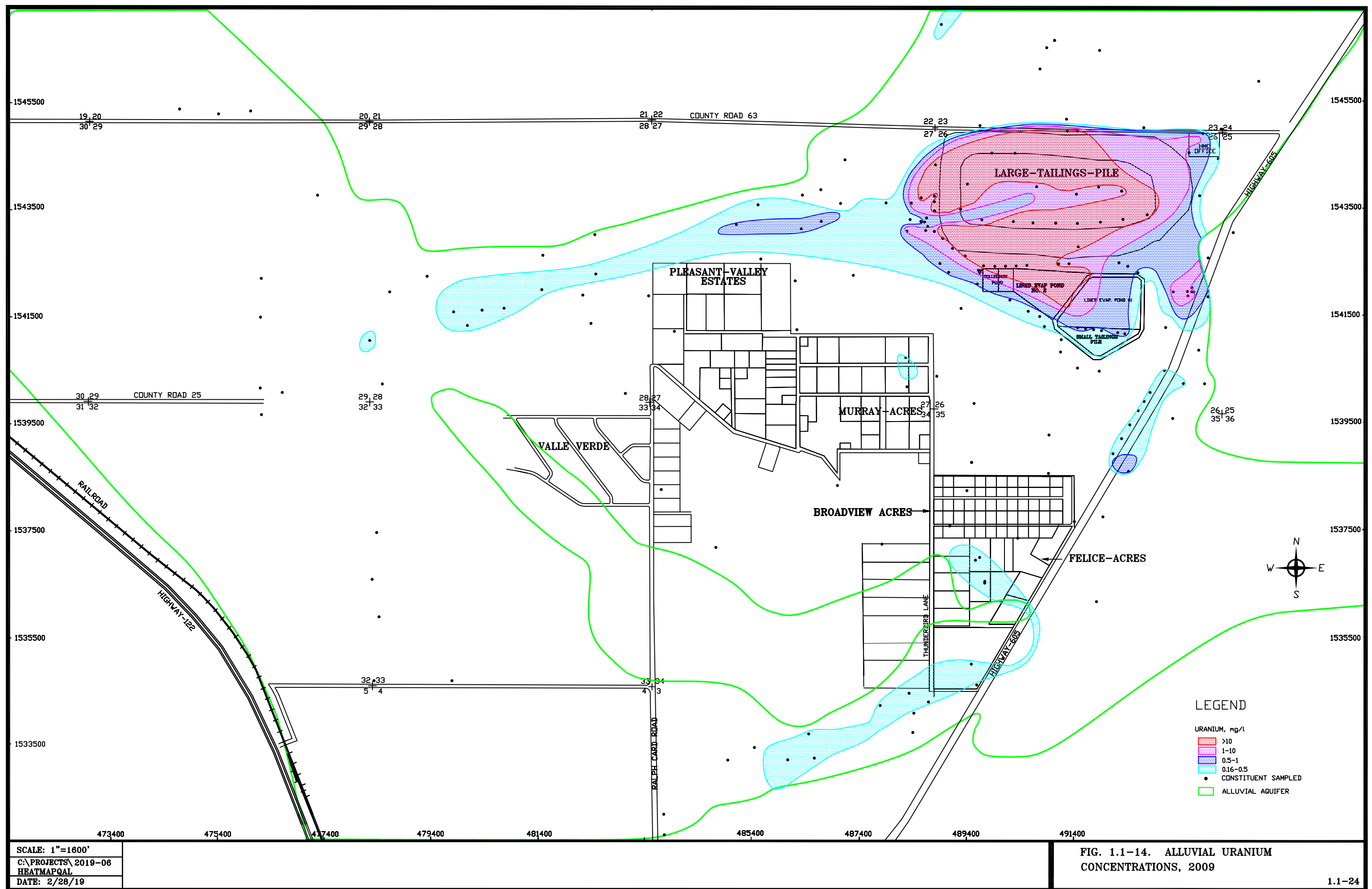
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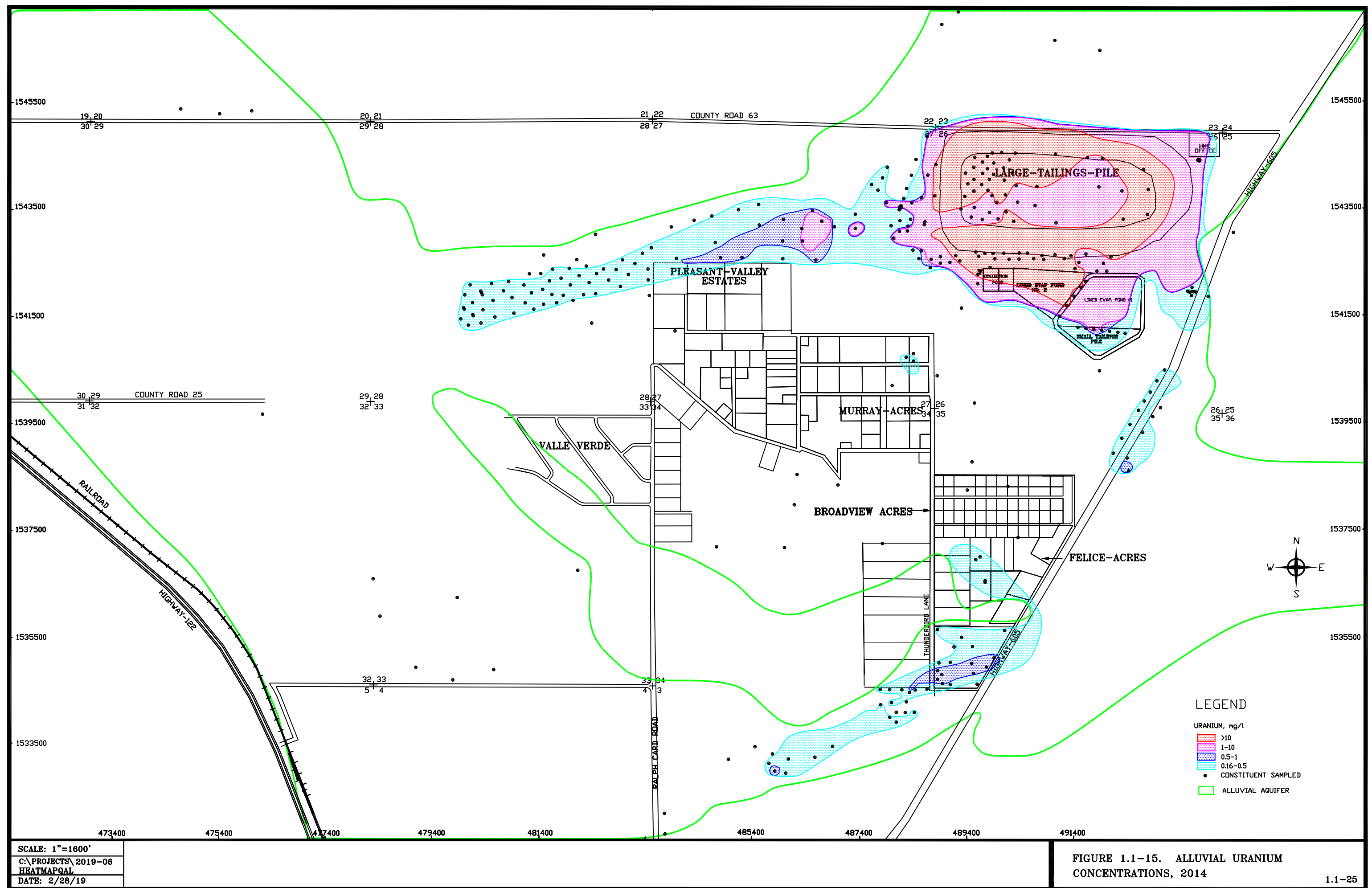
FIG. 1.1-13. ALLUVIAL URANIUM CONCENTRATIONS, 1999



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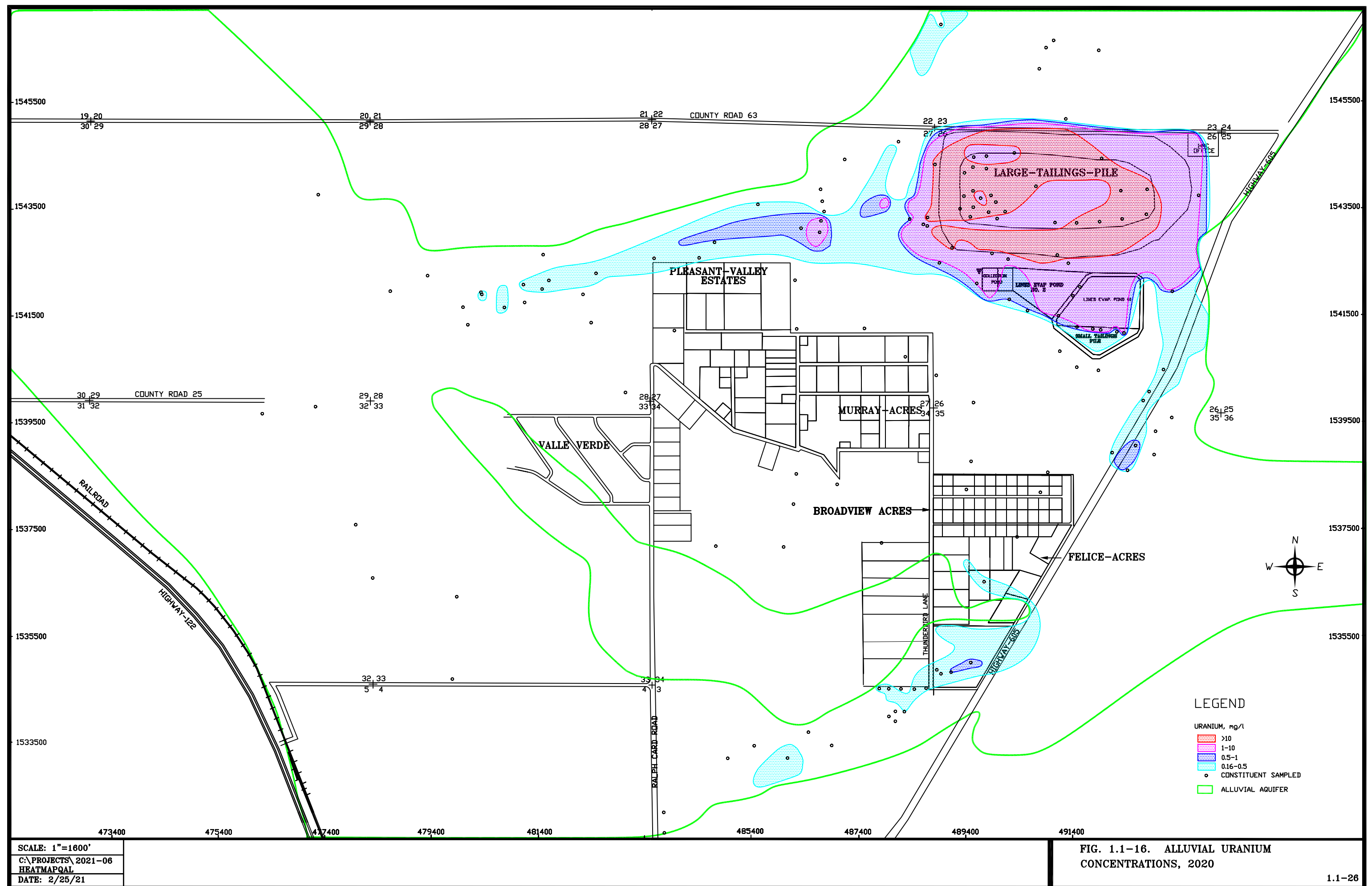
FIG. 1.1-14. ALLUVIAL URANIUM  
CONCENTRATIONS, 2009

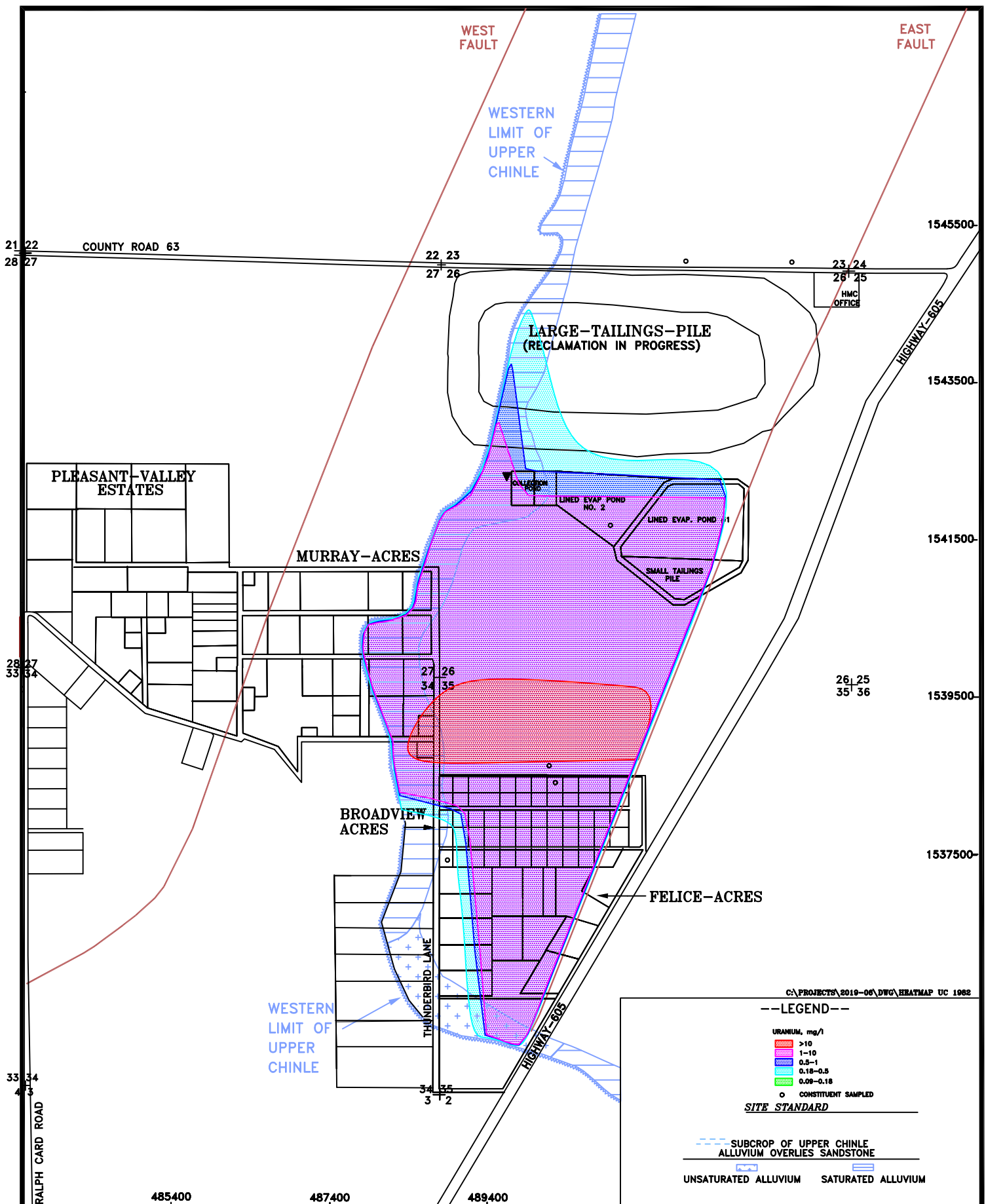




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FIGURE 1.1-15. ALLUVIAL URANIUM  
CONCENTRATIONS, 2014





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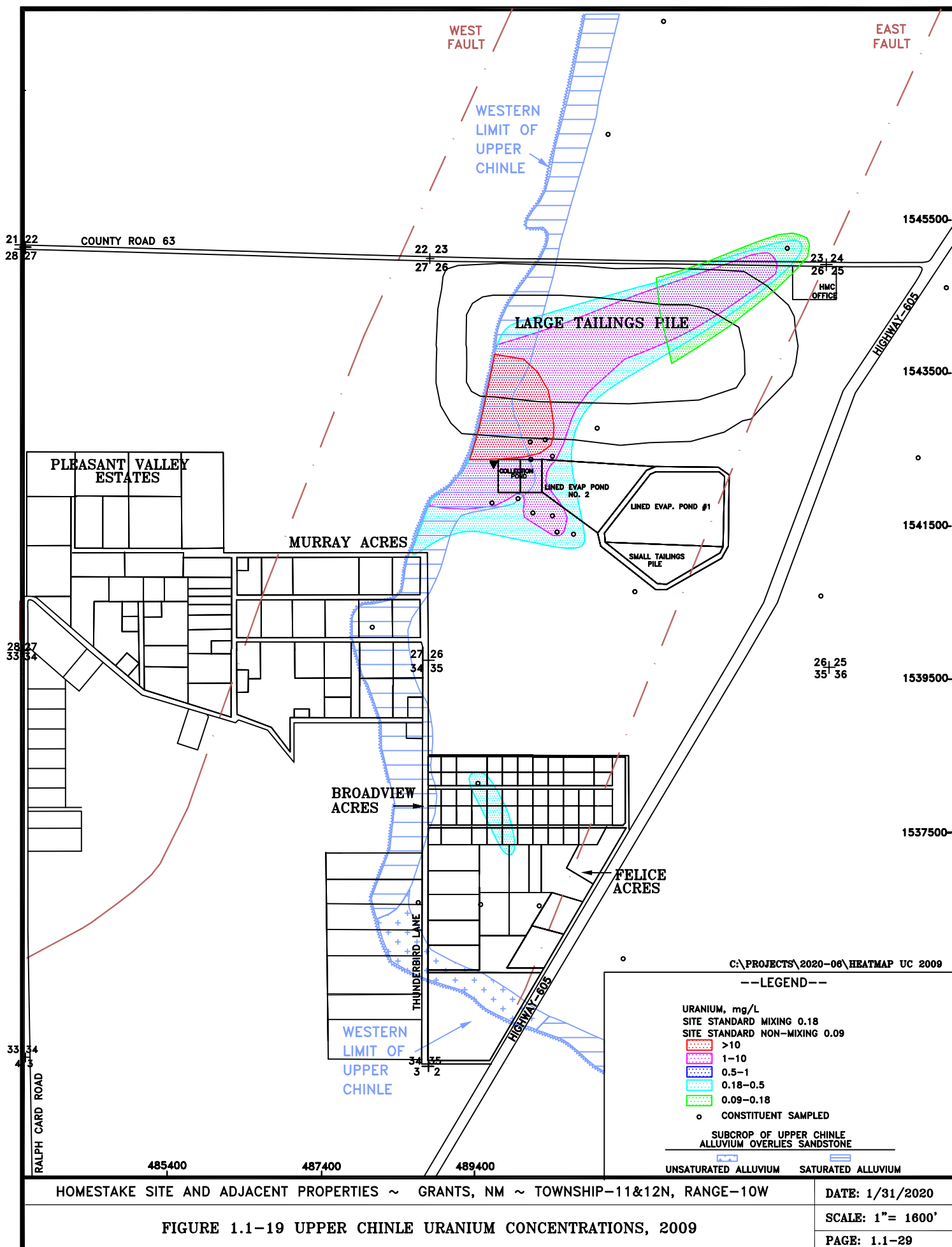
FIGURE 1.1-17 UPPER CHINLE URANIUM CONCENTRATIONS, 1982

SCALE: 1"= 1600'

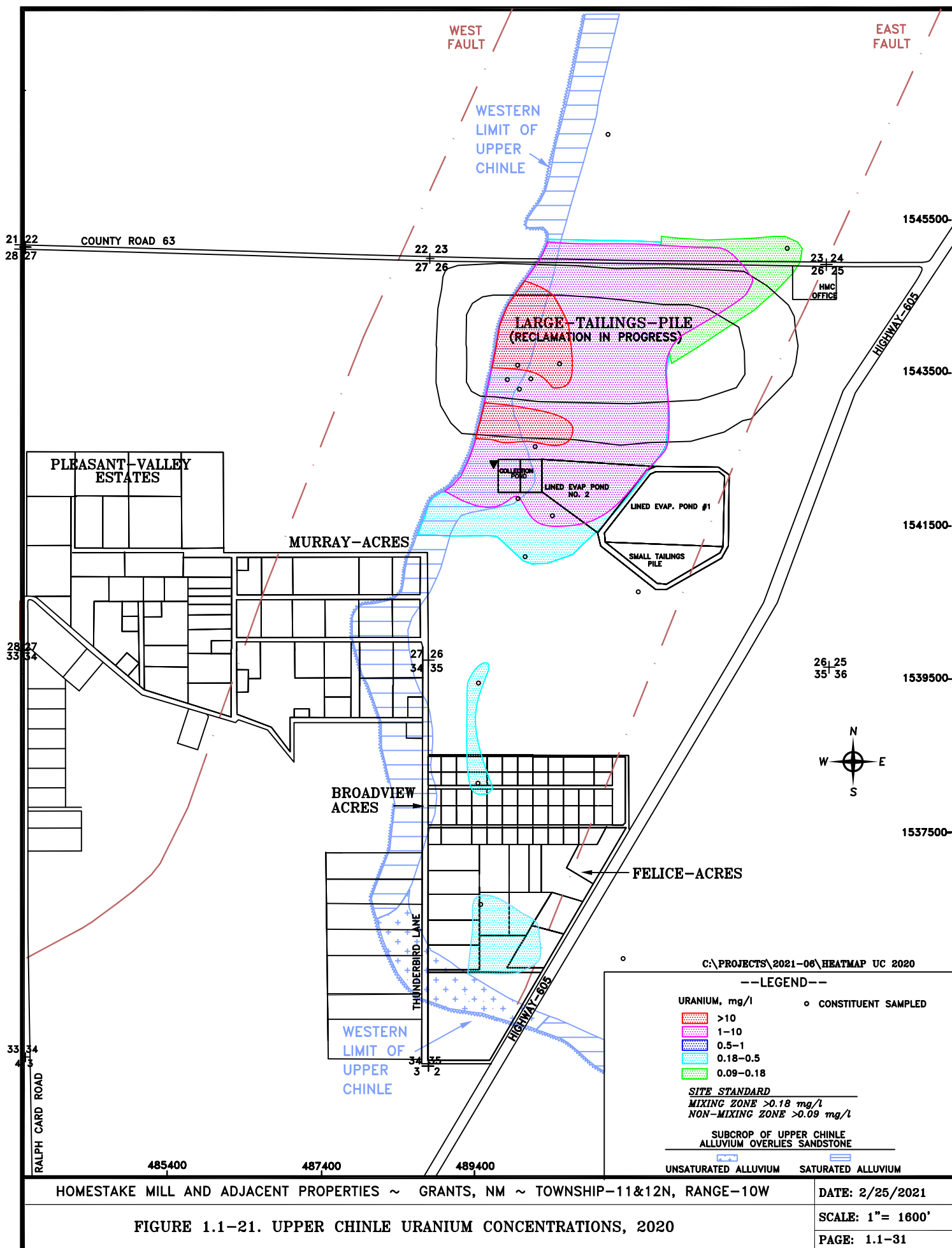
PAGE: 1.1-27

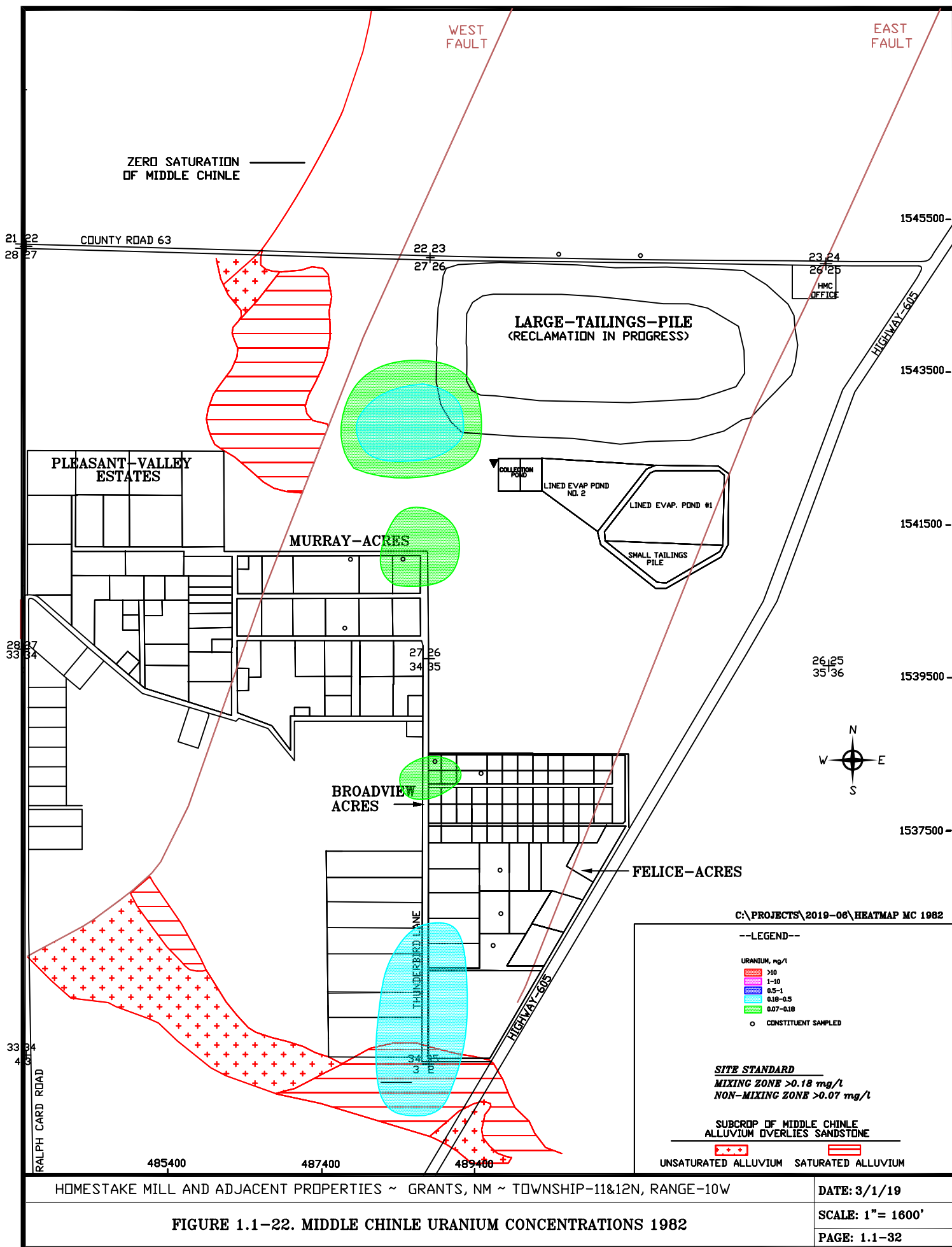


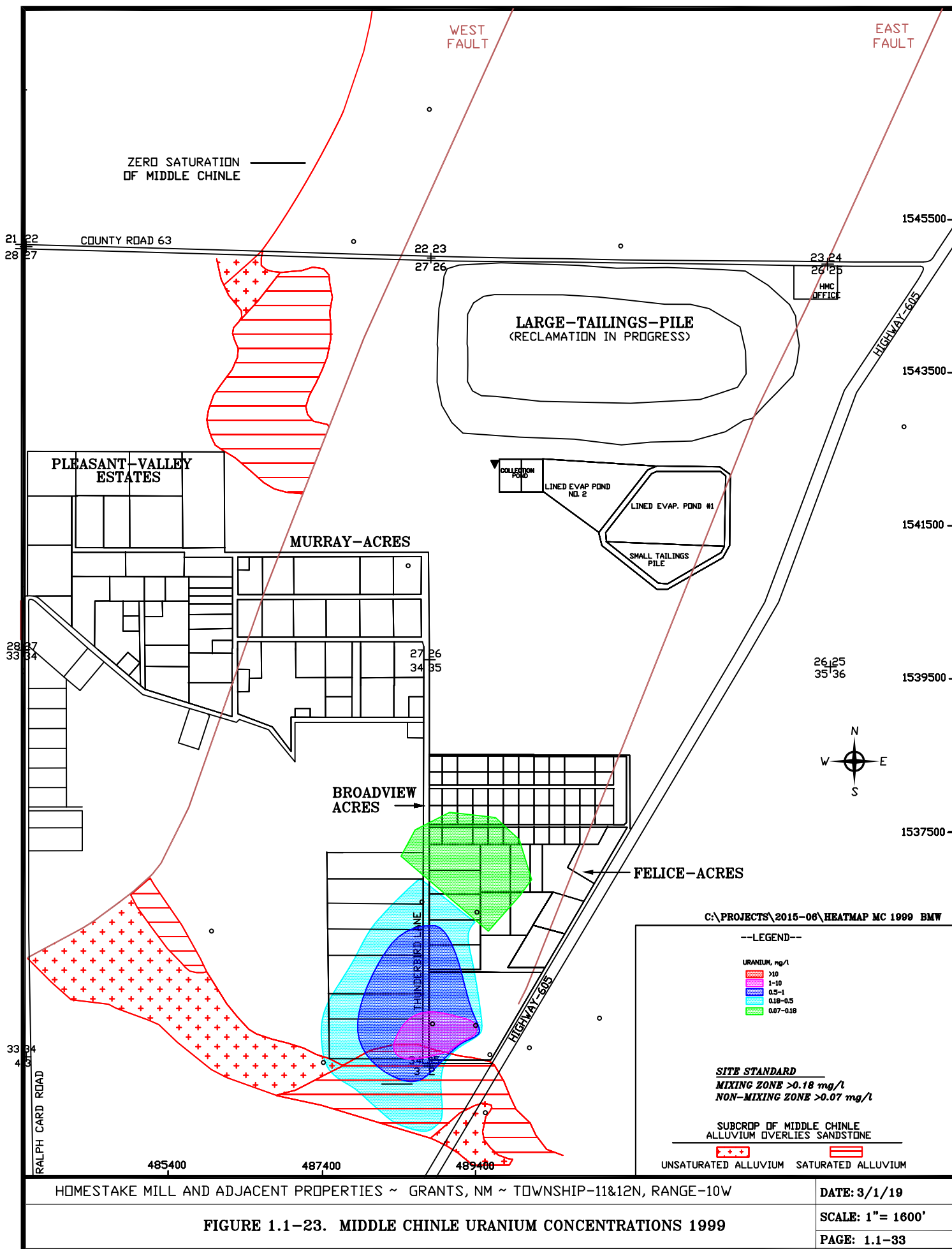












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DATE: 3/1/19

FIGURE 1.1-23. MIDDLE CHINLE URANIUM CONCENTRATIONS 1999

SCALE: 1"= 1800'

PAGE: 1.1-33

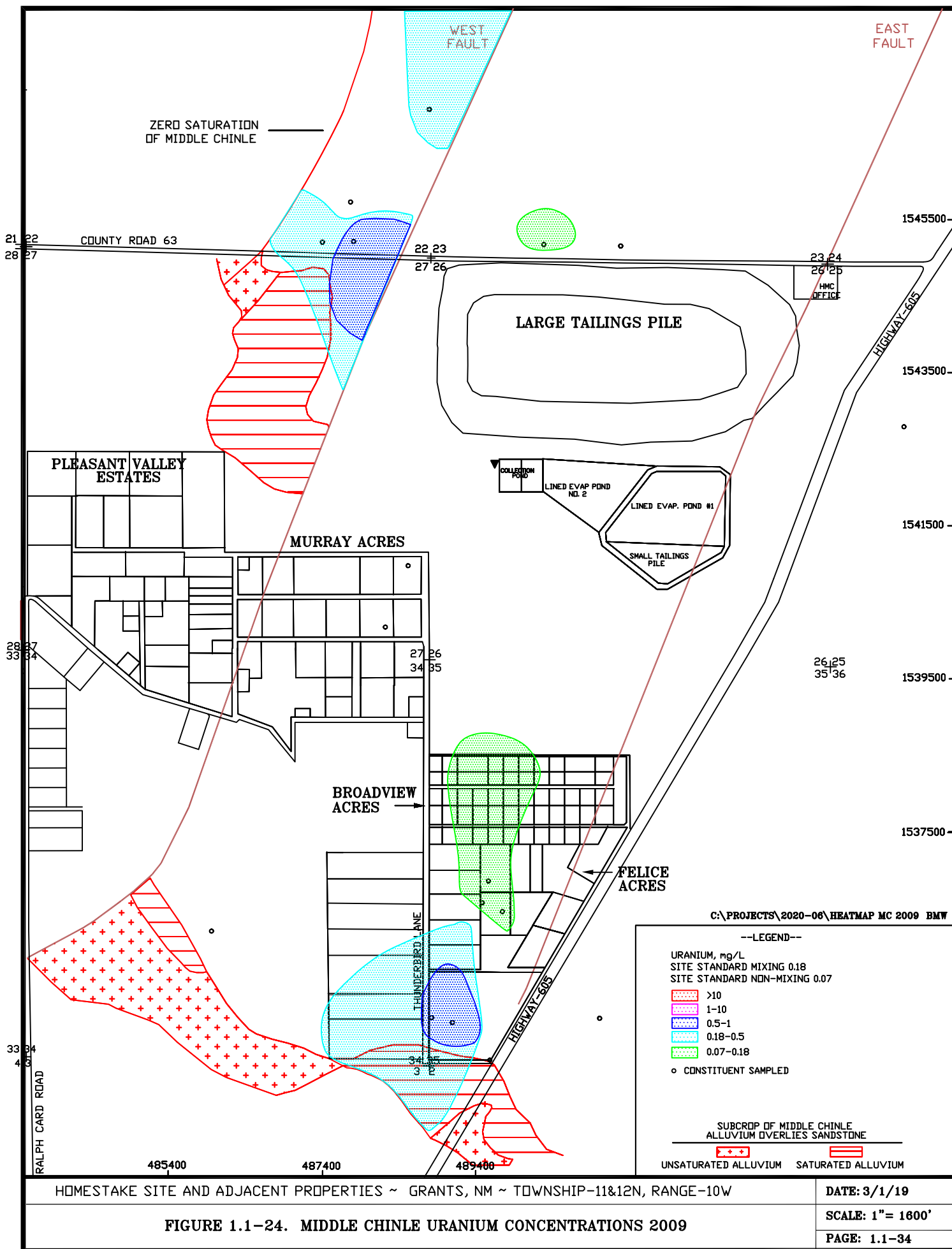


FIGURE 1.1-24. MIDDLE CHINLE URANIUM CONCENTRATIONS 2009

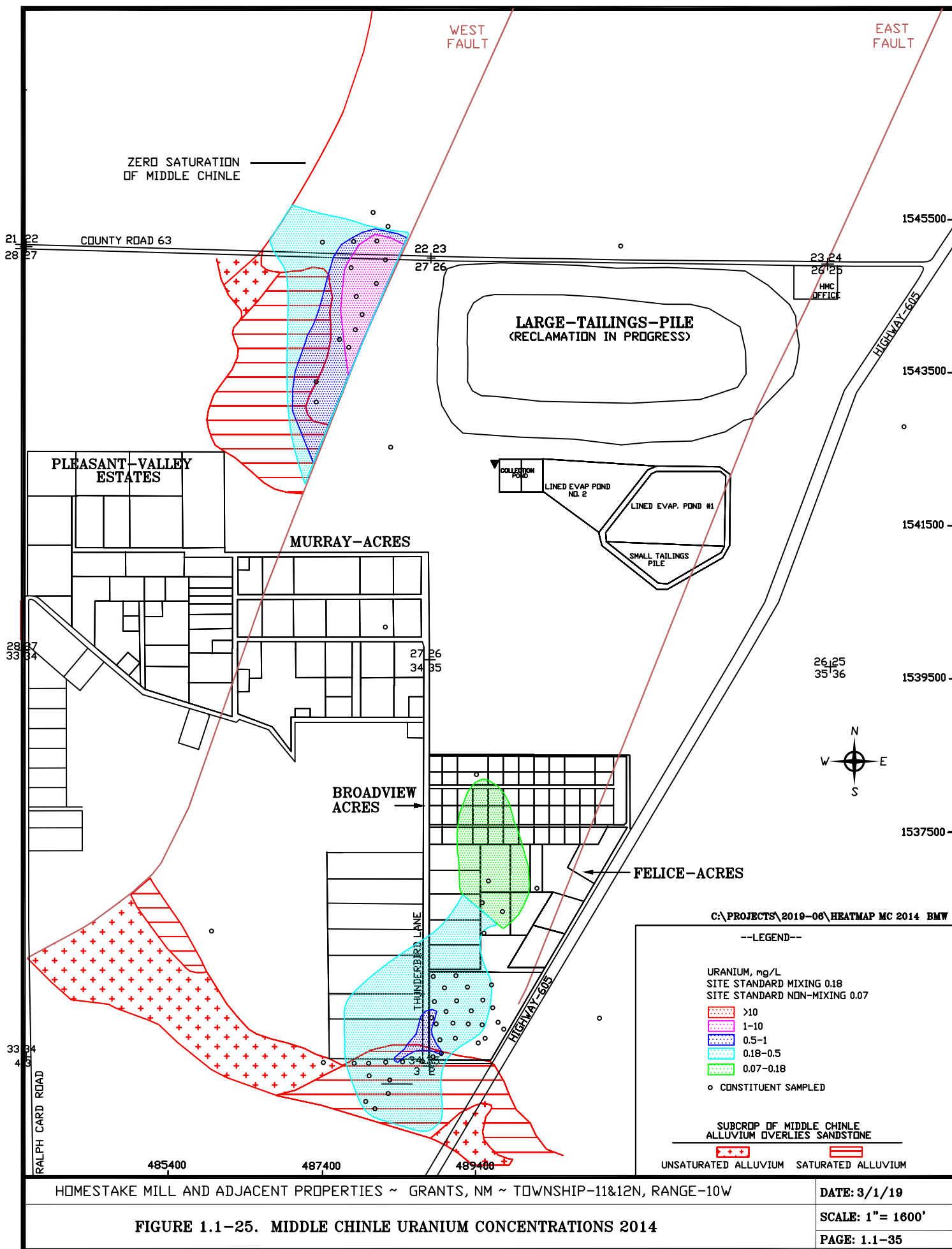
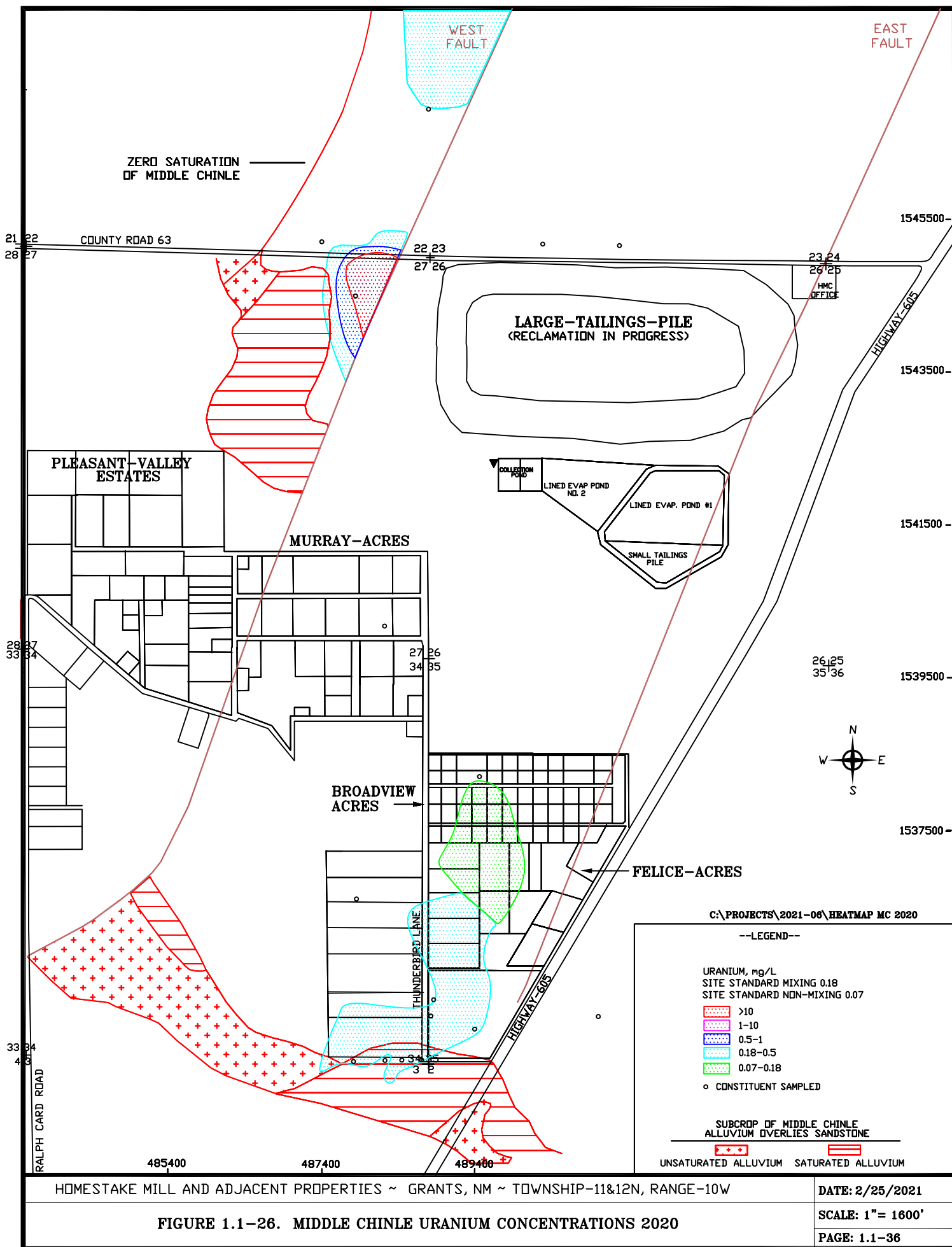
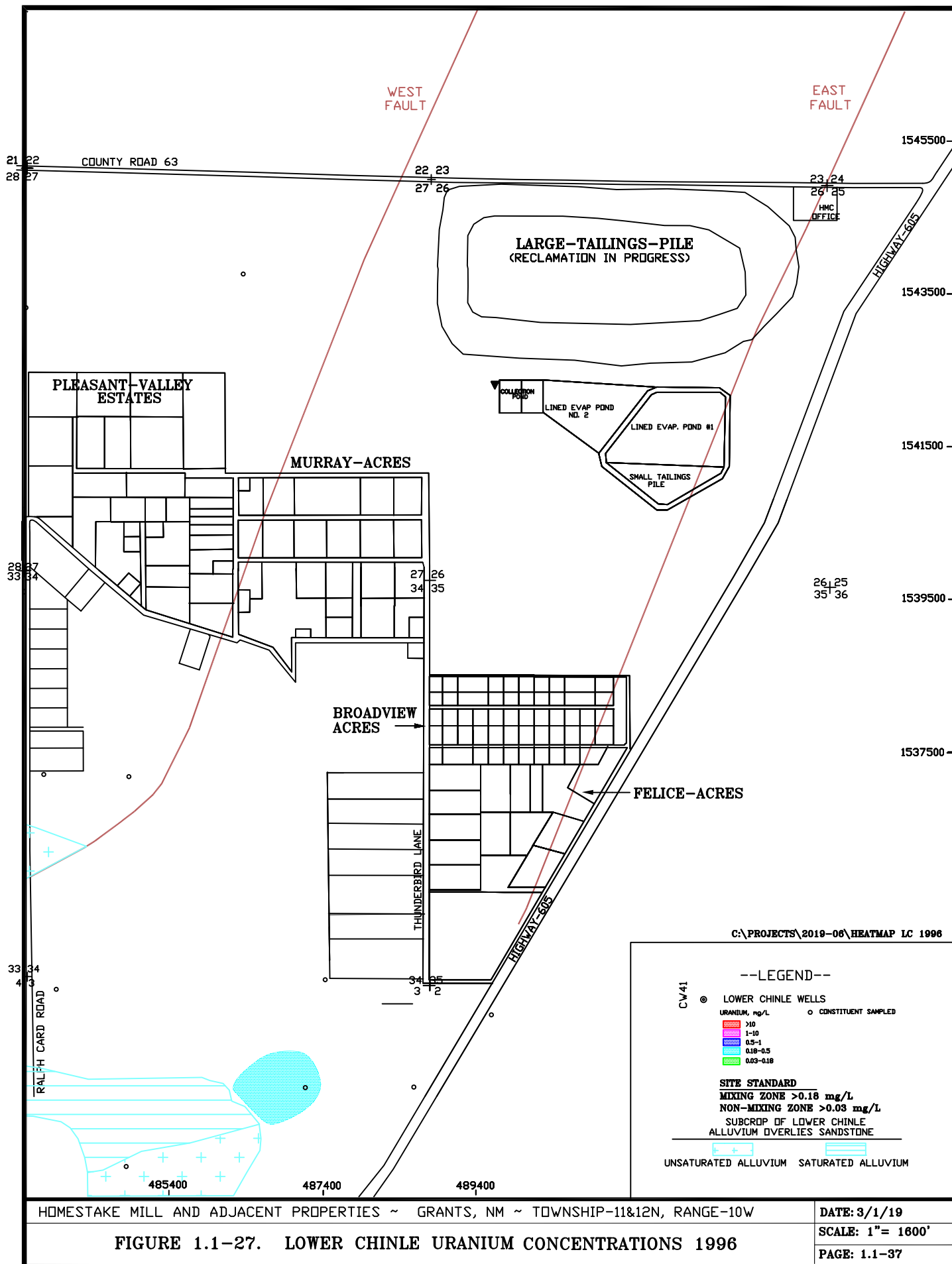


FIGURE 1.1-25. MIDDLE CHINLE URANIUM CONCENTRATIONS 2014









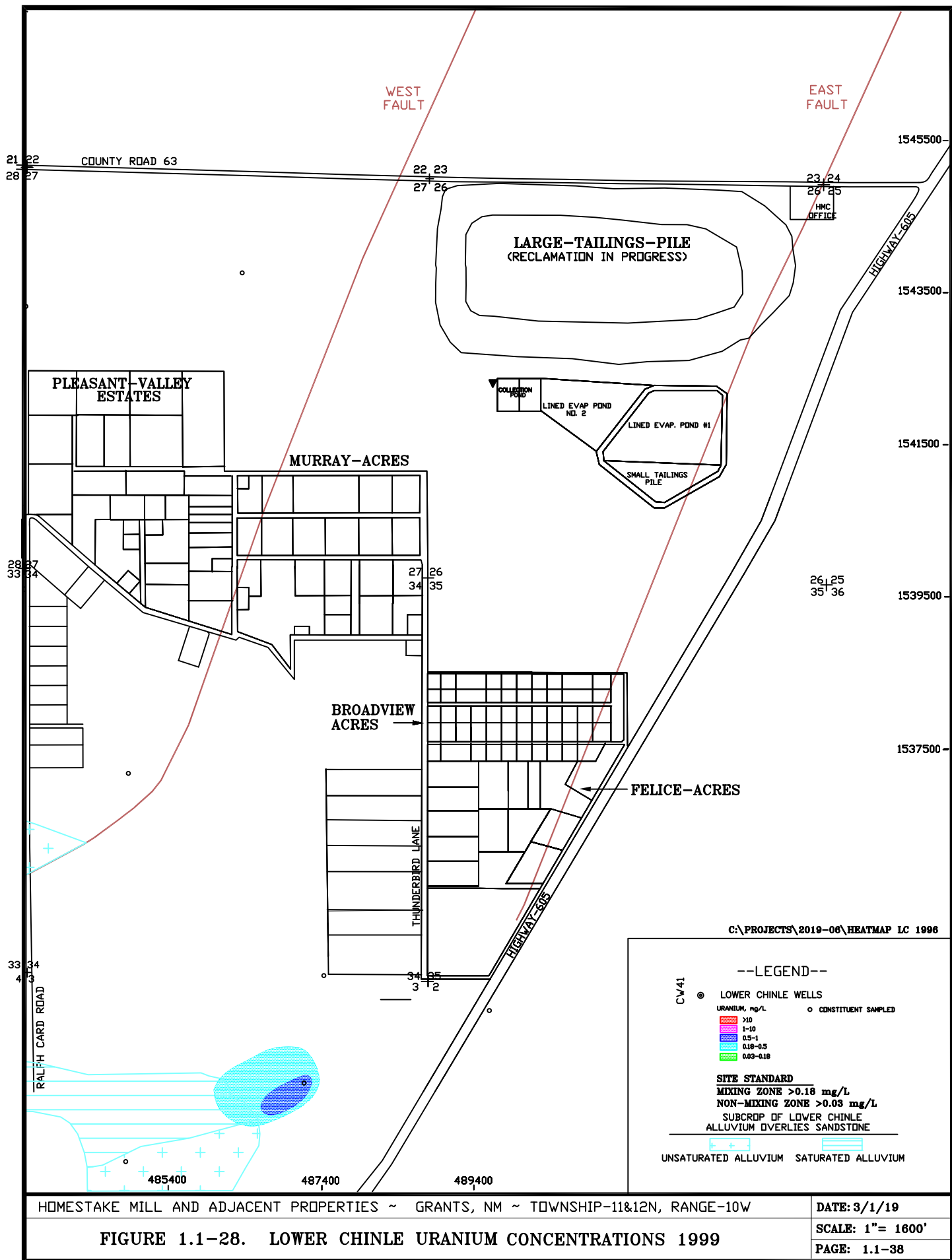
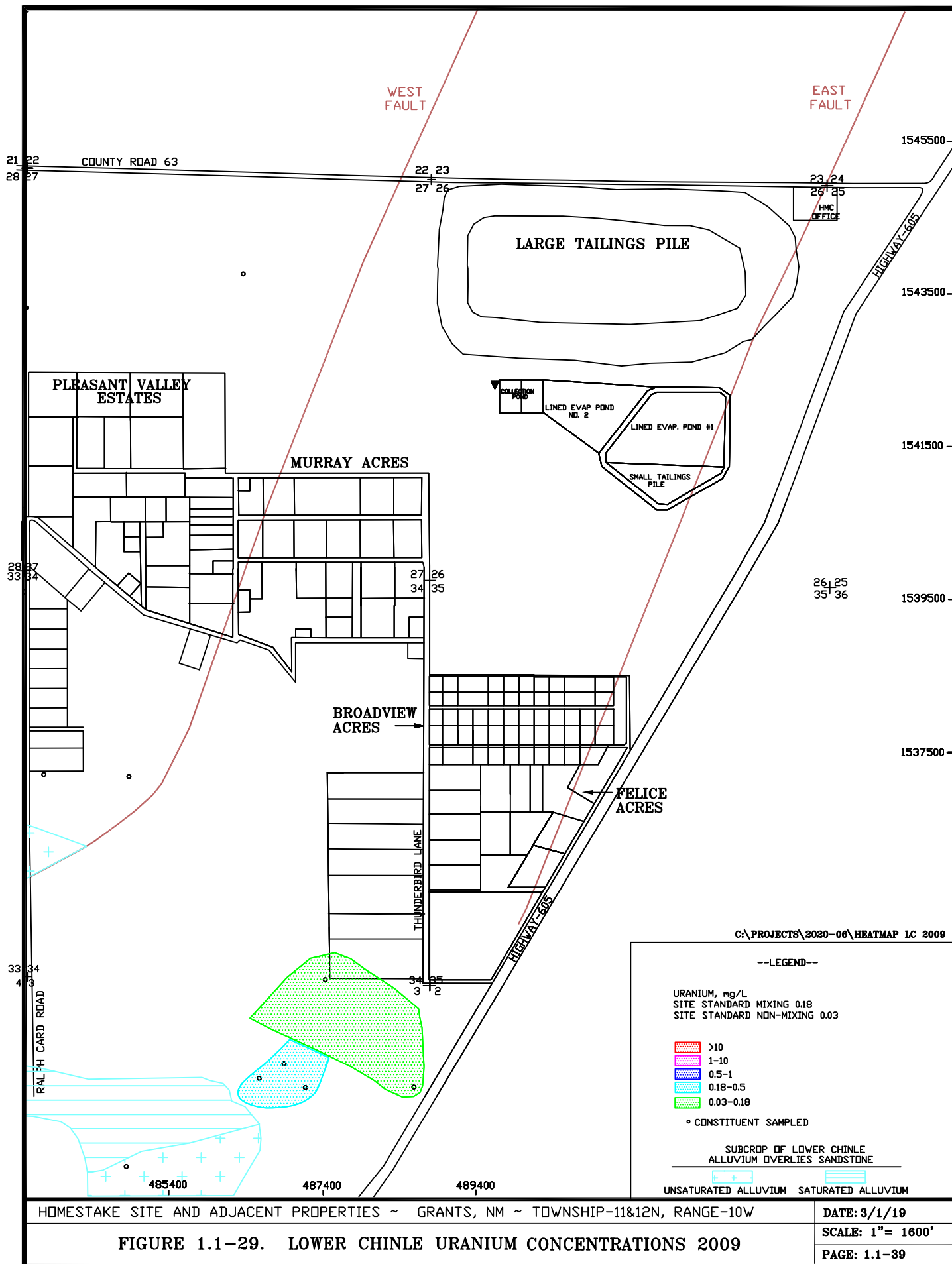


FIGURE 1.1-28. LOWER CHINLE URANIUM CONCENTRATIONS 1999



HOMESTAKE SITE AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

**FIGURE 1.1-29. LOWER CHINLE URANIUM CONCENTRATIONS 2009**

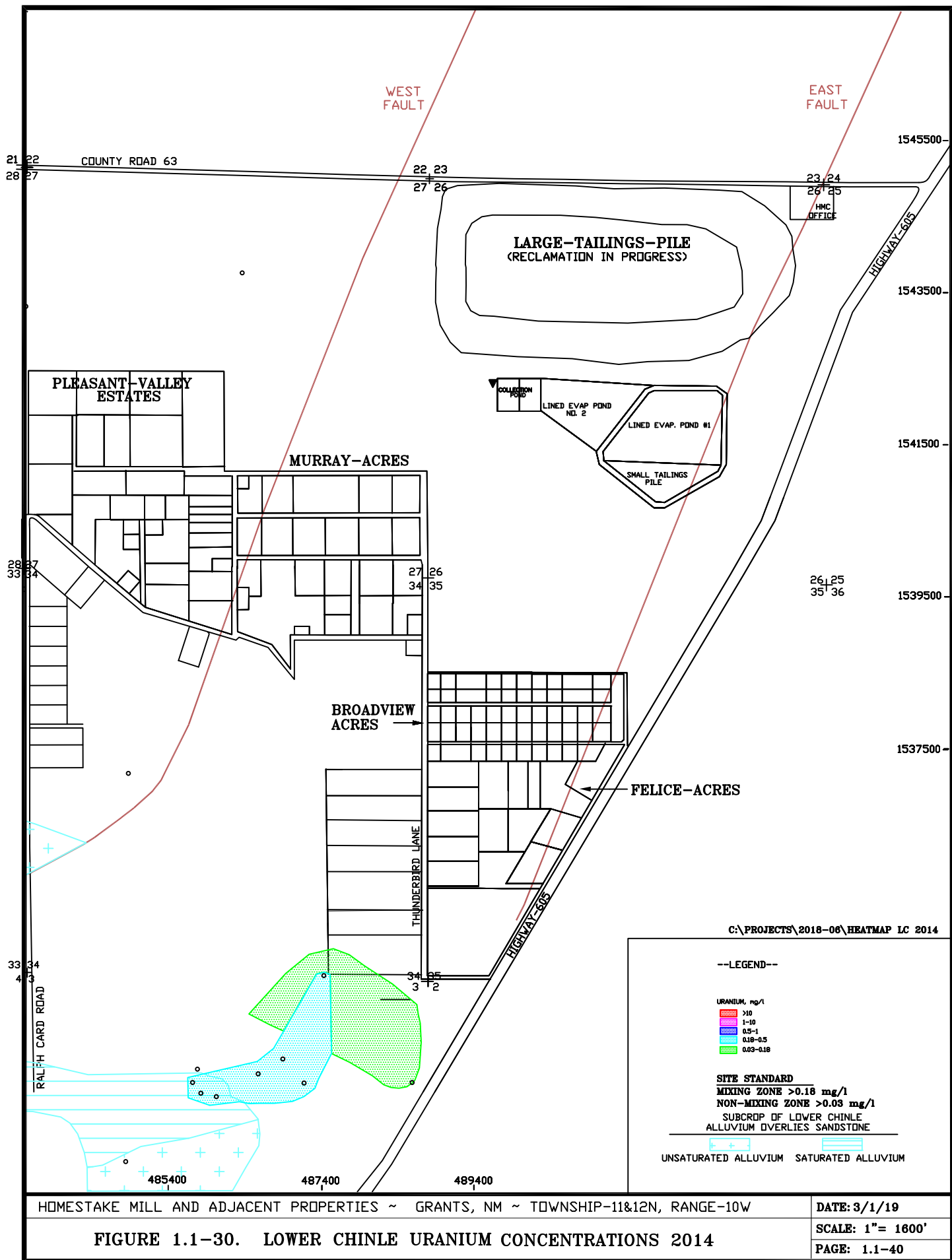
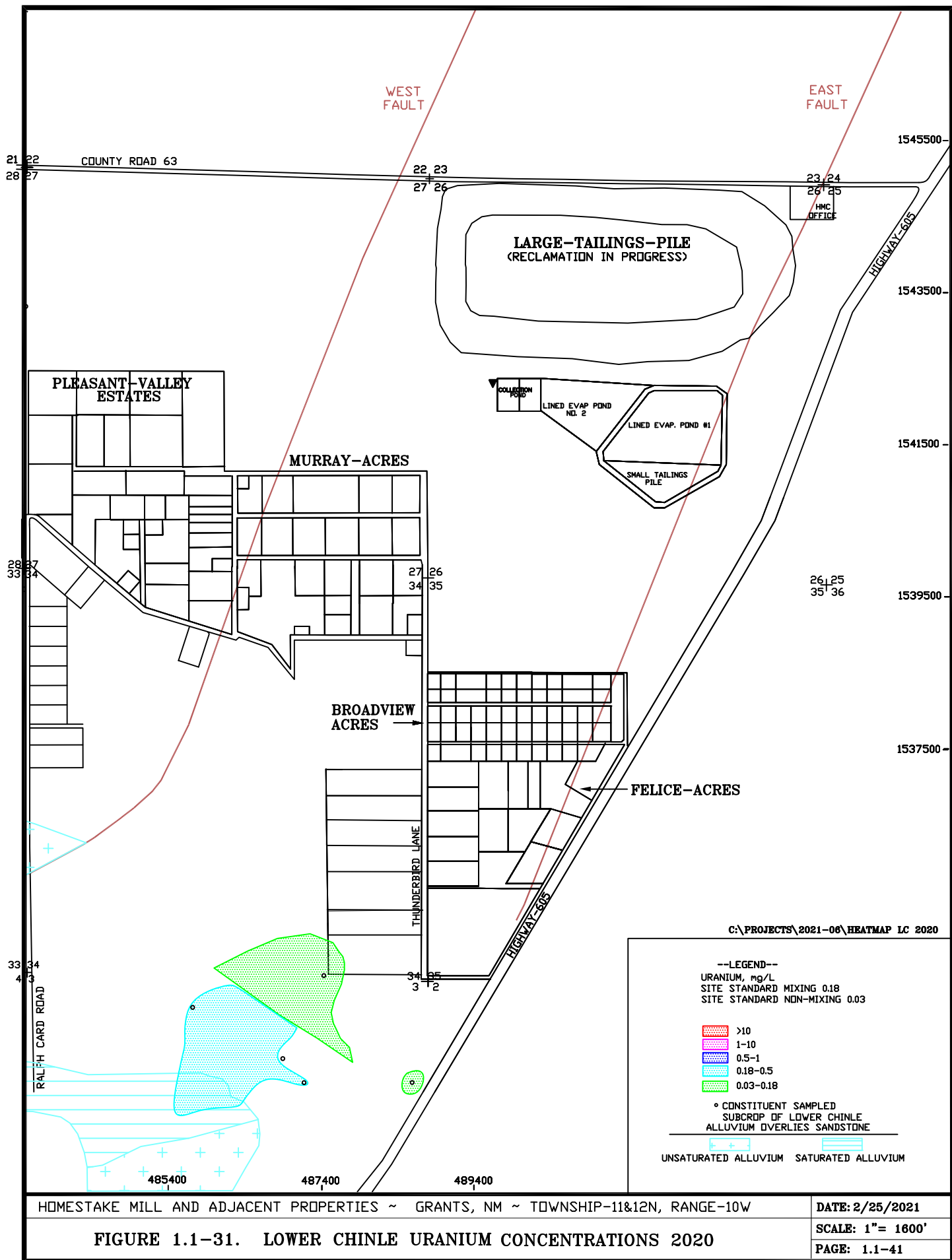


FIGURE 1.1-30. LOWER CHINLE URANIUM CONCENTRATIONS 2014



## 1.2 INTRODUCTION

This report, as required by the New Mexico Environment Department (NMED) discharge plan DP-200 and the Nuclear Regulatory Commission (NRC) License SUA-1471, presents results of the 2020 annual groundwater monitoring program at Homestake's Grants Project. Homestake Mining Company (HMC) conducted uranium milling operations five miles northeast of Milan, New Mexico from 1958 to 1990 (see [Figure 1.2-1](#)). Referred to as the Grants Project, Grants Reclamation Project (GRP) or Grants site, HMC deposited uranium tailings from the alkaline leach (high pH) Grants mills into two unlined piles (Large and Small Tailings Piles) that overlie San Mateo alluvium. The San Mateo alluvium is simply referred to as the alluvium or alluvial aquifer in this report. In 1977, due to initial concerns about groundwater selenium levels, HMC installed a system of wells and pumps in order to inject fresh water into the alluvium at the property boundary and to withdraw contaminated water from the alluvium near the tailings. The groundwater restoration program has been divided into three areas: North Off-site, South Off-site and On-site. [Figure 1.2-2](#) present limits of these three restoration areas.

Previous monitoring reports have been published in quarterly, semi-annual and annual reports<sup>1</sup>, which were presented to the NMED and the NRC.

Four subdivisions, Broadview Acres, Murray Acres, Felice Acres and Pleasant Valley Estates, are adjacent to the HMC site. These subdivisions are shown on many of the various figures found in this report. Land Sections 28, 33, 34 and 35 referenced in this report are located in Township 12N, Range 10W, and Section 3 referenced in this report is located in Township 11N, Range 10W.

Monitoring data for groundwater west of the project site is included in the 1995 through 2020 reports (see [Appendix A](#) for water levels and [Appendix B](#) for water quality). This area was designated the "West Area" and was so labeled on the figures in the annual reports prior to 2003. The 2003 through 2020 annual reports combine the project site and West Area figures on one 11 x 17 inch set of figures.

The annual ALARA audit, required in NRC license condition 42, is presented in [Appendix C](#). Additionally, a report of an annual inspection of the tailings piles and pond dikes must

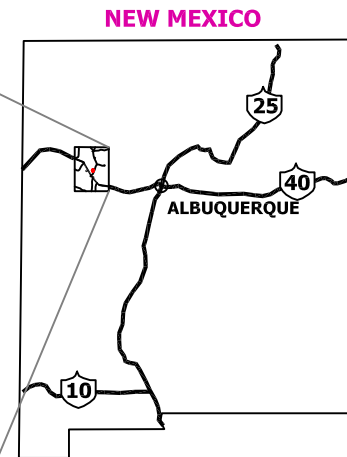
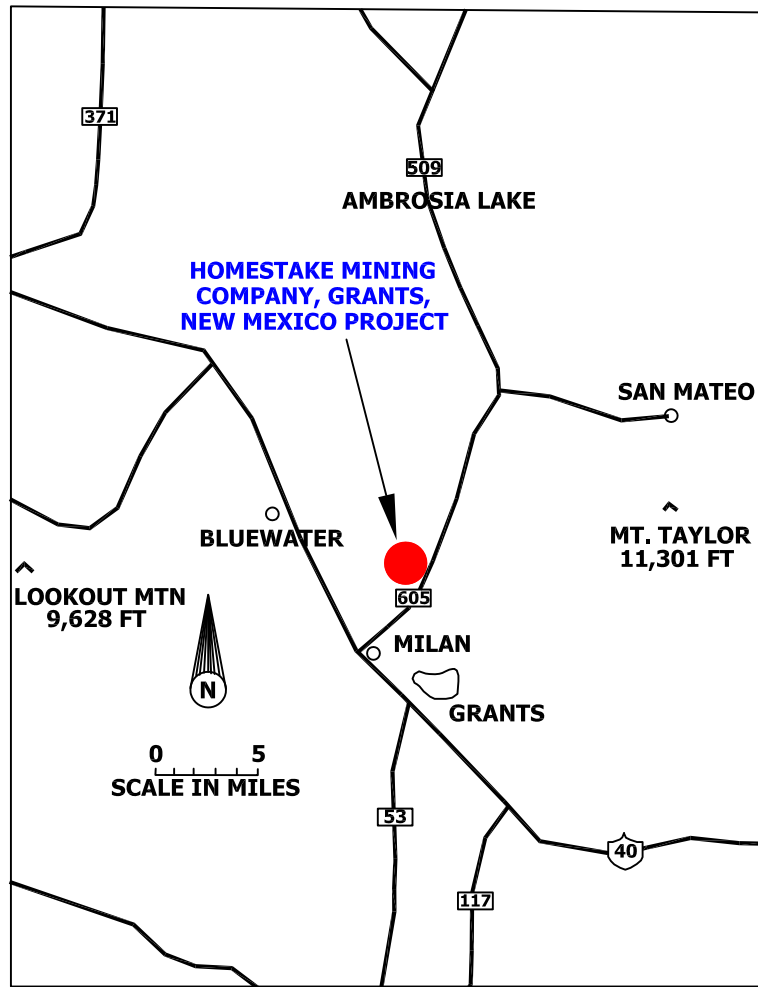
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<sup>1</sup> See Hydro-Engineering 1983b, 1983c, 1984a, 1984b, 1984c, 1985a, 1985b, 1985c, 1985d, 1986a, 1986b, 1986c, 1987a, 1987b, 1988a, 1988b, 1990, 1991, 1992, 1993a, 1994, 1995, 1996, 1997, 1998, 1999, 2000a, 2001a, 2002, 2003a, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019 and 2020.

be submitted per license condition 12 and DP-200 Condition 52i and is presented in [Appendix D](#). [Appendix E](#) provides an annual land-use survey discussion for the immediate Grants site area as required by license condition 42 and was added in 2002. The annual radon flux survey report for the Large and Small Tailings Piles was presented in the Grants Semi-Annual Environmental Monitoring Report 2016 through 2020 and therefore is not presented in this report as it was prior to the 2016 report. [Appendix F](#) gives the meteorological data for the Grants site for 2020. No soil moisture data was collected in 2020 from the irrigation area instruments.

A detailed table of contents is included at the front of each report section including a list of associated section figures and tables.

1.2-3

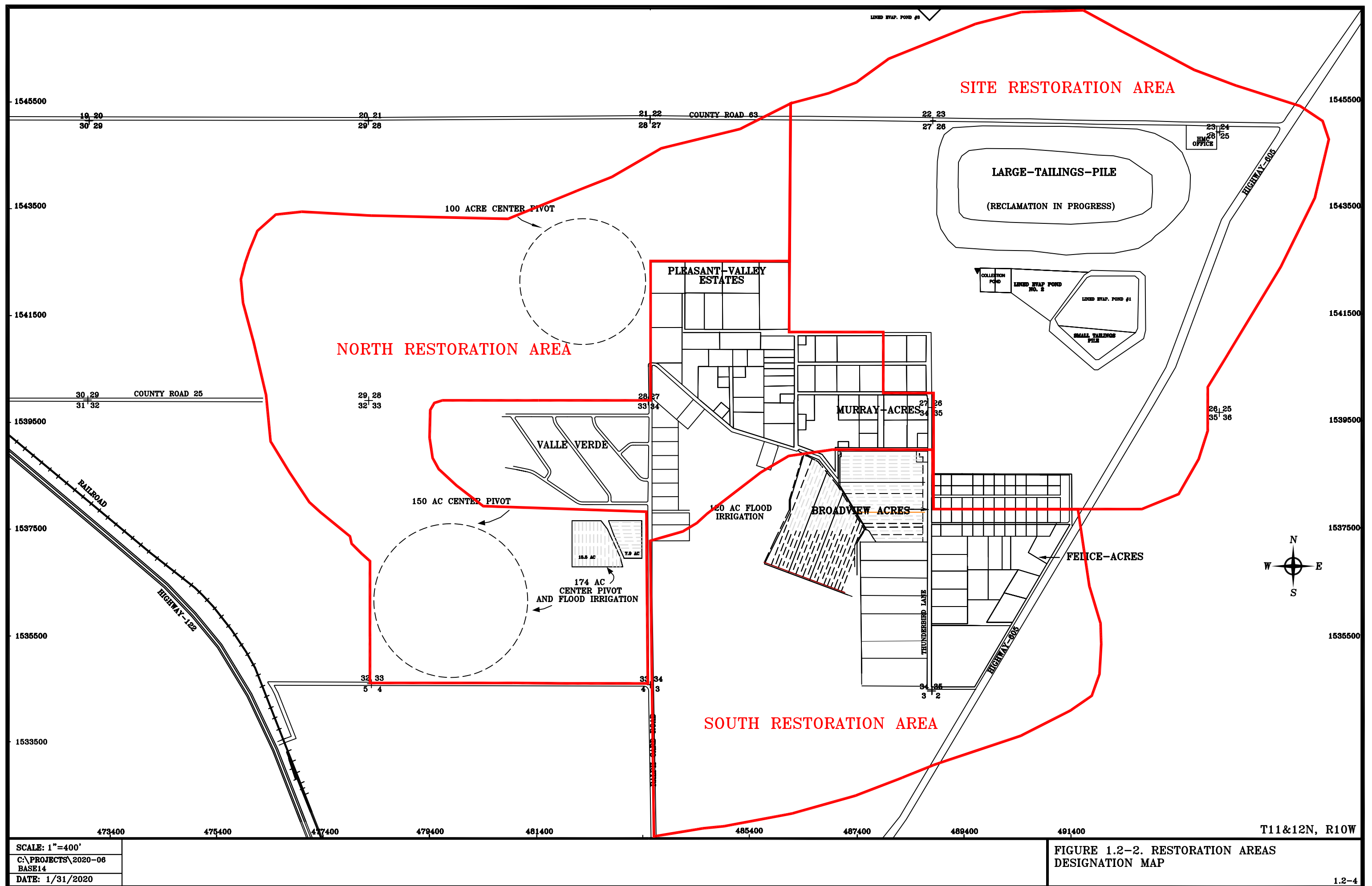


**HOMESTAKE MINING  
COMPANY, GRANTS,  
NEW MEXICO PROJECT**

DATE: 3/7/17  
PROJECTS\2017-06\DWG\STATELOC.DWG

**FIGURE 1.2-1. LOCATION OF THE GRANTS PROJECT**





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FOR HOMESTAKE'S GRANTS PROJECT**

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## **2.0 OPERATIONS**

### **2.1 CURRENT OPERATIONS SUMMARY**

The annual precipitation of 7.55 inches at the Grants Project site in 2020 is below normal precipitation for Grants, New Mexico. This below normal precipitation condition would be expected to cause natural water levels at the Grants site to gradually decline. Appendix F gives the meteorological data for 2020 for the Grants site including an annual wind rose plot.

The Grants Project groundwater remediation system consists of collection of contaminated groundwater near the tailings piles, collection of slightly contaminated groundwater Off-site and down-gradient injection of treated and/or fresh water. Starting in late 2015, the treated water consisted of a mixture of R.O. product, zeolite treated and fresh water that was mixed in the post treatment tank (PTT). These collection and injection systems continued to operate in 2020, along with the reverse osmosis (R.O.) plant and the zeolite treatment of Off-site water, which are used to treat and manage the majority of collected groundwater. The water treatment and injection rates for 2020 were smaller due to operational problems with the zeolite treatment and the limited evaporation capacity for disposal of R.O. brine and zeolite regeneration water. The R.O. plant produces product water that is of much better quality than the natural alluvial water, and it is used as injection water in most areas of the Grants Project restoration program. The zeolite treatment removes slightly elevated uranium concentrations from the Off-site water and the treated water is also used for injection water. [Figure 2.1-1](#) on page 2.1-15 shows the location of the present (end of 2020) injection and collection systems along with their starting dates of operation. Water collected from the On-Site area is pumped to the R.O. plant while water collected from the Off-site area is pumped to the zeolite treatment.

The area where groundwater flow is controlled by the treated and/or fresh-water injection and collection systems is called the “Collection Area” and is shown by the yellow cross-hatched pattern on [Figure 2.1-1](#). All of the alluvial groundwater within the collection area converges to the collection wells.

### 2.1.1 R.O. AND ZEOLITE TREATMENT

R.O. treatment and zeolite beds are utilized to treat water at the GRP. R.O. is used to treat the On-site collected water while zeolite is used to remove the uranium from the Off-site water.

#### 2.1.1.1 R.O. PLANT

The R.O. plant utilizes a lime/caustic pre-treatment and clarification unit. The R.O. plant was switched in mid-2015 from the use of sand filters to microfiltration. Blowdown (sludge) from the pre-treatment unit discharges to the West Collection Pond with the treated water feeding the three R.O. units (two 300 gpm low-pressure R.O. units and a No. 3 600 gpm low-pressure unit). The brine from the No. 1 low-pressure unit feeds a 75-gpm high-pressure R.O. unit while the brine from all units feed a second high-pressure unit when all of units are operating. The second high-pressure unit was added in the middle of 2016. The No. 2 R.O. unit is a single stage, low pressure 300 gpm system. The No. 3 600 gpm R.O. low-pressure unit was installed in late 2015. Only one of the 300 gpm R.O. units was typically used at one time during 2020 due to limitations on brine discharge to the evaporation system. The R.O. product water from the five units is discharged to the PTT where it is mixed with zeolite treated water and/or fresh water prior to being injected into a series of injection wells. The brine from the R.O. plant is discharged to the evaporation ponds. Other miscellaneous flows and blowdown from the R.O. plant are pumped to the West Collection Pond for recycle to the R.O. plant. The R.O. plant inputs and output of R.O. product water for injection are listed in the following tabulation:

R.O. Plant Performance (GPM) (2000-2020)				
Year	Input		Output	
	Collection Wells	Tailings Collection	R.O. Injection	Brine
2000	274	0	204	70
2001	276	5	222	59
2002	383	5	288	100
2003	338	4	266	76
2004	293	12.2	249	64

R.O. Plant Performance (GPM) (cont'd)				
(2000-2020)				
Year	Input		Output	
	Collection Wells	Tailings Collection	R.O. Injection	Brine
2005	250	6.4	198	49
2006	257	2.1	184	48
2007	262	0	204	55
2008	264	3.1	194	60
2009	251	0.3	171	60
2010	240	0	166	59
2011	257	1.4	170	58
2012	267	0	182	50
2013	236	0	148	47
2014	235	0	165	47
2015	228	0	112	52
2016	584	8	449	141
2017	497	3	407	108
2018	445	0.5	350	85
2019	314	0	236	57
2020	342	0	205	68

### 2.1.1.2 ZEOLITE BEDS

The zeolite beds have been used since 2016 to remove the uranium from the Off-site collection water because uranium is the only site constituent that exceeds the site standards in this collected water. The 300Z has a design capacity of 300 gpm while the 1200Z has four trains with a total design capacity of 1200 gpm. This allows this water to be used as an input to the PTT and mixed with R.O. product water and fresh water prior to injecting it back into the groundwater. The following tabulation list the inputs to the 1200Z and 300Z treatment systems and the rates of treated and regeneration water for 2016 through 2020 and shows that the average treated water rate has varied from 26 to 267 gpm.

Zeolite Treatment Performance (GPM) (2016-2020)				
Year	Input		Output	
	1200 Zeolite	300 Zeolite	Zeolite Treated Water	Regeneration
2016	152	115	233	34
2017	247	56	253	50
2018	259	37	267	29
2019	160	0	126	34
2020	34	0	26	8

## 2.1.2 COLLECTION

The alluvial and Upper Chinle aquifer collection rates to the R.O. plant were increased in 2016 while the Middle Chinle aquifer On-site collection was started in 2016. The R.O. plant was operated at an average rate of 342 gpm during 2020, which is slightly higher than the 2019 rate.

Up-gradient alluvial aquifer collection north of County Road 63 from the P wells ceased after May of 2013. Collection water from the South and North Off-site areas was treated with the zeolite process starting in 2016 and this continued in 2020. Upper Chinle aquifer collection continued from wells CE2, CE5, CE6, CE11, CE12, CE15 and CE19 in 2020 (red X symbols located south of the collection ponds), and Upper Chinle wells CE15, CE15A and CE19 were added as input to the R.O. plant in 2017. None of the tailings sumps were input to the R.O. plant during 2020.

### 2.1.2.1 ALLUVIAL AQUIFER COLLECTION

Figure 2.1-1 shows the locations of six lines of alluvial aquifer collection wells (red x symbols). The S and D-lines are adjacent to the LTP while the B-line is between the LTP and the collection and evaporation ponds. The K and C-lines are adjacent to the Small Tailings Pile (STP). Alluvial wells M9 and MQ were added to the alluvial collection system in 2011 and continued to be used in 2020. The L-line south of the STP continued to operate in 2020 and includes collection wells 521 and 522, which are located on the east side of Highway 605 (see Figure 4.1-1 for location). The L-line collection was switched to R.O. supply at the end of July 2016 therefore stopping the collection for re-injection program. Figure 2.1-2 on page 2.1-16 graphically presents

collection rates for the eight years at the Grants Project. The On-Site alluvial collection system operated at an average rate of 145 gpm in 2020.

#### **2.1.2.2 UPPER AND MIDDLE CHINLE AQUIFER COLLECTION**

Figure 2.1-2 shows the collection rate for Upper Chinle collection wells CE2, CE5, CE6, CE11, CE12, CE15 and CE19, which are located on the south and north sides of the collection ponds and just north of Broadview Acres. Collection from Upper Chinle well CE2 started in 1999 and is expected to continue for several years. Collection from wells CE5 and CE6 started in August 2006 while pumping from wells CE11 and CE12 was initiated in October of 2006. Upper Chinle wells CE15, CE15A and CE19 were initially pumped in 2017. The Upper Chinle wells were operated to supply water to the R.O. for 2020. Additionally, wells B16, B31 and B32 were pumped in 2020. These wells are dual completed in the alluvial and Upper Chinle aquifers in the subcrop area. The yearly average collection rate from the Upper Chinle was 123 gpm. Figure 2.1-2 also shows the collection rate for the Middle Chinle collection well CW62. Well CW62 was added to the On-Site collection system in May 2016 and continued in 2020. The yearly average collection rate from the Middle Chinle aquifer On-Site for 2020 was 30 gpm.

#### **2.1.2.3 OFF-SITE COLLECTION**

The former irrigation systems were operated as Off-site collection from 2000 through 2012 (see Figure 2.1-1 for locations of former irrigation areas). Some of the Section 3 and 35 South Off-site and Section 28 North Off-site collection wells were operated in 2016 through 2020 to supply water for the zeolite treatment. Figure 2.1-1 shows the Off-site collection wells that were used in 2020. South collection wells Q2, Q5, Q11, Q28, Q29, R2, R3, R5 and Y13 were pumped for the zeolite treatment of this Off-site water. North Off-site collection wells 659, 890, H2A, H12 and H24 were pumped for the zeolite treatment of this Off-site water during 2020.

The cumulative volume of water applied to the former irrigation (land treatment) fields from 2000 through 2012 (blue line) and the Off-site collection for 2013 through 2020 (cyan) are presented in Figure 2.1-3 which shows that greater than 3.6 billion gallons of water have been pumped from the Off-site collection wells. Figure 2.1-3 shows a comparison between the volumes of water pumped for the Off-site collection versus the volume of water from the On-site collection treated by



the R.O. plant since 2000. The volume of Off-site collection water is more than the volume of On-site collection water for the same period.

The 2013 Irrigation Report (ERG and Hydro-Engineering LLC, 2013) presents the monitoring results through 2013 for the irrigation areas, while the groundwater monitoring results for 2020 in the irrigation areas are presented in this report. This data shows no effects on the uranium and selenium concentrations in the underlying groundwater from the HMC irrigation/land treatment program, except for possibly a small and temporary increase in uranium in the Section 34 groundwater. The uranium concentration in the area has returned to near the pre-irrigation concentration. No data were obtained from the soil moisture instruments in 2020. No soil moisture samples were collected from the lysimeters in 2020 because the early October 2017 attempt to collect samples from the lysimeters was unsuccessful.

#### **2.1.2.4 QUANTITY OF CONSTITUENTS COLLECTED FROM GROUNDWATER**

[Table 2.1-1](#) (page 2.1-21) presents the quantities of chemical constituents extracted from the On-site groundwater system, the tailings piles and the toe drains. The On-site groundwater collection system has produced an average pumping rate of 275 gpm for the entire period between 1978 and 2020. The portion of the collection water that has been re-injected into the alluvial aquifer is not included in the values in [Table 2.1-1](#). The quantity of constituents removed in 2020 was computed by multiplying the average concentration of a particular constituent for each source of water (groundwater, toe drains and tailings collection) by the volume of water pumped for each groundwater source during that year. The quantities of constituents collected by aquifer and area are presented in [Table 2.1-2](#) for 2020 with 10,900 and 18,700 pounds of uranium and molybdenum, respectively, removed from the Grants On-site groundwater in 2020. This table lists the total for the On-site and the sum of the Off-site quantities for 2018 through 2020, showing that the On-site collection of water the last three years has been approximately twice the Off-site collection volume. The mass of sulfate, molybdenum and selenium collected in the Off-site water is not tabulated because only uranium is removed in the treatment of the Off-site water.

[Figure 2.1-4](#) presents the volume of water and the pounds of uranium removed by the On-site and Off-site collection systems from 2000 through 2020. The light blue, purple and green bars show the comparison of the water volumes for each area during each year, while the red, brown and gold

bars present the pounds of uranium removed respectively by the Off-site land treatment, Off-site collection and On-site collection. The figure shows that the volume of water collected from the Off-site wells was generally larger than the On-site collection during the irrigation period, but the mass of uranium removed by Off-site collection is small in comparison to the uranium mass removed by the On-site collection. The volume of water collected On-site has been more than the Off-site collection since 2010.

#### **2.1.2.5 QUALITY OF TREATED WATER**

[Table 2.1-3](#) presents the water quality results for the Post Treatment Tank injection monitoring point, SP2 (monitors mixture of R.O. product, fresh water and zeolite treated water prior to injection). Monitoring point SP2 is the monitoring of compliant water prior to injection into the groundwater. The site standards are listed at the top of [Table 2.1-3](#) and constituent concentrations in all SP2 water samples were less than or equal to the corresponding site standards in 2020 except for a small thorium-230 value of 0.4 pCi/L on January 28 which is thought to be a laboratory outlier. The corresponding R.O. product SP1 sample was less than 0.1 pCi/L, no zeolite treated water was being produced at this time and the deep San Andres fresh water supply does not contain thorium.

Field and weekly samples have been used to aid in the tracking of the SP2 compliant water quality. [Table 2.1-3](#) also presents the SP2 field water quality data for 2020. This table shows that weekly samples were not collected during 2020 because the SP2 water quality during this time period was compliant.

[Table 2.1-4](#) presents the R.O. feed water and the R.O. product (SP1) water quality for 2020 and all of the SP1 water quality analyses meet the site standards. Exceedances of site standards in the table would be highlighted in blue had they occurred.

The zeolite treated water is monitored at three locations prior to being discharged to the PTT to be mixed with the R.O. product and/or fresh water. [Table 2.1-5](#) gives the treated zeolite water quality for these three locations. The treated water is monitored from the 300 zeolite, the 1200 zeolite for Trains 1&2 and the 1200 zeolite for Trains 3&4. Blue highlighting in [Table 2.1-5](#) would indicate values exceeding the site standards had that occurred. The uranium, selenium, molybdenum, chloride, sulfate and TDS concentrations were below the site standard for all zeolite samples taken during 2020. None of the radium-226 plus radium-228 and thorium-230

activity and vanadium concentrations exceeded the site standards for the zeolite during 2020.

### **2.1.3 INJECTION**

The treated and/or fresh-water injection systems, which aid in the reversal of the groundwater gradients back toward the collection wells, consist of lines of injection wells and infiltration lines, which are oriented generally along the east, south and west perimeter of the two tailings piles and evaporation ponds (see green circles and infiltration lines on [Figure 2.1-1](#)).

In 2003, approximately 2100 feet of four-inch corrugated slotted polyethylene pipe was installed at a depth of approximately 6 feet below land surface west of the Large Tailings Pile to serve as a horizontal infiltration line (see green line on [Figure 2.1-1](#)). A filter sock was placed over the pipe thus negating the need for a sandpack. Water is currently being injected into this injection line (S injection line) at three locations. The 2020 injection rate for this horizontal injection line is included in the On-site alluvial injection rates, and was 73 gpm for the year.

In July 2004, two 250 foot sections of injection line (EBA1 and EBA2) were added south of collection well 522 east of Highway 605 (see [Figure 2.1-1](#) for location). The average injection rate for these two lines is estimated at 20 gpm and is included in the On-site alluvial injection rate.

A 400-foot extension to the S injection line was added on the north end of this line in 2005. Five EMA injection lines were added southwest of the Large Tailings while three ETA injection lines were added east of the Large Tailings in 2005 (see [Figure 2.1-1](#)).

#### **2.1.3.1 ON-SITE ALLUVIAL INJECTION**

The Broadview Acres injection system started in 1977 with the G line on the north side of this subdivision. Injection into the majority of the G-line wells was discontinued in mid-April of 2000 in order to supply more water to injection wells near the collection area. The J-line, wells X1 through X10, and wells X28 through X31 are also considered part of the Broadview Acres injection system. Alluvial fresh-water injection wells 523 and 524 were added to the Broadview Acres injection system in 2002 (see [Figure 4.1-1](#)).

All wells adjacent to the northeast corner and to the north and east of Murray Acres are included in the Murray Acres injection system. This system includes all of the M and WR series

injection wells. The M line of the Murray Acres injection system was initially used in 1983. Injection into the M-line west of well WR1R was discontinued at the end of September of 2000, and injection into the WR-line, north of WR10, began at this time. The horizontal injection line, west of the Large Tailings Pile, (S. Inj. Line) was added to this system on August 25, 2003. Fresh-water injection into lines ETA1, ETA2 and ETA3 started in July of 2005 but the lines were not used in 2016 through 2020. Injection into EMA1 with fresh water started in December, 2005 and continued with treated and/or fresh water in 2020.

[Figure 2.1-5](#) (page 2.1-17) presents treated and/or fresh-water injection rates for the last eight years. An average of 155 gpm, or a total of 81 million gallons, was injected into the On-site alluvial aquifer during 2020.

#### **2.1.3.2 R.O. PRODUCT**

The R.O. product water mixed with fresh water was supplied to the EMA2 through EMA5 infiltration lines to the south and west of the collection ponds. Until October, 2005, R.O. product water was discharged into the X line and injected into wells X1 through X10, X28 through X31 and into wells K2, K6, KA through KE, KM, KN, C4, C13, C5, C3R and PM. Fresh-water injection commenced after that date for these wells. The switch to supply of R.O. product and fresh water to injection lines EMA2 through EMA5 occurred in October 2005. The supply of a mixture of treated and/or fresh water for injection was from the Post Treatment Tank from 2016 through 2020. [Figure 2.1-5](#) shows the rates of R.O. product water produced, which averaged 205 gpm in 2020 for a total of 108 million gallons.

#### **2.1.3.3 ZEOLITE TREATED WATER**

The zeolite treated water is mixed with the R.O. product and fresh water in the PTT prior to use of this water for injection into the groundwater to aid the groundwater restoration program. The zeolite treated water rate for 2020 averaged 26 gpm for the year.

#### **2.1.3.4 UPPER CHINLE AQUIFER INJECTION**

Hydro-Engineering (2003b) and the Updated Corrective Action Program (HMC 2020) should be reviewed for a detail discussion of the geologic setting for the Chinle aquifers. From 1984

through early 1995, the Upper Chinle injection system consisted of injecting fresh water into Upper Chinle well CW5, located on the north side of Broadview Acres. This effort restored most of the area in the Upper Chinle aquifer between the two faults. Injection into well CW5 was resumed in April of 1997 and continues at present to complete the restoration of this aquifer.

In order to maintain head in the Upper Chinle aquifer east of the East Fault, injection of fresh water into well CW13, an Upper Chinle well, was begun in June, 1996. Injection into Upper Chinle well CW25, located on the western edge of the Upper Chinle outcrop east of Murray Acres, began in 2000 and ceased in 2019. Injection into CW25 was conducted to increase the head in the Upper Chinle aquifer and force flow in the Upper Chinle back toward collection well CE2. Injection into Upper Chinle well 944 started in June of 2002, and injection into well CW4R started in 2003. The red squares on [Figure 2.1-5](#) present monthly average injection rates into Upper Chinle wells 944, CW5 and CW13, with an overall 2020 average of 18 gpm. On-site injection into dual completed Upper Chinle wells C18 through C21 in the subcrop area was started in 2016.

#### **2.1.3.5 MIDDLE CHINLE AQUIFER INJECTION**

Injection of San Andres fresh water into Middle Chinle well CW14 was started in December of 1997. This injection was initiated to prevent northward movement of alluvial water that recharges the Middle Chinle on the south side of Felice Acres. The injection rate averaged 7 gpm in 2020 (see [Figure 2.1-5](#)). This injection has prevented the movement of constituents further to the north and allows up-gradient collection from the well field. Injection into dual completion Middle Chinle wells M30, M31 and M36 was started in 2016.

#### **2.1.3.6 SECTIONS 28 AND 29 INJECTION**

The fresh-water injection in Sections 28 and 29 was initiated in March of 2002 to impede movement of groundwater with modest contaminant concentrations in Section 28. Eight infiltration lines were added in 2005 in Sections 27 and 28 to replace the injection wells and adjust the location of this injection. Injection into lines NPV1 through NPV5 (5 of the 8 infiltration lines) was started on July 27, 2005 while injection into NPV6 was started in December 2005. Fresh water injection into alluvial wells 633 and 655 was restarted in June of 2010. Three additional fresh water infiltration lines (NPV9, NPV10, and NPV11) were added in

2011 to better contain the front of the Section 28 uranium plume. San Andres well 951 was replaced by San Andres well 951R as the fresh water supply in April of 2012. PTT water was also used to supply this injection starting in 2016 and well 951R was not used in 2020 to supply this injection. The injection rate averaged 69 gpm for 2020 with a total injected volume of 36 million gallons. [Figure 2.1-5](#) presents the monthly injection rates into wells and infiltration lines located in Sections 28 and 29.

#### **2.1.3.7 SECTIONS 35 AND 3 INJECTION**

Fresh-water injection in the southwestern quarter of Section 35 was initiated in late 2002 utilizing production from Upper Chinle well CW18 and Middle Chinle well CW28. This water was injected into alluvial wells 641, 642, 848 and 868 (see [Figure 4.1-1](#) for location).

Fresh-water injection into alluvial wells 643, 863, 865 and 866, located in the northeast portion of Section 3 was initiated in 2003. Injection into Middle Chinle wells CW30 and CW46 was added to this program in 2004 (see [Figure 2.1-1](#)). Seven infiltration lines in Section 3 and two infiltration lines in Felice Acres were also added in 2004. Two additional infiltration lines, FA1 in central Felice Acres and WFA1 west of Felice Acres, were added in 2005. These injection wells and lines were supplied with water from the PTT in 2019. Use of San Andres well 943 as a fresh water supply well ended on May 18, 2017 except during the 943 pump test in January of 2018. No pumping from well CW28 occurred in 2020 to supply injection water for wells 848 and 868. Injection into three additional infiltration lines (FA2, RCR8, and RCR9) was started in 2011 while injection into infiltration lines FA3 and FA4 were started in 2013.

[Figure 2.1-5](#) presents the combined monthly injection rates for Sections 34, 35 and 3 treated and/or fresh-water injection lines and wells (see brown diamond symbols on [Figure 2.1-5](#)). This injection effort is associated with the groundwater restoration of the Sections 3 and 35 areas. Water collected from wells in Sections 3 and 35 was treated in the zeolite systems. During 2020, the yearly average injection rate in Sections 34, 35 and 3 was 112 gpm.

#### **2.1.4 RE-INJECTION**

Alluvial water containing relatively low concentrations of contaminants had been collected and injected into areas of the alluvial aquifer near the Large Tailings Pile but this

collection water was treated through the R.O. plant starting in August 2016. Prior to R.O. treatment, this water was re-injected into areas with higher concentrations of contaminants in order to enhance restoration near the LTP. This aspect of the restoration plan at the Grants sites is referred to as the collection for re-injection program. The lower-concentration water was effective as comparatively fresh water during the initial stages of restoration, and therefore, re-injection was a beneficial use of this slightly contaminated groundwater. No collection for re-injection occurred in 2020. The monthly re-injection rates are depicted on [Figure 2.1-2](#) as collection for re-injection use (COL/RE-INJ).

### **2.1.5 TAILINGS CONDITIONS**

Tailings conditions have typically been presented in this section of the APR but is expanded and presented in Section 3 of this report. The quantities of constituents collected from the tailings is still presented in Table 2.1-1 in this section as it had been done in the past but the discussion of the collected quantities from the toe drains and dewatering wells will be discussed in Section 3.

### **2.1.6 LINED EVAPORATION PONDS**

The use of lined evaporation collection ponds (East Collection Pond and West Collection Pond) began in October of 1986 when the two ponds were constructed and the ponds are presently used to contain water that can be recycled to the R.O. plant. The No. 1 Evaporation Pond, located on the Small Tailings Pile, began receiving water in November of 1990. Usage of the No. 2 Evaporation Pond began in March of 1996. The No.3 Evaporation pond began operation in December of 2010.

The water from the well collection system and some water from the tailings dewatering wells and toe drains have been pumped to the R.O. plant as feed water. During tailings dewatering, the majority of the extracted tailings water was discharged directly to the No. 2 Evaporation Pond for subsequent evaporation. Excess water is transferred from the East Collection Pond to the No. 2 Evaporation Pond. When necessary, water is transferred from the No. 2 Evaporation Pond to the No. 1 or No. 3 Evaporation Ponds. The forced evaporation system has transitioned to APEX evaporators and these floating evaporators have replaced the spray evaporation system on all three evaporation ponds. A total of 47 million gallons (average rate of 90 gpm) of water was delivered to the



evaporation pond system in 2020 in addition to the 15 million gallons (average rate of 29 gpm) of natural precipitation added to the pond. The net evaporation from the evaporation system averaged 201 gpm in 2020, compared to 174 gpm in 2019 and the change in storage in the evaporation ponds in 2020 was a decline of 82 gpm.

Water quality samples results collected from the No. 1, No. 2 and No. 3 Evaporation Ponds, the East Collection Pond (E COLL POND), and the West Collection Pond (W COLL POND) are presented in [Tables B.3-1](#) and [B.3-2](#) of [Appendix B](#).

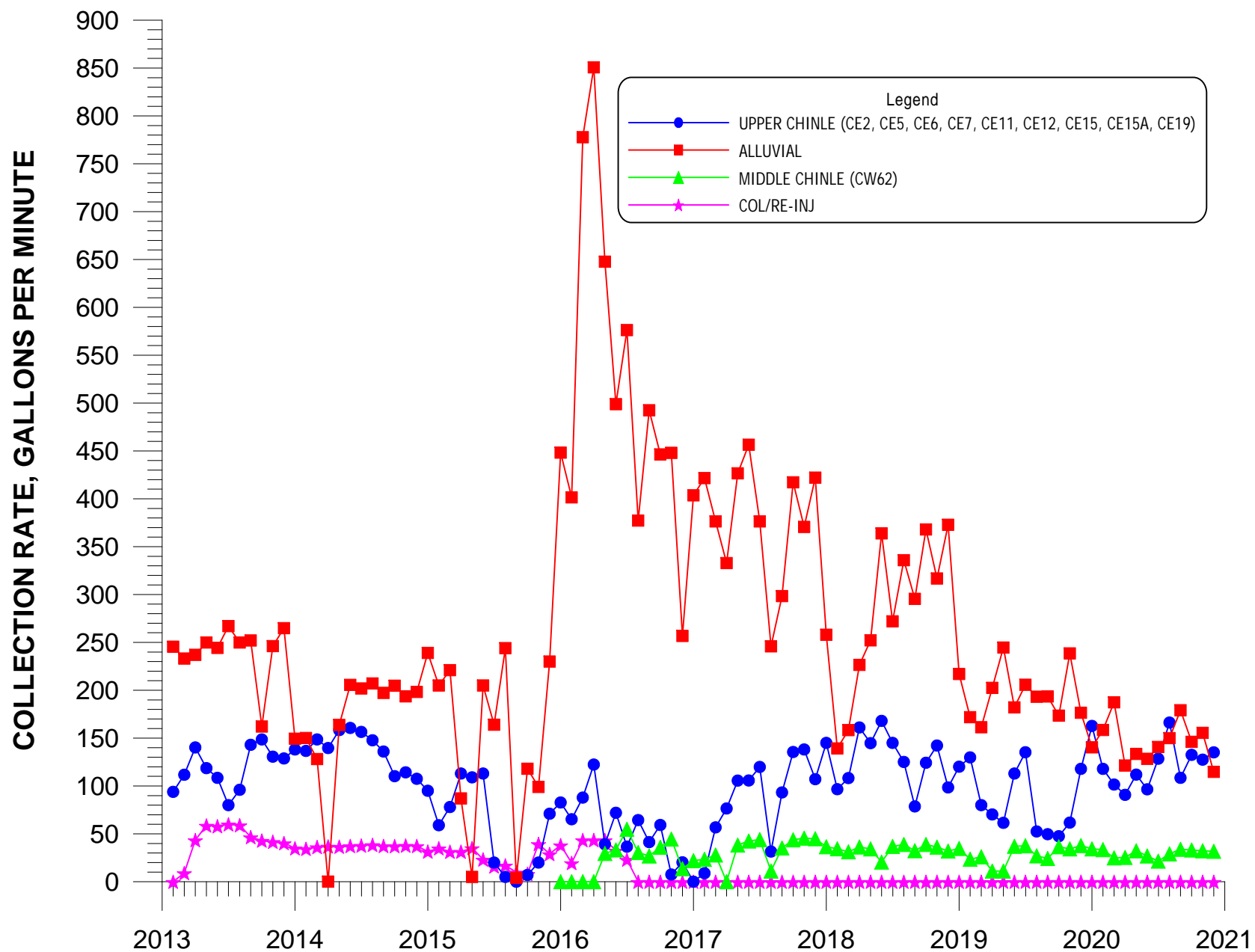
### **2.1.7 YEARLY OPERATIONAL RATES**

A tabulation of yearly operational rates and volumes is presented below, and a summary of the yearly operational rates is also presented in [Figure 2.1-6](#). This figure gives the average yearly rates for each aquifer on the left side and shows where the quantity of water was pumped in 2020. A rate of 5 gpm in 2020 was pumped from the LTP toe drains and discharged to the evaporation ponds. Estimated seepage based on the LTP water balance and change in saturated storage are also given for the LTP. The RO plant and zeolite inputs and discharges and the input and removal rates from the Collection Ponds rates are presented in [Figure 2.1-6](#).

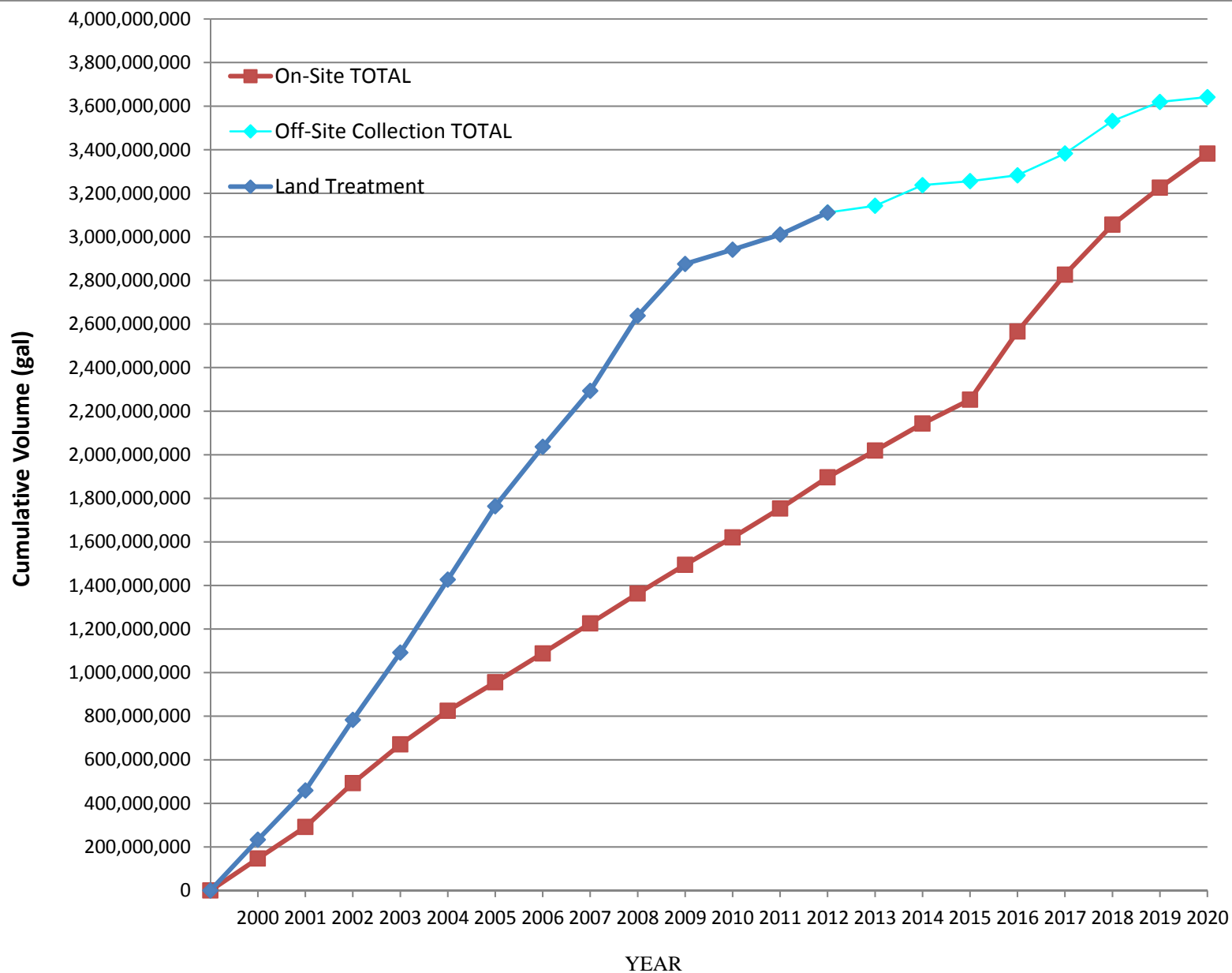
Major Collection and Injection Flows and Volumes During 2020						
Aquifer System	Injection		Collection		Seepage from LTP	
	Rate (gpm)	Volume (gallons)	Rate (gpm)	Volume (gallons)	Rate (gpm)	Volume (gallons)
Alluvial	427	223,820,000	177	97,780,000	10	5,240,000
Upper Chinle	49	25,680,000	123	64,970,000	--	--
Middle Chinle	38	19,920,000	40	20,970,000	--	--
Lower Chinle	--	--	0	0	--	--
San Andres	--	--	283	148,340,000	--	--
Tailings	--	--	5.5	2,880,000	--	--

Major Treatment and Disposal Flows and Volumes During 2020						
Treatment/Disposal System	Feed/Input Rate		Treated Water Discharge		Evap/Disposal Discharge	
	Rate (gpm)	Volume (gallons)	Rate (gpm)	Volume (gallons)	Rate (gpm)	Volume (gallons)
Reverse Osmosis	342	179,160,000	205	107,600,000	68	35,600,000
Zeolite	34	18,020,000	26	13,610,000	8	4,410,000
Evaporation Ponds	--	--	--	--	--	--
Collection Ponds	69	35,960,000	--	--	--	--

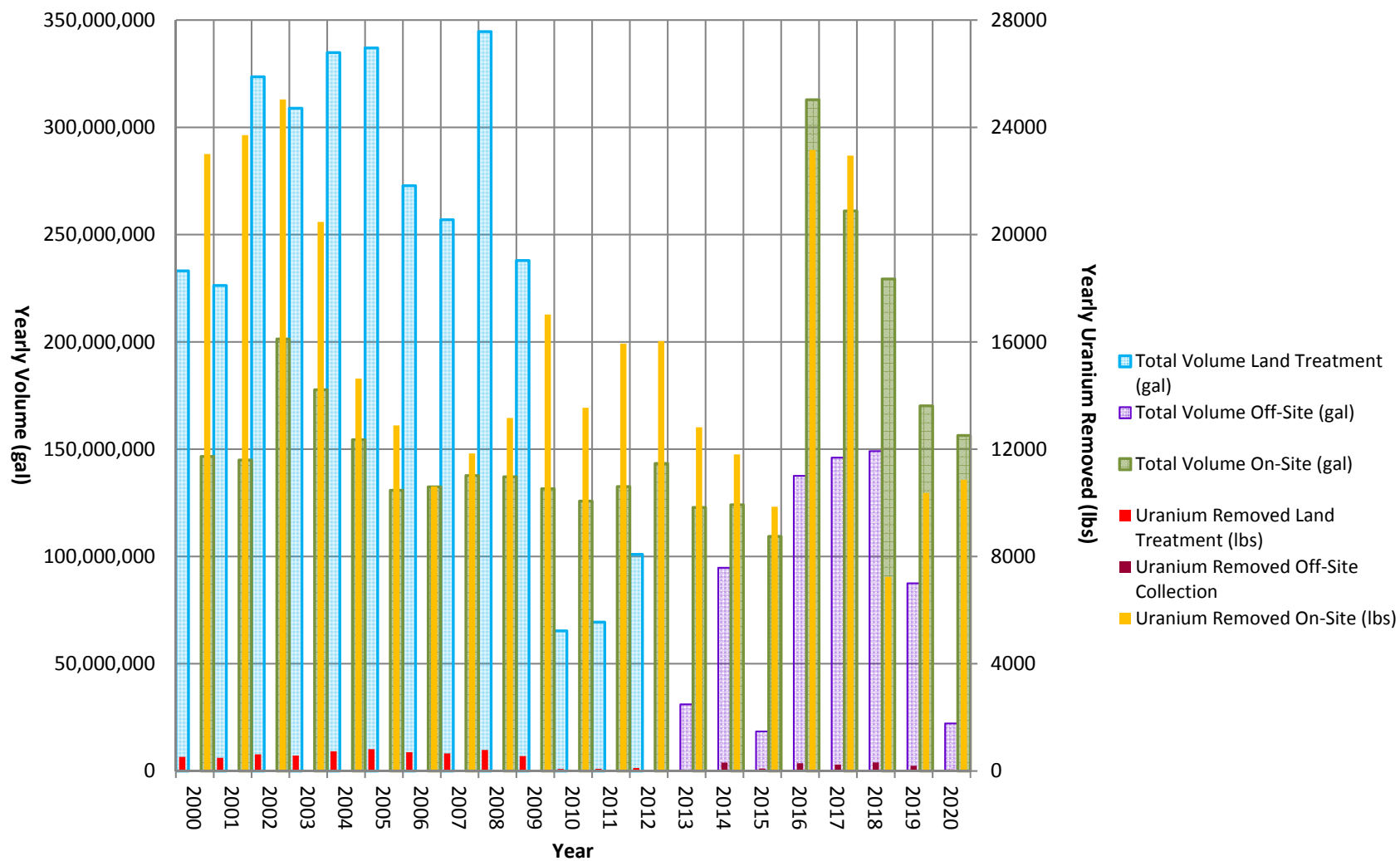




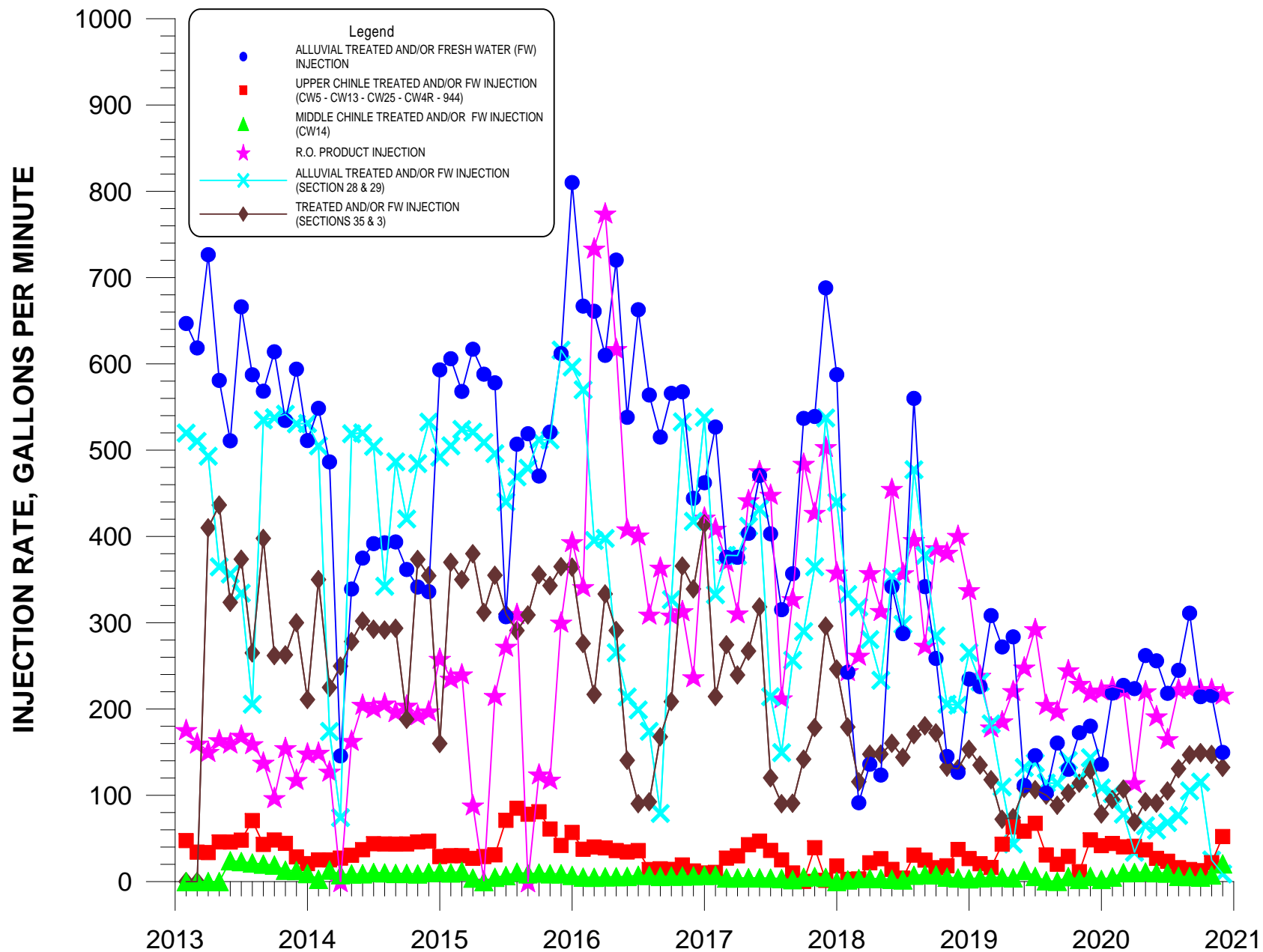
**FIGURE 2.1-2. AVERAGE MONTHLY COLLECTION RATES FOR THE ALLUVIAL AND UPPER AND MIDDLE CHINLE AQUIFERS.**



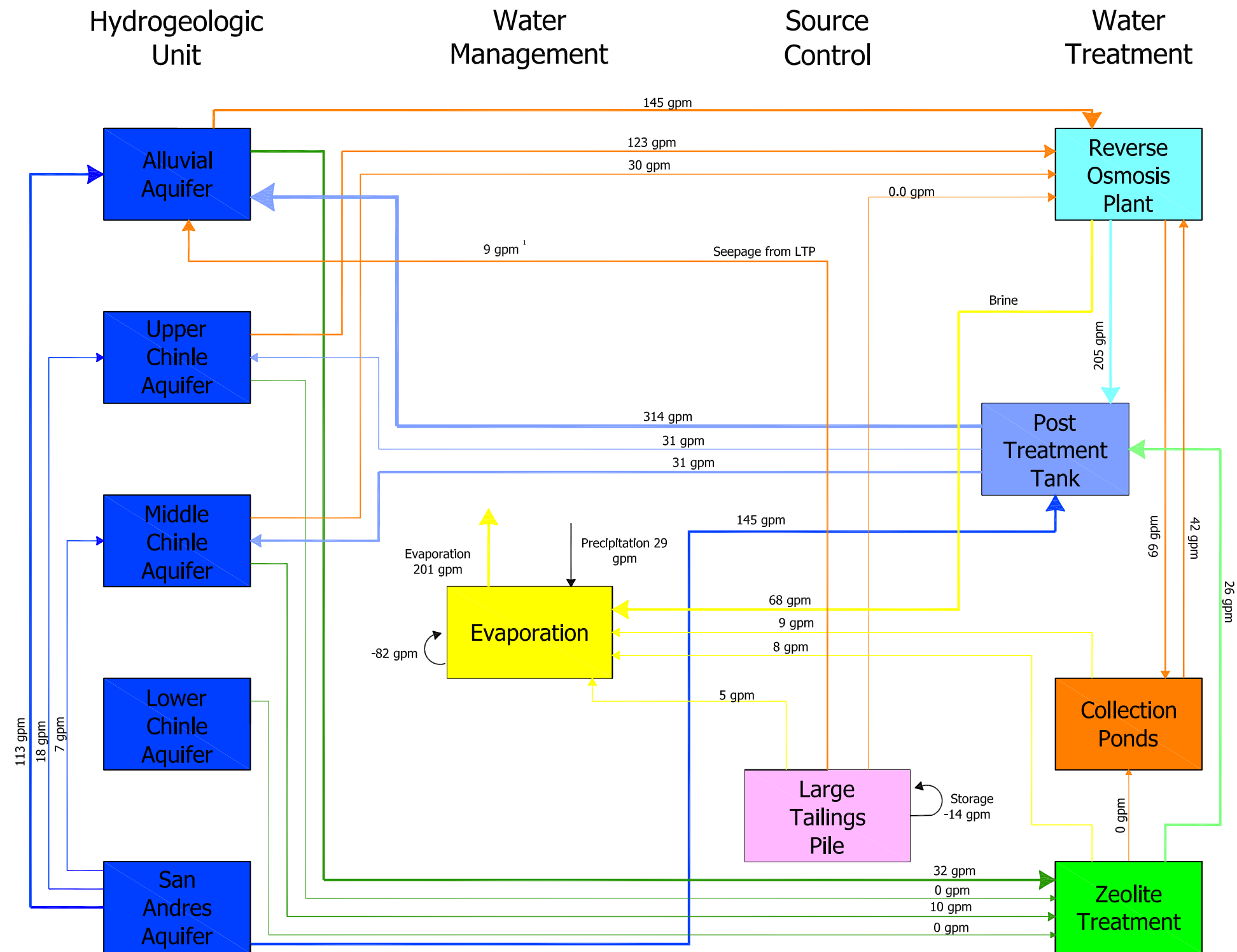
**Figure 2.1-3. Cumulative Volume of Land Treatment, On-Site and Off-Site Collection from 2000 to Present**



**Figure 2.1-4. Yearly Quantity of Groundwater and Uranium Removed**



**FIGURE 2.1-5. AVERAGE MONTHLY INJECTION RATES FOR THE ALLUVIAL UPPER CHINLE AND MIDDLE CHINLE AQUIFERS.**



### LEGEND:

Flow Range (gpm= gallons per minute)

- 0-10 gpm
- 11-50 gpm
- 51-100 gpm
- 101-500 gpm
- >500 gpm

Restoration Strategy

- Zeolite Feed
- Zeolite Treated Water
- Evaporation
- Reverse Osmosis Treatment
- Fresh Water
- Post Treatment Tank

Note <sup>1</sup>: LTP seepage based on the water balance.



**TABLE 2.1-1. QUANTITIES OF CONSTITUENTS COLLECTED ON-SITE.**

YEAR	SOURCE	TOTAL VOLUME PUMPED (GAL)	SULFATE (SO4) CONC. AMT.		URANIUM (U) CONC. AMT.		MOLYBDENUM (MO) CONC. AMT.		SELENIUM (SE) CONC. AMT.	
			(MG/L)	(LB)	(MG/L)	(LB)	(MG/L)	(LB)	(MG/L)	(LB)
1978	G.W.	27670033	5200	1200620	35	8081	40	9236	2	462
1979	G.W.	46371629	5200	2012095	35	13543	40	15478	2	774
1980	G.W.	39385860	5200	1708978	35	11503	40	13146	2	657
1981	G.W.	91613183	5200	3975155	35	26756	40	30578	2	1529
1982	G.W.	159848025	5200	6935910	35	46684	40	53353	2	2668
1983	G.W.	167018540	5200	7247043	35	48778	40	55746	2	2787
1984	G.W.	203258522	5200	8819519	35	59362	40	67842	2	3392
1985	G.W.	194074421	5200	8421015	35	56680	40	64777	2	3239
1986	G.W.	199326030	5200	8648886	35	58214	40	66530	2	3326
1987	G.W.	180881740	5200	7848576	35	52827	40	60374	2	3019
1988	G.W.	166460826	5200	7222843	35	48615	40	55560	2	2778
1989	G.W.	175780800	5200	7627243	35	51337	40	58671	2	2934
1990	G.W.	164378919	5200	7132508	35	48007	40	54865	2	2743
1991	G.W.	171497720	5200	7441397	35	50086	40	57242	2	2862
1992	G.W.	128398849	4925	5276234	27.2	29134	35.9	38419	1.60	1718
1992	TOE	8544670	12117	864006	53.2	3793	106.5	7595	1.73	123
1993	G.W.	115795020	5011	4841203	28.1	27130	45.4	43885	1.47	1425
1993	TOE	18357680	12117	1856262	53.2	8150	106.5	16315	1.73	265
1994	G.W.	98294087	4423	3624762	26.0	21146	27.3	22349	1.42	1162
1994	TOE	18337680	12117	1854240	53.2	8141	106.5	16299	1.73	264
1995	G.W.	108306398	3256	2942827	16.1	14553	19.2	17355	1.65	1491
1995	TOE	17711370	11370	1680500	54.6	8069	94.4	13952	2.25	332
1995	TAILS	5905740	8191	403680	36.1	1778	89.7	4420	0.15	7
1996	G.W.	122064160	3899	3967919	20.9	21225	26.8	27259	1.92	1950
1996	TOE	15431810	11537	1484295	46.4	5970	105.0	13509	1.29	166
1996	TAILS	9181390	9434	722129	40.2	3077	108.0	8236	0.18	14
1997	G.W.	94465562	4955	3836678	26.9	20892	33.4	25887	3.17	2456
1997	TOE	12029390	11094	1113808	41.8	419	100.0	10040	0.81	81
1997	TAILS	21292900	10284	1827575	45.8	8139	92.4	16420	0.14	25
1998	G.W.	74459130	5088	3161866	29.6	18385	34.8	21625	1.85	1151
1998	TOE	10321780	9870	850257	42.5	3665	95.2	8203	0.73	63
1999	G.W.	117752408	3363	3305027	16.6	16314	14.8	14545	2.06	2024
1999	TOE	8809890	11560	849976	54.3	3993	106.0	7794	0.46	34
1999	TAILS	120550	9420	9478	40.9	41	111.5	112	0.19	0
2000	G.W.	146609842	3358	4108868	18.8	23004	20.6	25206	1.94	2374
2000	TOE	8032870	9734	652590	58.6	3929	118.0	7911	0.34	23
2000	TAILS	12446810	9710	1008685	37.8	3927	127.0	13193	0.30	31
2001	G.W.	144925056	2770	3350438	19.6	23707	21.4	25884	1.65	1996
2001	TOE	9606280	9935	796529	43.1	3455	95.7	7673	0.78	63
2001	TAILS	31465370	8688	2281555	34.6	9086	89.2	23425	0.19	50
2002	G.W.	201357360	2748	4618092	14.9	25040	16.7	28065	1.23	2067
2002	TOE	17975520	9210	1381718	33.4	5011	88.7	13307	0.76	114
2002	TAILS	17817840	7670	1140588	23.5	3495	40.8	6067	0.12	18
2003	G.W.	177727419	2417	3585168	13.8	20470	15.5	22991	0.73	1083
2003	TOE	28418871	9457	2243048	35.6	8444	78.9	18714	4.35	1032
2003	TAILS	8890076	9800	727126	28.0	2078	92.0	6826	0.30	22
2004	G.W.	154422720	2272	2931913	11.3	14633	16.6	21386	0.79	1017
2004	TOE	26720928	8007	1787722	31.9	7115	67.6	15102	2.78	622
2004	TAILS	44745696	6360	2377848	23.1	8637	60.9	22769	0.20	75
2005	G.W.	130810679	2478	2705346	11.8	12883	15.5	16922	0.59	644
2005	TOE	20704320	8228	1421784	43.5	7517	87.5	15120	2.63	454
2005	TAILS	45685786	4389	1673497	18.7	7130	56.3	21467	0.18	69
2006	G.W.	132406109	1990	2199072	9.6	10609	14.3	15802	0.73	807
2006	TOE	20374782	7432	1263796	38.0	6462	76.2	12958	1.09	185
2006	TAILS	43707760	4278	1560550	17.6	6420	51.9	18932	0.14	51
2007	G.W.	137707200	2420	2781316	10.3	11838	16.7	19193	0.52	598
2007	TOE	25037779	6829	1427024	31.9	6666	67.3	14063	1.20	251
2007	TAILS	24561680	4130	846616	19.9	4079	61.1	12525	0.15	31
2008	G.W.	137145174	2672	3058408	11.5	13163	16.5	18886	0.61	698
2008	TOE	26140850	7847	1711992	31.6	6894	68.5	14945	1.58	345
2008	TAILS	5950324	4671	231968	16.0	795	42.8	2126	0.24	12
2009	G.W.	131564160	3145	3453318	15.5	17020	19.1	20660	0.85	933
2009	TOE	27238830	7792	1771396	35.0	7957	69.9	15891	0.81	184
2009	TAILS	29403070	3850	944782	13.7	3362	38.6	9472	0.24	59
2010	G.W.	125785118	2793	2932099	12.9	13542	16.6	17427	0.64	672
2010	TOE	18444330	6848	1054156	32.9	5065	52.1	8020	0.51	79
2010	TAILS	12953960	3018	326287	9.4	1016	33.5	3622	0.19	21
2011	G.W.	132573855	2908	3217590	14.4	15933	22.5	24895	1.23	1361
2011	TOE	14777020	6747	832101	29.9	3688	53.2	6561	0.44	54
2011	TAILS	54713150	2887	1318308	10.5	4795	33.5	15297	0.18	82

**TABLE 2.1-1. QUANTITIES OF CONSTITUENTS COLLECTED ON-SITE.**

YEAR	SOURCE	TOTAL VOLUME PUMPED (GAL)	SULFATE (SO4) CONC. AMT.		URANIUM (U) CONC. AMT.		MOLYBDENUM (MO) CONC. AMT.		SELENIUM (SE) CONC. AMT.	
			(MG/L)	(LB)	(MG/L)	(LB)	(MG/L)	(LB)	(MG/L)	(LB)
2012	G.W.	143304728	3070	3671785	13.4	16027	16.8	20093	0.62	742
2012	TOE	12201316	6476	659465	26.8	2729	48.9	4980	0.43	44
2012	TAILS	56486600	2632	1240823	8.9	4196	26.2	12352	0.17	80
2013	G.W.	122813790	2793	2862836	12.5	12813	16.2	16605	0.73	748
2013	TOE	9211575	6453	496105	26.7	2053	53.3	4098	0.35	27
2013	TAILS	31489800	2448	643368	7.5	1958	23.6	6202	0.12	32
2014	G.W.	124070324	2570	2661212	11.4	11805	15.8	16361	0.63	652
2014	TOE	9427490	5683	447149	21.2	1668	46.0	3619	0.15	12
2014	TAILS	24487100	2788	569782	7.8	1594	27.1	5538	0.16	33
2015	G.W.	109360371	3100	2829437	10.8	9857	14.1	12869	0.83	758
2015	TOE	10222310	5252	448076	20.7	1766	41.2	3515	0.30	26
2015	TAILS	8644000	2891	208565	8.2	592	28.0	2020	0.11	8
2016	G.W.	312653024	2590	6758352	8.2	21397	14.5	37836	0.45	1174
2016	TOE	7553090	4756	299809	17.2	1085	36.7	2310	0.15	9
2016	TAILS	2678400	2891	64625	8.2	183	28.0	626	0.11	2
2017	G.W.	261047358	2104	4583987	10.5	22876	17.1	37256	0.66	1438
2017	TOE	5455170	3305	150473	13.9	633	26.9	1225	0.21	10
2017	TAILS	674300	4918	27677	14.7	83	32.5	183	0.70	4
2018	G.W.	229336854	1460	2794506	3.8	7235	5.5	10566	0.28	542
2018	TOE	4530130	4708	178002	17.5	662	36.6	1384	0.27	10
2019	G.W.	170189842	2185	3103584	7.3	10369	13.4	19033	0.49	696
2019	TOE	3024380	4959	125172	15.4	389	42.4	1070	0.20	5
2020	G.W.	156370198	2500	3262664	8.3	10858	14.3	18662	0.45	587
2020	TOE	2152800	4952	88974	16.1	289	39.7	713	0.52	9
SUM G.W.		6,229,283,043		188,668,296		1,074,329		1,321,322		68,134
SUM TOE		416,794,911		29,790,427		125,674		266,885		4,885
SUM TAILS		493,302,302		20,155,515		76,460		211,831		725
COMBINED SUM		7,139,380,256		238,614,238		1,276,463		1,800,037		73,743

NOTE: Average concentrations for 1978 to 1991 were used in calculating the quantities of constituents removed.  
Concentrations from the collection wells have gradually decreased from 1978 through 1991.  
G.W. = Ground water; TOE = Toe drains on edge of tailings; TAILS = Large tailings collection wells

**TABLE 2.1-2. QUANTITIES OF CONSTITUENTS COLLECTED BY AQUIFER, 2018-2020**

YEAR	SOURCE	TOTAL VOLUME PUMPED (GAL)	SULFATE (SO4) CONC. AMT.		URANIUM (U) CONC. AMT.		MOLYBDENUM (MO) CONC. AMT.		SELENIUM (SE) CONC. AMT.	
			(MG/L)	(LB)	(MG/L)	(LB)	(MG/L)	(LB)	(MG/L)	(LB)
ON-SITE										
2018	ALLUVIAL	144,785,813	1772	2,141,062	5.46	6,593	8.28	10,005	0.38	465
2018	UPPER CHINLE	66,858,941	729	406,855	0.81	453	0.80	445	0.06	31
2018	MIDDLE CHINLE	17,692,100	1670	246,589	1.28	189	0.78	115	0.31	46
2019	ALLUVIAL	107,089,394	2848	2,545,237	10.89	9,730	20.54	18,355	0.70	622
2019	UPPER CHINLE	47,674,449	864	343,728	1.19	472	1.34	535	0.08	33
2019	MIDDLE CHINLE	15,426,000	1667	214,619	1.29	166	1.12	144	0.32	41
2020	ALLUVIAL	76,128,661	4258	2,705,144	16.01	10,173	28.30	17,981	0.64	405
2020	UPPER CHINLE	64,623,937	698	376,341	0.96	520	1.00	540	0.30	160
2020	MIDDLE CHINLE	15,617,600	1390	181,179	1.27	166	1.09	142	0.17	22
OFF-SITE										
2018	SOUTH ALLUVIAL	69,828,478			0.32	189				
2018	SOUTH MIDDLE CHINLE	28,432,465			0.30	71				
2018	SOUTH LOWER CHINLE	0				0				
2018	NORTH ALLUVIAL	50,803,376			0.13	55				
2019	SOUTH ALLUVIAL	44,241,529			0.31	113				
2019	SOUTH MIDDLE CHINLE	16,853,311			0.28	39				
2019	SOUTH LOWER CHINLE	0				0				
2019	NORTH ALLUVIAL	26,409,500			0.20	43				
2020	SOUTH ALLUVIAL	12,744,009			0.36	38				
2020	SOUTH MIDDLE CHINLE	5,058,915			0.23	10				
2020	SOUTH LOWER CHINLE	0				0				
2020	NORTH ALLUVIAL	4,359,400			0.22	8				
SUM ON-SITE		555,896,895		9,160,754		28,462		48,261		1,825
SUM OFF-SITE		258,730,983				567				
COMBINED SUM		814,627,878				29,029				

Table 2.1-3 Compliant (SP2) Water Quality Data

Sample Point Name Site Standard	Date	Field Parameters					Lab Data					
		pH(f) (units)	Temp. (°C)	Cond. (µmhos/cm)	KPA U (mg/L)	Mo(f) (mg/L)	Cl (mg/L) 250	SO4 (mg/L) 1500	TDS (mg/L) 2734	U (mg/L) 0.16	Mo (mg/L) 0.1	Se (mg/L) 0.32
SP2	1/28/20	6.89	15.1	19.36	0.003		81	260	703	0.0204	0.053	0.004
	2/25/20	6.67	11.5	728	0.007		53	165	458	0.0066	0.011	0.002
	3/26/2020	6.44	12.57	2682	0.006	0.01	66	207	575	0.0043	0.005	0.002
	4/30/2020	7.12	18.6	1246			91	284	1060	0.0047	<0.01	<0.005
	5/28/2020	7.9	20.8	885.1			62	194	550	0.0036	<0.03	<0.005
	6/29/2020	7.45	23.7	1191			92	263	750	0.0106	0.02	<0.005
	7/30/2020	7.58	20.1	1343			106	312	920	0.0072	<0.01	<0.005
	8/27/2020	7.49	22.5	1382	0.005	0.01	3	<2	<20	0.002	<0.01	<0.005
	9/29/2020	7.1	14.4	1544	0.009		114	399	1060	0.007	<0.01	<0.005
	10/26/2020	8.08	16.3	1694	0.005	0.01	132	527	1210	0.011	<0.01	0.013
	11/30/2020	7.82	16.3	1287	0.001	0.01	31	146	350	0.011	<0.01	<0.005
	12/29/2020	7.54	16.6	1322			102	326	920	0.007	<0.01	<0.005

Concentrations greater than site standards are in **bold**.

Table 2.1-3 Compliant (SP2) Water Quality Data (cont.)

Sample Point Name Site Standard	Date	NO3 (mg/L)	Ra226 (pCi/L)	Ra226e (pCi/L)	Ra228 (pCi/L)	Ra228e (pCi/L)	Ra226+ Ra228	Th230 (pCi/L)	Th230e (pCi/L)	V (mg/L)
		12					5	0.3		0.02
SP2	1/28/20	0.8	0.2	0.1	<1.2		<1.4	<b>0.4</b>	0.2	<0.01
	2/25/20									
	3/26/2020	0.7	0.3	0.2	<1.3		<1.6	<0.08	0.05	<0.01
	4/30/2020	1.1	<0.2		4	5.8	<4.2	<0.3		<0.01
	5/28/2020	0.5	<0.2		<1		<1.2	<0.3		<0.01
	6/29/2020	1	<0.2		<1		<1.2	<0.3		<0.01
	7/30/2020	1	<0.2		<1	6	<1.2	<0.3		<0.02
	8/27/2020	0.5	<0.2		<1		<1.2	<0.3		<0.02
	9/29/2020	0.7	0.3	0.1	<1		<1.3	<0.3		<0.01
	10/26/2020	1.5	<0.2		<1		<1.2	<0.3		<0.01
	11/30/2020	0.6	<0.2		<1		<1.2	<0.3		<0.01
	12/29/2020	1	<0.2		<1		<1.2	0.3	0.200	<0.01

Concentrations greater than site standards are in **bold**.

Table 2.1-4 RO Clarifier Feed and RO SP1 Water Quality Data

Sample Point Name	Date	Field Parameters					Lab Data					
		pH(f) (units)	Temp. (°C)	Cond. (µmhos/cm)	KPA U (mg/L)	Mo(f) (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	U (mg/L)	Mo (mg/L)	Se (mg/L)
Site Standard							250	1500	2734	0.16	0.1	0.32
RO CLAR FEED	5/28/20	7.75	16.4	4960			328	2500	4960	8.32	14.3	0.45
RO SP1	1/28/20	6.08	14.6	38.02	0.003		3	3	20	0.0047	0.014	<0.001
	2/25/2020	5.45	12.6	39.55	0.008	0.02	3	3	24	0.0061	0.018	<0.001
	3/26/2020	5.98	13.7	34.21			3	1	<10	0.001	0.007	<0.001
	4/30/2020	5.6	18.4	33.21			3	<2	<20	0.001	<0.03	<0.005
	5/28/2020	6.23	19.9	101.3			11	15	70	0.017	0.09	<0.005
	6/29/2020	4.91	23.2	24.14			3	<2	<20	0.001	<0.01	<0.005
	7/30/2020	5.39	19.6	26.27			3	<2	<20	0.001	<0.01	<0.005
	8/27/2020	5.46	23.4	32.88	0.001		127	403	1070	0.007	<0.01	<0.005
	9/29/2020	4.93	13.9	34.42	0.009		<2	<2	60	0.002	<0.01	<0.005
	10/26/2020	7.02	16.8	21.03	0.002		<2	<2	20	<0.0003	<0.01	<0.005
	11/30/2020	7.8	16.1	28.96	0.023	0.01	4	<2	30	0.004	<0.01	<0.005
	12/29/2020	4.66	16.6	75.97			8	723	200	0.017	0.04	<0.005
LPRO #2 Product	12/21/2020	6.52	16.8	58.59			6	9	40	0.013	0.040	<0.005

Concentrations greater than site standards are in **bold**.

Table 2.1-4 RO Clarifier Feed and RO SP1 Water Quality Data (cont.)

Sample Point Name	Date	NO3 (mg/L)	Ra226 (pCi/L)	Ra226e (pCi/L)	Ra228 (pCi/L)	Ra228e (pCi/L)	Ra226+ Ra228 (pCi/L)	Th230 (pCi/L)	Th230e (pCi/L)	V (mg/L)
		12					5	0.30		0.02
RO CLAR FEED	5/28/20	5.9	<0.2		1.4	2.3	<1.6	<.3		<.01
RO SP1	1/28/20	0.3	0.2	0.2	<1.3	0.8	<1.5	<0.1	0.07	<0.01
	2/25/2020									
	3/26/2020	0.4	<0.2	0.2	<1.3	0.8	<1.5	0.04	0.03	<0.01
	4/30/2020	0.4	<0.2		4.3	4.9	<4.5	<0.3		<0.01
	5/28/2020	0.5	<0.2		<1		<1.2	<0.3		<0.01
	6/29/2020	0.3	0.2	0.1	1.9	2.9	2.1	<0.3		<0.01
	7/30/2020	0.3	<0.2		6.9	6	<7.1	<0.3		<0.02
	8/27/2020	1	<0.2		3.4	2.3	<3.6	0.40	0.10	<0.02
	9/29/2020	0.4	0.3	0.1	<1		<1.3	1.70	0.30	<0.01
	10/26/2020	0.4	<0.2		<1		<1.2	<0.3		<0.01
	11/30/2020	0.5	<0.2		<1		<1.2	<0.3		<0.01
	12/29/2020	0.4	<0.2		1.6	2	<1.8	<0.3		<0.01
LPRO #2 Product	12/21/2020	0.3	<0.2		<1		<1.2	<0.3		<0.01

Concentrations greater than site standards are in **bold**.

**Table 2.1-5 Zeolite Treated Water Quality Data**

Sample Point Name	Date	Field Parameters					Lab Data					
		pH(f) (units)	Temp. (°C)	Cond. (µmhos)	KPA U (mg/L)	Mo(f) (mg/L)	U (mg/L)	Mo (mg/L)	Se (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)
Site Standard							0.16	0.1	0.32	250	1500	2734
300Z		NO 2020 OPERATION										
1200Z Trains 1&2		NO 2020 OPERATION										
1200Z Trains 3&4	9/17/20	5.65	13.8	2563	0.031	0	0.0298	<0.01	0.041	155	1070	1920
	11/5/20	5.38	19.6	2340	0.123	0	0.139	<0.01	0.034	152	976	1790

Concentrations greater than site standards are in **bold**.

**Table 2.1-5 Zeolite Treated Water Quality Data (cont.)**

Sample Point Name	Date	NO3	Ra226	Ra226e	Ra228	Ra228e	Ra226+ Ra228	Th230	Th230e	V
		(mg/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)		(pCi/L)	(pCi/L)	(mg/L)
Site Standard		<b>12</b>					<b>5</b>	<b>0.3</b>		<b>0.02</b>
300Z		NO 2020 OPERATION								
1200Z Trains 1&2		NO 2020 OPERATION								
1200Z Trains 3&4	9/17/20	2.3	<0.2		<1		<1.2	<0.3		<0.01
	11/5/20	2.2	<0.2		2.1	2	<2.3	<0.3		<0.01

Concentrations greater than site standards are in **bold**.

## **2.2 FUTURE OPERATION**

Groundwater quality restoration in 2021 will continue as a combination of fresh-water, zeolite treated water, and R.O. product injection to maintain the overall piezometric gradient reversal between the lines of injection (M Line, WR Line, J Line and X Line) and contaminated water collection near the tailings piles. The operation of the R.O. plant in 2021 is projected to be 300 gpm to maintain hydraulic control in the vicinity of the tailings piles due to the possibility of re-lining of EP1. The operation of the zeolite treatment is also expected to be limited to a capacity of 200 gpm in 2021 due to the potential re-lining of EP1. As articulated in the 2020 Groundwater Corrective Action Program, future groundwater remediation will not yield significant progress towards compliance with established protective groundwater standards as the means for the protection of human health and will be focused upon maintaining compliance with obligations in RML SUA-1471 until the approval of Alternate Concentration Limits at a future date.

Collection from Upper Chinle wells CE2, CE5, CE6, CE11, CE12, CE15 and CE19 will continue to intercept contaminants in this aquifer in 2021. Injection into Upper Chinle wells 944, CW5 and CW13 is planned to continue to control the direction of flow in these areas of the Upper Chinle aquifer.

Collection from Middle Chinle well CW62 will continue in 2021. Injection into well CW14 will be continued in order to build the head in this area of the Middle Chinle aquifer. This will prevent alluvial water from flowing into this portion of the Middle Chinle aquifer.

Off-site collection of water from Sections 3, 27, 28 and 35 will be restricted in 2021 for the potential re-lining of EP1. Operation of the South collection and injection in the northeast portion of Section 3 and South Felice Acres is planned to continue in 2021. The North Off-site operation of collection and injection is also planned to be continued in 2021. Limited treated and fresh-water injection will mainly be into injection wells on the down gradient side of the restoration area in 2021 to decrease the movement of the plumes.

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## SECTION 3

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### 3.0 TAILINGS MONITORING

The tailings monitoring program includes Large Tailings Pile (LTP) wells that were monitored to define water quality and water level conditions and changes during 2020. [Figure 3.1-1](#) shows the locations of the tailings wells for the LTP with [Figures 3.1-1A](#) and [3.1-1B](#) showing expanded mapping of the west and east halves of the LTP, respectively. [Figure 3.1-2](#) shows the locations of the tailings wells monitored during 2020 and shows the locations of toe drains and the sumps that are also monitored for tailings water quality. [Figures 3.1-3](#) and [3.1-4](#) present volumes of water removed from the LTP by the toe drains and previous dewatering efforts. [Figure 3.1-5](#) presents an example cross section for the LTP and illustrates the typical transition from sandy or coarser tailings deposited on the perimeter of the LTP to the slime or fine-grained tailings deposited on the interior of the LTP. The LTP was constructed by building a starter berm around the perimeter and the location of this berm is between 530 and 610 feet from the south end of the cross section shown in [Figure 3.1-5](#). The method of tailings deposition using a cyclone resulted in the segregation of the fine-grained slimes with much lower permeability tailings on the interior of the LTP, and as indicated in [Figure 3.1-2](#), a distinction is made between the slime and sand tailings and the wells installed in each tailings type. Cross Section A-A' in [Figure 3.1-5](#) also shows the approximate location of the toe drain corridor and the expected potentiometric surface in the tailings.

### 3.1 TAILINGS OPERATIONS

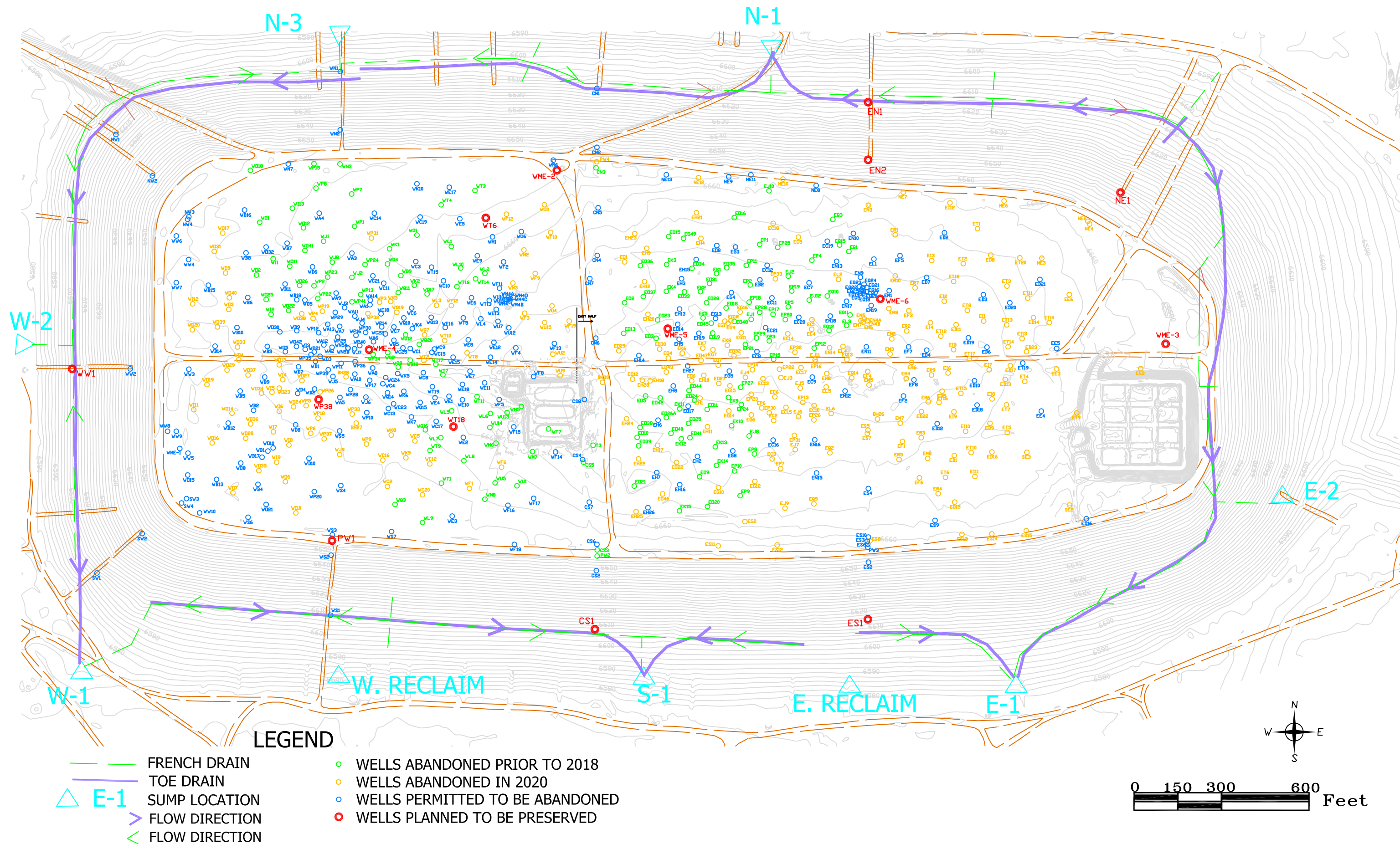
Tailings well locations are shown on [Figures 3.1-1](#), [3.1-1A](#) and [3.1-1B](#). The tailings wells on the outslope of the LTP are shown on [Figure 3.1-1](#) while the wells on top of the LTP are shown on [Figures 3.1-1A](#) and [3.1-1B](#) for the west and east half of the LTP respectively. These three figures show locations for wells that have been abandoned, wells permitted to be abandoned, and wells that are planned to be preserved for monitoring of the tailings. Two hundred and fifty seven wells were abandoned in 2020.

The historical collection of water from the tailings and toe drains is presented in [Figures 3.1-3](#) and [3.1-4](#). No tailings dewatering wells were operated during 2018 through 2020, while the pumping rates from the collection sumps for the toe drains continue to decline with time as shown in [Figure 3.1-4](#). These declining toe drain collection rates reflect the diminishing

thickness of saturated tailings and also result in a reduced rate of uranium mass removal by the toe drains.

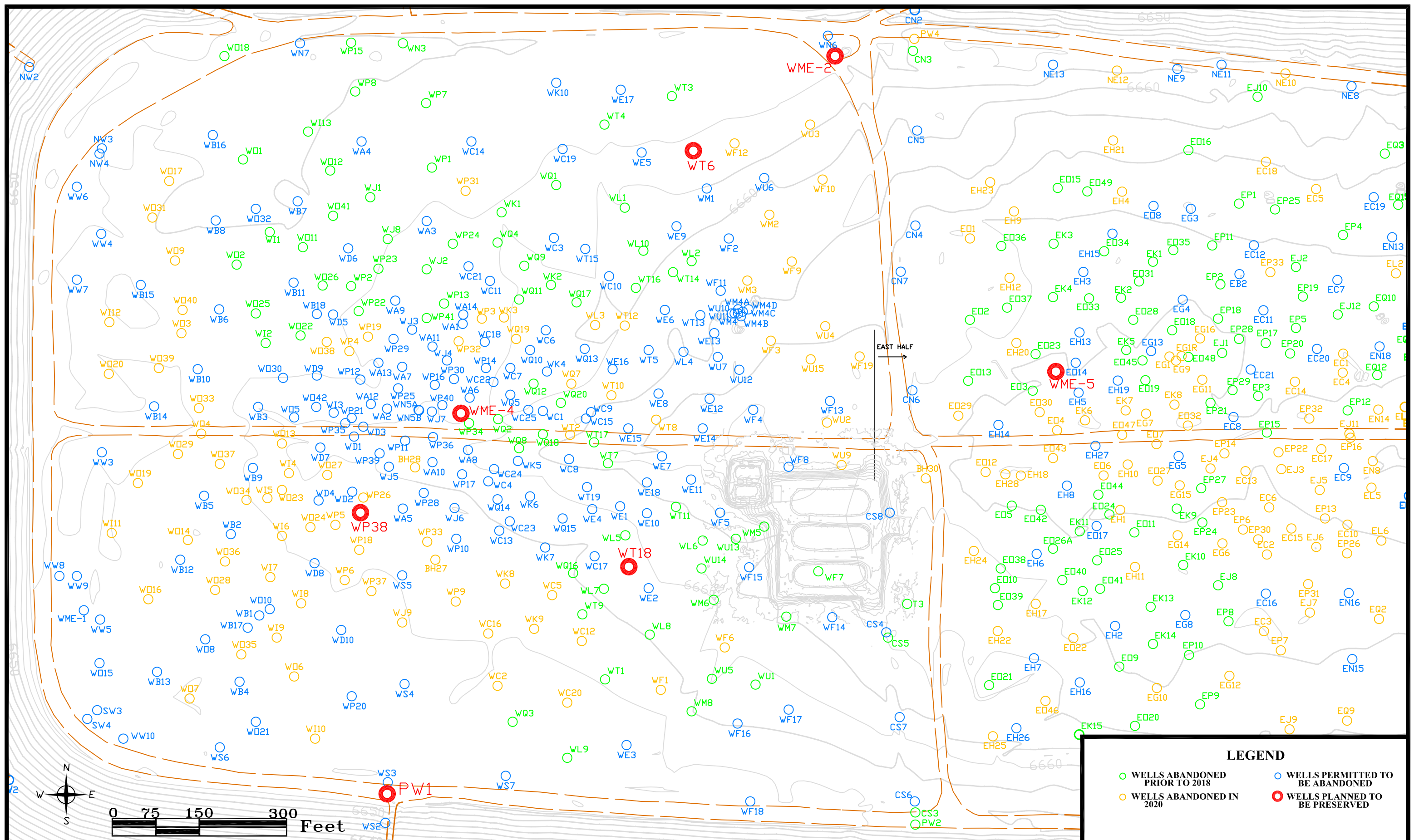
### **3.1.1 TAILINGS WELL COMPLETIONS**

[Table 3.1-1](#) presents basic information for the tailings wells located on the LTP. This table indicates well coordinates, well depth, casing diameter, water level, measuring point in feet above land surface and elevation, and casing perforation interval. Numerous wells were abandoned on the LTP in 2020, and a notation is included in [Table 3.1-1](#) to indicate wells that have been abandoned.

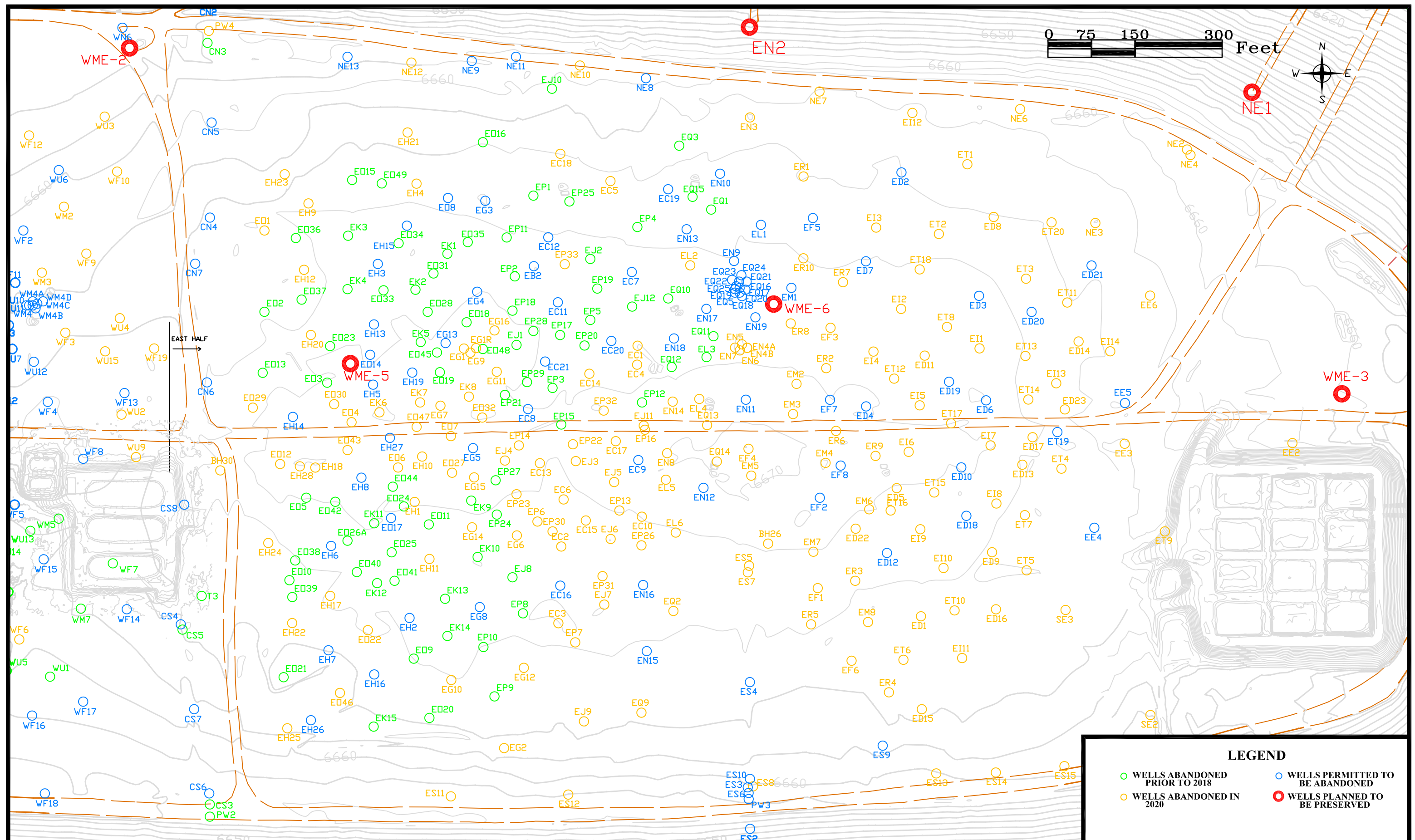


**FIGURE 3.1-1. TAILINGS WELL LOCATIONS, 2020**



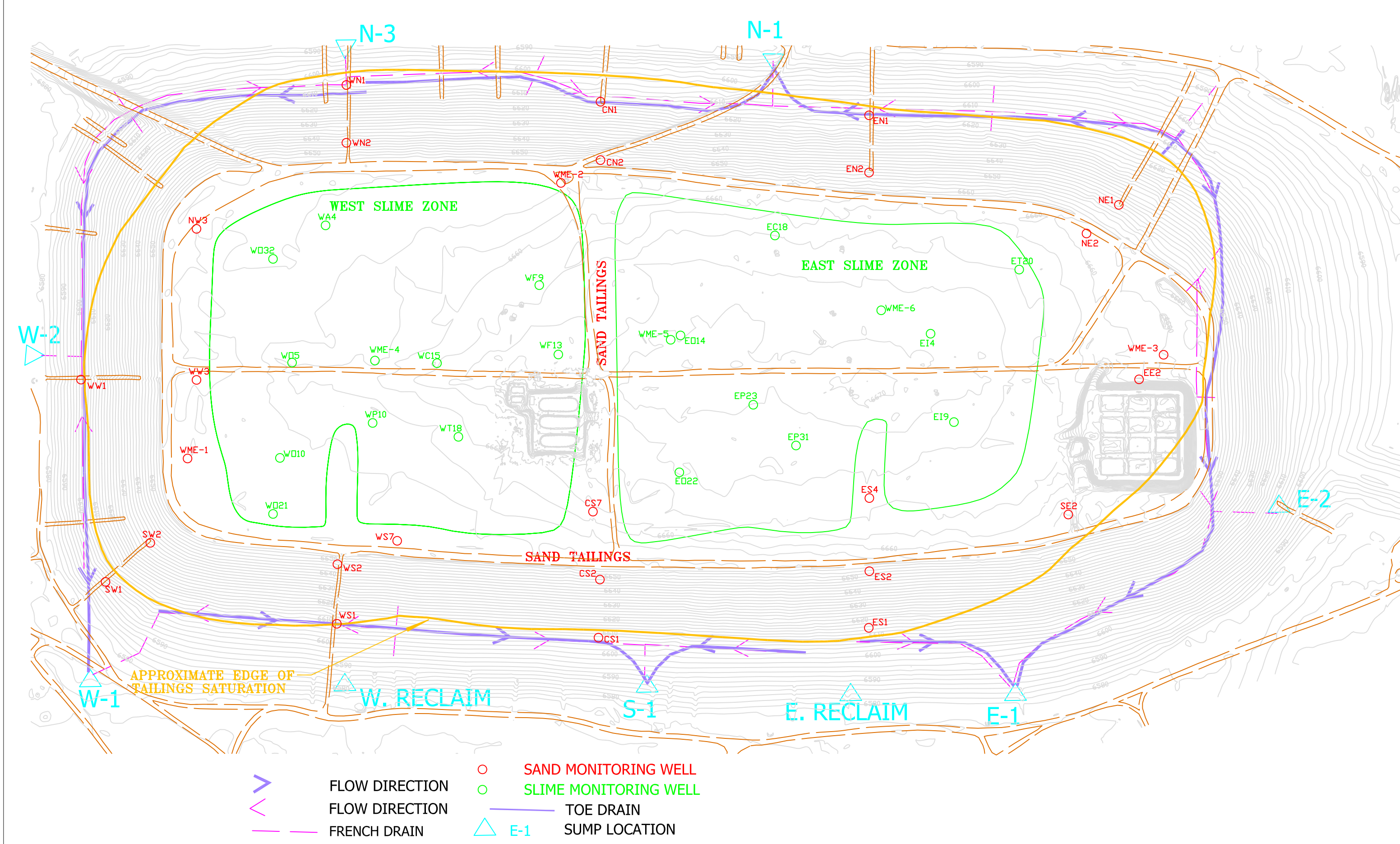


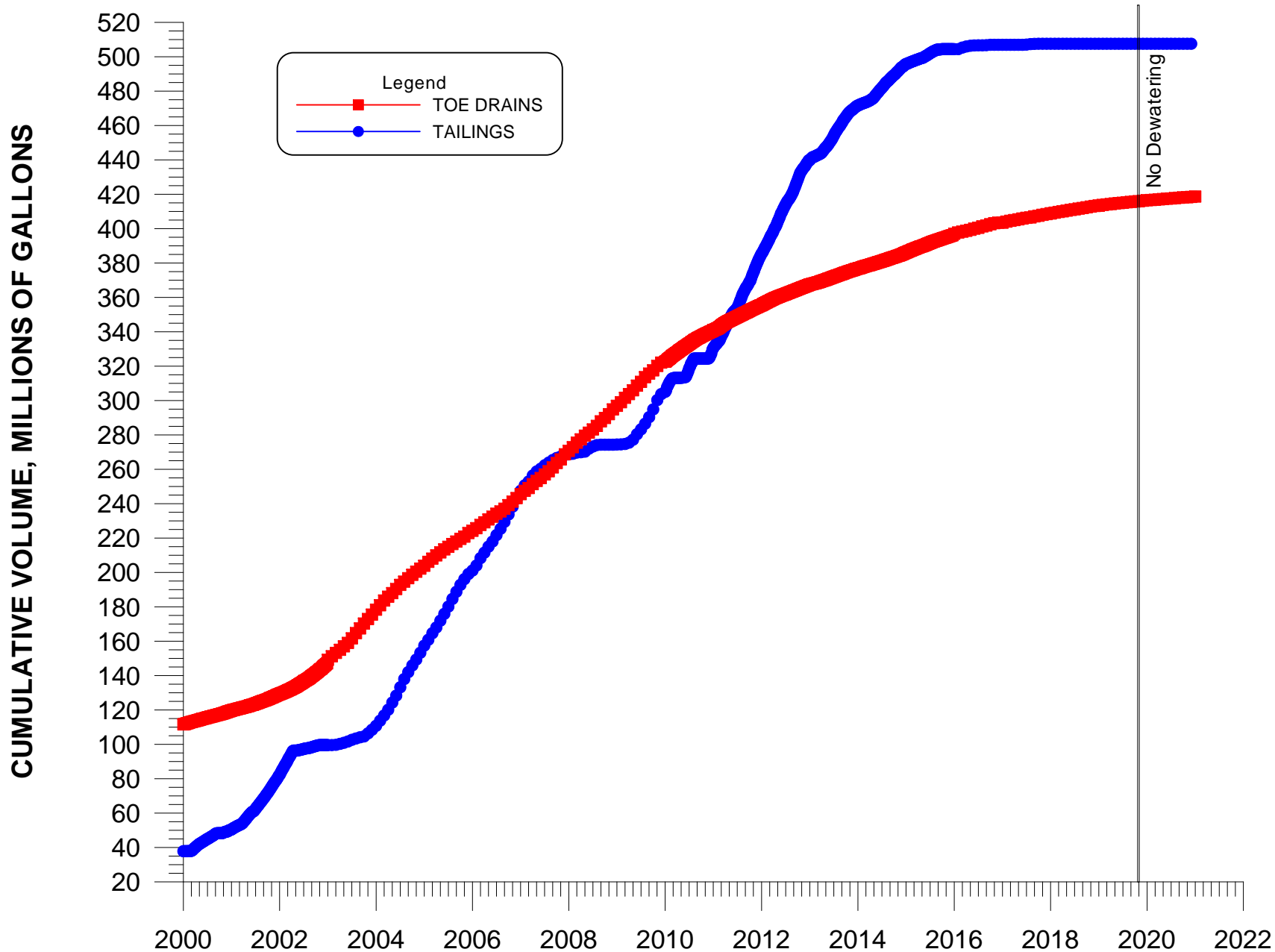
**FIGURE 3.1-1A. LOCATION OF TAILINGS WELLS IN WEST HALF OF LTP**



**FIGURE 3.1-1B. LOCATION OF TAILINGS WELLS IN EAST HALF OF LTP**

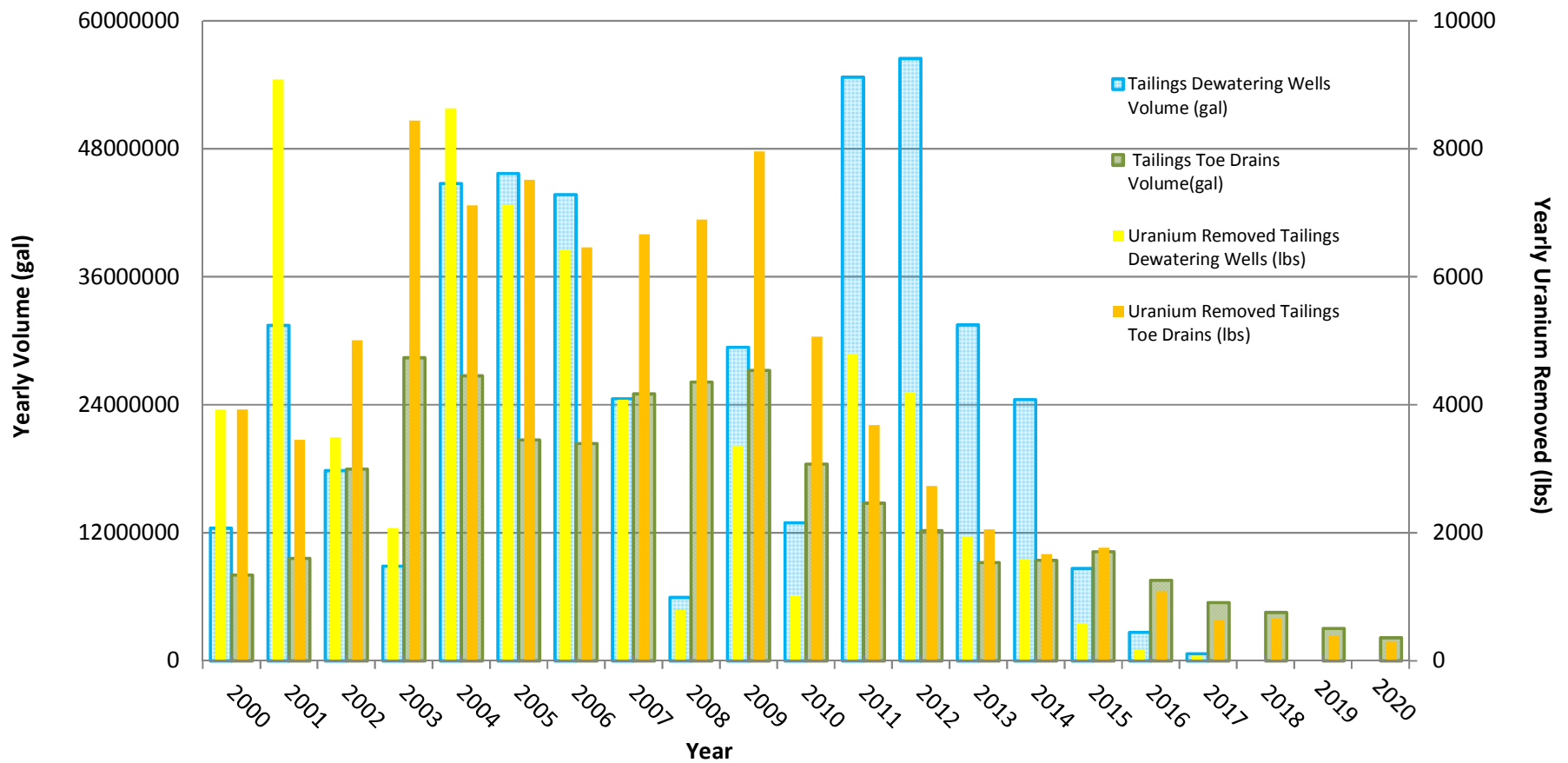




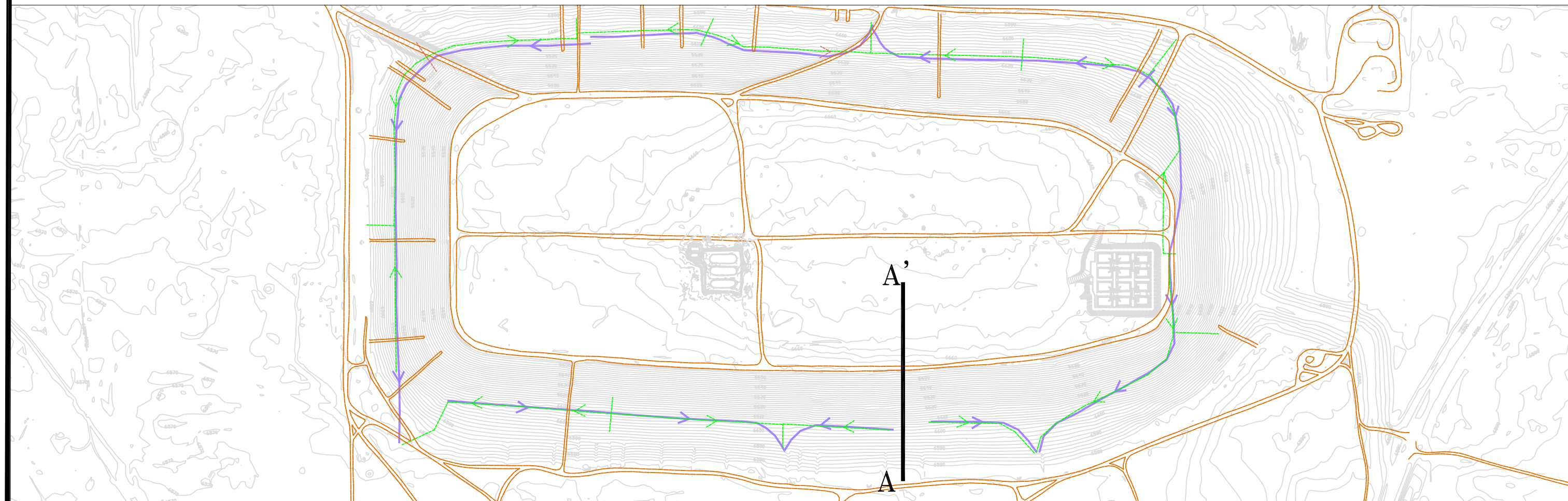
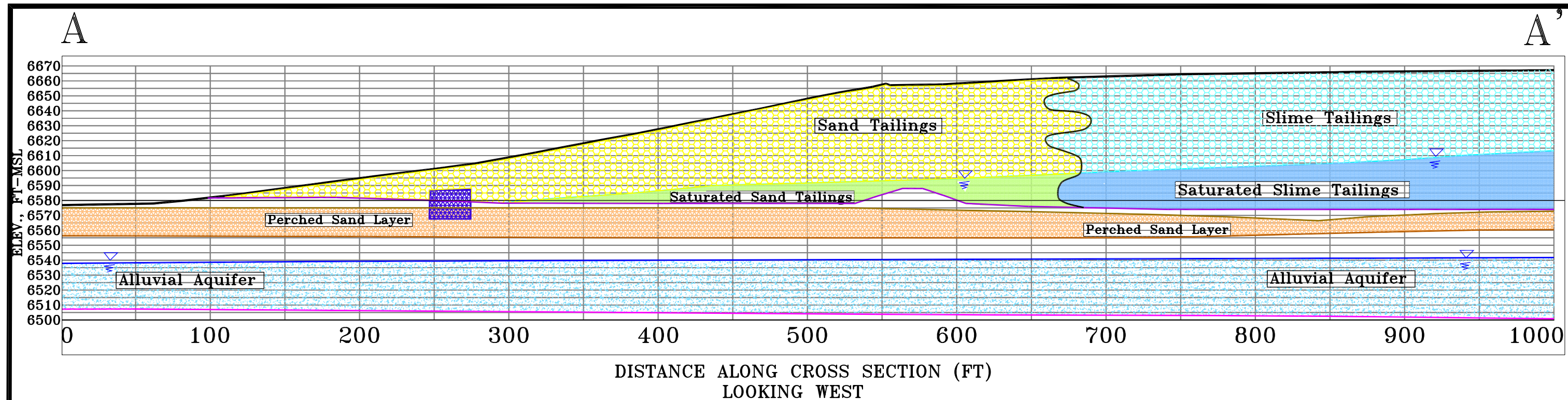


**FIGURE 3.1-3. CUMULATIVE VOLUME OF COLLECTION WATER FROM TAILINGS DEWATERING WELLS AND TOE DRAINS.**





**Figure 3.1-4. Yearly Quantity of Tailings Water and Uranium Removed**



**LEGEND**

- |                        |                                  |                    |
|------------------------|----------------------------------|--------------------|
| — LAND SURFACE         | — BASE OF ALLUVIUM               | — TOE DRAIN        |
| — BASE OF TAILINGS     | — TAILINGS WATER-LEVEL ELEVATION | - - - FRENCH DRAIN |
| — TOP OF PERCHED SAND  | — ALLUVIAL WATER-LEVEL ELEVATION |                    |
| — BASE OF PERCHED SAND | ■ TOE DRAIN CORRIDOR             |                    |

REVISIONS	No.	DATE	MADE BY	DATE	DRAWN BY
	1				
	2				
	3				
	4				
		11-2020			TGM

**Homestake Mining Company**  
Grants, New Mexico

**FIGURE 3.1-5**  
**TAILINGS CROSS SECTION A-A'**

3.1-9

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE.**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* BH26	2.0	1543722	491784	5.0	6674.33	98.00	69.60	6604.73	80-90	70-90
* BH27	2.0	1543708	489997	3.3	6660.93	51.30	38.74	6622.19	56-66	46-66
* BH28	2.0	1543867	489962	3.9	6665.59	40.00	21.35	6644.24	30-40	20-40
* BH30	4.0	1543848	490841	5.6	6671.60	89.20	79.93	6591.67	77-87	-
CN1	2.0	1544856	490822	2.2	6615.01	35.00	19.92	6595.09	22-32	5-32
CN2	2.0	1544654	490822	2.8	6658.17	87.10	73.00	6585.17	60-80	5-80
* CN3	3.0	1544584	490819	1.3	6656.72	90.50	47.90	6608.82	47-87	5-87
CN4	3.0	1544283	490823	2.1	6666.22	96.40	63.63	6602.59	57-97	7-97
CN5	5.0	1544447	490826	3.1	6660.02	113.70	52.10	6607.92	31-111	21-111
CN6	5.0	1544000	490818	2.7	6668.04	116.80	61.19	6606.85	35-115	25-115
CN7	5.0	1544204	490798	3.3	6667.88	116.00	83.00	6584.88	36-116	-
CS1	2.0	1543001	490815	0.9	6608.30	34.80	32.70	6575.60	25-35	5-35
CS2	2.0	1543202	490820	4.8	6651.98	78.30	61.70	6590.28	55-75	5-75
* CS3	2.0	1543273	490823	2.0	6657.64	87.30	47.81	6609.83	67-87	5-87
CS4	5.0	1543583	490773	3.7	6667.63	99.80	53.40	6614.23	61-101	0-101
* CS5	2.0	1543574	490776	2.1	6666.03	42.70	43.60	6622.43	10-40	0-40
CS6	5.0	1543292	490822	1.2	6657.30	97.70	45.70	6611.60	55-95	0-95
CS7	5.0	1543437	490796	3.8	6664.69	99.90	71.50	6593.19	61-101	0-101
CS8	5.0	1543789	490779	3.4	6668.98	116.00	58.89	6610.09	36-116	-
EB2	5.0	1544200	491381	2.6	6672.24	115.70	70.14	6602.10	31-111	21-111
* EC1	5.0	1544063	491559	1.0	6668.50	113.00	38.20	6630.30	15-110	-
* EC2	5.0	1543717	491428	4.0	6669.78	110.90	61.18	6608.60	15-110	-
* EC3	5.0	1543585	491423	4.4	6668.11	110.00	58.84	6609.27	15-110	15-110
* EC4	5.0	1544030	491559	3.6	6670.14	44.20	94.00	6576.14	20-40	15-40
* EC5	5.0	1544346	491513	3.1	6667.10	110.00	15.32	6651.78	30-110	20-110
* EC6	5.0	1543798	491432	4.8	6668.69	115.60	78.28	6590.41	33-113	23-113
EC7	5.0	1544190	491549	2.5	6668.92	115.10	80.80	6588.12	33-113	23-113
EC8	5.0	1543954	491371	4.9	6672.41	116.55	100.60	6571.81	44-114	34-114
EC9	5.0	1543866	491561	2.6	6672.25	116.00	66.60	6605.65	36-116	26-116
* EC10	5.0	1543768	491567	3.3	6670.99	116.00	69.00	6601.99	36-116	26-116
EC11	5.0	1544137	491422	3.3	6670.26	116.00	89.00	6581.26	36-116	26-116
EC12	5.0	1544249	491406	3.1	6669.05	116.00	99.10	6569.95	36-116	26-116
* EC13	5.0	1543860	491391	3.2	6670.40	116.00	40.50	6629.90	34-114	24-114
* EC14	5.0	1544014	491476	2.0	6670.23	116.00	35.80	6634.43	36-116	26-116

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EC15	5.0	1543762	491470	2.1	6669.75	118.00	92.40	6577.35	38-118	28-118
EC16	5.0	1543650	491426	2.0	6668.81	118.00	64.30	6604.51	38-118	28-118
* EC17	5.0	1543898	491522	2.9	6672.48	117.00	29.80	6642.68	37-117	27-117
* EC18	5.0	1544393	491426	2.7	6667.28	120.00	66.20	6601.08	60-120	50-120
EC19	5.0	1544332	491612	2.0	6666.79	120.00	58.60	6608.19	60-120	50-120
EC20	5.0	1544071	491514	1.9	6669.17	120.00	67.00	6602.17	60-120	-
EC21	5.0	1544035	491400	1.1	6669.02	120.00	76.50	6592.52	60-120	-
* ED1	5.0	1543597	492047	4.4	6666.62	97.00	40.30	6626.32	15-95	5-95
ED2	5.0	1544361	492014	5.0	6665.47	113.60	36.30	6629.17	30-110	20-110
ED3	5.0	1544149	492147	2.6	6670.66	114.60	67.50	6603.16	32-112	22-112
ED4	5.0	1543958	491953	3.0	6671.97	115.20	74.80	6597.17	33-113	23-113
* ED5	5.0	1543818	492005	3.0	6671.44	116.20	81.50	6589.94	33-113	23-113
ED6	5.0	1543969	492159	2.0	6670.82	118.15	84.10	6586.72	46-116	36-116
ED7	5.0	1544208	491952	1.9	6668.44	118.55	67.20	6601.24	45-115	35-115
* ED8	5.0	1544284	492172	3.4	6668.51	114.00	30.04	6638.47	35-115	25-115
* ED9	5.0	1543707	492170	3.1	6670.49	115.00	41.70	6628.79	36-116	26-116
ED10	5.0	1543853	492117	3.2	6672.16	116.00	65.50	6606.66	36-116	26-116
* ED11	5.0	1544046	492054	3.6	6671.78	116.00	23.20	6648.58	36-116	26-116
ED12	5.0	1543706	491989	3.3	6669.97	116.00	48.20	6621.77	36-116	26-116
* ED13	5.0	1543858	492222	2.6	6669.70	118.00	42.80	6626.90	38-118	28-118
* ED14	5.0	1544070	492319	2.3	6667.38	112.00	28.10	6639.28	32-112	22-112
* ED15	5.0	1543437	492049	2.6	6667.42	114.00	61.40	6606.02	34-114	24-114
* ED16	5.0	1543609	492176	---	6669.02	115.00	39.30	6629.72	35-115	25-115
* ED17	5.0	1543905	492239	---	6667.89	115.00	41.90	6625.99	35-115	25-115
ED18	5.0	1543770	492125	3.2	6667.19	120.00	62.90	6604.29	60-120	50-120
ED19	5.0	1544001	492096	3.3	6670.86	120.00	66.50	6604.36	60-120	50-120
ED20	5.0	1544121	492238	3.9	6670.42	116.00	62.10	6608.32	56-116	46-116
ED21	5.0	1544201	492341	3.0	6667.67	120.00	50.10	6617.57	60-120	50-120
* ED22	5.0	1543748	491935	2.0	6669.48	120.00	54.90	6614.58	60-120	50-120
* ED23	5.0	1543953	492295	3.2	6669.48	120.00	79.40	6590.08	60-120	50-120
* EE1	2.0	1543894	492887	0.0	6635.07	---	68.95	6566.12	45-65	5-65
* EE2	2.0	1543895	492687	2.5	6667.84	87.80	66.40	6601.44	55-75	5-75
* EE3	2.0	1543894	492398	1.3	6665.05	25.60	24.72	6640.33	5-23	0-23
EE4	5.0	1543749	492346	5.6	6669.82	113.00	84.20	6585.62	30-110	20-110
EE5	5.0	1543964	492398	5.5	6668.72	112.70	69.37	6599.35	31-111	21-111

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EE6	5.0	1544149	492442	4.6	6667.72	113.00	23.30	6644.42	31-111	21-111
* EF1	5.0	1543645	491870	5.0	6671.48	115.10	54.60	6616.88	32-112	60-112
EF2	5.0	1543801	491873	4.9	6672.98	116.00	88.90	6584.08	34-114	24-114
* EF3	5.0	1544094	491892	3.4	6670.29	115.00	23.90	6646.39	35-115	25-115
* EF4	5.0	1543885	491750	3.2	6674.58	116.00	44.10	6630.48	36-116	26-116
EF5	5.0	1544282	491861	3.2	6668.82	116.00	49.60	6619.22	36-116	26-116
* EF6	5.0	1543520	491928	3.4	6668.41	116.00	54.70	6613.71	36-116	26-116
EF7	5.0	1543970	491891	2.5	6671.28	117.00	54.70	6616.58	37-117	27-117
EF8	5.0	1543856	491909	---	6671.75	118.00	83.50	6588.25	38-118	28-118
* EG1	5.0	1544058	491260	3.1	6671.21	116.37	34.60	6636.61	22-112	20-112
* EG1R	5.0	1544059	491281	3.2	6671.11	115.70	76.78	6594.33	32-112	20-112
* EG2	5.0	1543370	491330	2.5	6664.53	111.40	95.80	6568.73	30-110	20-110
EG3	5.0	1544312	491297	1.8	6667.97	117.90	83.90	6584.07	45-115	35-115
EG4	5.0	1544156	491283	5.0	6672.05	116.70	66.30	6605.75	44-114	34-114
EG5	5.0	1543886	491276	3.2	6671.78	116.00	63.50	6608.28	36-116	26-116
* EG6	5.0	1543736	491352	3.3	6669.98	116.00	85.90	6584.08	36-116	26-116
* EG7	5.0	1543959	491220	2.9	6671.06	116.00	65.20	6605.86	36-116	26-116
EG8	5.0	1543613	491288	3.5	6669.79	116.00	53.80	6615.99	36-116	26-116
* EG9	5.0	1544051	491272	2.9	6670.08	112.00	109.11	6560.97	102-112	92-112
* EG10	5.0	1543487	491239	2.0	6667.62	118.00	45.60	6622.02	38-118	28-118
* EG11	5.0	1544018	491317	2.3	6670.65	116.00	32.10	6638.55	36-116	26-116
* EG12	5.0	1543508	491364	3.2	6668.58	117.00	66.80	6601.78	37-117	27-117
EG13	5.0	1544067	491229	1.5	6669.87	120.00	74.10	6595.77	60-120	-
* EG14	5.0	1543750	491274	1.7	6669.27	120.00	74.60	6594.67	60-120	-
* EG15	5.0	1543836	491278	2.0	6670.53	120.00	64.10	6606.43	60-120	-
* EG16	5.0	1544089	491313	---	6670.27	120.00	87.10	6583.17	60-120	-
* EH1	5.0	1543794	491176	2.8	6671.13	116.90	97.80	6573.33	34-114	24-114
EH2	5.0	1543594	491167	3.5	6669.72	114.40	91.30	6578.42	31-111	21-111
EH3	5.0	1544203	491112	2.6	6669.98	115.70	74.30	6595.68	33-113	23-113
* EH4	5.0	1544342	491179	5.1	6670.09	115.70	10.53	6659.56	32-112	22-112
EH5	5.0	1543996	491104	2.6	6670.14	116.10	79.90	6590.24	44-114	34-114
EH6	5.0	1543718	491032	5.0	6671.68	113.00	84.10	6587.58	43-113	33-113
EH7	5.0	1543538	491027	3.5	6668.57	113.00	46.20	6622.37	43-113	33-113
EH8	5.0	1543836	491084	3.1	6672.31	116.00	90.70	6581.61	36-116	26-116

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EH9	5.0	1544308	490993	3.3	6669.53	116.00	39.90	6629.63	36-116	26-116
* EH10	5.0	1543872	491189	3.2	6672.46	116.00	100.00	6572.46	36-116	26-116
* EH11	5.0	1543696	491201	3.5	6670.01	116.00	40.80	6629.21	36-116	26-116
* EH12	5.0	1544193	490985	3.3	6669.87	116.00	31.50	6638.37	36-116	26-116
EH13	5.0	1544099	491106	1.8	6669.79	119.00	65.00	6604.79	39-119	29-119
EH14	5.0	1543940	490966	2.3	6671.39	119.00	35.00	6636.39	39-119	29-119
EH15	5.0	1544269	491162	3.0	6670.08	118.00	83.20	6586.88	38-118	28-118
EH16	5.0	1543497	491106	3.1	6665.06	120.00	51.90	6613.16	60-120	50-120
* EH17	5.0	1543632	491030	3.2	6668.83	120.00	48.20	6620.63	60-120	50-120
* EH18	5.0	1543853	491005	---	6672.33	120.00	41.50	6630.83	60-120	50-120
EH19	5.0	1544016	491171	3.0	6671.61	120.00	63.90	6607.71	60-120	50-120
* EH20	5.0	1544081	490997	---	6670.11	120.00	43.30	6626.81	60-120	50-120
* EH21	5.0	1544430	491163	---	6666.88	120.00	57.90	6608.98	60-120	50-120
* EH22	5.0	1543585	490965	2.0	6666.46	120.00	49.80	6616.66	60-120	50-120
* EH23	5.0	1544358	490952	2.0	6665.81	120.00	53.40	6612.41	60-120	50-120
* EH24	5.0	1543723	490924	---	6667.78	110.00	62.60	6605.18	50-110	45-110
* EH25	5.0	1543404	490956	2.4	6664.32	110.00	88.10	6576.22	50-110	45-110
EH26	5.0	1543418	490997	---	6663.00	120.00	---	---	60-120	-
EH27	5.0	1543904	491133	---	6671.00	120.00	93.60	6577.40	60-120	-
* EH28	5.0	1543855	490978	---	6670.00	120.00	---	---	60-120	-
* EI1	2.0	1544058	492148	0.6	6668.00	90.00	3.53	6664.47	30-90	20-90
* EI2	2.0	1544126	492013	0.5	6668.00	90.00	1.90	6666.10	30-90	20-90
* EI3	2.0	1544266	491970	0.6	6665.00	90.00	5.21	6659.79	30-90	20-90
* EI4	3.0	1544053	491965	0.5	6668.00	92.00	40.60	6627.40	32-92	22-92
* EI5	3.0	1543960	492045	0.6	6670.00	93.00	1.86	6668.14	33-93	23-93
* EI6	2.0	1543880	492026	---	6670.00	90.00	---	---	30-90	0-20
* EI7	2.0	1543891	492167	---	6669.00	90.00	---	---	30-90	0-20
* EI8	2.0	1543791	492177	---	6668.00	90.00	---	---	30-90	20-90
* EI9	2.0	1543747	492046	---	6668.00	90.00	63.90	6604.10	30-90	20-90
* EI10	2.0	1543680	492086	---	6667.00	90.00	---	---	30-90	20-90
* EI11	2.0	1543525	492118	---	6666.00	90.00	---	---	30-90	20-90
* EI12	2.0	1544463	492032	---	6663.00	85.00	2.00	6661.00	25-85	15-85
* EI13	2.0	1543998	492280	---	6666.00	90.00	---	---	30-90	0-30
* EI14	2.0	1544053	492373	---	6665.00	85.00	---	---	25-85	15-85
* EJ1	2.0	1544064	491351	0.8	6668.00	90.00	1.40	6666.60	30-90	20-90

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EJ2	4.0	1544212	491478	0.7	6667.00	90.00	---	---	30-90	20-90
* EJ3	2.0	1543864	491453	---	6670.00	90.00	---	---	30-90	20-90
* EJ4	2.0	1543865	491331	---	6669.00	90.00	---	---	30-90	20-90
* EJ5	2.0	1543828	491519	---	6669.00	90.00	---	---	30-90	20-90
* EJ6	2.0	1543730	491513	---	6668.00	90.00	---	---	30-90	20-90
* EJ7	2.0	1543617	491502	---	6666.00	90.00	---	---	30-90	20-90
* EJ8	2.0	1543664	491344	---	6667.00	90.00	---	---	30-90	20-90
* EJ9	2.0	1543416	491467	---	6664.00	90.00	---	---	30-90	20-90
* EJ10	2.0	1544505	491412	---	6661.00	85.00	---	---	25-85	15-85
* EJ11	2.0	1543925	491570	---	6670.00	90.00	---	---	30-90	20-90
* EJ12	2.0	1544130	491550	---	6667.00	90.00	---	---	30-90	20-90
* EK1	2.0	1544221	491232	0.8	6668.00	85.00	3.15	6664.85	25-85	15-85
* EK2	4.0	1544159	491177	0.4	6668.00	90.00	---	---	30-90	20-90
* EK3	4.0	1544252	491061	0.7	6667.00	90.00	---	---	30-90	20-90
* EK4	4.0	1544160	491060	0.5	6668.00	90.00	---	---	30-90	20-90
* EK5	4.0	1544069	491186	0.5	6667.00	90.00	---	---	30-90	20-90
* EK6	4.0	1543948	491115	0.7	6670.00	90.00	---	---	30-90	20-90
* EK7	4.0	1543965	491185	0.6	6670.00	90.00	---	---	30-90	20-90
* EK8	4.0	1543975	491269	0.6	6670.00	90.00	---	---	30-90	20-90
* EK9	2.0	1543796	491273	---	6669.00	90.00	---	---	30-90	20-90
* EK10	2.0	1543699	491284	---	6668.00	90.00	---	---	30-90	20-90
* EK11	2.0	1543757	491106	3.3	6668.00	90.00	4.10	6663.90	30-90	20-90
* EK12	2.0	1543654	491111	3.1	6667.00	90.00	3.00	6664.00	30-90	20-90
* EK13	2.0	1543627	491228	---	6667.00	90.00	---	---	30-90	20-90
* EK14	2.0	1543563	491232	---	6667.00	90.00	---	---	30-90	20-90
* EK15	2.0	1543407	491105	---	6663.00	90.00	---	---	30-90	20-90
EL1	4.0	1544271	491772	0.7	6666.00	87.00	2.70	6663.30	27-87	17-87
* EL2	4.0	1544201	491650	0.7	6667.00	90.00	---	---	30-90	20-90
* EL3	4.0	1544043	491678	0.6	6668.00	90.00	---	---	30-90	20-90
* EL4	4.0	1543971	491666	1.0	6670.00	90.00	61.90	6608.10	30-90	20-90
* EL5	2.0	1543832	491608	---	6670.00	90.00	---	---	30-90	20-90
* EL6	2.0	1543741	491625	---	6669.00	90.00	---	---	30-90	20-90
EM1	3.0	1544162	491824	0.7	6667.00	90.00	1.63	6665.37	30-90	20-90
* EM2	3.0	1543997	491833	0.6	6670.00	90.00	2.15	6667.85	30-90	20-90

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EM3	4.0	1543945	491827	0.6	6671.00	90.00	1.24	6669.76	30-90	20-90
* EM4	2.0	1543861	491883	---	6671.00	90.00	---	---	30-90	20-90
* EM5	2.0	1543839	491755	---	6671.00	90.00	---	---	30-90	20-90
* EM6	2.0	1543781	491958	---	6669.00	90.00	---	---	30-90	20-90
* EM7	2.0	1543708	491862	---	6668.00	90.00	---	---	30-90	20-90
* EM8	2.0	1543587	491956	---	6666.00	90.00	---	---	30-90	20-90
EN1	2.0	1544809	491752	4.0	6618.86	38.40	32.30	6586.56	25-35	5-35
EN2	2.0	1544611	491752	2.2	6651.61	69.30	54.65	6596.96	50-70	5-70
* EN3	3.0	1544456	491753	4.6	6667.51	93.20	62.00	6605.51	50-90	5-90
* EN4A	2.0	1544059	491748	6.8	6673.50	33.30	31.42	6642.08	32-52	22-52
* EN4B	2.0	1544059	491748	6.8	6673.51	96.60	31.31	6642.20	69-99	66-99
* EN5	5.0	1544065	491739	5.8	6672.42	105.00	19.90	6652.52	15-105	-
* EN6	2.0	1544055	491735	6.7	6673.59	40.00	18.40	6655.19	20-40	-
* EN7	5.0	1544059	491727	0.6	6668.27	41.00	17.92	6650.35	20-40	15-40
* EN8	5.0	1543878	491610	2.6	6672.87	113.00	23.80	6649.07	33-113	23-113
EN9	5.0	1544209	491725	2.3	6668.50	116.80	50.50	6618.00	34-114	24-114
EN10	5.0	1544359	491701	2.4	6666.34	114.50	63.00	6603.34	32-112	22-112
EN11	5.0	1543970	491746	1.9	6671.46	118.00	61.30	6610.16	45-115	35-115
EN12	5.0	1543818	491673	1.9	6671.34	116.00	61.90	6609.44	46-116	36-116
EN13	5.0	1544263	491644	3.1	6664.14	116.00	82.50	6581.64	36-116	26-116
* EN14	5.0	1543966	491620	3.4	6672.13	116.00	47.10	6625.03	36-116	26-116
EN15	5.0	1543537	491575	3.0	6669.02	116.00	98.30	6570.72	36-116	26-116
EN16	5.0	1543651	491569	2.0	6668.86	118.00	64.60	6604.26	38-118	28-118
EN17	5.0	1544126	491678	1.9	6668.85	118.00	58.90	6609.95	38-118	28-118
EN18	5.0	1544075	491622	---	6670.36	120.00	72.20	6598.16	60-120	50-120
EN19	5.0	1544112	491762	---	6670.65	120.00	66.40	6604.25	60-120	50-120
* EO1	2.0	1544261	490917	---	6665.00	90.00	47.40	6617.60	30-90	20-90
* EO2	2.0	1544121	490917	---	6666.00	90.00	32.53	6633.47	30-90	20-90
* EO3	2.0	1543999	491025	---	6667.00	90.00	29.52	6637.48	30-90	20-90
* EO4	2.0	1543931	491067	---	6670.00	90.00	---	---	30-90	20-90
* EO5	2.0	1543801	490989	---	6668.00	90.00	29.78	6638.22	30-90	20-90
* EO6	2.0	1543853	491147	---	6669.00	90.00	22.37	6646.63	30-90	20-90
* EO7	2.0	1543907	491238	---	6670.00	90.00	---	---	30-90	20-90
EO8	2.0	1544317	491233	2.0	6667.00	90.00	36.00	6631.00	30-90	20-90
* EO9	2.0	1543524	491174	2.0	6667.00	90.00	---	---	30-90	20-90



**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EO10	2.0	1543659	490960	---	6667.00	90.00	31.30	6635.70	30-90	20-90
* EO11	2.0	1543755	491200	---	6668.00	90.00	---	---	30-90	20-90
* EO12	2.0	1543859	490944	---	6670.00	90.00	---	---	30-90	20-90
* EO13	2.0	1544016	490914	---	6668.00	90.00	---	---	30-90	20-90
EO14	2.0	1544047	491099	---	6670.00	90.00	57.20	6612.80	30-90	20-90
* EO15	2.0	1544348	491068	---	6666.00	90.00	27.00	6639.00	30-90	20-90
* EO16	2.0	1544413	491293	---	6664.00	90.00	---	---	30-90	20-90
EO17	2.0	1543766	491135	---	6670.00	80.00	60.41	6609.59	50-80	40-80
* EO18	2.0	1544103	491265	---	6670.00	90.00	---	---	30-90	20-90
* EO19	2.0	1544017	491219	---	6668.00	90.00	---	---	30-90	20-90
* EO20	2.0	1543422	491201	---	6664.00	90.00	---	---	30-90	20-90
* EO21	2.0	1543492	490950	---	6664.00	90.00	41.80	6622.20	30-90	20-90
* EO22	2.0	1543573	491095	2.0	6667.00	90.00	41.30	6625.70	40-90	30-90
* EO23	2.0	1544062	491030	---	6670.00	80.00	41.83	6628.17	40-80	30-80
* EO24	2.0	1543786	491157	---	6670.00	80.00	26.87	6643.13	30-80	20-80
* EO25	2.0	1543707	491136	---	6669.00	80.00	32.60	6636.40	30-80	20-80
* EO26A	2.0	1543727	491060	---	6669.00	80.00	32.15	6636.85	30-80	20-80
* EO27	2.0	1543844	491240	---	6669.00	90.00	38.60	6630.40	40-90	30-90
* EO28	2.0	1544121	491198	---	6670.00	90.00	38.60	6631.40	40-90	30-90
* EO29	2.0	1543956	490897	---	6669.00	90.00	50.19	6618.81	40-90	-
* EO30	2.0	1543962	491037	---	6670.00	90.00	51.13	6618.87	40-90	-
* EO31	2.0	1544187	491208	---	6668.00	90.00	51.35	6616.65	40-90	-
* EO32	2.0	1543939	491292	---	6670.00	90.00	---	---	40-90	-
* EO33	2.0	1544158	491122	---	6668.00	90.00	54.85	6613.15	40-90	-
* EO34	2.0	1544239	491148	---	6667.00	90.00	---	---	40-90	-
* EO35	2.0	1544241	491267	---	6668.00	90.00	52.10	6615.90	40-90	-
* EO36	2.0	1544248	490971	---	6666.00	90.00	---	---	40-90	30-90
* EO37	2.0	1544142	490981	---	---	90.00	---	---	40-90	30-90
* EO38	2.0	1543693	490970	---	6666.00	90.00	44.00	6622.00	50-90	40-90
* EO39	2.0	1543630	490965	---	6666.00	90.00	43.00	6623.00	50-90	40-90
* EO40	2.0	1543673	491076	---	6667.00	90.00	44.00	6623.00	50-90	40-90
* EO41	2.0	1543658	491141	---	6667.00	90.00	46.00	6621.00	50-90	40-90
* EO42	2.0	1543794	491039	---	6669.00	90.00	47.99	6621.01	40-90	-
* EO43	2.0	1543883	491060	---	6672.00	90.00	---	---	40-90	-

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EO44	2.0	1543820	491138	---	6671.00	90.00	---	---	40-90	-
* EO45	2.0	1544051	491214	---	6669.00	90.00	---	---	40-90	-
* EO46	2.0	1543465	491047	---	6665.00	90.00	63.30	6601.70	40-90	-
* EO47	2.0	1543923	491179	---	6670.00	90.00	---	---	-	-
* EO48	2.0	1544057	491293	---	6668.00	90.00	---	---	-	-
* EO49	2.0	1544342	491119	---	6665.00	90.00	57.38	6607.62	-	-
* EP1	2.0	1544321	491380	---	6666.00	90.00	---	---	30-90	20-90
* EP2	2.0	1544182	491348	---	6668.00	90.00	---	---	30-90	20-90
* EP3	2.0	1543990	491413	---	6668.00	90.00	57.60	6610.40	30-90	20-90
* EP4	2.0	1544267	491559	---	6665.00	90.00	41.94	6623.06	30-90	20-90
* EP5	2.0	1544107	491478	---	6667.00	90.00	31.38	6635.62	30-90	20-90
* EP6	2.0	1543760	491387	---	6668.00	90.00	46.70	6621.30	30-90	20-90
* EP7	2.0	1543552	491452	---	6666.00	90.00	57.00	6609.00	30-90	20-90
* EP8	2.0	1543602	491362	---	6667.00	90.00	---	---	30-90	20-90
* EP9	2.0	1543459	491313	---	6665.00	90.00	---	---	30-90	20-90
* EP10	2.0	1543544	491294	---	6667.00	90.00	---	---	30-90	20-90
* EP11	2.0	1544249	491334	---	6667.00	90.00	---	---	30-90	20-90
* EP12	2.0	1543965	491567	---	6669.00	85.00	36.23	6632.77	35-85	25-85
* EP13	2.0	1543779	491528	2.0	6667.00	90.00	40.23	6626.77	40-90	30-90
* EP14	2.0	1543891	491355	---	6669.00	90.00	40.50	6628.50	40-90	30-90
* EP15	2.0	1543927	491428	---	6670.00	90.00	---	---	40-90	30-90
* EP16	2.0	1543918	491572	---	6671.00	90.00	42.90	6628.10	40-90	30-90
* EP17	2.0	1544081	491426	---	6668.00	90.00	34.80	6633.20	40-90	30-90
* EP18	2.0	1544123	491344	---	6668.00	90.00	39.70	6628.30	40-90	-
* EP19	2.0	1544161	491490	---	6667.00	90.00	58.71	6608.29	40-90	-
* EP20	2.0	1544063	491468	---	6667.00	90.00	33.27	6633.73	40-90	-
* EP21	2.0	1543978	491331	---	6669.00	90.00	39.99	6629.01	-	-
* EP22	2.0	1543893	491448	---	6670.00	90.00	---	---	40-90	-
* EP23	2.0	1543807	491351	---	6668.00	90.00	58.70	6609.30	40-90	-
* EP24	2.0	1543772	491317	---	6668.00	90.00	---	---	40-90	-
* EP25	2.0	1544311	491442	---	6666.00	90.00	39.80	6626.20	40-90	-
* EP26	2.0	1543719	491566	---	6668.00	90.00	---	---	40-90	-
* EP27	2.0	1543831	491315	---	6669.00	90.00	34.98	6634.02	40-90	-
* EP28	2.0	1544088	491380	---	6667.00	90.00	---	---	40-90	-
* EP29	2.0	1544000	491369	---	6668.00	90.00	---	---	40-90	-

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* EP30	2.0	1543743	491413	---	6667.00	90.00	---	---	40-90	-
* EP31	2.0	1543666	491499	---	6667.00	90.00	52.90	6614.10	40-90	-
* EP32	2.0	1543951	491501	---	6669.00	90.00	---	---	40-90	-
* EP33	2.0	1544203	491434	---	6667.00	90.00	---	---	-	-
* EQ1	2.0	1544297	491686	---	6666.00	90.00	---	---	30-90	20-90
* EQ2	2.0	1543606	491621	---	6667.00	90.00	50.57	6616.43	30-90	20-90
* EQ3	2.0	1544407	491631	---	6664.00	90.00	24.36	6639.64	30-90	20-90
EQ5	2.0	1544154	491735	---	6667.00	90.00	---	---	40-90	30-90
* EQ9	2.0	1543431	491566	---	6664.00	90.00	---	---	30-90	20-90
* EQ10	2.0	1544144	491612	---	6667.00	90.00	51.50	6615.50	50-90	40-90
* EQ11	2.0	1544079	491690	---	6667.00	90.00	---	---	40-90	-
* EQ12	2.0	1544026	491618	---	6668.00	90.00	42.00	6626.00	40-90	-
* EQ13	2.0	1543926	491679	---	6672.00	90.00	46.00	6626.00	40-90	-
* EQ14	2.0	1543863	491696	---	6672.00	90.00	55.44	6616.56	40-90	-
* EQ15	2.0	1544319	491654	---	6666.00	90.00	40.10	6625.90	40-90	-
EQ16	2.0	1544165	491729	2.0	6667.00	95.00	52.65	6614.35	85-95	83-95
EQ17	4.0	1544162	491735	---	6667.00	130.00	125.05	6541.95	120-130	118-130
EQ18	2.0	1544148	491739	---	6667.00	95.00	61.79	6605.21	85-95	83-95
EQ19	2.0	1544154	491727	---	6667.00	60.00	44.09	6622.91	50-60	48-60
EQ20	2.0	1544159	491745	---	6667.00	60.00	43.89	6623.11	50-60	48-60
EQ21	2.0	1544173	491747	---	6667.00	95.00	62.28	6604.72	85-95	83-95
EQ22	2.0	1544173	491734	---	6667.00	60.00	43.90	6623.10	50-60	48-60
EQ23	2.0	1544176	491722	---	6667.00	95.00	63.05	6603.95	85-95	83-95
EQ24	2.0	1544184	491738	---	6667.00	60.00	43.91	6623.09	50-60	48-60
EQ25	2.0	1544160	491727	---	6667.00	80.00	49.93	6617.07	70-80	68-80
* ER1	2.0	1544354	491845	---	6665.00	90.00	---	---	30-90	20-90
* ER2	2.0	1544024	491884	---	6669.00	90.00	---	---	30-90	20-90
* ER3	2.0	1543658	491934	---	6667.00	90.00	35.30	6631.70	30-90	20-90
* ER4	2.0	1543466	491992	---	6664.00	90.00	---	---	30-90	20-90
* ER5	2.0	1543583	491858	---	6666.00	90.00	47.45	6618.55	30-90	20-90
* ER6	2.0	1543916	491901	---	6672.00	90.00	---	---	30-90	20-90
* ER7	2.0	1544172	491913	---	6667.00	90.00	26.50	6640.50	30-90	20-90
* ER8	2.0	1544101	491823	---	6667.00	90.00	---	---	40-90	-
* ER9	2.0	1543873	491969	---	6670.00	90.00	---	---	40-90	-

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* ER10	2.0	1544213	491845	---	6667.00	90.00	36.10	6630.90	40-90	-
ES1	2.0	1543035	491751	1.3	6615.18	49.10	30.65	6584.53	40-50	5-50
ES2	2.0	1543231	491753	1.9	6655.30	76.00	76.00	6579.30	60-80	5-80
ES3	2.0	1543302	491749	2.4	6660.23	86.40	64.00	6596.23	70-90	5-90
ES4	5.0	1543484	491753	4.4	6665.80	99.10	72.67	6593.13	62-102	0-102
* ES5	3.0	1543684	491751	2.7	6670.59	96.70	76.51	6594.08	58-98	5-98
ES6	5.0	1543293	491751	1.2	6660.00	97.50	97.50	6562.50	57-97	0-97
* ES7	2.0	1543673	491749	2.1	6669.98	35.80	35.80	6634.18	10-37	0-37
* ES8	2.0	1543304	491758	2.7	6659.72	36.20	34.98	6624.74	10-38	0-38
ES9	5.0	1543374	491981	4.9	6663.04	113.70	58.80	6604.24	32-112	22-112
ES10	2.0	1543317	491753	---	6660.06	90.00	56.40	6603.66	40-90	-
* ES11	4.5	1543287	491238	2.0	6659.00	120.00	67.00	6592.00	60-120	50-120
* ES12	4.5	1543290	491440	2.0	6659.00	120.00	60.00	6599.00	60-120	50-120
* ES13	4.5	1543326	492074	2.0	6661.00	120.00	72.00	6589.00	60-120	50-120
* ES14	4.5	1543328	492176	2.0	6662.00	120.00	87.00	6575.00	60-120	50-120
* ES15	4.5	1543339	492294	2.0	6662.00	120.00	87.00	6575.00	60-120	50-120
ES16	4.5	1543380	492500	2.0	6662.00	120.00	67.00	6595.00	60-120	50-120
* ET1	2.0	1544375	492127	---	6664.00	90.00	---	---	30-90	20-90
* ET2	2.0	1544255	492078	---	6666.00	90.00	---	---	30-90	20-90
* ET3	2.0	1544178	492228	---	6666.00	90.00	32.10	6633.90	30-90	20-90
* ET4	2.0	1543851	492289	---	6666.00	90.00	33.12	6632.88	30-90	20-90
* ET5	2.0	1543676	492229	---	6666.00	90.00	51.58	6614.42	30-90	20-90
* ET6	2.0	1543522	492017	---	6665.00	90.00	41.60	6623.40	30-90	20-90
* ET7	2.0	1543771	492226	---	6667.00	90.00	33.00	6634.00	30-90	20-90
* ET8	2.0	1544095	492092	---	6668.00	90.00	25.46	6642.54	30-90	20-90
* ET9	2.0	1543743	492467	---	6664.00	90.00	---	---	30-90	20-90
* ET10	2.0	1543607	492105	---	6666.00	85.00	34.12	6631.88	35-85	25-85
* ET11	2.0	1544137	492299	---	6665.00	80.00	---	---	30-80	20-80
* ET12	2.0	1544006	492001	---	6669.00	90.00	---	---	40-90	-
* ET13	2.0	1544045	492227	---	6667.00	90.00	---	---	40-90	-
* ET14	2.0	1543970	492232	---	6667.00	90.00	---	---	40-90	-
* ET15	2.0	1543810	492070	---	6668.00	90.00	---	---	40-90	-
* ET16	2.0	1543779	491995	---	6668.00	90.00	---	---	40-90	-
* ET17	2.0	1543929	492099	---	6670.00	90.00	---	---	40-90	-
* ET18	2.0	1544194	492045	---	6667.00	90.00	---	---	40-90	-

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
ET19	2.0	1543914	492282	---	6666.00	90.00	90.00	6576.00	40-90	-
* ET20	2.0	1544275	492272	---	6664.00	90.00	67.60	6596.40	40-90	-
NE1	2.0	1544499	492617	1.0	6648.82	67.30	51.43	6597.39	55-75	5-75
* NE2	5.0	1544400	492505	0.9	6660.98	92.00	64.95	6596.03	51-91	0-91
* NE3	3.0	1544274	492347	4.8	6667.44	94.30	56.00	6611.44	50-92	7-92
* NE4	2.0	1544391	492511	1.8	6661.63	27.90	12.25	6649.38	10-30	0-30
* NE6	5.0	1544470	492218	2.7	6664.10	113.50	42.50	6621.60	32-112	22-112
* NE7	5.0	1544500	491873	2.6	6664.13	113.60	40.20	6623.93	31-111	21-111
NE8	5.0	1544523	491574	4.1	6663.01	113.90	55.40	6607.61	32-112	22-112
NE9	5.0	1544553	491274	2.5	6657.89	114.30	54.90	6602.99	32-112	22-112
* NE10	4.5	1544545	491460	2.0	6660.00	120.00	---	---	60-120	-
NE11	4.5	1544560	491350	2.0	6660.00	120.00	59.00	6601.00	60-120	50-120
* NE12	4.5	1544550	491170	2.0	6660.00	120.00	64.10	6595.90	60-120	50-120
NE13	4.5	1544560	491060	2.0	6659.00	120.00	56.50	6602.50	60-120	50-120
NW1	2.0	1544698	489173	1.8	6609.59	33.20	32.82	6576.77	20-30	5-30
NW2	2.0	1544556	489298	2.3	6643.72	94.30	81.35	6562.37	70-90	5-90
NW3	5.0	1544416	489423	1.1	6655.01	93.90	66.30	6588.71	52-92	0-92
NW4	2.0	1544407	489419	2.4	6656.15	33.70	33.70	6622.45	10-30	0-30
PW1	5.0	1543305	489914	3.1	6657.34	91.80	50.50	6606.84	50-90	5-90
* PW2	5.0	1543252	490823	3.4	6658.85	88.20	51.80	6607.05	45-85	5-85
PW3	5.0	1543282	491751	3.0	6659.79	93.80	12.10	6647.69	55-95	5-95
* PW4	5.0	1544605	490821	4.0	6658.98	79.70	52.53	6606.45	40-80	5-80
* SE2	5.0	1543427	492442	3.7	6661.37	94.20	71.85	6589.52	50-90	0-90
* SE3	3.0	1543608	492296	4.3	6668.70	95.10	72.69	6596.01	54-94	5-94
SW1	2.0	1543194	489108	3.5	6599.83	32.30	25.60	6574.23	20-30	5-30
SW2	2.0	1543329	489263	3.9	6637.87	52.30	45.10	6592.77	29-49	5-49
SW3	5.0	1543449	489415	1.2	6656.00	84.50	63.02	6592.98	42-82	0-82
SW4	2.0	1543434	489398	3.0	6655.82	38.80	16.82	6639.00	10-38	0-38
* T3	4.0	1543632	490809	1.2	6665.68	56.20	55.70	6609.98	-	-
WA1	5.0	1544114	490044	3.0	6660.37	112.40	40.90	6619.47	33-113	23-113
WA2	5.0	1543968	489914	4.0	6662.52	115.00	46.80	6615.72	32-112	22-112
WA3	5.0	1544291	489982	1.6	6658.32	114.30	77.60	6580.72	32-112	22-112
WA4	5.0	1544428	489870	2.5	6657.10	115.00	62.20	6594.90	45-115	35-115
WA5	5.0	1543796	489941	4.4	6662.28	115.00	37.00	6625.28	45-115	35-115

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
WA6	5.0	1543987	490056	4.0	6661.45	116.00	101.10	6560.35	36-116	26-116
WA7	5.0	1544040	489940	3.1	6659.26	116.00	64.50	6594.76	36-116	26-116
WA8	5.0	1543897	490053	3.0	6663.89	116.00	86.20	6577.69	36-116	26-116
WA9	5.0	1544154	489928	3.1	6659.41	116.00	63.00	6596.41	36-116	26-116
WA10	5.0	1543876	489992	---	6662.92	118.00	64.10	6598.82	38-118	28-118
WA11	5.0	1544075	489992	2.3	6658.29	117.00	68.50	6589.79	37-117	27-117
WA12	5.0	1543976	489886	2.4	6659.46	110.00	71.70	6587.76	50-110	40-110
WA13	5.0	1544047	489899	1.4	6658.14	120.00	70.10	6588.04	60-120	-
WA14	5.0	1544130	490045	---	6658.34	120.00	---	---	60-120	-
WB1	5.0	1543612	489694	3.0	6658.30	112.00	50.30	6608.00	31-111	21-111
WB2	5.0	1543752	489645	2.3	6657.75	113.00	68.60	6589.15	32-112	22-112
WB3	5.0	1543971	489692	4.3	6657.77	116.20	30.00	6627.77	32-112	22-112
WB4	5.0	1543498	489660	4.5	6659.20	114.60	88.90	6570.30	33-113	23-113
WB5	5.0	1543818	489599	2.1	6657.36	113.00	88.80	6568.56	32-112	22-112
WB6	5.0	1544139	489625	2.6	6657.99	115.70	21.18	6636.81	32-112	22-112
WB7	5.0	1544325	489760	2.6	6657.40	112.00	86.10	6571.30	32-112	22-112
WB8	5.0	1544292	489619	2.3	6654.79	116.00	82.30	6572.49	46-116	36-116
WB9	5.0	1543866	489683	3.0	6659.72	116.00	63.80	6595.92	36-116	26-116
WB10	5.0	1544036	489588	3.0	6657.39	116.00	82.90	6574.49	36-116	26-116
WB11	5.0	1544185	489753	3.4	6659.30	116.00	65.20	6594.10	36-116	26-116
WB12	5.0	1543708	489558	2.6	6657.88	120.00	96.50	6561.38	60-120	50-120
WB13	5.0	1543515	489518	2.0	6657.63	120.00	95.20	6562.43	60-120	50-120
WB14	5.0	1543972	489513	2.0	6656.62	120.00	65.10	6591.52	60-120	50-120
WB15	5.0	1544181	489490	2.0	6656.47	120.00	55.00	6601.47	60-120	50-120
WB16	5.0	1544439	489614	2.0	6655.82	110.00	91.00	6564.82	50-110	45-110
WB17	5.0	1543591	489674	2.0	6658.16	110.00	59.80	6598.36	50-110	45-110
WB18	5.0	1544131	489793	2.6	6658.71	110.00	42.60	6616.11	50-110	45-110
WC1	5.0	1543964	490182	2.7	6664.22	115.00	79.10	6585.12	32-112	20-112
* WC2	5.0	1543491	490104	3.6	6658.62	115.00	64.35	6594.27	31-111	21-111
WC3	5.0	1544262	490201	3.1	6661.07	115.70	82.20	6578.87	33-113	23-113
WC4	5.0	1543843	490088	0.4	6662.86	112.30	19.10	6643.76	32-112	22-112
WC5	5.0	1543647	490198	4.9	6662.70	117.80	81.70	6581.00	46-116	36-116
WC6	5.0	1544103	490187	3.2	6661.78	116.00	90.10	6571.68	36-116	26-116
WC7	5.0	1544038	490126	3.2	6660.53	116.00	98.00	6562.53	36-116	26-116
WC8	5.0	1543881	490227	2.9	6666.68	116.00	88.60	6578.08	36-116	26-116

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
WC9	5.0	1543962	490265	3.2	6664.74	116.00	22.10	6642.64	36-116	26-116
WC10	5.0	1544196	490296	3.2	6662.40	116.00	102.50	6559.90	36-116	26-116
WC11	5.0	1544188	490091	3.2	6661.06	116.00	82.10	6578.96	36-116	26-116
* WC12	5.0	1543568	490249	2.9	6659.93	116.00	76.20	6583.73	36-116	26-116
WC13	5.0	1543758	490107	3.5	6662.20	116.00	22.30	6639.90	36-116	26-116
WC14	5.0	1544428	490059	3.4	6658.57	116.00	104.00	6554.57	36-116	26-116
WC15	5.0	1543951	490256	---	6664.06	76.00	47.40	6616.66	36-76	26-76
* WC16	5.0	1543581	490088	2.7	6658.78	118.00	28.36	6630.42	38-118	28-118
WC17	5.0	1543714	490271	1.6	6658.74	120.00	57.70	6601.04	31-120	21-120
WC18	5.0	1544083	490082	2.3	6659.98	115.00	110.00	6549.98	35-115	25-115
WC19	5.0	1544415	490216	2.8	6658.63	120.00	75.70	6582.93	60-120	50-120
WC20	5.0	1543462	490224	3.3	6658.75	120.00	84.30	6574.45	60-120	50-120
WC21	5.0	1544213	490054	2.6	6659.90	110.00	78.20	6581.70	50-110	40-110
WC22	5.0	1544014	490097	2.0	6659.54	110.00	65.60	6593.94	50-110	45-110
WC23	5.0	1543774	490125	2.0	6661.58	110.00	92.30	6569.28	50-110	45-110
WC24	5.0	1543864	490098	---	6655.00	120.00	85.10	6569.90	50-110	-
WC25	5.0	1543966	490157	---	6656.00	120.00	78.70	6577.30	60-120	-
WD1	5.0	1543920	489857	5.1	6665.31	41.80	36.01	6629.30	20-40	15-40
WD2	5.0	1543825	489854	4.0	6662.50	44.10	27.94	6634.56	20-40	10-40
WD3	5.0	1543937	489873	3.2	6662.83	44.10	31.10	6631.73	20-40	10-40
WD4	5.0	1543810	489796	3.6	6661.67	115.70	87.30	6574.37	32-112	22-112
WD5	5.0	1544130	489821	3.0	6659.81	115.60	44.80	6615.01	33-113	23-113
WD6	5.0	1544244	489847	3.1	6658.38	116.00	17.90	6640.48	36-116	26-116
WD7	5.0	1543901	489799	3.2	6662.30	116.00	82.70	6579.60	36-116	26-116
WD8	5.0	1543702	489789	3.0	6658.71	116.00	38.90	6619.81	36-116	26-116
WD9	5.0	1544025	489793	3.2	6659.69	116.00	34.80	6624.89	36-116	26-116
WD10	5.0	1543587	489835	3.3	6658.82	118.00	60.80	6598.02	38-118	28-118
WE1	5.0	1543800	490315	6.2	6667.50	112.70	36.10	6631.40	30-110	20-110
WE2	5.0	1543659	490364	3.5	6663.02	112.00	64.40	6598.62	32-112	22-112
WE3	5.0	1543389	490326	2.1	6657.21	112.00	80.50	6576.71	31-111	21-111
WE4	5.0	1543795	490267	3.0	6663.70	113.00	30.10	6633.60	33-113	23-113
WE5	5.0	1544409	490352	2.5	6658.98	116.00	69.50	6589.48	46-116	36-116
WE6	5.0	1544138	490392	1.9	6663.26	116.00	53.20	6610.06	46-116	36-116
WE7	5.0	1543886	490387	2.1	6667.20	116.00	27.00	6640.20	46-116	36-116

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
WE8	5.0	1543994	490381	3.3	6666.20	116.00	89.70	6576.50	36-116	26-116
WE9	5.0	1544282	490412	3.0	6661.96	116.00	60.05	6601.91	36-116	26-116
WE10	5.0	1543788	490361	3.0	6664.94	116.00	40.59	6624.35	36-116	26-116
WE11	5.0	1543846	490437	3.4	6667.69	116.00	28.00	6639.69	36-116	26-116
WE12	5.0	1543985	490469	3.5	6667.22	116.00	54.06	6613.16	36-116	26-116
WE13	5.0	1544098	490477	3.3	6666.17	116.00	32.16	6634.01	36-116	26-116
WE14	5.0	1543934	490457	2.0	6668.14	118.00	62.10	6606.04	38-118	28-118
WE15	5.0	1543934	490329	2.1	6665.93	118.00	83.50	6582.43	38-118	28-118
WE16	5.0	1544036	490302	---	6663.25	120.00	52.50	6610.75	60-120	50-120
WE17	5.0	1544517	490316	3.3	6658.59	120.00	58.20	6600.39	60-120	50-120
WE18	5.0	1543841	490361	---	6665.39	120.00	37.70	6627.69	60-120	-
* WF1	5.0	1543484	490385	0.5	6659.91	110.00	41.20	6618.71	31-111	21-111
WF2	5.0	1544261	490502	3.7	6660.82	111.80	64.20	6596.62	28-108	18-108
* WF3	5.0	1544085	490574	2.3	6666.04	114.50	33.80	6632.24	32-112	22-112
WF4	5.0	1543966	490544	2.4	6668.17	116.00	36.50	6631.67	46-116	36-116
WF5	5.0	1543789	490487	1.8	6665.36	116.00	83.20	6582.16	46-116	36-116
* WF6	5.0	1543557	490495	2.2	6662.08	118.50	35.30	6626.78	46-116	36-116
WF7	5.0	1543688	490656	2.9	6665.78	116.00	66.00	6599.78	36-116	26-116
WF8	5.0	1543868	490605	3.2	6668.59	116.00	46.70	6621.89	36-116	26-116
* WF9	5.0	1544221	490610	3.2	6665.70	116.00	68.50	6597.20	36-116	26-116
* WF10	5.0	1544362	490663	3.1	6663.39	116.00	39.50	6623.89	36-116	26-116
WF11	5.0	1544171	490488	2.9	6664.84	116.00	57.70	6607.14	36-116	26-116
* WF12	5.0	1544425	490512	3.3	6655.65	116.00	39.50	6616.15	36-116	26-116
WF13	5.0	1543981	490676	1.9	6667.05	118.00	72.10	6594.95	38-118	28-118
WF14	5.0	1543609	490680	1.9	6664.63	118.00	40.90	6623.73	38-118	28-118
WF15	5.0	1543695	490537	2.0	6663.69	118.00	33.90	6629.79	38-118	28-118
WF16	5.0	1543426	490517	---	6660.58	120.00	40.80	6619.78	60-120	50-120
WF17	5.0	1543450	490605	2.0	6660.88	120.00	94.80	6566.08	60-120	55-120
WF18	5.0	1543292	490539	---	6657.48	110.00	50.10	6607.38	50-110	45-110
* WF19	5.0	1544058	490727	---	6666.33	120.00	---	---	60-120	-
* WI1	2.0	1544272	489712	---	6656.00	90.00	---	---	30-90	20-90
* WI2	2.0	1544081	489705	---	6657.00	90.00	---	---	30-90	20-90
WI3	2.0	1543961	489822	---	6661.00	90.00	---	---	30-90	20-90
* WI4	2.0	1543857	489745	---	6658.00	90.00	42.25	6615.75	30-90	20-90
* WI5	2.0	1543814	489708	---	6657.00	90.00	68.80	6588.20	30-90	20-90



**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* WI6	2.0	1543749	489733	---	6657.00	90.00	18.48	6638.52	30-90	20-90
* WI7	2.0	1543678	489713	---	6657.00	90.00	58.91	6598.09	30-90	20-90
* WI8	2.0	1543633	489766	---	6657.00	90.00	53.84	6603.16	30-90	20-90
* WI9	2.0	1543574	489724	---	6656.00	90.00	52.30	6603.70	30-90	20-90
* WI10	2.0	1543400	489790	---	6655.00	90.00	---	---	30-90	20-90
* WI11	2.0	1543754	489440	---	6654.00	85.00	---	---	25-85	15-85
* WI12	2.0	1544117	489436	---	6654.00	85.00	---	---	25-85	15-85
* WI13	2.0	1544445	489778	---	6655.00	90.00	3.70	6651.30	30-90	20-90
* WJ1	2.0	1544332	489885	---	6657.00	90.00	---	---	30-90	20-90
* WJ2	2.0	1544208	489982	---	6658.00	90.00	---	---	30-90	20-90
WJ3	2.0	1544104	489957	---	6658.00	90.00	---	---	30-90	20-90
WJ4	2.0	1544051	490017	---	6660.00	90.00	---	---	30-90	20-90
WJ5	2.0	1543868	489917	---	6659.00	90.00	49.99	6609.01	30-90	20-90
WJ6	2.0	1543797	490030	---	6659.00	90.00	40.48	6618.52	30-90	20-90
WJ7	2.0	1543963	489991	---	6662.00	90.00	---	---	30-90	20-90
* WJ8	2.0	1544260	489915	---	6657.00	90.00	---	---	30-90	20-90
* WJ9	2.0	1543600	489940	---	6657.00	90.00	34.62	6622.38	30-90	20-90
* WK1	2.0	1544306	490111	---	6658.00	90.00	---	---	30-90	20-90
* WK2	2.0	1544181	490196	---	6660.00	90.00	---	---	30-90	20-90
* WK3	2.0	1544125	490115	---	6659.00	90.00	---	---	30-90	20-90
WK4	2.0	1544032	490189	---	6661.00	90.00	---	---	30-90	20-90
WK5	2.0	1543878	490139	---	6662.00	90.00	---	---	30-90	20-90
WK6	2.0	1543817	490160	---	6661.00	90.00	---	---	30-90	20-90
WK7	2.0	1543729	490186	---	6660.00	90.00	39.88	6620.12	30-90	20-90
* WK8	2.0	1543667	490117	---	6653.00	90.00	50.26	6602.74	30-90	20-90
* WK9	2.0	1543589	490167	---	6658.00	90.00	41.03	6616.97	30-90	20-90
WK10	2.0	1544529	490205	---	6657.00	85.00	49.63	6607.37	25-85	15-85
* WL1	2.0	1544314	490323	---	6659.00	90.00	---	---	30-90	20-90
* WL2	2.0	1544222	490438	---	6662.00	90.00	---	---	30-90	20-90
* WL3	2.0	1544112	490272	---	6661.00	90.00	---	---	30-60	20-90
WL4	2.0	1544066	490424	---	6664.00	90.00	---	---	30-90	20-90
* WL5	2.0	1543750	490324	---	6661.00	90.00	47.50	6613.50	30-90	20-90
* WL6	2.0	1543741	490457	---	6667.00	90.00	---	---	30-90	20-90
* WL7	2.0	1543658	490287	---	6659.00	90.00	---	---	30-90	20-90

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* WL8	2.0	1543579	490366	---	6659.00	90.00	---	---	30-90	20-90
* WL9	2.0	1543367	490224	---	6655.00	90.00	45.50	6609.50	30-90	20-90
* WL10	2.0	1544240	490355	---	6661.00	90.00	---	---	30-90	20-90
WM1	2.0	1544347	490464	---	6660.00	90.00	---	---	30-90	20-90
* WM2	2.0	1544302	490572	---	6661.00	90.00	---	---	30-90	20-90
* WM3	2.0	1544189	490534	---	6661.43	90.00	33.80	6627.63	30-90	20-90
WM4	2.0	1544132	490518	---	6664.00	90.00	31.80	6632.20	30-90	20-90
WM4A	2.0	1544139	490518	---	---	90.00	---	---	40-90	-
WM4B	2.0	1544127	490523	---	---	90.00	---	---	40-90	-
WM4C	2.0	1544135	490526	---	---	90.00	---	---	40-90	-
WM4D	2.0	1544139	490536	---	---	90.00	---	---	40-90	-
* WM5	2.0	1543765	490563	---	6664.00	90.00	---	---	30-90	20-90
* WM6	2.0	1543639	490476	---	6661.00	90.00	---	---	30-90	20-90
* WM7	2.0	1543610	490601	---	6663.00	90.00	---	---	30-90	20-90
* WM8	2.0	1543447	490438	---	6658.00	85.00	---	---	25-85	15-85
WME-1	4.0	1543621	489392	1.7	6659.23	57.30	57.30	6601.93	51-56	47-56
WME-2	4.0	1544575	490685	2.1	6661.05	64.60	61.60	6599.45	58-63	54-63
WME-6	4.0	1544134	491794	1.9	6671.50	67.25	67.25	6604.25	61-66	57-66
WME-4	4.0	1543960	490041	2.0	6662.31	67.60	58.40	6603.91	61-66	57-66
WME-3	4.0	1543980	492772	2.1	6664.31	67.15	64.40	6599.91	66-71	63-71
WME-5	4.0	1544032	491065	2.0	6672.35	77.32	77.32	6595.03	70-75	67-75
WN1	2.0	1544914	489942	1.4	6606.68	38.50	21.10	6585.58	10-35	5-35
WN2	2.0	1544714	489942	1.5	6644.32	63.30	55.80	6588.52	55-75	5-75
* WN3	5.0	1544597	489941	2.3	6654.48	86.70	5.60	6648.88	45-85	0-85
WN4	5.0	1543958	489961	3.0	6662.78	142.40	53.00	6609.78	40-100	33-97
WN5A	2.0	1543966	489968	2.8	6663.53	58.10	24.68	6638.85	32-52	27-52
WN5B	2.0	1543965	489969	2.7	6663.36	100.80	44.27	6619.09	70-100	68-100
WN6	5.0	1544610	490673	4.5	6656.60	114.60	48.20	6608.40	32-112	22-112
WN7	5.0	1544597	489764	4.0	6658.03	114.50	50.40	6607.63	32-112	22-112
* WO1	2.0	1544397	489666	---	6655.00	90.00	---	---	30-90	20-90
* WO2	2.0	1544216	489655	---	6656.00	90.00	---	---	30-90	20-90
* WO3	2.0	1544098	489560	---	6656.00	90.00	---	---	30-90	20-90
* WO4	2.0	1543925	489594	---	6656.00	90.00	---	---	30-90	20-90
WO5	2.0	1543953	489754	2.0	6660.00	90.00	36.70	6623.30	30-90	20-90
* WO6	2.0	1543507	489754	---	6656.00	90.00	43.06	6612.94	30-90	25-90
* WO7	2.0	1543469	489574	---	6655.00	90.00	51.44	6603.56	30-90	25-90

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
WO8	2.0	1543571	489601	---	6656.00	90.00	52.10	6603.90	30-90	25-90
* WO9	2.0	1544223	489549	---	6655.00	90.00	---	---	30-90	25-90
WO10	2.0	1543623	489712	---	6657.00	80.00	62.25	6594.75	50-80	40-80
* WO11	2.0	1544246	489769	---	6656.00	90.00	---	---	30-90	20-90
* WO12	2.0	1544378	489816	---	6656.00	90.00	---	---	30-90	20-90
* WO13	2.0	1543908	489733	---	6658.00	90.00	---	---	40-90	30-90
* WO14	2.0	1543742	489571	---	6655.00	90.00	---	---	40-90	30-90
WO15	2.0	1543530	489419	2.0	6654.00	90.00	90.00	6564.00	40-90	30-90
* WO16	2.0	1543640	489503	2.0	6653.00	90.00	44.85	6608.15	40-90	30-90
* WO17	2.0	1544360	489539	2.0	6653.00	90.00	49.50	6603.50	40-90	30-90
* WO18	2.0	1544575	489634	2.0	6651.00	90.00	45.80	6605.20	40-90	30-90
* WO19	2.0	1543840	489485	2.0	6653.00	90.00	52.80	6600.20	40-90	30-90
* WO20	2.0	1544028	489435	---	6653.00	90.00	58.90	6594.10	40-90	30-90
WO21	2.0	1543429	489688	2.0	6653.00	90.00	61.80	6591.20	40-90	30-90
* WO22	2.0	1544094	489765	---	6657.00	90.00	---	---	40-90	35-90
* WO23	2.0	1543828	489733	---	6657.00	90.00	---	---	40-90	35-90
* WO24	2.0	1543764	489782	---	6657.00	90.00	37.60	6619.40	40-90	-
* WO25	2.0	1544132	489688	---	6656.00	90.00	40.21	6615.79	-	-
* WO26	2.0	1544180	489803	---	6657.00	90.00	45.18	6611.82	-	-
* WO27	2.0	1543854	489811	---	6658.00	90.00	35.73	6622.27	-	-
* WO28	2.0	1543656	489618	---	6655.00	90.00	48.82	6606.18	40-90	-
WO29	2.0	1543890	489554	---	6656.00	90.00	---	---	-	-
WO30	2.0	1544021	489735	---	6659.00	90.00	34.02	6624.98	40-90	-
* WO31	2.0	1544297	489510	---	6666.00	90.00	53.75	6612.25	40-90	-
WO32	2.0	1544312	489688	---	6655.00	90.00	65.10	6589.90	40-90	-
* WO33	2.0	1543969	489590	---	6656.00	90.00	---	---	40-90	-
* WO34	2.0	1543811	489672	---	6657.00	90.00	---	---	40-90	-
* WO35	2.0	1543545	489663	---	6655.00	90.00	---	---	40-90	-
* WO36	2.0	1543705	489635	---	6656.00	90.00	---	---	-	-
* WO37	2.0	1543873	489626	---	6657.00	90.00	---	---	-	-
* WO38	2.0	1544083	489810	---	6657.00	90.00	---	---	-	-
* WO39	2.0	1544038	489521	---	6655.00	90.00	---	---	-	-
* WO40	2.0	1544138	489562	---	6655.00	90.00	---	---	-	-
* WO41	2.0	1544300	489821	---	6656.00	90.00	---	---	-	-

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
WO42	2.0	1543971	489792	---	6660.00	90.00	---	---	40-90	-
* WP1	2.0	1544383	489991	---	6657.00	90.00	---	---	30-90	20-90
* WP2	2.0	1544179	489852	---	6657.00	90.00	---	---	30-90	20-90
* WP3	2.0	1544123	490077	---	6659.00	90.00	---	---	30-90	20-90
* WP4	2.0	1544067	489849	---	6659.00	90.00	---	---	30-90	20-90
* WP5	2.0	1543768	489825	---	6658.00	90.00	58.86	6599.14	30-90	20-90
* WP6	2.0	1543673	489841	---	6657.00	90.00	52.53	6604.47	30-90	20-90
* WP7	2.0	1544494	489981	2.0	6656.00	90.00	51.00	6605.00	30-90	20-90
* WP8	2.0	1544514	489859	---	6655.00	90.00	55.73	6599.27	30-90	20-90
* WP9	2.0	1543636	490032	---	6666.00	90.00	---	---	40-90	30-90
WP10	2.0	1543744	490033	2.0	6658.00	90.00	66.30	6591.70	40-90	30-90
WP11	2.0	1543913	489945	---	6661.00	90.00	---	---	40-90	30-90
WP12	2.0	1544018	489868	---	6660.00	90.00	---	---	40-90	30-90
* WP13	2.0	1544149	490012	---	6658.00	90.00	44.24	6613.76	40-90	30-90
WP14	2.0	1544038	490084	---	6660.00	90.00	38.20	6621.80	40-90	30-90
* WP15	2.0	1544598	489852	---	6655.00	90.00	60.02	6594.98	40-90	30-90
WP16	2.0	1544009	489996	---	6660.00	90.00	65.55	6594.45	40-90	35-90
WP17	2.0	1543855	490043	2.0	6659.00	90.00	31.09	6627.91	40-90	35-90
* WP18	2.0	1543725	489866	---	6657.00	90.00	38.70	6618.30	40-90	35-90
* WP19	2.0	1544092	489881	2.0	6657.00	90.00	40.30	6616.70	40-90	30-90
WP20	2.0	1543473	489853	2.0	6658.00	90.00	25.10	6632.90	40-90	30-90
WP21	2.0	1543952	489853	2.0	6661.00	90.00	23.80	6637.20	40-90	30-90
* WP22	2.0	1544136	489865	---	6657.00	90.00	50.60	6606.40	40-90	-
* WP23	2.0	1544209	489899	---	6657.00	90.00	45.77	6611.23	40-90	-
* WP24	2.0	1544252	490027	---	6658.00	90.00	42.36	6615.64	40-90	-
WP25	2.0	1544003	489933	---	6660.00	90.00	46.17	6613.83	40-90	-
* WP26	2.0	1543815	489873	---	6657.00	90.00	33.79	6623.21	40-90	-
WP28	2.0	1543823	489977	---	6658.00	90.00	35.20	6622.80	40-90	-
WP29	2.0	1544088	489925	---	6658.00	90.00	61.05	6596.95	40-90	-
WP30	2.0	1544019	490029	---	6660.00	90.00	34.30	6625.70	40-90	-
* WP31	2.0	1544343	490049	---	6657.00	90.00	18.15	6638.85	40-90	-
* WP32	2.0	1544084	490037	---	6659.00	90.00	---	---	-	-
* WP33	2.0	1543739	489983	---	6657.00	90.00	---	---	40-90	-
* WP34	2.0	1543943	490055	---	6663.00	90.00	---	---	40-90	-
WP35	2.0	1543943	489842	---	6660.00	90.00	---	---	40-90	-

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
WP36	2.0	1543919	489993	---	6661.00	90.00	---	---	40-90	-
* WP37	2.0	1543654	489887	---	6656.00	90.00	---	---	-	-
WP38	2.0	1543789	489868	---	6657.00	90.00	---	---	40-90	-
WP39	2.0	1543891	489901	---	6659.00	90.00	---	---	40-90	-
WP40	2.0	1543974	490009	---	6661.00	90.00	---	---	40-90	-
* WP41	2.0	1544124	489982	---	6658.00	90.00	---	---	-	-
* WQ1	2.0	1544353	490205	---	6658.00	90.00	---	---	30-90	20-90
* WQ2	2.0	1543950	490105	---	6663.00	90.00	---	---	30-90	20-90
* WQ3	2.0	1543429	490130	---	6655.00	90.00	46.00	6609.00	30-90	20-90
* WQ4	2.0	1544254	490104	---	6658.00	90.00	---	---	40-90	30-90
WQ5	2.0	1543992	490126	---	6662.00	90.00	---	---	40-90	30-90
* WQ7	2.0	1544011	490231	2.0	6661.00	90.00	32.35	6628.65	40-90	30-90
* WQ8	2.0	1543900	490141	---	6662.00	90.00	---	---	40-90	30-90
* WQ9	2.0	1544214	490150	---	6659.00	90.00	---	---	40-90	35-90
WQ10	2.0	1544069	490160	---	6660.00	90.00	32.95	6627.05	40-90	-
* WQ11	2.0	1544156	490141	---	6659.00	90.00	34.98	6624.02	40-90	-
* WQ12	2.0	1544011	490166	---	6661.00	90.00	51.30	6609.70	40-90	-
WQ13	2.0	1544071	490254	---	6661.00	90.00	31.54	6629.46	40-90	-
WQ14	2.0	1543812	490104	---	6660.00	90.00	30.25	6629.75	40-90	-
WQ15	2.0	1543779	490216	---	6661.00	90.00	---	---	40-90	-
* WQ16	2.0	1543685	490234	---	6659.00	90.00	---	---	40-90	-
* WQ17	2.0	1544151	490240	---	6660.00	90.00	32.45	6627.55	40-90	-
* WQ18	2.0	1543924	490182	---	6664.00	90.00	---	---	50-100	-
* WQ19	2.0	1544088	490136	---	6659.00	90.00	---	---	40-90	-
* WQ20	2.0	1543978	490213	---	6663.00	90.00	---	---	-	-
WS1	2.0	1543049	489909	0.7	6607.11	36.90	10.78	6596.33	27-37	5-37
WS2	2.0	1543255	489911	2.2	6649.44	77.30	59.60	6589.84	55-75	5-75
WS3	2.0	1543325	489915	2.4	6656.62	79.70	43.10	6613.52	60-80	5-80
WS4	5.0	1543494	489944	4.0	6659.57	89.40	59.13	6600.44	53-93	0-93
WS5	5.0	1543681	489940	3.7	6660.58	90.90	35.60	6624.98	52-92	0-92
WS6	5.0	1543385	489626	2.4	6657.23	113.30	45.70	6611.53	31-111	21-111
WS7	5.0	1543336	490118	4.4	6659.12	114.50	74.20	6584.92	32-112	22-112
* WT1	2.0	1543502	490289	---	6667.00	90.00	47.25	6619.75	30-90	20-90
* WT2	2.0	1543923	490229	---	6665.00	90.00	---	---	30-90	20-90

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
* WT3	2.0	1544506	490404	---	6657.00	90.00	60.21	6596.79	30-90	20-90
* WT4	2.0	1544457	490288	---	6657.00	90.00	---	---	30-90	20-90
WT5	2.0	1544069	490364	---	6663.00	90.00	---	---	30-90	20-90
WT6	2.0	1544412	490441	2.0	6657.00	90.00	90.00	6567.00	40-90	30-90
* WT7	2.0	1543874	490294	---	6664.00	90.00	31.66	6632.34	40-90	30-90
* WT8	2.0	1543949	490377	---	6667.00	90.00	62.03	6604.97	40-90	30-90
* WT9	2.0	1543614	490250	2.0	6659.00	90.00	33.00	6626.00	40-90	30-90
* WT10	2.0	1543991	490300	2.0	6663.00	90.00	29.29	6633.71	40-90	35-90
* WT11	2.0	---	---	---	6663.00	100.00	37.80	6625.20	40-90	-
* WT12	2.0	1544111	490323	---	6661.00	90.00	28.70	6632.30	40-90	35-90
WT13	2.0	1544129	490453	---	6663.00	90.00	---	---	40-90	35-90
* WT14	2.0	1544203	490406	---	6662.00	90.00	---	---	40-90	35-90
WT15	2.0	1544243	490255	---	6660.00	90.00	121.40	6538.60	40-90	-
* WT16	2.0	1544176	490342	---	6661.00	90.00	34.20	6626.80	40-90	-
* WT17	2.0	1543910	490270	---	6665.00	90.00	29.70	6635.30	50-100	-
WT18	2.0	1543696	490330	---	6660.00	90.00	50.20	6609.80	40-90	-
WT19	2.0	1543833	490258	---	6662.00	90.00	---	---	40-90	-
* WU1	2.0	1543493	490548	---	6666.00	90.00	49.97	6616.03	30-90	20-90
* WU2	2.0	1543944	490671	---	6667.00	90.00	37.00	6630.00	30-90	20-90
* WU3	2.0	1544457	490642	---	6659.00	90.00	---	---	30-90	20-90
* WU4	2.0	1544110	490668	2.0	6664.00	90.00	36.00	6628.00	40-90	35-90
* WU5	2.0	1543503	490473	---	6660.00	90.00	---	---	40-90	30-90
WU6	2.0	1544365	490563	2.0	6661.00	90.00	37.60	6623.40	40-90	30-90
WU7	2.0	1544057	490483	0.9	6663.08	90.00	41.00	6622.08	30-90	20-90
* WU9	2.0	1543871	490696	2.0	6666.00	90.00	41.00	6625.00	40-90	30-90
WU10	2.0	1544132	490507	1.3	6663.00	90.00	35.10	6627.90	40-90	-
WU11	2.0	1544132	490512	1.4	6663.00	90.00	35.20	6627.80	40-90	-
WU12	2.0	1544035	490520	1.6	6663.00	90.00	34.15	6628.85	40-90	-
* WU13	2.0	1543744	490514	---	6663.00	90.00	---	---	40-90	-
* WU14	2.0	1543693	490455	---	6661.00	90.00	---	---	40-90	-
* WU15	2.0	1544053	490643	2.0	6666.00	90.00	---	---	50-90	40-90
WW1	2.0	1543894	489023	2.7	6603.09	33.00	25.68	6577.41	20-30	5-30
WW2	2.0	1543894	489222	2.9	6643.64	64.90	64.90	6578.74	45-65	5-65
WW3	3.0	1543893	489423	5.4	6659.54	80.50	51.70	6607.84	48-88	5-88
WW4	5.0	1544269	489422	3.0	6657.00	112.00	40.80	6616.20	32-112	22-112

**Table 3.1-1. WELL DATA FOR TAILINGS WELLS ON THE LARGE TAILINGS PILE. (cont'd.)**

WELL NAME	CASING DIAMETER (in)	NORTH. COORD.	EAST. COORD.	STICKUP (ft)	MP ELEV. (ft-msl)	TOTAL DEPTH (ft-mp)	DEPTH TO WATER (ft-mp)	WATER LEVEL ELEVATION (ft-msl)	CASING PERFORATIONS (ft-lsd)	SAND PACK (ft-lsd)
WW5	5.0	1543605	489420	5.0	6659.24	113.00	71.20	6588.04	33-113	23-113
WW6	4.5	1544350	489380	2.0	6656.00	120.00	75.10	6580.90	60-120	50-120
WW7	4.5	1544190	489380	2.0	6656.00	120.00	80.60	6575.40	60-120	50-120
WW8	4.5	1543680	489350	2.0	6656.00	120.00	90.00	6566.00	60-120	50-120
WW9	4.5	1543525	489375	2.0	6656.00	120.00	90.00	6566.00	60-120	50-120
WW10	4.5	1543400	489460	2.0	6656.00	120.00	80.00	6576.00	60-120	50-120

### 3.2 TAILINGS WATER LEVELS

The volume of water collected from the tailings dewatering wells (light blue bars) and the toe drains (green bars) are presented on [Figure 3.1-4](#). Active dewatering of the LTP was discontinued after 2017. The tailings flushing injection was discontinued in mid-2015 and the tailings dewatering rates in 2016 and 2017 were approximately 5 gpm and 1.3 gpm, respectively. Because there is no recent dewatering and the tailings flushing injection was discontinued more than five years prior to this reporting, the changes in tailings water levels in 2020 are almost entirely a result of natural slime and sand tailings exchange and natural drainage from the tailings. The final cover has not been constructed on the top of the LTP and the natural recharge is greater than will occur when reclamation is complete. However, the top of the LTP has been graded and shaped to prevent significant ponding and the typical recharge is estimated at two gpm.

An overall decline in tailings water levels was observed during 2020 with the largest declines occurring along the central sand dike, in the perimeter sand dike and in the southwest quadrant of the LTP (see [Table A.1-1](#) in Appendix A and [Figure 3.2-1](#)). This water level decline resulted in a slight reduction in the saturated footprint of the LTP area with a more pronounced reduction in the saturated footprint on the south side of the LTP. In contrast, there was an increase in the size of two water level mounds located in the slime areas in the east and west halves of the LTP. The increase in the size of the east and west mounds is attributed to some variability in water level measurements in specific wells (e.g. wells WME-5 and WME-6), and the measurement of water levels during 2020 in additional wells located specifically in water level mound areas to confirm the presence and extent of the mounds. It is unlikely that there are significant water level rises in the tailings, and the variability in water levels in some wells may indicate incomplete recovery between frequent sample cycles or errors or other anomalies in the measurements.

An analysis of the water volume change in the saturated tailings in the LTP indicates a reduction of approximately 7,356,000 gallons over 2020 which equates to a reduction rate of approximately 14 gpm. The composite discharge from the toe drains during 2020 was approximately 5 gpm. Subtracting the toe drain discharge from the water volume change leaves approximately 9 gpm of the water volume change that was discharged from the tailings as



seepage. However, there is a small rate of infiltration to the LTP that is not accounted for in the water volume change calculation, and this rate should be added to the 9 gpm water volume change to produce the effective estimated seepage rate. The present infiltration rate with interim cover on the top of the LTP has been estimated to range up to a very conservative 4 gpm with a rate of approximately 2 gpm considered more appropriate. Adding an estimated 2 gpm of infiltration to the 9 gpm seepage discharge from water storage produces an effective seepage rate of 11 gpm. However, water flow and balance calculations and estimates in Section 2 of this report do not include the estimate of infiltration through the interim cover of the LTP.

The volume of water collected from the tailings dewatering wells (light blue bars) and the toe drains (green bars) are presented on [Figure 3.1-4](#) to show the changes in collection rate with time. This figure also shows the pounds of uranium removed with the tailings dewatering wells (red bars) and the toe drains (gold bars) for each year. Prior to mid-2015, dewatering rates ranged up to 105 gpm. With the discontinuation of flushing injection and the subsequent lowering of the potentiometric surface, potential yields from dewatering wells decreased dramatically and no further dewatering well operation is anticipated.

### **3.2.1 TAILINGS WATER LEVEL CHANGES**

Numerous wells were monitored for water level change during 2020 and the water-level elevations for years 2009 through 2020 are presented [Figures 3.2-2 through 3.2-7](#) with a general grouping by area.

Wells CN1, CN2, CS1 and CS2 are located on the north (CN1 and CN2) and south (CS1 and CS2) outcrops of the LTP roughly at the east to west midpoint of the LTP, and the measured water levels since 2009 are presented in [Figure 3.2-2](#). A strong declining trend in water-level elevation has been occurring in all four sand tailings wells since mid-2015 although there have been some erratic measurements in wells CN2 and CS1. The abrupt water level changes in well CN2 since late 2017 may reflect the well completion to below the base of the tailings that creates contact with the underlying perched sand. Well WME-2 is located approximately 160 feet south and east of well CN2 and the higher water-level elevations presented in [Figure 3.2-2](#) indicate the horizontal drainage from the interior tailings is likely supplying tailings water to support the water levels in the perimeter wells. The water level in

well CN2 was not honored in the contouring in [Figure 3.2-1](#).

Wells EE2, NE1, NE2, SE2 and WME-3 are located on the eastern side of the LTP and the measured water levels since 2009 are presented in [Figure 3.2-3](#). A declining trend in water-level elevation has been occurring in all five wells since mid-2015 or since ceasing injection into the tailings (well WME-3 was installed in 2018). Higher water-level elevations exist in the slime area to the west of these wells and the horizontal drainage from the slimes is supplying tailings water to support the water levels in the perimeter wells.

Sand tailings wells EN1, EN2, ES1 and ES2 are located on the north (EN1 and EN2) and south (ES1 and ES2) outcrops of the LTP roughly at the east to west midpoint of the eastern cell of the LTP, and well WME-6 is in the slime tailings south of well EN2. The measured water levels for the wells are presented in [Figure 3.2-4](#). A strong declining trend in water-level elevation since 2015 has been occurring in well EN2 with a milder trend in well EN1. Water level changes in the two southern wells since 2015 have been somewhat erratic with no significant trends. The water-level elevation in the slime tailings well WME-6 is higher than that in the sand tailings wells and is relatively steady.

Sand tailings wells WN1, WN2, WS1 and WS2 are located on the north (WN1 and WN2) and south (WS1 and WS2) outcrops of the LTP roughly at the east to west midpoint of the western cell of the LTP and well WME-4 is in the slime tailings between wells WN2 and WS2. The measured water levels in the wells since 2009 are presented in [Figure 3.2-5](#). A strong declining trend in water-level elevation since 2015 has been occurring in wells WN2 and WS2 with a slightly milder declining trend in well WN1. The water-level elevation in well WS1 has been erratic with a relatively modest decline since 2015, and the gradient reversal between wells WS1 and WS2 is not consistent with the general radially outward tailings water flow direction from the slime areas in the tailings indicated by the higher water level in well WME-4. The measured water-level elevation in well WS1 may be affected by proximity to the toe drains or west reclaim system in the LTP, and is not representative of the tailings and is not honored in the contouring in [Figure 3.2-1](#).

Wells SW1, SW2, WW1, WW3 and WME-1 are located on the western and southwestern side of the LTP and the measured water levels since 2009 are presented in [Figure 3.2-6](#). A relatively mild declining water-level elevation trend is occurring in all five wells since

mid-2015. A mound in the potentiometric surface occurs in the western side of the slime tailings in the western half of the LTP, and past and recent water level measurements were used in the contouring of the residual mound shown in [Figure 3.2-1](#). The horizontal outward movement of tailings water from the slime tailings to the sand tailings on the LTP out slopes reduces the rate of water level decline in the area represented by wells SW1, SW2, and WW1. With the very small permeability of the slime tailings, there are also likely confining layers in the slimes that restrict vertical tailings water movement and cause partial or local perching of tailings water within the slime tailings.

Slime tailings wells WE9, WF2, WF9 and WF11 are located in the northeastern portion of the western slime cell of the LTP and the measured water levels since 2009 are presented in [Figure 3.2-7](#). Only a few measurements were taken between 2011 and 2018, but there is a declining water level trend in all wells since 2011 and during 2018 and 2019, and a measurement in well WF9 indicates the trend continued through 2020. The water-level elevations in the wells have declined by approximately 24 to 33 feet since the flushing program was discontinued.

Slime tailings wells WO10, WO21, WO10 and WT18 are located in the southwestern quadrant of the LTP and the measured water levels since 2009 are presented in [Figure 3.2-8](#). With the exception of an anomalous measurement in well WT18 in 2020, there has been a decline in water-level elevation in all four wells since flushing ended in 2015. The anomalous water-level elevation in well WT18 was not honored in the contouring in [Figure 3.2-1](#). The rate of drainage from the slime tailings in the area represented by these wells has been greater and more consistent than other areas of LTP where slime tailings are present.

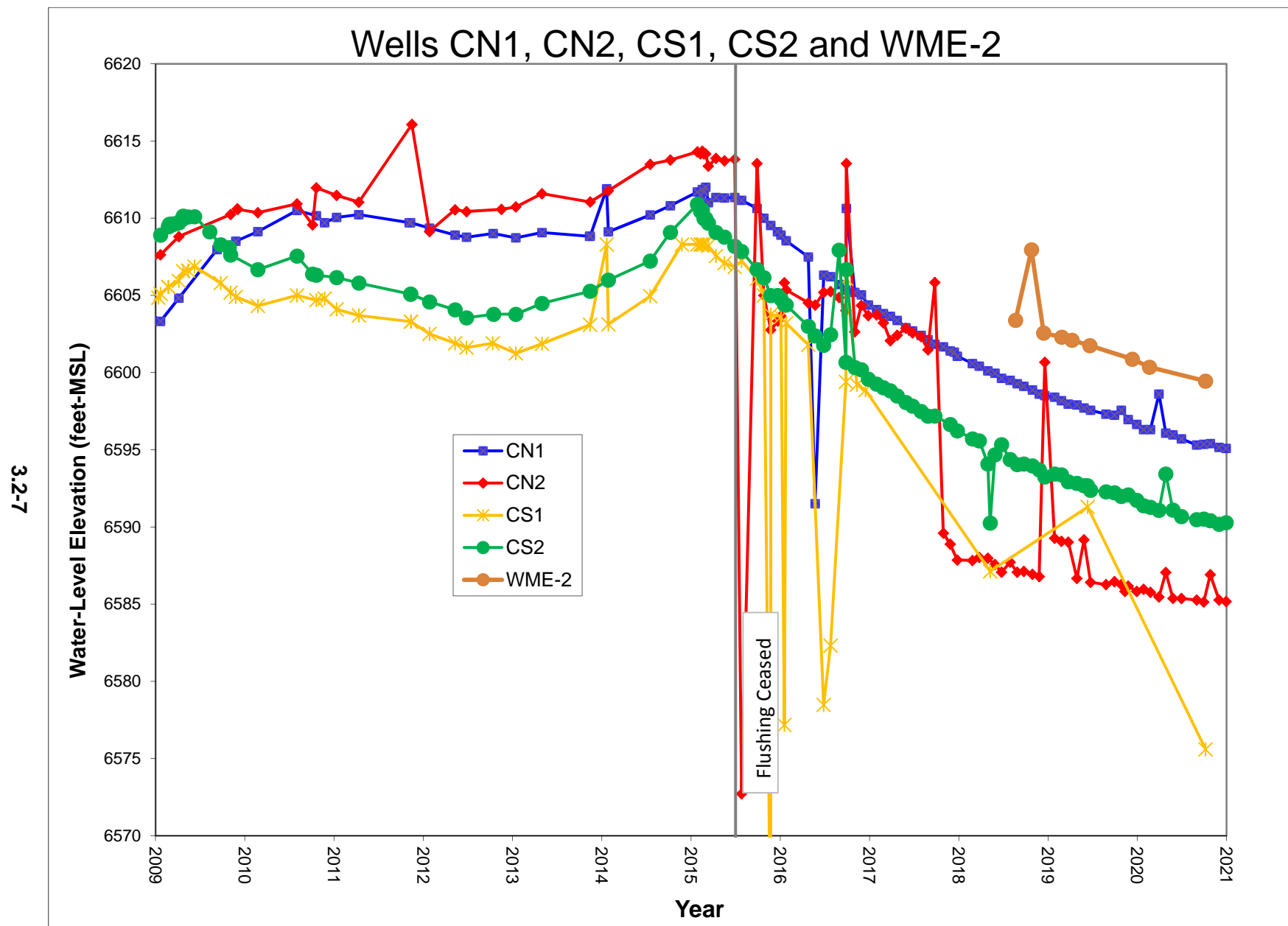
[Figure 3.2-9](#) presents water-level elevations in wells CS7, WF13, WC15 and WO32. Well CS7 is located within the central sand dike of the LTP and well WF13 is located in approximately 150 feet west of the central sand dike (see [Figure 3.2-1](#)). Well WC15 is located approximately 550 feet west of the central sand dike of the LTP. The difference in water-level elevation and the rate of decline in water-level elevation illustrates the typical drainage conditions of the LTP. The highest water-level elevation and slowest rate of decline occurs in slime well WC15. Although well WF13 is in the slime tailings, it is close enough to the central sand dike for significant drainage to have occurred. The central sand dike appears to be an

effective lateral drainage feature through the center of the LTP because the most recent water-level elevation in well WF13 is only slightly higher than that in well CS7, which is closer to the perimeter sand dike. Well WO32 is located in the northwest corner of the tailings, but is close enough to the perimeter sand dike to have exhibited significant drainage.

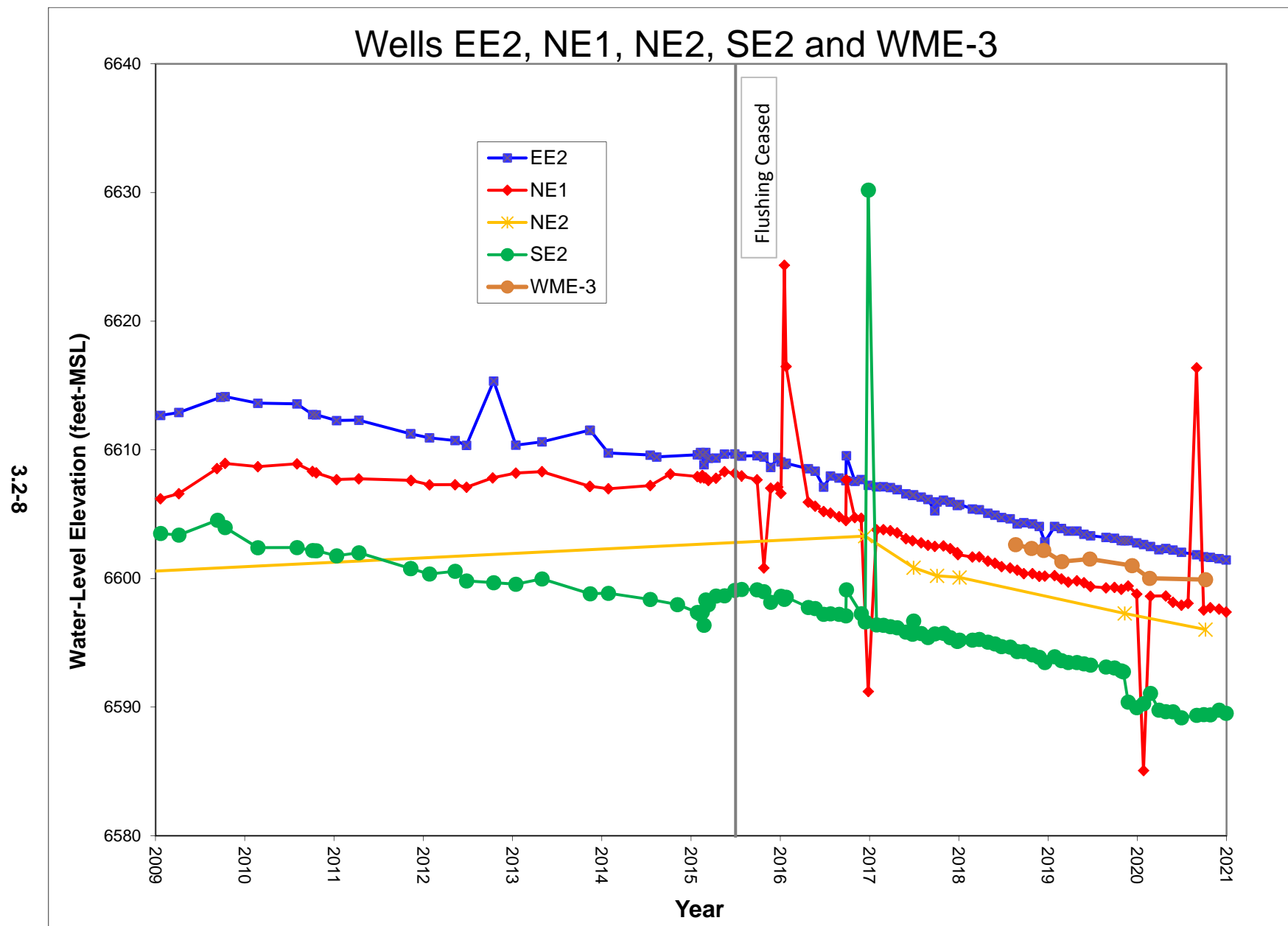
Slime tailings wells EP23, EP31, ET20 and WME-5 are located in the eastern slime cell of the LTP and the measured water levels since late 2016 are presented in [Figure 3.2-10](#). A general declining water level trend is occurring in well EP23, and wells EP31, ET20 and WME-5 show somewhat erratic measurements with no significant trends. Water levels in these four wells indicate that drainage from the central slime area of the east cell is very slow. Wells EI4, ES4, ES6 and ET19 are also located in the eastern cell of the LTP with wells ES4 and ES6 located within a sand dike and showing a declining trend in water-level elevation (see [Figure 3.2-11](#)). In contrast, the water level in well EI4 defines a mound in the slime tailings as shown on [Figure 3.2-1](#). A decline in water-level elevation occurred in well EI4 through 2017, but recent water levels have been steady. Water-level elevation in well ET19 has been slightly erratic with no significant trend.



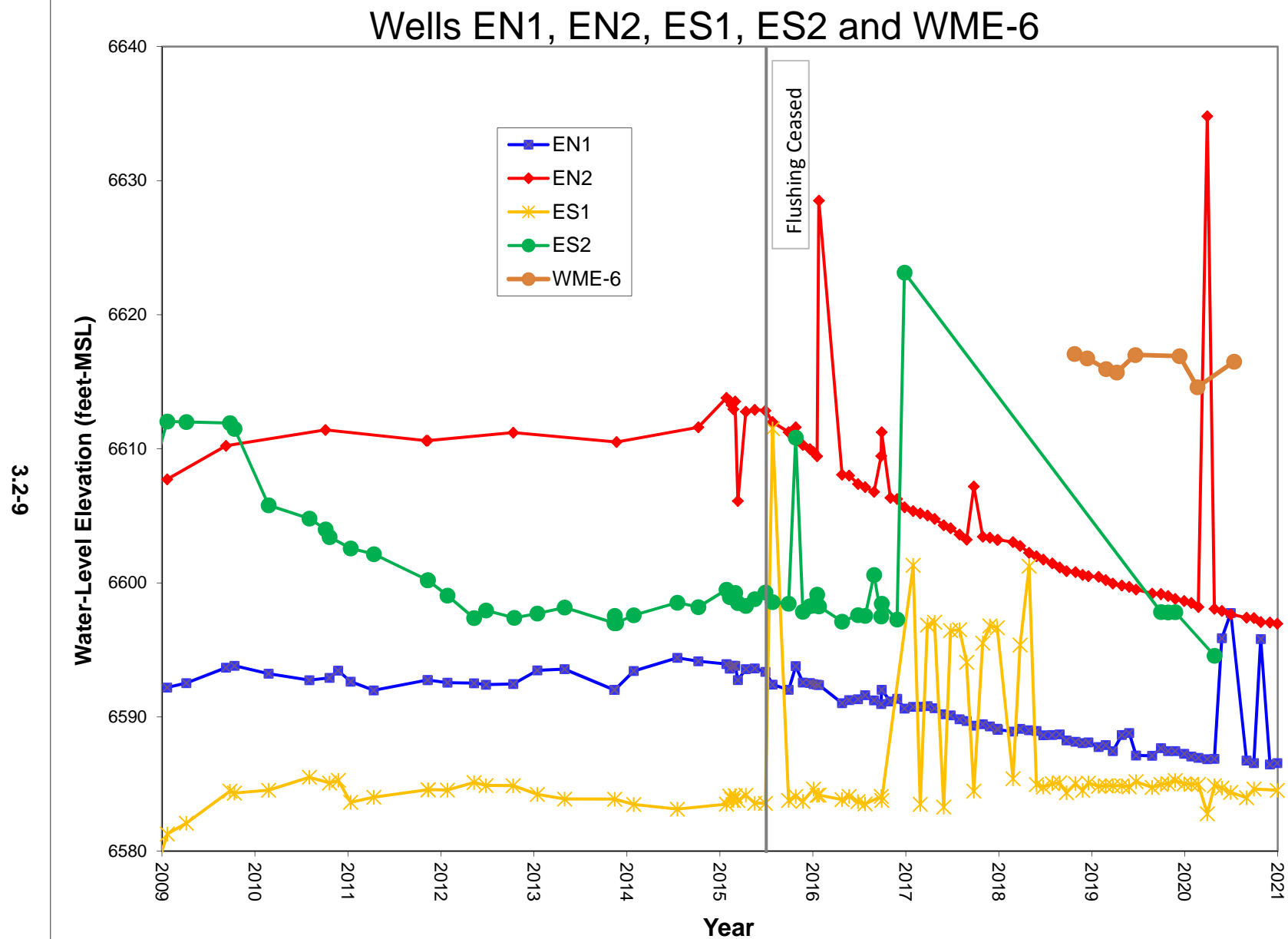




**Figure 3.2-2. Water-Level Elevation For Tailings Wells CN1, CN2, CS1, CS2 and WME-2**

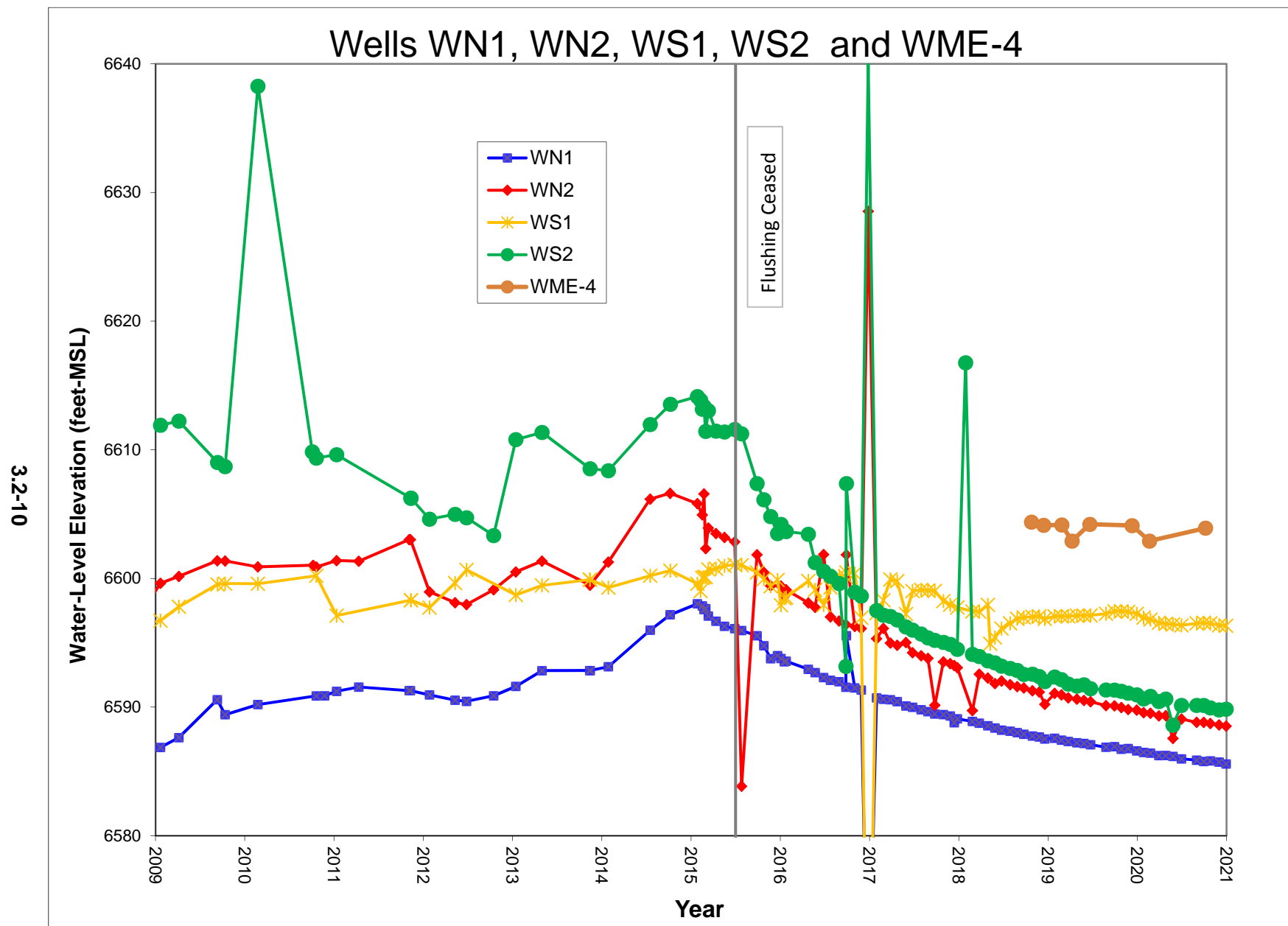


**Figure 3.2-3. Water-Level Elevation For Tailings Wells EE2, NE1, NE2, SE2 and WME-3**



**Figure 3.2-4. Water-Level Elevation For Tailings Wells EN1, EN2, ES1, ES2 and WME-6**





**Figure 3.2-5. Water-Level Elevation For Tailings Wells WN1, WN2, WS1, WS2 and WME-4**

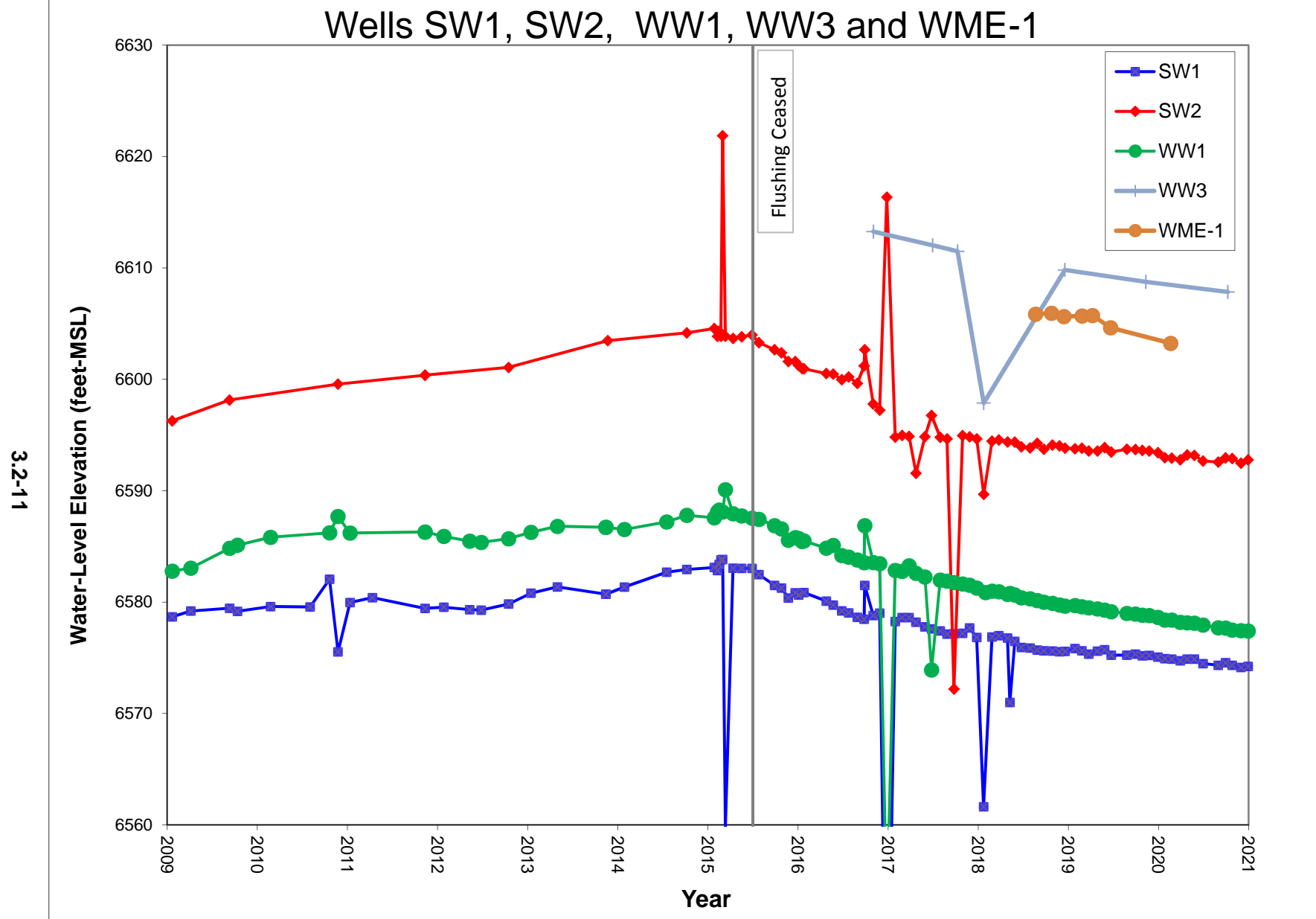


Figure 3.2-6. Water-Level Elevation For Tailings Wells SW1, SW2, WW1, WW3 and WME-1

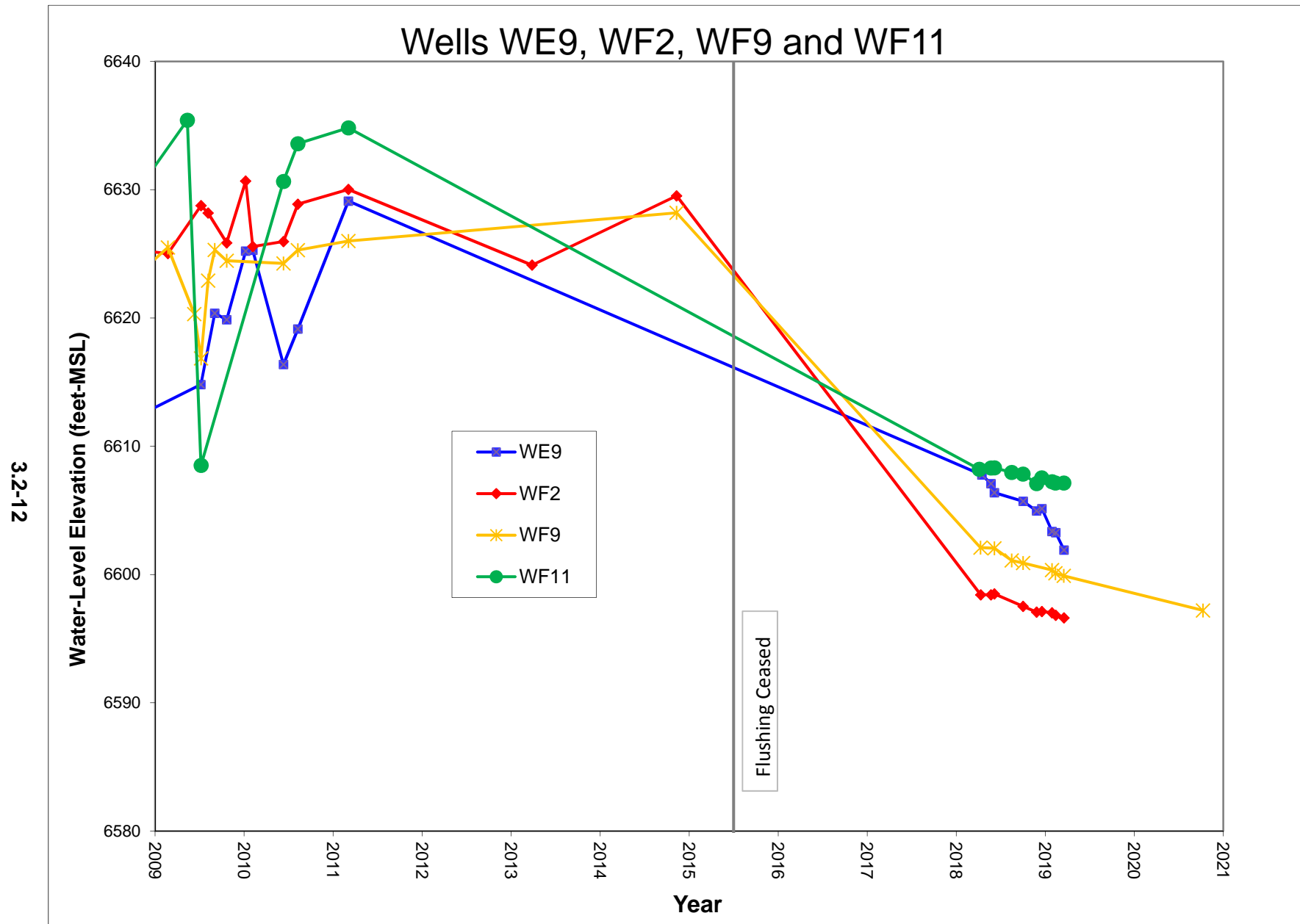
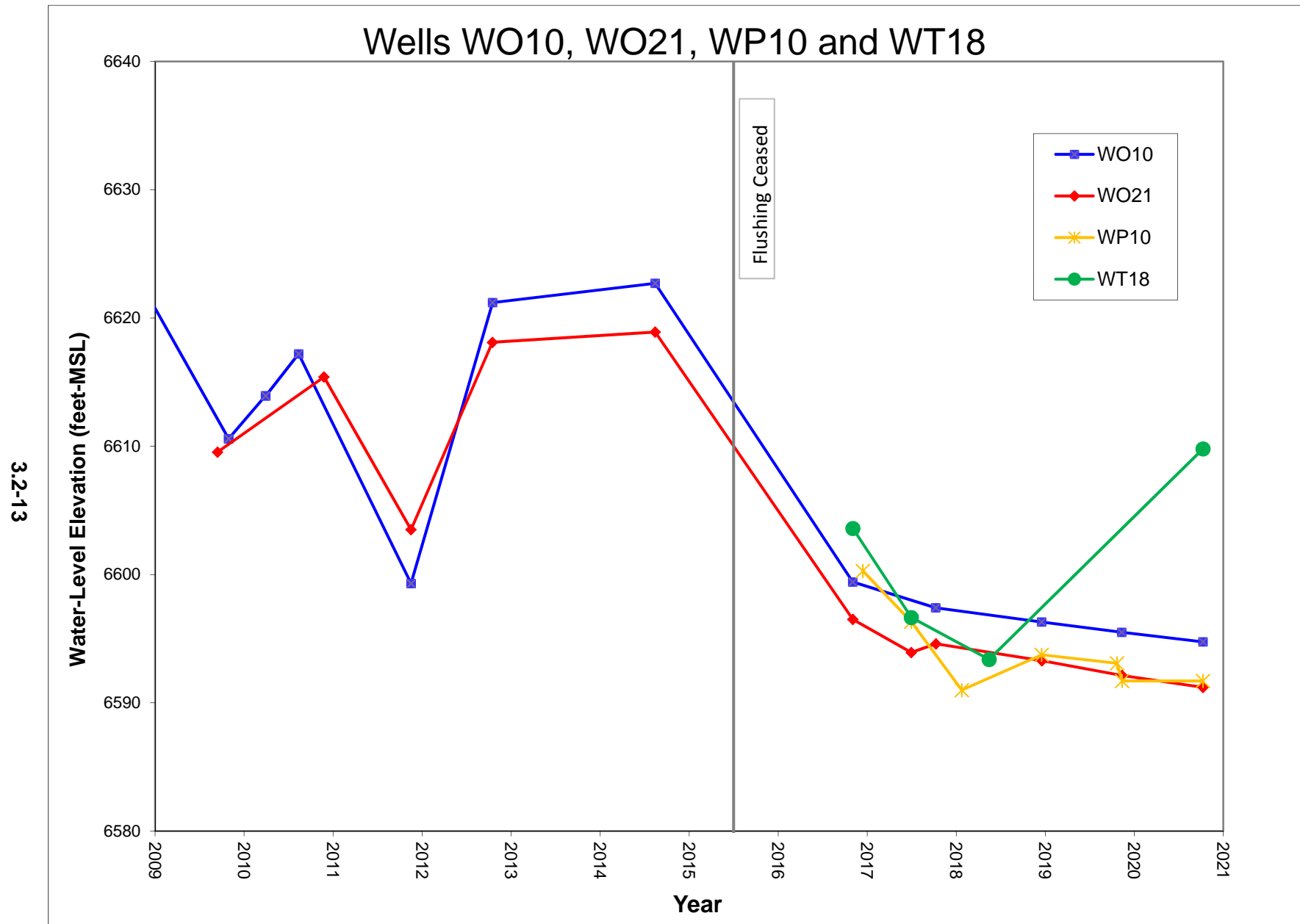
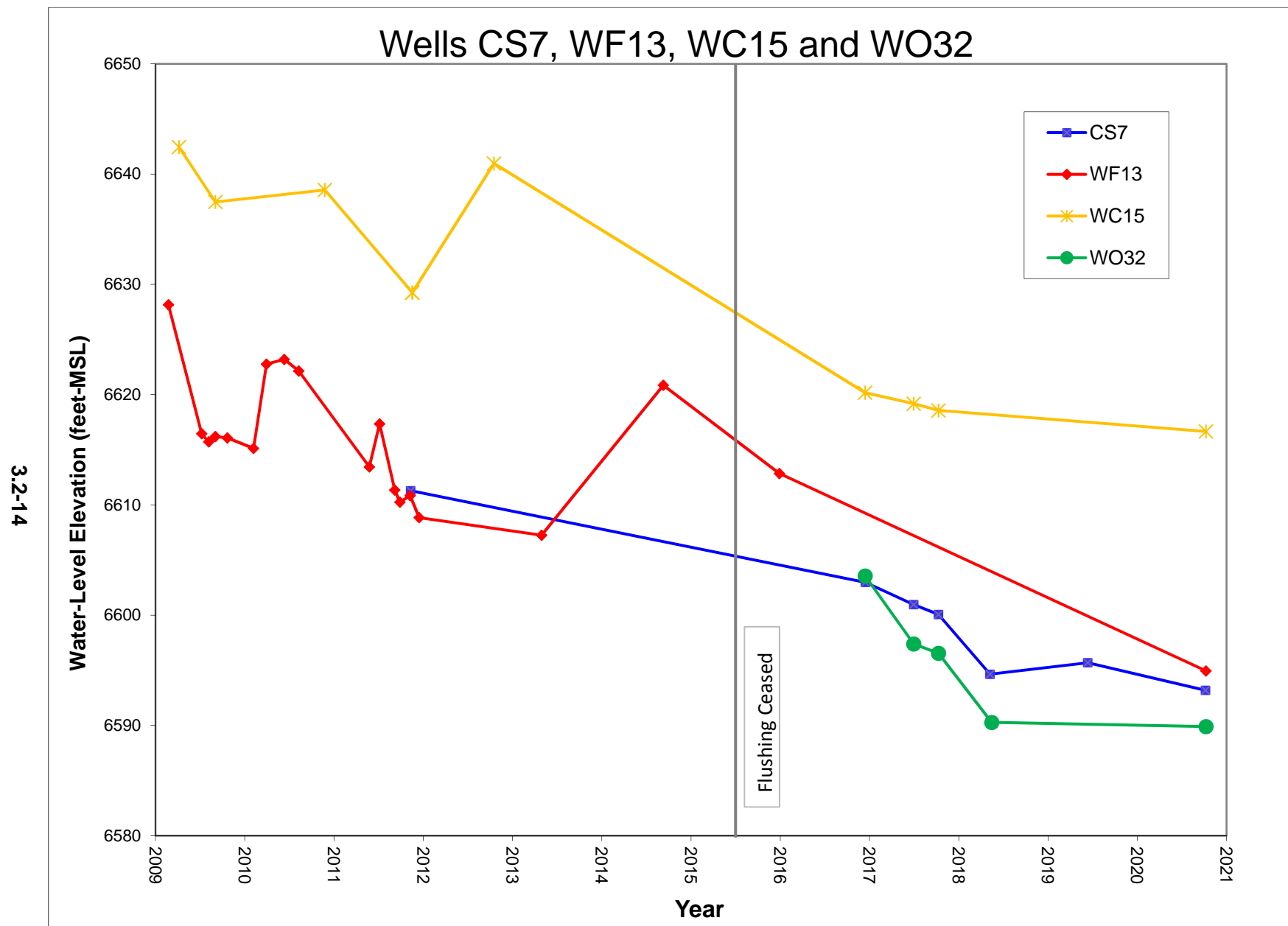


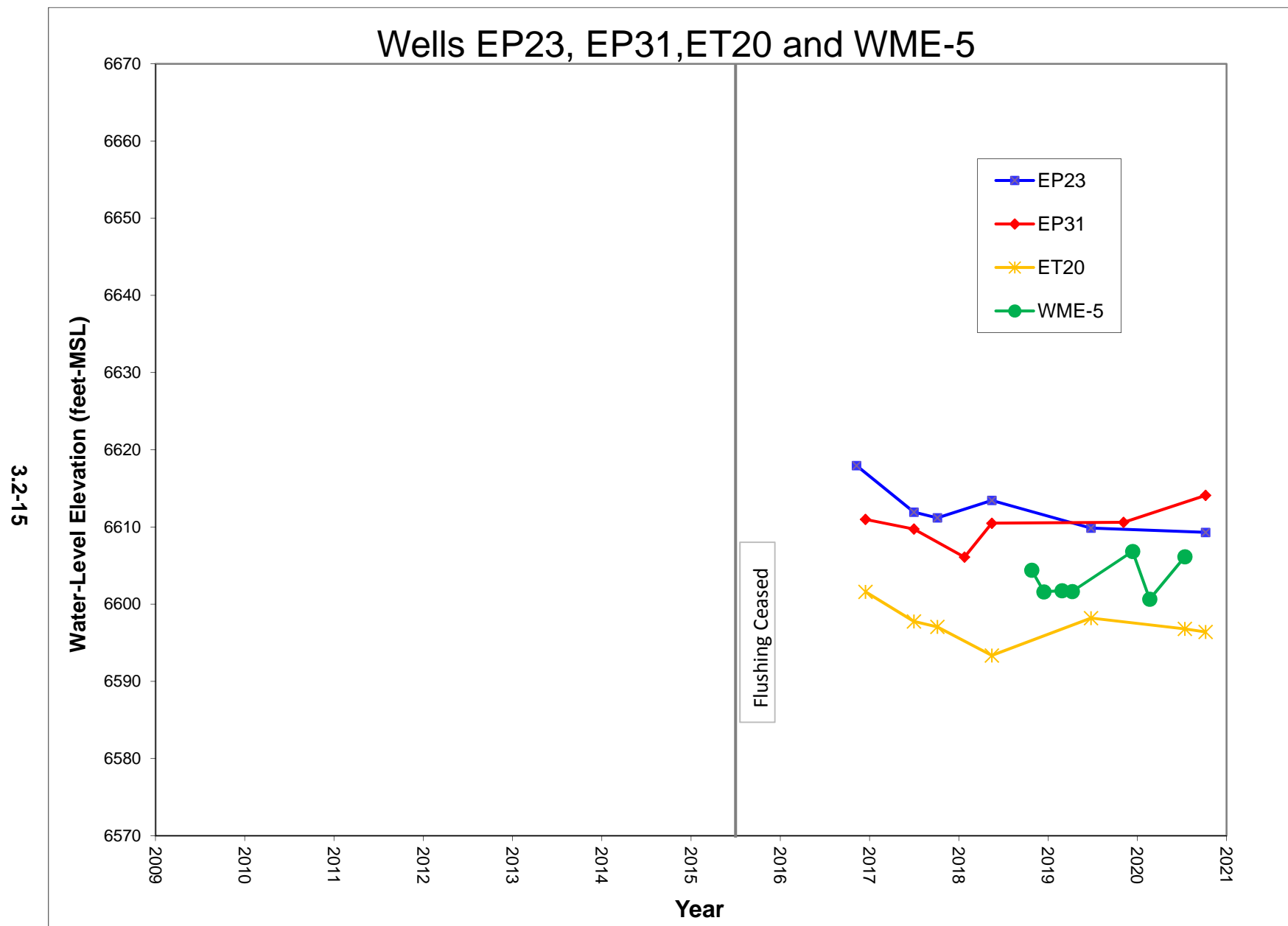
Figure 3.2-7. Water-Level Elevation For Tailings Wells WE9, WF2, WF9 and WF11



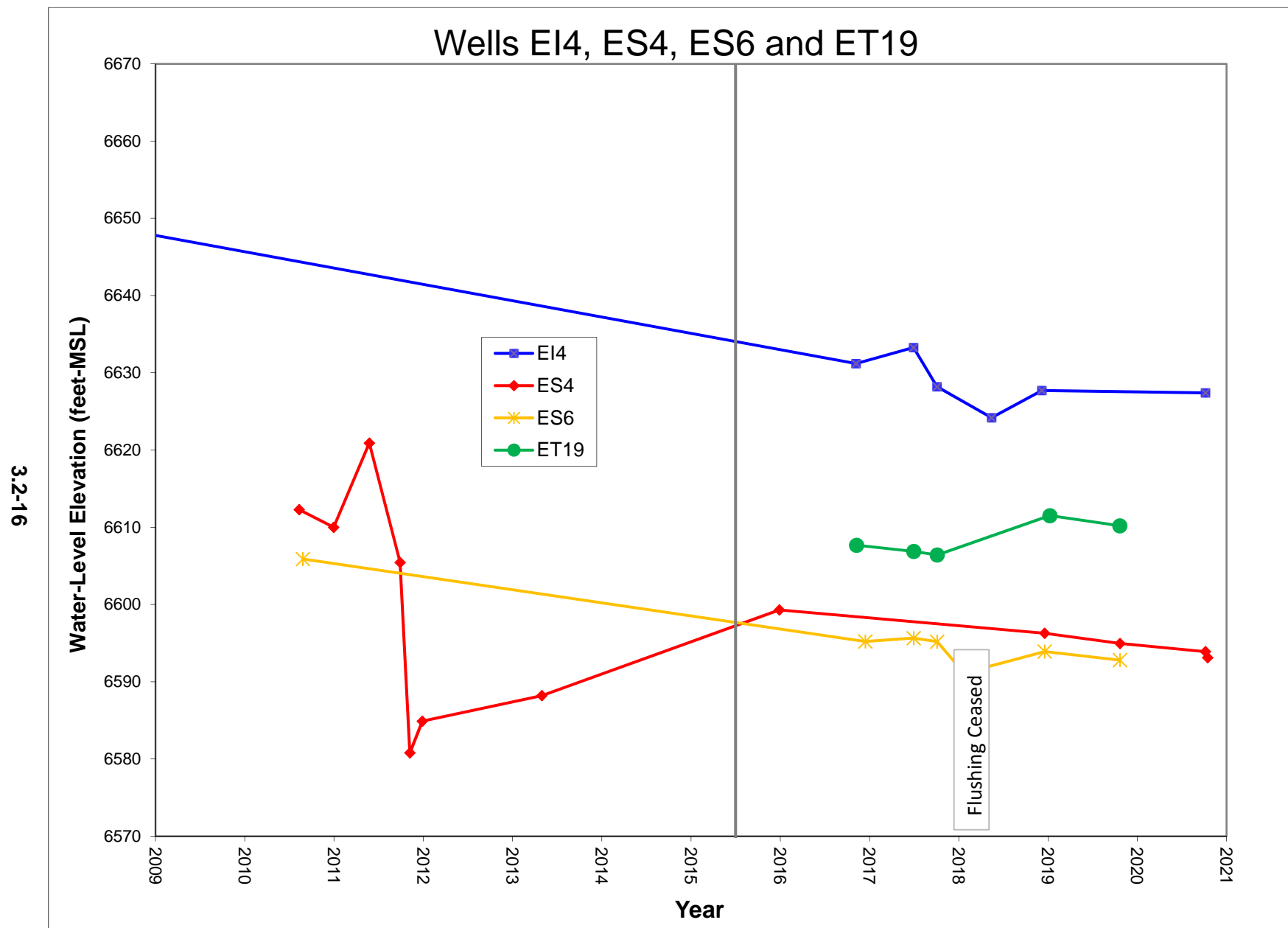
**Figure 3.2-8. Water-Level Elevation For Tailings Wells WO10, WO21, WP10 and WT18**



**Figure 3.2-9. Water-Level Elevation For Tailings Wells CS7, WF13, WC15 and WO32**



**Figure 3.2-10. Water-Level Elevation For Tailings Wells EP23, EP31, ET20 and WME-5**



**Figure 3.2-11. Water-Level Elevation For Tailings Wells EI4, ES4, ES6 and ET19**

### 3.3 TAILINGS WATER QUALITY

Table 2.1-1 presents the quantity of constituents collected from the tailings wells since dewatering began. Tables B.1-1 and B.1-2 of Appendix B present chemical analyses of tailings well water samples collected during 2019 and 2020, with only a few samples taken in 2020. Uranium is a key water quality indicator constituent for the tailings solution. A series of five uranium concentration mapping figures are presented to convey the changes in uranium in the LTP with time. Figure 3.3-1 presents the uranium concentrations in the tailings solution in 2000 shortly after the start of the flushing program. The red pattern shows where uranium concentrations were greater than 40 mg/L, while the magenta gives the area where a uranium concentration of 30 to 40 mg/L was present. The green pattern shows the area of 20 to 30 mg/L uranium concentration and the cyan color shows where uranium concentrations were less than 10 mg/L. Figures 3.3-2, 3.3-3, 3.3-4 and 3.3-5 present the tailings solution uranium concentrations for 2008, 2015, 2018 and 2019 respectively. These figures show the decline in uranium concentrations with time during the tailings flushing program, with stabilization of the uranium concentrations and other water quality indicators after the flushing ended.

Figures 3.3-4 and 3.3-5 show that uranium concentrations in the tailings solution exhibited very little change between 2018 and 2019, and the water quality stabilization is also illustrated in graphs of uranium, molybdenum and selenium concentration over time for selected tailings wells and toe drain sumps shown in Figures 3.3-6 through 3.3-15. Table 3.3-1 presents estimated average uranium, molybdenum and selenium concentrations for the water in the saturated portion of the LTP. Because the constituent concentrations in the tailings solution are stable, the 2019 uranium, molybdenum and selenium concentration contours were used in calculation of the average constituent concentrations, along with the 2020 saturated thickness in the LTP. The average constituent concentrations are calculated using concentration contours and mapping of the saturated thickness in the LTP. Surface modeling software (QUICKSURF) is used to multiply the constituent concentration surface by the saturated thickness distribution over the LTP and that product is then divided by the saturated volume in the LTP to determine the average concentration.



### **3.3.1 URANIUM CONCENTRATION MAPPING**

Figures 3.3-1 through 3.3-5 were developed using measured uranium concentrations in samples from tailings wells in conjunction with operational configurations for the flushing injection and tailings dewatering wells. As an example, the generally circular areas of lower concentration shown in Figure 3.3-1 are located at operating injection wells or groups of injection wells. Figures 3.3-2 and 3.3-3 show the expansion of these areas of the LTP that have been flushed with the injection water. The injection wells were not sampled during the operation of the flushing program but each injection well had an area of influence and these areas gradually merged with the flushing progress as shown in Figures 3.3-2, 3.3-3 and 3.3-4.

Following the cessation of injection in mid-2015, there was redistribution and exchange of resident water within the LTP and Figure 3.3-5 presents the tailings solution uranium concentration for the tailings in 2019. Because there has been no active injection since mid-2015, the decay of the mounds in the potentiometric surface around injection wells and the associated redistribution of tailings solution allows representative samples to be collected from the former injection wells as well as former dewatering wells and monitoring wells. The pattern of uranium concentrations shown in Figure 3.3-4 and Figure 3.3-5 reflects this redistribution. The saturated footprint of the LTP has been reduced significantly since 2015 (see Figure 3.3-3) and there was a reduction on the south side of the LTP from 2019 to 2020 as shown by the 2020 saturated boundary delineation on Figure 3.3-5.

### **3.3.2 SAND TAILINGS WATER QUALITY**

A series of graphs presenting uranium, molybdenum and selenium concentration over time were developed for selected wells in the LTP. For the sand tailings, these graphs are presented in Figures 3.3-6 through 3.3-10 with concentration data for two wells included on each graph. The grouping of wells for each graph is based on general location and the nature of the tailings in the area of the well. The uranium concentrations for the two wells are shown with blue or cyan lines and symbols, and the molybdenum concentrations are shown with red or orange lines and symbols. The selenium concentrations are typically much smaller than uranium concentrations and are plotted with dark and light green lines with the scale on the right-hand axis as shown on the series of graphs.

Figure 3.3-6 presents uranium, molybdenum and selenium concentration over time for wells CS1 and CS2. These wells are located at the south end of the central sand dike in the LTP (see Figure 3.1-2). Since approximately 2016, there have been no trends in constituent concentrations and this reflects the post-flushing water quality stabilization.

Figures 3.3-7 and 3.3-8 present uranium, molybdenum and selenium concentration over time for well pairs located eastern side of the LTP (see Figure 3.1-2). Figure 3.3-7 shows that, since 2018, constituent concentrations have been relatively steady except for a declining trend in uranium concentration in well ES6. Very little change in the uranium, molybdenum and selenium concentration has occurred in samples from well ES4 from 2014 through 2020. Similarly, Figure 3.3-8 shows generally steady selenium and uranium concentrations since 2018 in wells EE2 and SE2. The molybdenum concentration in well SE2 had a slight declining trend while the molybdenum concentration in well EE2 has shown typical sample variability since 2016.

Figure 3.3-9 shows relatively steady uranium, selenium and molybdenum concentration in well wells WW3 and WME-1 since late 2016. Although minor sample variability occurred, there were no trends in constituent concentrations. Wells WW3 and WME-1 are located on the western side of the LTP. Figure 3.3-10 presents constituent concentrations for sand tailings wells WME-3 and SW3, which are located at the east end and southwest corner of the LTP respectively. Measured constituent concentration changes after mid-2018 are very small, with very little change between 2019 and 2020 samples for well WME-3.

### **3.3.3 TOE DRAIN DISCHARGE WATER QUALITY**

The toe drain system around the perimeter of the LTP collects tailings water draining from the tailings and possibly tailings seepage water in the perched sand layer and discharges the impacted water to sumps. Figures 3.3-11 and 3.3-12 present uranium, molybdenum and selenium concentration over time for the East 1 and West 1 sumps, and the North 1 and South 1 sumps respectively. The constituent concentrations for the four sumps have declined significantly from levels that were present prior to the flushing program. The discharge rates to the sumps have also declined as the drainage from the LTP continues and the saturated footprint shrinks. Since 2016, the uranium concentration in the discharge from the sumps has stabilized or

has a declining trend. With the exception of erratic concentration changes in the West 1 sump discharge, the molybdenum concentration in the sumps has typically stabilized or shown a gradual decline since 2016. The selenium concentration in the toe drain discharge has declined since 1996, but exhibited a dramatic increase shortly after flushing injection began followed by a declining trend through the end of flushing (see [Figures 3.3-11 and 3.3-12](#)).

### **3.3.4 SLIME TAILINGS WATER QUALITY**

Monitoring wells WO10 and WO21 are located in the southwest portion of the slime tailings area in the west cell of the LTP and the constituent concentrations in well WO10 showed a significant decline through 2014 reflecting the flushing progress (see [Figure 3.3-13](#)). Between 2018 and 2019, there was a slight increase in constituent concentrations in well WO10. The changes in constituent concentrations in well WO21 were relatively minor between 2009 and 2019. [Figure 3.3-14](#) illustrates a dramatic contrast between constituent concentration in former injection well WP10 and monitoring well WME-4. Only a few samples were taken from each well and the constituent concentrations in well WP10 are relatively low indicating successful flushing of the slime tailings in the area (see [Figure 3.3-14](#)). In contrast, the uranium and molybdenum concentrations in well WME-4 are roughly an order of magnitude greater than those in well WP10. This large disparity in constituent concentration in wells that are less than 200 feet apart may indicate that the flushing injection water did not reach well WME-4, or possibly that the smaller completion interval of well WME-4 is within a layer that was not affected by flushing. However, the water quality results do not indicate any change in constituent concentrations other than typical sample variability.

[Figure 3.3-15](#) presents constituent concentrations for slime tailings wells WME-5 and WME-6 which are located in the eastern slime area of the LTP. The wells were first sampled in late 2018 and the constituent concentrations have been relatively stable with the exception of a decrease in selenium concentration and an increase in molybdenum concentration in well WME-5 from the earliest samples. The constituent concentrations in both wells are indicative of areas that were partially flushed during the tailings flushing program, and the constituent concentrations are relatively stable.

### **3.3.5 AVERAGE TAILINGS COC CONCENTRATION ESTIMATES**

[Table 3.3-1](#) presents estimated uranium, molybdenum and selenium concentrations for the tailings water in the saturated portion of the LTP. These estimated average concentrations were calculated using mapping of uranium, molybdenum and selenium concentrations in the LTP for 2019 along with the potentiometric surface shown in [Figure 3.2-1](#). As described previously, the use of 2019 constituent concentrations in the calculation is considered appropriate because the water quality in the residual tailings solution is relatively stable. The estimation of average uranium concentration began in 2006 and estimation of average molybdenum concentration began in 2010. The average selenium concentrations in the saturated tailings are relatively small and calculation of the average concentration began in 2018. The estimated average uranium and molybdenum concentrations decreased dramatically during active flushing of the LTP, but recent changes have been modest. A slight increase in average concentrations between 2017 and 2018 and between 2016 and 2015 (see [Table 3.3-1](#)) is likely reflective of the interpretation of constituent concentration contours for differing water sample distributions over the LTP rather than an actual increase in constituent concentrations. With the cessation of tailings flushing and the expectation of no future dewatering, the future changes in the average uranium and molybdenum concentrations in the LTP are expected to be very small. However, the seepage rates from the sand tailings are larger than those from the slime tailings so there is some potential for minor average constituent concentration changes resulting from differing rates of seepage. This is supported by the changes in estimated drainable water volume presented in [Table 3.3-1](#) with the majority of the year-to-year water volume reduction since 2016 occurring in the sand tailings.

### **3.3.6 GENERAL TAILINGS WATER QUALITY STABILITY**

The water quality in the LTP has been relatively stable with minor declining trends in some areas for the past two or more years based on sampling of wells and the discharge from toe drains. The flushing injection that occurred prior to mid-2015 had the potential to cause significant changes in water quality in areas of the tailings, and the flushing program produced dramatic changes in constituent concentrations as illustrated in [Figures 3.3-8, 3.3-11, 3.3-12, and 3.3-13](#). After the end of flushing injection, the redistribution of injection water within the LTP

also had the potential for causing less dramatic water quality changes within the LTP until the water level mounds around injection wells decayed. Following this redistribution and equilibration, the tailings water quality as reflected in uranium, molybdenum and selenium concentrations has been relatively stable in the LTP since at least 2018. Occasional erratic results occur for a single constituent, but the majority of constituent concentrations presented in [Figures 3.3-6 through 3.3-14](#) exhibit general stability with only typical sample variability since the flushing injection water was redistributed and equilibrated within the LTP after cessation of injection. Although it has been posited that geochemical changes or mobile/immobile water exchanges within the tailings could produce a rebound in constituent concentrations, the data collected suggests that recent changes are not significant.

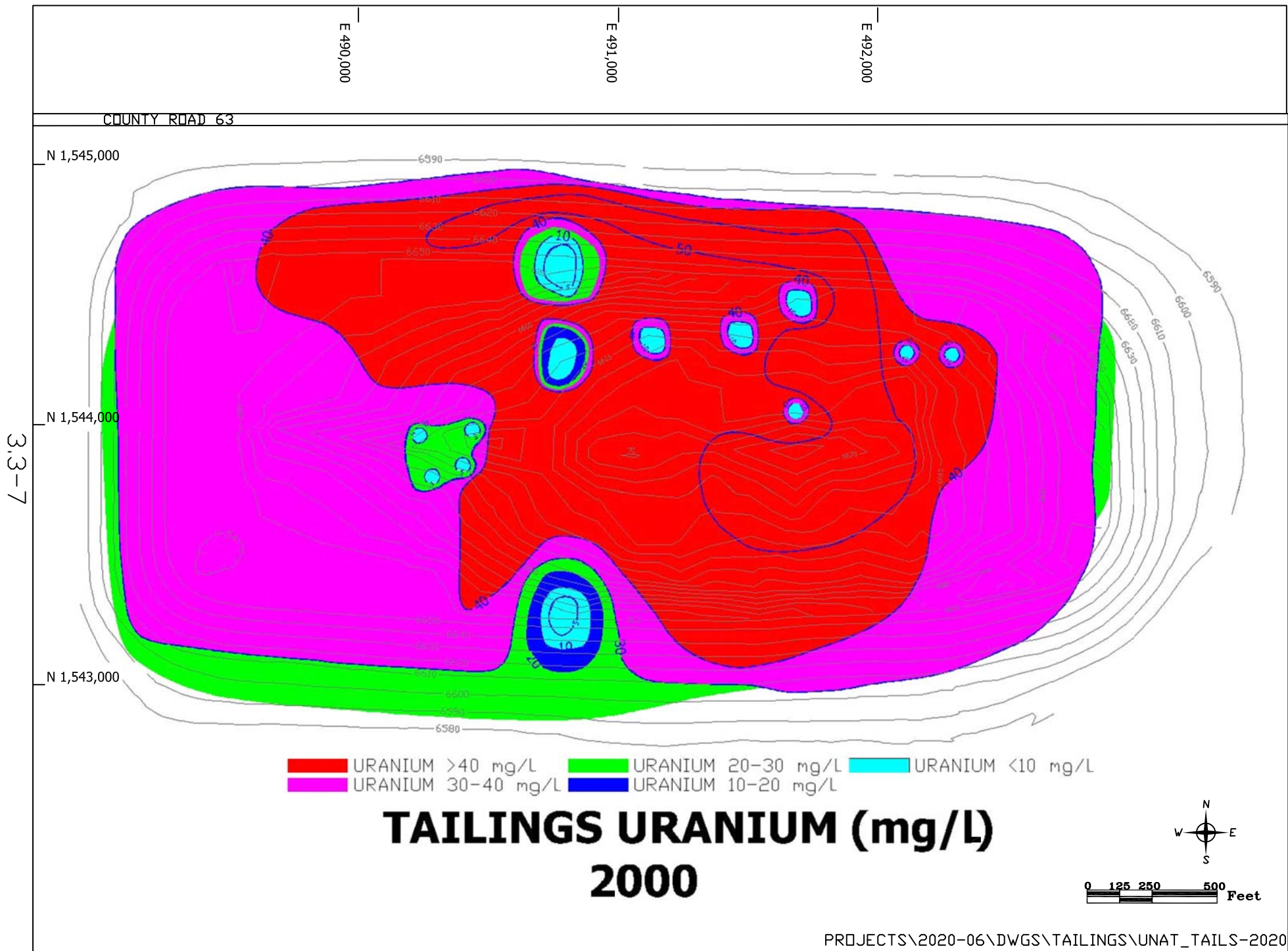


FIGURE 3.3-1. TAILINGS SOLUTION URANIUM CONCENTRATION, 2000



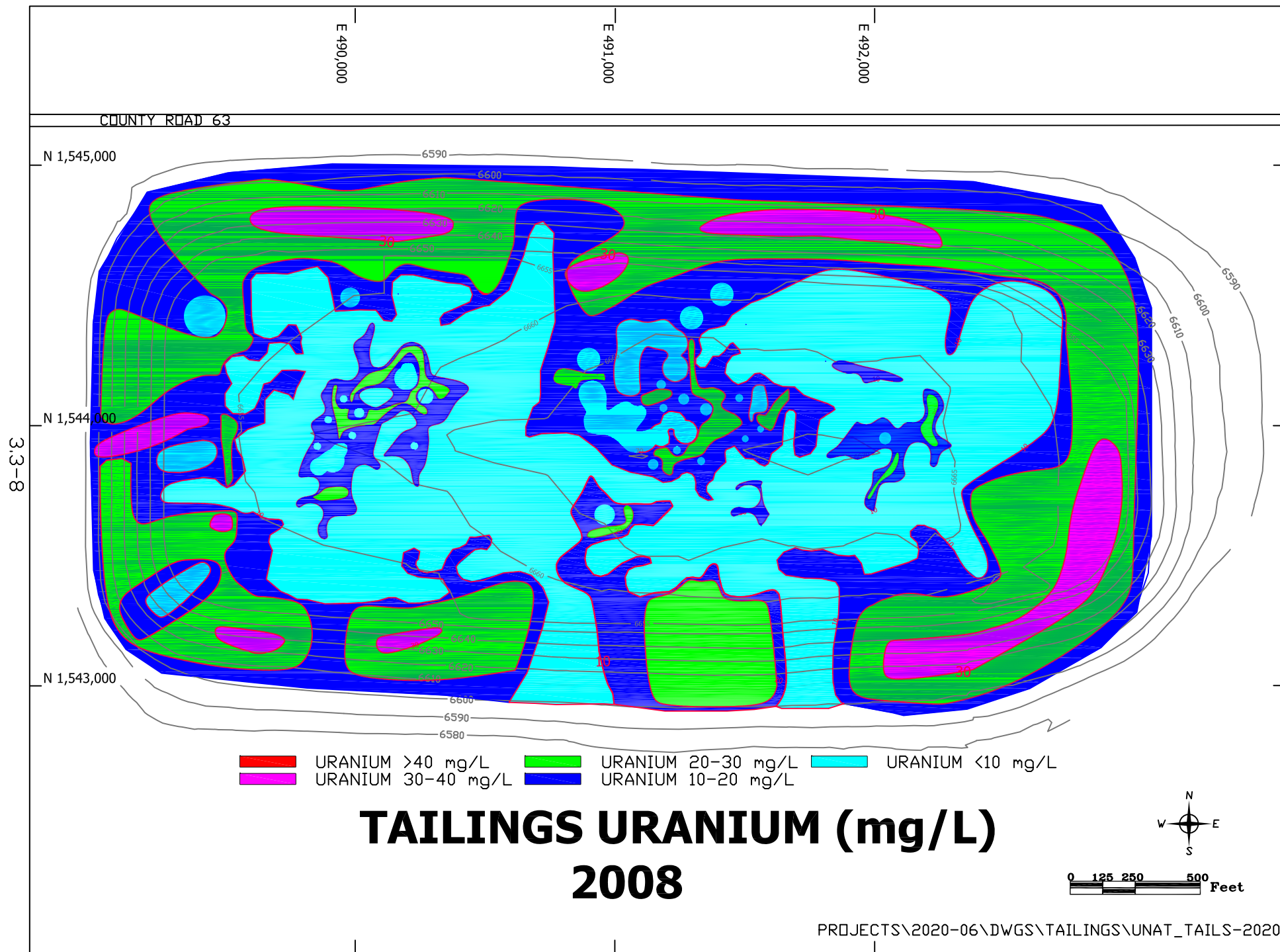


FIGURE 3.3-2. TAILINGS SOLUTION URANIUM CONCENTRATION, 2008

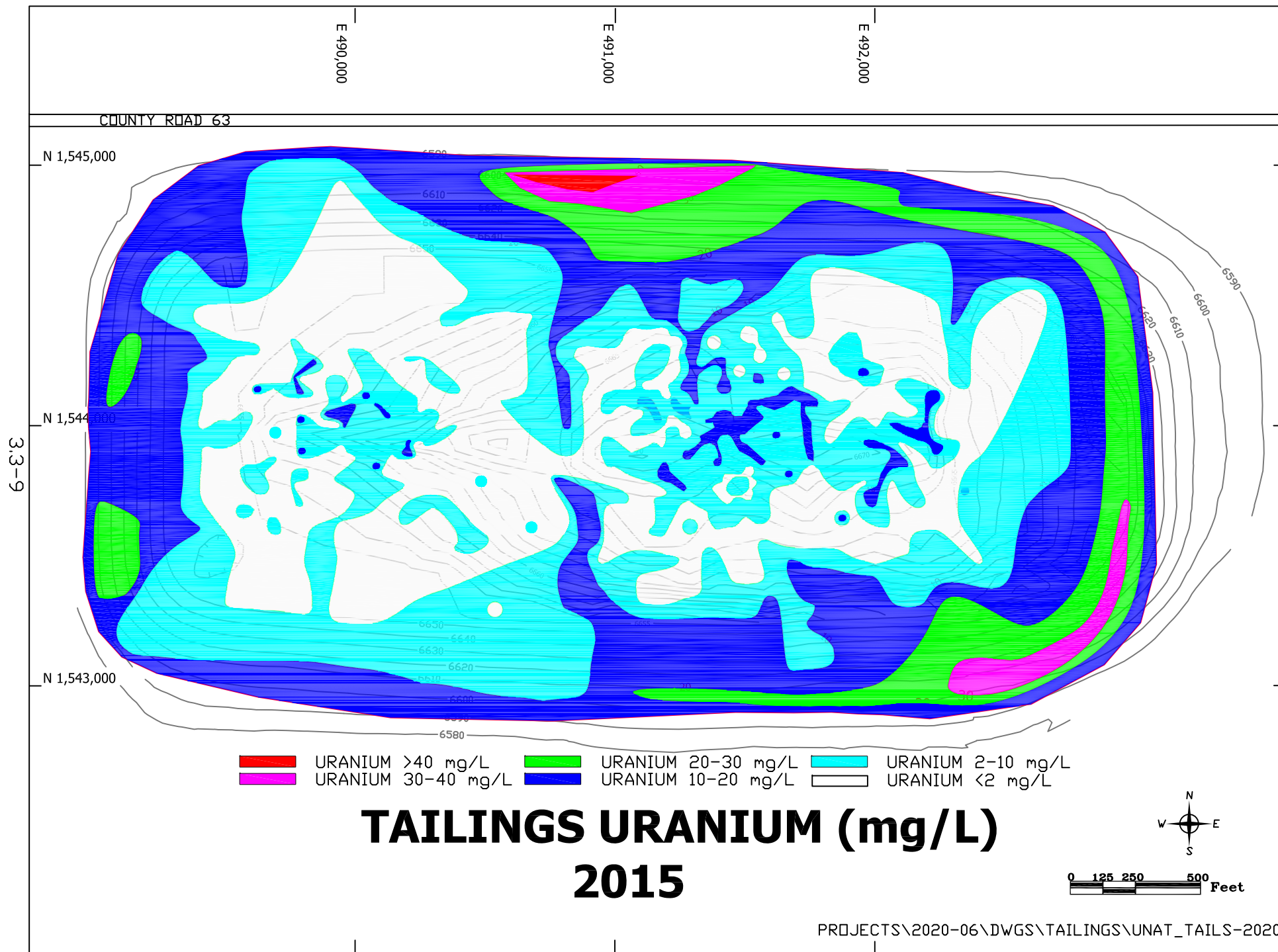


FIGURE 3.3-3. TAILINGS SOLUTION URANIUM CONCENTRATION, 2015



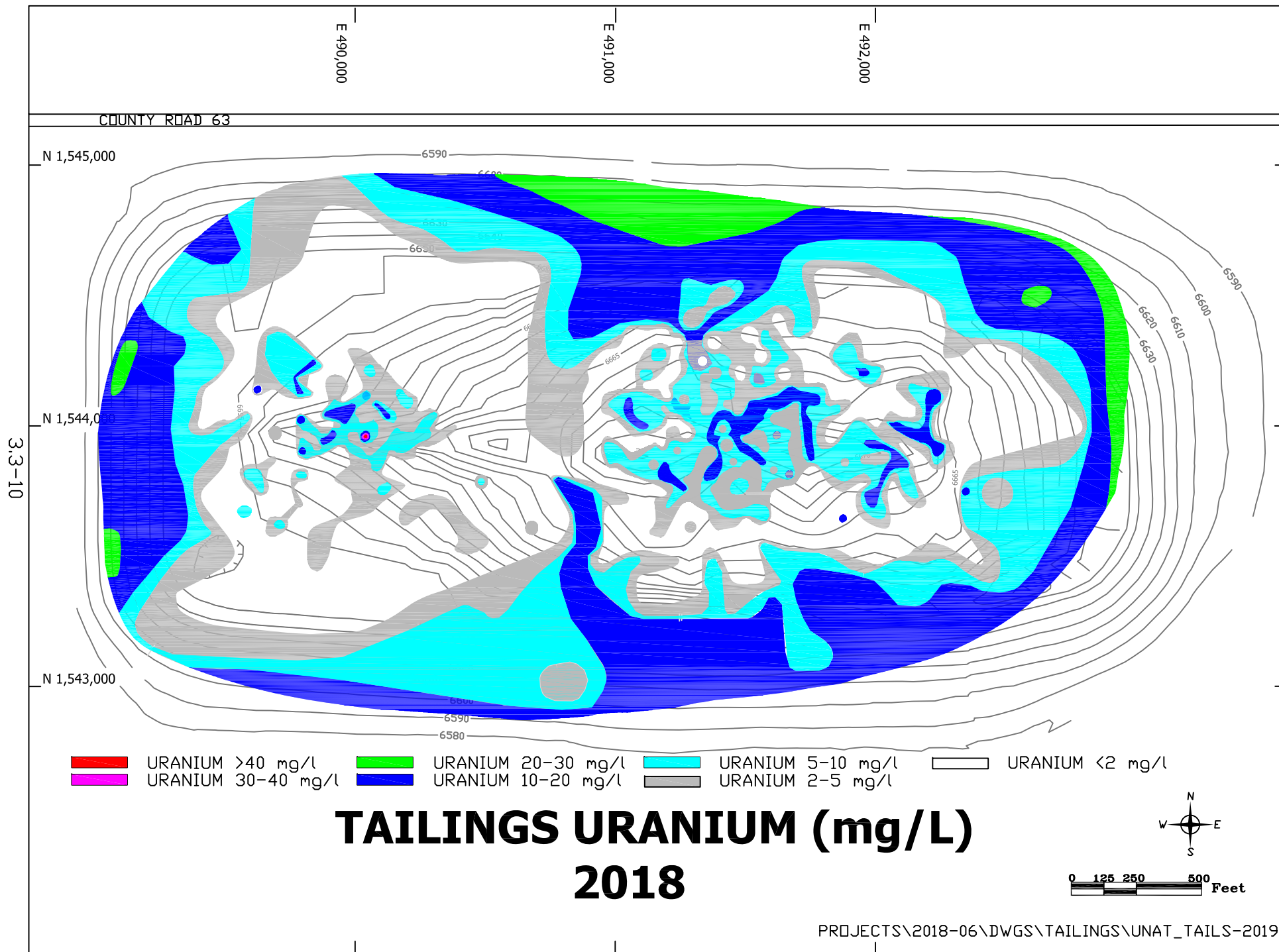


FIGURE 3.3-4. TAILINGS SOLUTION URANIUM CONCENTRATION, 2018

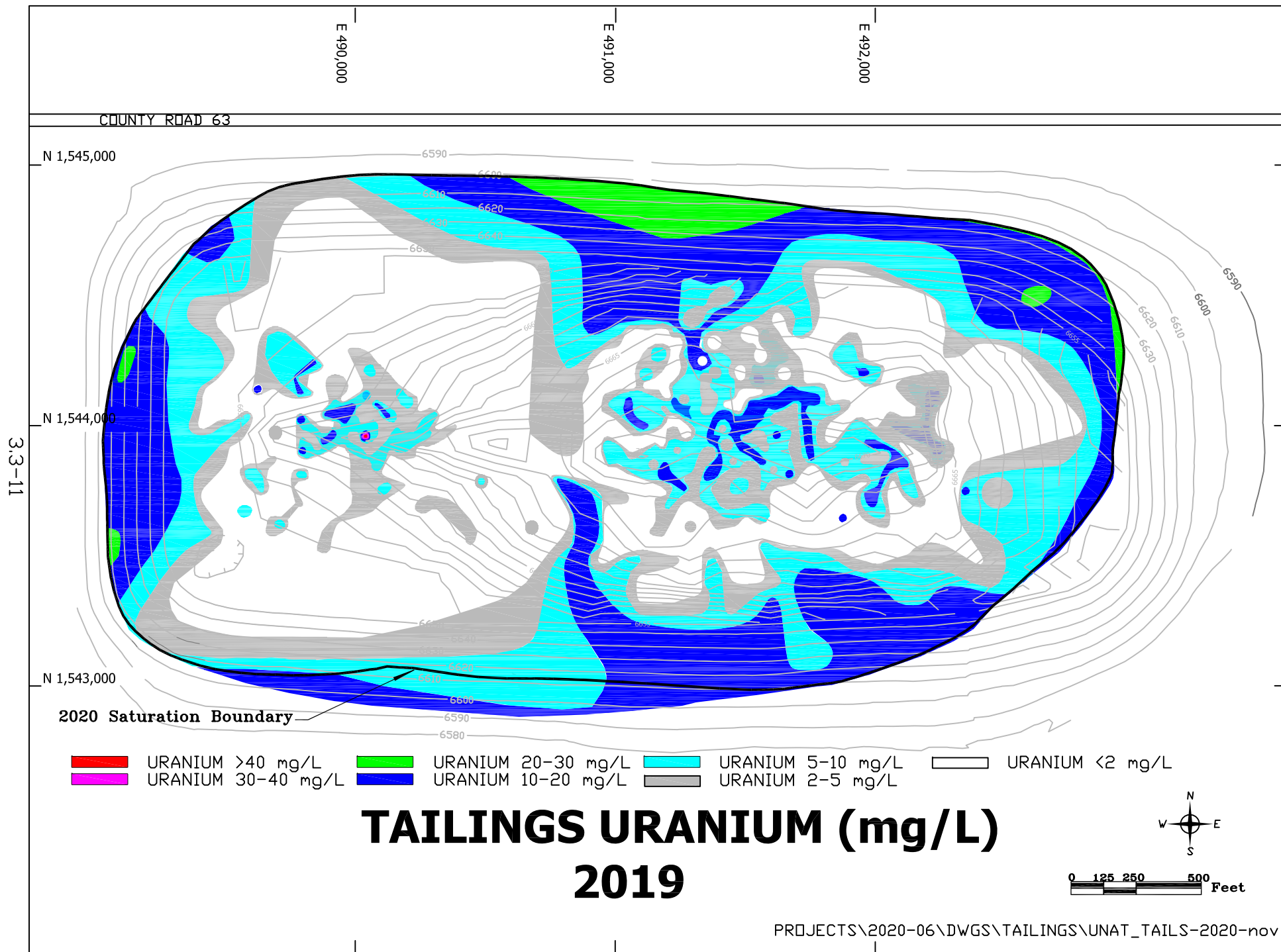


FIGURE 3.3-5. TAILINGS SOLUTION URANIUM CONCENTRATION, 2019

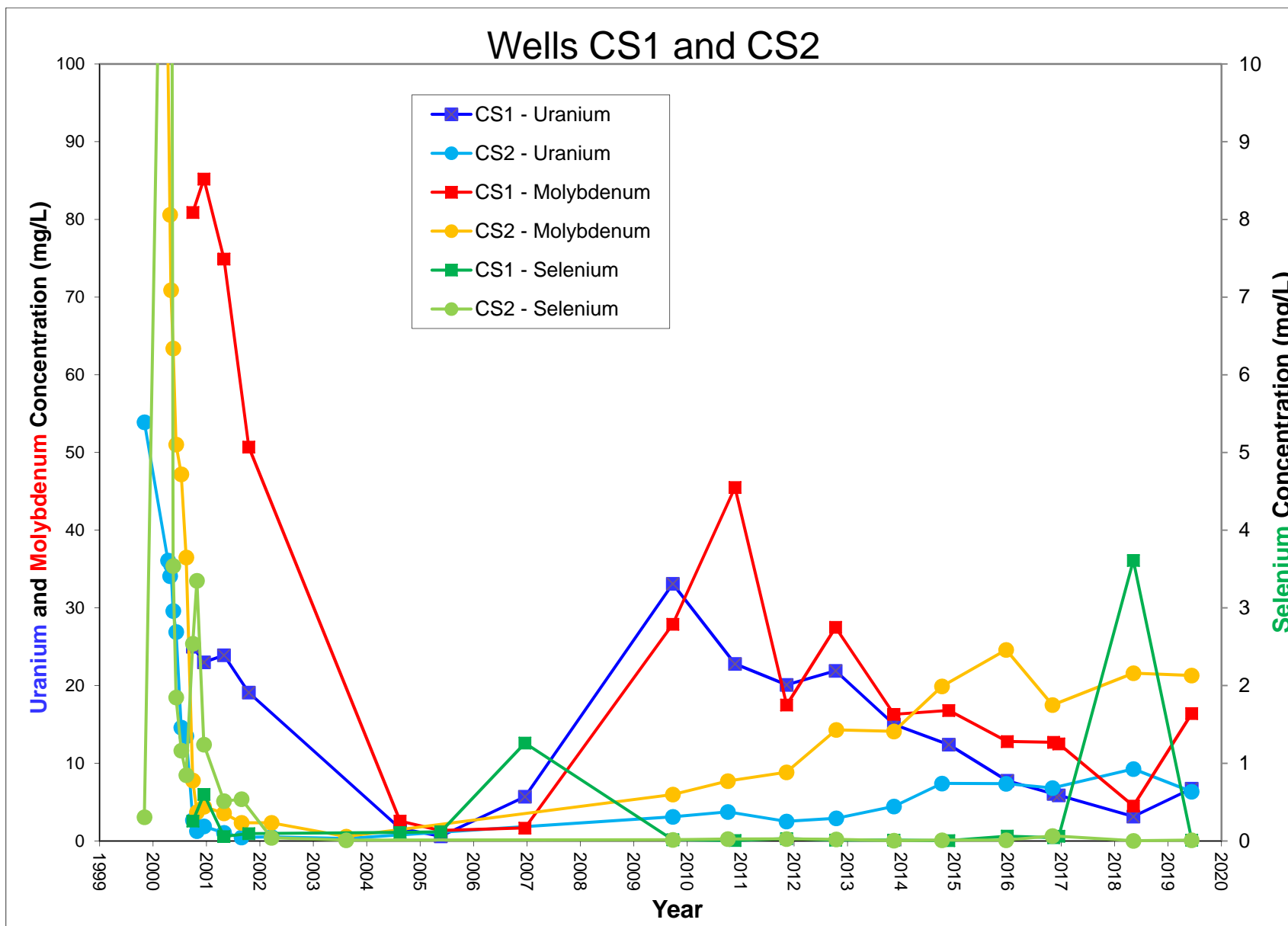
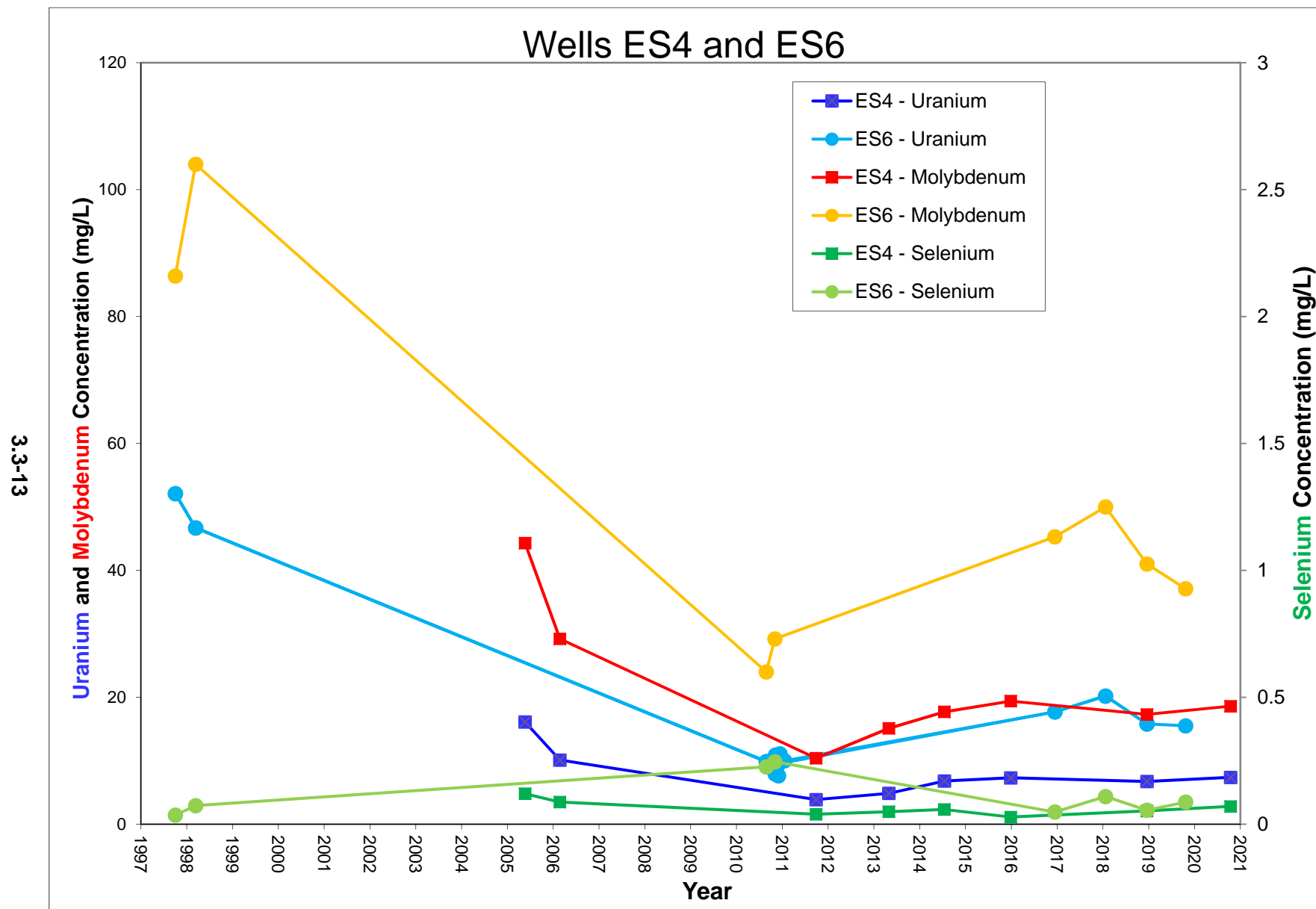
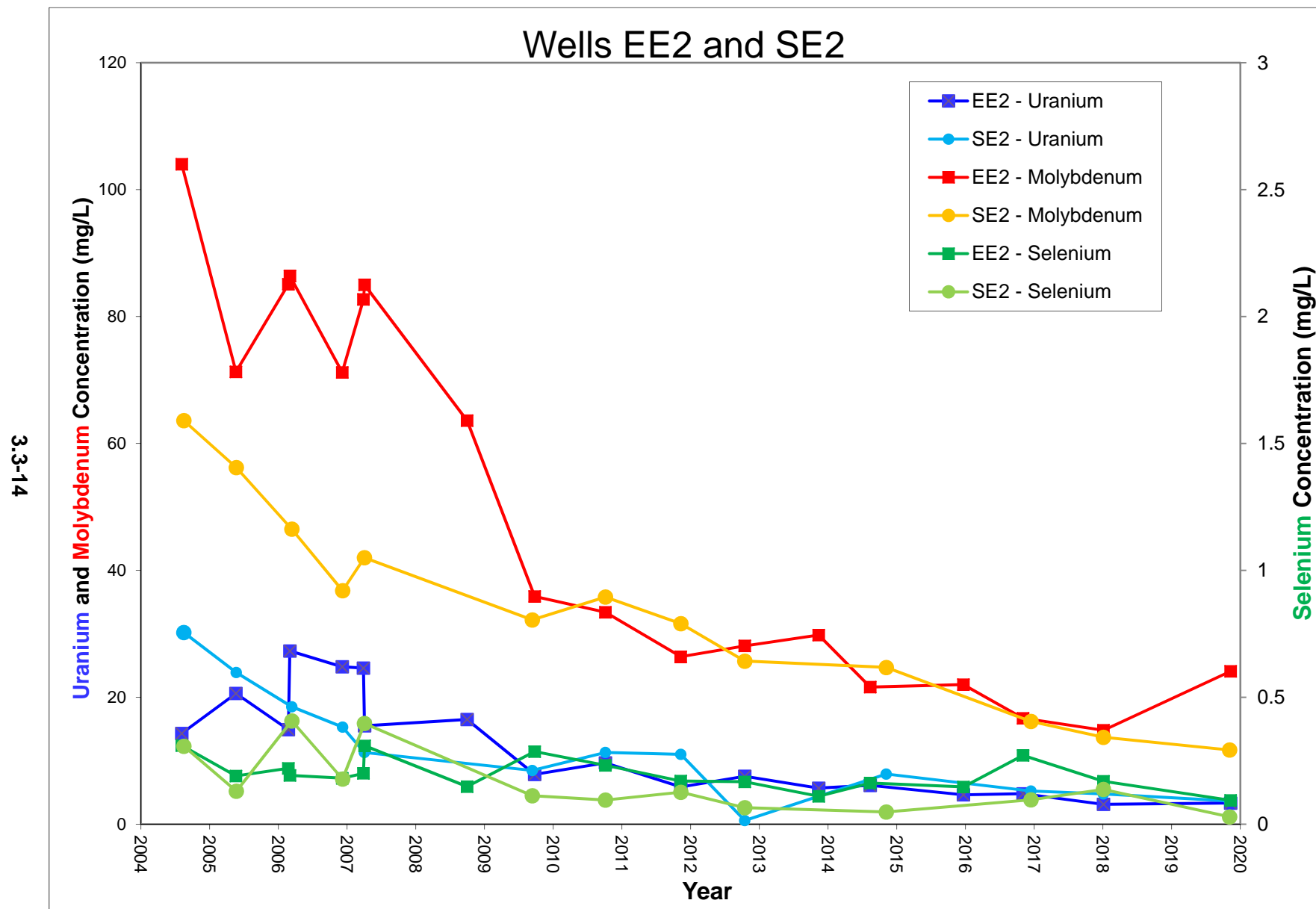


Figure 3.3-6. Uranium, Molybdenum and Selenium Concentrations for Sand Tailings Wells CS1 and CS2



**Figure 3.3-7. Uranium, Molybdenum and Selenium Concentrations for Sand Tailings Wells ES4 and ES6**



**Figure 3.3-8. Uranium, Molybdenum and Selenium Concentrations for Sand Tailings Wells EE2 and SE2**

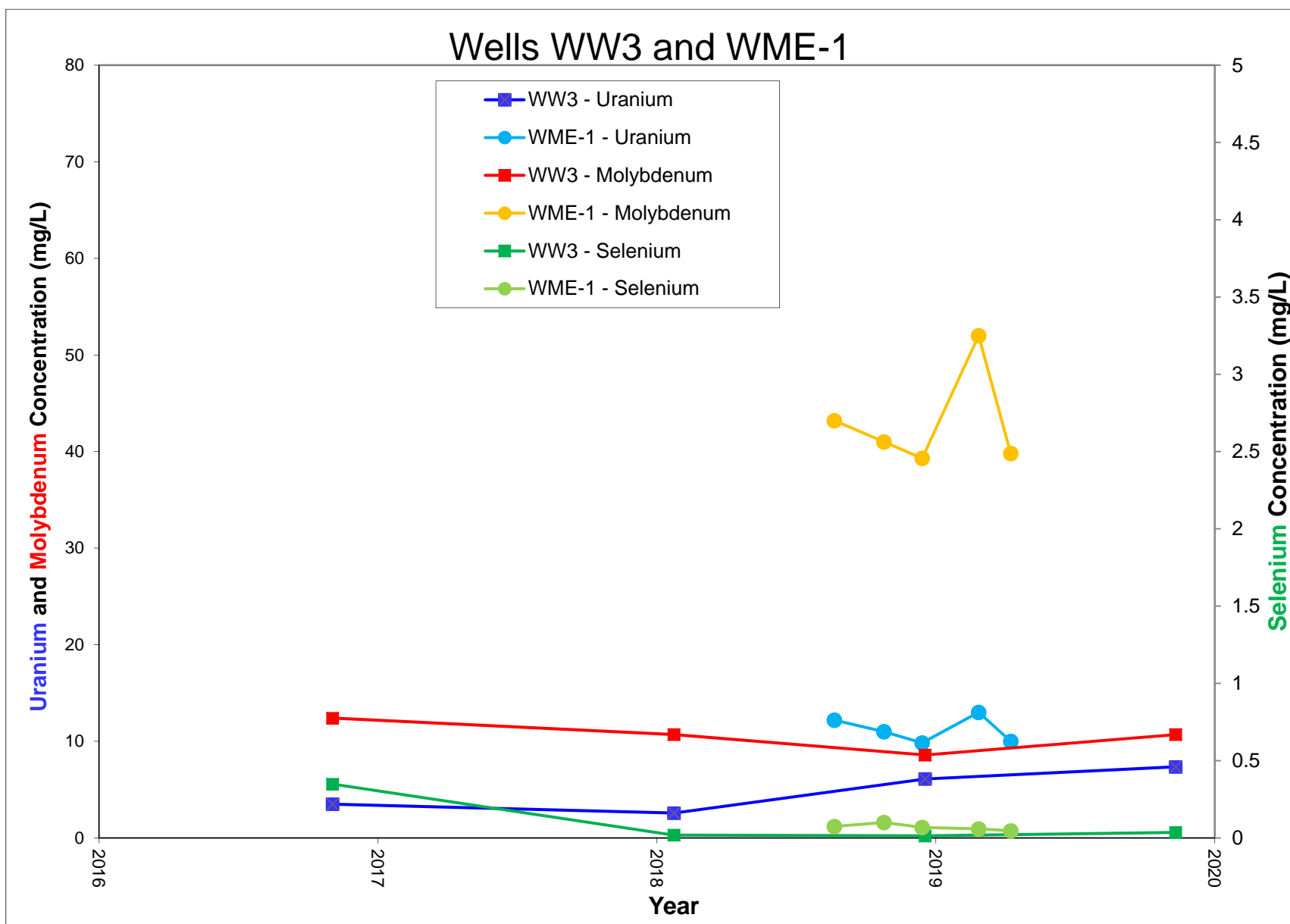


Figure 3.3-9. Uranium, Molybdenum and Selenium Concentrations for Sand Tailings Wells WW3 and WME-1

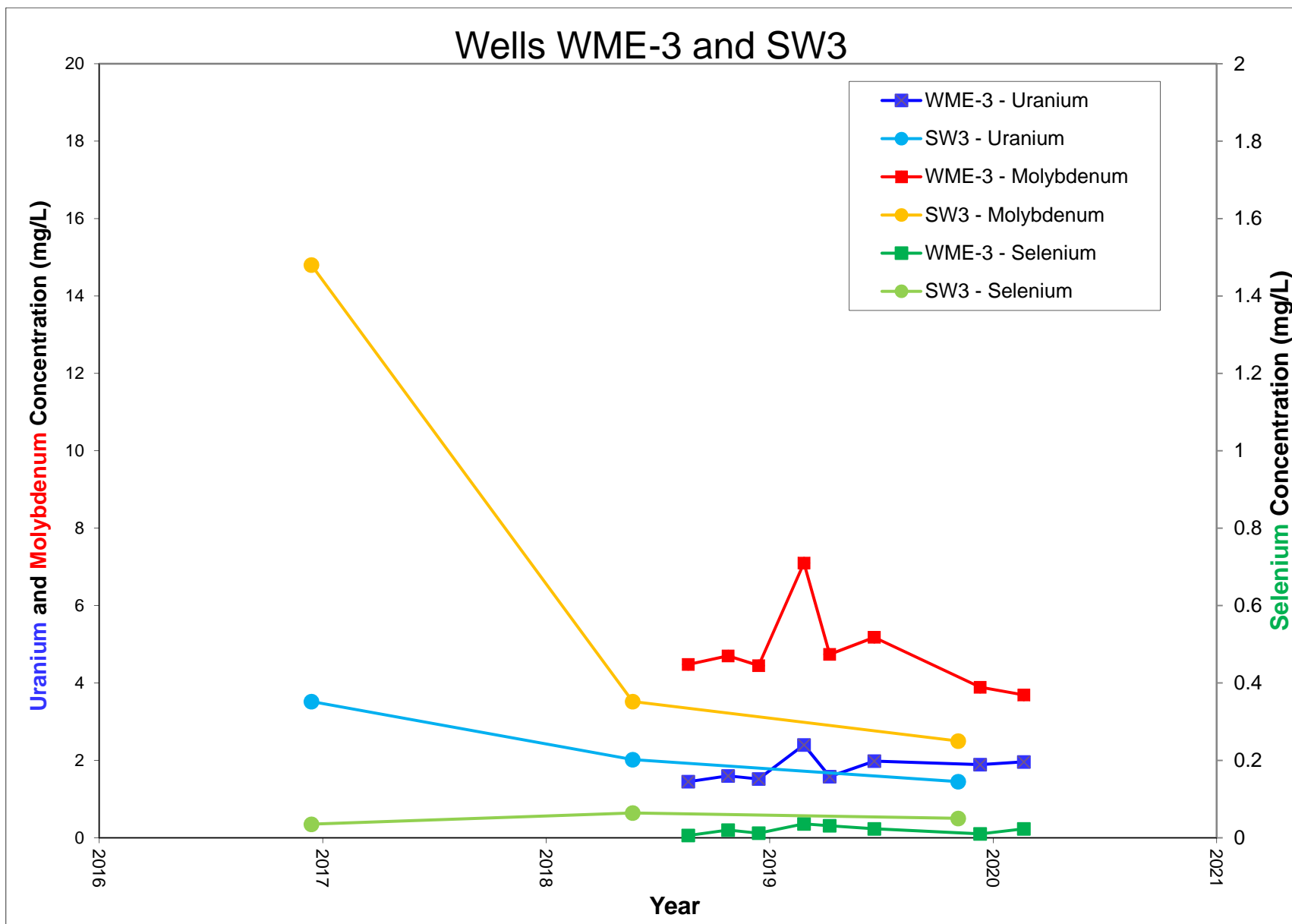


Figure 3.3-10. Uranium, Molybdenum and Selenium Concentrations for Sand Tailings Wells WME-3 and SW3

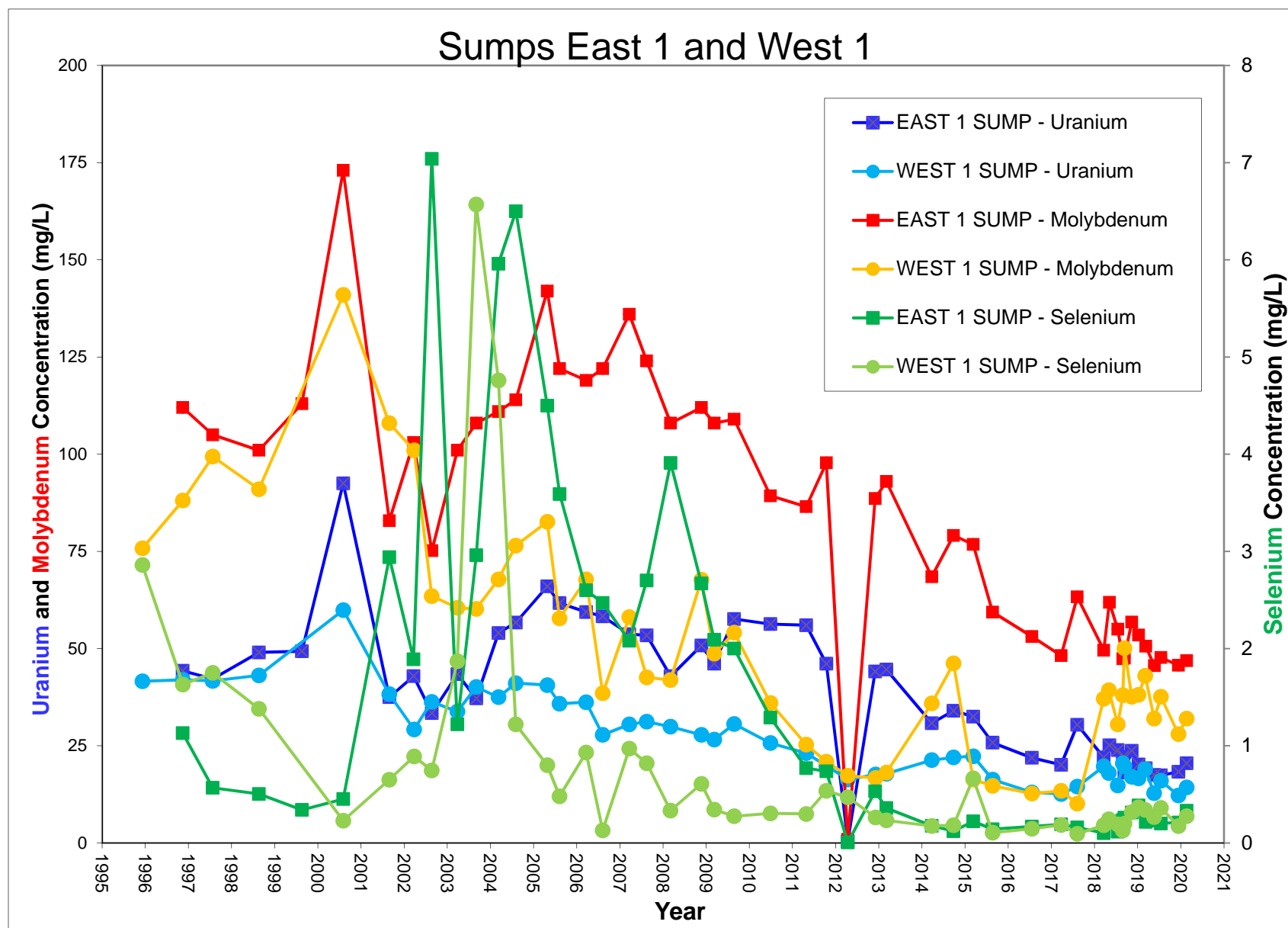


Figure 3.3-11. Uranium, Molybdenum and Selenium Concentrations for East 1 and West 1 Sumps



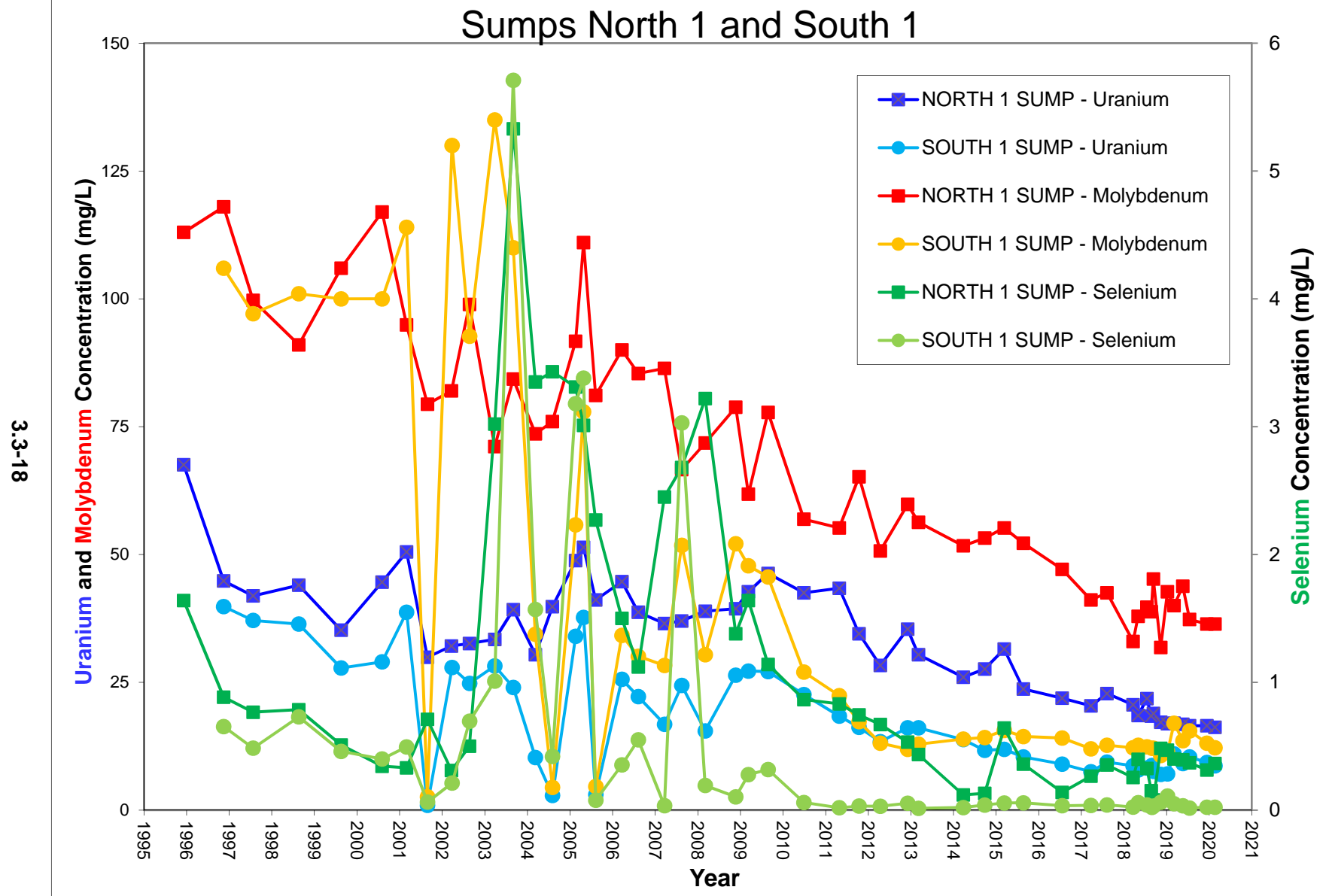
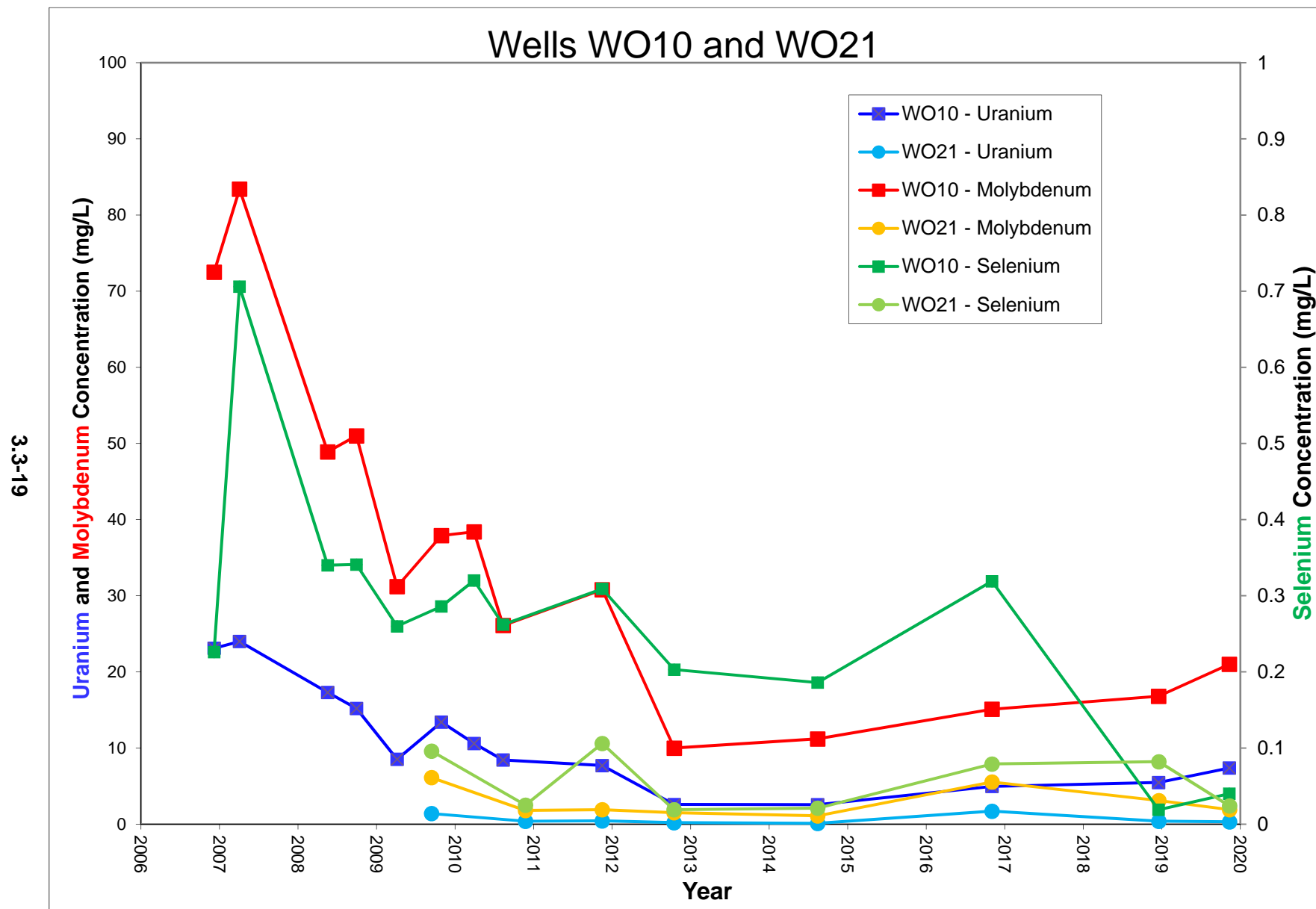


Figure 3.3-12. Uranium, Molybdenum and Selenium Concentrations for North 1 and South 1 Sumps



**Figure 3.3-13. Uranium, Molybdenum and Selenium Concentrations for Slime Tailings Wells WO10 and WO21**

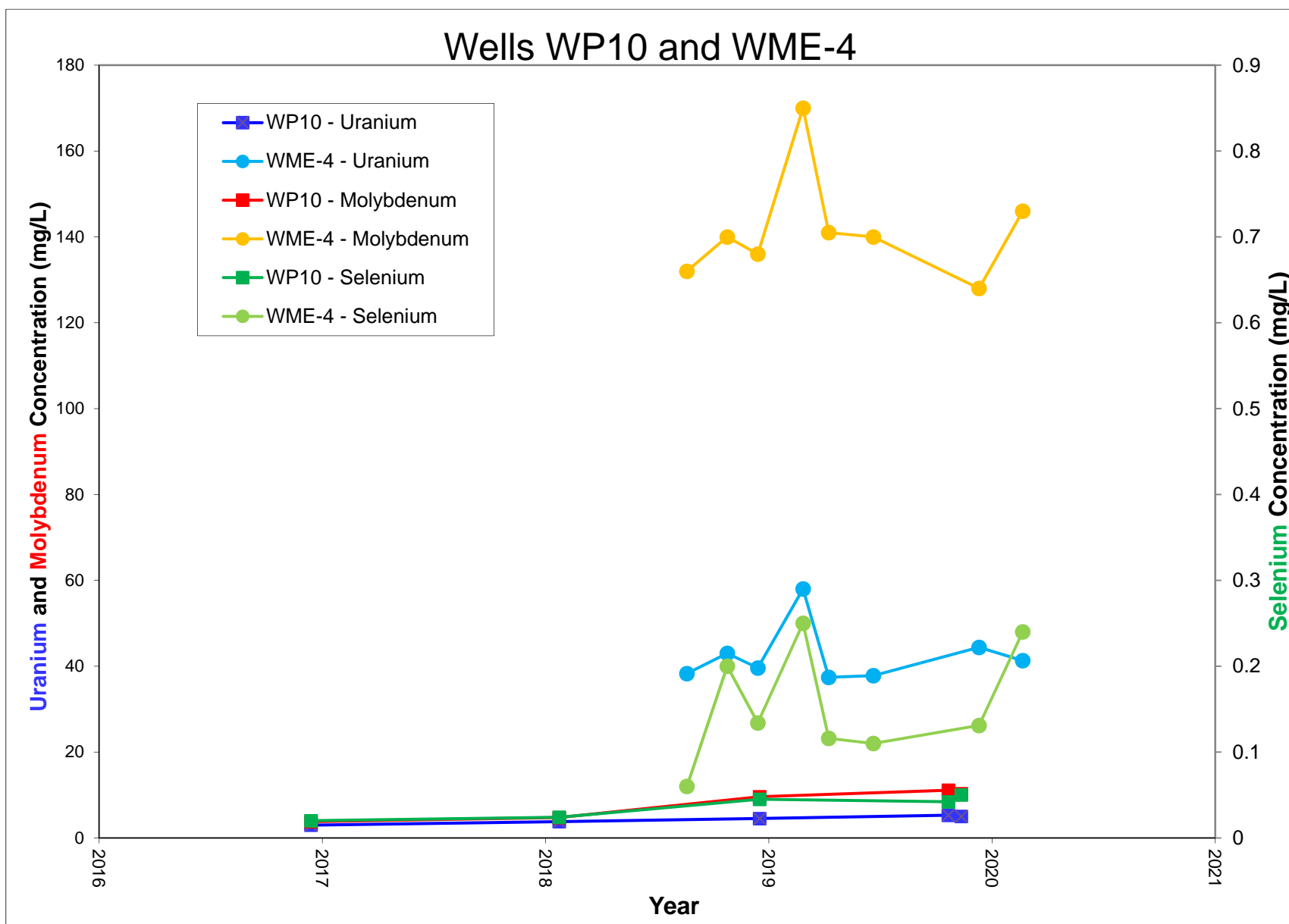


Figure 3.3-14. Uranium, Molybdenum and Selenium Concentrations for Slime Tailings Wells WP10 and WME-4

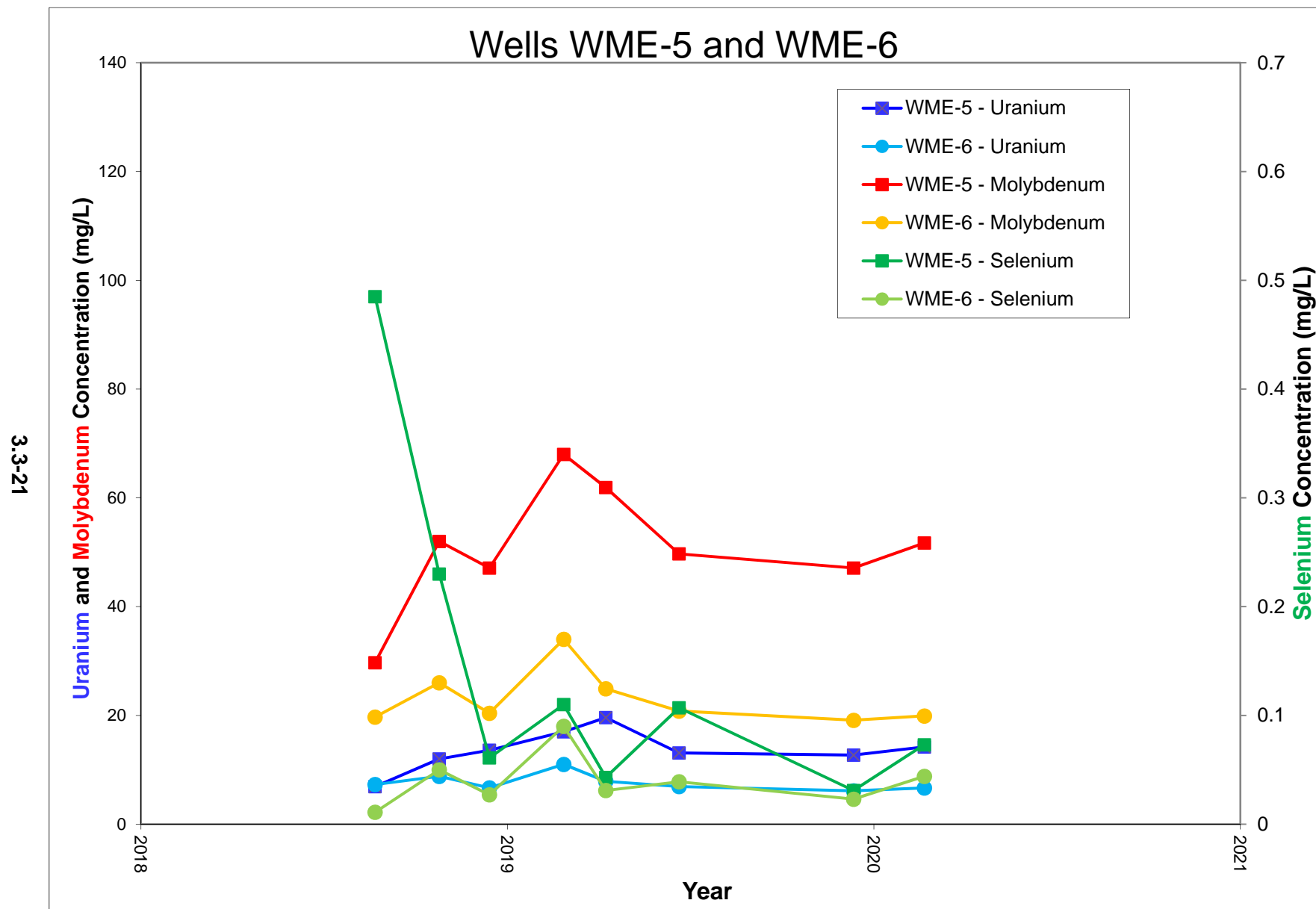


Figure 3.3-15. Uranium, Molybdenum and Selenium Concentrations for Slime Tailings Wells WME-5 and WME-6

**TABLE 3.3-1. ESTIMATED AVERAGE URANIUM, MOLYBDENUM AND SELENIUM CONCENTRATIONS FOR THE LTP**

Area	Saturated Volume (cubic feet)	Drainable Water Volume (gallons)	Unat * Saturated Volume (mg/L * cubic feet)	Average Unat Conc. (mg/L)	Moly * Saturated Volume (mg/L * cubic feet)	Average Moly Conc. (mg/L)	Se * Saturated Volume (mg/L * cubic feet)	Average Se Conc. (mg/L)
<b>2006 - Estimate</b>								
Sand	77,157,018	80,798,829	1,335,000,000	17.30				
Slimes	139,758,190	83,631,301	1,329,600,000	9.51				
Total	216,915,208	164,430,130	2,664,600,000	12.28				
<b>2007</b>								
Sand	77,157,018	80,798,829	1,249,100,000	16.19				
Slimes	139,758,190	83,631,301	1,287,800,000	9.21				
Total	216,915,208	164,430,130	2,536,900,000	11.70				
<b>2008</b>								
Sand	94,922,795	99,403,151	1,413,800,000	14.89				
Slimes	153,286,550	91,726,672	920,905,576	6.01				
Total	248,209,345	191,129,822	2,334,705,576	9.41				
<b>2009</b>								
Sand	102,218,044	107,042,736	1,346,200,000	13.17				
Slimes	152,943,835	91,521,591	810,147,132	5.30				
Total	255,161,879	198,564,327	2,156,347,132	8.45				
<b>2010</b>								
Sand	102,740,335	107,589,679	1,286,700,000	12.52	2,897,000,000	28.20		
Slimes	145,865,021	87,285,629	718,350,126	4.92	1,608,100,000	11.02		
Total	248,605,356	194,875,307	2,005,050,126	8.07	4,505,100,000	18.12		
<b>2011</b>								
Sand	107,638,906	112,719,462	1,147,300,000	10.66	2,548,600,000	23.68		
Slimes	144,830,473	86,666,555	641,596,854	4.43	1,577,800,000	10.89		
Total	252,469,379	199,386,017	1,788,896,854	7.09	4,126,400,000	16.34		
<b>2012</b>								
Sand	106,011,831	111,015,589	1,100,000,000	10.38	2,368,500,000	22.34		
Slimes	144,790,994	86,642,931	541,074,539	3.74	1,472,400,000	10.17		
Total	250,802,825	197,658,520	1,641,074,539	6.54	3,840,900,000	15.31		
<b>2013</b>								
Sand	106,226,948	111,240,860	972,629,548	9.16	2,299,700,000	21.65		
Slimes	144,852,116	86,679,506	514,455,035	3.55	1,459,800,000	10.08		
Total	251,079,064	197,920,366	1,487,084,583	5.92	3,759,500,000	14.97		
<b>2014</b>								
Sand	111,406,209	116,664,582	991,820,057	8.90	2,439,700,000	21.90		
Slimes	149,395,092	89,398,023	490,956,792	3.29	1,461,900,000	9.79		
Total	260,801,301	206,062,605	1,482,776,849	5.69	3,901,600,000	14.96		
<b>2015</b>								
Sand	101,569,653	106,363,741	835,649,839	8.23	2,154,600,000	21.21		
Slimes	143,921,106	86,122,390	476,402,234	3.31	1,417,000,000	9.85		
Total	245,490,759	192,486,130	1,312,052,073	5.34	3,571,600,000	14.55		
<b>2016</b>								
Sand	76,083,797	79,674,952	670,422,842	8.81	1,662,000,000	21.84		
Slimes	90,918,919	54,405,881	298,542,406	3.28	858,781,569	9.45		
Total	167,002,716	134,080,833	968,965,248	5.80	2,520,781,569	15.09		
<b>2017</b>								
Sand	69,004,696	72,261,718	535,171,616	7.76	1,245,100,000	18.04		
Slimes	87,007,632	52,065,367	283,993,784	3.26	821,451,955	9.44		
Total	156,012,328	124,327,085	819,165,400	5.25	2,066,551,955	13.25		
<b>2018</b>								
Sand	59,534,566	62,344,598	453,383,206	7.62	1,104,200,000	18.55	12,407,796	0.21
Slimes	78,245,048	46,821,837	279,020,346	3.57	734,892,138	9.39	4,290,629	0.05
Total	137,779,614	109,166,434	732,403,552	5.32	1,839,092,138	13.35	16,698,425	0.12
<b>2019</b>								
Sand	51,301,159	53,722,574	375,095,530	7.31	887,410,054	17.30	6,807,448	0.13
Slimes	74,614,665	44,649,416	274,488,652	3.68	743,999,446	9.97	3,822,215	0.05
Total	125,915,824	98,371,989	649,584,182	5.16	1,631,409,500	12.96	10,629,663	0.08
<b>2020</b>								
Sand	45,709,159	47,866,631	336,921,023	7.37	806,965,660	17.65	6,465,602	0.14
Slimes	72,108,445	43,149,693	267,857,410	3.71	725,088,804	10.06	3,666,969	0.05
Total	117,817,604	91,016,325	604,778,433	5.13	1,532,054,464	13.00	10,132,571	0.09

Note: Calculation of average uranium, molybdenum and selenium concentrations in 2020 was based on iso-concentration mapping using 2019 samples.

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## 4.0 ALLUVIAL AQUIFER MONITORING

This section presents 2020 monitoring results for the alluvial aquifer. The alluvial aquifer immediately underlies the Grants Project site and is therefore the most important groundwater system at the Grants Project site. The section describing well completions is presented first, and is followed by several report sections presenting water-level and water-quality information. Three additional alluvial maps have been added to present the well information in areas where data is too dense for the initial 1" = 1600' map. The scale of the additional maps is 1" = 500'. The locations of the additional maps are shown on the 1600 scale map (Figure 4.1-1) and they are the On-site (OS, Figure 4.1-1A), South Off-site (SOS, Figure 4.1-1B) and North Off-site (NOS, Figure 4.1-1C). OS, SOS and NOS have been added to these figure titles. The boundaries of the restoration areas are presented on Figure 1.2-2. The edges of the OS, SOS and NOS maps are not set the same as the restoration boundaries.

### 4.1 ALLUVIAL WELL COMPLETIONS

No new alluvial wells were drilled and no new additional infiltration lines were installed during 2020. Operational status and other characteristics of the new and previously installed alluvial wells and infiltration lines are discussed in this section. Figure 4.1-1 shows the locations of the alluvial wells near the Homestake Grants Project with the operational status for each well and infiltration line for 2020. Figure 4.1-1A shows the wells in the OS area while Figures 4.1-1B and 4.1-1C show the SOS and NOS area wells respectively. Wells labeled in black were used only for monitoring and black labeled infiltration lines were not used in 2020. Figure 4.1-1 is plotted at a scale of 1" = 1600' while the other figures are plotted at a scale of 1" = 500'. Alluvial wells 914, 920, 921, 922, 950, DD3, DD4, DD6 and DD7 are located outside, and north of, the area presented on Figure 4.1-1. These up-gradient wells are shown on Figure 4.3-1 in the alluvial water quality section.

The injection and collection wells that were active in 2020 are labeled with different colors on Figures 4.1-1, 4.1-1A, 4.1-1B and 4.1-1C so active wells can be distinguished from monitoring wells. Figures 4.1-1B and 4.1-1C also show the wells used for the Off-site collection during 2020. Figure 4.1-1B shows that South collection alluvial wells Q2, Q5, Q11, Q28, Q29, R2, R3 and R5 were pumped in 2020. Figure 4.1-1C shows that North collection alluvial wells 659, 890, H2A, H12 and H24 were pumped in 2020. This water was pumped to the zeolite for

treatment during 2020 but collection rate was limited due to the restrictions on water discharged to the evaporation ponds. [Table 4.1-1](#) presents basic well data for alluvial wells located on the Grants Project that have been used to define the alluvial groundwater hydrology. Many additional alluvial wells outside of the Grants Project have also been used for that purpose. The basic well data table presents the location, well depth, casing diameter, water-level information, depth to the base of the alluvium and casing perforation intervals for each well.

[Table 4.1-2](#) presents the same type of basic well data for alluvial wells in the Broadview and Felice Acres subdivisions. These two subdivisions are located just south of the Homestake property. [Figure 4.1-1](#) shows the locations of the subdivision wells. [Table 4.1-3](#) presents similar basic data for alluvial wells located in Murray Acres and Pleasant Valley Estates subdivisions.

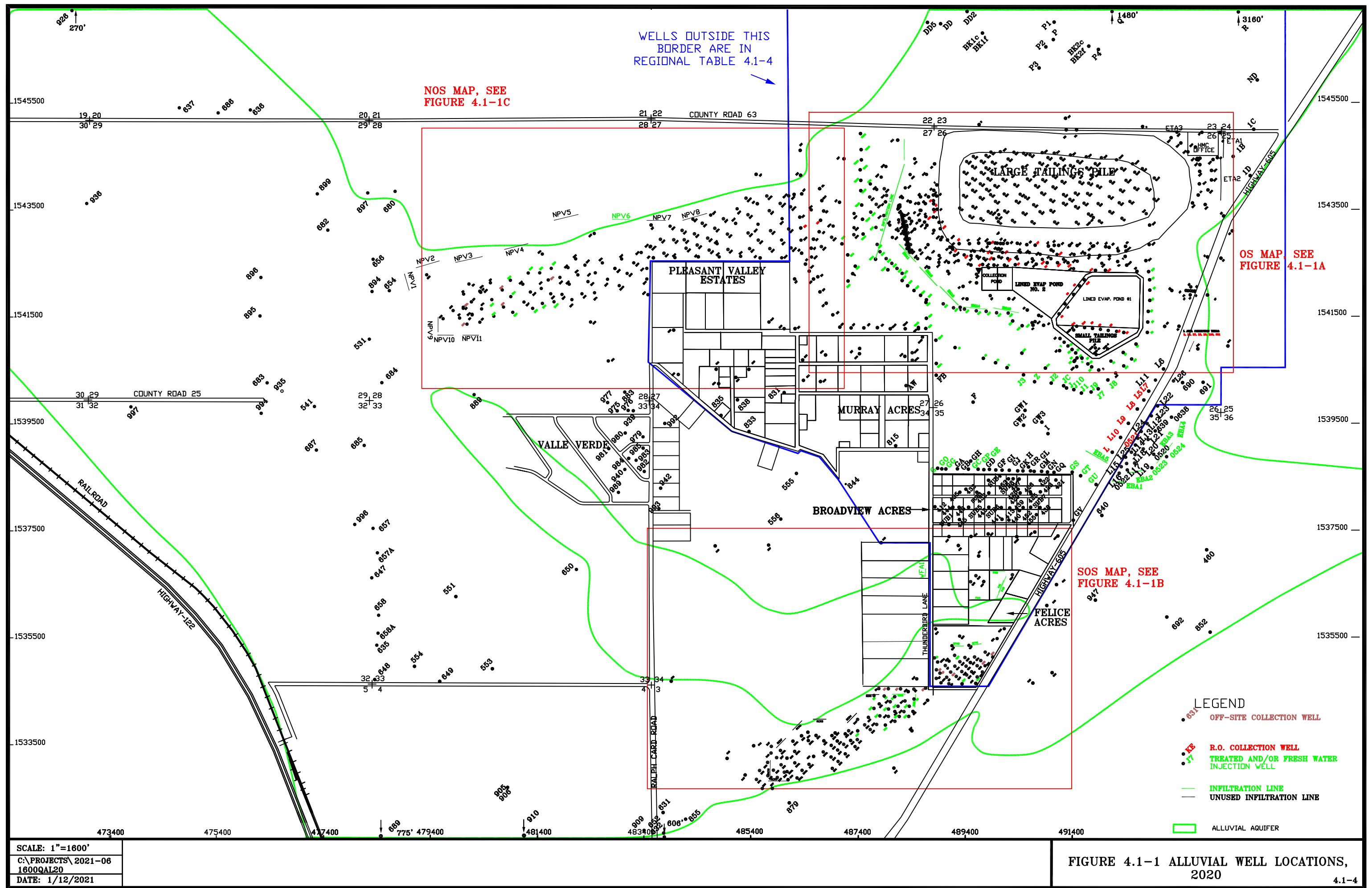
[Table 4.1-4](#) presents data for regional wells located outside of the subdivisions and the immediate Homestake property around the tailings sites (Grants Project). Wells outside the area delineated with a heavy blue boundary line on [Figure 4.1-1](#) are considered to be regional wells; data for these wells are presented in this table. The wells are listed in numerical or alphabetical order based on their well names.

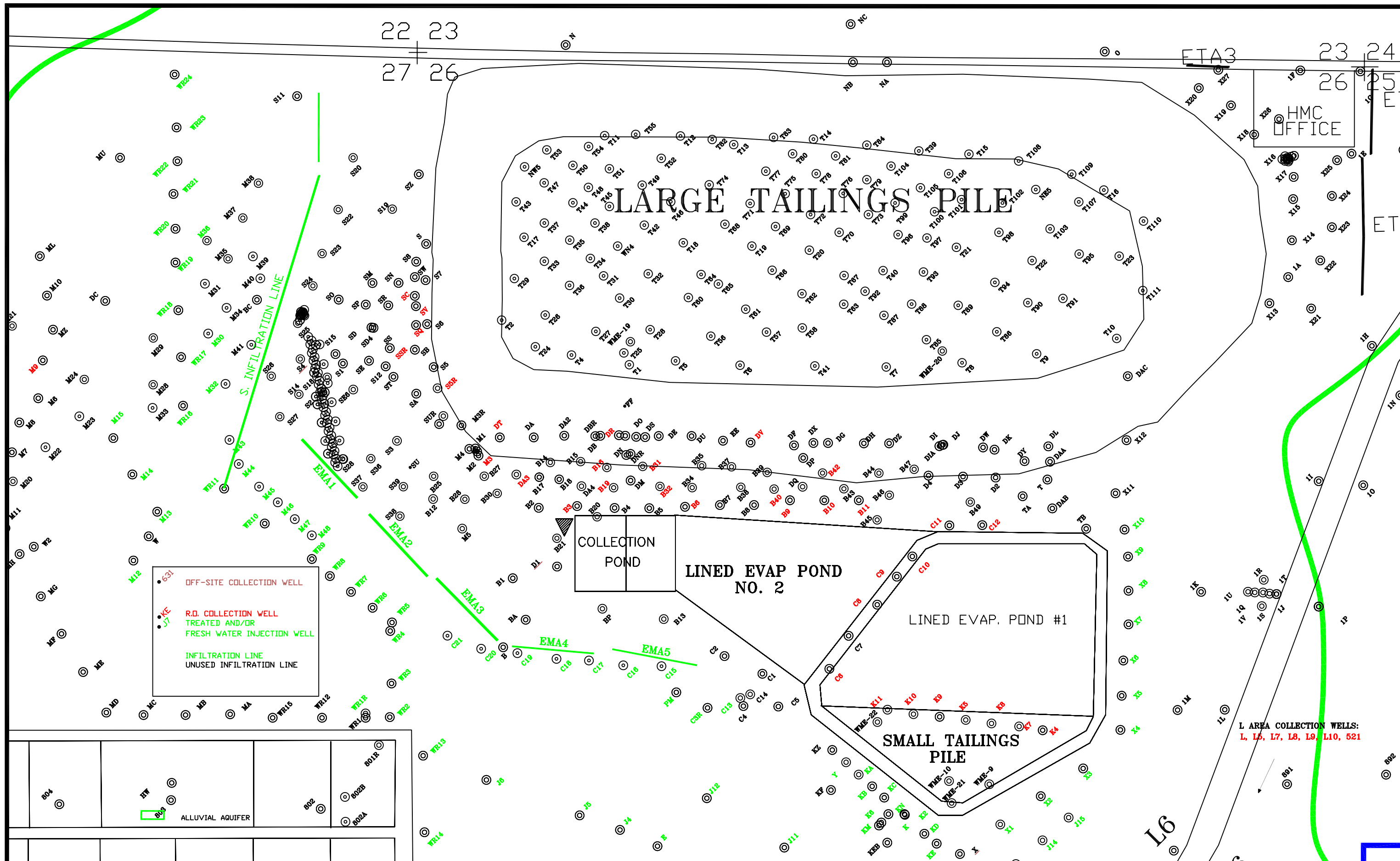
The elevation of the base of the alluvium has been used in determining required depths for alluvial wells. This elevation is the same as the elevation of the top of the Chinle Formation except in the far western portion of the area. [Figure 4.1-2](#) presents the base of the alluvium with data points used to define these elevation contours. The deepest portion of the San Mateo alluvium exists in the western portion of the LTP and extends to the west central portion of Section 28 where the San Mateo alluvium joins the Rio San Jose alluvium. An additional San Mateo channel exists in Section 3 that joins the Rio San Jose alluvium in Section 4. The mapping of the base of the alluvium was adjusted in the area near the northeast corner of the LTP due to additional drilling in this area.

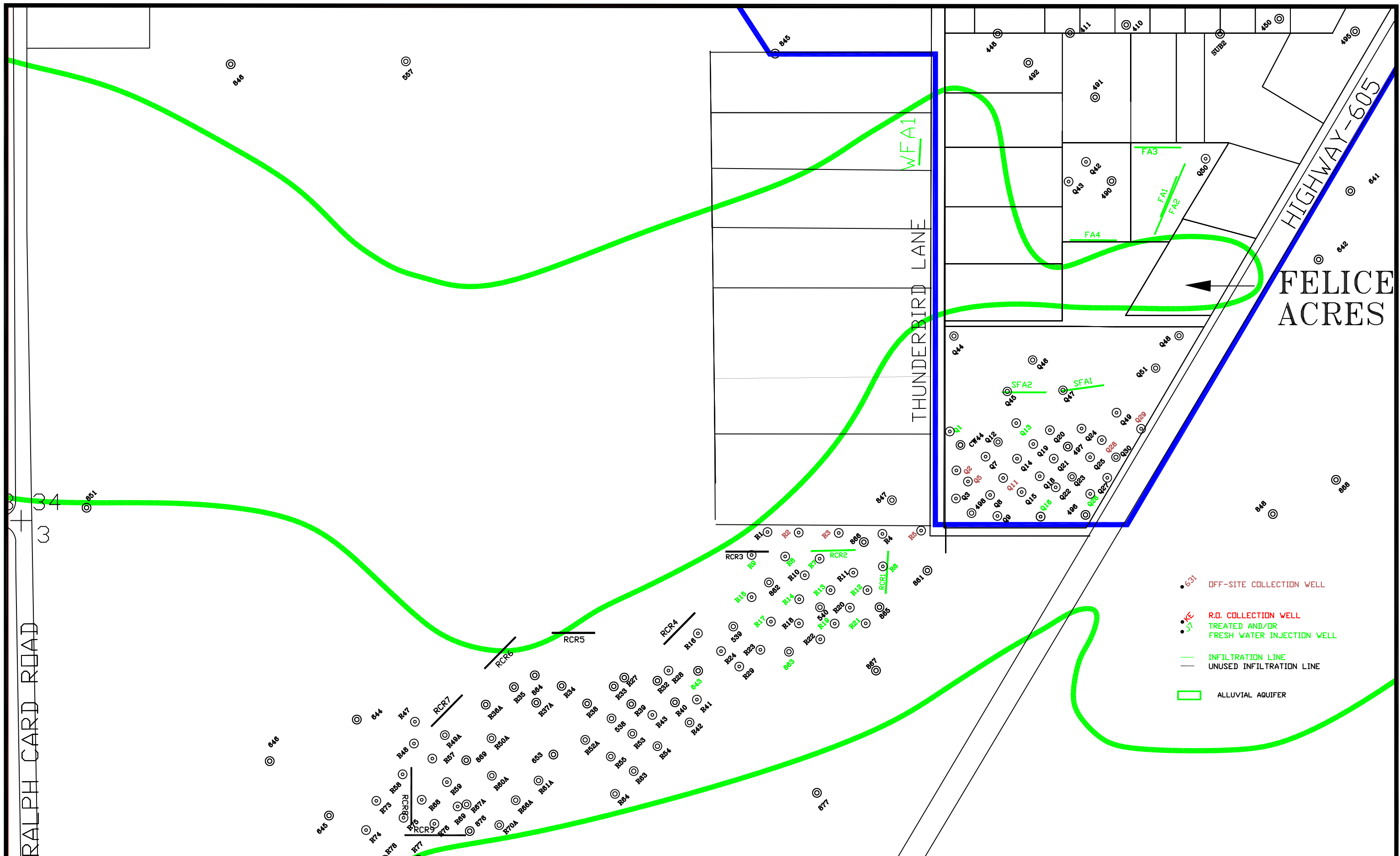
The green line in [Figures 4.1-1](#) and [4.1-2](#) shows the limits of the alluvial aquifer with alluvial saturation existing inside these limits where the base of the alluvium is lower than the water-level elevation. The 2014 alluvial water-level elevation was used in drawing the aquifer limits. The aquifer limits were updated with the 2014 water-level elevations because additional wells changed the interpretation of the limits of the alluvial aquifer in South Felice Acres area.



The base elevation of the alluvium rises on the western side of [Figure 4.1-2](#) and results in the western limit of the alluvial aquifer as shown on the west side of this figure. The alluvial aquifer extends to the south of this figure in Sections 4 and 5 of Township 11N, Range 10W.

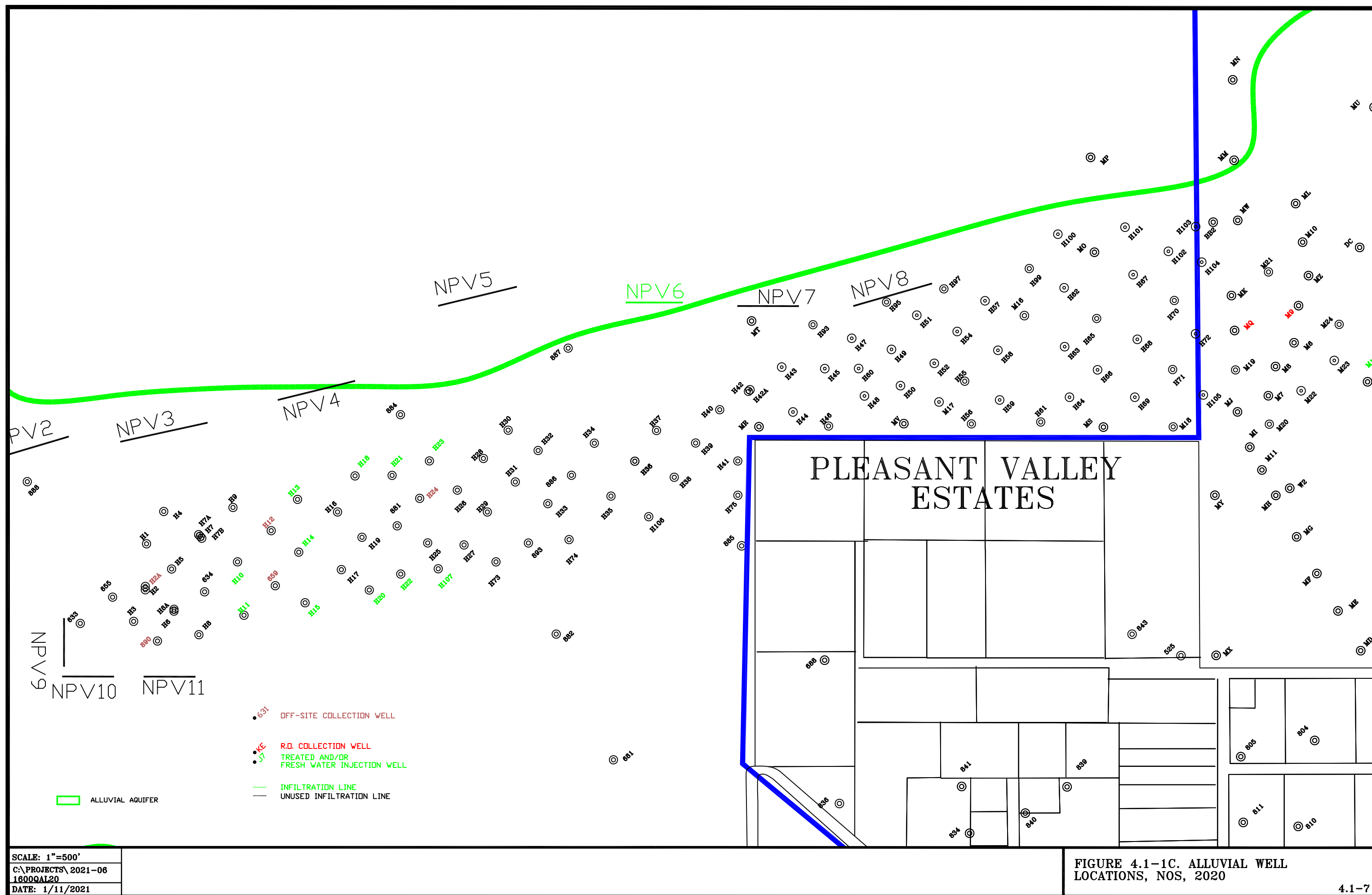






SCALE: 1"=500'  
 C:\PROJECTS\ 2021-06  
 1600QAL20  
 DATE: 1/8/2021

FIGURE 4.1-1B. ALLUVIAL WELL  
 LOCATIONS, SOS, 2020







**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)						
0690	1540279	493465	65.0	5.0	11/11/2020	42.10	6539.96	2.5	6582.06	55	6524.6 A	15.4
0691	1540276	493860	66.0	5.0	11/11/2020	47.18	6541.63	2.9	6588.81	55	6530.9 A	10.7
0891	1540904	493751	54.0	5.0	3/27/2019	36.81	6544.31	2.1	6581.12	50	6529.0 A	15.3
0892	1540954	494317	50.0	5.0	11/11/2020	43.65	6543.56	2.0	6587.21	42	6543.2 A	0.3
1A	1543790	493768	61.0	5.0	4/9/2020	37.91	6547.52	2.9	6585.43	47	6535.5 A	12.0
1B	1544502	494412	51.8	5.0	10/30/2001	38.70	6545.72	1.5	6584.42	50	6532.9 A	12.8
1C	1545018	494799	52.9	5.0	11/20/2020	37.32	6550.67	2.5	6587.99	43	6542.5 A	8.2
1D	1544142	494752	42.9	5.0	12/3/2005	26.42	6559.55	2.2	6585.97	40	6543.8 A	15.8
1E	1544481	494116	51.4	5.0	9/19/2017	35.00	6549.31	2.1	6584.31	43	6539.2 A	10.1
1F	1544952	493831	61.8	5.0	9/30/2019	38.97	6548.41	1.8	6587.38	54	6531.6 A	16.8
1G	1545034	494170	57.5	5.0	11/14/2012	39.28	6547.79	2.3	6587.07	48	6536.8 A	11.0
1H	1543388	494233	55.4	5.0	11/20/2020	55.40	6530.99	1.8	6586.39	43	6541.6 A	0.0
1I	1542627	493928	49.8	5.0	11/20/2020	34.40	6563.95	1.3	6598.35	35	6562.1 A	1.8
1J	1541986	493695	50.3	5.0	12/16/2019	40.50	6544.90	1.8	6585.40	40	6543.6 A	1.3
1K	1541992	493275	55.6	5.0	4/9/2020	43.38	6540.75	1.0	6584.13	47	6536.1 A	4.6
1L	1541256	493416	53.4	5.0	11/4/2008	27.46	6551.15	3.1	6578.61	40	6535.5 A	15.6
1M	1541327	493133	43.1	5.0	2/19/2019	31.62	6543.91	1.3	6575.53	33	6541.2 A	2.7
1N	1543100	494396	45.6	5.0	11/11/2020	32.33	6558.52	2.4	6590.85	25	6563.5 A	0.0
1O	1542592	494175	44.0	5.0	11/11/2020	43.95	6550.99	0.8	6594.94	29	6565.1 A	0.0
1P	1541902	493924	52.8	5.0	11/11/2020	41.10	6544.14	2.6	6585.24	35	6547.6 A	0.0
1Q	1541993	493619	56.0	5.0	1/16/2017	33.05	6550.06	1.9	6583.11	56	6525.2 A	24.9
1R	1542071	493623	56.0	5.0	1/16/2017	34.50	6551.49	1.3	6585.99	56	6528.7 A	22.8
1S	1541920	493614	56.0	5.0	4/17/2012	35.80	6546.19	1.5	6581.99	56	6524.5 A	21.7
1T	1541990	493656	56.0	5.0	1/16/2017	32.88	6552.03	1.7	6584.91	56	6527.2 A	24.8
1U	1542001	493542	44.2	4.0	1/14/2020	41.65	6544.57	3.2	6586.22	---	--- A -	---
1V	1541982	493579	61.4	5.0	1/16/2017	33.20	6551.74	1.7	6584.94	---	--- A -	---
* A1	1542365	491539	55.6	4.0	1/12/1994	45.29	6527.86	1.1	6573.15	55	6517.1 A	10.8
* A2	1542356	491539	46.4	4.0	12/23/1991	47.98	6525.42	1.1	6573.40	---	--- A	---
B	1541684	489311	68.6	4.0	12/28/2020	40.36	6530.54	2.4	6570.90	60	6508.5 A	22.0
B1	1542071	489370	90.9	5.0	11/20/2020	41.35	6530.30	0.6	6571.65	82	6489.1 A	41.3
B2	1542475	489515	83.0	5.0	10/17/2006	42.08	6532.17	2.0	6574.25	72	6500.3 A	31.9
B3	1542480	489731	87.0	5.0	5/1/2017	87.30	6486.99	2.6	6574.29	77	6494.7 A	0.0
B4	1542471	489942	88.8	5.0	11/1/2019	58.24	6516.42	7.4	6574.66	82	6485.3 A	31.2
B5	1542474	490141	91.0	5.0	5/1/2017	56.67	6516.79	1.4	6573.46	81	6491.1 A	25.7
B6	1542478	490341	90.0	5.0	4/27/2018	62.74	6514.95	2.0	6577.69	80	6495.7 A	19.3
B7	1542488	490540	87.0	5.0	12/9/2019	44.74	6529.66	2.2	6574.40	77	6495.2 A	34.5

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
B8	1542488	490734	87.0	5.0	12/9/2019	46.52	6529.23	2.3	6575.75	77	6496.5 A	53-78	32.8
B9	1542514	490935	86.0	5.0	4/10/2018	47.61	6528.56	2.2	6576.17	76	6498.0 A	51-78	30.6
B10	1542517	491133	84.8	5.0	7/14/2008	48.91	6527.86	2.3	6576.77	75	6499.5 A	51-78	28.4
B11	1542517	491329	84.9	5.0	3/2/2020	46.10	6531.29	2.2	6577.39	77	6498.2 A	42-80	33.1
B12	1542524	488915	100.0	5.0	11/25/2020	41.47	6531.55	2.2	6573.02	91	6479.8 A	30-100	51.7
B13	1541841	490223	80.0	5.0	11/20/2020	37.70	6532.34	3.1	6570.04	72	6494.9 A	30-80	37.4
B14	1542733	489579	120.0	4.5	4/22/2014	34.46	6541.19	2.0	6575.65	68	6505.7 A	60-120	35.5
B15	1542708	489749	120.0	4.5	10/28/2019	46.20	6530.11	2.0	6576.31	72	6502.3 A	60-120	27.8
B16	1542705	489900	120.0	4.5	10/28/2019	60.75	6514.62	2.0	6575.37	83	6490.4 A	60-120	24.3
B17	1542659	489493	95.0	4.5	10/28/2019	42.80	6531.51	2.0	6574.31	---	--- A	55-95	---
B18	1542652	489634	120.0	4.5	10/28/2019	45.60	6530.53	2.0	6576.13	70	6504.1 A	60-120	26.4
B19	1542605	489936	120.0	4.5	9/11/2014	39.79	6534.22	2.0	6574.01	90	6482.0 A	60-120	52.2
B20	1542444	489847	120.0	4.5	10/9/2014	40.11	6534.33	2.0	6574.44	90	6482.4 A	60-120	51.9
B21	1542315	489619	80.0	4.5	9/11/2014	38.45	6535.57	2.0	6574.02	80	6492.0 A	50-80	43.5
B25	1542644	488917	90.0	4.5	9/8/2014	35.77	6537.90	2.0	6573.67	90	6481.7 A	50-90	56.2
B26	1542819	488938	110.0	4.5	---	---	---	1.3	6574.25	---	--- A	50-110	---
B27	1542667	489204	90.0	4.5	9/8/2014	36.57	6537.47	2.0	6574.04	90	6482.0 A	50-90	55.4
B28	1542538	489095	90.0	4.5	9/8/2014	36.43	6537.55	2.0	6573.98	80	6492.0 A	50-90	45.6
B30	1542568	489281	90.0	4.5	9/5/2014	35.38	6539.35	2.0	6574.73	90	6482.7 A	50-90	56.6
B31	1542710	490103	120.0	4.5	10/28/2019	59.40	6516.56	2.0	6575.96	83	6491.0 A	60-100	25.6
B32	1542598	490201	120.0	4.5	10/28/2019	46.10	6529.29	2.0	6575.39	93	6480.4 A	60-120	48.9
B33	1542709	490269	85.0	4.5	---	---	---	2.4	6575.46	---	--- A	45-85	---
B34	1542601	490388	90.0	4.5	9/5/2014	37.12	6538.57	2.0	6575.69	90	6483.7 A	50-90	54.9
B35	1542714	490393	90.0	4.5	4/17/2018	39.70	6537.16	2.0	6576.86	90	6484.9 A	50-90	52.3
B36	1542668	490467	85.0	4.5	---	---	---	2.0	6576.44	---	--- A	40-85	---
B37	1542711	490543	80.0	4.5	9/11/2014	35.60	6540.73	2.0	6576.33	80	6494.3 A	40-80	46.4
B38	1542607	490662	80.0	4.5	5/2/2017	69.37	6506.30	2.0	6575.67	80	6493.7 A	40-80	12.6
B39	1542667	490816	80.0	4.5	9/10/2014	37.49	6539.11	2.0	6576.60	80	6494.6 A	40-80	44.5
B40	1542595	490850	80.0	4.5	4/10/2018	42.73	6533.16	2.0	6575.89	80	6493.9 A	40-80	39.3
B41	1542656	490998	85.0	4.5	---	---	---	1.8	6578.13	---	--- A	40-85	---
B42	1542679	491060	80.0	4.5	4/10/2018	42.10	6536.87	2.0	6578.97	80	6497.0 A	40-80	39.9
B43	1542610	491235	80.0	4.5	9/5/2014	35.49	6541.47	2.0	6576.96	80	6495.0 A	40-80	46.5
B44	1542665	491360	80.0	4.5	4/10/2018	40.08	6538.52	2.0	6578.60	80	6496.6 A	40-80	41.9
B45	1542423	491434	80.0	4.5	10/9/2014	35.31	6541.61	2.0	6576.92	80	6494.9 A	40-80	46.7
B46	1542539	491507	80.0	4.5	9/10/2014	37.87	6541.39	2.0	6579.26	80	6497.3 A	40-80	44.1
B47	1542695	491639	80.0	4.5	9/8/2014	35.51	6543.45	2.0	6578.96	80	6497.0 A	40-80	46.5



**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS	
					DATE	DEPTH (FT-MP) (FT-MSL)							
B48	1542395	491633	80.0	4.5	---	---	---	2.0	6579.68	---	--- A	40-80	---
B49	1542521	491966	80.0	4.5	9/10/2014	34.86	6545.00	2.0	6579.86	80	6497.9 A	40-80	47.1
BA	1541835	489440	86.0	5.0	12/28/2020	41.55	6530.03	1.7	6571.58	76	6493.9 A	64-78	36.2
BB2	1543791	486213	56.6	4.0	11/15/2002	53.36	6520.44	0.6	6573.80	---	--- A	42-62	---
BC	1543655	487910	82.8	4.0	11/23/2020	39.89	6534.72	2.6	6574.61	75	6497.0 A	63-83	37.7
BK1c	1546812	489728	52.0	---	6/10/2019	44.25	6539.75	0.0	6584.00	---	--- A	47-52	---
BK1f	1546834	489743	57.0	---	6/10/2019	44.79	6539.21	0.0	6584.00	---	--- A	52-57	---
BK2c	1546567	491717	83.5	---	6/10/2019	40.29	6551.71	0.0	6592.00	---	--- A	58.5-63.	---
BK2f	1546553	491732	79.0	---	6/10/2019	40.06	6551.94	0.0	6592.00	---	--- A	74-79	---
BP	1541882	489841	85.4	4.0	12/13/2019	43.00	6529.30	3.0	6572.30	75	6494.3 A	40-85	35.0
* C	1541762	490854	79.7	4.0	5/16/1994	41.50	6529.34	0.3	6570.84	75	6495.5 A	59-79	33.8
C1	1541533	490780	76.0	5.0	3/26/2020	38.54	6533.32	0.8	6571.86	67	6504.1 A	41-68	29.3
C2	1541630	490566	76.0	5.0	3/26/2020	35.11	6529.91	0.9	6565.02	66	6498.1 A	42-67	31.8
* C3	1541344	490481	75.0	5.0	6/20/1994	36.20	6532.33	0.9	6568.53	65	6502.6 A	45-67	29.7
C3R	1541338	490472	75.0	5.0	3/7/2002	18.00	6551.29	2.0	6569.29	66	6501.3 A	43-68	50.0
C4	1541348	490675	75.0	5.0	10/2/2000	39.66	6531.18	1.3	6570.84	66	6503.5 A	46-66	27.6
C5	1541344	490869	72.0	5.0	3/27/2019	34.82	6535.03	0.8	6569.85	62	6507.1 A	43-63	28.0
C6	1541533	491142	80.8	5.0	3/26/2020	78.36	6506.53	1.6	6584.89	72	6511.3 A	34-74	0.0
C7	1541734	491280	72.4	5.0	3/26/2020	53.85	6530.59	1.5	6584.44	61	6521.9 A	25-65	8.7
C8	1541906	491415	78.1	5.0	3/26/2020	50.13	6534.36	1.6	6584.49	67	6515.9 A	31-71	18.5
C9	1542075	491545	77.0	5.0	3/26/2020	57.28	6527.27	1.5	6584.55	65	6518.1 A	27-67	9.2
C10	1542182	491629	71.6	5.0	3/26/2020	62.67	6522.59	2.7	6585.26	65	6517.6 A	30-70	5.0
C11	1542376	491844	68.2	5.0	11/5/2019	43.08	6538.30	2.4	6581.38	60	6519.0 A	35-65	19.3
C12	1542375	492029	63.5	5.0	11/1/2019	25.26	6555.29	2.6	6580.55	55	6523.0 A	34-64	32.3
C13	1541394	490655	63.0	5.0	11/9/2005	30.00	6540.01	2.0	6570.01	63	6505.0 A	36-70	35.0
C14	1541413	490713	63.0	5.0	11/9/2005	29.95	6539.74	2.0	6569.69	63	6504.7 A	36-70	35.0
C15	1541574	490209	70.0	4.5	---	---	---	0.5	6570.62	70	6500.1 A	30-70	---
C16	1541579	489993	70.0	4.5	---	---	---	0.5	6570.39	70	6499.9 A	30-70	---
C17	1541607	489798	70.0	4.5	---	---	---	0.5	6570.74	70	6500.2 A	30-70	---
C18	1541616	489614	120.0	4.5	10/28/2019	10.40	6560.70	0.5	6571.10	60	6510.6 A	40-120	50.1
C19	1541648	489392	120.0	4.5	10/28/2019	18.60	6551.31	0.5	6569.91	80	6489.4 A	40-120	61.9
C20	1541673	489187	110.0	4.5	10/28/2019	17.20	6552.96	0.5	6570.16	70	6499.7 A	50-110	53.3
C21	1541747	488996	100.0	4.5	10/28/2019	26.24	6545.75	0.5	6571.99	90	6481.5 A	40-100	64.3
* D	1542127	490118	89.7	4.0	7/5/2011	37.10	6535.79	0.8	6572.89	90	6482.1 A	71-91	53.7
D1	1542140	489615	89.4	4.0	7/22/2020	46.20	6524.70	1.0	6570.90	80	6489.9 A	58-90	34.8
D2	1542641	492107	70.0	5.0	6/18/2014	46.20	6533.97	3.0	6580.17	62	6515.2 A	40-70	18.7

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
D3	1542646	491917	80.0	5.0	11/29/1999	0.50	6579.63	2.5	6580.13	72	6505.6 A	40-80	74.0
D4	1542652	491724	78.0	5.0	11/29/1999	0.50	6578.93	2.5	6579.43	70	6506.9 A	48-78	72.0
DA	1542864	489488	99.1	5.0	12/4/1997	61.40	6524.15	3.0	6585.55	90	6492.6 A	50-100	31.6
DA2	1542881	489656	82.1	5.0	1/13/1995	51.11	6536.18	2.8	6587.29	83	6501.5 A	64-74	34.7
DA3	1542664	489390	81.0	5.0	4/5/2018	39.12	6535.24	2.6	6574.36	72	6499.8 A	30-81	35.4
DA4	1542598	489756	81.0	5.0	6/26/2002	76.50	6497.47	1.7	6573.97	71	6501.3 A	31-81	0.0
DAA	1542733	492411	62.7	5.0	12/5/2000	2.00	6578.60	2.2	6580.60	54	6524.4 A	30-60	54.2
DAB	1542633	492399	65.1	5.0	12/5/2000	0.50	6579.38	2.3	6579.88	56	6521.6 A	30-60	57.8
DAC	1543218	492851	67.7	5.0	---	---	---	4.1	6620.36	45	6571.3 A	20-30	---
DB	1542874	489842	73.2	5.0	9/8/1998	66.15	6523.33	0.5	6589.48	---	---	55-85	---
DBR	1542877	489855	55.6	5.0	1/25/1995	52.19	6536.97	4.8	6589.16	---	---	-	---
DC	1543646	487060	64.1	4.0	11/23/2020	42.43	6528.88	2.7	6571.31	---	---	45-65	---
DD	1546989	488943	78.5	4.0	10/12/2020	49.70	6542.89	1.9	6592.59	83	6507.7 A	40-80	35.2
DD2	1547439	489251	94.3	5.0	10/7/2020	46.50	6546.78	2.0	6593.28	80	6511.3 A	50-90	35.5
DD3	1548273	489592	69.9	4.0	10/23/2019	48.65	6552.29	3.6	6600.94	67	6530.3 A	40-70	22.0
DD4	1547675	489466	81.5	4.0	10/23/2019	48.15	6551.28	3.8	6599.43	80	6515.6 A	42-82	35.7
DD5	1547013	488704	68.0	4.0	10/23/2019	50.45	6544.90	3.6	6595.35	65	6526.8 A	58-68	18.1
DD6	1547340	488377	35.0	4.0	6/13/2019	35.00	6560.81	3.2	6595.81	35	6557.6 A	25-35	3.2
DD7	1547606	488129	24.2	4.0	6/13/2019	24.20	6572.63	4.1	6596.83	20	6572.8 A	14-24	0.0
DE	1542877	490193	70.2	5.0	10/5/1998	63.70	6527.65	0.8	6591.35	80	6510.6 A	60-90	17.1
DF	1542839	490869	88.5	5.0	5/23/2002	65.06	6525.53	0.6	6590.59	---	---	65-95	---
DG	1542839	491157	88.9	5.0	5/23/2002	59.80	6531.98	0.4	6591.78	---	---	65-95	---
DH	1542835	491365	61.7	5.0	12/24/1991	52.65	6538.69	4.8	6591.34	---	---	65-95	---
DI	1542821	491788	86.1	5.0	12/9/1997	57.87	6531.75	2.3	6589.62	75	6512.3 A	35-85	19.4
DIA	1542821	491793	---	4.0	12/23/1991	50.41	6543.22	1.4	6593.63	---	---	-	---
DJ	1542821	491793	85.7	5.0	8/24/1988	46.87	6542.69	0.7	6589.56	75	6513.9 A	35-85	28.8
DK	1542799	492094	65.4	5.0	12/23/1991	43.58	6542.33	0.7	6585.91	55	6530.2 A	35-55	12.1
DL	1542813	492398	64.4	5.0	12/5/2000	2.00	6582.87	2.9	6584.87	55	6527.0 A	35-55	55.9
DM	1542628	490035	62.8	5.0	12/14/2000	52.00	6523.08	3.0	6575.08	---	---	-	---
DN	1542776	490020	66.7	4.0	12/14/2000	51.52	6525.14	3.7	6576.66	---	---	-	---
DNR	1542779	490031	79.7	4.0	12/5/2000	51.80	6525.26	3.3	6577.06	---	---	-	---
DO	1542874	490049	75.8	5.0	12/5/2000	65.20	6525.13	1.6	6590.33	75	6513.7 A	65-75	11.4
DP	1542754	491012	79.8	5.0	6/26/2002	53.46	6526.25	3.5	6579.71	---	---	-	---
DQ	1542592	491006	85.3	5.0	6/11/2015	40.77	6535.66	2.2	6576.43	---	---	-	---
DR	1542884	489966	87.8	5.0	6/11/2015	55.75	6535.08	2.7	6590.83	85	6503.1 A	65-85	32.0
DS	1542876	490118	87.0	5.0	8/2/1999	65.22	6523.59	0.9	6588.81	77	6510.9 A	62-77	12.7

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
DT	1542871	489293	72.3	5.0	12/28/2020	48.62	6535.19	2.7	6583.81	99	6482.1 A	59-99	53.1
DU	1542879	490380	84.6	5.0	7/6/1988	51.56	6539.51	2.9	6591.07	81	6507.2 A	61-81	32.3
DV	1542826	490702	80.0	5.0	8/28/2006	54.64	6530.96	2.9	6585.60	77	6505.7 A	60-80	25.3
DW	1542818	492029	73.4	5.0	12/5/2000	2.50	6586.16	3.6	6588.66	59	6526.1 A	45-60	60.1
DX	1542838	491074	90.0	6.0	8/2/1999	61.80	6530.18	1.0	6591.98	80	6511.0 A	60-90	19.2
DY	1542737	492271	65.7	5.0	12/5/2000	1.50	6579.11	2.3	6580.61	56	6522.3 A	15-65	56.8
DZ	1542834	491501	81.8	5.0	12/28/2020	54.82	6535.71	2.2	6590.53	---	--- A	-	---
E	1540553	490187	61.7	4.0	12/5/2000	2.00	6566.94	1.7	6568.94	60	6507.2 A	44-64	59.7
EE	1542853	490523	91.2	5.0	1/31/1995	45.26	6542.85	0.6	6588.11	80	6507.5 A	50-90	35.3
EW-1	1543400	488270	95.0	4.0	---	---	---	---	6577.04	---	--- A	50-90	---
EW-2	1543288	488294	94.0	4.0	---	---	---	---	6576.75	---	--- A	49-89	---
EW-3	1543180	488316	95.0	4.0	---	---	---	---	6576.58	---	--- A	50-90	---
EW-4	1543072	488339	95.0	4.0	---	---	---	---	6575.81	---	--- A	50-90	---
EW-5	1542963	488361	95.0	4.0	---	---	---	---	6575.63	---	--- A	50-90	---
EW-6	1542855	488383	95.0	4.0	---	---	---	---	6575.58	---	--- A	50-90	---
EW-7	1542749	488405	95.0	4.0	---	---	---	---	6576.05	---	--- A	50-90	---
F	1539908	489554	63.8	4.0	11/20/2020	37.21	6527.61	1.2	6564.82	62	6501.6 A	45-65	26.0
FB	1540417	488857	62.0	4.0	9/23/2020	38.50	6527.16	2.0	6565.66	58	6505.7 A	43-58	21.5
* FF	1542878	490017	---	4.0	6/21/1983	41.08	6535.46	0.2	6576.54	124	6452.3 A	52-132	83.1
G	1538672	488890	78.3	4.0	12/13/2004	4.00	6559.09	2.0	6563.09	75	6486.1 A	50-80	73.0
GA	1538657	489255	---	4.0	11/20/2020	38.72	6524.07	1.8	6562.79	62	6499.0 A	45-65	25.1
GB	1538654	489456	65.2	4.0	4/3/2000	4.00	6558.99	1.9	6562.99	64	6497.1 A	45-65	61.9
GC	1538650	489654	---	4.0	12/11/2003	33.82	6531.35	2.5	6565.17	78	6484.7 A	60-80	46.7
GD	1538646	489855	---	4.0	12/4/1995	0.50	6565.12	1.8	6565.62	72	6491.8 A	55-75	73.3
GE	1538637	489972	117.0	4.0	12/11/2003	34.61	6531.66	2.4	6566.27	65	6498.9 A	50-120	32.8
GF	1538632	490097	119.2	4.0	11/20/2020	40.13	6525.88	1.8	6566.01	67	6497.2 A	50-120	28.7
GG	1538662	489055	58.7	4.0	4/3/2000	4.00	6559.13	1.8	6563.13	57	6504.3 A	48-68	54.8
GH	1538807	489509	69.2	4.0	9/15/2020	37.70	6525.06	1.3	6562.76	67	6494.5 A	55-65	30.6
GI	1538631	490218	119.0	4.0	4/3/2000	4.00	6561.85	1.5	6565.85	67	6497.4 A	50-120	64.5
GJ	1538629	490382	119.2	4.0	4/3/2000	4.00	6562.15	2.0	6566.15	65	6499.2 A	50-120	63.0
GK	1538622	490482	115.7	4.0	9/18/2018	37.37	6529.39	2.4	6566.76	67	6497.4 A	50-120	32.0
GL	1538614	490701	119.3	4.0	4/3/2000	4.00	6563.15	2.1	6567.15	71	6494.1 A	50-120	69.1
GM	1538605	490824	118.2	4.0	4/3/2000	4.00	6563.65	2.1	6567.65	69	6496.6 A	50-120	67.1
GN	1538602	490944	116.5	4.0	3/2/2020	40.00	6527.97	1.8	6567.97	70	6496.2 A	50-120	31.8
GO	1538663	488973	122.3	4.0	4/3/2000	4.00	6559.00	1.6	6563.00	75	6486.4 A	50-120	72.6
GP	1538649	489752	121.4	4.0	12/5/2000	5.00	6559.87	2.1	6564.87	68	6494.8 A	50-120	65.1

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
GQ	1538599	491067	70.0	4.0	12/13/2010	1.40	6566.76	0.9	6568.16	71	6496.3 A	50-70	70.5
GR	1538619	490619	85.0	4.0	12/23/1991	36.55	6528.66	1.0	6565.21	75	6489.2 A	50-85	39.5
GS	1538597	491408	86.4	5.0	12/5/2000	33.00	6541.31	2.0	6574.31	80	6492.3 A	50-85	49.0
GT	1538534	491565	84.0	5.0	12/5/2000	8.30	6567.87	2.1	6576.17	76	6498.1 A	60-84	69.8
GU	1538367	491854	80.0	5.0	3/7/2002	15.00	6560.65	2.0	6575.65	73	6500.7 A	60-80	60.0
GV	1537701	491428	83.0	5.0	11/20/2020	52.79	6524.59	2.5	6577.38	74	6500.9 A	62-82	23.7
GW1	1539755	490530	73.0	5.0	11/20/2020	38.49	6526.78	1.0	6565.27	65	6499.3 A	48-73	27.5
GW2	1539471	490497	75.0	5.0	11/20/2020	38.95	6527.13	1.0	6566.08	68	6497.1 A	47-75	30.0
GW3	1539532	490835	72.0	5.0	5/4/1993	34.42	6531.86	1.0	6566.28	62	6503.3 A	45-72	28.6
H	1538703	490582	69.3	4.0	12/23/1991	37.93	6528.65	1.8	6566.58	69	6495.8 A	50-70	32.9
I	1539319	490954	70.0	4.0	11/20/2020	38.82	6528.38	1.6	6567.20	68	6497.6 A	52-72	30.8
IW-1D	1543443	488206	85.0	4.0	---	---	---	---	6574.57	---	---	A 60-80	---
IW-1S	1543422	488225	63.0						6573.45	---	---	A 38-58	---
IW-2S	1543373	488232	59.0	4.0	---	---	---	---	6573.93	---	---	A 34-54	---
IW-2D	1543401	488218	83.0						6573.79	---	---	A 58-78	---
IW-3S	1543329	488242	59.0	4.0	---	---	---	---	6574.08	---	---	A 34-54	---
IW-3D	1543352	488226	79.0						6574.66	---	---	A 54-74	---
IW-4S	1543286	488251	66.0	4.0	---	---	---	---	6573.55	---	---	A 41-61	---
IW-4D	1543309	488236	86.0						6574.11	---	---	A 61-81	---
IW-5S	1543239	488261	64.0	4.0	---	---	---	---	6574.90	---	---	A 39-59	---
IW-5D	1543264	488245	90.0						6574.85	---	---	A 65-85	---
IW-6S	1543195	488270	62.0	4.0	---	---	---	---	6574.43	---	---	A 37-57	---
IW-6D	1543218	488255	84.5						6574.27	---	---	A 59.5-79.	---
IW-7S	1543151	488280	60.0	4.0	---	---	---	---	6574.94	---	---	A 35-55	---
IW-7D	1543174	488265	82.0						6574.02	---	---	A 57-77	---
IW-8S	1543110	488289	58.0	4.0	---	---	---	---	6574.20	---	---	A 33-53	---
IW-8D	1543129	488274	80.0						6574.53	---	---	A 55-75	---
IW-9S	1543064	488298	58.0	4.0	---	---	---	---	6573.36	---	---	A 33-53	---
IW-9D	1543088	488283	77.0						6574.23	---	---	A 52-72	---
IW-10S	1543018	488307	58.0	4.0	---	---	---	---	6573.72	---	---	A 33-53	---
IW-10D	1543043	488292	81.0						6573.46	---	---	A 56-76	---
IW-11S	1542974	488317	60.0	4.0	---	---	---	---	6573.56	---	---	A 35-55	---
IW-11D	1542998	488302	78.0						6574.14	---	---	A 53-73	---
IW-12S	1542929	488327	65.0	4.0	---	---	---	---	6574.11	---	---	A 40-60	---
IW-12D	1542953	488312	85.0						6573.76	---	---	A 60-80	---
IW-13S	1542883	488337	65.0	4.0	---	---	---	---	6573.36	---	---	A 40-60	---
IW-13D	1542908	488321	84.0						6573.43	---	---	A 59-79	---
IW-14S	1542839	488346	69.0	4.0	---	---	---	---	6573.10	---	---	A 44-64	---

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS	
					DATE	DEPTH (FT-MP) ELEV. (FT-MSL)							
IW-14D	1542863	488330	90.0	4.0	---	---	---	---	6573.04	---	--- A	65-85	---
IW-15D	1542818	488340	87.0	4.0	---	---	---	---	6573.22	---	--- A	62-82	---
IW-15S	1542796	488355	67.0						6573.76	---	--- A	42-62	---
IW-16S	1542752	488365	67.0	4.0	---	---	---	---	6573.94	---	--- A	42-62	---
IW-16D	1542775	488350	89.0						6573.98	---	--- A	64-84	---
IW-17S	1542709	488373	69.0	4.0	---	---	---	---	6573.48	---	--- A	44-64	---
IW-17D	1542731	488359	97.0						6573.69	---	--- A	72-92	---
J	1540174	491302	65.6	4.0	12/5/2000	6.00	6564.19	3.4	6570.19	56	6510.8 A	46-68	53.4
J1	1540082	491585	57.0	6.0	12/5/2000	18.80	6553.05	3.8	6571.85	55	6513.1 A	50-57	40.0
J2	1540271	491013	58.0	6.0	12/5/2000	26.00	6544.19	2.9	6570.19	55	6512.3 A	50-58	31.9
J3	1540414	490499	70.0	6.0	12/5/2000	27.40	6541.74	2.6	6569.14	66	6500.5 A	43-70	41.2
J4	1540643	489974	80.0	6.0	12/5/2000	18.00	6551.52	3.9	6569.52	68	6497.6 A	40-70	53.9
J5	1540728	489747	65.0	6.0	12/5/2000	10.55	6559.24	2.8	6569.79	61	6506.0 A	50-65	53.2
J6	1540919	489221	67.0	6.0	12/5/2000	7.10	6563.00	3.7	6570.10	65	6501.4 A	48-67	61.6
J7	1540168	491892	61.9	5.0	12/5/2000	19.50	6550.88	2.1	6570.38	53	6515.3 A	40-60	35.6
J8	1540318	492064	63.2	5.0	12/5/2000	23.30	6547.49	2.4	6570.79	52	6516.4 A	35-61	31.1
J9	1540101	491759	68.0	5.0	12/5/2000	24.60	6546.60	2.0	6571.20	58	6511.2 A	36-68	35.4
J10	1540138	491436	66.0	5.0	12/5/2000	18.00	6552.91	3.5	6570.91	54	6513.4 A	36-66	39.5
J11	1540545	490909	66.0	5.0	12/5/2000	12.00	6557.86	2.0	6569.86	55	6512.9 A	36-66	45.0
J12	1540827	490466	70.0	5.0	12/5/2000	18.44	6551.86	3.0	6570.30	60	6507.3 A	40-70	44.6
J13	1540451	492218	55.0	5.0	2/5/2002	4.00	6564.40	1.8	6568.40	46	6520.6 A	15-55	43.8
J14	1540585	492367	55.0	5.0	2/5/2002	12.90	6556.08	1.7	6568.98	44	6523.3 A	15-55	32.8
J15	1540719	492521	55.0	4.0	2/5/2002	3.10	6566.53	2.2	6569.63	46	6521.4 A	15-55	45.1
JC	1540215	491240	60.0	5.0	12/5/2000	22.10	6546.34	1.8	6568.44	50	6516.6 A	35-55	29.7
K	1540730	491590	61.7	4.0	8/12/2002	2.00	6571.51	3.8	6573.51	60	6509.7 A	44-64	61.8
K2	1540736	491587	58.9	4.0	7/15/2005	19.40	6552.81	2.5	6572.21	58	6511.7 A	46-56	41.1
K3	1540744	491571	56.7	2.0	7/15/2005	19.20	6551.47	1.3	6570.67	---	--- A	53-58	---
K4	1541211	492371	86.2	5.0	3/9/2020	58.75	6543.27	2.5	6602.02	80	6519.5 A	65-85	23.8
K5	1541269	491935	86.4	5.0	3/5/2020	76.05	6525.68	2.8	6601.73	80	6518.9 A	55-85	6.7
K6	1540689	491459	58.0	5.0	3/6/2002	13.00	6557.07	2.0	6570.07	---	--- A	33-58	---
K7	1541232	492237	86.0	5.0	3/10/2020	61.50	6540.03	2.0	6601.53	79	6520.5 A	56-86	19.5
K8	1541250	492081	86.0	5.0	11/5/2019	79.97	6520.52	2.0	6600.49	78	6520.5 A	66-86	0.0
K9	1541287	491787	86.0	5.0	2/27/2020	64.45	6535.89	2.0	6600.34	79	6519.3 A	56-86	16.6
K10	1541305	491638	87.0	5.0	11/5/2019	62.88	6537.93	2.0	6600.81	81	6517.8 A	47-87	20.1
K11	1541325	491490	84.0	5.0	3/8/2020	65.85	6534.76	2.0	6600.61	78	6520.6 A	64-84	14.2
KA	1540959	491331	67.8	5.0	8/12/2002	13.00	6559.19	1.9	6572.19	65	6505.3 A	42-72	53.9

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS	
					DATE	DEPTH (FT-MP) (FT-MSL)							
KB	1540893	491406	61.8	5.0	8/12/2002	0.60	6571.05	0.8	6571.65	60	6510.9 A	40-70	60.2
KC	1540826	491477	68.6	5.0	8/12/2002	0.50	6569.81	0.7	6570.31	59	6510.6 A	42-72	59.2
KD	1540627	491701	62.1	5.0	8/12/2002	1.10	6569.12	0.6	6570.22	---	--- A	40-70	---
KE	1540566	491776	60.8	5.0	8/12/2002	9.10	6563.18	2.5	6572.28	---	--- A	40-70	---
KEB	1540570	491487	59.9	5.0	3/8/2020	42.10	6527.63	1.5	6569.73	50	6518.2 A	40-60	9.4
KF	1540870	491169	63.5	5.0	3/10/2020	34.80	6535.41	2.2	6570.21	50	6518.0 A	30-60	17.4
KM	1540671	491444	52.4	5.0	3/6/2002	12.20	6557.57	2.2	6569.77	---	--- A	-	---
KN	1540734	491492	50.1	5.0	10/11/2002	8.36	6561.23	2.3	6569.59	---	--- A	-	---
KZ	1541100	491183	58.4	5.0	12/28/2020	35.60	6536.12	1.2	6571.72	---	--- A	-	---
L	1538970	492150	67.0	4.0	4/9/2020	45.37	6529.60	0.8	6574.97	59	6515.2 A	46-66	14.4
L5	1539946	492730	60.2	5.0	4/9/2020	41.64	6534.43	1.3	6576.07	50	6524.8 A	25-55	9.7
L6	1540526	493110	51.1	5.0	10/14/2020	33.64	6541.00	2.1	6574.64	50	6522.5 A	25-55	18.5
L7	1540113	492842	67.8	5.0	10/14/2020	41.41	6535.20	2.3	6576.61	62	6512.3 A	36-66	22.9
L8	1539773	492621	73.9	5.0	4/5/2018	57.62	6518.87	2.1	6576.49	65	6509.4 A	32-72	9.5
L9	1539509	492463	74.9	5.0	12/17/2019	29.80	6547.43	2.2	6577.23	64	6511.0 A	43-73	36.4
L10	1539250	492310	74.2	5.0	4/5/2018	48.68	6528.15	2.0	6576.83	63	6511.8 A	53-73	16.3
L11	1540323	492965	70.0	4.5	4/24/2017	32.77	6543.28	2.0	6576.05	70	6504.1 A	30-70	39.2
L12	1539507	492810	75.0	4.5	5/16/2017	50.61	6536.33	2.0	6586.94	70	6514.9 A	55-75	21.4
L13	1539233	492633	75.0	4.5	5/19/2017	51.61	6533.80	2.0	6585.41	75	6508.4 A	35-75	25.4
L14	1538972	492514	75.0	4.5	5/19/2017	47.26	6533.58	2.0	6580.84	60	6518.8 A	35-75	14.7
L15	1538701	492324	75.0	4.5	4/24/2017	45.25	6533.15	2.0	6578.40	70	6506.4 A	35-75	26.8
L16	1538579	492286	75.0	4.5	5/16/2017	46.83	6532.67	2.0	6579.50	70	6507.5 A	35-75	25.2
L17	1538761	492424	75.0	4.5	---	---	---	2.0	6578.52	70	6506.5 A	35-75	---
L18	1538927	492582	75.0	4.5	---	---	---	2.0	6582.32	70	6510.3 A	35-75	---
L19	1538768	492575	75.0	4.5	4/24/2017	47.25	6533.80	2.0	6581.05	70	6509.1 A	35-75	24.8
L20	1539033	492736	75.0	4.5	4/24/2017	49.68	6534.96	2.0	6584.64	70	6512.6 A	35-75	22.3
L21	1539211	492827	75.0	4.5	---	---	---	2.0	6586.62	70	6514.6 A	55-75	---
L22	1539822	493033	70.0	4.5	4/9/2014	45.86	6542.69	2.0	6588.55	70	6516.6 A	30-70	26.1
L23	1539654	492890	70.0	4.5	5/16/2017	53.23	6536.03	2.0	6589.26	70	6517.3 A	30-70	18.8
L24	1539361	492700	70.0	4.5	4/24/2017	53.31	6534.76	2.0	6588.07	70	6516.1 A	30-70	18.7
L25	1538880	492409	70.0	4.5	4/24/2017	46.07	6533.47	2.0	6579.54	70	6507.5 A	30-70	25.9
L26	1540306	493302	60.0	4.5	4/25/2017	35.12	6544.55	2.0	6579.67	---	--- A	20-60	---
M1	1542797	489157	103.4	4.0	1/3/1989	79.80	6505.17	1.5	6584.97	120	6463.5 A	66-106	41.7
M2	1542785	489159	40.4	4.0	1/20/1995	34.85	6541.41	1.4	6576.26	---	--- A	-	---
M3	1542805	489151	105.3	4.0	4/29/2020	59.96	6516.14	1.0	6576.10	---	--- A	79-99	---
M3R	1542926	489078	115.0	5.0	12/15/2004	50.70	6529.56	2.1	6580.26	108	6470.2 A	55-115	59.4

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
M4	1542804	489134	81.8	5.0	10/31/2000	56.72	6521.54	3.7	6578.26	---	---	A 78-82	---
M5	1542360	489080	92.3	5.0	11/20/2020	44.12	6531.22	3.2	6575.34	84	6488.1	A 60-90	43.1
M6	1543097	486674	110.0	5.0	11/23/2020	62.93	6512.11	2.2	6575.04	65	6507.9	A 60-110	4.2
M7	1542790	486523	83.0	5.0	11/23/2020	58.43	6514.42	2.4	6572.85	71	6499.4	A 63-83	15.0
M8	1542960	486567	83.0	5.0	9/5/2000	33.71	6541.52	2.4	6575.23	57	6515.8	A 53-83	25.7
M9	1543310	486699	103.0	5.0	11/23/2020	66.37	6510.44	3.5	6576.81	78	6495.3	A 63-103	15.1
M10	1543677	486723	88.0	5.0	11/23/2020	64.10	6509.26	2.3	6573.36	86	6485.1	A 58-88	24.2
M11	1542358	486486	118.0	5.0	12/8/2003	53.98	6519.24	3.2	6573.22	109	6461.0	A 58-118	58.2
M12	1542174	487209	124.0	5.0	12/5/2000	3.87	6569.64	2.5	6573.51	118	6453.0	A 57-124	116.7
M13	1542450	487336	117.0	5.0	12/5/2000	29.81	6546.35	3.0	6576.16	108	6465.2	A 57-117	81.2
M14	1542661	487216	117.0	5.0	12/5/2000	29.42	6547.75	2.7	6577.17	109	6465.5	A 57-117	82.3
M15	1542872	487094	102.0	5.0	12/5/2000	3.71	6575.37	3.5	6579.08	93	6482.6	A 52-102	92.7
M19	1542940	486334	100.0	4.5	10/1/2018	65.45	6510.68	2.0	6576.13	97	6477.1	A 60-100	33.6
M20	1542584	486588	100.0	4.5	4/23/2014	49.64	6525.90	2.0	6575.54	100	6473.5	A 60-100	52.4
M21	1543508	486526	100.0	4.5	4/23/2014	57.74	6516.98	2.0	6574.72	80	6492.7	A 60-100	24.3
M22	1542817	486716	100.0	4.5	---	---	---	2.0	6575.43	100	6473.4	A 60-100	---
M23	1542992	486908	100.0	4.5	---	---	---	2.0	6575.97	100	6474.0	A 60-100	---
M24	1543204	486935	120.0	4.5	4/23/2014	43.23	6531.47	2.0	6574.70	65	6507.7	A 60-120	23.8
M28	1543175	487326	120.0	4.5	4/23/2014	42.11	6536.65	2.0	6578.76	69	6507.8	A 60-120	28.9
M29	1543440	487326	120.0	4.5	4/23/2014	36.92	6535.95	2.0	6572.87	61	6509.9	A 60-120	26.1
M30	1543462	487639	110.0	4.5	9/30/2019	36.00	6538.91	2.0	6574.91	80	6492.9	A 80-110	46.0
M31	1543745	487620	120.0	4.5	10/28/2019	40.40	6535.53	2.0	6575.93	80	6493.9	A 70-120	41.6
M32	1543176	487737	110.0	4.5	---	---	---	2.0	6573.35	80	6491.4	A 50-110	---
M33	1543040	487323	100.0	4.5	---	---	---	2.0	6577.71	100	6475.7	A 50-110	---
M34	1543608	487743	120.0	4.5	---	---	---	2.0	6574.55	66	6506.6	A 60-120	---
M35	1543889	487750	120.0	4.5	4/15/2014	35.13	6539.59	2.0	6574.72	71	6501.7	A 60-120	37.9
M36	1543993	487631	120.0	4.5	4/15/2014	36.56	6538.88	2.0	6575.44	72	6501.4	A 60-120	37.4
M37	1544120	487835	120.0	4.5	4/15/2014	38.37	6537.07	2.0	6575.44	73	6500.4	A 60-120	36.6
M38	1544319	487923	120.0	4.5	4/15/2014	37.91	6541.71	2.0	6579.62	79	6498.6	A 60-120	43.1
M39	1543950	488087	80.0	4.5	---	---	---	2.0	6574.58	60	6512.6	A 40-80	---
M40	1543775	487934	80.0	4.5	---	---	---	2.0	6574.52	60	6512.5	A 40-80	---
M41	1543398	487883	100.0	4.5	---	---	---	2.0	6573.73	60	6511.7	A 40-100	---
M43	1542858	487759	110.0	4.5	---	---	---	2.0	6572.10	80	6490.1	A 50-110	---
M44	1542722	487812	110.0	4.5	---	---	---	2.0	6571.74	110	6459.7	A 50-110	---
M45	1542593	487927	110.0	4.5	---	---	---	2.0	6572.20	110	6460.2	A 50-110	---
M46	1542504	488033	110.0	4.5	---	---	---	2.0	6572.60	110	6460.6	A 50-110	---

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS	
					DATE	DEPTH (FT-MP)							ELEV. (FT-MSL)
M47	1542409	488130	110.0	4.5	---	---	---	2.0	6571.88	110	6459.9 A	50-110	---
M48	1542317	488226	110.0	4.5	---	---	---	2.0	6572.83	100	6470.8 A	50-110	---
MA	1541290	487767	85.0	4.0	11/23/2020	44.90	6527.32	1.0	6572.22	85	6486.2 A	70-85	41.1
MB	1541296	487512	90.0	4.0	3/3/2020	45.15	6526.91	1.0	6572.06	85	6486.1 A	60-90	40.8
MC	1541304	487264	100.0	4.0	11/23/2020	46.45	6525.61	1.0	6572.06	95	6476.1 A	70-100	49.5
MD	1541311	487050	105.0	4.0	9/5/2000	2.00	6569.46	1.0	6571.46	105	6465.5 A	75-105	104.0
ME	1541537	486934	105.0	4.0	9/5/2000	1.61	6569.31	1.0	6570.92	105	6464.9 A	75-105	104.4
MF	1541757	486808	110.0	4.0	11/23/2020	49.11	6523.17	1.0	6572.28	110	6461.3 A	90-110	61.9
MG	1541972	486694	110.0	4.0	9/5/2000	1.72	6571.36	1.0	6573.08	110	6462.1 A	90-110	109.3
MH	1542208	486569	110.0	4.0	11/23/2020	53.40	6520.52	1.0	6573.92	110	6462.9 A	90-110	57.6
MI	1542486	486413	110.0	4.0	9/5/2000	2.24	6574.03	1.0	6576.27	110	6465.3 A	90-110	108.8
MJ	1542682	486350	60.0	4.0	11/23/2020	54.30	6518.64	1.8	6572.94	60	6511.1 A	40-60	7.5
MK	1543373	486324	57.0	4.5	12/5/2011	59.75	6514.04	1.5	6573.79	92	6480.3 A	-	33.8
ML	1543902	486691	76.0	5.0	11/23/2020	55.11	6517.59	2.3	6572.70	80	6490.4 A	56-76	27.2
MM	1544154	486324	63.0	5.0	9/5/2000	3.46	6573.99	2.4	6577.45	50	6525.1 A	33-63	48.9
MN	1544613	486325	63.0	5.0	11/23/2020	63.92	6513.64	1.9	6577.56	42	6533.7 A	23-63	0.0
MQ	1543173	486326	98.0	5.0	3/3/2020	64.60	6509.70	1.6	6574.30	88	6484.7 A	58-98	25.0
MU	1544461	487143	80.0	5.0	11/23/2020	45.01	6529.18	1.5	6574.19	72	6500.7 A	50-80	28.5
MW	1543802	486346	85.0	5.0	11/23/2020	64.80	6510.11	1.9	6574.91	83	6490.0 A	35-85	20.1
MX	1541287	486244	103.0	5.0	8/19/2020	52.25	6516.36	1.7	6568.61	94	6472.9 A	63-103	43.5
MY	1542200	486213	112.0	5.0	10/14/2020	57.72	6515.84	3.0	6573.56	102	6468.6 A	72-112	47.3
MZ	1543485	486757	92.0	5.0	11/23/2020	66.92	6509.72	3.0	6576.64	84	6489.6 A	60-92	20.1
N	1545101	489665	92.0	4.0	8/29/2019	41.60	6542.37	0.9	6583.97	80	6503.1 A	54-94	39.3
NA	1545000	491488	91.4	5.0	8/29/2019	46.02	6544.96	1.1	6590.98	80	6509.9 A	50-90	35.1
NB	1545000	491296	96.4	5.0	8/29/2019	48.45	6544.85	3.5	6593.30	80	6509.8 A	50-90	35.0
NC	1545220	491282	95.0	4.0	11/11/2020	41.97	6543.86	0.8	6585.83	85	6500.0 A	65-95	43.8
ND	1545927	494872	70.0	4.0	11/11/2020	40.40	6552.49	1.1	6592.89	65	6526.8 A	50-70	25.7
NE5	1544279	492332	156.8	5.0	6/30/2017	76.71	6590.29	3.2	6667.00	150	--- T	50-110	---
										150	6513.8 A	135-155	76.5
NW5	1544408	489433	149.8	5.0	5/29/2007	42.72	6614.86	2.7	6657.58	155	--- T	39-79	---
										155	6499.9 A	119-159	115.0
O	1545060	492725	69.9	4.0	8/28/2019	40.48	6547.35	1.3	6587.83	77	6509.5 A	40-70	37.8
P	1546691	491058	109.1	4.0	11/17/2020	40.33	6546.93	1.7	6587.26	107	6478.6 A	82-112	68.4
P1	1547017	491060	105.0	6.0	11/11/2020	40.32	6552.15	0.8	6592.47	105	6486.7 A	60-105	65.5
P2	1546555	490912	105.0	6.0	3/16/2020	42.40	6547.39	0.9	6589.79	105	6483.9 A	60-105	63.5
P3	1546159	490785	95.0	5.0	3/11/2020	42.60	6547.35	2.2	6589.95	85	6502.8 A	55-95	44.6



**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
P4	1546504	491899	92.0	5.0	3/16/2020	39.10	6550.42	3.6	6589.52	84	6501.9 A	52-92	48.5
PM	1541426	490292	81.9	4.0	1/12/2004	12.33	6555.09	1.8	6567.42	---	---	A -	---
PMW-1S	1543104	488249	58.0	2.0	---	---	---	---	6575.81	---	---	A 43-53	---
PMW-3S	1542781	488318	73.0						6575.07	---	---	A 58-68	---
PMW-3D	1542780		92.0						6575.05	---	---	A 77-87	---
PMW-2D	1542957	488282	76.0						6575.35	---	---	A 61-71	---
PMW-1D	1543104	488249	73.0						6575.81	---	---	A 58-68	---
PMW-2S	1542957	488282	61.0						6575.31	---	---	A 46-56	---
Q	1548693	492153	98.3	4.0	5/13/2020	41.78	6552.04	2.3	6593.82	100	6491.5 A	72-102	60.5
R	1550372	494514	85.0	4.0	3/17/2020	39.60	6564.43	0.3	6604.03	95	6508.7 A	60-90	55.7
S	1543871	488816	72.2	4.0	11/23/2020	46.10	6535.07	2.0	6581.17	75	6504.2 A	52-72	30.9
S1	1543288	488401	85.0	2.0	12/28/2020	41.53	6533.66	5.3	6575.19	85	6484.9 A	60-85	48.8
S2	1543127	488299	100.0	3.0	12/28/2020	41.44	6532.28	2.0	6573.72	100	6471.7 A	90-100	60.6
S3	1542857	488714	122.6	5.0	11/23/2020	40.93	6533.85	6.2	6574.78	116	6452.6 A	80-120	81.3
S4	1543344	488359	112.4	5.0	11/23/2020	42.45	6532.84	2.3	6575.29	108	6465.0 A	50-110	67.8
S5	1543269	488923	115.0	5.0	12/28/2020	46.21	6528.48	1.0	6574.69	105	6468.7 A	54-106	59.8
S5R	1543150	488938	115.0	5.0	11/14/2019	49.10	6531.39	1.9	6580.49	109	6469.6 A	55-115	61.8
S6	1543515	488874	113.2	5.0	1/3/2000	55.85	6524.22	1.3	6580.07	105	6473.8 A	55-105	50.5
S7	1543763	488874	97.0	5.0	1/4/1999	57.38	6522.51	1.0	6579.89	82	6496.9 A	40-84	25.6
S8	1543968	488879	43.8	5.0	8/22/1995	43.28	6537.06	1.0	6580.34	40	6539.3 A	12-42	0.0
S11	1544793	488150	76.2	5.0	11/23/2020	43.16	6535.23	1.9	6578.39	70	6506.5 A	48-78	28.7
S12	1543297	488628	93.0	5.0	1/29/2020	46.05	6532.80	2.1	6578.85	80	6496.7 A	53-93	36.1
S14	1543120	488152	90.0	4.5	1/3/2018	38.80	6536.60	2.0	6575.40	90	6483.4 A	50-90	53.2
S15	1543320	488160	90.0	4.5	4/17/2014	33.68	6541.48	2.0	6575.16	90	6483.2 A	50-90	58.3
S18	1543216	488312	100.0	4.5	4/22/2014	32.73	6541.55	2.0	6574.28	100	6472.3 A	60-100	69.3
S19	1544172	488682	80.0	4.5	11/23/2020	42.93	6535.04	2.0	6577.97	55	6521.0 A	40-80	14.1
S20	1544463	488461	80.0	4.5	4/16/2014	30.59	6547.76	2.0	6578.35	80	6496.4 A	40-80	51.4
S21	1544896	488670	80.0	4.5	11/23/2020	41.92	6538.36	2.0	6580.28	46	6532.3 A	40-80	6.1
S22	1544169	488375	80.0	4.5	4/16/2014	30.29	6546.30	2.0	6576.59	80	6494.6 A	40-80	51.7
S23	1543920	488284	80.0	4.5	4/17/2014	31.07	6545.63	2.0	6576.70	80	6494.7 A	40-80	50.9
S24	1543735	488232	80.0	4.5	4/17/2014	31.89	6544.00	2.0	6575.89	80	6493.9 A	40-80	50.1
										80	6493.9 A	40-80	50.1
S25	1543524	488146	80.0	4.5	4/17/2014	33.26	6542.46	2.0	6575.72	80	6493.7 A	40-80	48.7
S26	1543224	487996	100.0	4.5	4/22/2014	32.37	6540.61	2.0	6572.98	100	6471.0 A	60-100	69.6
S27	1542993	488044	100.0	4.5	4/22/2014	32.68	6540.64	2.0	6573.32	100	6471.3 A	60-100	69.3
S28	1542769	488403	90.0	4.5	9/11/2014	34.77	6538.04	2.0	6572.81	90	6480.8 A	50-90	57.2
S32	1543815	488445	80.0	4.5	---	---	---	2.0	6575.93	---	---	A 40-80	---

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
S33	1543951	488570	80.0	4.5	---	---	---	2.0	6576.24	---	---	A 40-80	---
S34	1543064	488657	115.0	4.5	---	---	---	2.0	6575.92	---	---	A 55-115	---
S36	1542755	488559	90.0	4.5	4/22/2014	34.86	6540.77	2.0	6575.63	90	6483.6	A 50-90	57.1
S37	1542609	488516	90.0	4.5	9/11/2014	34.24	6538.05	2.0	6572.29	90	6480.3	A 50-90	57.8
S38	1542443	488727	90.0	4.5	9/11/2014	34.90	6538.06	2.0	6572.96	90	6481.0	A 50-90	57.1
S39	1542596	488744	90.0	4.5	4/8/2014	34.02	6540.41	2.0	6574.43	90	6482.4	A 50-90	58.0
S40	1542934	488778	115.0	4.5	---	---	---	2.0	6575.73	---	---	A 55-115	---
SA	1543122	488811	123.7	5.0	12/28/2020	47.77	6532.54	1.0	6580.31	115	6464.3	A 100-130	68.2
SB	1543371	488811	125.0	5.0	3/17/2020	49.05	6532.04	0.9	6581.09	115	6465.2	A 100-130	66.9
SC	1543617	488815	105.4	5.0	12/5/2000	57.11	6521.69	1.2	6578.80	103	6474.6	A 55-105	47.1
SD	1543490	488564	90.1	5.0	2/23/2009	41.50	6536.81	0.6	6578.31	107	6470.7	A 50-110	66.1
SD4	1543497	488556	95.0	5.0	2/23/2009	46.17	6532.60	1.1	6578.77	95	6482.7	A 45-95	49.9
SDR-2D	1543585	488165	95.0	2.0	---	---	---	---	6574.67	---	---	A 75-95	---
SDR-4S	1543570	488179	70.0						6574.32	---	---	A 55-70	---
SDR-4D			95.0						6574.39	---	---	A 55-70	---
SDR-3S	1543583	488176	70.0						6574.23	---	---	A 55-70	---
SDR-2S	1543585	488165							6574.67	---	---	A 55-70	---
SDR-1S	1543571	488169							6574.22	---	---	A 55-70	---
SDR-3D	1543583	488176	95.0						6574.24	---	---	A 75-95	---
SE	1543301	488550	111.8	5.0	10/4/2017	65.80	6512.19	0.5	6577.99	88	6489.5	A 50-90	22.7
SE4	1543308	488560	105.3	2.0	2/23/2009	45.78	6532.22	---	6578.00	---	---	A -	---
SE6	1543244	488615	92.0	5.0	1/29/2020	41.70	6537.21	2.3	6578.91	---	---	A -	---
SIW-D	1543575	488174	95.0	2.0	---	---	---	---	6573.40	---	---	A 75-95	---
SIW-S	1543578	488169	75.0	2.0	---	---	---	---	6573.54	---	---	A 55-75	---
SM	1543748	488566	86.0	5.0	12/28/2020	44.93	6533.81	0.7	6578.74	---	---	A -	---
SMW-5D	1543539	488159	95.0	2.0	---	---	---	---	6574.29	---	---	A 75-95	---
SMW-5S	1543538		70.0						6574.31	---	---	A 55-70	---
SMW-4S	1543570	488179							6574.33	---	---	A 55-70	---
SMW-4D			95.0							---	---	A 75-95	---
SMW-3S	1543565	488161	70.0						6574.52	---	---	A 55-70	---
SMW-3D			95.0						6574.51	---	---	A 75-95	---
SMW-2	1543564	488184	85.0						6574.23	---	---	A 65-85	---
SMW-1	1543570	488164							6574.39	---	---	A 65-85	---
SMW-6	1543596	488183							6574.32	---	---	A 65-85	---
SN	1543752	488716	67.5	4.0	12/28/2020	44.53	6534.73	1.1	6579.26	---	---	A -	---
SO	1543652	488381	92.3	5.0	12/28/2020	45.53	6533.26	0.6	6578.79	---	---	A -	---
SP	1543630	488531	94.4	4.0	12/28/2020	45.27	6533.39	2.0	6578.66	---	---	A -	---
SQ	1543507	488814	95.0	5.0	6/11/2015	42.25	6536.95	0.9	6579.20	95	6483.3	A 55-95	53.7
SR	1543611	488669	95.0	5.0	9/21/2007	47.54	6531.65	0.8	6579.19	95	6483.4	A 50-90	48.3

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
SS	1543374	488666	101.0	5.0	12/28/2020	47.38	6531.00	1.2	6578.38	90	6487.2 A	51-101	43.8
SSR	1543374	488694	110.0	5.0	3/17/2020	47.60	6531.37	1.7	6578.97	---	---	A -	---
ST	1543215	488688	97.0	5.0	12/28/2020	47.12	6532.19	2.2	6579.31	96	6481.1 A	55-97	51.1
* SU	1542946	488953	110.0	5.0	9/5/1995	35.60	6542.50	0.7	6578.10	110	6467.4 A	50-110	75.1
SUR	1542991	488968	115.0	5.0	12/9/2019	47.23	6533.49	2.6	6580.72	106	6472.1 A	35-115	61.4
SV	1543676	488813	78.2	6.0	3/17/2020	46.70	6532.55	1.7	6579.25	100	6477.6 A	55-105	55.0
SW	1543783	488812	81.9	6.0	6/11/2019	45.70	6535.59	2.9	6581.29	75	6503.4 A	35-80	32.2
SX	1544510	489025	45.0	5.0	---	---	---	1.0	6581.49	40	6540.5 A	20-40	---
SZ	1544367	488833	62.6	5.0	11/23/2020	43.91	6537.56	2.2	6581.47	60	6519.3 A	40-70	18.3
T	1542536	492260	70.2	4.0	12/10/2019	39.10	6540.13	2.4	6579.23	68	6508.8 A	61-71	31.3
T1	1543285	490027	171.0	5.0	12/6/2002	102.40	6561.51	1.0	6663.91	161	6501.9 A	121-171	59.6
T2	1543538	489303	186.0	5.0	6/24/2020	98.00	6566.82	1.6	6664.82	180	6483.2 A	100-186	83.6
T4	1543340	489699	205.0	5.0	7/27/2015	114.60	6543.14	2.9	6657.74	175	6479.8 A	145-205	63.3
T5	1543307	490289	182.0	5.0	7/27/2015	113.65	6543.68	3.1	6657.33	151	6503.2 A	122-182	40.4
T6	1543282	490655	160.0	5.0	5/18/2015	112.94	6545.83	2.9	6658.77	156	6499.9 A	130-160	46.0
T7	1543272	491484	160.0	5.0	3/25/2020	121.10	6538.57	2.0	6659.67	142	6515.7 A	130-160	22.9
T8	1543296	491914	162.0	5.0	3/25/2020	122.12	6539.49	2.6	6661.61	158	6501.0 A	132-162	38.5
T9	1543347	492337	141.0	5.0	3/26/2020	121.07	6542.88	3.3	6663.95	138	6522.7 A	121-141	20.2
T10	1543434	492791	148.0	5.0	3/25/2020	104.61	6555.35	2.3	6659.96	142	6515.7 A	108-148	39.7
T11	1544585	489887	193.0	5.0	3/29/2017	114.42	6542.39	2.7	6656.81	160	6494.1 A	113-193	48.3
T12	1544583	490317	200.0	5.0	3/25/2020	106.14	6551.09	2.5	6657.23	170	6484.7 A	120-200	66.4
T13	1544534	490619	160.0	5.0	---	---	---	---	6657.37	160	---	A 120-160	---
T14	1544565	491071	155.0	5.0	11/25/2014	112.64	6547.49	---	6660.13	155	---	A 125-155	---
T15	1544480	491953	150.0	5.0	3/25/2020	120.91	6544.38	---	6665.29	150	---	A 120-150	---
T16	1544276	492718	140.0	5.0	3/12/2018	113.56	6546.42	2.0	6659.98	132	6526.0 A	120-140	20.4
T17	1544008	489430	183.0	5.0	5/14/2015	110.83	6546.08	2.6	6656.91	170	6484.3 A	143-183	61.8
T18	1543977	490333	195.0	5.0	5/15/2015	117.78	6547.38	2.9	6665.16	162	6500.3 A	115-195	47.1
T19	1543958	490722	167.0	5.0	6/24/2020	128.20	6539.56	2.5	6667.76	162	6503.3 A	137-167	36.3
T20	1543935	491048	170.0	5.0	12/11/2018	130.86	6539.83	1.5	6670.69	162	6507.2 A	140-170	32.6
T21	1543951	491882	170.0	5.0	3/8/2018	127.99	6542.01	1.3	6670.00	163	6505.7 A	140-170	36.3
T22	1543876	492311	165.0	5.0	3/17/2020	124.10	6543.09	2.1	6667.19	160	6505.1 A	120-165	38.0
T23	1543901	492805	140.0	5.0	6/25/2020	113.00	6548.11	---	6661.11	140	---	A 120-140	---
T24	1543387	489494	200.0	4.5	1/14/2020	122.60	6534.43	2.0	6657.03	---	---	A 140-200	---
T25	1543352	489996	200.0	4.5	1/14/2020	122.80	6534.54	2.0	6657.34	---	---	A 140-200	---
T26	1543567	489550	200.0	4.5	1/15/2020	121.90	6534.76	2.0	6656.66	---	---	A 140-200	---
T27	1543474	489837	200.0	4.5	1/15/2020	121.80	6535.34	2.0	6657.14	---	---	A 140-200	---

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
T28	1543484	490145	200.0	4.5	1/15/2020	121.75	6536.96	2.0	6658.71	---	---	A 140-200	---
T29	1543774	489375	200.0	4.5	1/15/2020	119.20	6537.51	2.0	6656.71	---	---	A 140-200	---
T30	1543663	489972	200.0	4.5	1/16/2020	123.00	6536.62	2.0	6659.62	---	---	A 140-200	---
T31	1543789	489881	200.0	4.5	1/15/2020	122.10	6536.93	2.0	6659.03	---	---	A 140-200	---
T32	1543801	490134	200.0	4.5	10/28/2019	123.70	6537.91	2.0	6661.61	---	---	A 140-200	---
T33	1543872	489545	200.0	4.5	1/28/2020	79.45	6576.34	2.0	6655.79	---	---	A 140-200	---
T34	1543888	489806	200.0	4.5	8/12/2014	115.45	6544.94	2.0	6660.39	---	---	A 140-200	---
T35	1543992	489689	200.0	4.5	---	---	---	2.0	6659.33	---	---	A 140-200	---
T36	1543735	489688	170.0	5.0	1/28/2020	119.30	6536.14	2.0	6655.44	170	6483.4	A 130-170	52.7
T37	1544089	489545	200.0	4.5	3/30/2017	116.13	6540.39	2.0	6656.52	---	---	A 140-200	---
T38	1544089	489832	200.0	4.5	---	---	---	2.0	6658.46	---	---	A 140-200	---
T39	1544498	491669	150.0	5.0	3/12/2018	120.00	6545.31	---	6665.31	150	---	A 120-150	---
T40	1543819	491466	170.0	5.0	3/8/2018	130.18	6540.09	2.3	6670.27	165	6503.0	A 140-170	37.1
T41	1543278	491079	160.0	5.0	6/24/2020	102.95	6557.01	3.2	6659.96	155	6501.8	A 130-160	55.3
T42	1544077	490112	200.0	4.5	6/5/2014	113.69	6546.32	2.0	6660.01	---	---	A 140-200	---
T43	1544209	489385	180.0	4.5	1/28/2020	119.85	6537.67	2.0	6657.52	---	---	A 120-180	---
T44	1544204	489707	---	4.5	6/2/2014	110.76	6546.55	2.0	6657.31	---	---	A -	---
T45	1544183	489914	200.0	4.5	10/28/2019	118.40	6539.66	2.0	6658.06	---	---	A 140-200	---
T46	1544210	490262	200.0	4.5	6/3/2014	114.24	6546.41	2.0	6660.65	---	---	A 140-200	---
T47	1544317	489544	180.0	4.5	1/29/2020	118.75	6538.46	2.0	6657.21	---	---	A 120-180	---
T48	1544291	489795	180.0	4.5	1/28/2020	119.50	6538.06	2.0	6657.56	---	---	A 120-180	---
T49	1544304	490100	200.0	4.5	6/3/2014	111.80	6546.59	2.0	6658.39	---	---	A 140-200	---
T50	1544416	489707	200.0	4.5	3/30/2017	114.88	6541.62	2.0	6656.50	---	---	A 140-200	---
T51	1544397	489914	200.0	4.5	3/14/2018	121.18	6536.16	2.0	6657.34	---	---	A 140-200	---
T52	1544456	490208	200.0	4.5	6/3/2014	109.87	6548.13	2.0	6658.00	---	---	A 140-200	---
T53	1544504	489559	175.0	4.5	1/28/2020	121.50	6535.48	2.0	6656.98	---	---	A 115-175	---
T54	1544523	489796	200.0	4.5	6/24/2020	123.80	6533.30	2.0	6657.10	---	---	A 140-200	---
T55	1544592	490063	195.0	4.5	6/3/2014	110.87	6546.79	2.0	6657.66	---	---	A 135-195	---
T56	1543447	490489	180.0	4.5	---	---	---	2.0	6661.39	180	6479.4	A 140-180	---
T57	1543470	490805	160.0	4.5	---	---	---	2.0	6666.15	160	6504.2	A 120-160	---
T58	1543494	491008	160.0	4.5	---	---	---	2.0	6666.59	160	6504.6	A 120-160	---
T59	1543426	491247	160.0	4.5	---	---	---	2.0	6668.00	160	6506.0	A 120-160	---
T60	1543666	490362	200.0	4.5	8/8/2014	116.76	6545.10	2.0	6661.86	---	---	A 140-200	---
T61	1543600	490687	160.0	4.5	8/13/2014	108.93	6559.92	2.0	6668.85	---	---	A 100-160	---
T62	1543688	491006	180.0	4.5	---	---	---	2.0	6668.34	180	6486.3	A 140-180	---
T63	1543628	491243	180.0	4.5	---	---	---	2.0	6669.54	180	6487.5	A 140-180	---

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS	
					DATE	DEPTH (FT-MP) ELEV. (FT-MSL)							
T64	1543797	490434	180.0	4.5	---	---	---	2.0	6665.29	180	6483.3 A	140-180	---
T65	1543743	490532	180.0	4.5	---	---	---	2.0	6664.86	180	6482.9 A	140-180	---
T66	1543821	490837	180.0	4.5	---	---	---	2.0	6669.08	180	6487.1 A	140-180	---
T67	1543791	491245	180.0	4.5	---	---	---	2.0	6670.75	180	6488.8 A	140-180	---
T68	1544082	490569	180.0	4.5	---	---	---	2.0	6666.45	180	6484.5 A	140-180	---
T69	1544069	490856	180.0	4.5	---	---	---	2.0	6668.52	180	6486.5 A	140-180	---
T70	1544036	491217	160.0	4.5	---	---	---	2.0	6670.67	160	6508.7 A	120-160	---
T71	1544200	490712	160.0	4.5	---	---	---	2.0	6667.54	160	6505.5 A	120-160	---
T72	1544137	491055	160.0	4.5	---	---	---	2.0	6670.03	160	6508.0 A	120-160	---
T73	1544137	491383	160.0	4.5	---	---	---	2.0	6669.85	160	6507.9 A	120-160	---
T74	1544306	490480	160.0	4.5	---	---	---	2.0	6662.57	160	6500.6 A	120-160	---
T75	1544255	490911	160.0	4.5	---	---	---	2.0	6669.55	160	6507.6 A	120-160	---
T76	1544257	491240	160.0	4.5	---	---	---	2.0	6669.33	160	6507.3 A	120-160	---
T77	1544383	490801	160.0	4.5	---	---	---	2.0	6664.51	160	6502.5 A	120-160	---
T78	1544369	491087	160.0	4.5	---	---	---	2.0	6667.13	160	6505.1 A	120-160	---
T79	1544335	491374	160.0	4.5	---	---	---	2.0	6668.27	160	6506.3 A	120-160	---
T80	1544482	490953	160.0	4.5	---	---	---	2.0	6663.14	160	6501.1 A	120-160	---
T81	1544470	491197	160.0	4.5	---	---	---	2.0	6664.98	160	6503.0 A	120-160	---
T82	1544563	490497	160.0	4.5	---	---	---	2.0	6657.66	160	6495.7 A	120-160	---
T83	1544575	490845	160.0	4.5	---	---	---	2.0	6660.72	160	6498.7 A	120-160	---
T84	1544531	491374	160.0	4.5	---	---	---	2.0	6662.09	160	6500.1 A	120-160	---
T85	1543427	491712	160.0	4.5	---	---	---	2.0	6667.09	160	6505.1 A	120-160	---
T86	1543472	492111	160.0	4.5	---	---	---	2.0	6668.52	160	6506.5 A	120-160	---
T87	1543565	491471	160.0	4.5	---	---	---	2.0	6668.18	160	6506.2 A	120-160	---
T88	1543629	491628	160.0	4.5	---	---	---	2.0	6670.12	160	6508.1 A	120-160	---
T89	1543622	491892	160.0	4.5	---	---	---	2.0	6669.63	160	6507.6 A	120-160	---
T90	1543637	492287	160.0	4.5	---	---	---	2.0	6669.67	160	6507.7 A	120-160	---
T91	1543661	492486	160.0	4.5	---	---	---	2.0	6666.41	160	6504.4 A	120-160	---
T92	1543702	491364	160.0	4.5	---	---	---	2.0	6670.13	160	6508.1 A	120-160	---
T93	1543811	491695	160.0	4.5	---	---	---	2.0	6671.90	160	6509.9 A	120-160	---
T94	1543752	492100	160.0	4.5	---	---	---	2.0	6670.22	160	6508.2 A	120-160	---
T95	1543913	492578	160.0	4.5	---	---	---	2.0	6664.51	160	6502.5 A	120-160	---
T96	1544023	491551	160.0	4.5	---	---	---	2.0	6670.17	160	6508.2 A	120-160	---
T97	1544004	491715	160.0	4.5	---	---	---	2.0	6671.69	160	6509.7 A	120-160	---
T98	1544036	492123	160.0	4.5	---	---	---	2.0	6671.69	160	6509.7 A	120-160	---
T99	1544203	491534	160.0	4.5	---	---	---	2.0	6669.25	160	6507.3 A	120-160	---

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
T100	1544153	491758	160.0	4.5	---	---	---	2.0	6669.13	160	6507.1 A	120-160	---
T101	1544222	491911	160.0	4.5	---	---	---	2.0	6668.43	160	6506.4 A	120-160	---
T102	1544203	492143	160.0	4.5	---	---	---	2.0	6669.85	160	6507.9 A	120-160	---
T103	1544056	492413	160.0	4.5	---	---	---	2.0	6666.69	160	6504.7 A	120-160	---
T104	1544412	491511	160.0	4.5	---	---	---	2.0	6666.09	160	6504.1 A	120-160	---
T105	1544289	491678	160.0	4.5	---	---	---	2.0	6668.99	160	6507.0 A	120-160	---
T106	1544369	491838	160.0	4.5	---	---	---	2.0	6667.00	160	6505.0 A	120-160	---
T107	1544209	492576	160.0	4.5	---	---	---	2.0	6662.80	160	6500.8 A	120-160	---
T108	1544441	492235	160.0	4.5	---	---	---	2.0	6664.75	160	6502.8 A	120-160	---
T109	1544366	492536	160.0	4.5	---	---	---	2.0	6662.90	160	6500.9 A	120-160	---
T110	1544100	492943	160.0	4.5	---	---	---	2.0	6660.29	160	6498.3 A	120-160	---
T111	1543706	492939	160.0	4.5	---	---	---	2.0	6660.29	160	6498.3 A	120-160	---
TA	1542471	492426	62.4	5.0	12/10/2019	39.39	6540.91	2.4	6580.30	55	6522.9 A	35-65	18.0
TB	1542351	492616	64.4	5.0	9/26/2017	39.20	6544.37	1.9	6583.57	55	6526.7 A	35-65	17.7
TDR-2D	1543240	488239	85.0	2.0	---	---	---	---	6576.28	---	--- A	70-80	---
TDR-5S	1542852	488302	59.0						6574.71	---	--- A	44-54	---
TDR-5D		488303	87.0							---	--- A	62-82	---
TDR-4S	1543060	488258	60.5						6575.12	---	--- A	45.5-55.	---
TDR-4D		488259	75.5							---	--- A	60.5-70.	---
TDR-3S	1543130	488284	59.0						6576.15	---	--- A	44-54	---
TDR-2S	1543240	488240	67.0						6576.07	---	--- A	52-62	---
TDR-1S	1543397	488249	59.0						6576.86	---	--- A	44-54	---
TDR-1D			83.0							---	--- A	68-78	---
TDR-3D	1543130	488284	74.0						6576.16	---	--- A	59-69	---
W	1542302	487297	99.3	4.0	12/6/2018	44.00	6528.14	0.3	6572.14	117	6454.8 A	58-118	73.3
W2	1542251	486654	79.1	4.0	3/2/1998	56.21	6515.29	0.9	6571.50	---	--- A	-	---
WME-9	1540825	492081	73.2	---	12/13/2019	57.38	6543.44	2.0	6600.82	---	--- A	-	---
WME-18	1544138	489665	154.0	4.0	---	---	---	2.6	6659.12	---	--- A	149-154	---
WME-19	1543415	490033	138.0					1.9	6659.43	---	--- A	133-138	---
WME-10	1540988	491910	76.7		12/13/2019	60.54	6542.29	2.0	6602.83	---	--- A	-	---
WME-20	1543363	491802	154.0	4.0	---	---	---	3.1	6665.08	---	--- A	149-154	---
WME-21	1540798	491855	72.0					2.7	6600.15	---	--- A	67-72	---
WME-22	1541258	491434	74.0					2.9	6603.44	---	--- A	69-74	---
WN4	1543958	489961	142.4	5.0	7/6/2011	53.00	6609.78	3.0	6662.78	165	---	T 40-100	---
										165	6494.8 A	50-190	115.0
WR1	1541280	488529	---	5.0	6/27/1989	46.54	6521.86	0.8	6568.40	---	--- A	-	---
WR1R	1541302	488536	85.0	5.0	12/5/2000	28.62	6539.85	0.0	6568.47	85	6483.5 A	-	56.4
WR2	1541290	488678	94.1	5.0	12/5/2000	2.52	6566.07	0.9	6568.59	85	6482.7 A	65-95	83.4

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
WR3	1541490	488671	82.3	5.0	12/5/2000	32.96	6536.58	2.7	6569.54	83	6483.8 A	63-93	52.7
WR4	1541788	488678	62.0	5.0	12/5/2000	1.92	6570.89	0.0	6572.81	---	---	A -	---
WR5	1541813	488683	72.4	5.0	12/5/2000	38.69	6532.54	0.6	6571.23	80	6490.6 A	60-80	41.9
WR6	1541902	488566	96.8	5.0	12/5/2000	3.04	6569.99	1.3	6573.03	84	6487.7 A	55-85	82.3
WR7	1541997	488456	97.3	5.0	12/5/2000	38.91	6534.82	2.0	6573.73	84	6487.8 A	55-85	47.0
WR8	1542095	488328	110.2	5.0	11/10/2008	26.40	6546.20	0.4	6572.60	100	6472.2 A	50-100	74.0
WR9	1542185	488217	111.3	5.0	12/5/2000	46.82	6526.23	0.8	6573.05	100	6472.3 A	50-100	54.0
WR10	1542389	487961	120.6	5.0	1/29/2003	14.84	6558.35	0.7	6573.19	110	6462.5 A	60-110	95.9
WR11	1542586	487728	120.5	5.0	1/29/2003	14.88	6559.61	0.3	6574.49	110	6464.2 A	60-110	95.4
WR12	1541280	488277	96.7	4.0	11/23/2020	29.45	6538.74	1.1	6568.19	85	6482.1 A	55-85	56.6
WR13	1541068	488861	70.0	5.0	12/5/2000	18.98	6550.19	3.2	6569.17	60	6506.0 A	50-60	44.2
WR14	1540638	488863	70.0	5.0	5/28/2003	15.50	6551.41	2.3	6566.91	61	6503.6 A	50-60	47.8
WR15	1541280	488016	70.0	4.0	5/28/2003	10.90	6560.29	0.0	6571.19	75	6496.2 A	60-75	64.1
WR16	1543051	487495	122.3	5.0	1/29/2003	6.54	6566.24	1.9	6572.78	100	6470.9 A	40-120	95.4
WR17	1543328	487485	124.4	5.0	1/29/2003	2.45	6570.64	2.2	6573.09	75	6495.9 A	40-120	74.7
WR18	1543597	487465	73.6	5.0	1/29/2003	2.97	6569.94	2.2	6572.91	70	6500.7 A	20-70	69.2
WR19	1543873	487458	87.8	5.0	1/29/2003	3.31	6571.62	2.2	6574.93	74	6498.7 A	25-85	72.9
WR20	1544059	487449	102.3	5.0	1/29/2003	3.98	6570.49	2.1	6574.47	80	6492.4 A	42-102	78.1
WR21	1544241	487449	88.9	5.0	1/29/2003	6.28	6569.77	2.1	6576.05	77	6497.0 A	28-88	72.8
WR22	1544434	487462	91.5	5.0	1/29/2003	3.44	6574.45	2.4	6577.89	86	6489.5 A	30-90	85.0
WR23	1544632	487445	94.3	5.0	1/29/2003	1.72	6574.75	2.2	6576.47	77	6497.3 A	32-92	77.5
WR24	1544938	487438	89.2	5.0	1/29/2003	2.04	6586.63	3.0	6588.67	82	6503.7 A	50-90	83.0
X	1540512	491892	50.7	4.0	10/12/2020	33.10	6538.51	1.7	6571.61	---	---	A -	---
X1	1540671	492129	54.0	5.0	8/12/2002	7.50	6566.04	3.9	6573.54	47	6522.6 A	37-47	43.4
X2	1540836	492363	53.0	6.0	8/12/2002	2.50	6569.43	1.9	6571.93	45	6525.0 A	40-45	44.4
X3	1540992	492599	52.0	5.0	8/12/2002	2.50	6570.78	2.0	6573.28	42	6529.3 A	32-42	41.5
X4	1541210	492814	54.0	5.0	8/12/2002	13.10	6563.84	3.2	6576.94	45	6528.7 A	37-45	35.1
X5	1541408	492821	44.0	6.0	8/12/2002	7.80	6569.81	3.6	6577.61	35	6539.0 A	24-36	30.8
X6	1541609	492828	46.0	6.0	8/12/2002	8.00	6570.72	3.5	6578.72	35	6540.2 A	22-37	30.5
X7	1541808	492851	56.0	6.0	12/5/2000	8.60	6571.83	3.4	6580.43	45	6532.0 A	32-46	39.8
X8	1542007	492852	61.0	5.0	12/5/2000	13.00	6568.76	3.4	6581.76	51	6527.4 A	32-52	41.4
X9	1542194	492852	61.0	5.0	12/5/2000	27.00	6555.92	3.6	6582.92	51	6528.3 A	24-52	27.6
X10	1542352	492835	61.0	5.0	8/12/2002	4.00	6578.43	3.6	6582.43	53	6525.8 A	30-55	52.6
X11	1542553	492782	57.0	5.0	12/5/2000	0.50	6581.50	3.0	6582.00	53	6526.0 A	17-57	55.5
X12	1542861	492852	57.0	5.0	12/5/2000	0.50	6582.83	3.0	6583.33	53	6527.3 A	17-57	55.5
X13	1543640	493665	56.0	5.0	4/16/2012	39.61	6547.33	2.5	6586.94	51	6533.4 A	16-56	13.9

**TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
X14	1544002	493777	56.0	5.0	4/9/2002	39.80	6546.40	2.1	6586.20	49	6535.1 A	16-56	11.3
X15	1544222	493800	57.0	5.0	4/9/2002	40.54	6542.37	2.3	6582.91	51	6529.6 A	17-57	12.8
X16	1544473	493795	47.0	5.0	4/16/2012	38.22	6546.57	2.3	6584.79	47	6535.5 A	22-47	11.1
X17	1544356	493793	55.0	5.0	4/9/2002	41.06	6544.78	3.3	6585.84	48	6534.6 A	35-55	10.2
X18	1544593	493569	57.0	5.0	12/11/2019	37.85	6548.23	2.9	6586.08	49	6534.2 A	37-57	14.0
X19	1544753	493437	63.0	5.0	11/17/2006	32.46	6552.74	4.2	6585.20	56	6525.1 A	33-63	27.7
X20	1544855	493256	71.0	5.0	4/16/2012	38.54	6547.19	5.0	6585.73	64	6516.8 A	31-71	30.4
X21	1543606	493894	55.0	5.0	12/5/2000	38.99	6547.34	2.7	6586.33	51	6532.6 A	35-55	14.7
X22	1543874	493946	56.0	5.0	12/5/2000	39.21	6546.49	2.6	6585.70	50	6533.1 A	36-56	13.4
X23	1544064	494012	56.0	5.0	12/5/2000	38.96	6546.98	2.8	6585.94	47	6536.1 A	36-56	10.8
X24	1544244	494011	56.0	5.0	12/5/2000	39.94	6545.78	2.6	6585.72	46	6537.1 A	36-56	8.7
X25	1544445	494042	53.0	5.0	12/5/2000	39.41	6546.22	2.8	6585.63	46	6536.9 A	33-53	9.3
X26	1544693	493702	53.0	5.0	12/5/2000	35.34	6552.30	2.8	6587.64	43	6541.8 A	33-53	10.5
X27	1544953	493374	71.0	5.0	11/17/2006	39.75	6545.55	6.0	6585.30	64	6515.4 A	31-71	30.2
X28	1540545	491971	56.0	5.0	8/12/2002	8.30	6561.66	2.0	6569.96	48	6520.0 A	16-56	41.7
X29	1540735	492256	51.0	5.0	8/12/2002	4.00	6566.03	2.0	6570.03	43	6525.0 A	11-51	41.0
X30	1540897	492493	51.0	5.0	8/12/2002	3.00	6569.53	2.0	6572.53	43	6527.5 A	11-51	42.0
X31	1541052	492731	51.0	5.0	8/12/2002	8.00	6566.13	2.0	6574.13	44	6528.1 A	11-51	38.0
XDR-1	1544450	493758	45.0	2.0	---	---	---	---	6585.28	---	--- A	35-45	---
XDR-2	1544459								6585.44	---	--- A	35-45	---
XDR-3	1544456	493767							6585.37	---	--- A	35-45	---
XDR-4	1544447								6585.41	---	--- A	35-45	---
XIW	1544453	493762	45.0	4.0	---	---	---	---	6583.09	---	--- A	35-45	---
XMW-6	1544465	493778	45.0	3.0	---	---	---	---	6585.57	---	--- A	35-45	---
XMW-5	1544468	493746		2.0					6585.31	---	--- A	35-45	---
XMW-4	1544438	493764							6585.39	---	--- A	35-45	---
XMW-3	1544442	493746							6585.21	---	--- A	35-45	---
XMW-1	1544452								6585.26	---	--- A	35-45	---
XMW-2	1544451	493731							6585.57	---	--- A	35-45	---
Y	1541025	491256	60.8	4.0	10/15/2002	15.20	6557.68	2.4	6572.88	57	6513.5 A	54-59	44.2
Z	1540290	490701	73.9	4.0	12/5/2000	5.00	6564.22	0.6	6569.22	68	6500.6 A	60-70	63.6
										68	6500.6 A	60-70	63.6

Note: A = Alluvial Aquifer  
MP = Measuring Point  
LSD = Land Surface Datum  
IN = Inches  
FT = Feet  
MSL = Mean Sea Level



**TABLE 4.1-2. WELL DATA FOR THE ALLUVIAL AQUIFER BROADVIEW AND FELICE ACRES WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
Broadview													
0410	1537459	489882	105.0	6.0	6/27/2019	38.00	6521.66	0.0	6559.66	75	6484.7 A	90-105	37.0
0411	1537400	489510	70.0	6.0	8/7/1996	35.10	6524.90	0.0	6560.00	70	6490.0 A	65-70	34.9
0412	1537940	488830	---	6.0	---	---	---	0.0	6561.00	---	---	A -	---
0413	1537925	490234	---	---	4/27/1994	35.25	6530.75	0.0	6566.00	---	---	A -	---
0421	1538450	491100	88.0	5.0	7/11/2019	43.20	6528.80	0.9	6572.00	92	6479.1 A	72-102	49.7
0422	1538440	490810	80.0	4.0	4/6/1994	32.82	6537.18	0.0	6570.00	75	6495.0 A	60-80	42.2
0423	1538227	490806	---	---	---	---	---	0.0	6570.00	---	---	A -	---
0425	1538188	490631	90.0	6.0	4/7/1994	32.42	6534.58	0.0	6567.00	71	6496.0 A	50-90	38.6
0426	1538230	490620	100.0	---	11/10/1981	30.65	6534.35	0.0	6565.00	80	6485.0 A	80-100	49.4
0427	1538450	490410	121.0	6.0	9/20/2012	33.61	6536.39	0.0	6570.00	81	6489.0 A	62-120	47.4
0428	1538277	490391	110.0	4.0	---	---	---	0.0	6570.00	66	6504.0 A	83-104	---
0429	1538210	490430	100.0	6.0	9/1/1995	37.21	6532.79	0.0	6570.00	74	6496.0 A	58-75	36.8
0430	1538469	490300	145.0	---	---	---	---	0.0	6568.00	72	6496.0 A	-	---
										72	6433.0 U	-	---
0431	1538045	490090	130.0	6.0	4/12/1994	35.00	6533.00	0.0	6568.00	60	6508.0 A	125-130	25.0
										60	6450.0 U	125-130	83.0
0432	1538210	489840	---	---	---	---	---	0.0	6565.00	---	---	A -	---
0433	1538220	489620	90.0	4.0	5/2/1997	36.05	6527.95	1.5	6564.00	75	6487.5 A	58-84	40.5
0435	1538220	489300	85.0	6.0	3/25/2003	34.48	6526.52	1.3	6561.00	85	6474.7 A	-	51.8
0438	1537933	490801	120.0	4.0	---	---	---	0.0	6571.00	105	6466.0 A	70-100	---
0439	1537940	490490	97.0	4.0	8/7/1996	39.80	6527.20	0.0	6567.00	75	6492.0 A	77-97	35.2
0440	1537700	490230	---	---	---	---	---	0.0	6566.00	---	---	A -	---
0441	1537720	490090	116.0	6.0	1/30/1995	35.19	6530.81	0.0	6566.00	78	6488.0 A	106-116	42.8
0442	1537940	489840	100.0	4.0	8/7/1996	37.15	6527.85	0.0	6565.00	80	6485.0 A	70-100	42.8
0443	1537940	489280	---	4.0	---	---	---	0.0	6561.00	75	6486.0 A	60-80	---
0444	1537940	489180	80.0	4.0	5/18/1994	28.84	6532.16	0.0	6561.00	---	---	A -	---
0445	1537720	489300	108.0	6.0	---	---	---	0.0	6561.00	79	6482.0 A	75-105	---
0446	1537830	488960	110.0	6.0	9/8/1983	41.28	6518.72	0.0	6560.00	60	6500.0 U	60-95	18.7
										60	6500.0 A	60-95	18.7
0447	1537490	490480	142.0	6.0	4/11/1985	41.18	6526.82	0.0	6568.00	80	6488.0 A	120-142	38.8
										80	6430.0 U	120-142	96.8
0448	1537400	489100	---	---	---	---	---	0.0	6561.00	---	---	A -	---
0450	1537448	490763	---	6.0	1/25/1995	42.29	6528.71	0.0	6571.00	85	6486.0 A	70-105	42.7
* 0451	1537700	490600	---	---	---	---	---	0.0	0.00	---	---	A -	---
0452	1537880	490420	100.0	4.0	8/7/1996	41.20	6525.80	0.8	6567.00	85	6481.2 A	40-100	44.6

**TABLE 4.1-2. WELL DATA FOR THE ALLUVIAL AQUIFER BROADVIEW AND FELICE ACRES WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
0453	1538471	490297	110.0	4.0	7/1/2002	34.93	6533.07	0.9	6568.00	80	6487.1 A	60-110	46.0
* 0454	1537920	489025	---	4.0	---	---	---	0.0	0.00	---	---	A -	---
0455	1537804	490737	0.0	---	---	---	---	---	---	---	---	A -	---
0456	1538240	490060	300.0	5.0	---	---	---	---	6559.00	---	---	A -	---
SUB1	1537620	489100	---	4.0	4/30/2013	32.28	6528.72	0.0	6561.00	---	---	A -	---
SUB2	1537392	490370	---	4.0	7/20/2020	42.90	6524.67	0.0	6567.57	---	---	A -	---
SUB3	1538280	489420	84.0	6.0	5/12/2020	40.03	6517.04	0.0	6557.07	72	6485.1 A	56-72	32.0
SUB4	1538440	489840	100.0	4.0	9/21/1978	49.11	6515.89	0.0	6565.00	78	6487.0 A	60-85	28.9
SUB5	1537940	489470	86.0	4.0	---	---	---	0.0	6562.31	66	6496.3 A	55-80	---
SUB6	1537940	490090	82.0	4.0	---	---	---	0.0	6566.00	80	6486.0 A	52-82	---
SUB7	1537940	490630	98.0	4.0	---	---	---	0.0	6568.00	85	6483.0 A	78-98	---
SUB8	1538450	490210	150.0	5.0	---	---	---	0.0	6568.00	72	6496.0 A	60-90	---
SUB9	---	---	---	---	---	---	---	0.0	0.00	---	---	A -	---
<b><u>Felice Acres</u></b>													
0482	1536981	489579	260.0	5.0	5/14/2014	46.60	6516.06	0.0	6562.66	80	6482.7 A	220-260	33.4
										80	6352.7 M	220-260	163.4
										40	6522.7 A	-	0.0
0483	1536586	489753	280.0	5.0	4/29/2019	41.45	6521.21	0.0	6562.66	40	6497.7 U	-	23.5
										40	6326.7 M	270-300	194.5
										40	6522.7 A	-	0.0
0490	1536553	489752	63.0	4.0	6/3/2019	45.15	6517.27	0.0	6562.42	75	6487.4 A	20-80	29.8
0491	1537031	489658	63.0	4.0	9/18/2014	36.87	6525.75	0.0	6562.62	40	6522.6 A	30-63	3.1
0492	1537220	489280	60.0	4.0	3/15/2011	29.00	6531.68	1.2	6560.68	55	6504.5 A	40-60	27.2
0495	1537402	491135	---	---	---	---	---	0.0	6571.00	---	---	A -	---
0496	1534650	489603	93.0	5.0	3/25/2019	52.04	6510.48	1.6	6562.52	86	6474.9 A	53-93	35.6
0497	1535039	489503	94.0	5.0	11/25/2020	49.80	6512.82	2.0	6562.62	89	6471.6 A	64-94	41.2
0498	1534661	488953	150.0	6.0	4/9/2019	54.23	6506.36	2.0	6560.59	80	6478.6 M	130-150	27.8
										80	6478.6 A	70-110	27.8
CW44	1535048	488891	208.0	6.0	3/25/2019	55.51	6505.23	2.5	6560.74	94	6464.2 A	-	41.0
										94	6428.2 M	69-208	77.0
Q1	1535125	488830	106.0	4.5	3/25/2019	41.32	6520.29	2.0	6561.61	106	6453.6 A	70-110	66.7
Q2	1534903	488867	97.0	4.5	10/29/2020	72.10	6489.58	2.0	6561.68	97	6462.7 A	60-100	26.9
Q3	1534743	488865	108.0	4.5	4/15/2019	53.07	6506.67	2.0	6559.74	108	6449.7 A	60-100	56.9
Q5	1534829	488945	100.0	4.5	5/6/2020	51.91	6509.57	2.8	6561.48	---	---	A 60-100	---
Q7	1534981	489034	100.0	4.5	3/25/2019	54.05	6507.12	1.3	6561.17	100	6459.9 A	60-100	47.3
Q8	1534762	489059	100.0	4.5	11/25/2020	50.08	6510.72	2.0	6560.80	100	6458.8 A	60-100	51.9
Q9	1534643	489101	100.0	4.5	8/26/2019	53.51	6507.82	2.0	6561.33	100	6459.3 A	60-100	48.5
Q11	1534859	489134	100.0	4.5	10/29/2020	53.55	6507.47	2.1	6561.02	100	6458.9 A	60-100	48.6

**TABLE 4.1-2. WELL DATA FOR THE ALLUVIAL AQUIFER BROADVIEW AND FELICE ACRES WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
Q12	1535058	489102	102.0	4.5	8/26/2019	53.90	6507.22	2.0	6561.12	---	---	A 60-100	---
Q13	1535173	489208	100.0	4.5	3/25/2019	40.02	6522.12	2.0	6562.14	100	6460.1 A	60-100	62.0
Q14	1534969	489213	100.0	4.5	3/25/2019	33.06	6528.91	1.7	6561.97	100	6460.3 A	60-100	68.6
Q15	1534779	489239	100.0	4.5	6/24/2019	54.25	6508.00	2.1	6562.25	100	6460.2 A	60-100	47.9
Q16	1534639	489347	102.0	4.5	3/25/2019	54.86	6508.42	2.0	6563.28	97	6464.3 A	60-100	44.1
Q18	1534869	489342	100.0	4.5	6/24/2019	49.15	6512.54	1.3	6561.69	100	6460.4 A	60-100	52.1
Q19	1535053	489306	100.0	4.5	8/23/2019	53.42	6508.75	1.9	6562.17	100	6460.3 A	60-100	48.5
Q20	1535132	489400	100.0	4.5	5/8/2015	50.85	6511.96	2.2	6562.81	100	6460.6 A	60-100	51.4
Q21	1534970	489422	100.0	4.5	6/24/2019	52.30	6510.79	2.3	6563.09	100	6460.8 A	60-100	50.0
Q22	1534806	489433	100.0	4.5	6/24/2019	52.25	6510.54	2.9	6562.79	100	6459.9 A	60-100	50.7
Q23	1534851	489534	100.0	4.5	11/25/2020	62.45	6501.81	2.0	6564.26	---	---	A 60-100	---
Q24	1535141	489581	100.0	4.5	5/11/2015	50.55	6513.50	2.0	6564.05	100	6462.1 A	60-100	51.5
Q25	1534978	489629	100.0	4.5	6/24/2019	51.35	6513.16	2.5	6564.51	100	6462.0 A	60-100	51.2
Q26	1534769	489630	100.0	4.5	6/24/2019	52.40	6512.43	---	6564.83	100	---	A 60-100	---
Q27	1534861	489727	100.0	4.5	8/23/2019	54.20	6510.68	2.4	6564.88	100	6462.5 A	60-100	48.2
Q28	1535076	489696	100.0	4.5	8/27/2019	52.54	6511.40	2.2	6563.94	100	6461.7 A	60-100	49.7
Q29	1535140	489920	89.0	4.5	11/25/2020	51.70	6514.76	2.0	6566.46	89	6475.5 A	60-100	39.3
Q30	1534970	489778	100.0	4.5	8/27/2019	53.75	6512.38	2.0	6566.13	---	---	A 60-100	---
Q42	1536662	489606	80.0	4.5	6/5/2019	40.98	6523.50	1.6	6564.48	61	6501.9 U	40-80	21.6
										61	6501.9 A	40-80	21.6
Q43	1536550	489507	80.0	4.5	6/5/2019	39.70	6523.49	1.8	6563.19	80	6481.4 A	40-80	42.1
Q44	1535671	488864	110.0	4.5	11/25/2020	51.53	6509.80	2.0	6561.33	---	---	A 70-110	---
Q45	1535346	489172	110.0	4.5	12/1/2014	56.14	6506.21	2.0	6562.35	---	---	A 70-110	---
Q46	1535526	489315	110.0	4.5	6/5/2019	51.10	6510.60	2.0	6561.70	---	---	A 70-110	---
Q47	1535356	489516	110.0	4.5	6/4/2019	52.22	6508.94	2.0	6561.16	---	---	A 70-110	---
Q48	1535653	490120	105.0	4.5	11/25/2020	51.22	6516.62	2.0	6567.84	73	6492.8 A	65-105	23.8
										73	6492.8 U	65-105	23.8
Q49	1535232	489780	100.0	4.5	6/4/2019	51.25	6513.46	1.7	6564.71	---	---	A 60-100	---
Q50	1536680	490288	85.0	4.5	6/6/2019	44.97	6523.96	2.0	6568.93	43	6523.9 A	45-85	0.0
										43	6505.9 U	45-85	18.0
Q51	1535486	490003	76.0	4.0	---	---	---	2.5	6500.00	---	---	A 46-76	---

Note: A = Alluvial Aquifer  
MP = Measuring Point  
LSD = Land Surface Datum  
IN = Inches  
FT = Feet  
MSL = Mean Sea Level

**TABLE 4.1-3. WELL DATA FOR THE ALLUVIAL AQUIFER MURRAY ACRES AND PLEASANT VALLEY  
WELLS**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
Murray													
* 0801	1541020	488600	100.0	4.0	7/15/2004	39.20	6528.53	0.0	6567.73	85	6482.7 A	80-100	45.8
0801R	1541096	488431	90.0	5.0	11/4/2004	41.01	6528.04	3.0	6569.05	82	6484.1 A	60-90	44.0
0802	1540765	488277	98.0	6.0	8/18/2020	41.40	6521.32	2.0	6562.72	81	6479.7 A	75-81	41.6
0803	1540800	487430	---	6.0	9/19/1983	84.86	6476.14	0.0	6561.00	85	---	C 85-180	---
										85	6476.0 A	85-180	0.1
0804	1540790	486790	137.0	6.0	2/19/2013	42.20	6519.80	0.0	6562.00	85	6477.0 A	125-136	42.8
0805	1540818	486241	140.0	5.0	10/6/1994	59.34	6507.66	0.0	6567.00	110	6457.0 A	100-140	50.7
0810	1540290	486694	105.0	6.0	---	---	---	0.0	6562.00	81	6481.0 A	75-101	---
0811	1540320	486373	140.0	4.0	---	---	---	0.0	6563.00	110	6453.0 A	100-140	---
0815	1539090	488100	---	4.0	5/22/1991	29.14	6526.12	0.0	6555.26	---	---	A -	---
0844	1538376	487002	75.0	4.0	11/20/2020	39.04	6517.09	1.2	6556.13	70	6484.9 A	35-75	32.2
0845	1537280	487833	65.0	4.0	11/20/2020	37.43	6519.62	1.7	6557.05	55	6500.4 A	45-65	19.3
802A	1540691	488417	90.0	4.5	4/7/2014	35.64	6533.08	2.0	6568.72	82	6484.7 A	50-90	48.4
802B	1540833	488415	90.0	4.5	4/7/2014	34.46	6533.68	2.0	6568.14	58	6508.1 U	-	25.5
										58	6508.1 A	50-90	25.5
AW	1540235	488015	156.0	6.0	11/11/2020	38.40	6525.03	0.1	6563.43	63	6500.3 A	-	24.7
										63	6463.3 U	66-155	61.7
HW	1540920	487435	115.0	6.0	11/9/1994	40.00	6517.00	0.0	6557.00	95	6462.0 A	60-94	55.0
Pleasant Valley													
0525	1541283	486020	---	4.5	6/27/2019	53.45	6516.55	---	6570.00	---	---	A -	---
0688	1541257	483955	105.0	5.0	11/20/2020	60.88	6501.74	2.9	6562.62	95	6464.7 A	65-105	37.0
0831	1540090	486030	---	---	9/6/1983	54.95	6506.05	0.0	6561.00	---	---	A -	---
0833	1539335	485445	110.0	6.0	12/10/1996	46.61	6511.39	0.0	6558.00	103	6455.0 A	60-90	56.4
0834	1540259	484847	100.0	4.0	---	---	---	0.0	6560.00	80	6480.0 A	60-80	---
0835	1539610	484795	98.0	5.0	5/2/2000	49.74	6509.26	0.0	6559.00	94	6465.0 A	73-94	44.3
0836	1540422	484035	90.0	4.0	---	---	---	0.0	6558.00	80	6478.0 A	65-80	---
0838	1539948	485142	100.0	---	7/22/1995	49.03	6513.97	0.0	6563.00	---	---	A -	---
0839	1540519	485354	100.0	5.0	12/19/1994	50.00	6510.00	0.0	6560.00	94	6466.0 A	80-96	44.0
0840	1540367	485112	98.0	6.0	9/8/1983	47.32	6513.68	0.0	6561.00	94	6467.0 A	73-94	46.7
0841	1540835	485020	100.0	---	7/22/1995	54.66	6506.34	0.0	6561.00	---	---	A -	---
0843	1541411	485738	120.0	4.0	6/27/1989	52.40	6517.60	0.0	6570.00	112	6458.0 A	100-110	59.6

Note: A = Alluvial Aquifer  
MP = Measuring Point  
LSD = Land Surface Datum  
IN = Inches  
FT = Feet  
MSL = Mean Sea Level

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)					
0460	1537148	493921	114.2	5.0	7/12/2019	68.10	6526.90	---	6595.00	---	--- A -	---
0520	1538934	492935	75.0	5.0	11/11/2020	55.38	6530.64	0.3	6586.02	68	6517.7 A	35-75
0521	1539104	492588	75.0	5.0	3/18/2020	54.25	6530.19	2.5	6584.44	65	6516.9 A	35-75
0522	1538640	492437	77.0	5.0	3/18/2020	52.60	6527.93	2.8	6580.53	68	6509.7 A	37-77
0523	1538680	492896	74.0	5.0	9/10/2002	2.00	6584.79	3.0	6586.79	62	6521.8 A	34-74
0524	1538889	493173	78.0	5.0	1/28/2003	3.47	6586.88	3.0	6590.35	70	6517.4 A	33-78
0531	1541086	478262	---	---	5/9/2019	83.05	6470.74	2.0	6553.79	---	--- A -	---
* 0533	---	---	195.0	---	---	---	---	0.0	6520.00	---	--- A -	---
0538	1533486	486899	170.0	6.0	3/4/2020	67.80	6481.14	2.0	6548.94	95	6451.9 A	50-90
										95	6413.9 L	130-170
0539	1534014	487596	210.0	6.0	11/20/2020	210.00	6345.32	2.0	6555.32	100	6453.3 A	50-70
										100	6453.3 A	80-100
										100	6378.3 L	170-210
0540	1534125	488091	90.0	6.0	11/20/2020	57.08	6498.83	2.7	6555.91	80	6473.2 A	30-90
0541	1539831	477236	120.0	5.0	11/25/2020	91.80	6463.82	2.0	6555.62	112	6441.6 A	78-118
0551	1536272	479881	135.0	5.0	11/20/2020	99.48	6447.82	2.1	6547.30	115	6430.2 A	95-135
0553	1534923	480563	130.0	5.0	11/20/2020	104.44	6443.04	2.0	6547.48	128	6417.5 A	90-125
0554	1534967	479107	140.0	5.0	11/20/2020	140.00	6407.17	1.9	6547.17	118	6427.3 A	90-125
0555	1538572	486236	100.0	5.0	2/4/2020	42.40	6514.74	2.5	6557.14	100	6454.6 A	60-90
0556	1538006	486184	100.0	5.0	2/4/2020	42.90	6513.12	2.4	6556.02	95	6458.6 A	60-90
0557	1537204	486000	65.0	5.0	2/5/2020	43.00	6510.77	2.5	6553.77	55	6496.3 A	45-65
0631	1532234	483756	118.0	6.0	11/20/2020	84.39	6456.71	2.2	6541.10	109	6429.9 A	58-118
0632	1531850	483767	110.0	6.0	11/20/2020	83.20	6458.10	1.4	6541.30	102	6437.9 A	70-110
0633	1541467	479642	83.0	8.0	2/25/2019	72.63	6484.93	0.0	6557.56	95	6462.6 A	11-83
0634	1541652	480362	103.0	4.5	11/25/2020	70.48	6489.59	2.8	6560.07	95	6462.3 A	80-100
0635	1535363	478401	63.0	12.0	---	---	---	---	6546.25	---	--- A	4-63
0636	1545374	476038	123.0	4.5	12/18/2014	101.75	6471.69	2.3	6573.44	119	6452.1 A	103-123
0637	1545409	474710	124.0	4.5	9/30/2019	112.29	6462.91	2.5	6575.20	118	6454.7 A	104-124
0638	1539628	493265	75.0	5.0	11/11/2020	52.10	6533.46	0.0	6585.56	65	6520.6 A	35-75
0639	1539370	492961	80.0	5.0	7/15/2020	57.20	6530.68	2.5	6587.88	71	6514.4 A	35-80
0640	1537790	491961	84.0	5.0	11/11/2020	47.70	6532.27	2.2	6579.97	77	6500.8 A	64-84
0641	1536494	491110	95.0	5.0	6/30/2015	48.35	6525.01	2.5	6573.36	87	6483.9 A	65-95
0642	1536104	490932	95.0	5.0	6/30/2015	48.80	6523.08	2.4	6571.88	89	6480.5 A	65-95
0643	1533760	487386	108.0	5.0	10/16/2002	75.89	6475.44	1.5	6551.33	93	6456.8 A	58-108
0644	1533481	485450	110.0	5.0	11/20/2020	70.85	6473.05	2.0	6543.90	102	6439.9 A	55-110
0645	1532924	485282	80.0	5.0	4/15/2010	74.40	6469.39	2.5	6543.79	70	6471.3 A	60-80

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
0646	1533246	484953	100.0	5.0	11/20/2020	74.15	6469.20	1.5	6543.35	91	6450.9 A	60-100	18.3
0647	1536623	478308	140.0	4.5	11/20/2020	105.33	6446.58	1.4	6551.91	132	6418.5 A	80-140	28.1
0648	1534730	478343	120.0	4.5	11/20/2020	120.00	6427.79	2.0	6547.79	120	6425.8 A	80-120	2.0
0649	1534730	479798	124.0	4.5	11/20/2020	103.11	6440.18	0.3	6543.29	115	6428.0 A	84-124	12.2
0650	1536779	482135	109.0	4.5	11/11/2020	82.15	6464.96	2.2	6547.11	103	6441.9 A	89-109	23.0
0652	1531170	483779	88.0	5.0	11/20/2020	84.60	6453.55	1.5	6538.15	79	6457.7 A	60-88	0.0
0653	1533283	486570	206.0	6.0	11/20/2020	65.93	6479.04	1.6	6544.97	97	6446.4 A	69-206	32.7
										97	6408.4 L	-	70.7
0654	1541994	478636	120.0	4.5	11/25/2020	74.64	6475.86	1.4	6550.50	106	6443.1 A	60-120	32.8
0655	1541620	479830	96.0	8.0	10/28/2019	73.00	6485.18	---	6558.18	88	---	A 21-84	---
0656	1542578	478333	88.0	8.0	12/26/2018	88.00	6466.07	---	6554.07	88	---	A 6-88	---
0657	1537497	478392	128.0	6.0	11/20/2020	100.52	6451.29	2.2	6551.81	120	6429.6 A	87-128	21.7
0657A	1537083	478412	35.0	12.0	4/13/1999	37.00	6512.00	---	6549.00	---	---	A 17-35	---
0658	1535922	478436	130.0	6.0	11/20/2020	107.61	6442.57	0.4	6550.18	129	6420.8 A	89-130	21.8
0659	1541689	480772	101.0	4.5	11/25/2020	70.35	6489.82	2.0	6560.17	97	6461.2 A	61-101	28.7
0680	1543850	478746	80.0	4.5	11/25/2020	73.10	6485.77	2.0	6558.87	75	6481.9 A	50-80	3.9
0681	1540676	482734	117.0	6.0	11/11/2020	64.80	6495.72	2.1	6560.52	111	6447.4 A	67-117	48.3
0682	1543125	477489	94.0	4.0	10/20/2010	79.60	6474.37	2.8	6553.97	102	6449.2 A	54-94	25.2
0683	1540198	476217	120.0	6.0	4/16/2019	90.31	6465.73	2.0	6556.04	140	6414.0 A	80-120	51.7
0684	1540273	478499	143.0	6.0	5/6/2019	86.25	6467.03	2.0	6553.28	118	6433.3 A	83-143	33.8
0685	1539098	478170	100.0	4.5	11/25/2020	97.50	6459.07	1.7	6556.57	116	6438.9 A	60-100	20.2
0686	1545319	475438	115.0	4.5	9/30/2019	114.12	6464.68	1.8	6578.80	136	6441.0 A	75-115	23.7
0687	1539011	477276	102.0	6.0	11/25/2020	102.00	6453.96	2.2	6555.96	120	6433.8 A	62-102	20.2
0689	1530024	478478	80.0	4.5	11/24/2008	83.65	6458.37	2.6	6542.02	75	6464.4 A	60-80	0.0
0692	1535892	493175	90.0	5.0	7/25/2018	63.42	6521.40	2.5	6584.82	80	6502.3 A	58-90	19.1
0846	1537219	484730	75.0	4.0	11/20/2020	44.23	6504.69	0.8	6548.92	65	6483.1 A	40-65	21.6
0847	1534736	488508	92.0	5.0	11/22/1996	53.88	6504.39	2.6	6558.27	80	6475.7 A	52-92	28.7
0848	1534634	490660	92.0	5.0	2/28/2007	60.78	6511.71	2.7	6572.49	91	6478.8 A	52-92	32.9
0851	1534692	483909	91.0	5.0	11/11/2020	82.50	6463.94	3.3	6546.44	80	6463.1 A	41-91	0.8
0852	1535610	493989	74.0	5.0	11/11/2020	69.95	6520.19	2.5	6590.14	70	6517.7 A	54-74	2.5
0855	1532111	484184	105.0	5.0	11/20/2020	82.99	6458.12	2.1	6541.11	97	6442.0 A	70-105	16.1
0861	1534332	488702	100.0	5.0	9/21/2010	66.96	6492.89	2.3	6559.85	65	6492.6 A	50-100	0.3
0862	1534265	487800	110.0	5.0	11/20/2020	52.63	6503.55	3.3	6556.18	97	6455.9 A	63-103	47.6
0863	1533867	487912	110.0	5.0	4/29/2019	63.10	6493.46	2.5	6556.56	94	6460.1 A	63-103	33.4
0864	1533735	486464	95.0	5.0	4/30/2020	67.60	6479.12	1.9	6546.72	78	6466.9 A	44-84	12.3
0865	1534123	488429	97.0	5.0	4/29/2019	61.10	6495.68	2.2	6556.78	88	6466.6 A	37-97	29.1

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
0866	1534494	488340	120.0	5.0	11/12/2019	59.01	6499.11	1.8	6558.12	80	6476.3 A	33-113	22.8
0867	1533762	488409	88.0	5.0	11/20/2020	58.98	6496.92	2.0	6555.90	86	6467.9 A	48-88	29.0
0868	1534848	491033	103.0	5.0	6/30/2015	56.11	6518.63	2.2	6574.74	94	6478.5 A	53-103	40.1
0869	1533251	486073	94.0	5.0	11/20/2020	68.50	6475.99	1.7	6544.49	99	6443.8 A	44-94	32.2
* 0870	1532680	484906	93.0	5.0	1/11/1996	68.56	6475.60	1.9	6544.16	95	6447.3 A	69-89	28.3
* 0871	1533603	485400	100.0	5.0	1/11/1996	66.86	6477.85	2.4	6544.71	93	6449.3 A	60-100	28.5
* 0872	1533092	485407	100.0	5.0	1/11/1996	65.80	6477.51	1.8	6543.31	96	6445.5 A	55-100	32.0
* 0873	1533286	484505	100.0	5.0	1/11/1996	67.55	6475.46	1.9	6543.01	96	6445.1 A	60-100	30.3
* 0874	1533968	484925	105.0	5.0	1/11/1996	68.68	6476.66	2.2	6545.34	110	6433.1 A	55-105	43.5
* 0875	1532785	483634	125.0	5.0	1/11/1996	69.85	6472.99	1.7	6542.84	116	6425.1 A	65-125	47.9
0876	1532853	486088	95.0	5.0	11/20/2020	95.00	6449.26	1.9	6544.26	85	6457.4 A	58-88	0.0
0877	1533068	488067	70.0	5.0	11/20/2020	62.56	6490.52	1.9	6553.08	65	6486.2 A	58-68	4.3
0879	1532401	486104	70.0	5.0	11/20/2020	67.64	6476.91	2.2	6544.55	62	6480.4 A	48-68	0.0
0881	1542034	481478	96.0	4.5	11/25/2020	73.73	6491.31	2.0	6565.04	103	6460.0 A	76-96	31.3
0882	1541404	482396	110.0	4.5	2/5/2020	64.90	6496.26	2.0	6561.16	98	6461.2 A	70-110	35.0
0883	1540097	483039	100.0	5.0	2/5/2020	59.85	6497.28	1.9	6557.13	96	6459.3 A	60-90	38.0
0884	1542677	481498	90.0	5.0	2/6/2020	72.35	6493.75	1.0	6566.10	85	6480.2 A	58-88	13.6
0885	1541919	483474	100.0	5.0	11/25/2020	66.50	6498.14	1.5	6564.64	95	6468.1 A	70-100	30.0
0886	1542327	482487	90.0	5.0	11/25/2020	69.93	6494.62	1.5	6564.55	87	6476.1 A	60-90	18.6
0887	1543063	482469	67.0	5.0	11/25/2020	61.80	6505.93	1.5	6567.73	60	6506.2 A	42-67	0.0
0888	1542285	479335	105.0	5.0	11/25/2020	77.90	6479.43	1.1	6557.33	90	6466.2 A	75-105	13.2
0889	1540047	480222	65.0	5.0	12/18/2019	66.00	6483.63	1.5	6549.63	60	6488.2 A	35-65	0.0
0890	1541365	480088	101.0	5.0	10/20/2020	74.81	6483.62	1.7	6558.43	93	6463.7 A	81-101	19.9
0893	1541934	482244	98.0	4.5	11/25/2020	70.02	6493.95	2.1	6563.97	93	6468.9 A	78-98	25.1
0894	1541976	478317	78.0	4.5	10/20/2010	77.41	6476.88	3.0	6554.29	97	6454.3 A	58-78	22.6
0895	1541521	476222	104.0	5.0	10/3/2017	83.20	6470.64	2.4	6553.84	116	6435.4 A	61-101	35.2
0896	1542246	476237	113.0	5.0	10/3/2017	84.60	6471.01	2.0	6555.61	117	6436.6 A	73-113	34.4
0897	1543819	478237	93.0	4.0	11/25/2020	79.25	6483.00	2.0	6562.25	70	6490.3 A	63-93	0.0
0899	1543801	477288	110.0	4.0	1/9/2020	101.60	6469.24	2.0	6570.84	120	6448.8 A	70-110	20.4
0905	1532700	480850	120.0	5.0	5/9/2012	102.00	6443.00	0.0	6545.00	120	6425.0 A	100-120	18.0
0906	1532900	480450	---	---	8/29/1995	74.65	6462.75	0.0	6537.40	---	---	A -	---
0909	1531900	483400	140.0	4.0	5/12/2015	84.49	6454.41	0.0	6538.90	112	6426.9 A	80-135	27.5
										112	6426.9 L	80-135	27.5
0910	1528800	481150	138.0	5.0	---	---	---	0.0	6535.00	132	6403.0 A	120-134	---
0912	1471000	478250	---	---	---	---	---	0.0	6530.00	---	---	A -	---
0913	1555800	500950	---	8.0	1/24/1996	38.40	6604.60	0.3	6643.00	---	---	A -	---

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)					
0914	1555500	500850	---	6.0	2/20/2019	48.25	6593.75	1.4	6642.00	---	--- A -	---
0915	1552650	499650	100.0	4.0	6/19/2006	30.00	6595.00	0.0	6625.00	70	6555.0 A	55-85 40.0
0916	1552350	499600	160.0	4.0	5/7/2009	36.63	6588.37	0.0	6625.00	---	--- A	45-70 ---
0917	1542200	514600	---	---	---	---	---	0.0	6800.00	---	--- A -	---
0920	1555800	496900	---	7.0	10/6/2016	6.98	6620.62	0.7	6627.60	---	--- A -	---
0921	1555400	495800	---	5.0	2/10/2020	41.70	6582.30	1.9	6624.00	---	--- A -	---
0922	1555200	492500	---	6.0	2/12/2019	49.51	6572.19	1.7	6621.70	---	--- A -	---
0924	1547500	438900	135.0	4.0	---	---	---	0.0	6592.90	112	6480.9 A	94-114 ---
0925	1548600	480800	150.0	4.0	---	---	---	0.0	6601.40	140	6461.4 A	126-141 ---
0926	1547500	472700	134.0	4.0	---	---	---	0.0	6596.90	132	6464.9 A	123-132 ---
0935	1540115	476629	300.0	16.0	5/7/2019	92.10	6466.02	2.6	6558.12	125	6430.5 A	95-132 35.5
0936	1543621	472978	160.0	5.0	---	---	---	0.0	6573.38	160	6413.4 A	100-160 ---
0939	1539751	483202	97.0	8.0	7/25/1996	59.31	6497.69	2.3	6557.00	---	--- A -	---
0940	1538651	483040	70.0	---	7/24/1996	57.30	6495.70	8.8	6553.00	---	--- A -	---
0942	1538306	483703	100.0	6.0	---	---	---	0.0	6550.20	95	6455.2 A	85-95 ---
0947	1536206	491841	100.0	4.0	7/19/2018	53.02	6522.16	0.0	6575.18	95	6480.2 A	70-100 42.0
0950	1560400	498300	81.0	5.0	7/12/2000	25.70	6631.30	0.5	6657.00	---	--- A -	---
0952	1534550	477800	140.0	---	---	---	---	0.0	6550.00	---	--- A -	---
0975	1539753	482896	---	---	---	---	---	0.0	6556.00	---	--- A -	---
0976	1539751	483100	115.0	---	---	---	---	0.0	0.00	---	--- A -	---
0977	1539900	482720	---	---	12/9/1995	61.47	6495.53	1.0	6557.00	---	--- A -	---
0979	1539255	483375	105.0	5.0	7/10/2002	57.56	6593.44	0.0	6651.00	100	6551.0 A	90-100 42.4
0980	1539330	483050	---	---	11/8/1995	57.70	6497.30	0.0	6555.00	---	--- A -	---
0981	1539035	482734	---	---	---	---	---	0.0	6554.00	---	--- A -	---
0982	1538610	483400	110.0	5.0	---	---	---	0.0	6651.00	105	6546.0 A	90-105 ---
0983	1538817	483246	---	---	---	---	---	0.0	6552.00	---	--- A -	---
0984	1538860	483110	103.0	5.0	---	---	---	0.0	6651.00	98	6553.0 A	88-98 ---
0985	1539048	483380	115.0	5.0	7/18/1996	58.75	6592.25	0.0	6651.00	102	6549.0 A	90-110 43.3
0989	1538220	482920	---	---	11/2/1995	58.10	6494.90	1.0	6553.00	---	--- A -	---
0992	1539510	483790	100.0	5.0	---	---	---	0.0	6652.00	95	6557.0 A	85-95 ---
0993	1537920	483677	102.0	5.0	---	---	---	0.0	6650.00	98	6552.0 A	85-98 ---
0994	1539700	476240	144.0	6.0	10/6/2020	92.10	6462.90	0.0	6555.00	---	--- A	95-110 ---
0996	1537621	477989	138.0	5.0	1/9/2020	80.20	6472.32	1.7	6552.52	136	6414.8 A	126-136 57.5
0997	1539821	473807	---	---	3/12/1996	76.90	6491.40	0.0	6568.30	---	--- A -	---
1012	---	---	---	6.0	---	---	---	0.0	0.00	---	--- A -	---
1013	---	---	---	4.0	---	---	---	0.0	0.00	---	--- A -	---



**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS	
					DATE	DEPTH (FT-MP)							ELEV. (FT-MSL)
1014	---	---	---	9.0	---	---	---	0.0	0.00	---	--- A -	---	
1015	---	---	---	6.0	---	---	---	0.0	0.00	---	--- A -	---	
1018	---	---	---	5.0	---	---	---	0.0	0.00	---	--- A -	---	
1020	---	---	---	5.0	1/18/1996	15.17	-15.17	0.0	0.00	---	--- A -	---	
1021	---	---	---	---	1/18/1996	18.00	-18.00	0.0	0.00	---	--- A -	---	
H1	1541931	480022	98.0	4.5	10/28/2019	75.45	6483.80	2.0	6559.25	98	6459.3 A	78-98	24.6
H2	1541665	480014	100.0	4.5	5/5/2015	71.81	6489.02	2.0	6560.83	100	6458.8 A	80-100	30.2
H2A	1541694	479997	88.0	4.5	3/2/2020	52.45	6507.42	2.0	6559.87	88	6469.9 A	66-88	37.5
H3	1541482	479947	92.0	4.5	10/28/2019	74.45	6482.65	2.0	6557.10	92	6463.1 A	72-92	19.6
H4	1542118	480122	99.0	4.5	10/28/2019	72.80	6484.80	2.0	6557.60	99	6456.6 A	79-99	28.2
H5	1541786	480167	99.0	4.5	10/28/2019	73.45	6484.99	2.0	6558.44	99	6457.4 A	79-99	27.6
H6	1541541	480181	99.0	4.5	5/5/2015	65.36	6494.62	2.0	6559.98	99	6459.0 A	79-99	35.6
H6A	1541564	480172	100.0	4.5	10/28/2019	70.40	6487.17	2.0	6557.57	100	6455.6 A	80-100	31.6
H7	1541974	480333	102.0	4.5	10/20/2020	72.21	6487.33	2.0	6559.54	102	6455.5 A	82-102	31.8
H7A	1542002	480322	100.0	4.5	11/25/2020	71.83	6487.26	2.0	6559.09	100	6457.1 A	80-100	30.2
H7B	1541933	480350	98.0	4.5	10/20/2020	70.78	6488.60	2.0	6559.38	98	6459.4 A	78-98	29.2
H8	1541405	480325	95.0	4.5	5/5/2015	64.85	6493.26	2.0	6558.11	95	6461.1 A	75-95	32.2
H9	1542143	480524	97.0	4.5	10/28/2019	70.15	6490.47	2.0	6560.62	97	6461.6 A	77-97	28.8
H10	1541828	480550	100.0	4.5	10/28/2019	67.60	6490.96	2.0	6558.56	100	6456.6 A	80-100	34.4
H11	1541517	480586	97.0	4.5	10/28/2019	68.60	6490.82	2.0	6559.42	97	6460.4 A	77-97	30.4
H12	1542007	480744	100.0	4.5	10/28/2019	71.40	6492.22	2.0	6563.62	100	6461.6 A	80-100	30.6
H13	1542183	480842	100.0	4.5	5/28/2019	70.40	6492.02	2.0	6562.42	100	6460.4 A	80-100	31.6
H14	1541884	480906	100.0	4.5	3/25/2019	37.66	6521.19	2.0	6558.85	100	6456.9 A	80-100	64.3
H15	1541590	480941	97.0	4.5	10/28/2019	67.75	6492.66	2.0	6560.41	97	6461.4 A	77-97	31.3
H16	1542116	481129	92.0	4.5	10/20/2020	66.20	6491.78	2.0	6557.98	92	6464.0 A	72-92	27.8
H17	1541782	481151	99.0	4.5	10/20/2020	71.81	6491.55	2.0	6563.36	99	6462.4 A	79-99	29.2
H18	1542325	481231	93.0	4.5	2/25/2019	14.71	6546.06	2.0	6560.77	93	6465.8 A	73-93	80.3
H19	1541970	481270	91.0	4.5	10/28/2019	69.25	6493.29	2.0	6562.54	91	6469.5 A	71-91	23.8
H20	1541664	481314	86.0	4.5	10/28/2019	63.60	6494.08	2.0	6557.68	86	6469.7 A	66-86	24.4
H21	1542330	481444	95.0	4.5	10/28/2019	70.20	6494.20	2.0	6564.40	95	6467.4 A	75-95	26.8
H22	1541756	481496	94.0	4.5	10/28/2019	67.20	6494.33	2.0	6561.53	94	6465.5 A	74-94	28.8
H23	1542412	481663	95.0	4.5	10/28/2019	70.10	6494.86	2.0	6564.96	95	6468.0 A	75-95	26.9
H24	1542195	481605	100.0	4.5	10/20/2020	73.53	6492.34	2.0	6565.87	100	6463.9 A	80-100	28.5
H25	1541937	481652	100.0	4.5	10/28/2019	70.10	6494.69	2.0	6564.79	100	6462.8 A	80-100	31.9
H26	1542244	481823	98.0	4.5	7/29/2019	71.70	6495.11	2.0	6566.81	98	6466.8 A	78-98	28.3
H27	1541924	481863	96.0	4.5	10/28/2019	70.20	6495.05	2.0	6565.25	96	6467.3 A	76-96	27.8

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
H28	1542427	481976	97.0	4.5	3/28/2017	68.22	6497.16	2.0	6565.38	97	6466.4 A	77-97	30.8
H29	1542117	481997	100.0	4.5	3/28/2017	65.41	6496.59	2.0	6562.00	100	6460.0 A	80-100	36.6
H30	1542590	482118	92.0	4.5	4/28/2014	68.00	6497.80	2.0	6565.80	92	6471.8 A	72-92	26.0
H31	1542290	482160	95.0	4.5	8/28/2019	69.33	6495.73	2.0	6565.06	95	6468.1 A	75-95	27.7
H32	1542470	482295	98.0	4.5	3/28/2017	67.82	6497.29	2.0	6565.11	98	6465.1 A	78-98	32.2
H33	1542162	482347	98.0	4.5	3/28/2017	68.60	6497.48	2.0	6566.08	98	6466.1 A	78-98	31.4
H34	1542415	482618	96.0	4.5	3/29/2017	67.85	6498.34	2.0	6566.19	96	6468.2 A	76-96	30.2
H35	1542209	482713	97.0	4.5	3/29/2017	67.70	6497.23	2.0	6564.93	97	6465.9 A	77-97	31.3
H36	1542405	482853	100.0	4.5	8/28/2019	52.11	6507.85	2.0	6559.96	100	6458.0 A	80-100	49.9
H37	1542586	482972	96.0	4.5	3/29/2017	61.71	6498.85	2.0	6560.56	96	6462.6 A	76-96	36.3
H38	1542314	483081	93.0	4.5	3/29/2017	63.31	6499.18	2.0	6562.49	93	6467.5 A	73-93	31.7
H39	1542517	483204	100.0	4.5	7/2/2014	62.00	6504.03	2.0	6566.03	100	6464.0 A	80-100	40.0
H40	1542710	483345	98.0	4.5	7/10/2014	51.00	6514.57	2.0	6565.57	98	6465.6 A	78-98	49.0
H41	1542414	483448	100.0	4.5	2/12/2018	64.56	6499.77	2.0	6564.33	100	6462.3 A	80-100	37.4
H42	1542813	483511	100.0	4.5	10/9/2014	64.30	6503.50	2.0	6567.80	100	6465.8 A	80-100	37.7
H42A	1542822	483522	100.0	4.5	10/1/2015	64.00	6503.43	2.6	6567.43	100	6464.8 A	80-100	38.6
H43	1542954	483706	90.0	4.5	---	---	---	2.4	6569.14	90	6476.7 A	70-90	---
H44	1542694	483771	90.0	4.5	10/13/2015	82.00	6487.86	3.1	6569.86	90	6476.8 A	70-90	11.1
H45	1542945	483956	90.0	4.5	10/5/2015	63.50	6506.15	2.0	6569.65	90	6477.7 A	50-90	28.5
H46	1542614	483981	95.0	4.5	10/28/2019	67.50	6499.86	2.0	6567.36	95	6470.4 A	75-95	29.5
H47	1543121	484112	90.0	4.5	10/5/2015	63.00	6506.46	2.0	6569.46	90	6477.5 A	70-90	29.0
H48	1542787	484185	90.0	4.5	10/13/2015	62.00	6506.26	2.0	6568.26	90	6476.3 A	70-90	30.0
H49	1543056	484342	90.0	4.5	---	---	---	2.0	6570.84	90	6478.8 A	70-90	---
H50	1542846	484394	100.0	4.5	10/14/2015	62.00	6506.84	2.2	6568.84	90	6476.6 A	80-100	30.2
H51	1543254	484489	90.0	4.5	10/15/2015	62.00	6507.94	2.6	6569.94	95	6472.3 A	70-90	35.6
H52	1542976	484590	100.0	4.5	10/13/2015	54.00	6516.01	2.5	6570.01	95	6472.5 A	80-100	43.5
H54	1543160	484723	100.0	4.5	10/15/2015	60.00	6509.56	2.0	6569.56	70	6497.6 A	80-100	12.0
H55	1542909	484706	95.0	4.5	3/3/2020	63.50	6505.75	2.0	6569.25	95	6472.3 A	75-95	33.5
H56	1542625	484804	95.0	4.5	10/28/2019	63.80	6505.69	2.0	6569.49	95	6472.5 A	75-95	33.2
H57	1543338	484884	90.0	4.5	10/16/2015	64.00	6507.09	2.0	6571.09	90	6479.1 A	70-90	28.0
H58	1543051	484959	95.0	4.5	10/16/2015	60.00	6511.02	2.5	6571.02	95	6473.5 A	75-95	37.5
H59	1542764	484969	100.0	4.5	10/20/2015	58.00	6512.15	2.5	6570.15	95	6472.7 A	80-100	39.5
H60	1542945	484152	100.0	4.5	10/23/2015	70.00	6501.02	2.0	6571.02	100	6469.0 A	80-100	32.0
H61	1542631	485206	89.0	4.5	11/3/2017	61.94	6508.55	2.0	6570.49	89	6479.5 A	69-89	29.1
H62	1543413	485343	100.0	4.5	10/26/2015	81.00	6491.52	2.3	6572.52	100	6470.3 A	80-100	21.3
H63	1543072	485346	100.0	4.5	10/23/2015	81.00	6490.85	2.5	6571.85	100	6469.4 A	80-100	21.5

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
H64	1542779	485373	90.0	4.5	10/26/2015	83.00	6488.86	3.0	6571.86	90	6478.9 A	70-90	10.0
H65	1543237	485530	93.0	4.5	4/30/2014	58.00	6517.06	2.0	6575.06	93	6480.1 A	73-93	37.0
H66	1542938	485536	90.0	4.5	10/27/2015	64.00	6507.77	2.5	6571.77	100	6469.3 A	80-90	38.5
H67	1543489	485743	90.0	4.5	10/28/2015	64.00	6509.76	2.9	6573.76	90	6480.9 A	70-90	28.9
H68	1543114	485766	100.0	4.5	10/28/2015	62.00	6511.38	3.0	6573.38	100	6470.4 A	80-100	41.0
H69	1542779	485752	100.0	4.5	10/29/2015	61.00	6512.08	3.6	6573.08	95	6474.5 A	80-100	37.6
H70	1543343	485979	93.0	4.5	10/28/2019	66.30	6508.32	2.0	6574.62	93	6479.6 A	73-93	28.7
H71	1542939	485966	91.0	4.5	10/28/2019	64.65	6507.67	2.0	6572.32	91	6479.3 A	71-91	28.3
H72	1543147	486104	90.0	4.5	11/2/2015	64.00	6511.17	3.3	6575.17	90	6481.9 A	70-90	29.3
H73	1541828	482047	91.0	4.5	4/30/2014	60.00	6496.73	2.0	6556.73	91	6463.7 A	71-91	33.0
H74	1541953	482471	95.0	4.5	6/24/2014	65.00	6498.05	2.0	6563.05	95	6466.1 A	75-95	32.0
H75	1542212	483453	93.0	4.5	3/29/2017	66.29	6498.96	2.0	6565.25	93	6470.3 A	73-93	28.7
H93	1543202	483884	100.0	4.5	9/4/2014	59.50	6507.25	2.0	6566.75	100	6464.8 A	80-100	42.5
H95	1543327	484311	100.0	4.5	11/25/2020	65.92	6502.99	2.0	6568.91	100	6466.9 A	80-100	36.1
H97	1543406	484644	95.0	4.5	9/4/2014	58.16	6512.06	2.0	6570.22	95	6473.2 A	75-95	38.8
H99	1543525	485140	100.0	4.5	9/4/2014	58.93	6512.73	2.0	6571.66	100	6469.7 A	80-100	43.1
H100	1543724	485306	90.0	4.5	11/4/2015	82.00	6492.12	2.8	6574.12	80	6491.3 A	70-90	0.8
H101	1543764	485695	90.0	4.5	11/6/2015	64.00	6511.52	3.8	6575.52	90	6481.8 A	70-90	29.8
H102	1543624	485946	90.0	4.5	11/6/2015	63.00	6512.62	2.5	6575.62	90	6483.1 A	70-90	29.5
H103	1543767	486104	90.0	4.5	11/9/2015	70.00	6505.61	2.3	6575.61	90	6483.4 A	70-90	22.3
H104	1543562	486140	90.0	4.5	11/9/2015	83.00	6492.05	2.0	6575.05	80	6493.1 A	70-90	0.0
H105	1542792	486149	100.0	4.5	---	---	---	2.0	6574.76	90	6482.8 A	80-100	---
H106	1542087	482933	94.0	4.5	3/29/2017	65.97	6498.78	2.0	6564.75	94	6468.8 A	74-94	30.0
H107	1541784	481742	98.0	4.5	10/28/2019	67.30	6495.06	2.0	6562.36	98	6462.4 A	78-98	32.7
M16	1543252	485112	93.3	5.0	11/25/2020	63.40	6507.19	1.4	6570.59	100	6469.2 A	60-100	38.0
M17	1542752	484617	100.0	4.5	---	---	---	2.0	6569.21	95	6472.2 A	80-100	---
M18	1542607	485970	88.0	4.5	3/29/2017	60.52	6511.76	2.0	6572.28	88	6482.3 A	68-88	29.5
MO	1543620	485518	88.0	4.5	11/25/2020	64.40	6508.49	2.0	6572.89	80	6490.9 A	45-85	17.6
MP	1544164	485492	80.0	5.0	11/25/2020	64.85	6509.63	2.1	6574.48	50	6522.4 A	33-63	0.0
MR	1542609	483574	100.0	5.0	11/25/2020	69.35	6496.91	1.8	6566.26	100	6464.5 A	54-94	32.5
MS	1542607	485570	82.0	5.0	12/17/2019	61.34	6509.33	1.5	6570.67	89	6480.2 A	52-82	29.2
MT	1543221	483531	98.0	4.5	11/25/2020	60.50	6506.93	2.3	6567.43	87	6478.1 A	34-94	28.8
MV	1542618	484418	105.0	4.5	11/25/2020	67.94	6501.84	1.3	6569.78	95	6473.5 A	75-105	28.4
R1	1534551	487790	120.0	5.0	11/20/2020	50.78	6504.34	2.0	6555.12	84	6469.1 A	80-120	35.2
										84	6469.1 M	80-120	35.2
R2	1534548	487968	115.0	5.0	10/28/2020	67.39	6486.77	2.0	6554.16	83	6469.2 M	75-115	17.6

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
R2	1534548	487968	115.0	5.0	10/28/2020	67.39	6486.77	2.0	6554.16	83	6469.2 A	75-115	17.6
R3	1534546	488196	140.0	5.0	10/28/2020	62.64	6493.09	2.0	6555.73	88	6465.7 A	60-80	27.4
										88	6465.7 M	100-140	27.4
R4	1534541	488446	130.0	5.0	10/28/2020	54.04	6504.74	2.0	6558.78	84	6472.8 M	90-130	32.0
										84	6472.8 A	90-130	32.0
R5	1534560	488666	125.0	5.0	10/29/2020	54.43	6503.32	2.0	6557.75	71	6484.8 A	65-125	18.6
										71	6484.8 M	65-125	18.6
R6	1534356	488448	130.0	5.0	3/25/2019	38.42	6521.22	2.0	6559.64	68	6489.6 M	110-130	31.6
										68	6489.6 A	50-90	31.6
R7	1534399	488087	145.0	5.0	3/25/2019	31.52	6523.29	2.0	6554.81	74	6478.8 M	125-145	44.5
										74	6478.8 A	65-105	44.5
R8	1534412	487891	145.0	5.0	3/25/2019	34.16	6520.00	2.0	6554.16	94	6458.2 A	65-105	61.8
R9	1534420	487700	120.0	4.5	3/25/2019	33.61	6522.14	2.0	6555.75	104	6449.8 A	60-120	72.4
R10	1534305	488003	120.0	4.5	8/28/2019	58.05	6497.17	2.0	6555.22	83	6470.2 A	60-120	27.0
R11	1534320	488280	120.0	4.5	12/17/2019	62.11	6496.34	2.0	6558.45	70	6486.5 M	60-120	9.9
										70	6486.5 A	60-120	9.9
R12	1534220	488360	120.0	4.5	3/25/2019	36.82	6520.13	2.0	6556.95	66	6489.0 M	60-120	31.2
										66	6489.0 A	60-120	31.2
R13	1534220	488150	120.0	4.5	3/25/2019	43.18	6513.71	2.0	6556.89	96	6458.9 A	60-120	54.8
R14	1534168	487971	100.0	4.5	3/25/2019	33.91	6522.88	2.0	6556.79	83	6471.8 A	60-100	51.1
R15	1534180	487700	100.0	4.5	3/25/2019	37.64	6518.59	2.0	6556.23	98	6456.2 A	60-100	62.4
R16	1533973	487394	100.0	4.5	11/14/2013	68.19	6486.30	2.0	6554.49	92	6460.5 A	60-100	25.8
R17	1534040	487810	100.0	4.5	3/25/2019	40.38	6514.84	2.0	6555.22	95	6458.2 A	60-100	56.6
R18	1534030	487970	100.0	4.5	3/12/2020	61.10	6494.90	2.0	6556.00	87	6467.0 A	60-100	27.9
R19	1534029	488173	100.0	4.5	3/25/2019	48.62	6507.88	2.0	6556.50	90	6464.5 A	60-100	43.4
R20	1534120	488260	100.0	4.5	3/12/2020	59.90	6496.44	2.0	6556.34	80	6474.3 A	60-100	22.1
R21	1534031	488350	100.0	4.5	3/25/2019	31.52	6524.05	2.0	6555.57	88	6465.6 A	60-100	58.5
R22	1533940	488091	100.0	4.5	3/12/2020	61.70	6495.44	2.0	6557.14	91	6464.1 A	60-100	31.3
R23	1533880	487750	100.0	4.5	11/14/2013	62.02	6493.73	2.0	6555.75	97	6456.8 A	60-100	37.0
R24	1533872	487526	100.0	4.5	---	---	---	2.0	6552.30	100	6450.3 A	60-100	---
R26	1533761	486760	95.0	4.5	---	---	---	2.0	6548.29	95	6451.3 A	75-95	---
R27	1533765	487017	98.0	4.5	---	---	---	2.0	6550.07	98	6450.1 A	78-98	---
R28	1533761	487226	100.0	4.5	---	---	---	2.0	6550.30	100	6448.3 A	60-100	---
R29	1533785	487629	100.0	4.5	---	---	---	2.0	6554.08	100	6452.1 A	60-100	---
R32	1533704	487163	95.0	4.5	---	---	---	2.0	6550.10	90	6458.1 A	75-95	---
R33	1533672	486914	100.0	4.5	---	---	---	2.0	6548.72	100	6446.7 A	80-100	---
R34	1533675	486617	95.0	4.5	---	---	---	2.0	6547.79	95	6450.8 A	75-95	---

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
R35	1533668	486345	90.0	4.5	---	---	---	2.0	6545.26	90	6453.3 A	70-90	---
R36A	1533568	486184	95.0	4.5	---	---	---	2.0	6545.48	90	6453.5 A	75-95	---
R37A	1533579	486472	95.0	4.5	---	---	---	2.0	6546.81	95	6449.8 A	75-95	---
R38	1533574	486762	98.0	4.5	---	---	---	2.0	6547.69	98	6447.7 A	78-98	---
R39	1533571	487014	95.0	4.5	---	---	---	2.0	6549.34	95	6452.3 A	75-95	---
R40	1533581	487263	90.0	4.5	---	---	---	2.0	6549.12	90	6457.1 A	70-90	---
R41	1533596	487388	100.0	4.5	---	---	---	2.0	6550.90	100	6448.9 A	60-100	---
R42	1533466	487346	90.0	4.5	---	---	---	2.0	6549.34	90	6457.3 A	70-90	---
R43	1533509	487134	100.0	4.5	4/5/2017	63.25	6487.90	2.0	6551.15	100	6449.2 A	60-100	38.8
R47	1533470	485780	160.0	4.5	12/20/2013	75.59	6471.58	2.0	6547.17	103	6442.2 A	100-160	29.4
										103	6442.2 L	100-160	29.4
R48	1533345	485775	160.0	4.5	---	---	---	2.0	6545.24	100	6443.2 L	100-160	---
										100	6443.2 A	100-160	---
R49A	1533394	485951	95.0	4.5	---	---	---	2.0	6545.70	---	---	A 75-95	---
R50A	1533376	486217	100.0	4.5	---	---	---	2.0	6544.69	---	---	A 60-100	---
R52A	1533367	486751	95.0	4.5	---	---	---	2.0	6546.91	95	6449.9 A	75-95	---
R53	1533402	487020	95.0	4.5	---	---	---	2.0	6549.47	95	6452.5 A	75-95	---
R54	1533331	487163	95.0	4.5	---	---	---	2.0	6549.93	95	6452.9 A	75-95	---
R55	1533272	486897	95.0	4.5	---	---	---	2.0	6548.22	95	6451.2 A	75-95	---
R57	1533260	485880	135.0	4.5	12/20/2013	74.67	6472.40	2.0	6547.07	99	6446.1 A	75-135	26.3
										99	6446.1 L	75-135	26.3
R58	1533170	485710	160.0	4.5	4/8/2014	70.98	6473.47	2.0	6544.45	98	6444.5 A	100-160	29.0
										98	6444.5 L	100-160	29.0
R59	1533125	485963	150.0	4.5	8/2/2016	66.61	6478.40	2.0	6545.01	107	6436.0 L	110-150	42.4
										107	6436.0 A	110-150	42.4
R60A	1533093	486213	107.0	4.5	---	---	---	2.0	6544.99	---	---	A 60-107	---
R61A	1533135	486485	100.0	4.5	---	---	---	2.0	6544.69	95	6447.7 A	60-100	---
R63	1533189	487028	95.0	4.5	---	---	---	2.0	6549.92	95	6452.9 A	75-95	---
R64	1533059	486921	95.0	4.5	---	---	---	2.0	6548.15	85	6461.2 A	75-95	---
R65A	1533056	486614	95.0	4.5	---	---	---	2.0	6545.64	95	6448.6 A	75-95	---
R66A	1533023	486355	100.0	4.5	---	---	---	2.0	6545.33	---	---	A 60-100	---
R67A	1532999	486075	90.0	4.5	---	---	---	2.0	6544.38	90	6452.4 A	70-90	---
R68	1533025	485819	160.0	4.5	10/10/2014	69.44	6475.41	2.0	6544.85	99	6443.9 L	100-160	31.6
										99	6443.9 A	100-160	31.6
R69	1532987	486024	160.0	4.5	4/8/2014	70.53	6474.82	2.0	6545.35	96	6447.4 A	100-160	27.5
										96	6447.4 L	100-160	27.5
R70A	1532881	486261	105.0	4.5	---	---	---	2.0	6545.30	---	---	A 60-105	---

**TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
R73	1533019	485560	150.0	4.5	5/13/2015	69.92	6474.42	2.3	6544.34	99	6443.0 A	110-150	31.4
										99	6443.0 L	110-150	31.4
R74	1532852	485502	140.0	4.5	11/20/2020	71.33	6472.70	2.4	6544.03	104	6437.6 A	100-140	35.1
										104	6437.6 L	100-140	35.1
R75	1532922	485716	140.0	4.5	5/13/2015	69.14	6475.74	2.3	6544.88	98	6444.6 A	100-140	31.2
										98	6444.6 L	100-140	31.2
R76	1532888	485891	140.0	4.5	5/13/2015	68.37	6476.72	2.3	6545.09	106	6436.8 L	100-140	39.9
										106	6436.8 A	100-140	39.9
R77	1532683	485800	140.0	4.5	5/13/2015	68.28	6476.69	2.4	6544.97	80	6462.6 A	100-140	14.1
										80	6462.6 L	100-140	14.1
R78	1532683	485612	140.0	4.5	5/13/2015	69.16	6474.87	2.0	6544.03	85	6457.0 A	100-140	17.8
										85	6457.0 L	100-140	17.8
R79	1532703	485379	120.0	4.5	---	---	---	2.0	6542.94	80	6460.9 L	80-120	---
										80	6460.9 A	80-120	---
R80	1533169	485471	120.0	4.5	---	---	---	2.0	6543.72	---	---	80-120	---
										---	---	80-120	---

Note: A = Alluvial Aquifer  
 MP = Measuring Point  
 LSD = Land Surface Datum  
 IN = Inches  
 FT = Feet  
 MSL = Mean Sea Level

## **4.2 ALLUVIAL WATER LEVELS**

### **4.2.1 WATER-LEVEL ELEVATION - ALLUVIAL**

This section presents information necessary to evaluate the direction of groundwater flow in the alluvial aquifer. Water-level elevations are used to quantify the gradient of the alluvial water table, which in turn can be used to interpret the direction of groundwater flow.

Figures 4.2-1, 4.2-1A, 4.2-1B and 4.2-1C present the fall of 2020 alluvial aquifer water-level elevation contours for the Grants Project area. The three insert maps are used to show water-level elevations where the spacing of the wells is too close for showing the information on Figure 4.2-1. The alluvial aquifer limits (green lines on figure) are based on the 2014 water-level elevation map and base of the alluvium map. This 2014 adjustment in the alluvial aquifer limits resulted in only small changes in the limits of the alluvial aquifer. Locations of the alluvial wells, with their respective well names listed adjacent to the well symbol, are plotted on Figure 4.1-1 in the previous section. The 2020 groundwater flow patterns in the alluvial aquifer are very similar to those observed in the fall of 2014. The ridge in the piezometric surface west of the LTP is attributable to continued injection of water into the injection wells and lines in 2020 (see Figure 4.1-1 for locations). The water-level elevations and flow directions indicate the extent of the area of the alluvial aquifer from which groundwater is drawn by the collection system. The area of collection is between the treated water injection area and the collection wells, where groundwater is flowing back to the collection wells. The area underlying the LTP is also within the collection area, because alluvial groundwater in this area flows to the collection wells. The collection area also extends from the southeast corner of the STP through the injection ridge to the zero saturation line to the east. There are a small number of alluvial wells where the measured water-level elevation is not representative of the local alluvial potentiometric surface and the water-level elevation in those wells may not be honored in the contouring.

The water-level elevations in Section 3 overall decreased in 2020 with the collection and treated water injection (see Figure 4.2-1B). Water-level elevations also decreased a few feet in Section 33 (see the western half of Figure 4.2-1). The water levels in Section 28 also generally decreased a few feet in 2020.

Several wells have been drilled in the past in the area of the zero saturation boundaries to better define the limits of the alluvial aquifer. However, there are occurrences of limited saturation in the Chinle shale below the alluvium, indicating that there may be zones of perched water in the upper part of the Chinle shale. These wells have been used to help define where the zero saturation boundary of the alluvium occurs and the water levels in these wells may not be representative of the alluvial aquifer. Water levels were measured in wells 652, 680, 851, 852, 867, 877, 879, 887, 889, 892, 897, 1C, 1H, 1I, 1P, 1N, 1O, MN and MP in late 2020 to define the amount of limited groundwater that exists near the saturation boundary.

Flow in the San Mateo alluvium is naturally diverted either west through the western portion of Section 28 or south/southwest through Sections 35 and 3 around the area where the base of the alluvium is elevated. There is no alluvial saturation where the elevation of the base of the alluvium is above the water table. Further down-gradient, the San Mateo alluvial groundwater then mixes with the Rio San Jose alluvial groundwater flowing from the northwest. The combined flow continues to flow in a southerly direction. The gradient of the alluvial water-level elevation surface in the Rio San Jose alluvium has been increased in Section 33, but it is still relatively flat due to its large transmitting ability. San Mateo alluvial groundwater that flows through the northern portion of Section 3 (see [Figure 4.2-1](#)) joins the Rio San Jose groundwater system in the eastern portion of Section 4.

Water-level data for the alluvial wells are presented in Appendix A as [Table A.2-1](#) (HMC alluvial wells), [Table A.2-2](#) (Murray Acres, Broadview Acres, Felice Acres, and Pleasant Valley Estates alluvial wells) and [Table A.2-3](#) (regional alluvial wells).

#### **4.2.2 WATER-LEVEL CHANGE - ALLUVIAL**

[Figure 4.2-2](#) presents well locations and indicates the grouping of wells for presentation on water-level elevation versus time plots. The figure number of the water-level elevation plots for each group of wells is shown by the well groupings in the black boxes depicted on [Figure 4.2-2](#). The colors used for the well name and well symbol on [Figure 4.2-2](#) correspond with those used on the water-level elevation plots. Time plots ([Figures 4.2-3 through 4.2-18](#)) present the last eight years of data to illustrate the recent water-level elevation trends.



Water levels in the alluvial aquifer up-gradient of the LTP have been fairly stable during the last year except for a gradual declining trend in the wells DD, NC and P3 and a gradual rise in wells ND and Q. [Figures 4.2-3 and 4.2-3A](#) present water-level elevation data for up-gradient wells NC, ND, P3, P4, Q and R and DD, DD2, P, P1 and P2 respectively.

Water-level elevation data are presented for two sets of wells monitored for the purpose of detection of a reversal of the direction of alluvial groundwater gradient near the S line of the collection system. These wells (SP and SO) are located just northeast of the majority of the S line of collection wells. [Figure 4.2-4](#) graphically illustrates that the alluvial hydraulic gradient is very flat in the area of wells SM, SN, SO and SP. Water levels for well SS, which is to the south of the other four wells, show a similar trend but with a lower water-level elevation. Very gradual water-level rises were observed in wells SM, SN, SO and SP in the last half of 2020. The head is larger near the injection line than near wells SP and SO. The water-level elevations at these four wells (see [Figure 4.2-1A](#)) shows that they are located on the northern edge of the depression developed by the RO collection wells and therefore the gradient in this area is mainly to the south into the RO collection depression.

Wells S2 and S5 are the two reversal wells down-gradient of the S line of collection wells (see [Figures 4.1-1 and 4.2-2](#) for their location). Recent data from these two wells indicate a very good reversal of the groundwater flow direction due to the operation of collection wells near well S5 and the rise in water levels caused by the injection (see [Figure 4.2-5](#)).

[Figure 4.2-6](#) presents water-level elevation data for a group of wells located west of the S line of collection wells. Water-level elevations declined in each of these wells during the last five years.

The alluvial water levels north of Murray Acres gradually declined in 2020 in wells H55, M7, M9, MO, MR and MX (see [Figure 4.2-7](#)).

Wells B and BA are monitored in order to define the reversal in the groundwater gradient between the M and J injection lines and the B and D collection lines. [Figure 4.2-8](#) presents water-level elevation data for wells B and BA and indicates a gradient reversal between these two wells in 2020. The smaller collection rate up-gradient of these two wells in 2020 caused water level to be fairly steady in 2020. [Figure 4.2-9](#) presents water-level elevation plots for alluvial wells B12, B13, D1, DT, M5 and MB, which are located near and west of the lined

collection ponds. Water levels overall declined in this area of the alluvial aquifer in 2020. Water-level elevations in the alluvial aquifer near the STP collection system are presented on [Figure 4.2-10](#) for reversal wells DZ and KZ and collection well B11. Well DZ is near the D collection line and well KZ is close to the K injection line and, therefore, is naturally down-gradient of well DZ. A slight reversal was generally maintained with the smaller collection rates in 2020.

[Figure 4.2-11](#) presents water-level elevation data for wells C8, C10, K4 and L6. This data reflects the changes in water levels near the STP. Injection of treated water has caused the higher water-level elevations observed in well L6 with steady levels in 2011 through 2016, a decline in 2017, and fairly steady water levels in 2018 through 2020. [Figure 4.2-12](#) shows the water-level elevation plots for wells K5, K9, K11, KF and X which indicate fairly steady water levels in well X in 2020.

Water-level elevations in the alluvial aquifer north of the Broadview Acres injection system declined in 2020. The pumping in Felice Acres for South Off-site collection supply caused overall steady water levels in wells 497 and Q48 in 2020 (see water levels for wells 497, F, GH, Q48 and SUB3 on [Figure 4.2-13](#)). [Figure 4.2-13A](#) shows variable water levels in alluvial wells Q5, Q8, Q11, Q23 and Q29 due to the pumping in this area.

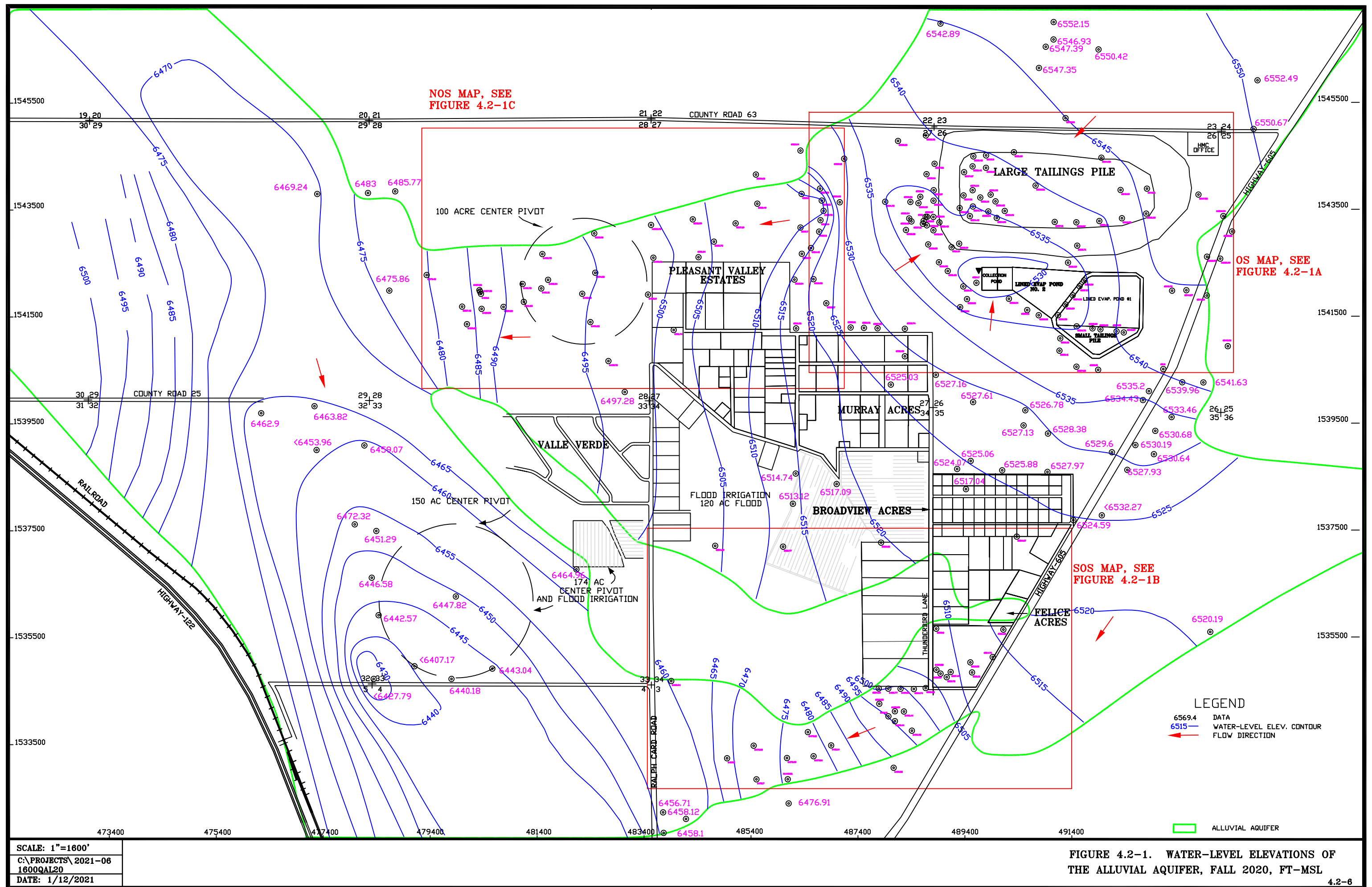
Water levels in the former flood irrigation area south of Murray Acres in alluvial wells 555, 556, 557, 844, 845 and 846 during 2020 (see [Figure 4.2-14](#)) gradually declined in wells 844 and 845 while levels were fairly steady in wells 555, 556, 557 and 846.

[Figure 4.2-15](#) presents water-level hydrographs for five wells located in Section 3. Water levels gradually increased in wells 540, 862 and 867 in 2020 and were steady in wells 631 and 644. [Figure 4.2-15A](#) presents water-level elevations for four of the R wells with variable levels depending on which wells are operating as collection wells.

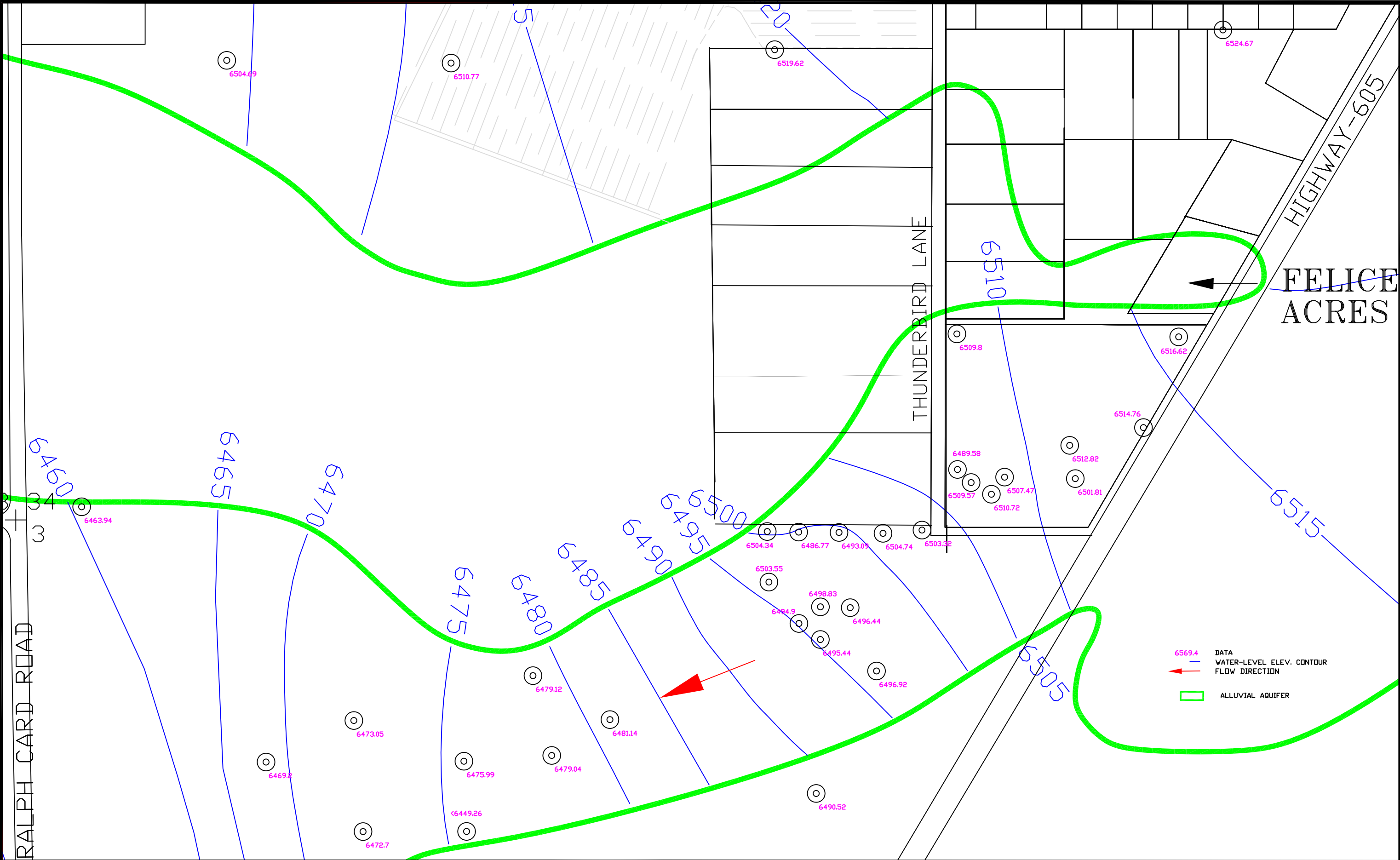
Water-level hydrographs for six wells in the former irrigation area in Section 28 are presented on [Figure 4.2-16](#). Water levels in 2020 overall slightly declined in this area except in well 886 which was generally steady. Water-level hydrographs for five wells just west of the former Section 28 irrigation area are presented on [Figure 4.2-16A](#) and show a very small decline in water levels in 2020 except for the steady levels in wells 659 and H16.

Figure 4.2-17 presents the water-level time plots for one well located in Section 20 and three wells located in Section 32. Water levels gradually declined in these wells in 2020 except for the increase in well 994.

Figure 4.2-18 presents the water-level plots for the Section 33 wells. Water levels were fairly steady in these wells in 2020 except for the one likely anomalous higher value in well 649. No pumping other than for sample collection from the Section 33 wells was done after 2012 and no future pumping operations are anticipated.



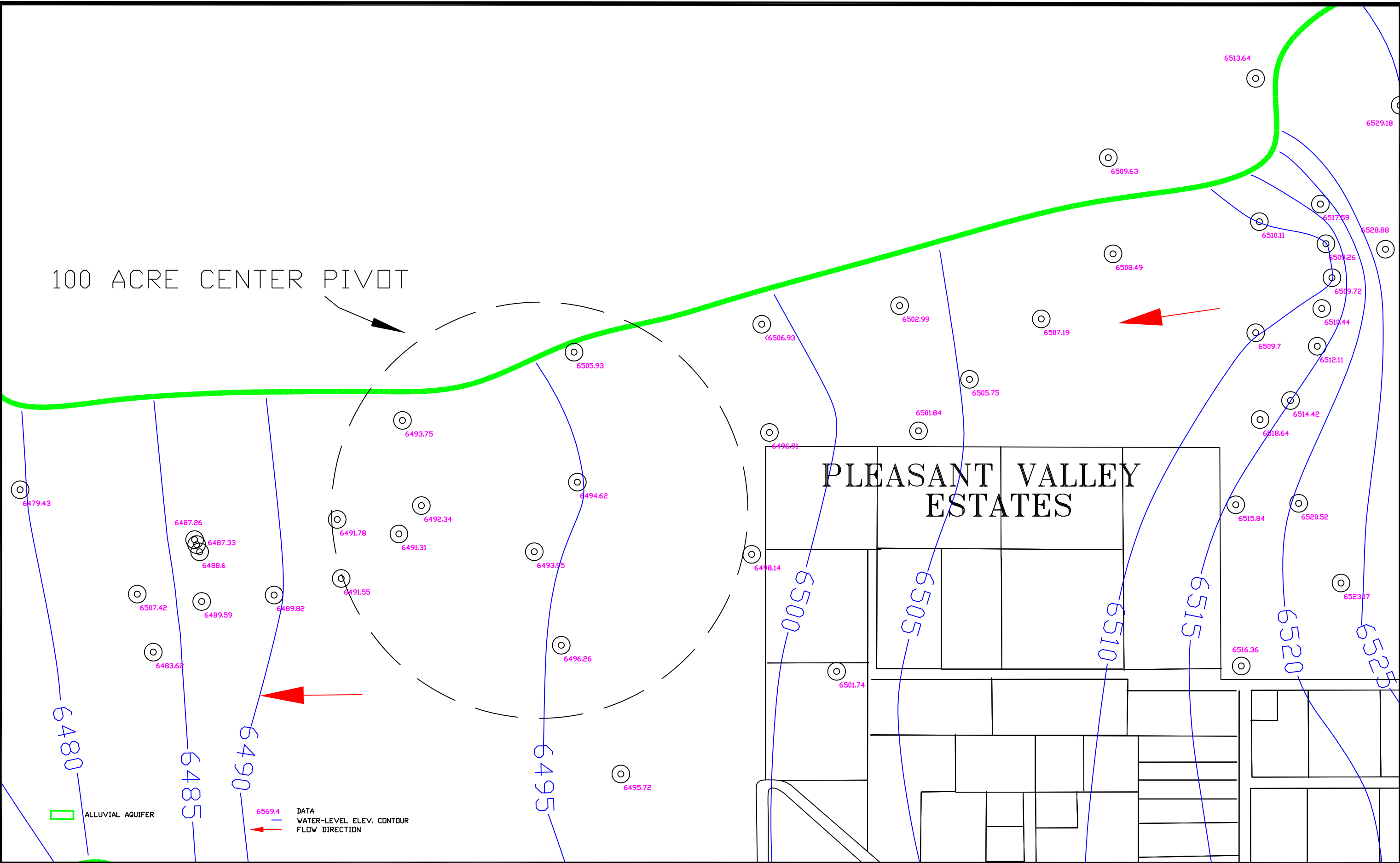


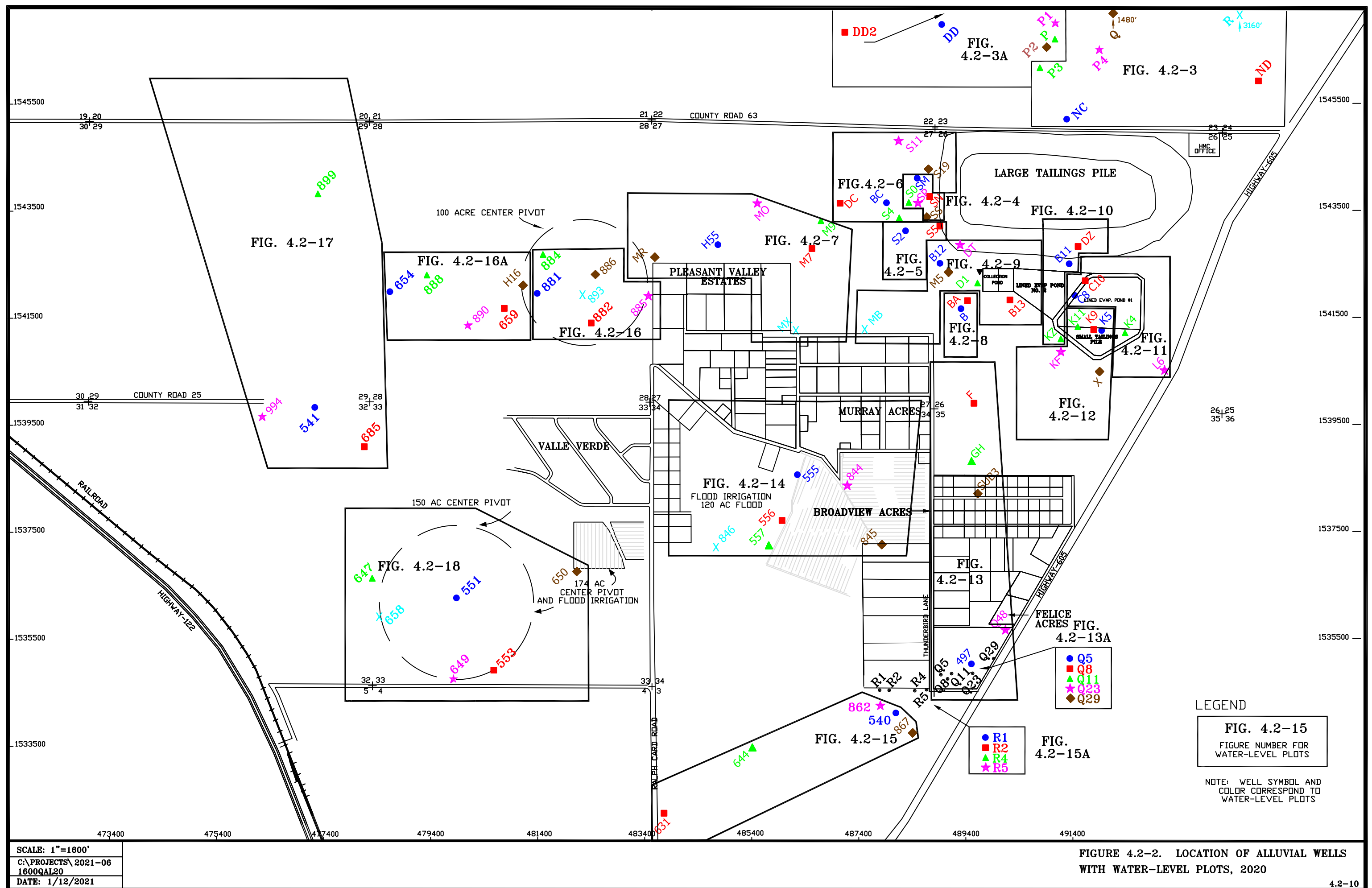


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1600QAL20  
DATE: 1/20/2021

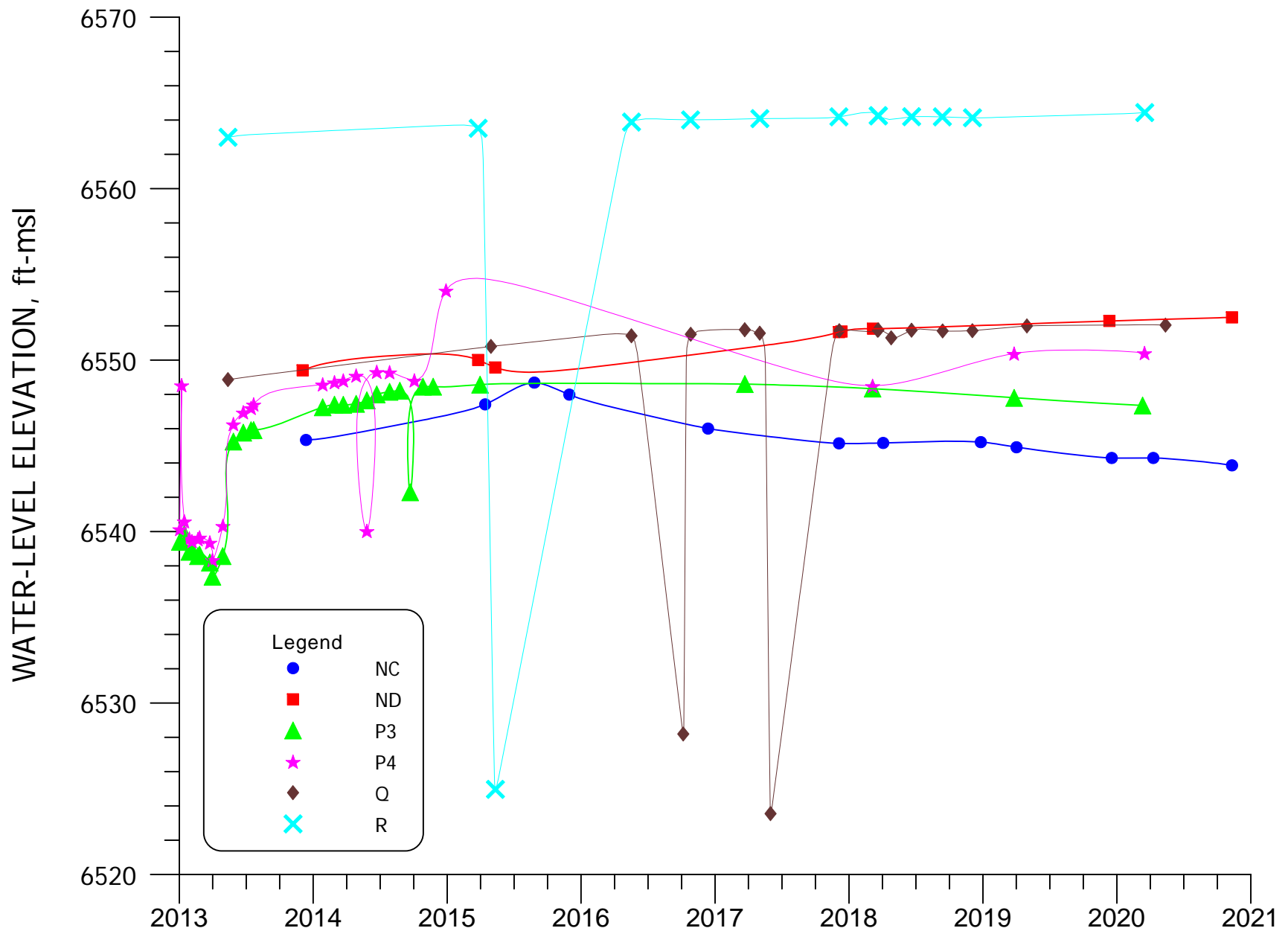
FIGURE 4.2-1B. WATER-LEVEL ELEVATIONS OF  
THE ALLUVIAL AQUIFER, SOS, FALL 2020, FT-MSL  
4.2-8



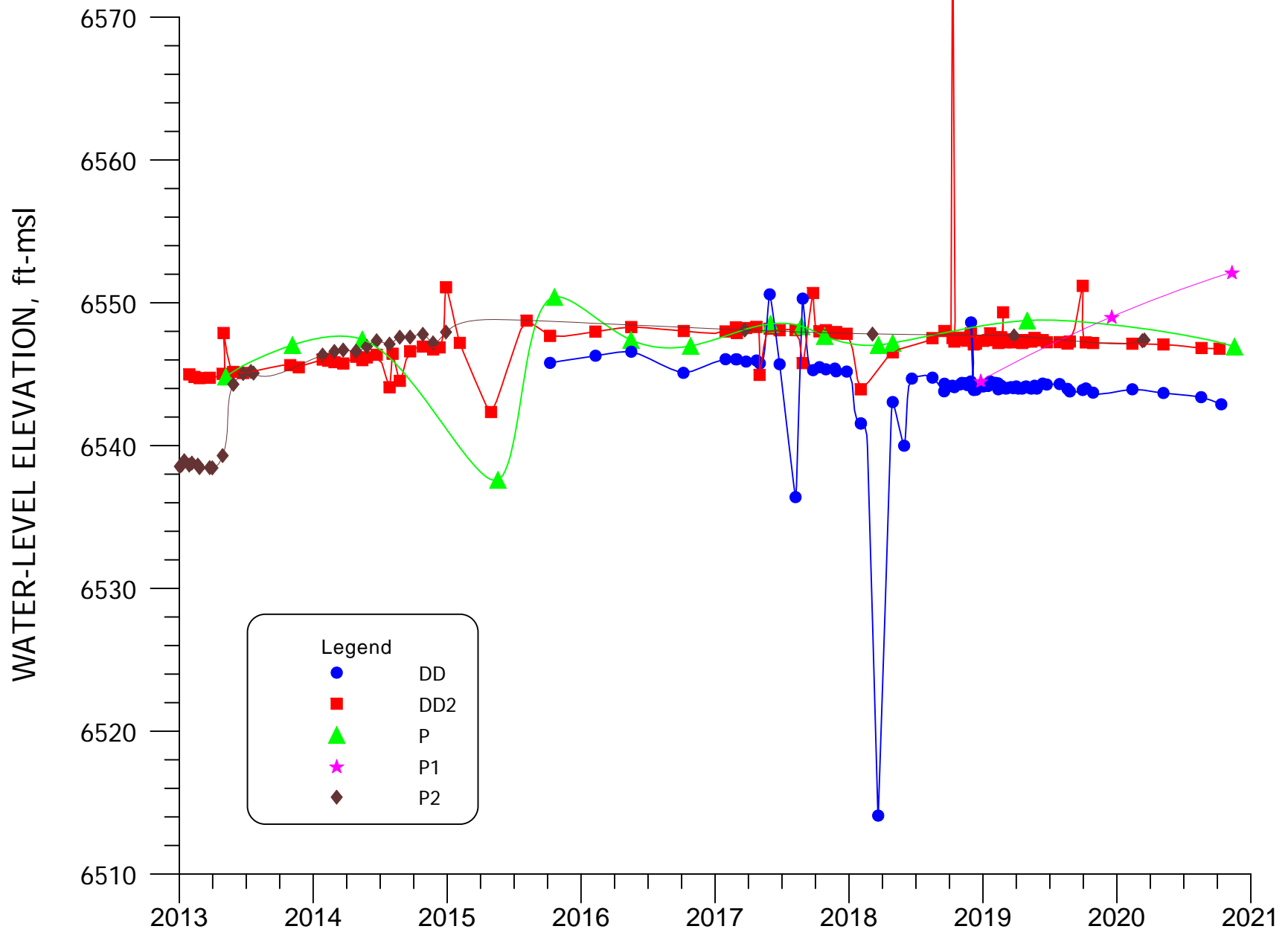




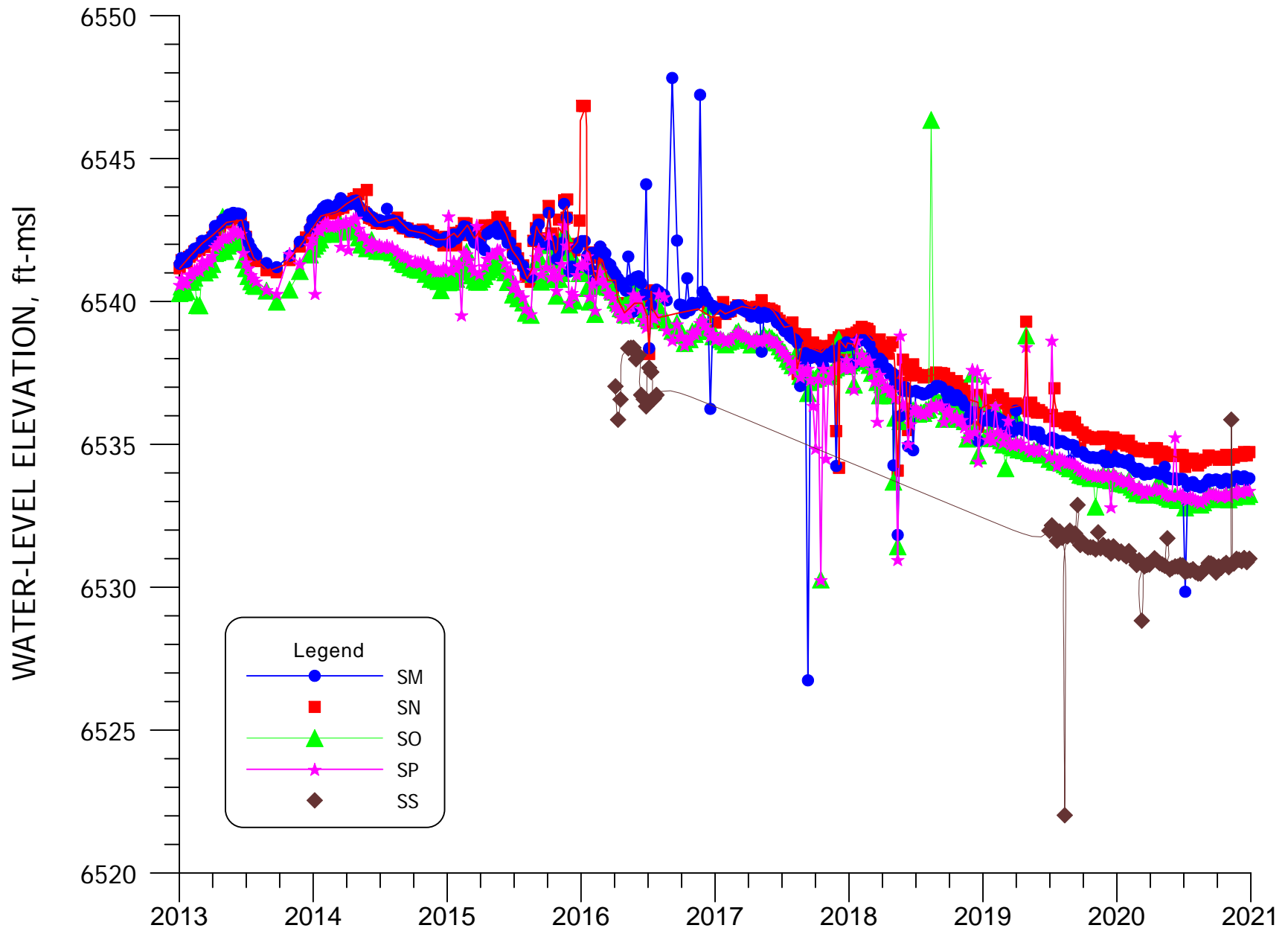




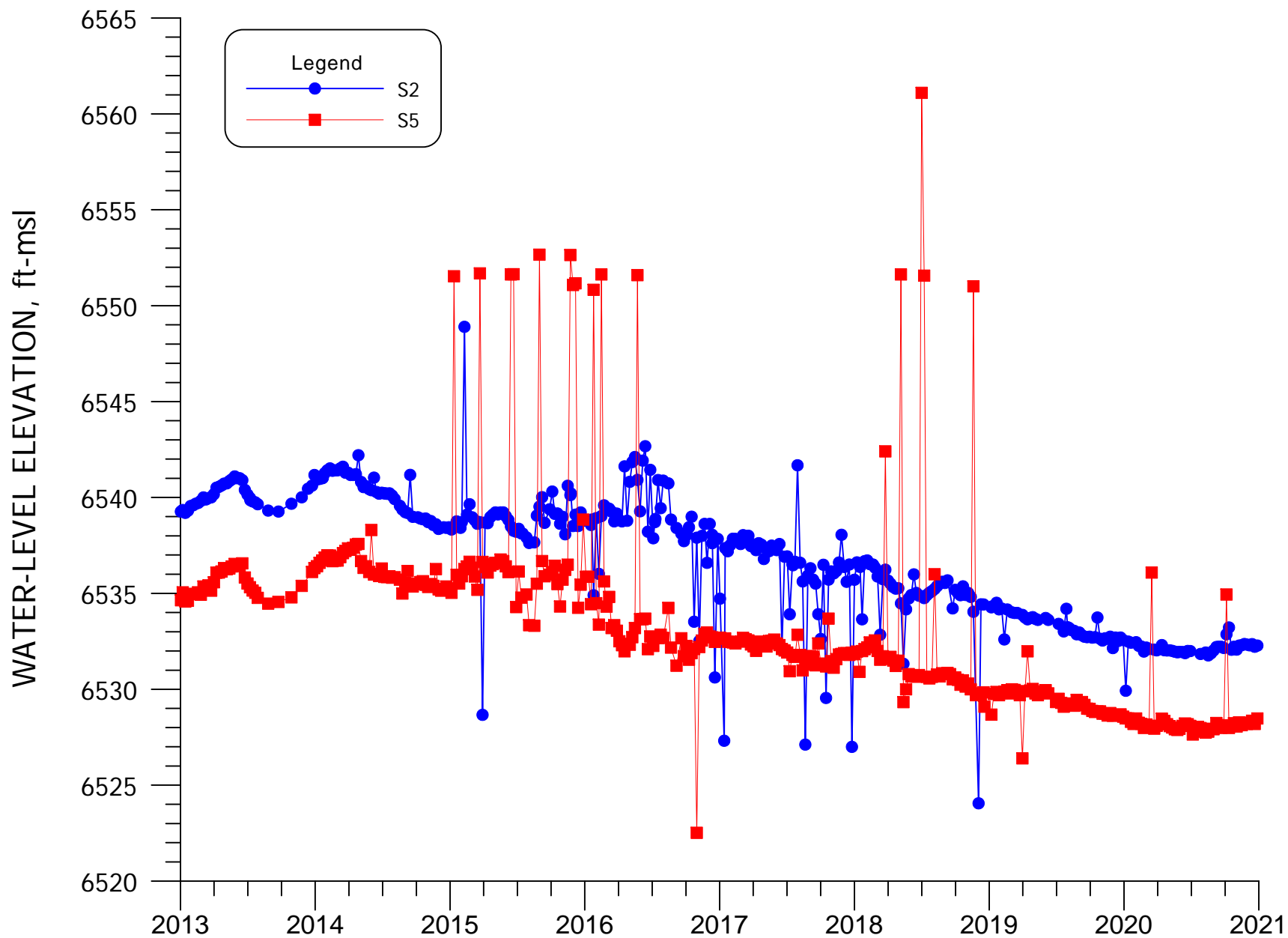
**FIGURE 4.2-3. WATER-LEVEL ELEVATION FOR WELLS NC, ND, P3, P4, Q AND R.**



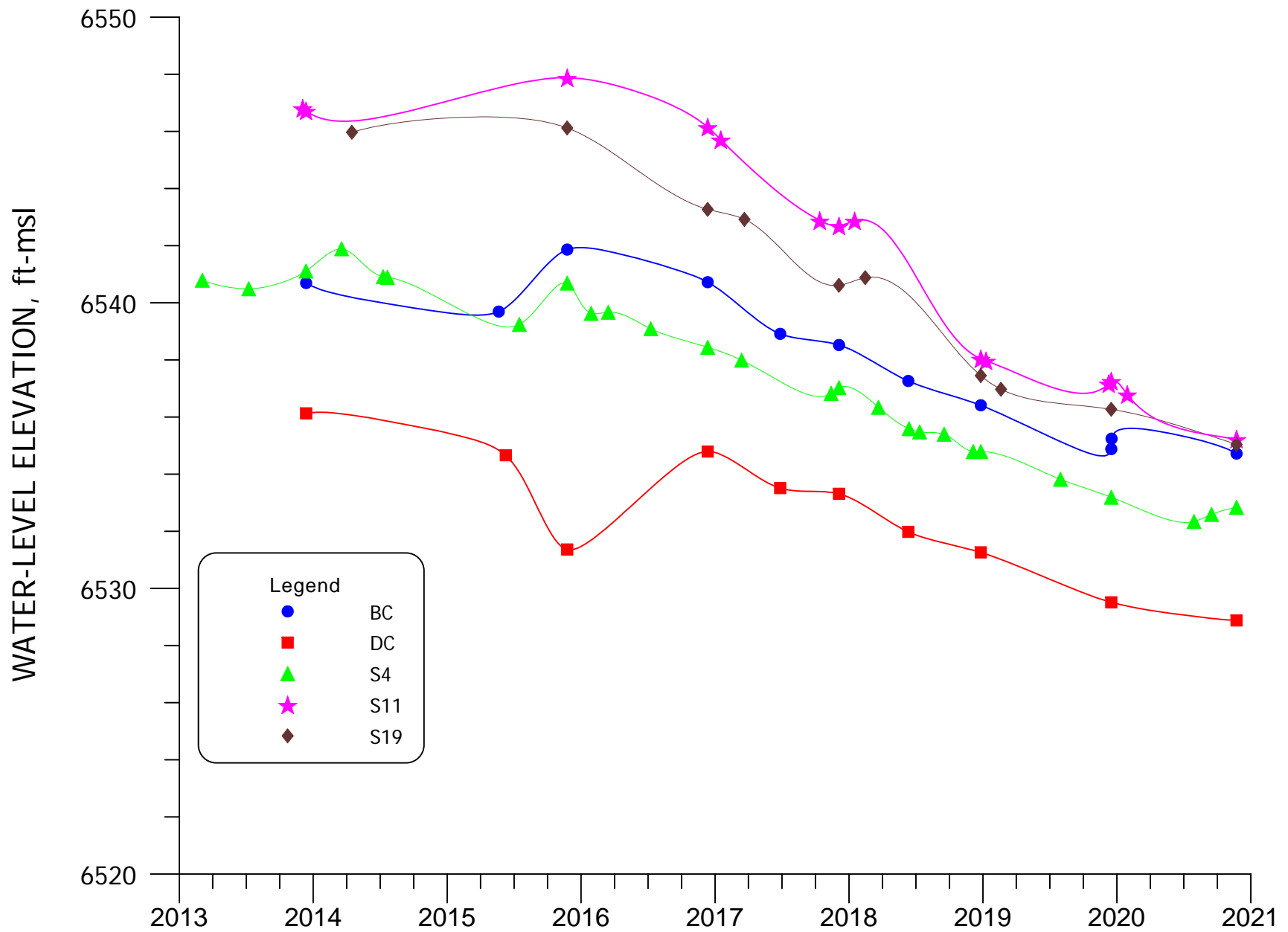
**FIGURE 4.2-3A. WATER-LEVEL ELEVATION FOR WELLS DD, DD2, P, P1 AND P2.**



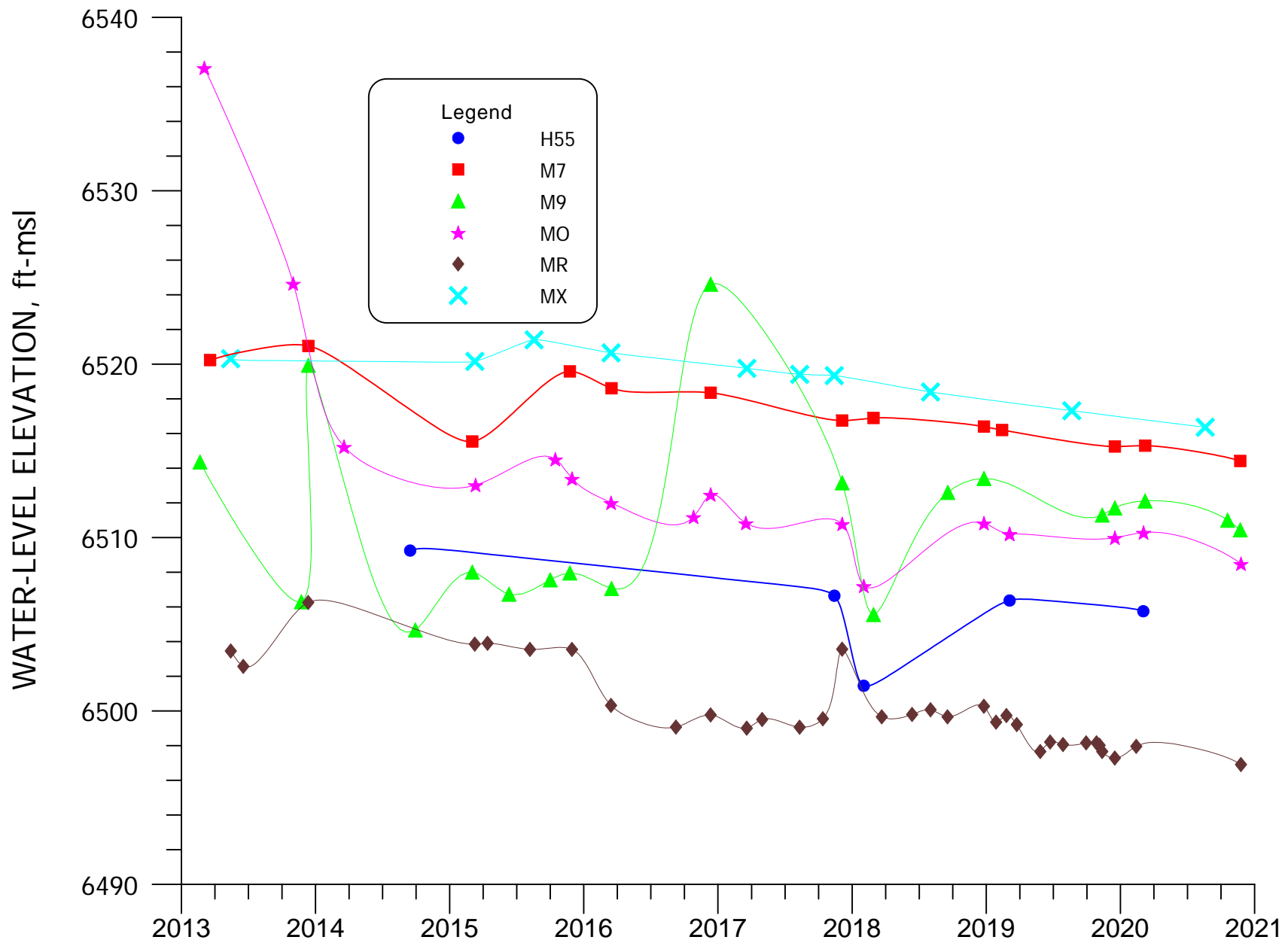
**FIGURE 4.2-4. WATER-LEVEL ELEVATION FOR WELLS SM, SN, SO, SP AND SS.**



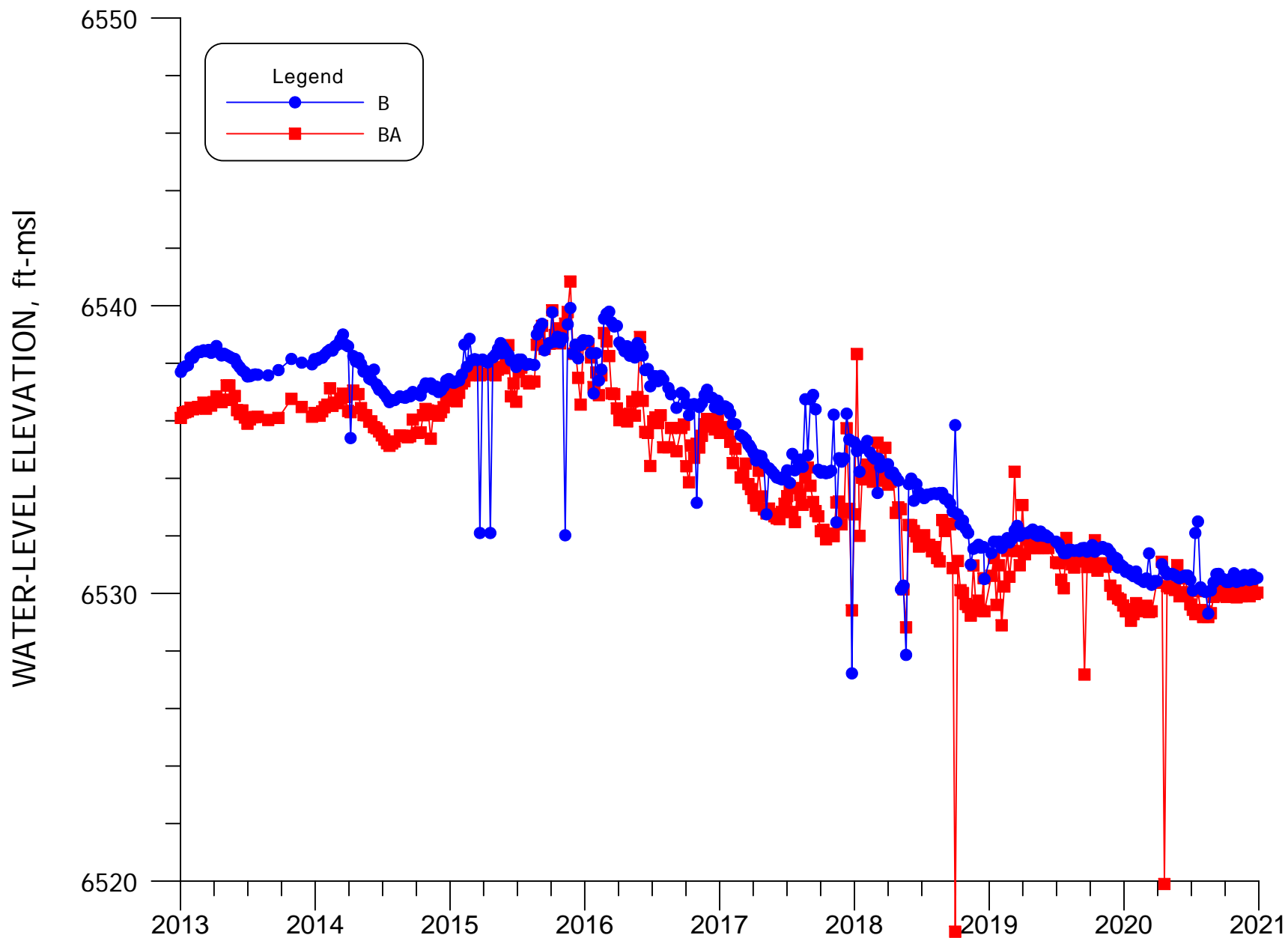
**FIGURE 4.2-5. WATER-LEVEL ELEVATION FOR WELLS S2 AND S5.**



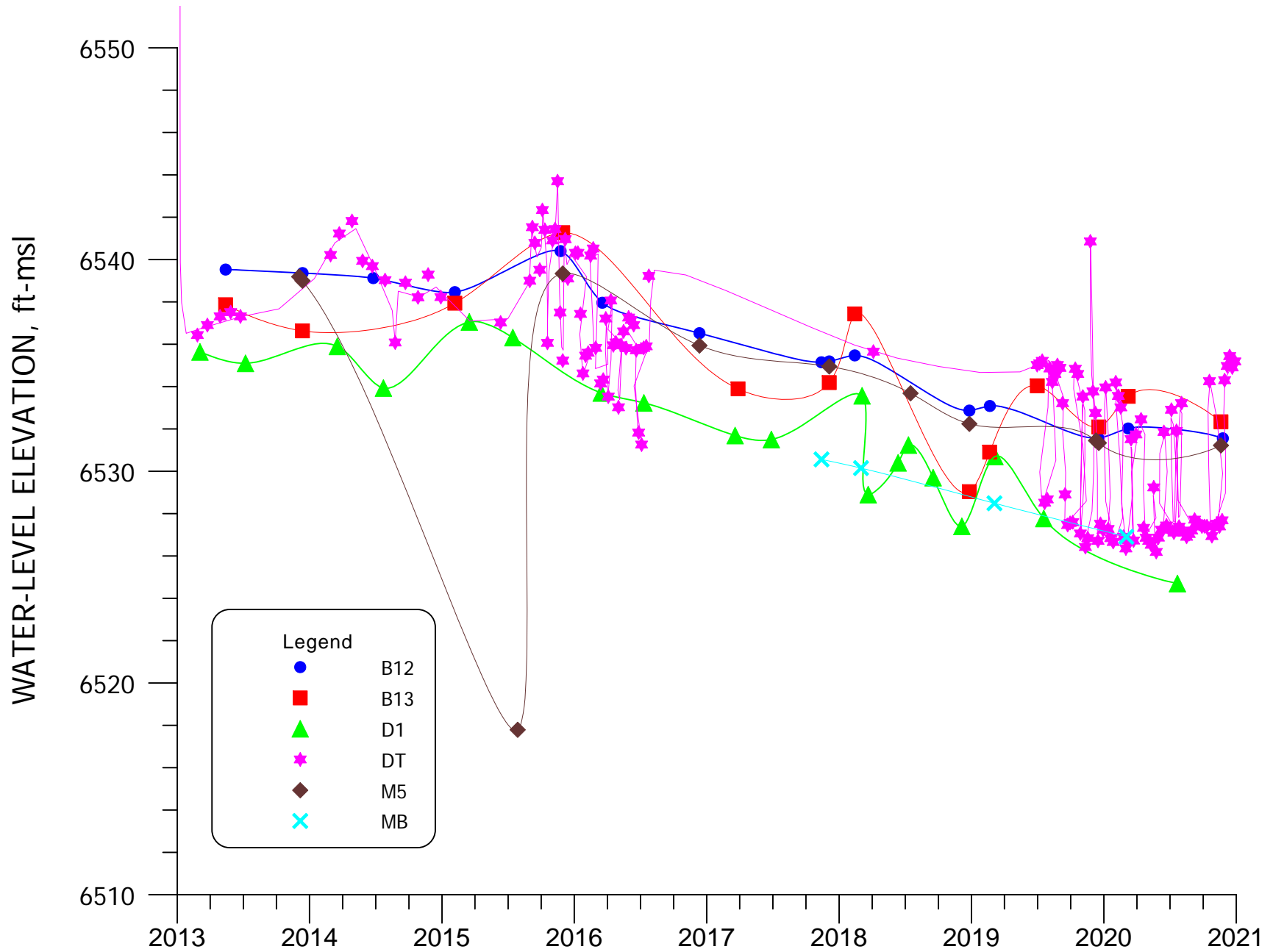
**FIGURE 4.2-6. WATER-LEVEL ELEVATION FOR WELLS  
BC, DC, S4, S11 AND S19.**



**FIGURE 4.2-7. WATER-LEVEL ELEVATION FOR WELLS  
H55, M7, M9, MO, MR AND MX.**

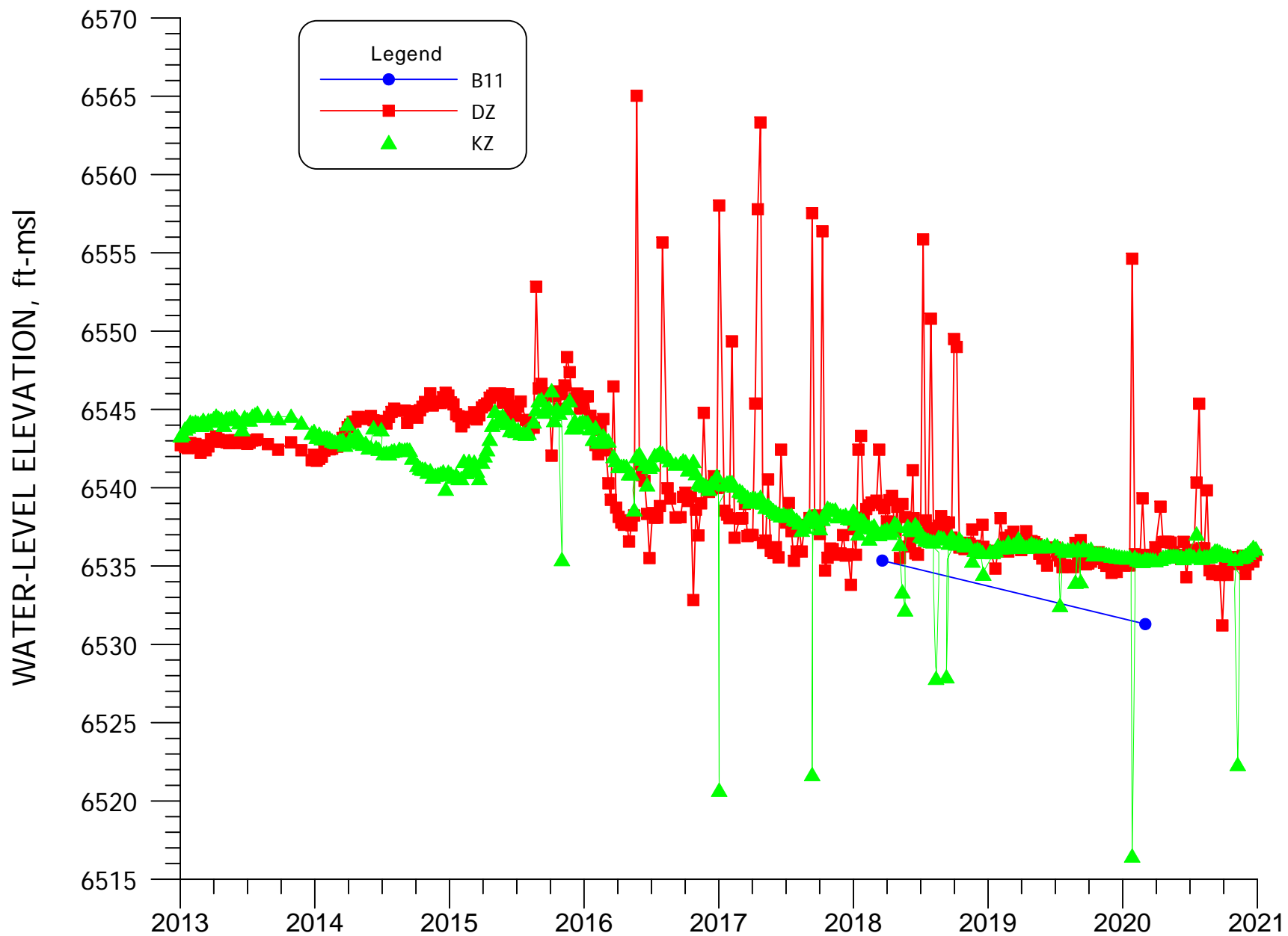


**FIGURE 4.2-8. WATER-LEVEL ELEVATION FOR WELLS B AND BA.**

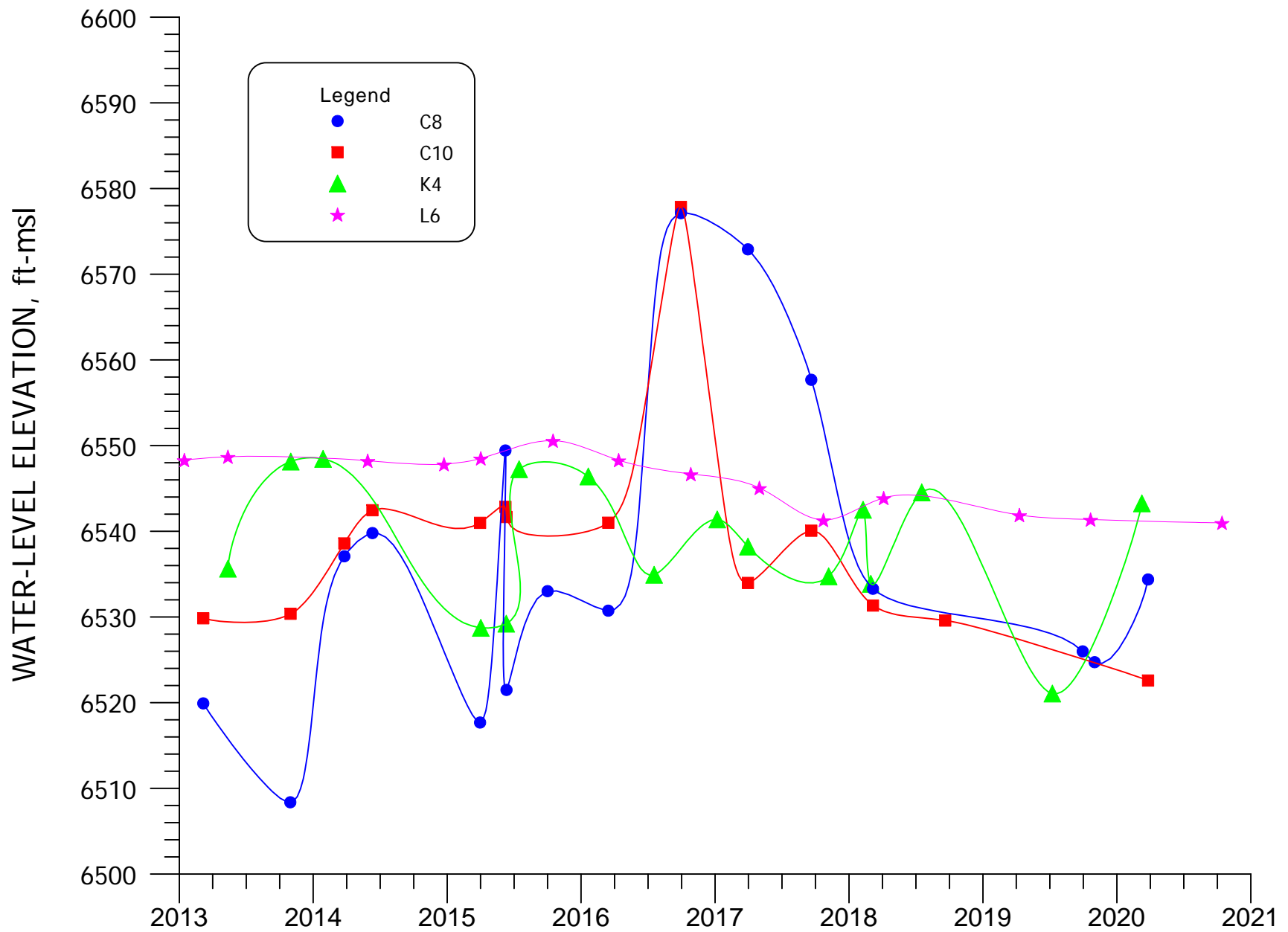


**FIGURE 4.2-9. WATER-LEVEL ELEVATION FOR WELLS  
B12, B13, D1, DT, M5 AND MB.**

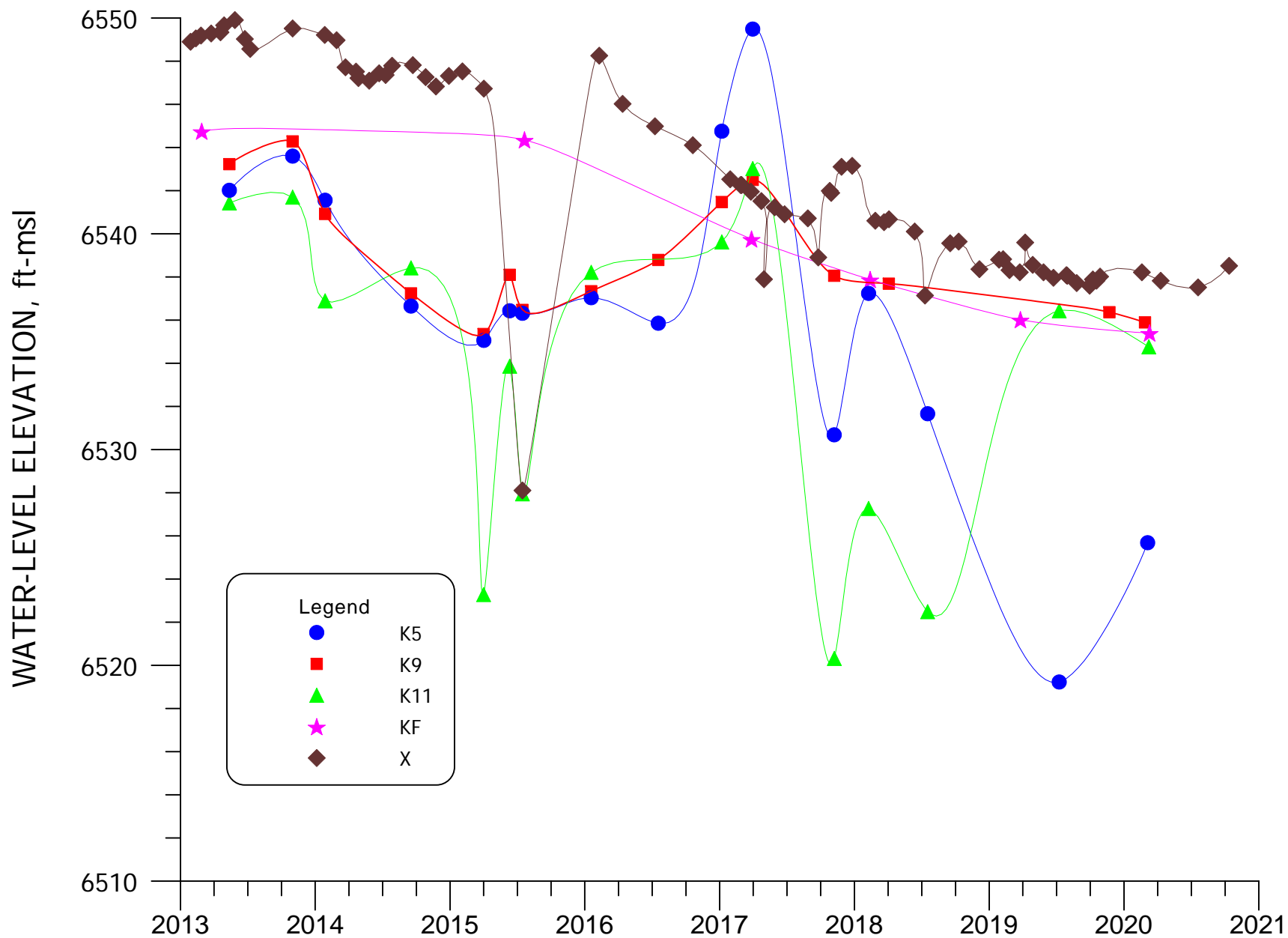




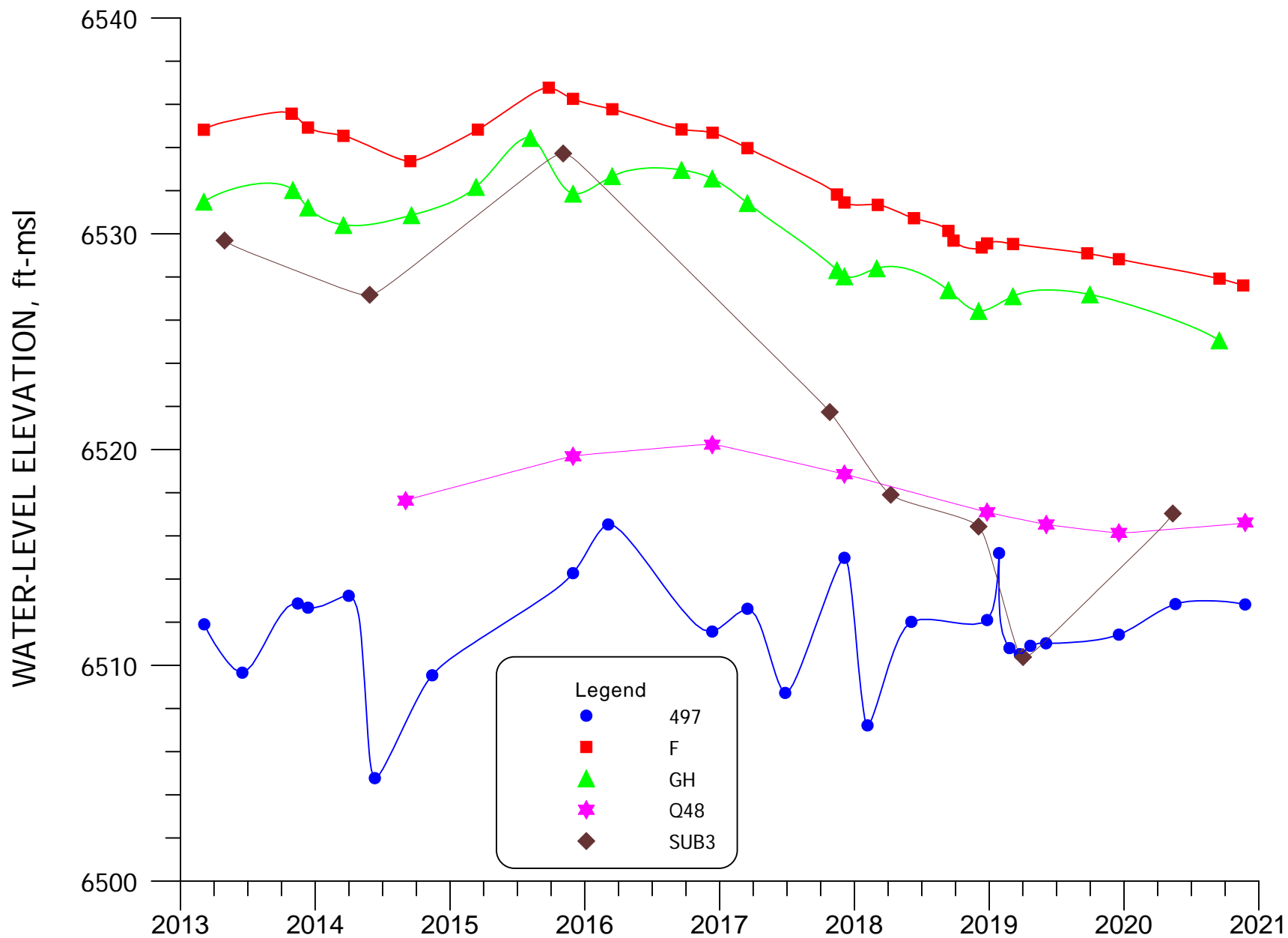
**FIGURE 4.2-10. WATER-LEVEL ELEVATION FOR WELLS B11, DZ AND KZ.**



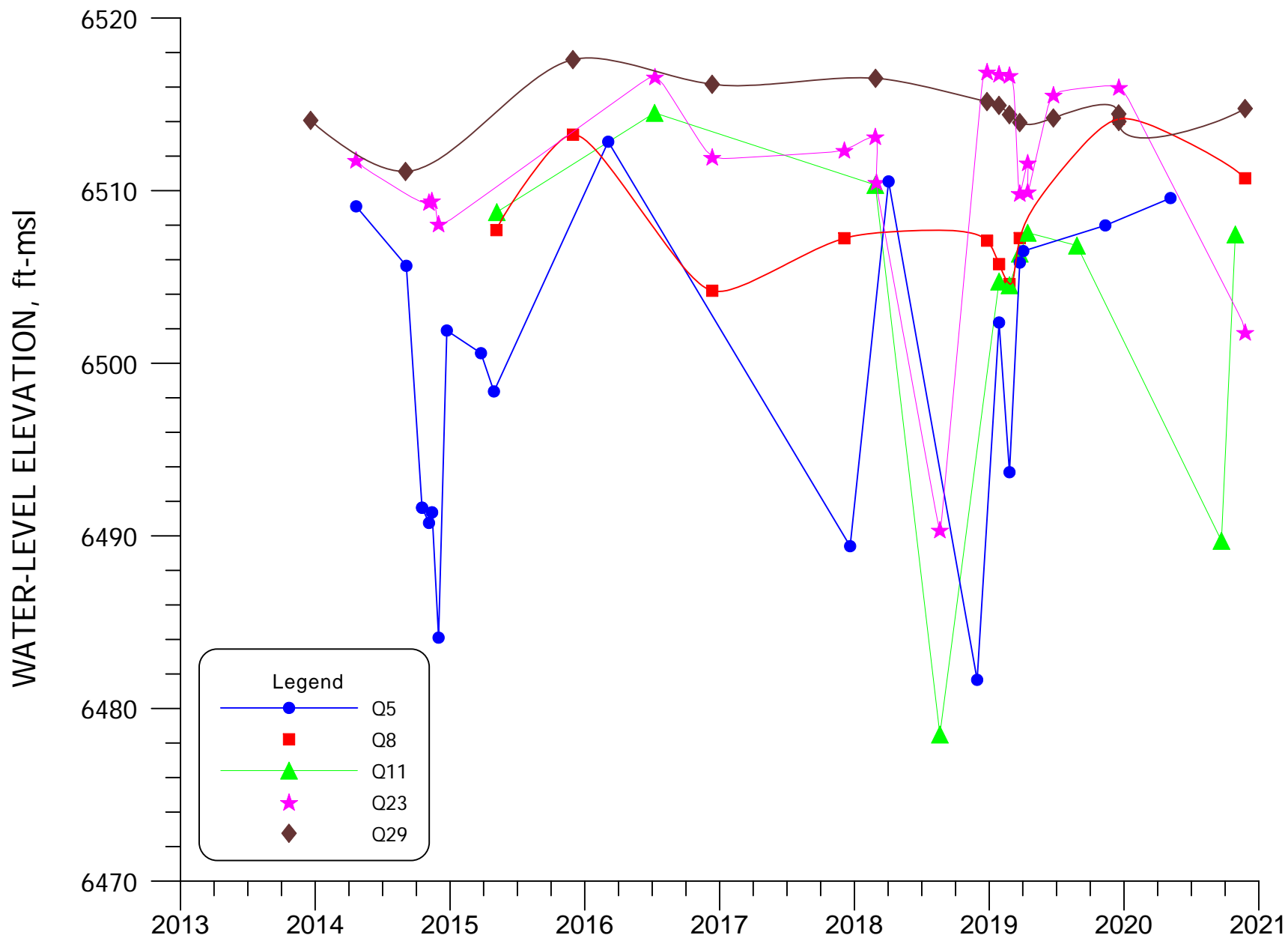
**FIGURE 4.2-11. WATER-LEVEL ELEVATION FOR WELLS C8, C10, K4 AND L6.**



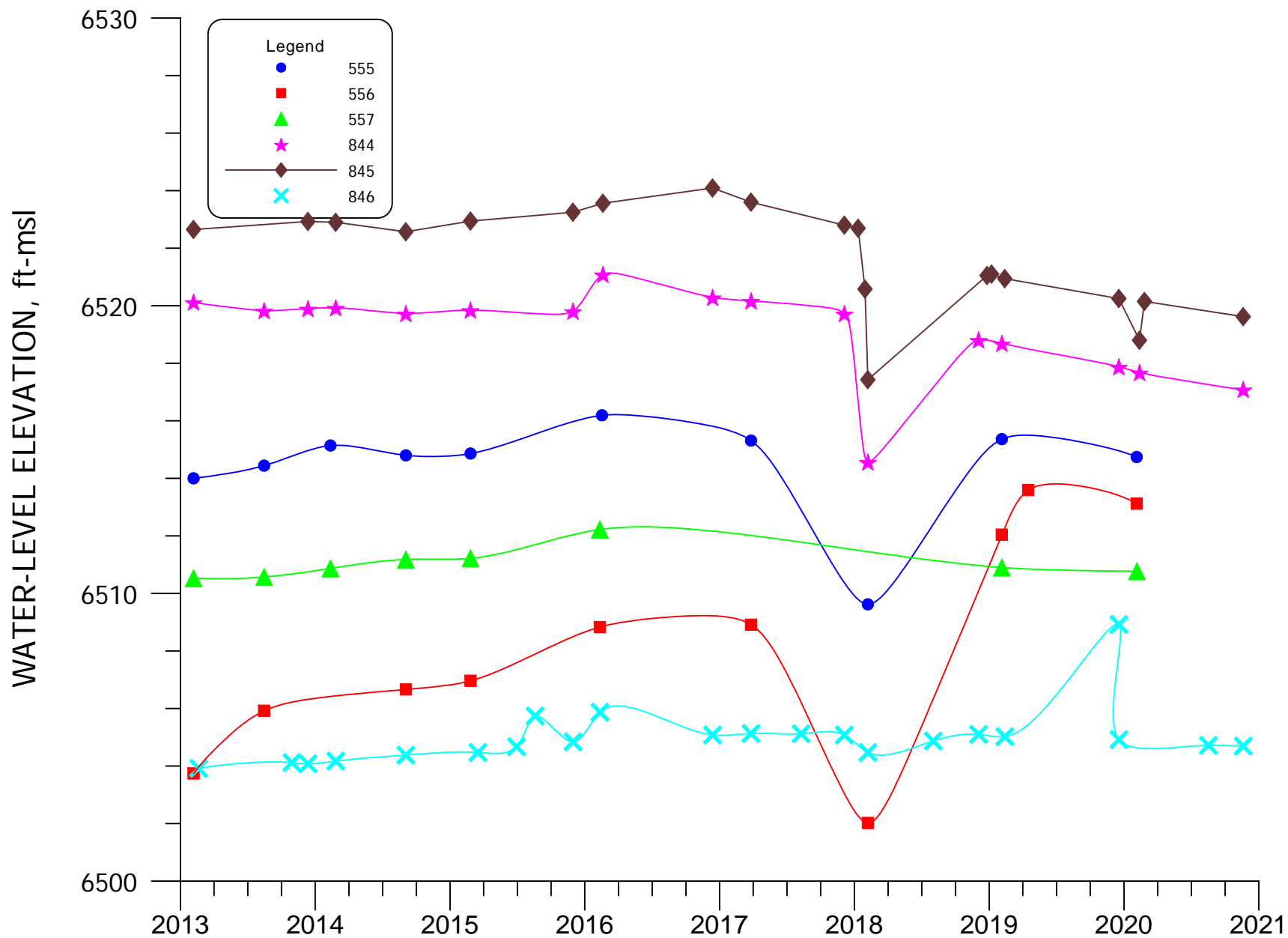
**FIGURE 4.2-12. WATER-LEVEL ELEVATION FOR WELLS K5, K9, K11, KF AND X.**



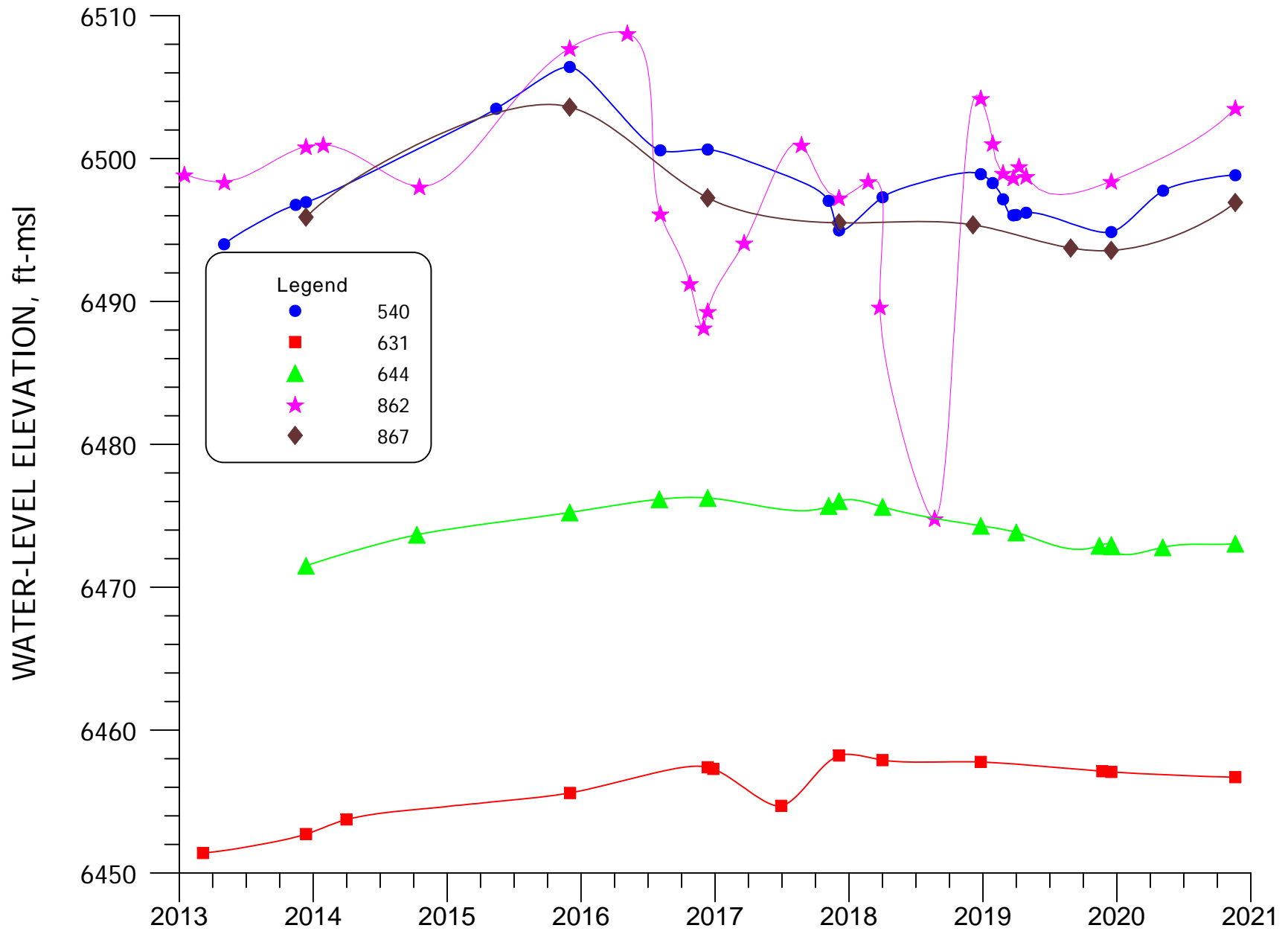
**FIGURE 4.2-13. WATER-LEVEL ELEVATION FOR WELLS 497, F, GH, Q48 AND SUB3.**



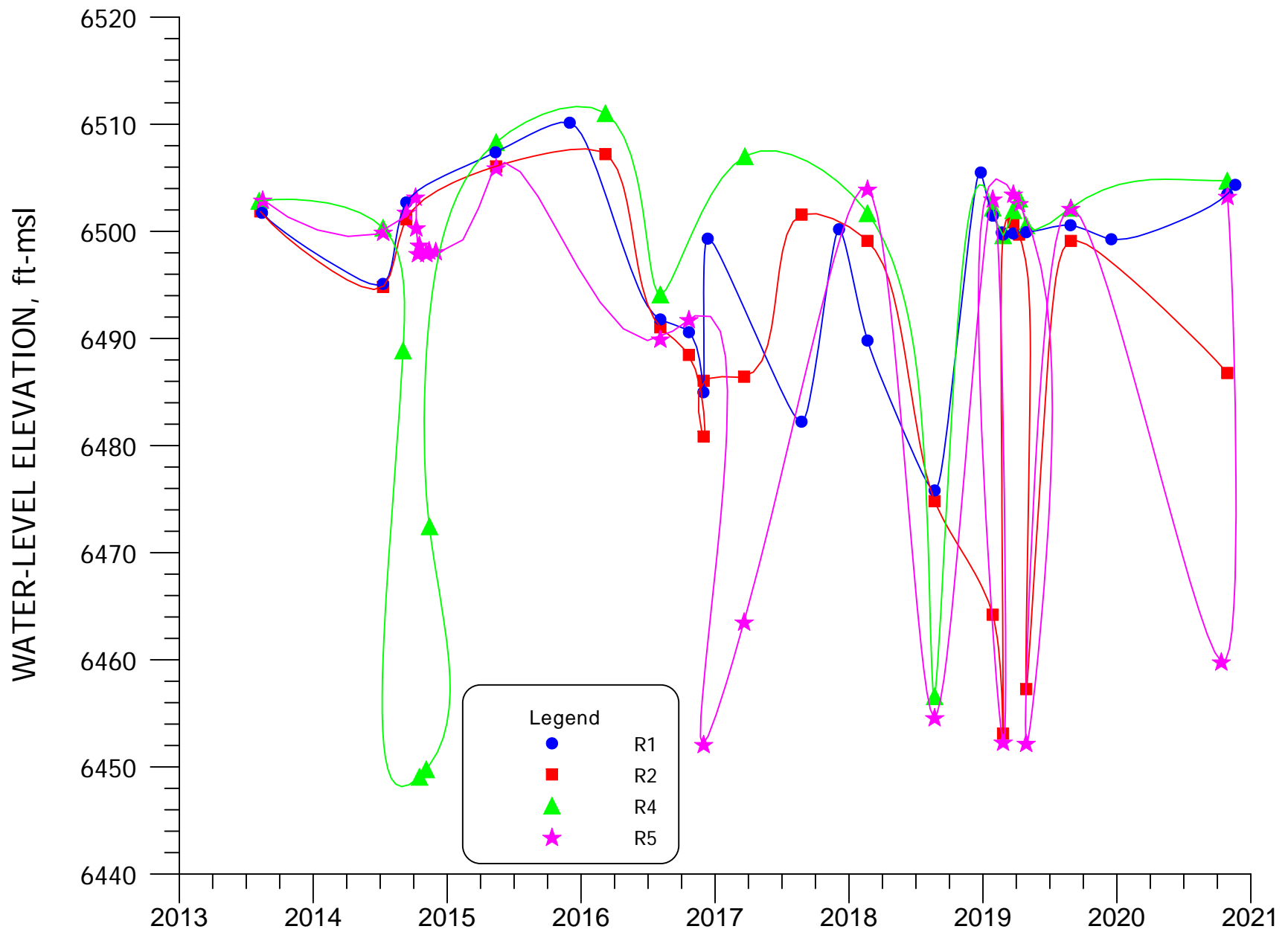
**FIGURE 4.2-13A. WATER-LEVEL ELEVATION FOR WELLS Q5, Q8, Q11, Q23 AND Q29.**



**FIGURE 4.2-14. WATER-LEVEL ELEVATION FOR WELLS 555, 556, 557, 844, 845, AND 846.**

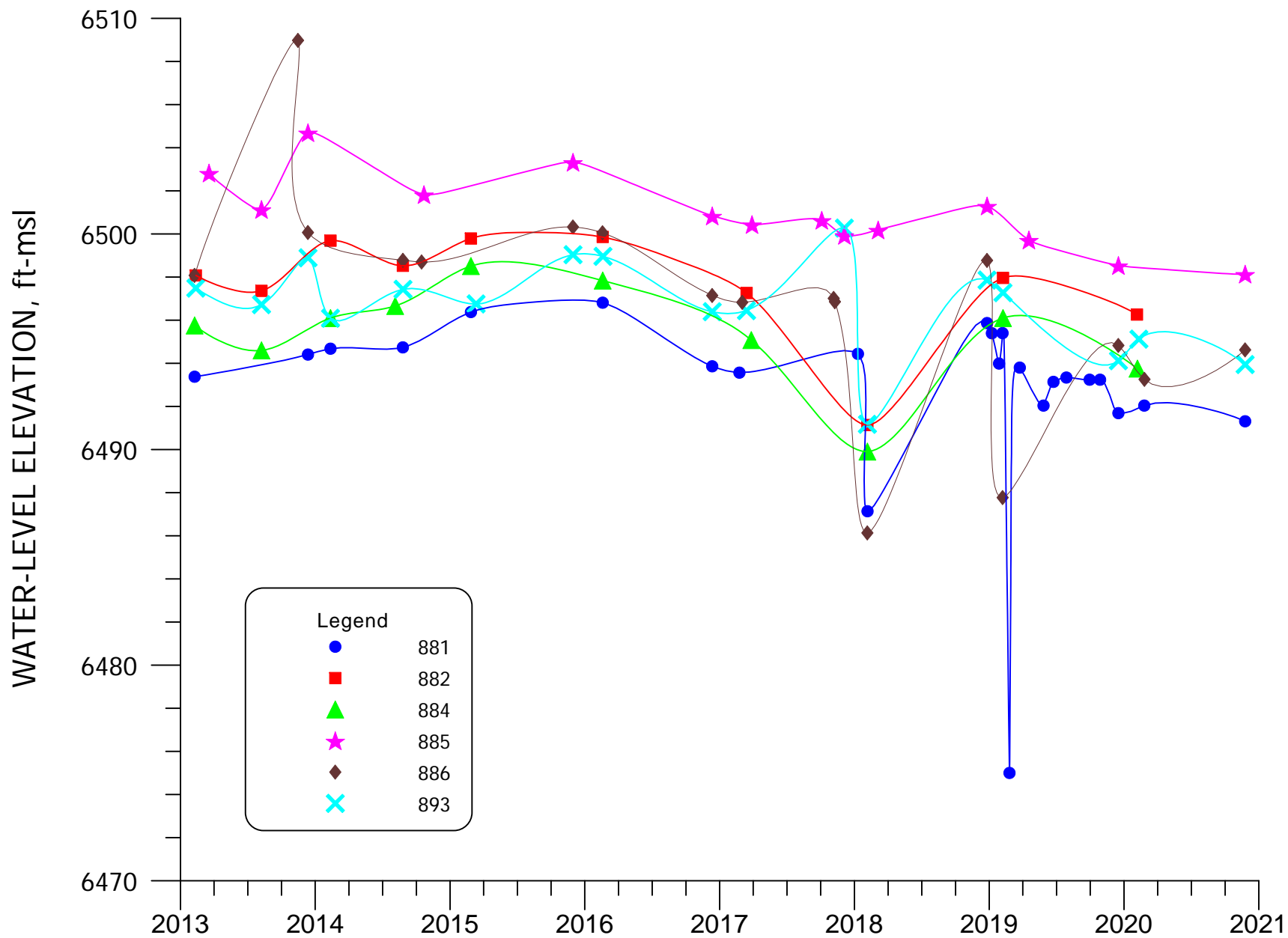


**FIGURE 4.2-15. WATER-LEVEL ELEVATION FOR WELLS 540, 631, 644, 862 AND 867.**

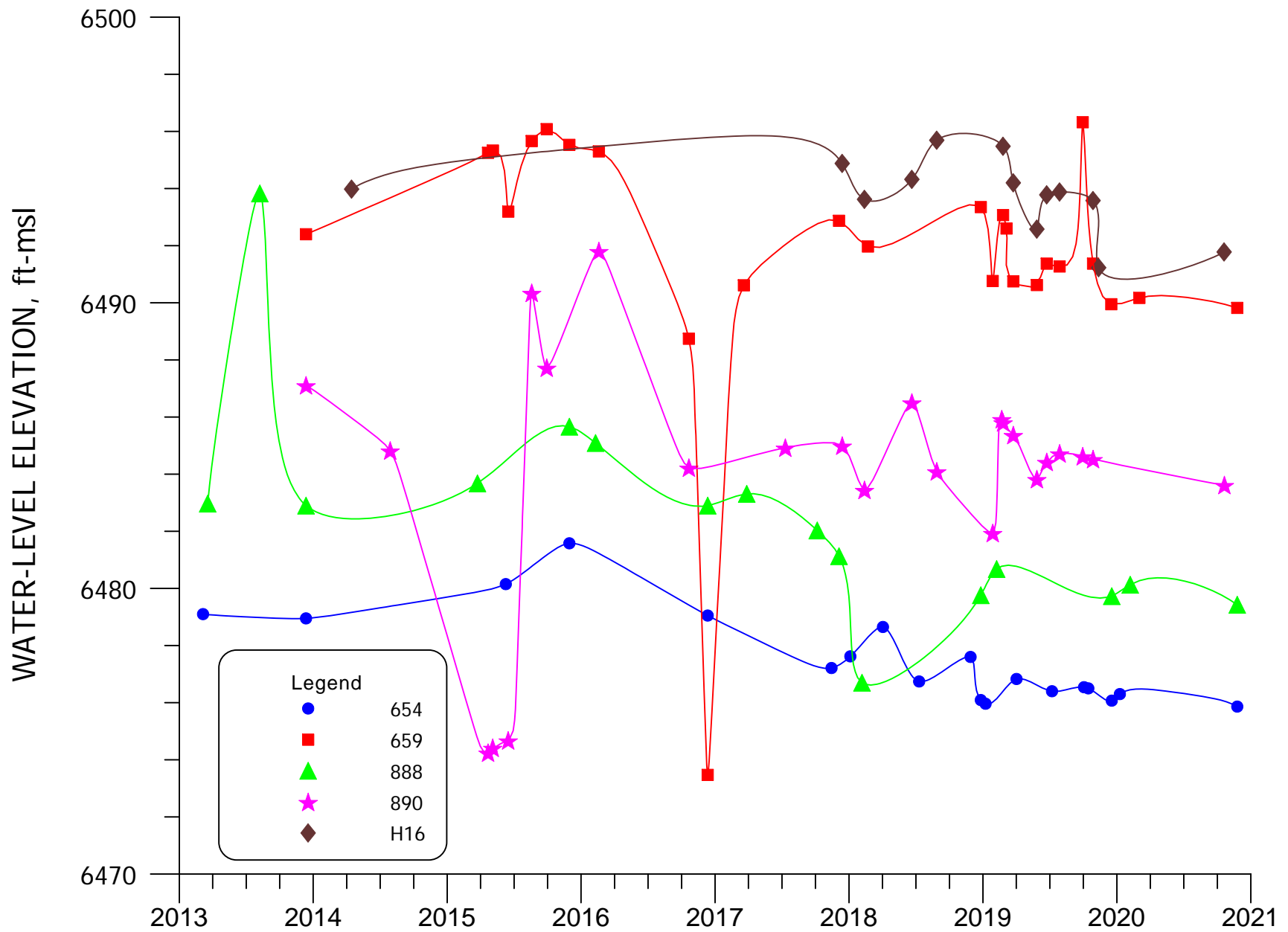


**FIGURE 4.2-15A. WATER-LEVEL ELEVATION FOR WELLS R1, R2, R4 AND R5.**

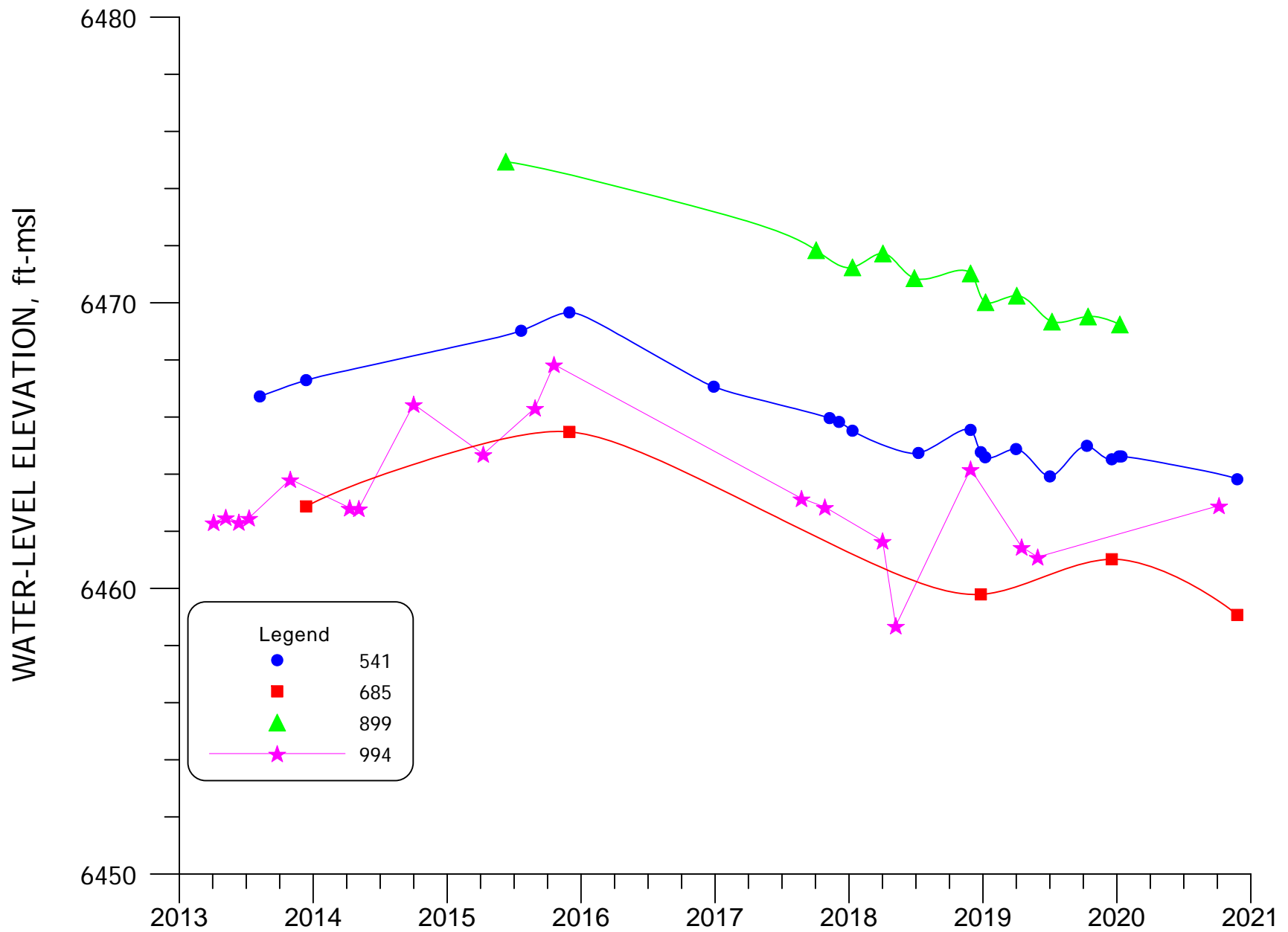




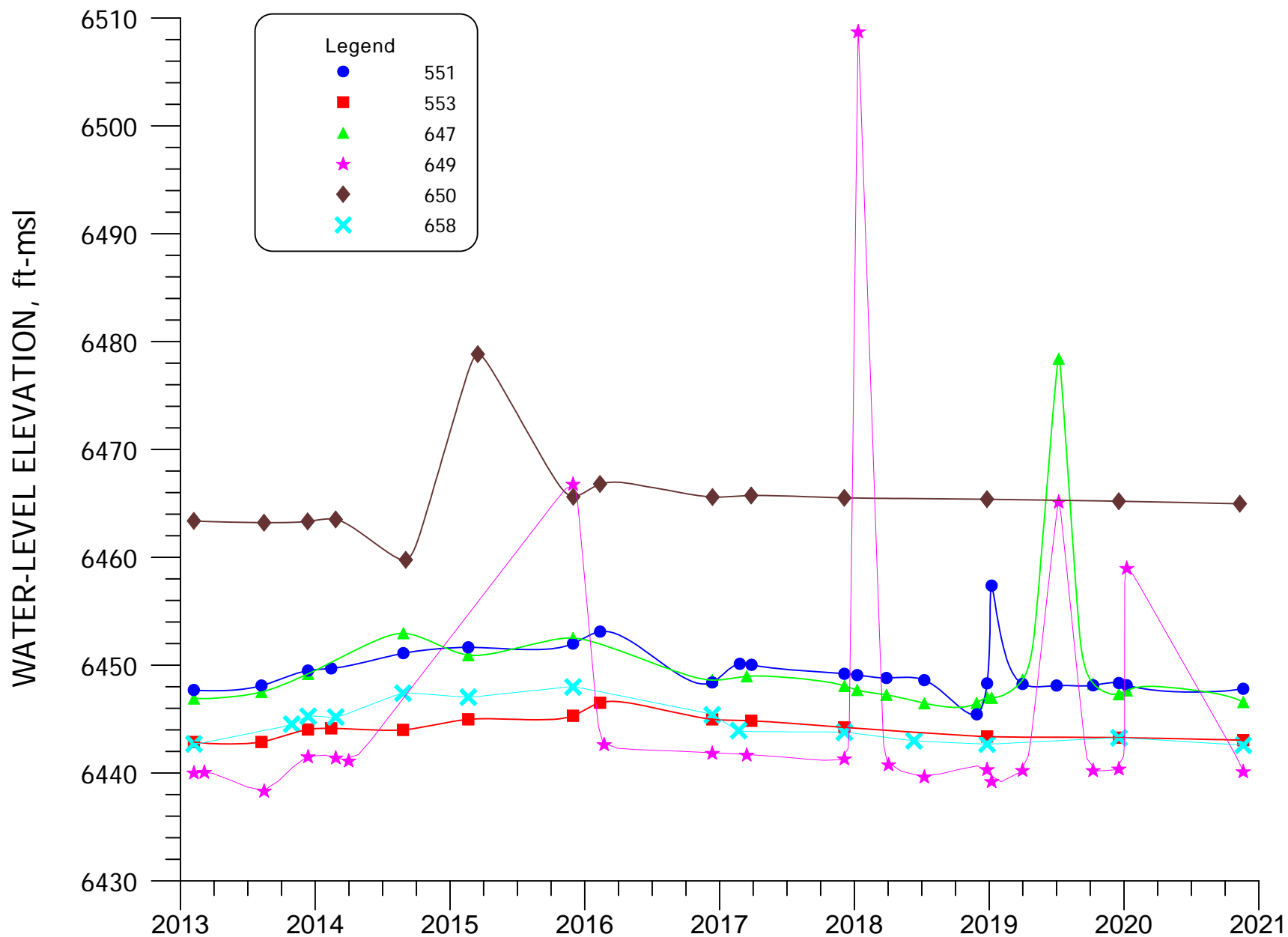
**FIGURE 4.2-16. WATER-LEVEL ELEVATION FOR WELLS  
881, 882, 884, 885, 886 AND 893.**



**FIGURE 4.2-16A. WATER-LEVEL ELEVATION FOR WELLS 654, 659, 888, 890 AND H16.**



**FIGURE 4.2-17. WATER-LEVEL ELEVATION FOR WELLS 541, 685, 899 AND 994.**



**FIGURE 4.2-18. WATER-LEVEL ELEVATION FOR WELLS 551, 553, 647, 649, 650 AND 658.**

### 4.3 ALLUVIAL WATER QUALITY

This section presents the 2020 water-quality data for the alluvial aquifer. The major general water quality constituents that are typically measured at this site are sulfate, chloride and TDS. Sulfate concentrations are used as the primary indicator where contaminant remediation remains to be completed. Selenium, uranium and molybdenum are the primary metals of concern at this site. Nitrate, radium, vanadium and thorium are also discussed in the monitoring report, but these constituents are of only minor concern at the Grants site. [Tables B.4-1 through B.4-6](#) in Appendix B present the 2020 alluvial water-quality data for each well.

Ten water-quality site standards (U, Se, Mo, SO<sub>4</sub>, Cl, TDS, NO<sub>3</sub>, Ra226 + Ra228, Th230 and V) have been set for the alluvial aquifer at the HMC site by the United States Nuclear Regulatory Commission (NRC) and the New Mexico Environmental Department (NMED) and the site Radioactive Materials License was amended accordingly. These site standards were established on the basis of defining the full range in alluvial aquifer background concentration values for these constituents. The site standards and background values, as well as the procedures used to establish them were reviewed and approved by the NRC, the EPA and NMED in 2005. Adjustment of the site standards to account for the full range in natural background concentrations was important in assuring that appropriate site standards are set in relation to background concentrations. The NRC and NMED alluvial aquifer site standards are shown in [Table 4.3-1](#). Alluvial site standards for the Grants Project are for all of the alluvial aquifer at the Grants Project.

Background alluvial aquifer water-quality conditions at the Grants site are those found up-gradient or north of the Large Tailings Pile (see [Figure 4.3-1](#)). These conditions in the San Mateo alluvium have been monitored since 1976. Groundwater flow in the San Mateo alluvial system is generally from the northeast to the southwest. Lobo Creek joins San Mateo Creek in the Felice Acres subdivision area at the HMC site, although neither creek has a well-defined surface flow channel in this area. Surface-water flow occurs only after extreme precipitation events and then generally only within some reaches of the channels.

Hydrographs of up-gradient wells that have been used to define the background hydrologic conditions of the alluvial aquifer are presented in [Sections 4.2 and 4.3](#) of this report. Wells DD, DD2, DD3, DD4, DD5, ND, P, P1, P2, P3, P4, Q and R, located just north of the Large Tailings Pile, have been used for monitoring alluvial background water quality and are

called the near up-gradient wells. Additional near up-gradient wells, DD3, DD4, DD5, DD6 and DD7 were drilled in 2017 with wells DD6 and DD7 on the southwest side of EP3 being dry, as expected. Well DD3 was drilled on the northeast and up-gradient side of EP3 while well DD4 was drilled on the southeast side and northeast of well DD2. Well DD5 was drilled on the southwest side of EP3 but near the southern corner where the alluvium is saturated. Wells DD6 and DD7 were drilled on the southwest side of EP3 and to the northwest of well DD5. Four additional near up-gradient wells were added in 2019 with one pair (BK1c and BK1f) of these wells located approximately 800 feet to the east and southeast of well DD and the second pair (BK2c and BK2f) of these wells located slightly greater than 200 feet west and northwest of well P4.

Additional alluvial background wells located farther north have also been sampled (wells 914, 920, 921, 922 and 950, see [Figure 4.3-1](#) for locations). Information gathered from these wells has been used to further define the piezometric surface and water-quality conditions in the up-gradient alluvial aquifer and these wells are referred to as the far up-gradient wells. The EPA has added three wells (N-15, N-16 and N-17) in the far up-gradient area for additional data in this area.

[Figure 4.3-1](#) presents the latest 2020 water-quality data for the near and far-up-gradient alluvial background wells for six parameters: sulfate, uranium, selenium, chloride, TDS and nitrate. The very small selenium concentrations in wells DD2 and DD4 are thought to be a result of reduced conditions also. The large selenium difference in up-gradient wells P and P2 are likely due to the differing reducing conditions in these two nearby wells.

The 95<sup>th</sup> percentile of the historical background alluvial aquifer water-quality data for the Grants site was defined by ERG (1999a and 1999b). These documents, along with a hydrologic support document (Hydro-Engineering 2001c), were submitted to the NRC in 2001 with a request to adjust some of the site standards based on the full range of natural background conditions. The 95<sup>th</sup> percentile was used to define the upper limit of background. Background data for a ten-year period of 1995 through 2004 was used to determine the 95<sup>th</sup> percentile values. The cumulative database for all of the background wells more adequately defines background concentrations, and this expanded database, based on near-up-gradient wells, was utilized in the two ERG (1999a and 1999b) studies. A tabulation of alluvial standards for the Grants Project area constituents is included in [Figure 4.3-1](#).

The concentrations in the alluvial up-gradient wells<sup>1</sup> sampled during 2020 are tabulated in [Table 4.3-2](#) with a list of the site standards that were established from data from the near up-gradient wells<sup>2</sup>. As shown by the present data, there is a large natural areal variability in the background water quality.

The most recent monitoring values were used for the iso-concentration contour figures presented in this section. Colored patterns are used on the figures to delineate where measured concentration exceeds the site standards for each of the constituents. The standard is presented in the legend of the respective figure for each parameter. A greater than sign was added in front of the numeric value to note that the pattern shows where the standard is exceeded.

#### **4.3.1 SULFATE - ALLUVIAL**

Sulfate has been used as a primary indicator constituent for this site because concentrations are large in the tailings water. Concentrations of sulfate in the alluvial aquifer for 2020 are presented on [Figure 4.3-1C](#). An updated statistical evaluation of the background sulfate concentration with data for a ten-year period (1995 – 2004) showed that concentrations as great as 1500 mg/L could occur naturally at this site and is, therefore, the alluvial site standard. Areas where sulfate concentrations exceed 1500 mg/L are shown with a green pattern on [Figure 4.3-1C](#). This figure shows the locations of three areas where the sulfate concentrations are also posted for the On-site (OS), the South Off-site (SOS) and the North Off-site (NOS) areas in [Figures 4.3-1B, 4.3-1C and 4.3-1D](#), respectively. As shown on [Figure 4.3-1B](#), sulfate concentration near and beneath the LTP exceeds 5,000 mg/L. The observed sulfate concentrations in the four adjacent subdivisions were less than the site standard of 1500 mg/L in 2020 except for samples from two wells in Section 34. Sulfate concentrations were similar in Section 3 and South Felice Acres in 2020 with no wells with a sulfate concentration above 1000 mg/L except at one well in the northeast portion of Section 3 (see [Figure 4.3-1C](#)). A few slightly smaller concentrations were observed in these two areas due the injection of treated water. Sulfate concentrations exceeded 1000 mg/L in the southwest portion of Murray Acres, southern Pleasant Valley Estates, eastern Valle Verde and to the southeast of Valle Verde. Sulfate concentrations also exceeded 1000 mg/L just north of Pleasant Valley in the northern portion of Section 27 (see [Figure 4.3-1D](#)). Down-gradient of the Grants Project site, the sulfate

concentrations are all within the natural range of background except two wells south of Murray Acres and Pleasant Valley (see [Figure 4.3-1C](#)).

Plots of constituent concentration versus time have been prepared for the alluvial aquifer for sulfate, TDS, chloride, uranium, selenium, molybdenum and nitrate. The groupings of wells used for these plots are shown on [Figure 4.3-2](#). The figure numbers for each of the well groupings that correspond with the sulfate concentration versus time plots are indicated. The color and symbol used for each well are the same as those used in the time plots for each constituent except for an additional uranium plot in South Felice Acres area. Figure numbers for the time plots of other constituents are not shown on this map; however, it is useful for the other time-concentration plots because the color, symbol and well groupings are consistent.

[Figure 4.3-3](#) presents sulfate concentrations plotted versus time for near up-gradient background wells NC, P3, P4, Q and R. Fairly steady concentrations occurred in these up-gradient wells in recent years except for a very gradual increasing trend that existed in wells P3 and Q prior to 2020. The historical values for these wells show similar periods of short term increasing and decreasing trends in the alluvial aquifer. The changes in sulfate concentration in these wells are well within the range previously observed for sulfate in the up-gradient wells. [Figure 4.3-3A](#) presents sulfate concentrations plotted versus time for near up-gradient wells DD, DD2, P and P2. Sulfate concentrations in well DD in 2016 and 2017 indicated an overall increasing trend followed by steady concentrations in 2018 and 2019 and a gradual decline in 2020. Steady concentrations were observed in 2016 through 2020 in wells DD2 and P2. The alluvial site standard is presented on each of the water quality plots for comparison with the water quality data.

Sulfate concentrations immediately west of the LTP in alluvial wells S4, S11, SE6 and SSR were fairly steady in 2020, except for the return to higher concentrations in collection well SSR in late 2019 (see [Figure 4.3-4](#)) and a small increase in well S4. [Figure 4.3-5](#) presents sulfate concentrations plotted versus time for alluvial wells H55, M9, MO, MQ, MR and MX situated further west of the LTP. Sulfate concentration in these wells has been fairly steady during 2020. [Figure 4.3-6](#) presents sulfate concentration versus time plots for alluvial wells 802, B12, D1, M3 and MB. Steady concentrations in 2017 through 2020 were observed in well D1. A large increase was observed in the sulfate concentration in collection well M3 in 2019 and is supported by the 2020 value. A decline to below the site standard was observed in well B12 in



2020. [Figure 4.3-7](#) presents time plots of sulfate concentrations for wells B11, T2, T19, T23, T41 and T54 which show a decline in sulfate concentrations in wells T2, T23 and T54 in 2020. [Figure 4.3-8](#) presents a plot of sulfate concentration versus time for alluvial wells on the west side of the STP. The plot shows steady concentrations in 2020 in wells B13, C2 and C8, while an increase was observed in well C6. [Figure 4.3-9](#) presents sulfate concentration versus time for alluvial wells on the STP and the south side of the STP. The plot shows a small overall decline in these concentrations except for fairly steady values in wells K9 and K11. [Figure 4.3-10](#) shows the sulfate concentrations for the STP area collection wells K4, K5 and K7 and monitoring wells 1A and 1K which indicate a slight decreasing trend in wells 1A and K4 while concentration increased in well K5.

Time plots of sulfate concentrations in L collection wells located southeast of the STP are presented on [Figure 4.3-11](#). This figure shows a steady sulfate concentration in 2020 in wells 639 and L5 while concentrations increased in wells 521 and 522.

[Figure 4.3-12](#) presents sulfate concentration time plots for wells in and to the north and east of Broadview Acres for alluvial wells F, FB, GH, GN, SUB2 and SUB3. A decline in concentration was measured in well SUB3 in 2019 and 2020 while concentrations in the remainder of the wells were steady. [Figure 4.3-13](#) presents sulfate concentrations versus time for Felice Acres alluvial wells 490, 497, Q2, Q5 and Q11. A very gradual decline in concentration was observed in 2020 in wells 497 and Q2.

[Figure 4.3-14](#) contains time plots of sulfate concentrations for alluvial wells 555, 556, 557, 844, 845 and 846 which are located in and near the former flood irrigation area in Section 34. This plot shows that sulfate concentrations in samples from alluvial wells 555, 556, 557 and 845 were fairly steady in 2020. Sulfate concentrations are higher than the site standard in alluvial wells 555 and 846 but are declining toward the site standard. The sulfate concentrations in well 846 are not thought to be from the Section 34 irrigation. The changes in the last few years in the other wells could be showing the small effect on sulfate concentrations from the past flood irrigation.

[Figures 4.3-15](#) and [4.3-15A](#) present the sulfate concentration time plots for wells in Section 3 (see [Figure 4.3-2](#) for the location of these wells). Sulfate concentrations in the Section 3 alluvial wells have been fairly steady over the last few years except for decreases in wells 540 and 631.

The sulfate concentrations in water from five wells within and near the former Section 28 center pivot irrigation area and Pleasant Valley monitoring well 688 are presented on [Figure 4.3-16](#) while [Figure 4.3-16A](#) presents sulfate concentrations for six wells located west of the Section 28 irrigation area where restoration activity has occurred. The sulfate concentrations in these wells are below the site standard and were generally steady the last two years.

[Figure 4.3-17](#) presents sulfate concentrations with time for four wells located farther west and after the confluence with the Rio San Jose alluvium. Concentrations in these four wells could be influenced by the Rio San Jose and/or San Mateo alluvial systems. Fairly steady sulfate concentrations were observed in 2020 in these wells. The time variations of sulfate concentrations in water sampled from five wells in the Section 33 Center Pivot area are plotted on [Figure 4.3-18](#). Sulfate concentrations in well 551 have gradually increased since 2017.

The western North Off-site post closure wells 541, 551, 647, 649, 654, 899 and 996 had been monitored quarterly from 2018 through 2019. The sulfate concentrations observed in these wells for the previous two years had been steady except the gradual increase observed in sulfate concentrations in well 551 and the small increase observed in well 654 sulfate concentrations in 2019. These variations in concentration are thought to be natural and not affected by the past tailings seepage or restoration operations.

#### **4.3.2 TOTAL DISSOLVED SOLIDS - ALLUVIAL**

Total dissolved solids (TDS) concentration contours for the alluvial aquifer during 2020 are presented on [Figures 4.3-19, 4.3-19A, 4.3-19B and 4.3-19C](#). Based on an updated statistical analysis, TDS concentration must exceed 2734 mg/L before it is considered elevated beyond the naturally occurring range. A light green pattern is shown on [Figures 4.3-19, 4.3-19A, 4.3-19B and 4.3-19C](#) to indicate where the TDS concentrations exceed the 2734 mg/L site standard. None of the observed concentrations in the west half of [Figure 4.3-19](#) exceed this level. The TDS concentrations exceed 2734 mg/L near the tailings and to the west and south of the LTP. TDS concentration in a significant portion of the alluvial aquifer underlying the LTP exceeds 10,000 mg/L (see [Figure 4.3-19A](#)). A zone of 2000 mg/L or greater TDS concentration extends to the west of the LTP through the eastern half of Section 28 (see [Figure 4.3-19C](#)). Additional areas of TDS concentration greater than 2000 mg/L exist in the southern portion of Pleasant Valley Estates, the southern portion of Murray Acres, the eastern portion of Valle Verde

and to the south of this area (see [Figure 4.3-19](#)). The only other areas of TDS concentration above 2000 mg/L is in two wells to the southwest of this area. Only the areas closely proximate to the two tailings piles, a small area west of the Large Tailings Pile, and two small areas east of Valle Verde and south of the Murray Acres exceed the TDS site standard.

TDS time concentration plots were developed for the same grouping of wells as those prepared for sulfate (see [Figure 4.3-2](#) for groupings of wells with TDS plots). [Figures 4.3-20 and 4.3-20A](#) present the TDS concentrations versus time for the up-gradient wells. The TDS in well P3 has increased during the last four years while TDS concentrations had gradually increased in wells DD and DD2 for a few years until becoming fairly steady over the last two years.

[Figures 4.3-21 through 4.3-24](#) present TDS concentrations plotted versus time for wells on, near and west of the LTP and shows that concentrations in collection wells M3 and SSR have increased in the last two years. Plots of TDS concentrations on and near the STP and in one well east of the LTP are presented in [Figures 4.3-25 through 4.3-27](#). TDS concentrations in samples from the L line of wells are presented in [Figure 4.3-28](#) while [Figure 4.3-29](#) presents the TDS concentrations versus time for wells north of Broadview Acres and for two wells in Broadview Acres.

The TDS concentrations in the Felice Acres alluvial wells are presented in [Figure 4.3-30](#) which indicates small variations in TDS in these wells for the last few years. TDS concentrations for the former flood irrigation area alluvial wells are presented in [Figure 4.3-31](#). Fairly steady TDS concentrations were observed in these wells in 2020 with a small decline in wells 844, 845 and 846 and fairly steady concentrations in wells 555 and 557. The prior increases in TDS concentrations in recent years in wells 555, 844 and 845 could be due to the flood irrigation in this area which ceased after the 2012 season.

[Figures 4.3-32 and 4.3-32A](#) present time plots of TDS concentrations for five wells located in Section 3 and five of the R series collection wells. The TDS concentration in wells R1 and R2 had very gradually increased in the previous couple of years but became steady in both wells in 2020. TDS concentrations for the former Section 28 irrigation monitoring wells and Pleasant Valley monitoring well 688 were stable in 2020 (see [Figure 4.3-33](#)). The observed changes in these wells in 2013 through 2015 could be due to ceasing irrigation in Section 28 but could also be due to freshwater injection proximate to these wells. The TDS in the freshwater injection source increased in 2012 due to the switch from San Andres well 951 to well 951R.

Some of the TDS variations could be due to past irrigation in this area. TDS concentrations in alluvial wells just west of the Section 28 former irrigation area are presented on [Figure 4.3-33A](#) which shows a small TDS concentration increase in wells 890 and H2A in 2019 and 2020.

TDS concentrations in alluvial wells in Sections 29 and 32 are presented on [Figure 4.3-34](#) while [Figure 4.3-35](#) presents TDS concentrations in the Section 33 alluvial wells. TDS concentration in well 551 showed an abrupt decline in 2015 with an increase in 2018 and 2019 and a steady value in 2020. TDS concentrations in the other wells were relatively steady with generally natural variations observed in the area. The variations observed in wells 541, 551, 647, 649, 654, 899 and 996 over the previous two years of monitoring have shown natural variations in the TDS concentrations.

### **4.3.3 CHLORIDE - ALLUVIAL**

Chloride concentration is another important indicator of tailings seepage because of the conservative nature of this constituent and the fact that up-gradient concentrations are low. Chloride concentrations measured during 2020 in the alluvial aquifer near the tailings are presented on [Figures 4.3-36, 4.3-36A, 4.3-36B and 4.3-36C](#). The fresh-water injection systems have used water with chloride concentrations of approximately 200 mg/L, whereas the RO product chloride concentration is less than 10 mg/L and the typical treated water from the PTT is 150 mg/L. The alluvial aquifer around and underlying the LTP contains chloride concentrations in excess of the State drinking water standard of 250 mg/L (site standard). Measurement of chloride concentration in alluvial groundwater is useful in defining areas where the treated water has migrated in the alluvial aquifer. A light green pattern on [Figures 4.3-36, 4.3-36A, 4.3-36B and 4.3-36C](#) is used to illustrate where concentrations exceed 250 mg/L. The limited areal extent of the green pattern on these figures shows that the area exceeding the chloride standard is limited to the immediate area of the tailings and in the area of three wells in Section 34. Chloride concentrations in the alluvial water in the western half of [Figure 4.3-36](#) have not typically exceeded 250 mg/L. None of the alluvial wells just north of the northern boundary of Pleasant Valley exceed the site standard in 2020 (see [Figure 4.3-36C](#)).

[Figures 4.3-37 and 4.3-37A](#) present chloride concentrations versus time for a total of nine up-gradient wells. Analysis of the data on these figures shows overall steady chloride concentrations in 2020 with small chloride concentrations of between 40 and 80 mg/L.

Figures 4.3-38 through 4.3-40 present time plots of chloride concentration for wells west and southwest of the LTP with higher values in collection wells M3 and SSR during 2019 and 2020. Chloride concentrations in wells on and near the LTP are presented on Figure 4.3-41 with the main change in these wells being a concentration decline in well T54 in 2019 and 2020. Chloride concentrations in alluvial wells on and near the STP and in one well east of the LTP are presented on Figures 4.3-42 through 4.3-44. A decline in the chloride concentration in wells K4, KEB and KF was observed in 2020. The chloride concentrations in samples from the L line collection wells are presented in Figure 4.3-45, showing increasing concentrations in wells 521, 522, 639 and L5 in 2020 while a concentration decrease was observed in well L.

Figure 4.3-46 presents time plots of chloride concentrations in wells near and in Broadview Acres with the concentrations very similar to the fresh water chloride concentration. Figure 4.3-47 presents the chloride concentration time plots for wells in Felice Acres, showing fairly steady concentrations.

Chloride concentration plots for the former flood irrigation area monitoring wells are presented on Figure 4.3-48. Chloride concentrations are very similar to the fresh water injection concentration except for larger chloride concentrations in wells 555, 556 and 844. The recent higher values in these three wells could possibly be due to the flood irrigation in this area. The decline in chloride concentration in wells 844 and 845 indicates that the effects from irrigation are dissipating while the concentration increase in well 556 in 2019 and 2020 could be showing a small residual irrigation effect in this area.

The plots of chloride concentration versus time in Section 3 wells are presented on Figures 4.3-49 and 4.3-49A. The Section 3 area chloride concentrations have generally been declining except for near collection wells R1, R2, R4 and R5 where concentrations are generally steady. Figure 4.3-50 presents a plot of the chloride concentrations with time in Section 28 wells and Pleasant Valley monitoring well 688. Chloride concentrations in these wells in the Section 28 Center Pivot area had been fairly steady since the irrigation ceased. Chloride concentrations in six wells west of the Section 28 irrigation area are presented on Figure 4.3-50A. Chloride concentrations in this area of active groundwater restoration gradually declined in recent years but a small increase was observed in wells 890 and H2A in 2019 and 2020.

Chloride concentrations in the Section 29 and Section 32 monitoring wells are presented on Figure 4.3-51, while Figure 4.3-52 presents time plots of chloride concentrations in

the Section 33 wells. The 2020 chloride concentrations were generally stable in the Section 33 wells following the increase in concentrations in well 551 since 2018. Chloride concentrations in well 649 increased in 2019 and 2020. Slightly higher chloride concentrations may indicate a minor effect from the Section 33 irrigation but it could also be a small natural change. The higher levels in 2019 and 2020 are thought to be due to variations in alluvial water up-gradient of the Section 33 irrigation. Chloride concentration in well 996, which is up-gradient of the Section 33 irrigation area, was showing a very gradual rising trend for six years prior to steady values for the last three years. The chloride concentrations observed in the seven post closure wells (541, 551, 647, 649, 654, 899 and 996) for the previous two years are considered natural and not affected by seepage.

#### **4.3.4 URANIUM - ALLUVIAL**

Uranium is considered an important groundwater constituent at this site due to the significant levels in the tailings seepage. Uranium data and contours for 2020 are presented on [Figure 4.3-53](#). The light green pattern on [Figure 4.3-53](#) shows where uranium concentrations exceed 0.16 mg/L, the site standard and statistical upper range of background from previous statistical analysis of the 1995-2004 data. The uranium values inside three areas outlined on [Figure 4.3-53](#) are posted on additional uranium figures due to the density of the wells in these three areas. [Figures 4.3-53A, 4.3-53B and 4.3-53C](#) present the OS, SOS and NOS areas respectively. The HMC uranium measurements made on site (KPA U) are also posted in a green color adjacent to the laboratory measurements on these figures.

Uranium concentrations exceed background in the area of the LTP and STP and west of the LTP (see [Figure 4.3-53A](#)). Elevated uranium concentrations extend to the west of the LTP through the eastern half of Section 28 based on wells in the NOS area (see [Figure 4.3-53C](#)). All of the uranium concentrations in the west half of Section 28 have been reduced to below the site standard except for samples from four wells which slightly exceed 0.16 mg/L in 2020. Some increase in uranium concentrations occurred in 2020 in this area while the Off-site collection was off during the first half of the year. Uranium concentration in a few of these wells was measured both by HMC with the KPA and by a laboratory. Uranium concentrations in Sections 29 and 32 also reflect a contribution from the Rio San Jose alluvial system in Section 20, but the maximum level observed in these wells in 2020 was less than the site standard of 0.16 mg/L. The zones of

moderately elevated concentrations join together and the combined area extends down-gradient approximately one mile into the western side of Section 33. The depression in the alluvial piezometric surface in the southwest portion of Section 33 prevents elevated concentrations from moving farther to the south in the alluvial aquifer.

Uranium concentrations greater than 0.16 mg/L are also present near the L collection wells south of the STP. Uranium concentrations in the L wells in 2020 were generally similar to values observed in 2019.

Additional areas, where uranium concentrations in the alluvium are greater than 0.16 mg/L, exist in Felice Acres and to the southwest into Section 3 (see [Figure 4.3-53B](#)). The area of elevated concentrations extends approximately 3800 feet to the southwest of the southwest corner of Felice Acres. Concentrations have been lowered in the northeast corner of Section 3 with the collection and injection into the R well field in 2014 through the present. Concentrations slightly decreased in 2020 in this area with a slightly smaller area exceeding the site standard. The uranium concentration in another small area in the northeast portion of Murray Acres at well 802 has been restored with the measured value in 2020 near 0.1 mg/L.

Uranium concentration plots were prepared in order to illustrate changes that result from the corrective action program and other factors. [Figure 4.3-2](#) shows the grouping and location of the alluvial wells used for the uranium time plots. The figure numbers shown on [Figure 4.3-2](#) correspond to the sulfate time plots. The same grouping of wells was used for the uranium plots, and their symbols and colors are the same as those used on other time plots. The open symbols in the uranium figures indicate the uranium concentration was measured with the KPA.

[Figure 4.3-54](#) presents uranium concentrations plotted versus time for up-gradient wells NC, P3, P4, Q and R. The uranium concentrations in these wells have been fairly steady during the last two years. [Figure 4.3-54A](#) presents uranium concentrations plotted versus time for near up-gradient wells DD, DD2, P and P2. Overall steady concentrations were observed in 2016 through 2020 in wells DD and DD2. The alluvial site standard is presented on each of the water quality plots for comparison with the water quality data.

Uranium concentrations in wells west and southwest of the LTP are presented in [Figures 4.3-55](#) through [4.3-57](#). These plots show that uranium concentrations in collection wells M3, M9 and SSR increased in 2020. Plots of uranium concentration versus time are presented



on [Figure 4.3-58](#) for alluvial wells on and near the LTP with a steady decline observed in wells T2 and T23 in 2020 while an increase was observed in well T19. [Figure 4.3-59](#) presents a plot of uranium concentration versus time for wells B13, C2, C6, C8 and C9 located on the west side of the STP for all of the historical data for these C wells showing that uranium concentrations in this area exceeded 100 mg/L historically. [Figures 4.3-60](#) through [4.3-61](#) present plots of uranium concentration versus time for additional wells on and near the STP and well 1A east of the LTP. Large variations in concentration have been observed in these STP area wells in recent years. Uranium concentrations in water from alluvial wells in the L area are presented on [Figure 4.3-62](#) which shows a very gradual decline in 2020 in uranium in wells 521 and L. A larger concentration decline was observed in well 639 while an increase occurred in well L5.

[Figure 4.3-63](#) presents uranium concentrations versus time for six wells near and in Broadview Acres with all the historical uranium data for these six wells. Uranium concentrations have been restored from levels near 10 mg/L in this area. [Figures 4.3-64](#) and [4.3-64A](#) present the uranium concentration time plots for Felice Acres wells. [Figure 4.3-64](#) shows small declines in uranium concentrations in collection well Q5 in 2020 while fairly steady levels were observed in the other collection wells in this area. [Figure 4.3-65](#) presents uranium concentrations for wells in the former flood irrigation area. Uranium concentration had declined in well 844 for the previous few years but has become fairly steady for the last five years. The previous higher uranium concentrations in well 844 may have revealed minor effects of past irrigation on the alluvial groundwater in the area. Uranium concentrations in the remainder of these wells in this area have been fairly steady except the 2016 value from well 556 which is an outlier.

The uranium concentrations for wells in Section 3 southwest of Felice Acres are plotted on [Figures 4.3-66](#) and [4.3-66A](#). The uranium concentrations in the R collection wells in northeast corner of Section 3 became fairly steady in 2019 and 2020 except for a small increase in well R5 in 2020. The changes in uranium concentrations in this area are due to the collection of alluvial water and injection of treated water in the northeast portion of Section 3.

Uranium concentrations from five Section 28 wells and Pleasant Valley well 688 are plotted on [Figure 4.3-67](#) with concentrations above the site standard for wells 881 and 886. The recent slightly elevated uranium concentrations in these Section 28 wells result from past tailings seepage impacts and are not caused by the past Section 28 irrigation. Uranium concentrations



from six wells west of the Section 28 irrigation are plotted on [Figure 4.3-67A](#). Uranium concentrations declined to below the alluvial site standard in each of these wells in 2017 and 2018 while values in wells 659, H2A, H7 and H16 have increased in 2020 due to reduced collection in 2019 and 2020. Uranium concentration in well 888, which is down-gradient of the restoration area, was steady in 2020.

Uranium concentration time plots for wells in Sections 29 and 32 are presented on [Figure 4.3-68](#). These wells are completed in the Rio San Jose alluvium up-gradient and down-gradient of the confluence with the San Mateo alluvium in Section 29 and concentrations have stayed fairly steady except for a small increase in wells 541 and 654 in 2019 and 2020. Uranium concentrations in wells located in Section 33 are relatively small (see [Figure 4.3-69](#)). Wells 647 and 996 are up-gradient of the Section 33 irrigation area and their slightly higher values are not caused by the Section 33 irrigation. There were no uranium concentration increases in the Section 33 wells that would indicate groundwater impacts from the past Section 33 irrigation. The small variations observed in the Section 33 wells are within the range of concentrations measured in wells up-gradient of this area.

#### **4.3.5 SELENIUM - ALLUVIAL**

Selenium is an important constituent at the Grants Project site because, like uranium, it was present in significant concentrations in the tailings water. [Figures 4.3-70, 4.3-70A, 4.3-70B and 4.3-70C](#) present maps of the spatial distribution of selenium concentrations throughout the site. The alluvial site standard for selenium is 0.32 mg/L. A green pattern is superimposed on the concentration contour figures to show where concentrations exceed 0.32 mg/L. The green pattern north of the LTP shows where selenium concentrations exceed the site standard of 0.32 mg/L due to up-gradient sources. These higher selenium concentrations are likely starting to affect the concentrations on the north side of the LTP.

A 0.1 mg/L selenium concentration contour surrounds the LTP, most of the STP and a portion of the L Area south of the STP (see [Figures 4.3-70, 4.3-70A and 4.3-70C](#)). All selenium concentrations measured west of this area are less than 0.1 mg/L, except for two values above 0.1 mg/L near the center of Section 27. Selenium concentrations in the alluvial aquifer in all of wells in the nearby subdivisions are less than 0.1 mg/L.

Selenium concentrations exceeding 0.32 mg/L were measured in wells around the LTP and STP and also extend to the east of the STP in the area north of the L area collection wells.

Figure 4.3-2 presents the location and grouping of wells for selenium concentration plots. The symbols and colors used on Figure 4.3-2 are the same as those used on each constituent time plot.

Figure 4.3-71 presents plots of selenium concentration versus time for up-gradient wells NC, P3, P4, Q and R while Figure 4.3-71A presents selenium concentrations plotted versus time for near up-gradient wells DD, DD2, P and P2. There have been small variations in the selenium concentration in up-gradient wells for last few years with an increasing trend in well P3 continuing in 2020. The selenium changes in well P3 indicate the front of the up-gradient selenium concentration above the site standard will be at the northwest side of the LTP in a few years. The concentrations in the northernmost near up-gradient well R are larger than the remainder of the near up-gradient wells and the level in up-gradient well Q is larger than the remainder near up-gradient wells except for the recent values from wells DD3, P2 and P3. Selenium concentration in wells Q and R were fairly steady the last eleven years after a long gradual increasing trend. A small increase in the selenium concentration in well DD was observed in 2016 followed by steady concentrations until a very small decrease in 2020. The alluvial site standard is presented on each of the water quality plots for comparison with the water quality data.

Figures 4.3-72 through 4.3-74 show selenium concentrations in water from alluvial wells located west and southwest of the LTP. Selenium concentrations increased in 2019 and 2020 in collection wells M3 and SSR. Figure 4.3-75 presents plots of selenium concentrations for wells on and near the LTP with an increase in concentration in collection well B11 in 2019 and 2020. The selenium concentration exhibited variability in wells located on and near the STP and east of the LTP as shown on Figures 4.3-76 through 4.3-78. Figure 4.3-79 presents selenium concentration for wells 521, 522, 639, L and L5, with overall small changes the last two years.

Figure 4.3-80 presents a selenium concentration plot for four wells to the north of Broadview Acres and for two wells in the subdivision. Figure 4.3-81 presents selenium concentration plots for wells in Felice Acres with steady and small values.

Selenium concentrations are presented for wells in the former flood irrigation area adjacent to Murray Acres on [Figure 4.3-82](#). This plot shows continuing low and steady selenium concentrations in monitoring wells in this area of the alluvial aquifer except for a small decline in well 846 in 2020. This data indicates that the flood irrigation did not affect the selenium concentrations in the groundwater in this area.

Selenium concentrations for the Section 3 wells are plotted on [Figures 4.3-83 and 4.3-83A](#). The selenium concentration in these R collection wells was small prior to the start of the collection in this area in 2014 and they stayed low during 2015 through 2020. A small increase in selenium was observed in 2019 in well R1 with the 2020 value being steady.

The selenium concentrations in alluvial water in Section 28 have been fairly steady with time. [Figures 4.3-84 and 4.3-84A](#) present the selenium concentrations from the Section 28 alluvial wells.

[Figure 4.3-85](#) displays selenium concentrations in wells in Sections 29 and 32, which are located before and after the confluence with the Rio San Jose alluvium. Selenium concentrations from wells in Section 33 are presented on [Figure 4.3-86](#). These two plots show steady and small concentrations in wells 541, 551, 647, 649, 654, 899 and 996, which are the seven western North Off-site post closure wells

#### **4.3.6 MOLYBDENUM – ALLUVIAL**

This section discusses the molybdenum concentrations in the alluvial aquifer at the Grants Project during 2020. [Figures 4.3-87, 4.3-87A, 4.3-87B and 4.3-87C](#) are spatial presentations of the concentration data and contours. Molybdenum concentrations in alluvial water in the west area of [Figure 4.3-87](#) have typically been less than 0.03 mg/L and, therefore, this parameter is not important in the western wells. Molybdenum concentrations measured in 2020 and previous years indicate that a 2019 value of 0.07 mg/L in the well in the center of the Section 33 center pivot was an outlier. A lower laboratory detection limit was used for most of the 2018 and all of the 2019 samples and these samples indicate that actual concentrations are generally much less than the 0.03 mg/L detection limit used for many samples. The movement of molybdenum in the alluvial aquifer is dramatically attenuated in comparison to that of selenium and uranium. Molybdenum concentrations did not exceed 100 mg/L in any location under the LTP in 2020

with only three of the LTP area wells with values above 50 mg/L. A 10 mg/L contour extends around most of the LTP and to the west side of the STP (see [Figure 4.3-87A](#)).

The light green patterns on these four figures show the area where molybdenum concentrations exceed the alluvial site standard of 0.10 mg/L. A molybdenum concentration of 0.10 mg/L is considered the threshold of significance for this constituent at this site. Significant molybdenum concentrations extend to just north of Pleasant Valley west of the LTP (see [Figures 4.3-87A](#) and [4.3-87C](#)) and also to the southeast of the STP to the L collection wells (see [Figure 4.3-87](#)). Molybdenum concentrations in one well in the west half of Section 27 is only slightly less than the site standard of 0.10 mg/L in this area. None of the concentrations in alluvial wells in the subdivisions exceed 0.10 mg/L of molybdenum.

[Figures 4.3-88](#) and [4.3-88A](#) presents molybdenum concentration for the up-gradient wells DD, DD2, NC, P, P2, P3, P4, Q and R. Concentrations have remained low in these nine wells in 2020 with the use of a smaller detection limit except for one sample each from wells DD, DD2 and Q.

Molybdenum concentrations are presented in [Figures 4.3-89](#) through [4.3-91](#) for the alluvial aquifer to the west and southwest of the LTP with increases in concentration in wells M3, M9, MQ and SSR in 2019 and 2020. [Figure 4.3-92](#) presents molybdenum concentrations for wells on and near the LTP with higher levels in this area and no consistent trend. Molybdenum concentrations in wells on and near the STP and in one well east of the LTP are presented on [Figures 4.3-93](#) through [4.3-95](#). These plots show variable concentrations with generally no consistent trend. [Figure 4.3-96](#) presents molybdenum concentrations in wells 521, 522, 639, L and L5 which are located further to the southeast of the STP. The molybdenum concentration in well 639 decreased in 2020.

Molybdenum concentrations in alluvial wells located north and in Broadview Acres are plotted on [Figure 4.3-97](#) with small and steady values through 2020. [Figure 4.3-98](#) presents the molybdenum concentrations for the Felice Acres wells. A small increase in molybdenum concentrations in 2019 was followed by a decrease in 2020 in well 490.

[Figure 4.3-99](#) presents the molybdenum concentrations for wells in the former flood irrigation area near Murray Acres. This plot shows that molybdenum concentrations have remained low in these alluvial wells.

Molybdenum concentration plots for the Section 3 wells are presented in [Figures 4.3-100](#) and [4.3-100A](#). The western area wells molybdenum concentrations are plotted on [Figures 4.3-101](#) through [4.3-103](#) with the Section 28 wells presented on the first two figures, Sections 29 and 32 wells presented on the third figure and Section 33 wells presented on the fourth figure. The previous two years of data for the seven post closure monitoring wells (541, 551, 647, 649, 654, 899 and 996) show that the molybdenum concentrations have been small through 2020 with the exception of an anomalous sample value from well 551 in the fourth quarter of 2019.

#### **4.3.7 NITRATE - ALLUVIAL**

The presence of relatively large nitrate concentrations up-gradient of the Grants site has resulted in a site background standard of 12 mg/L (see [Table 3.1-1](#)). A statistical analysis of the up-gradient 1995 through 2004 data produced the nitrate concentration of 12 mg/L based on the 95<sup>th</sup> percentile of background. [Figures 4.3-104](#), [4.3-104A](#), [4.3-104B](#) and [4.3-104C](#) present nitrate concentrations measured in 2020 in the alluvial aquifer. The pattern on [Figure 4.3-104](#) shows that nitrate concentrations exceed the site standard to the north of the LTP and these higher concentrations will be moving into the LTP area in the future. Some of the nitrate concentrations to the north of the LTP are small, such as the value from well P in 2020, due to the reducing conditions at the well. The pattern on [Figure 4.3-104](#) is drawn similar to the selenium pattern and does not account for the reduced concentrations from some of the wells. [Figure 4.3-104A](#) presents the nitrate values for the wells near the LTP and STP, showing that samples from two of these wells exceed the site standard in 2020. The nitrate concentrations north and up-gradient of the tailings will ultimately impact the nitrate concentrations down-gradient of the LTP. It is difficult to determine whether seepage from the tailings has any significant impact on the nitrate concentrations in this area, because the naturally higher concentrations up-gradient of the LTP makes modestly elevated nitrate concentrations indistinguishable from background. Also the recent seepage from the LTP contains much smaller nitrate concentrations.

Nitrate concentrations exceed 12 mg/L in some portions of the LTP and an area between the LTP and STP, and these exceedances are likely due to seepage from the tailings. Nitrate concentration above 12 mg/L was measured in one well southeast of Valle Verde. Nitrate concentration in all of the alluvial subdivision wells is below 12 mg/L. Areas where

nitrate concentrations are above the site standard are shown by the green patterns on [Figures 4.3-104, 4.3-104A, 4.3-104B and 4.3-104C](#).

Plots of nitrate concentration over time were prepared for the alluvial wells that are listed on [Figure 4.3-2](#). [Figures 4.3-105 and 4.3-105A](#) present the nitrate concentrations for the background wells. Concentrations in these wells have been relatively stable in 2020 except for a gradual decline in nitrate concentration in wells DD and Q. Nitrate concentrations in up-gradient wells farther to the north have been slightly larger than the site standard. The nitrate concentrations in wells west and southwest of the LTP, are plotted on [Figures 4.3-106 through 4.3-108](#). [Figure 4.3-109](#) presents nitrate concentrations in wells B11, T2, T19, T23, T41 and T54, which are located on and near the LTP. A large decline in the nitrate concentrations has been observed in well T23 since 2015. Nitrate concentrations in wells on and near the STP and in one well east of the LTP are plotted on [Figures 4.3-110 through 4.3-112](#). The nitrate concentrations in the L series wells are presented on [Figure 4.3-113](#) with the 2020 data for these wells being steady and significantly below the site standard.

Nitrate concentrations in wells near Broadview Acres are presented on [Figure 4.3-114](#) while nitrate concentrations for the Felice Acres wells are presented on [Figure 4.3-115](#) with all of these levels below the site standard.

Nitrate concentrations for wells in and near the former flood irrigation area are presented on [Figure 4.3-116](#). Nitrate concentrations in well 846 are higher than the other five wells shown on this figure and show a decrease from 2012 through 2020. Well 846 is down-gradient of the flood irrigation area and is not thought to be affected by the irrigation. The nitrate concentration in the remainder of these wells adjacent to the flood irrigation was fairly steady in 2020 except for a gradual decline in well 844 and a gradual increase in well 556 in recent years. This could possibly be showing a minor change in the nitrate groundwater concentration resulting from the past irrigation.

Nitrate concentrations in Section 3 wells are presented on [Figure 4.3-117](#). Nitrate concentrations for the Section 28 wells are presented on [Figure 4.3-118](#). [Figure 4.3-119](#) presents nitrate concentrations in wells 541, 654, 899 and 994. Nitrate concentrations in the Section 33 wells are presented on [Figure 4.3-120](#) and were steady in 2020. All of nitrate concentrations from the wells in these four figures are below the site standard. The nitrate concentration for the

previous two years in the seven western portion North Off-site post closure monitoring wells has been small and relatively steady.

#### **4.3.8 RADIUM-226 AND RADIUM-228 - ALLUVIAL**

[Figures 4.3-121, 4.3-121A, 4.3-121B](#) and [4.3-121C](#) present radium concentrations for the alluvial groundwater in the Grants Project area. Radium concentrations are very small in the alluvial aquifer except directly underneath the LTP. The monitoring program for radium has been scaled back because radium is not present in significant concentrations in the alluvial aquifer, except very near the LTP. The radium-226 concentrations are printed horizontally in black, while the radium-228 values are shown at a 45° angle and in magenta. The State standard for radium-226 plus radium-228 is 30 pCi/L, while the NRC site standard is 5 pCi/L.

Measured activities of radium-226 in alluvial wells beneath the LTP exceed 10 pCi/L. No radium-226 plus radium-228 values exceeded 5 pCi/L in 2020 outside of the LTP footprint (see [Figures 4.3-121, 4.3-121A, 4.3-121B](#) and [4.3-121C](#)), but a value of 5 pCi/L was measured in well 688 in Pleasant Valley. The radium-228 concentration of 4.8 pCi/L for well 688 is considered to be an outlier because the previous six values were less than two pCi/L. Additionally, larger detection levels utilized by a new laboratory for some samples resulted in wells 497, 540, 631, 644, 864, 869, DD, DD2, M3, Q5, R3 and SUB3 having a numeric combined value that was greater than 5 pCi/L despite having non-detects for radium-226 and/or radium-228. Samples where this was the case were not considered exceedances, and single samples with a higher radium-228 concentration are not considered significant. Single higher radium-228 values should not be given any significance. Past data has shown that radium is not mobile in the alluvial aquifer at this site. In 2008, the laboratory utilized through early 2020 started reporting negative and zero values for the radionuclides instead of a less than value. These very low results should be considered non-detect values.

#### **4.3.9 VANADIUM - ALLUVIAL**

Vanadium concentrations measured in 2020 are shown on [Figures 4.3-122, 4.3-122A, 4.3-122B](#) and [4.3-122C](#). None of the vanadium concentrations in 2020 exceeded the site standard of 0.02 mg/L except for values in the area of the LTP and STP. Well X was the only well that routinely contained a vanadium concentration above the site standard prior to



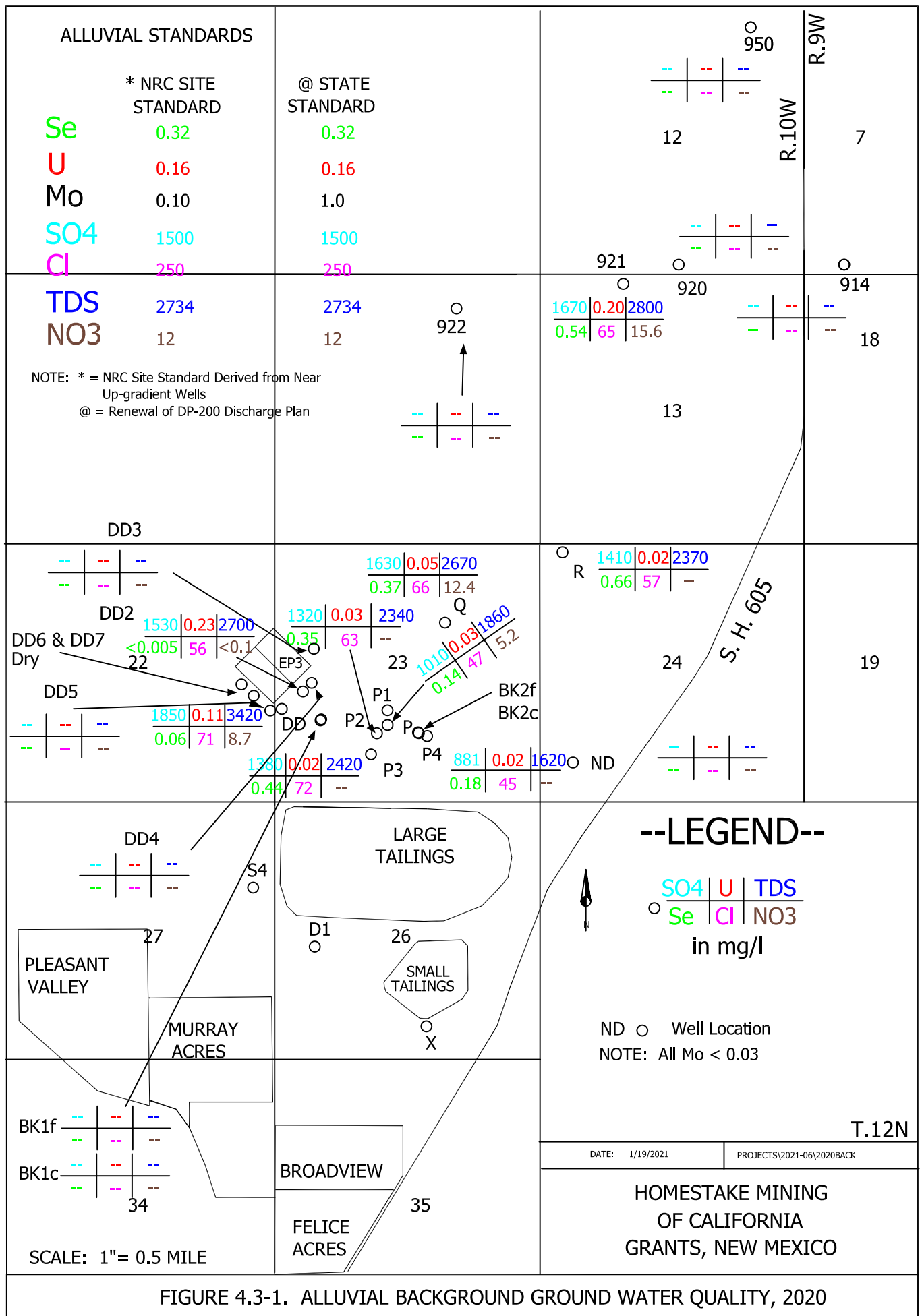
restoration of that area and was measured at less than 0.02 mg/L in 2020. Therefore, none of the alluvial wells outside of the immediate tailings areas are expected to contain vanadium concentrations above the site standard of 0.02 mg/L in the future. Injection of treated water has effectively restored groundwater quality in the area near well X. Vanadium concentrations in three alluvial wells located within the footprint of the LTP and in one well near the southern portion of the STP were above the site standard for vanadium in 2020. Previous measurements from the alluvial wells located outside of the LTP area show that the actual vanadium concentrations should be less than the site standard.

#### **4.3.10 THORIUM-230 - ALLUVIAL**

Figures 4.3-123, 4.3-123A, 4.3-123B and 4.3-123C present the 2020 thorium-230 concentrations in the alluvial aquifer. Thorium-230 concentrations are low at this site. The site standard of 0.3 pCi/L was established to reflect the low background concentrations. The thorium-230 activity has been significant in some of the alluvial wells underneath the LTP. Thorium-230 has not been mobile in the alluvial aquifer except in the immediate vicinity of the tailings. The site standard for thorium-230 was exceeded in 2020 in four wells in the alluvial aquifer underneath the LTP. Additional values also slightly exceeded the site standard in wells 884 in the north pivot area and in well MB just north of Murray Acres. The 0.5 and 0.6 pCi/L values from wells 884 and MB respectively are considered outliers because the previous six and three values from these two wells, respectively, were all less than 0.3 pCi/L. A large detection level was initially used by the new laboratory for thorium-230 for wells 497, 540, 631, 644, 864, DD, DD2, M3, Q5, R3 and SUB3. Previously measured values from these wells that are up-gradient or a large distance down-gradient of the LTP are generally very small as expected.

Thorium-230 levels from the wells near the tailings, as well as all other alluvial wells away from the LTP were less than the site standard in 2020 except those mentioned in the previous paragraph. Therefore, only the alluvial aquifer underneath the LTP exceeds the site standard for thorium-230.

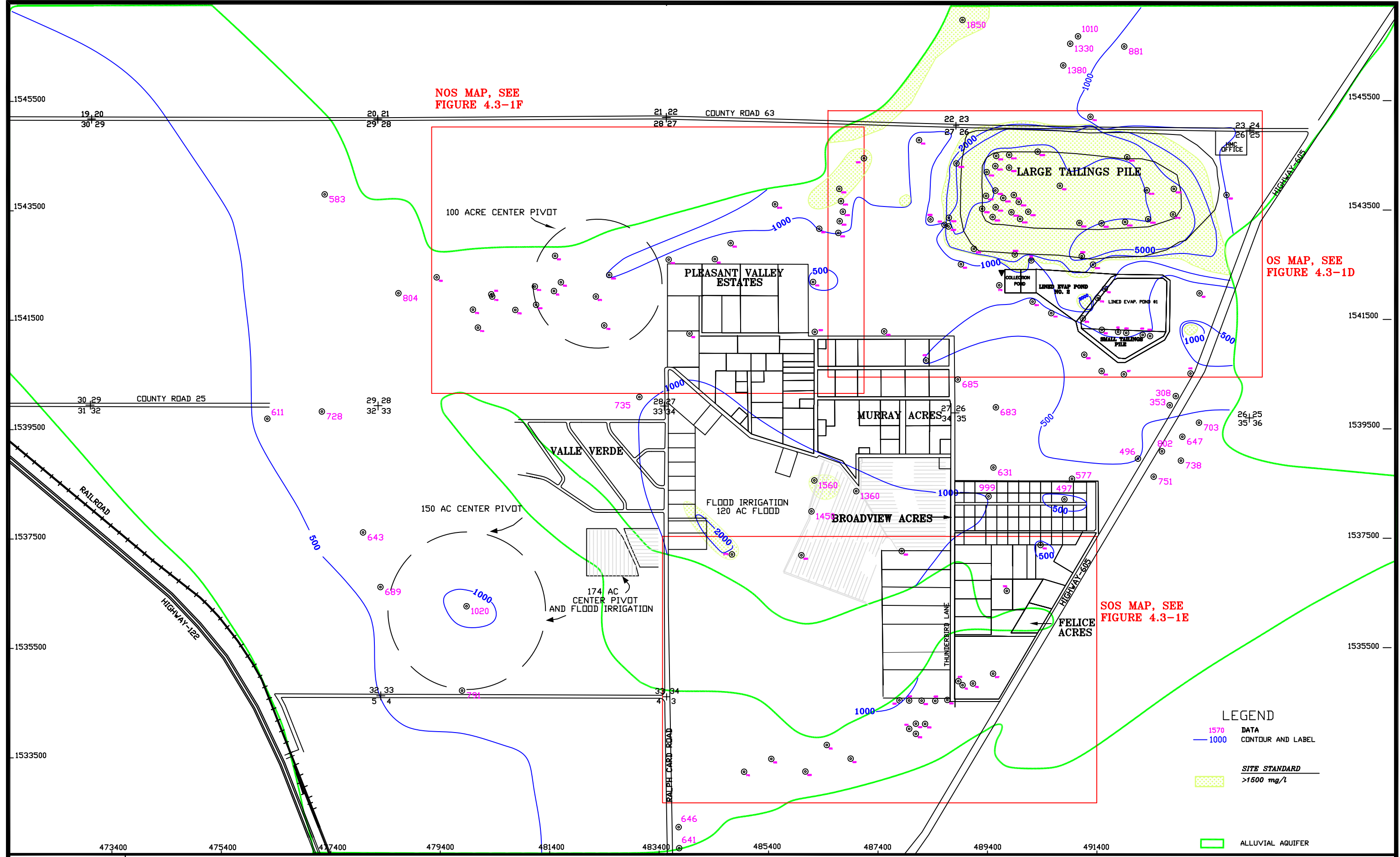




NOS MAP, SEE  
FIGURE 4.3-1F

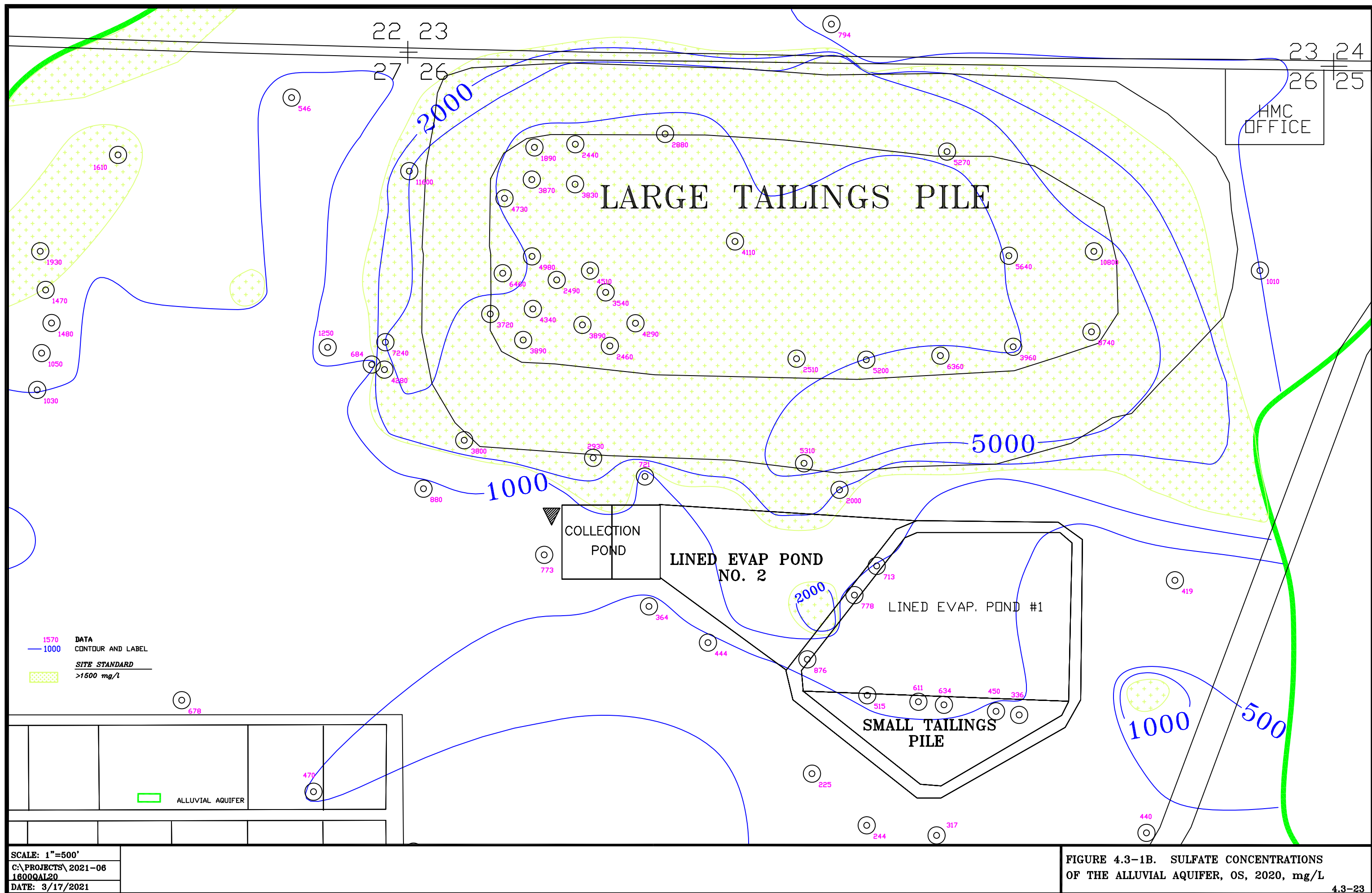
OS MAP, SEE  
FIGURE 4.3-1D

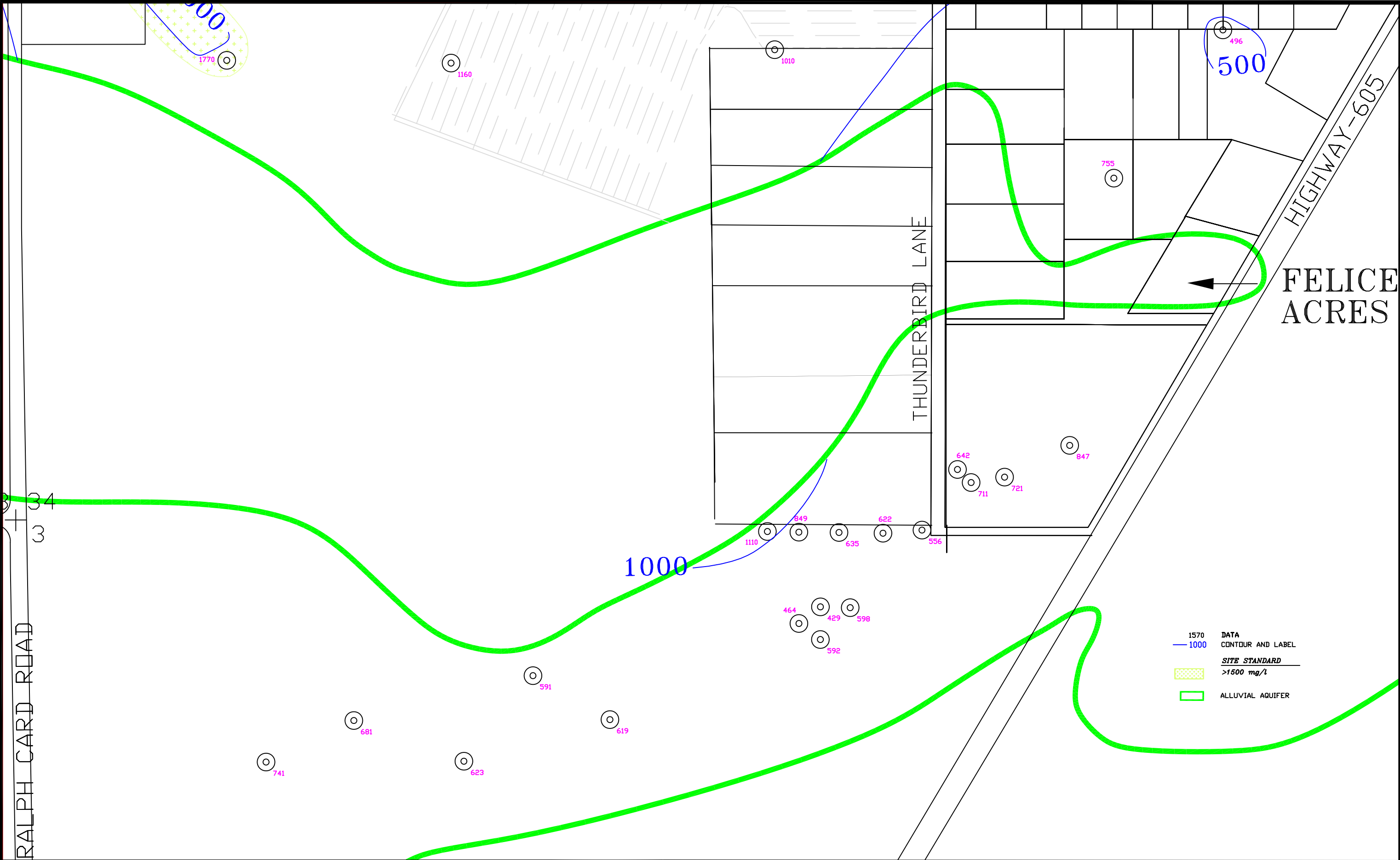
SOS MAP, SEE  
FIGURE 4.3-1E



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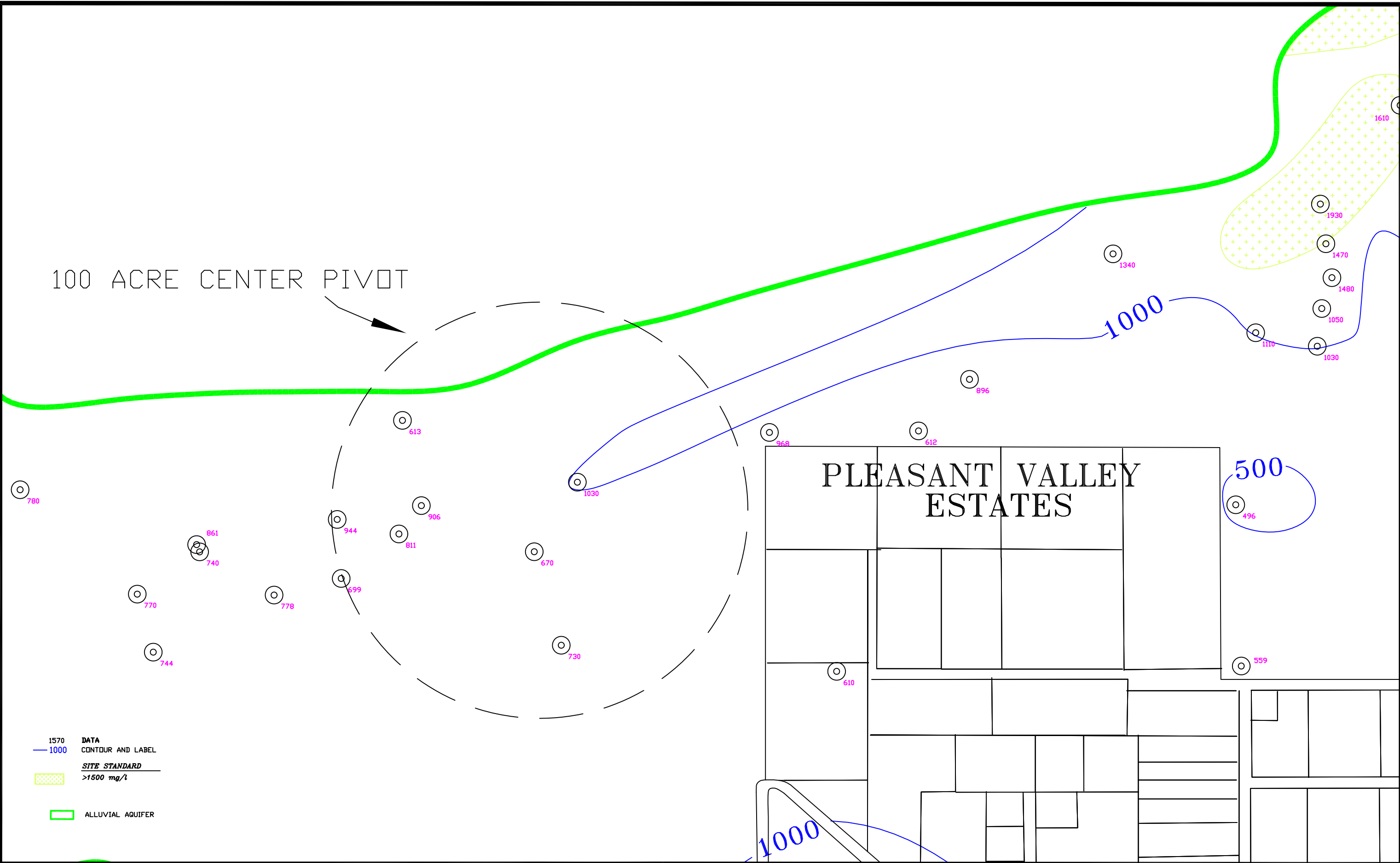
FIGURE 4.3-1A. SULFATE CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, 2020, mg/L



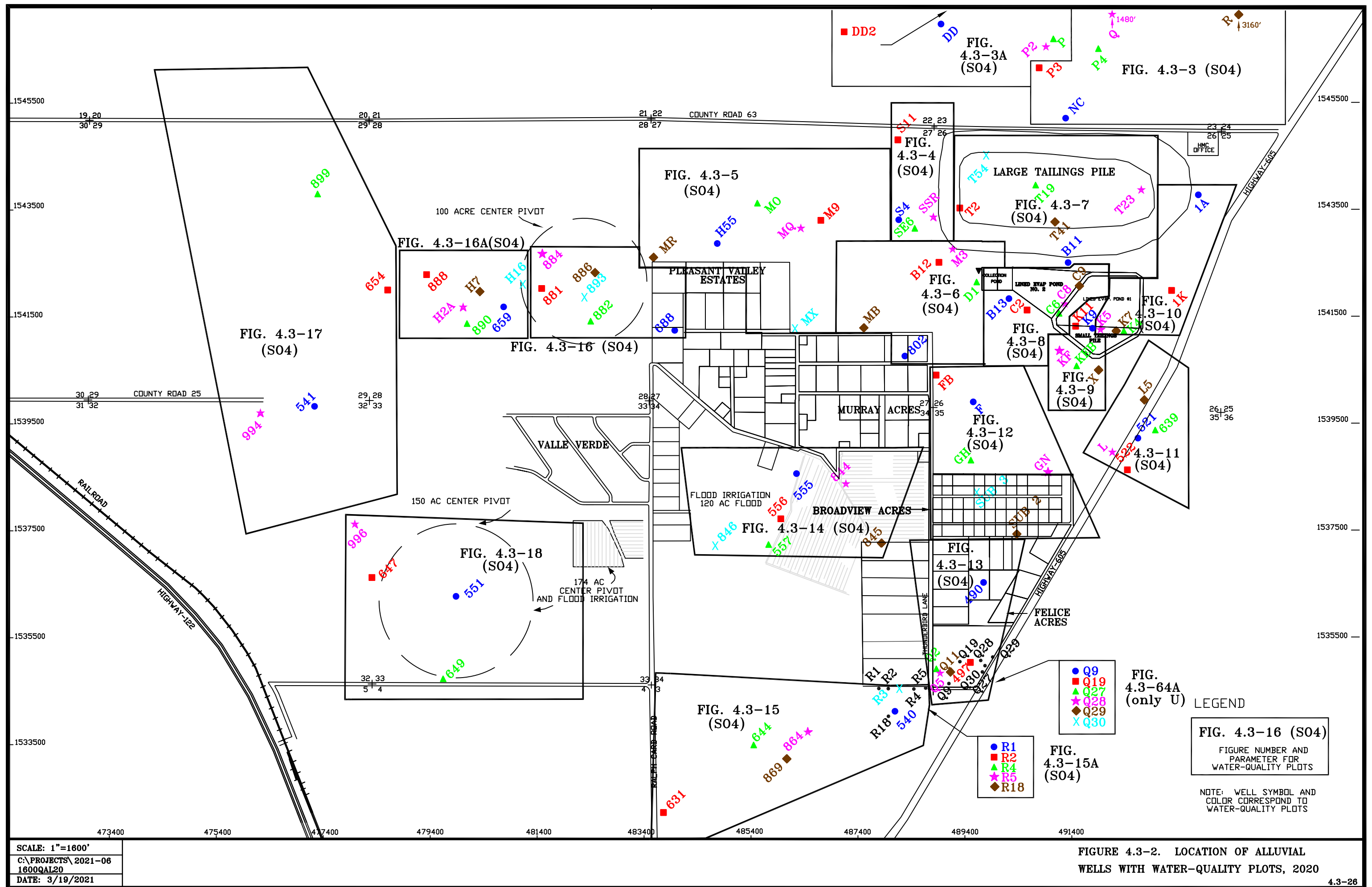


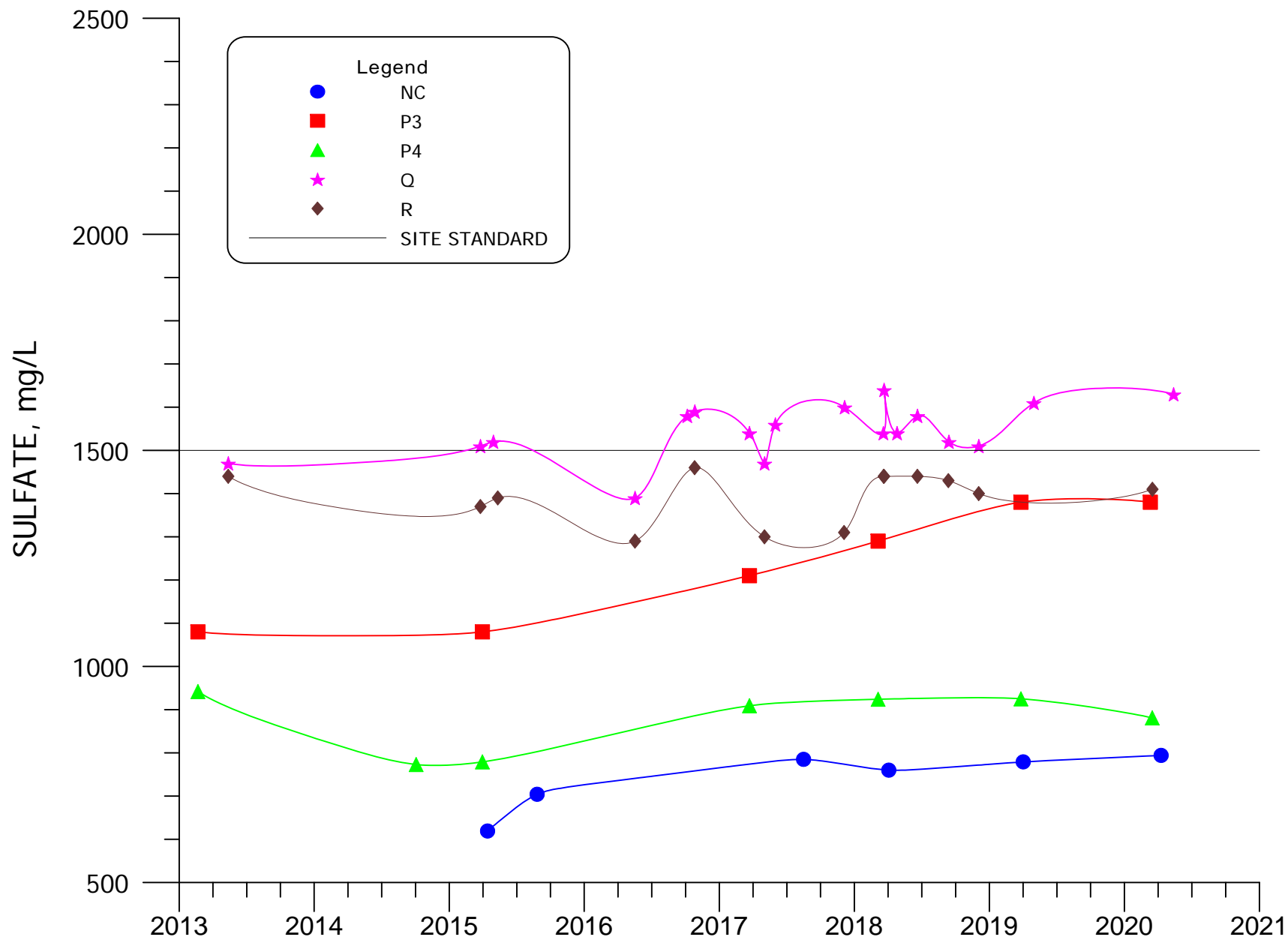
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FIGURE 4.3-1C. SULFATE CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, SOS, 2020, mg/L  
4.3-24

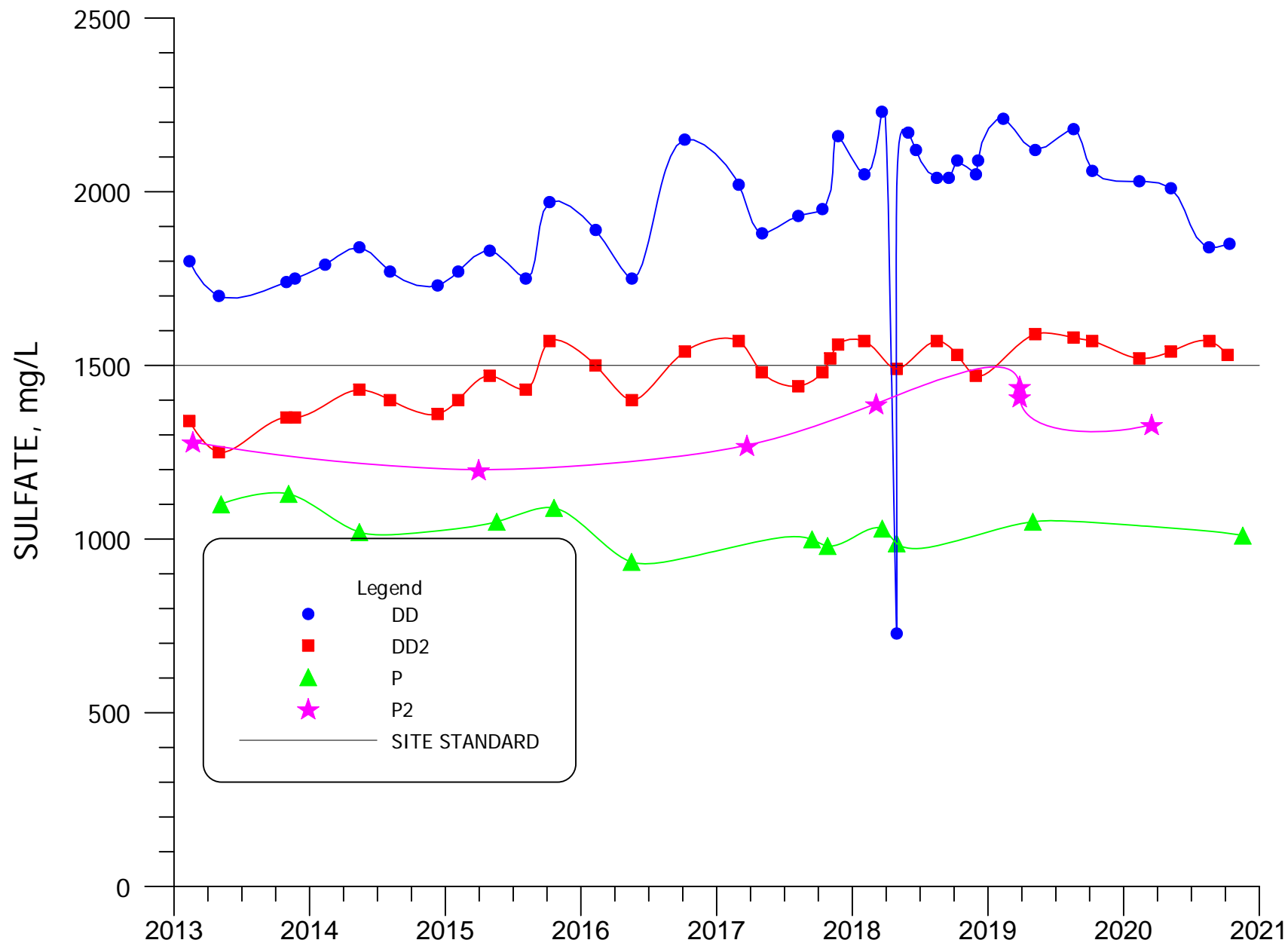






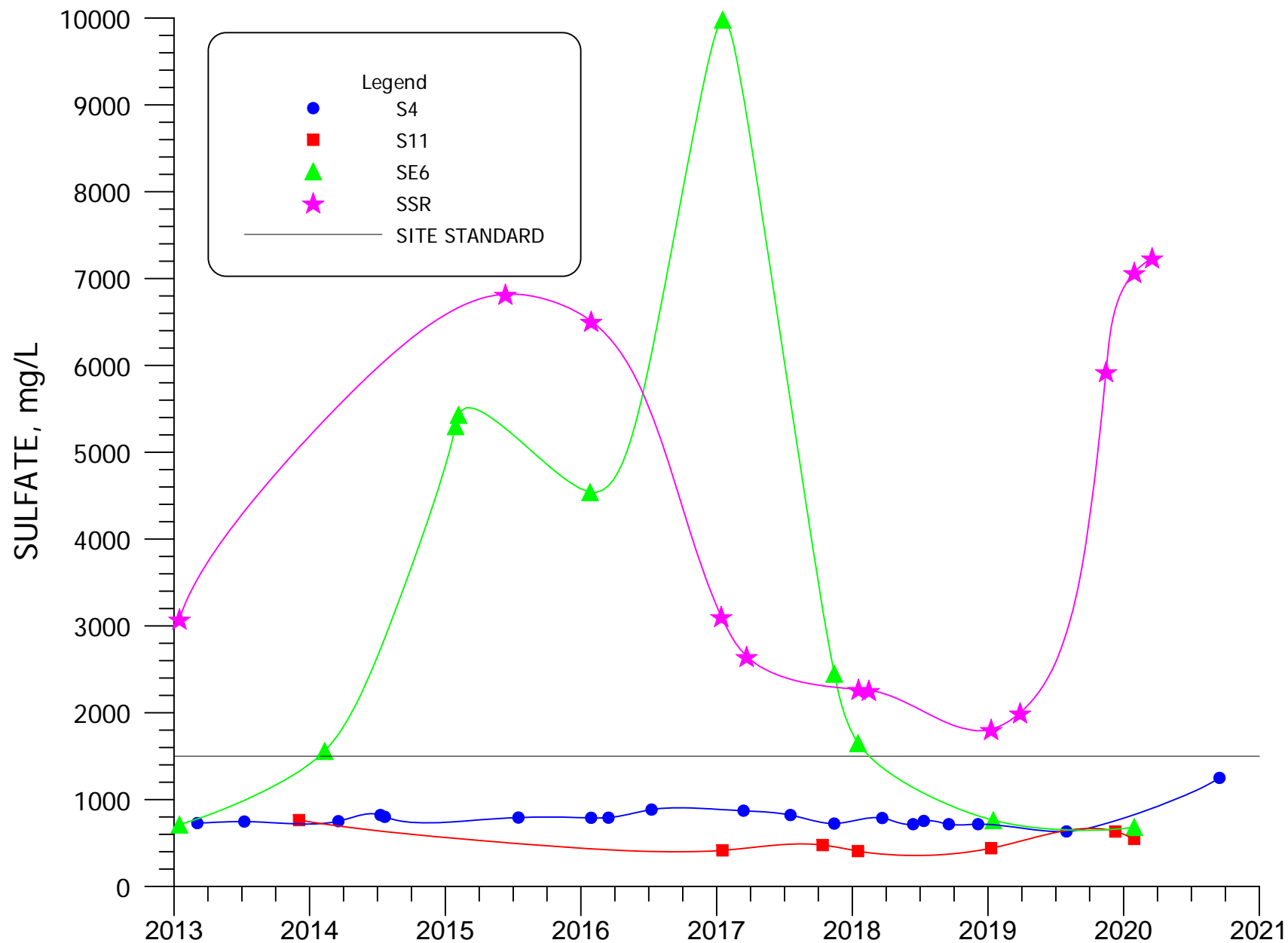


**FIGURE 4.3-3. SULFATE CONCENTRATIONS FOR WELLS NC, P3, P4, Q AND R.**



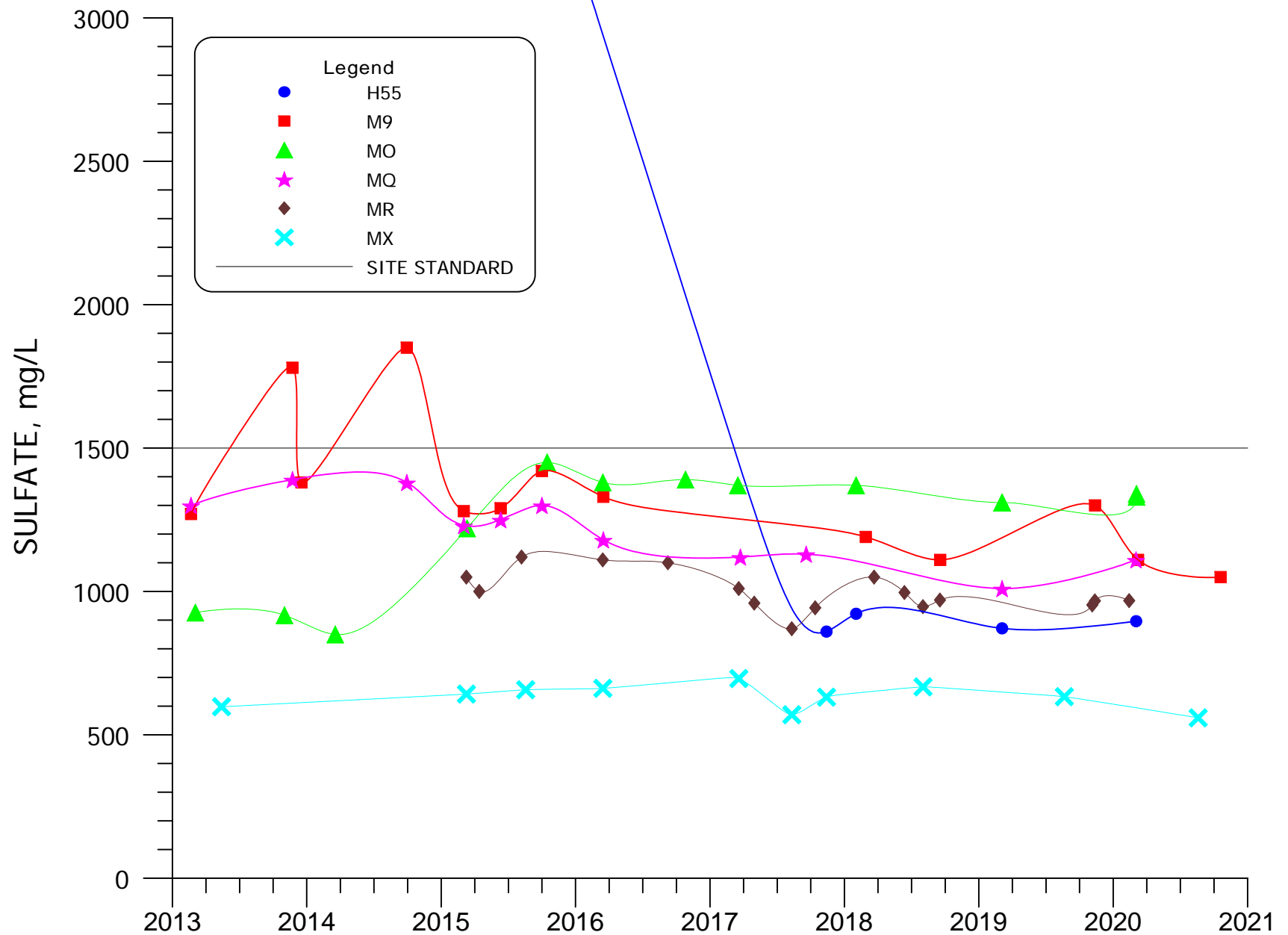
**FIGURE 4.3-3A. SULFATE CONCENTRATIONS FOR WELLS DD, DD2, P AND P2.**



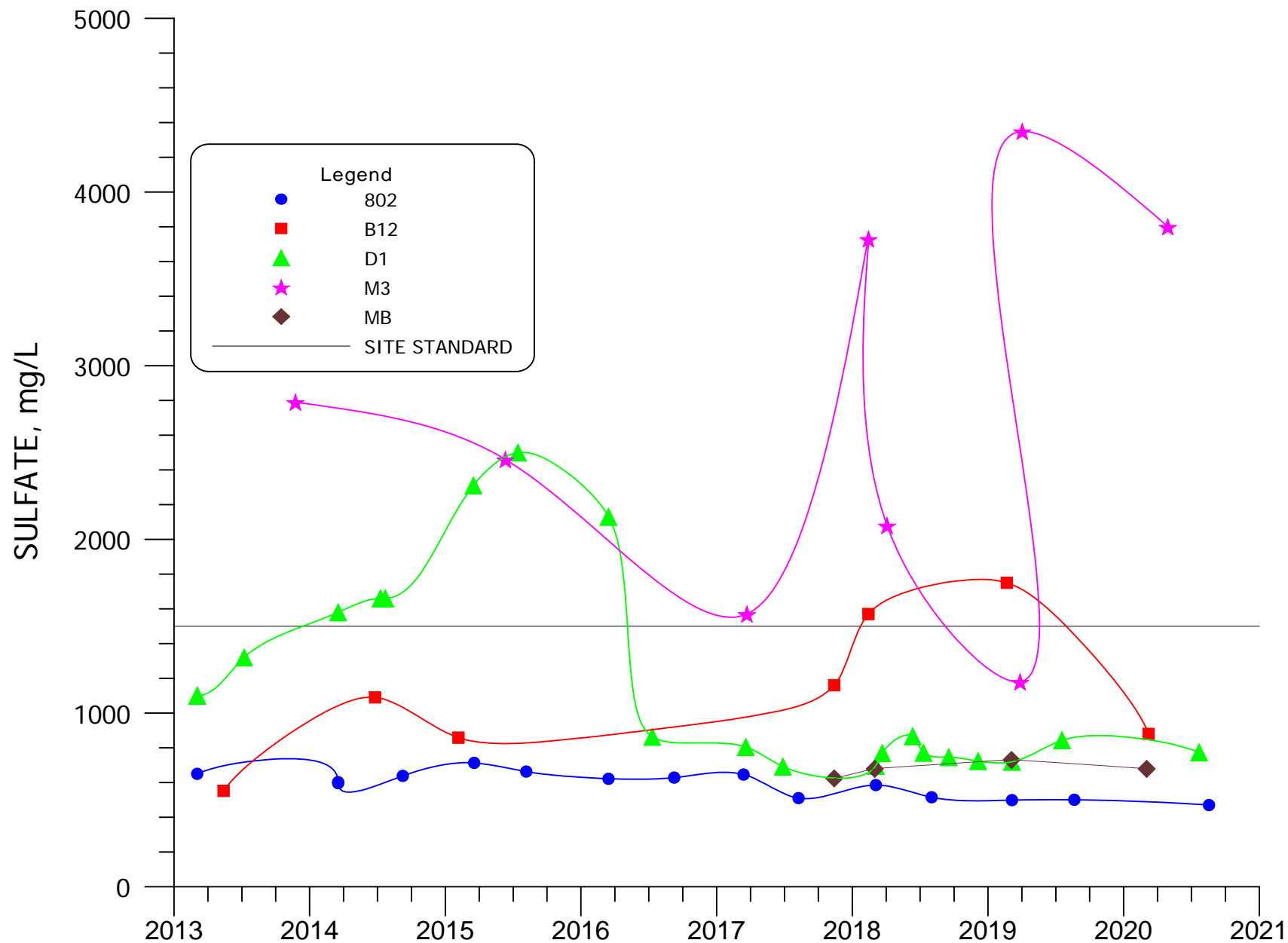


**FIGURE 4.3-4. SULFATE CONCENTRATIONS FOR WELLS S4, S11, SE6 AND SSR.**

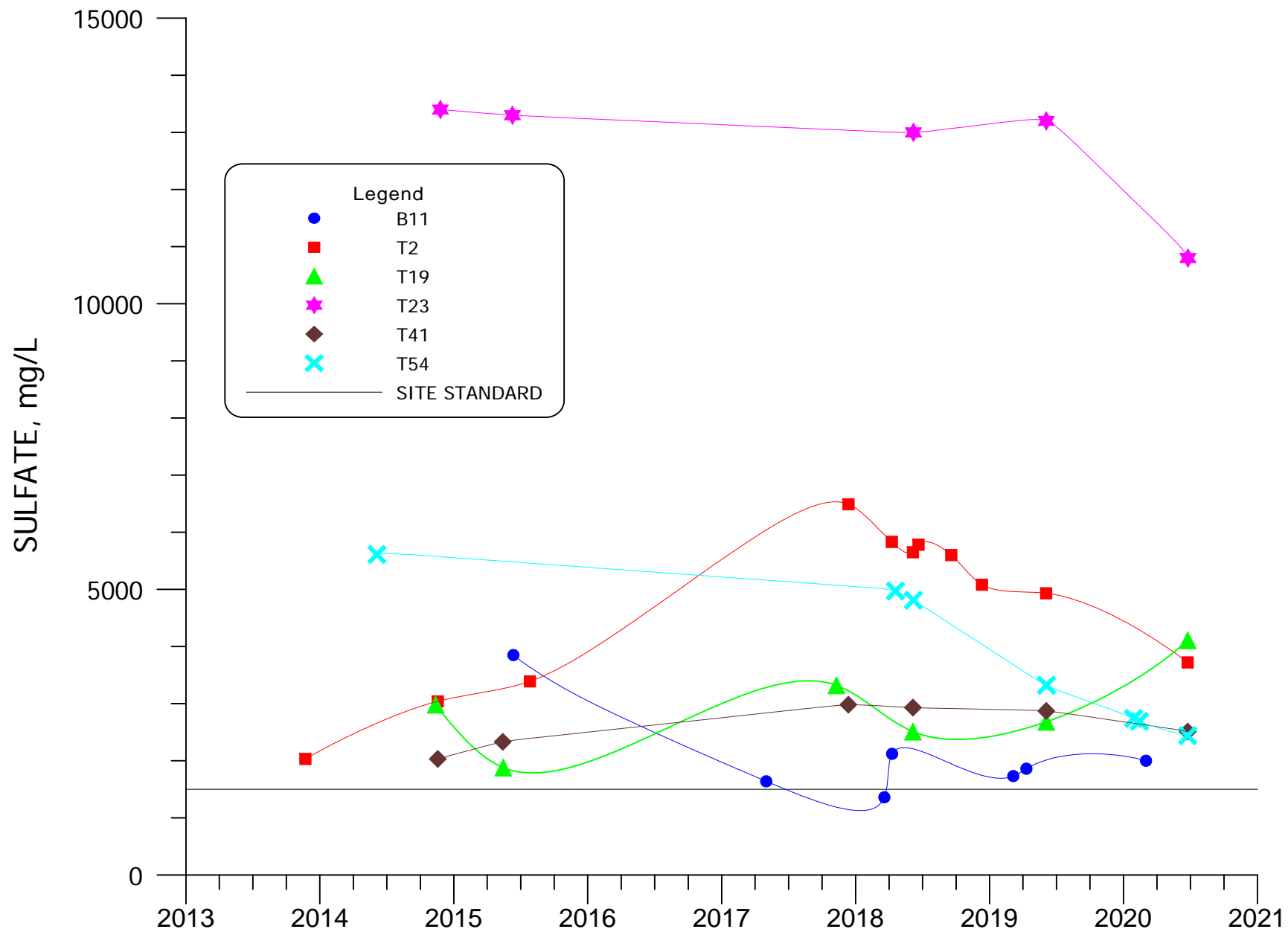
4.3-30



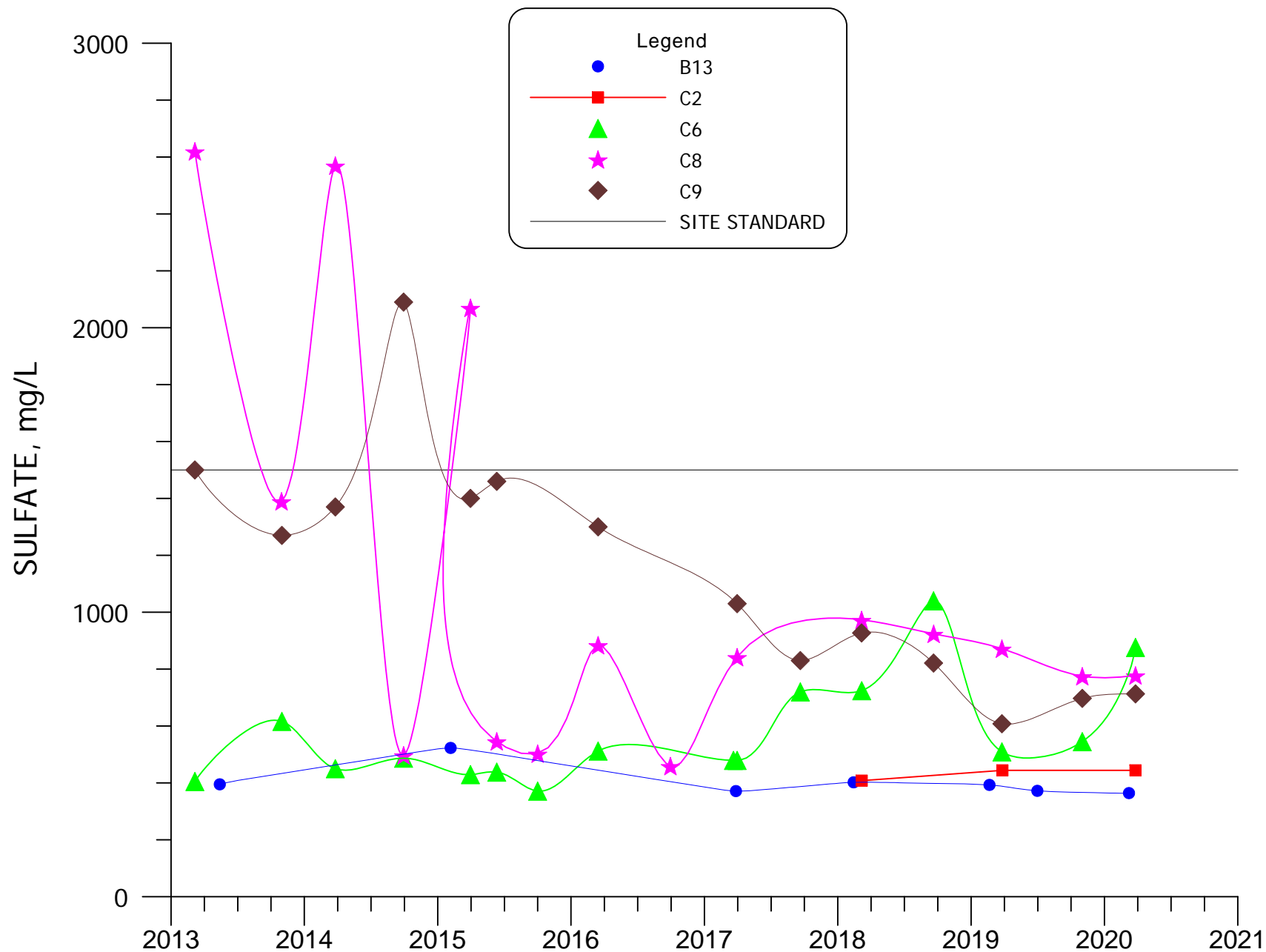
**FIGURE 4.3-5. SULFATE CONCENTRATIONS FOR WELLS H55, M9, MO, MQ, MR AND MX.**



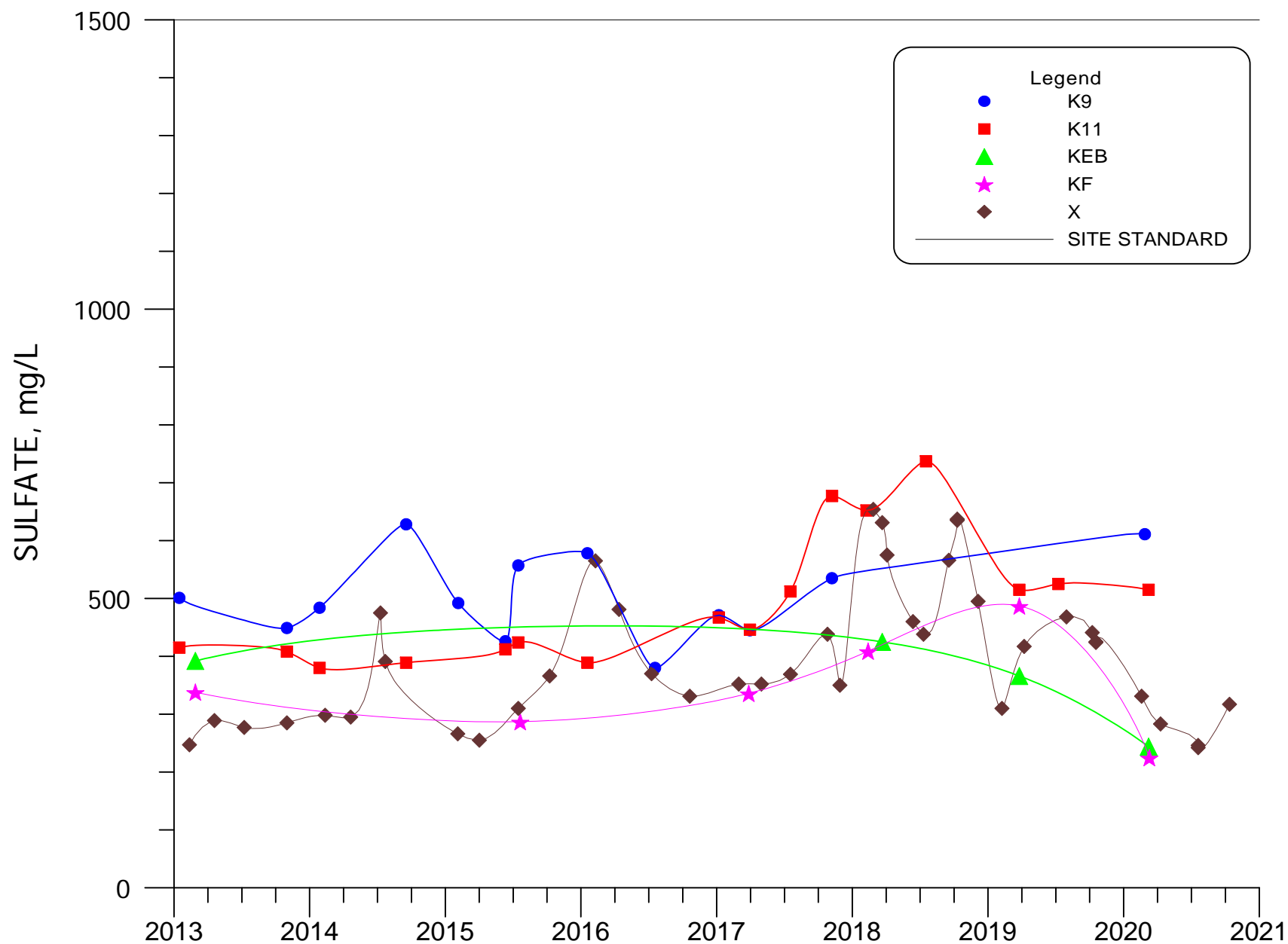
**FIGURE 4.3-6. SULFATE CONCENTRATIONS FOR WELLS  
802, B12, D1, M3 AND MB.**



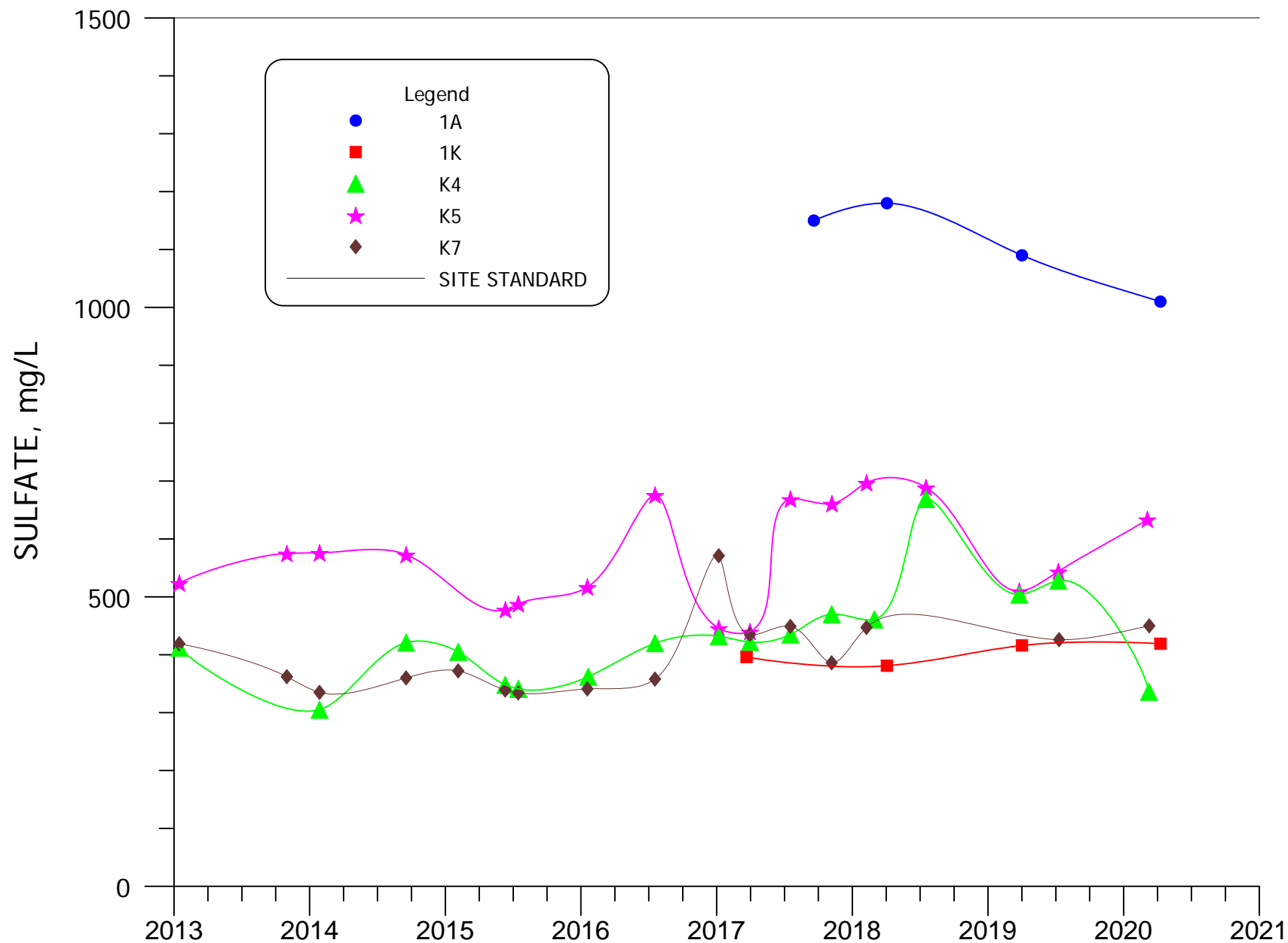
**FIGURE 4.3-7. SULFATE CONCENTRATIONS FOR WELLS B11, T2, T19, T23, T41 AND T54.**



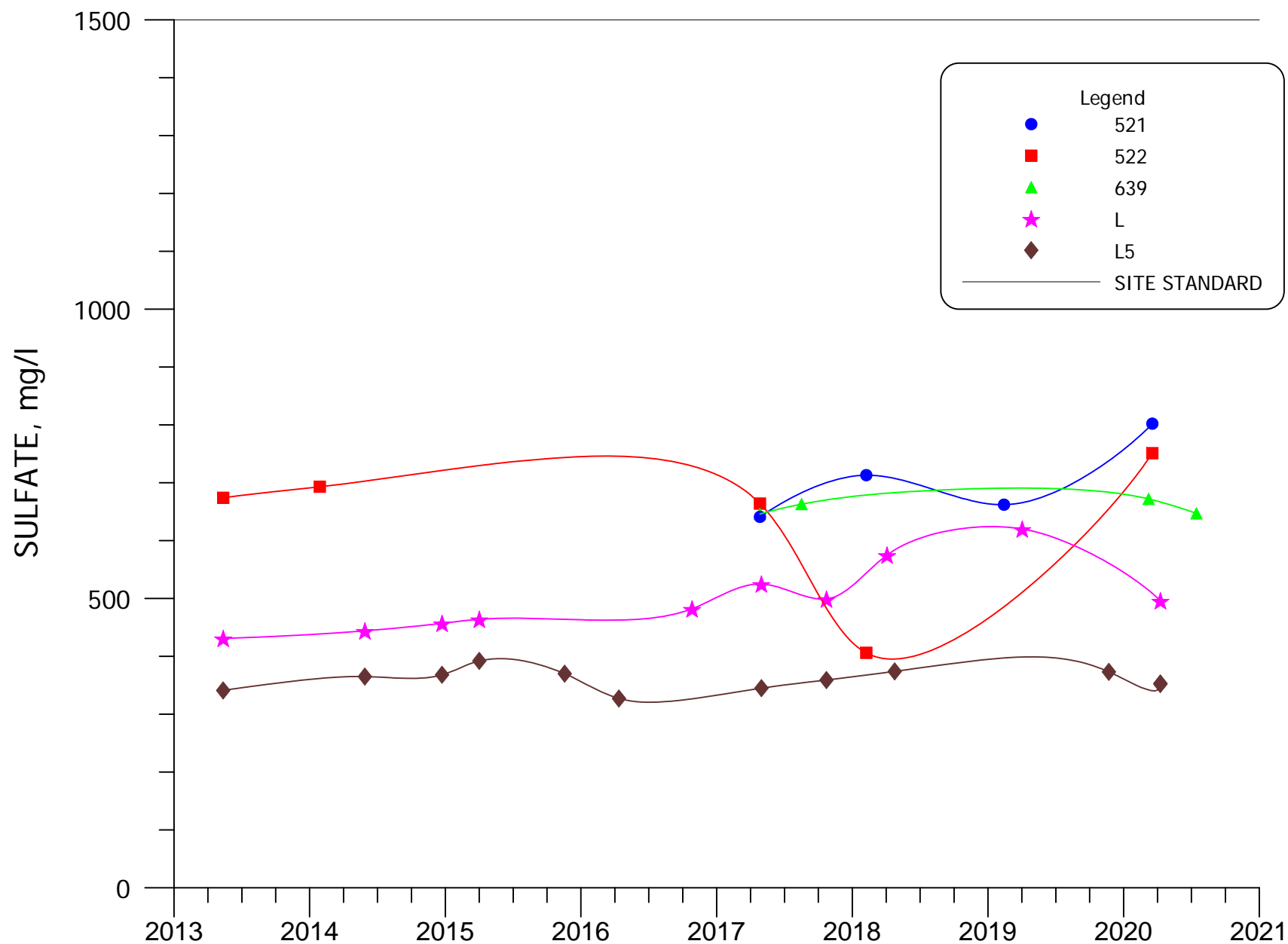
**FIGURE 4.3-8. SULFATE CONCENTRATIONS FOR WELLS B13, C2, C6, C8 AND C9.**



**FIGURE 4.3-9. SULFATE CONCENTRATIONS FOR WELLS K9, K11, KEB, KF AND X.**

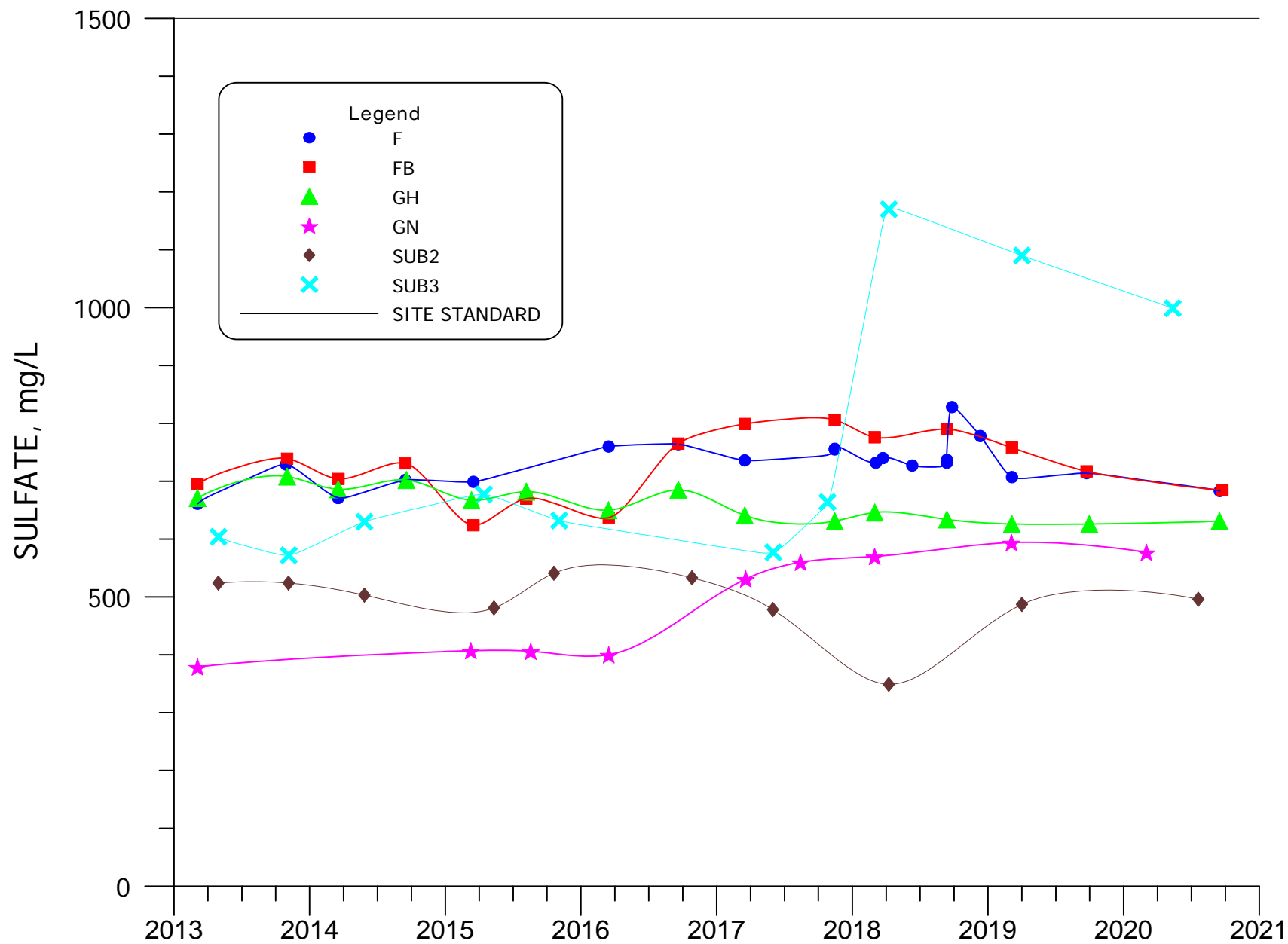


**FIGURE 4.3-10. SULFATE CONCENTRATIONS FOR WELLS 1A, 1K, K4, K5 AND K7.**

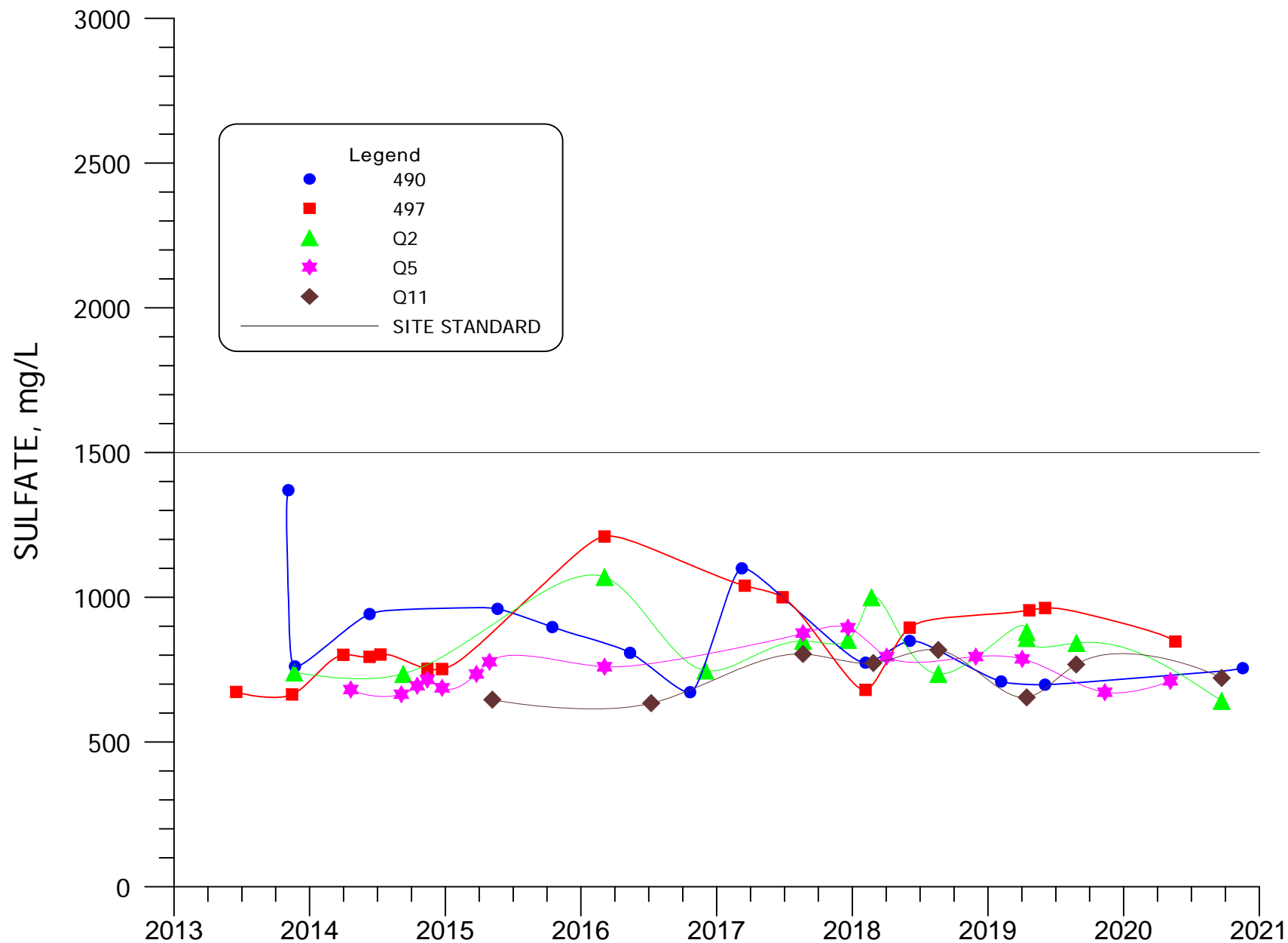


**FIGURE 4.3-11. SULFATE CONCENTRATIONS FOR WELLS 521, 522, 639, L AND L5.**

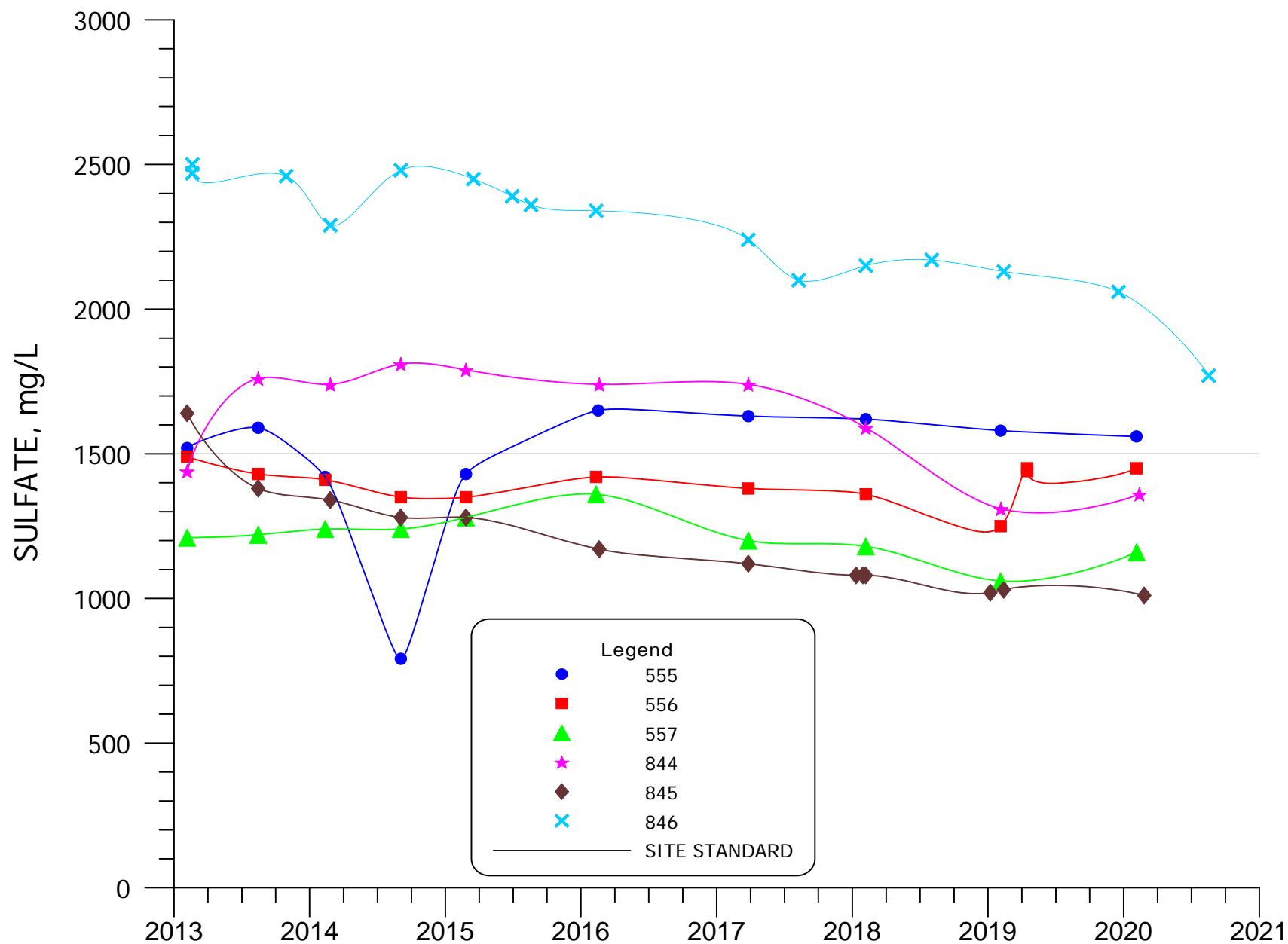




**FIGURE 4.3-12. SULFATE CONCENTRATIONS FOR WELLS F, FB, GH, GN, SUB2 AND SUB3.**

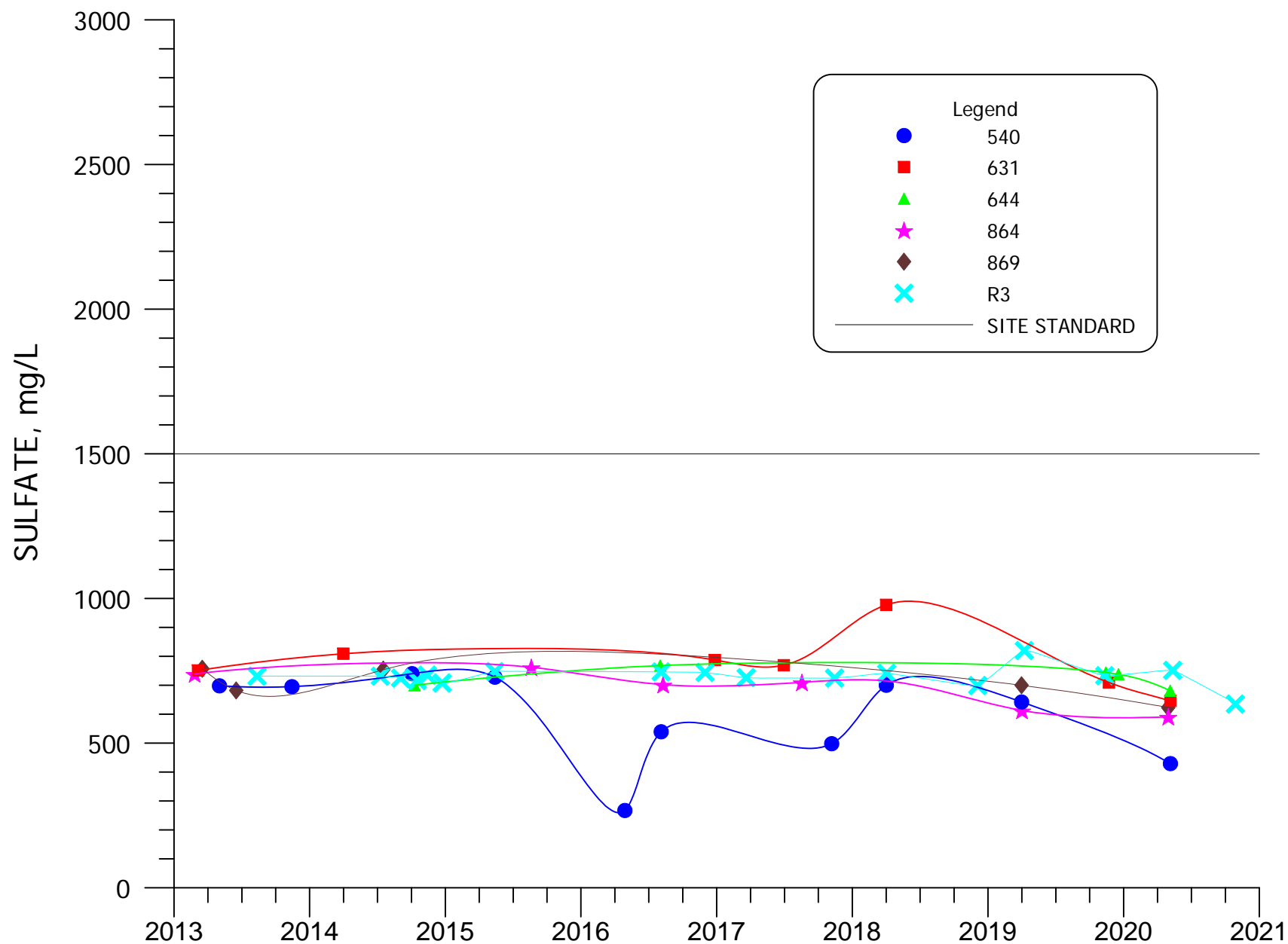


**FIGURE 4.3-13. SULFATE CONCENTRATIONS FOR WELLS 490, 497, Q2, Q5 AND Q11.**



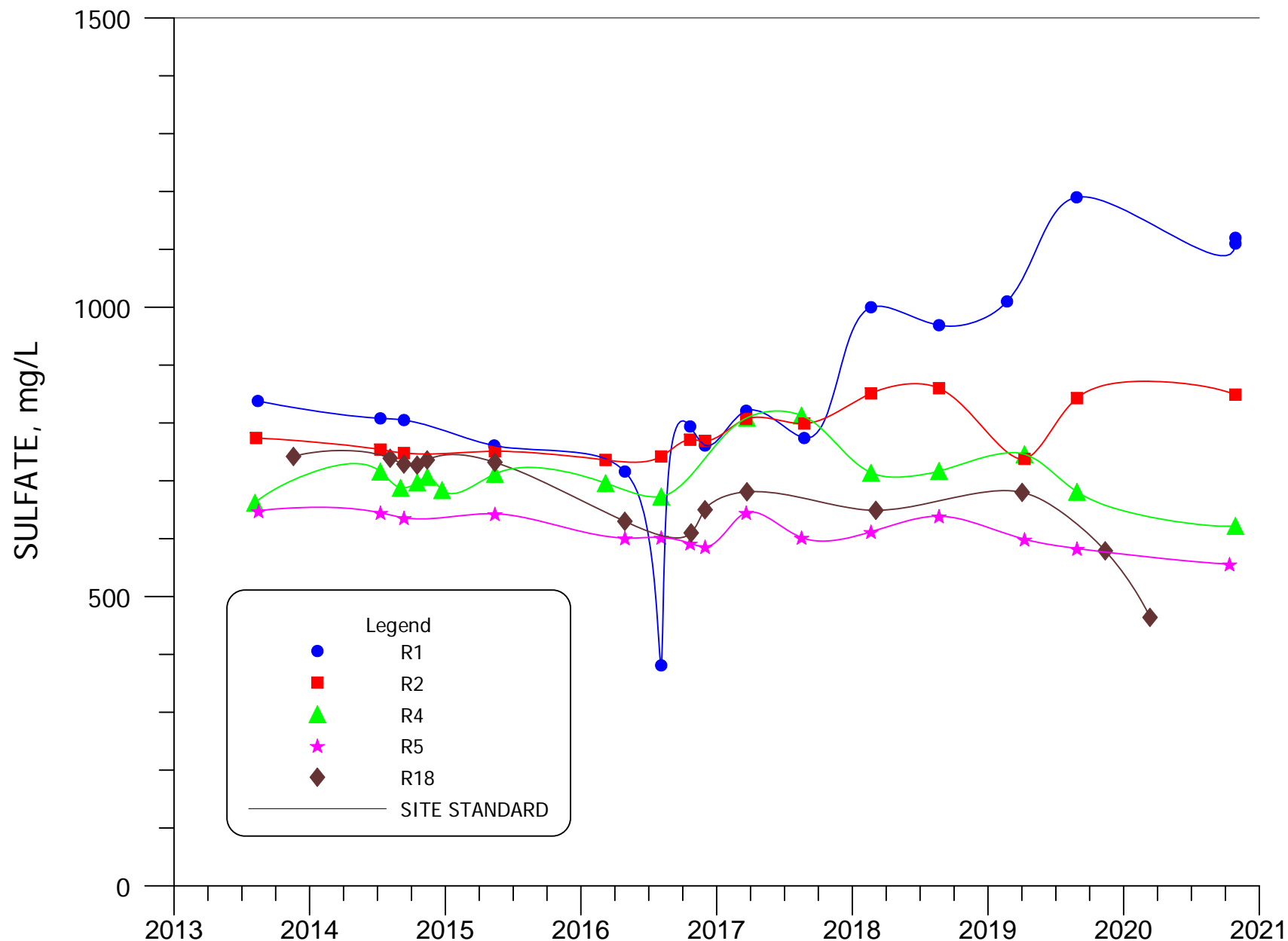
**FIGURE 4.3-14. SULFATE CONCENTRATIONS FOR WELLS 555, 556, 557, 844, 845, AND 846.**

4.3-40

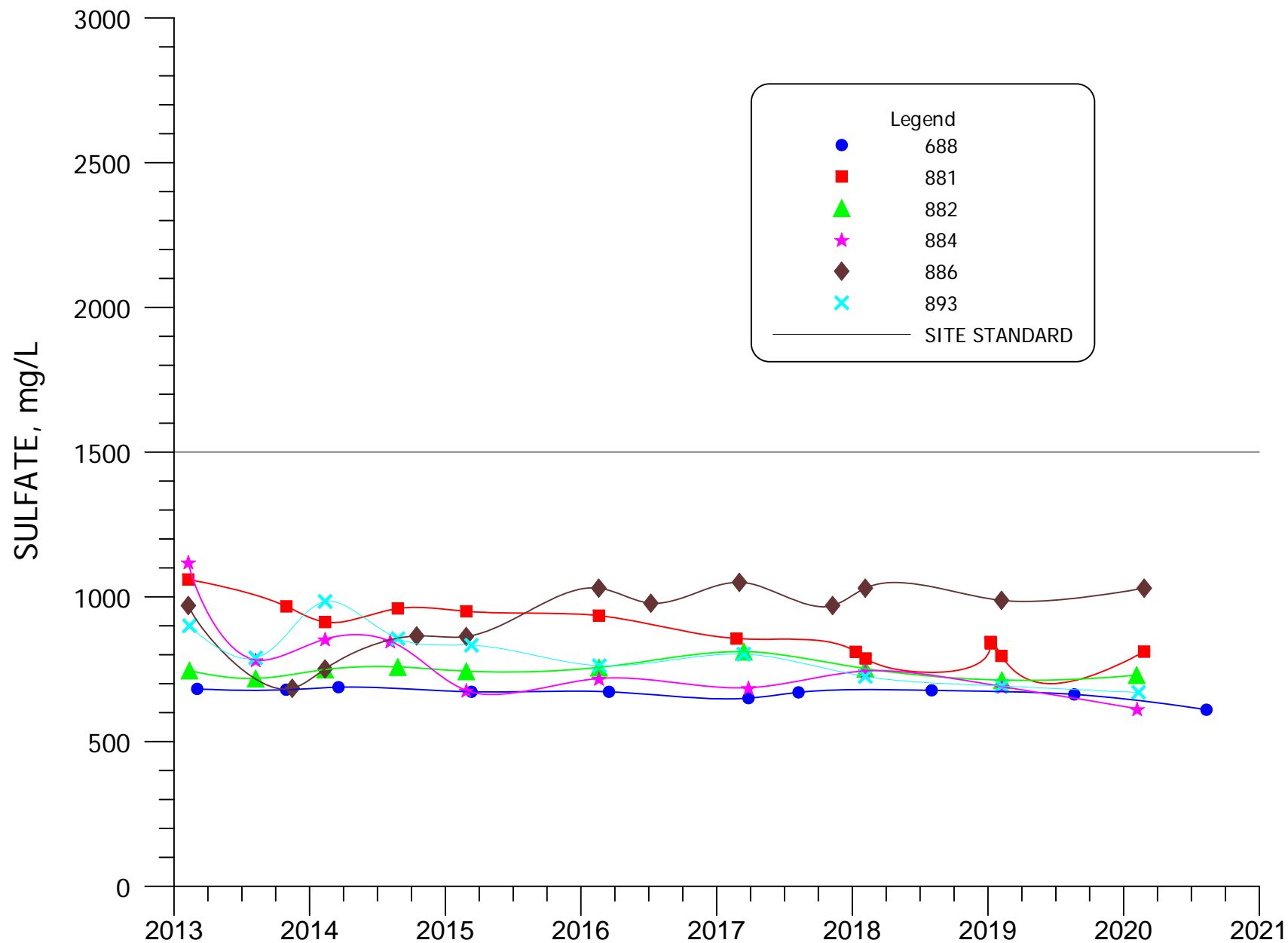


**FIGURE 4.3-15. SULFATE CONCENTRATIONS FOR WELLS  
540, 631, 644, 864, 869 AND R3.**

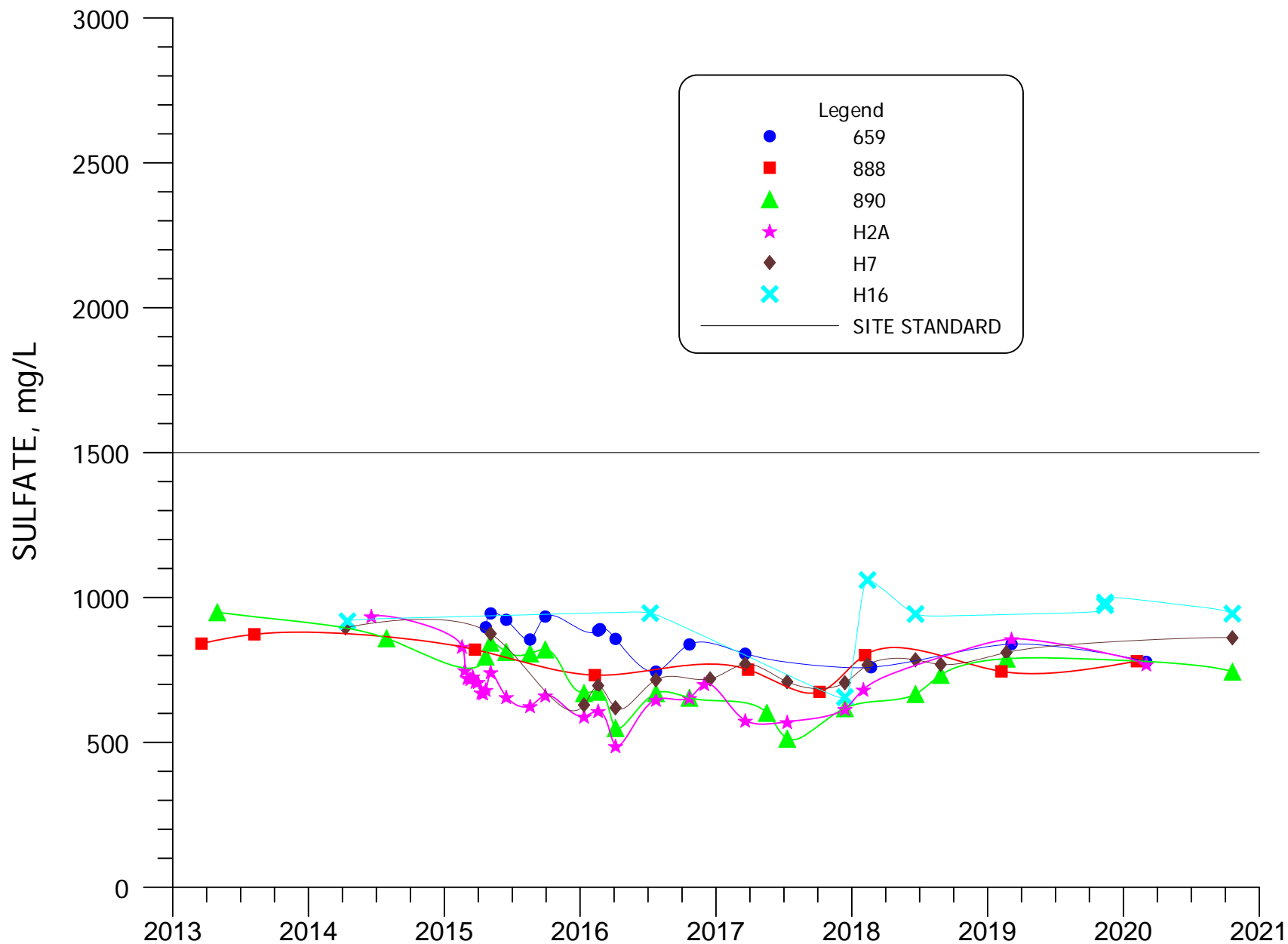
4.3-41



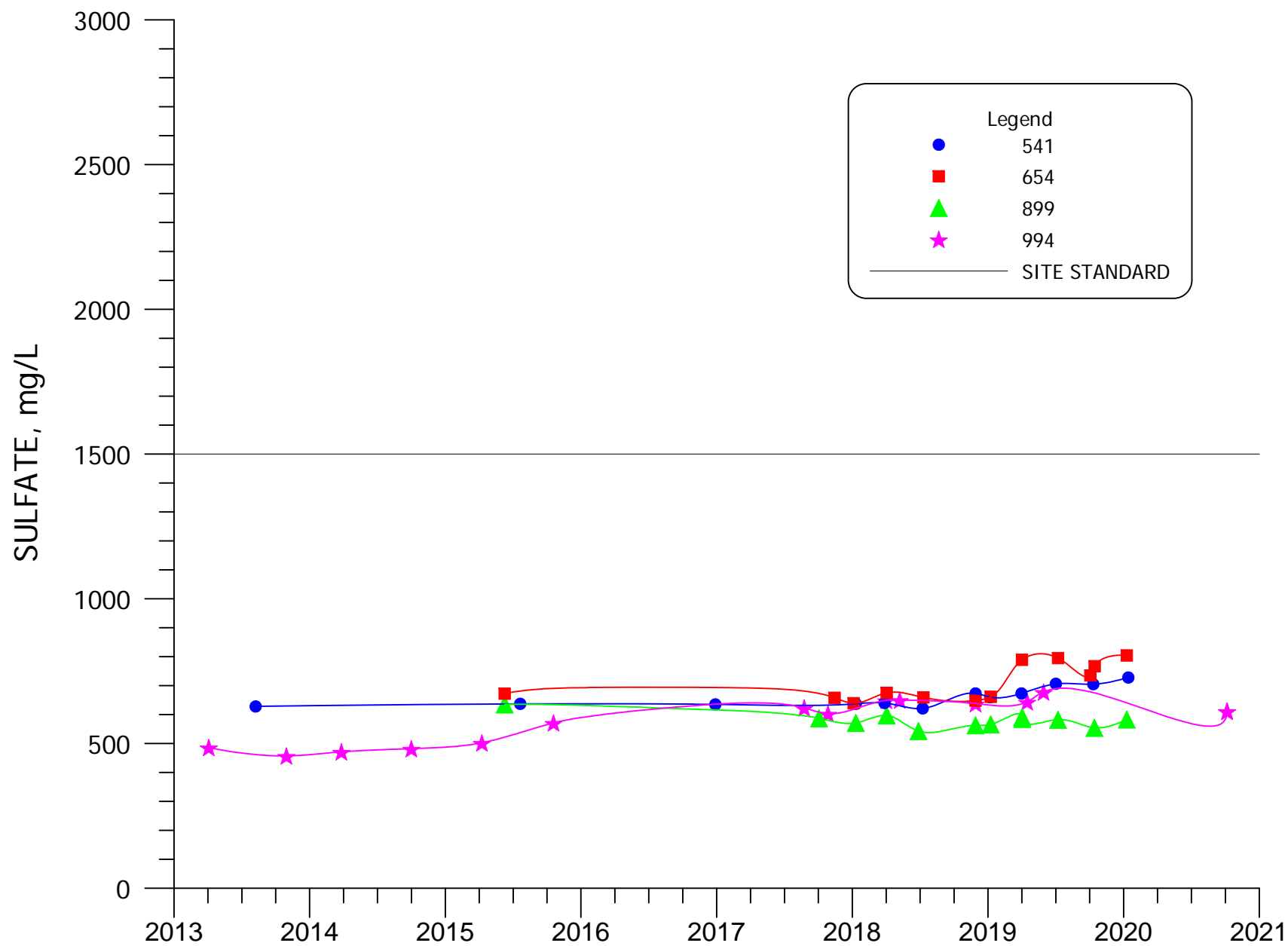
**FIGURE 4.3-15A. SULFATE CONCENTRATIONS FOR WELLS R1, R2, R4, R5 AND R18.**



**FIGURE 4.3-16. SULFATE CONCENTRATIONS FOR WELLS 688, 881, 882, 884, 886, AND 893.**

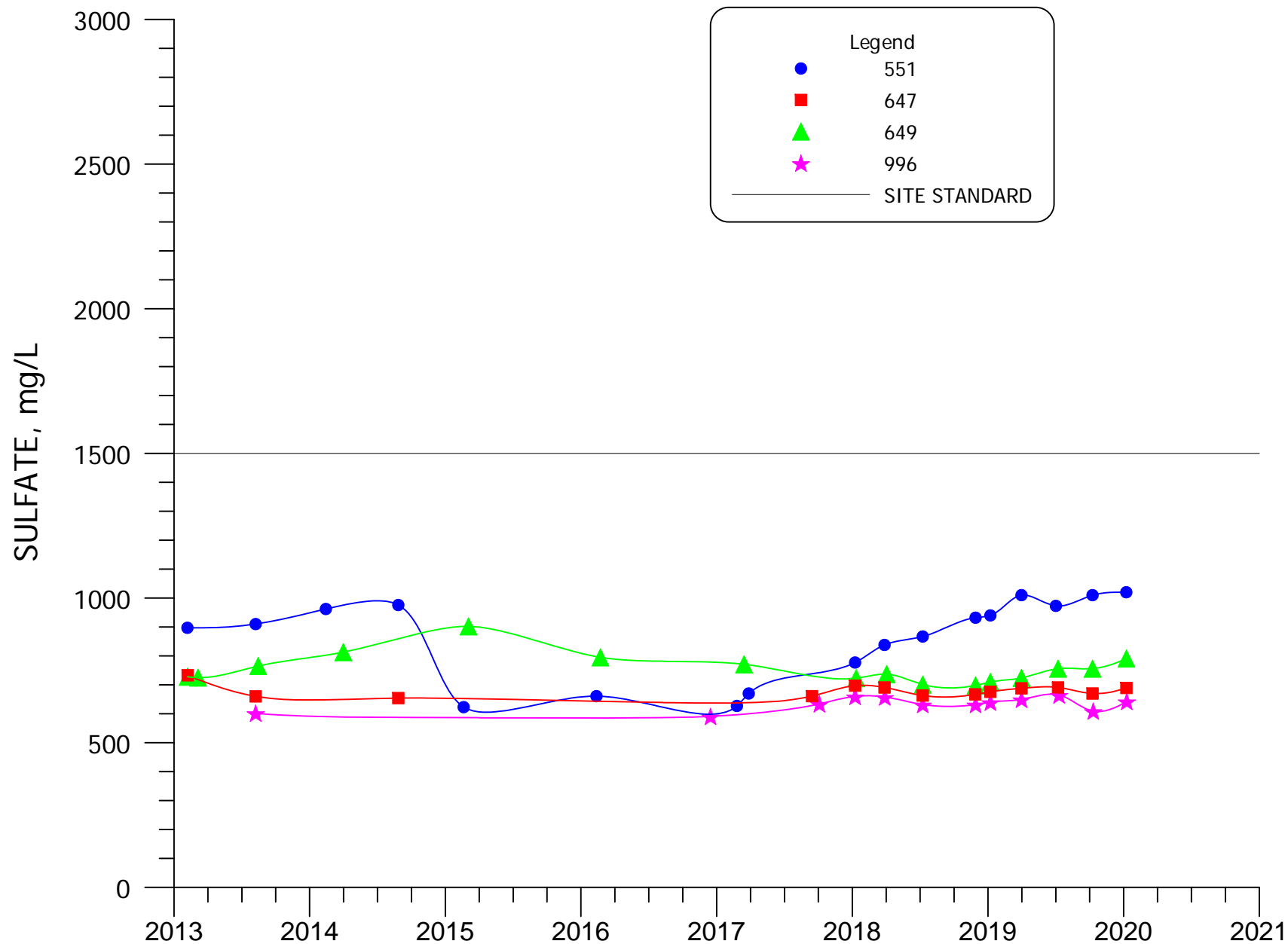


**FIGURE 4.3-16A. SULFATE CONCENTRATIONS FOR WELLS 659, 888, 890, H2A, H7 AND H16.**

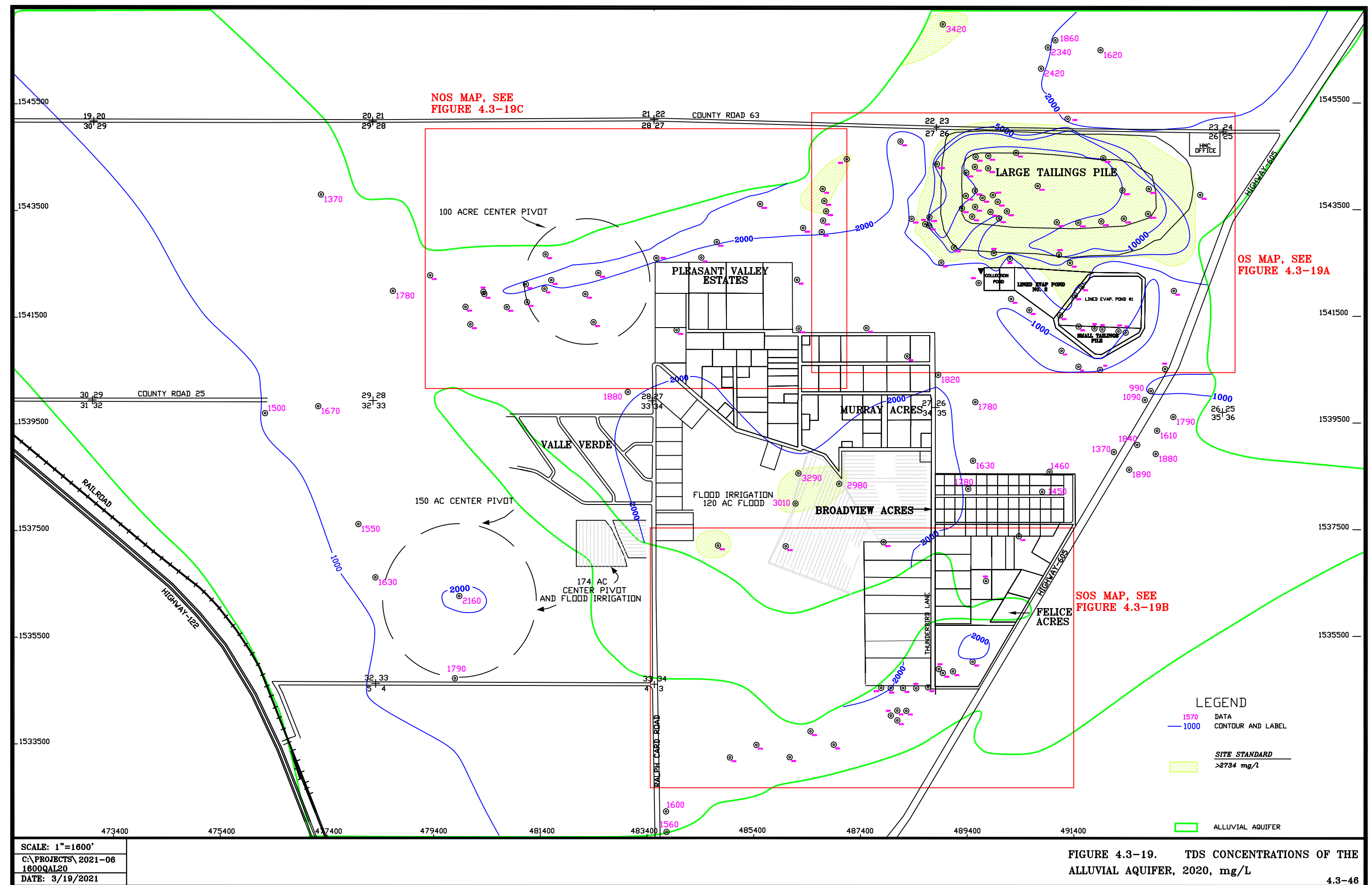


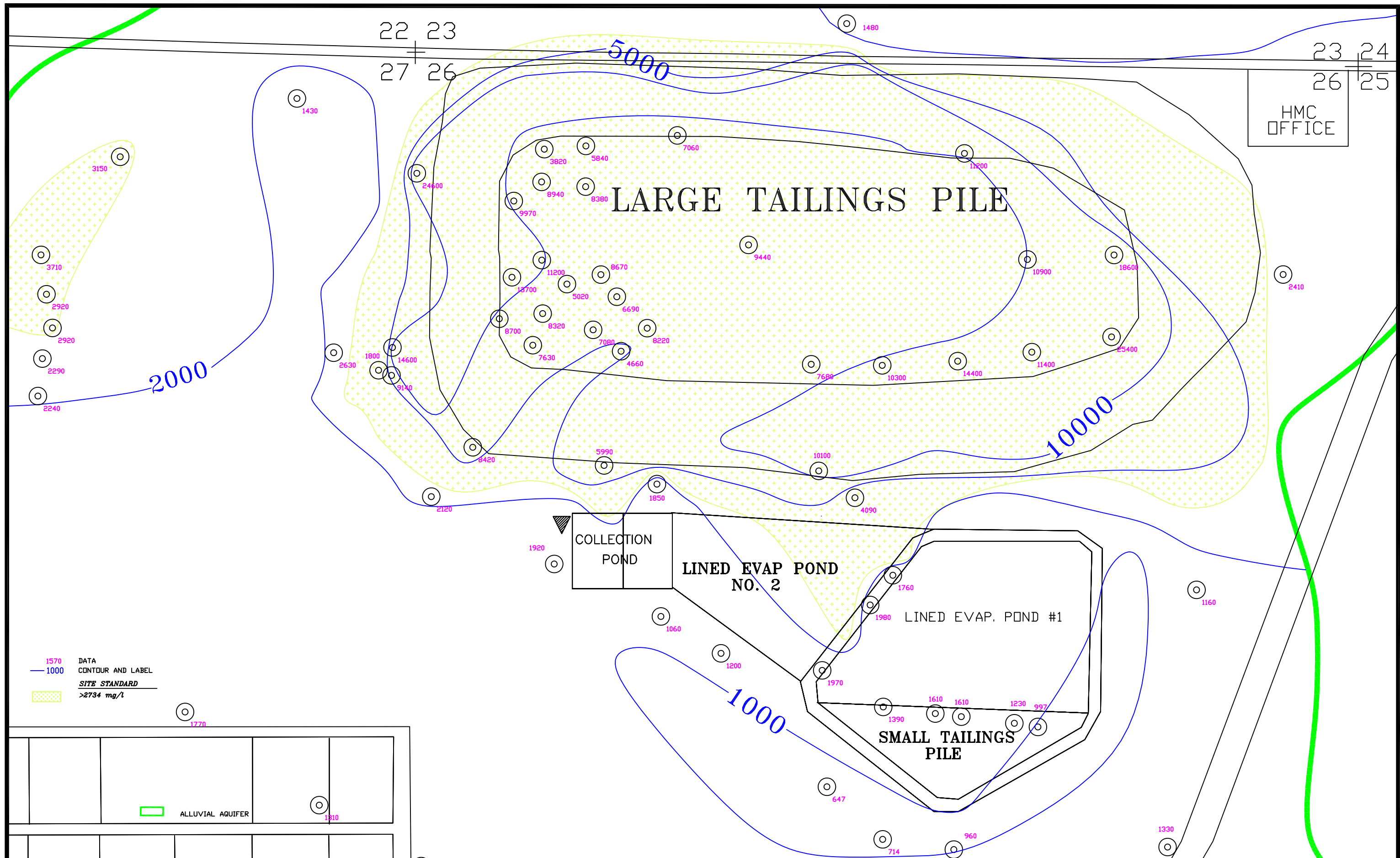
**FIGURE 4.3-17. SULFATE CONCENTRATIONS FOR WELLS  
541, 654, 899 and 994.**





**FIGURE 4.3-18. SULFATE CONCENTRATIONS FOR WELLS 551, 647, 649 AND 996.**





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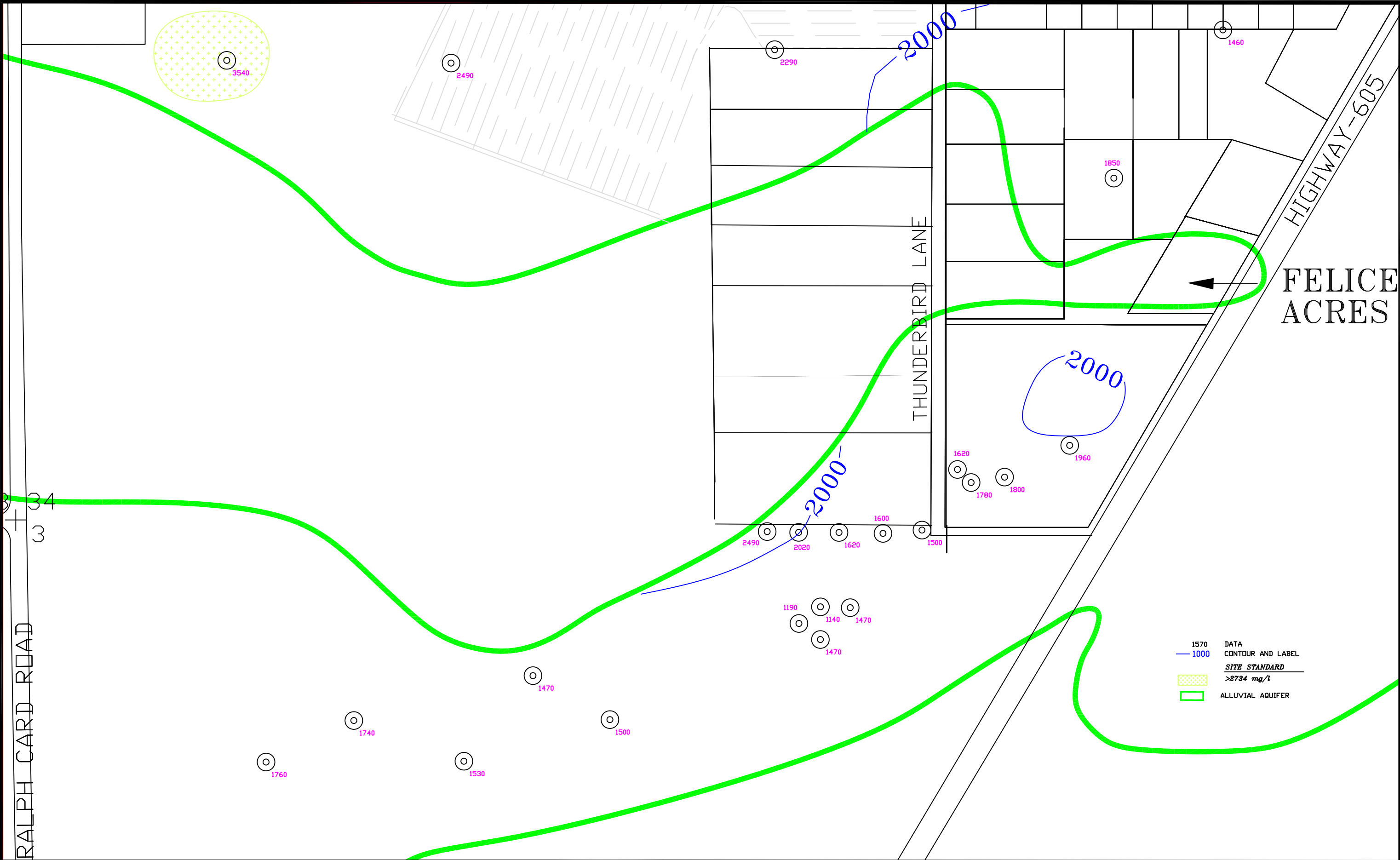
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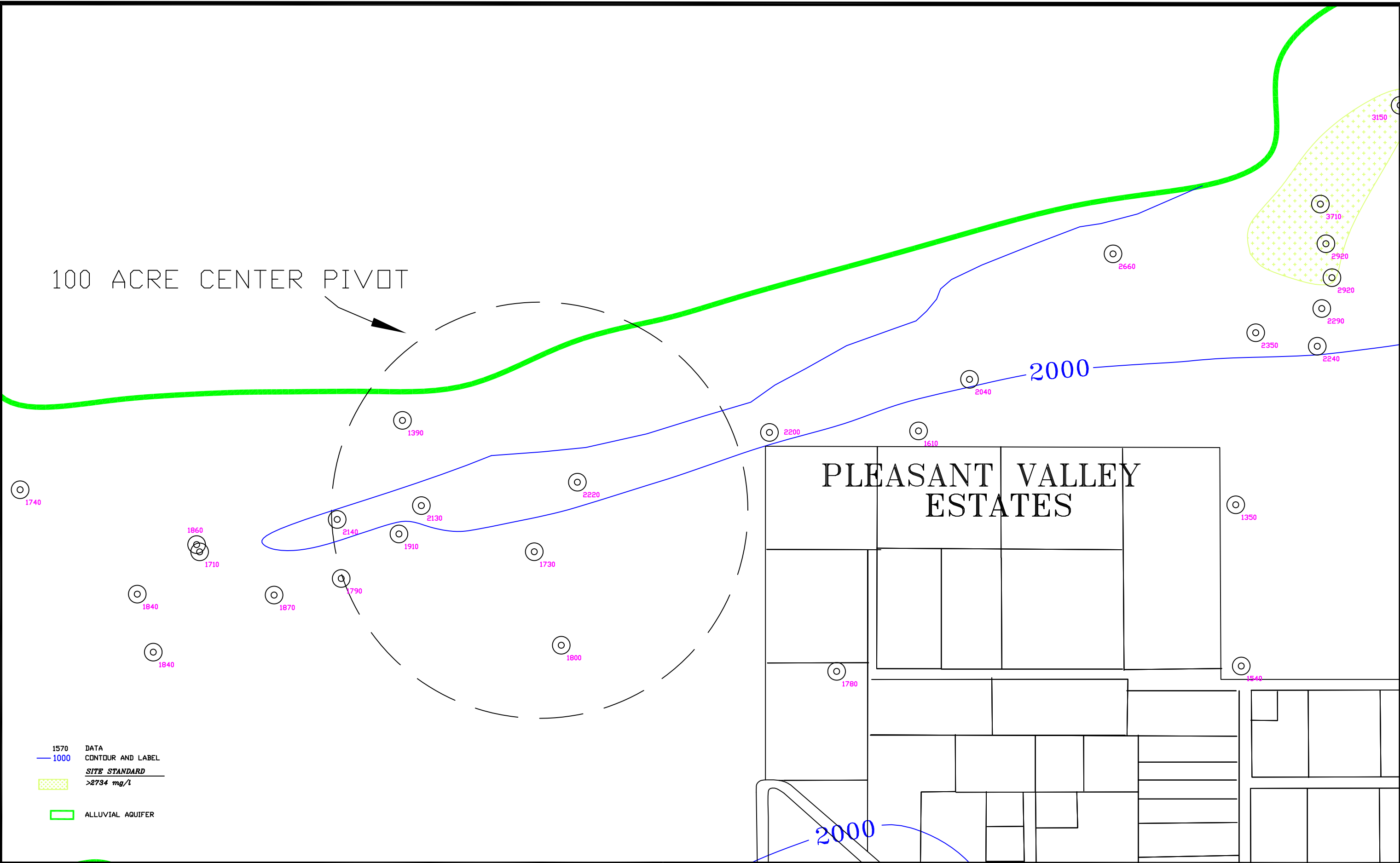
FIGURE 4.3-19A. TDS CONCENTRATIONS OF THE ALLUVIAL AQUIFER, OS, 2020, mg/L

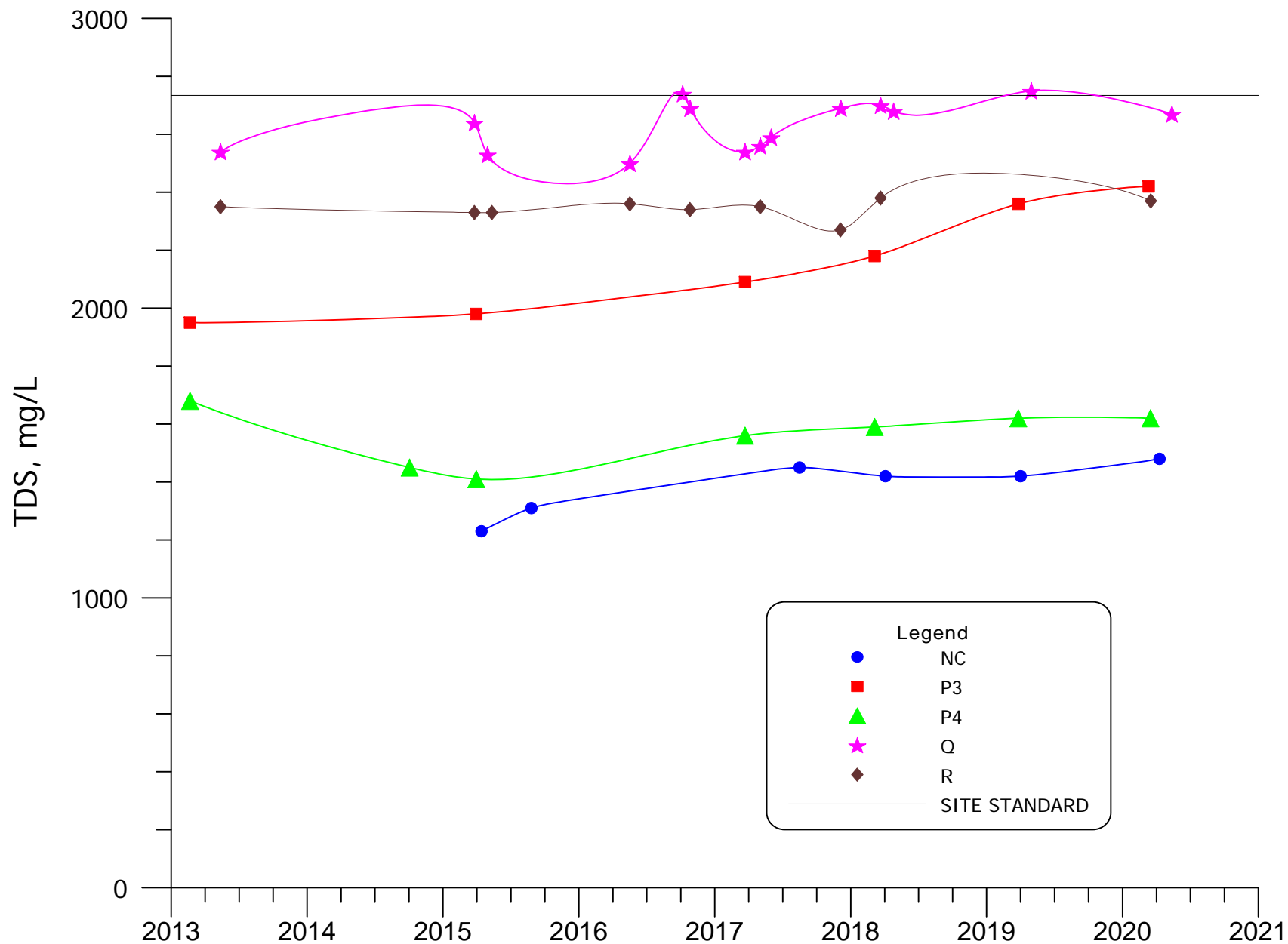
4.3-47



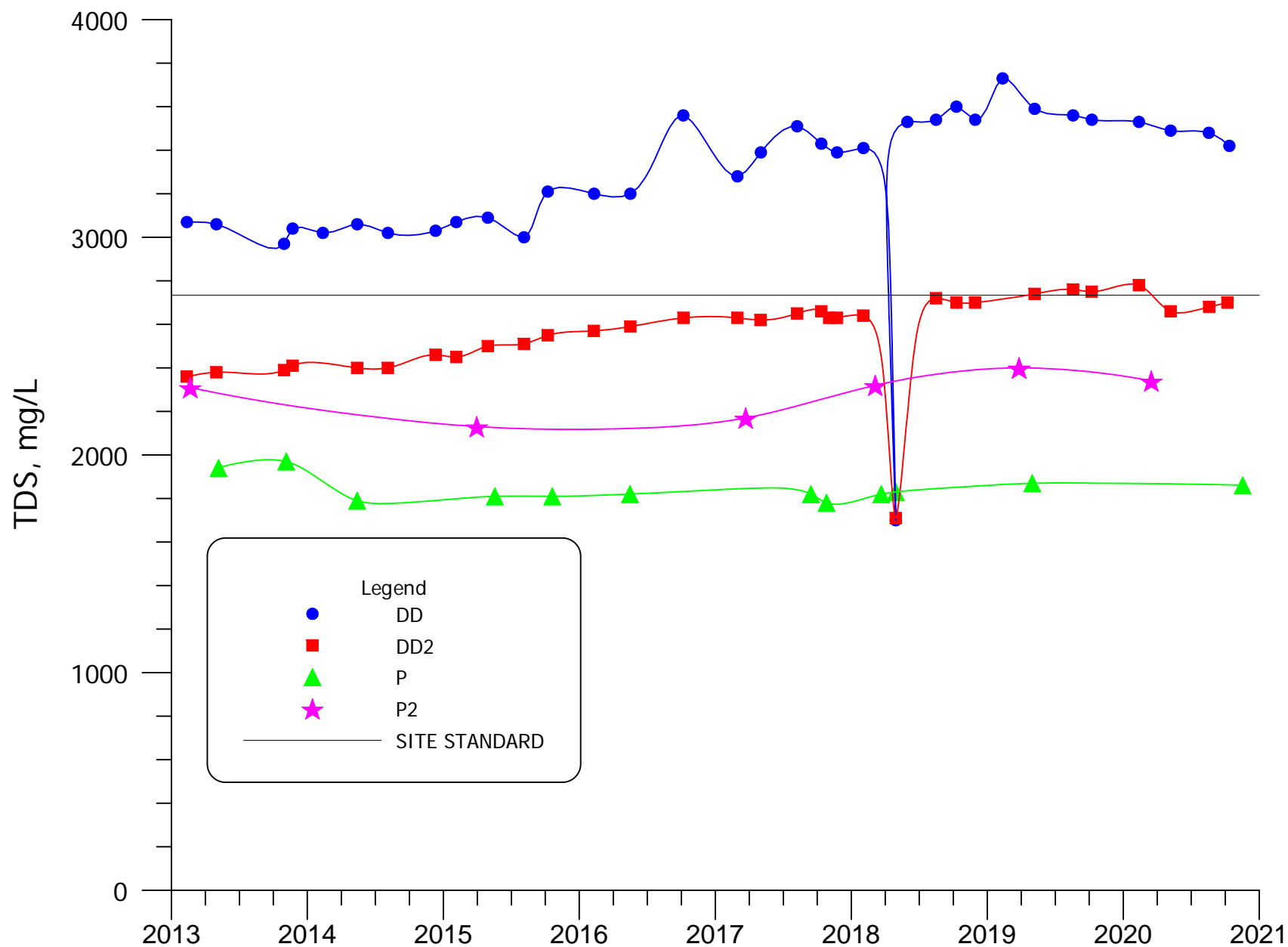
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FIGURE 4.3-19B. TDS CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, SOS, 2020, mg/L

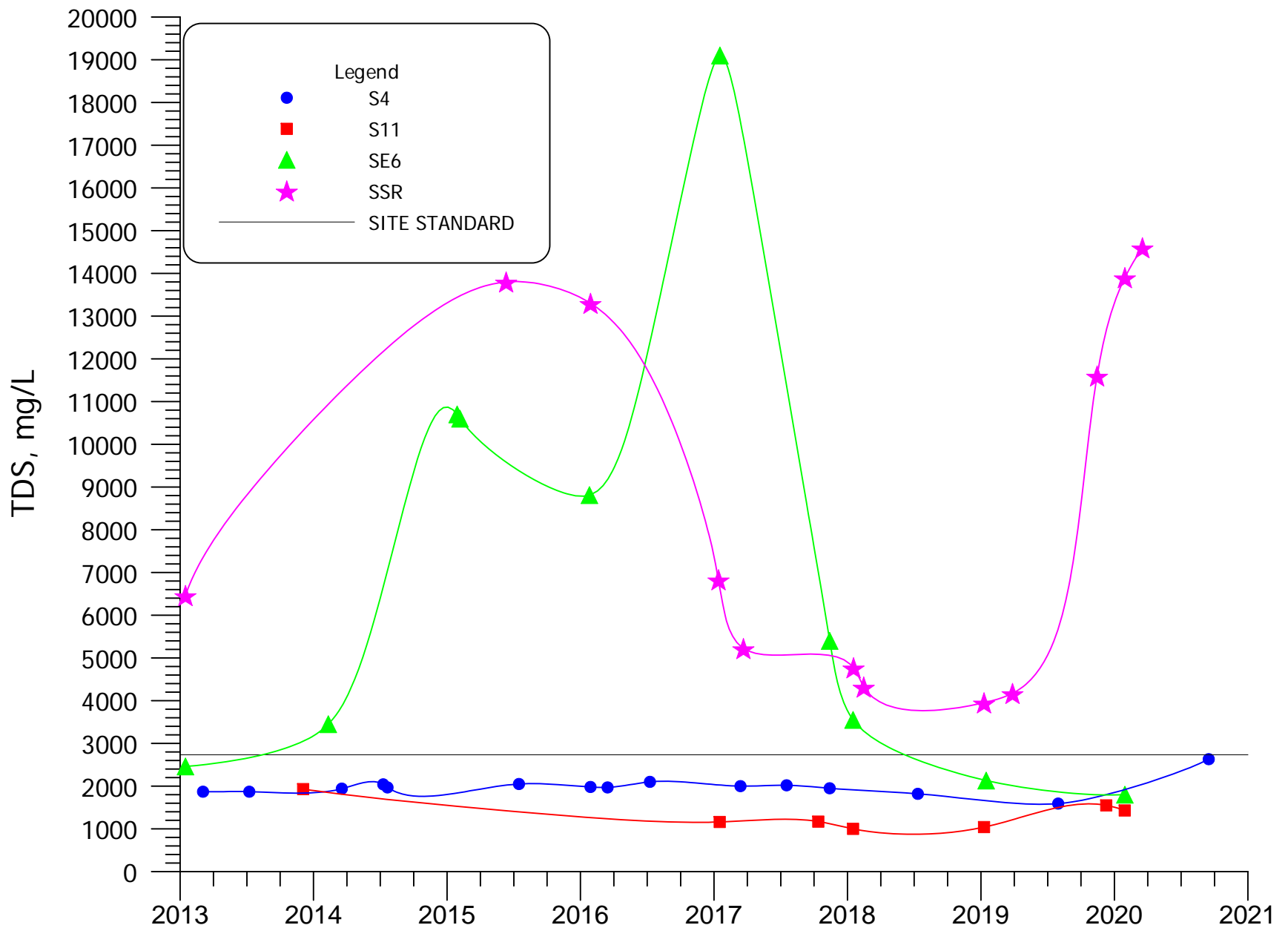




**FIGURE 4.3-20. TDS CONCENTRATIONS FOR WELLS NC, P3, P4, Q AND R.**

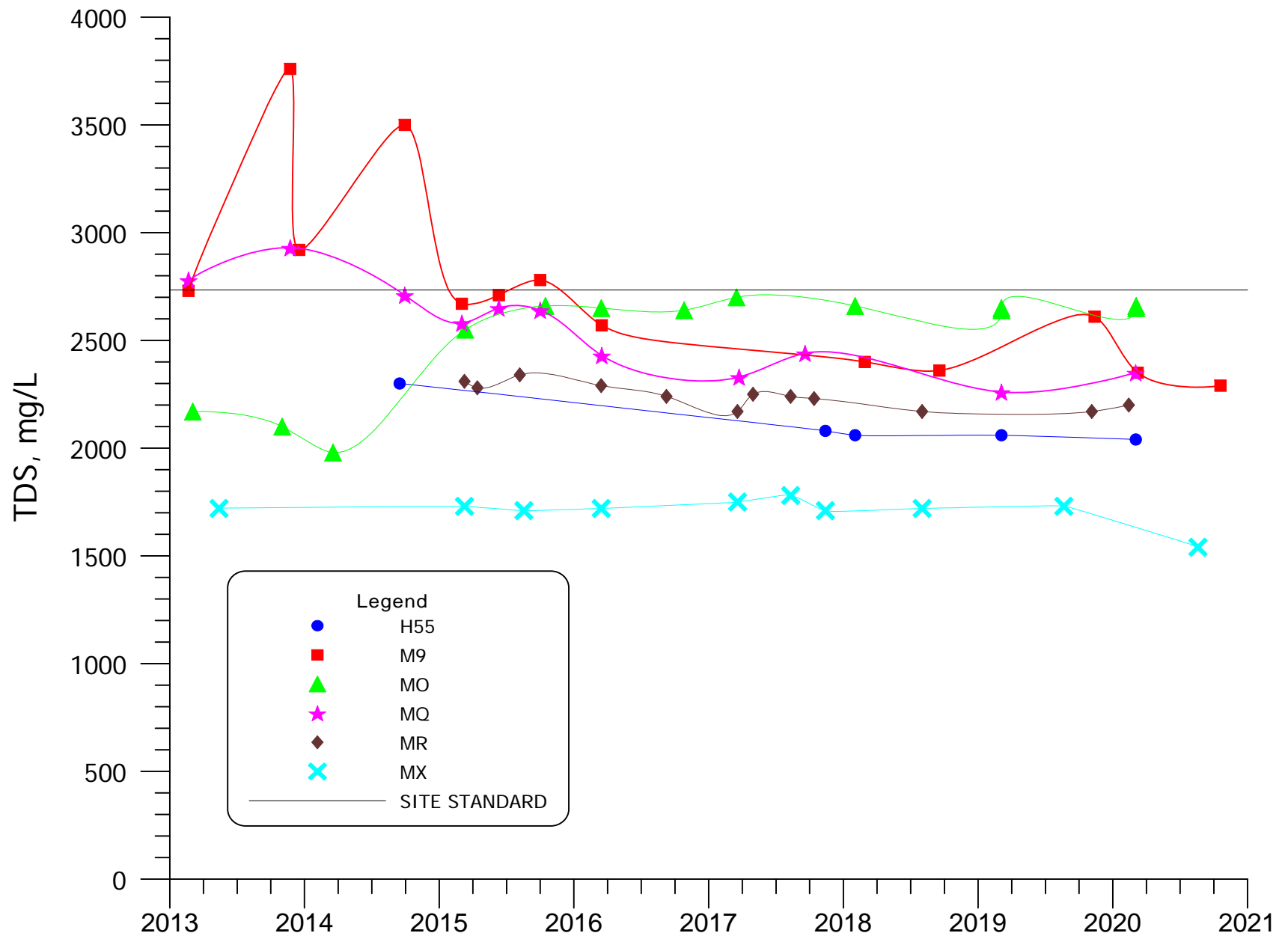


**FIGURE 4.3-20A. TDS CONCENTRATIONS FOR WELLS DD, DD2, P AND P2.**

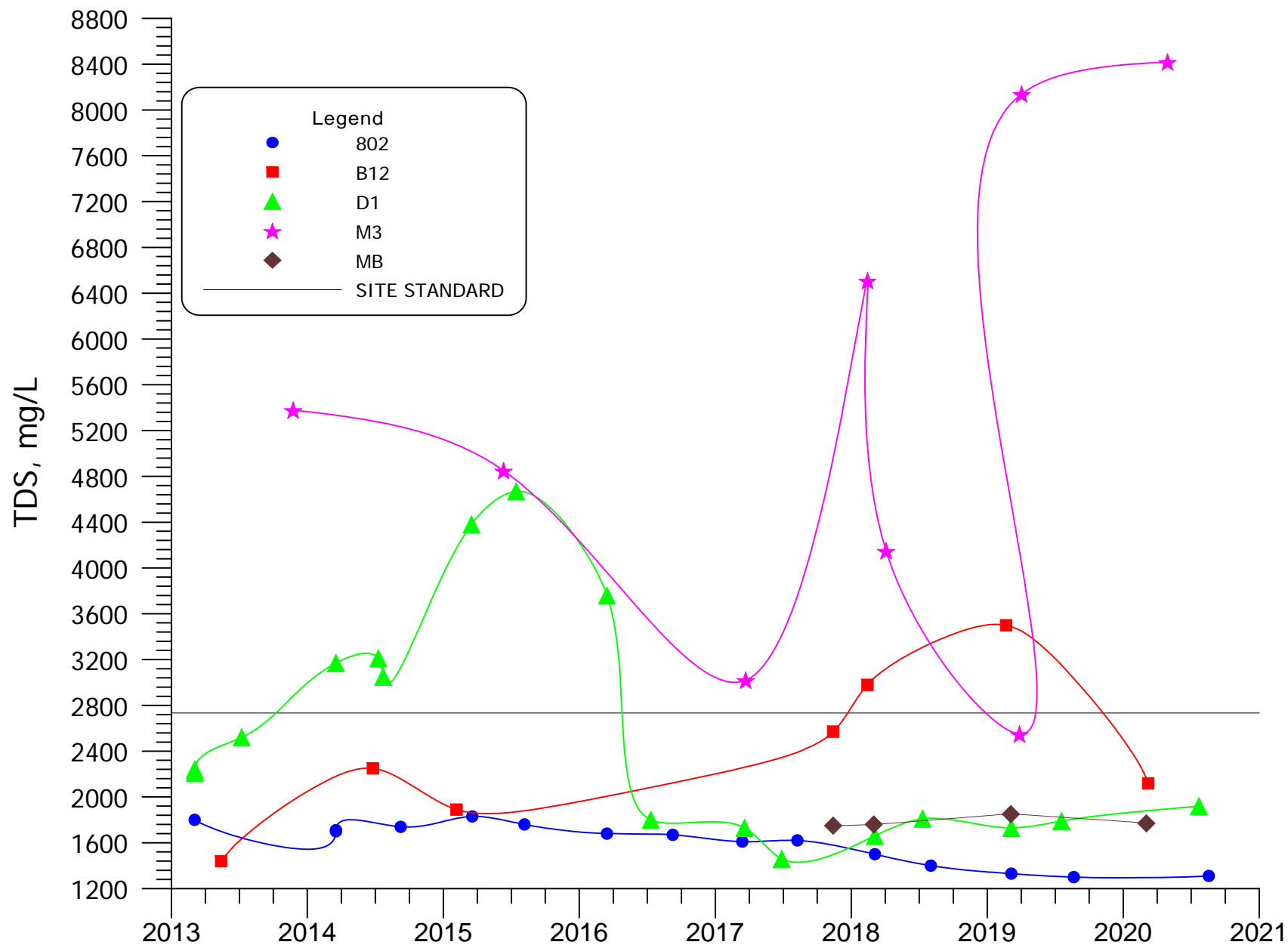


**FIGURE 4.3-21. TDS CONCENTRATIONS FOR WELLS S4, S11, SE6 AND SSR.**

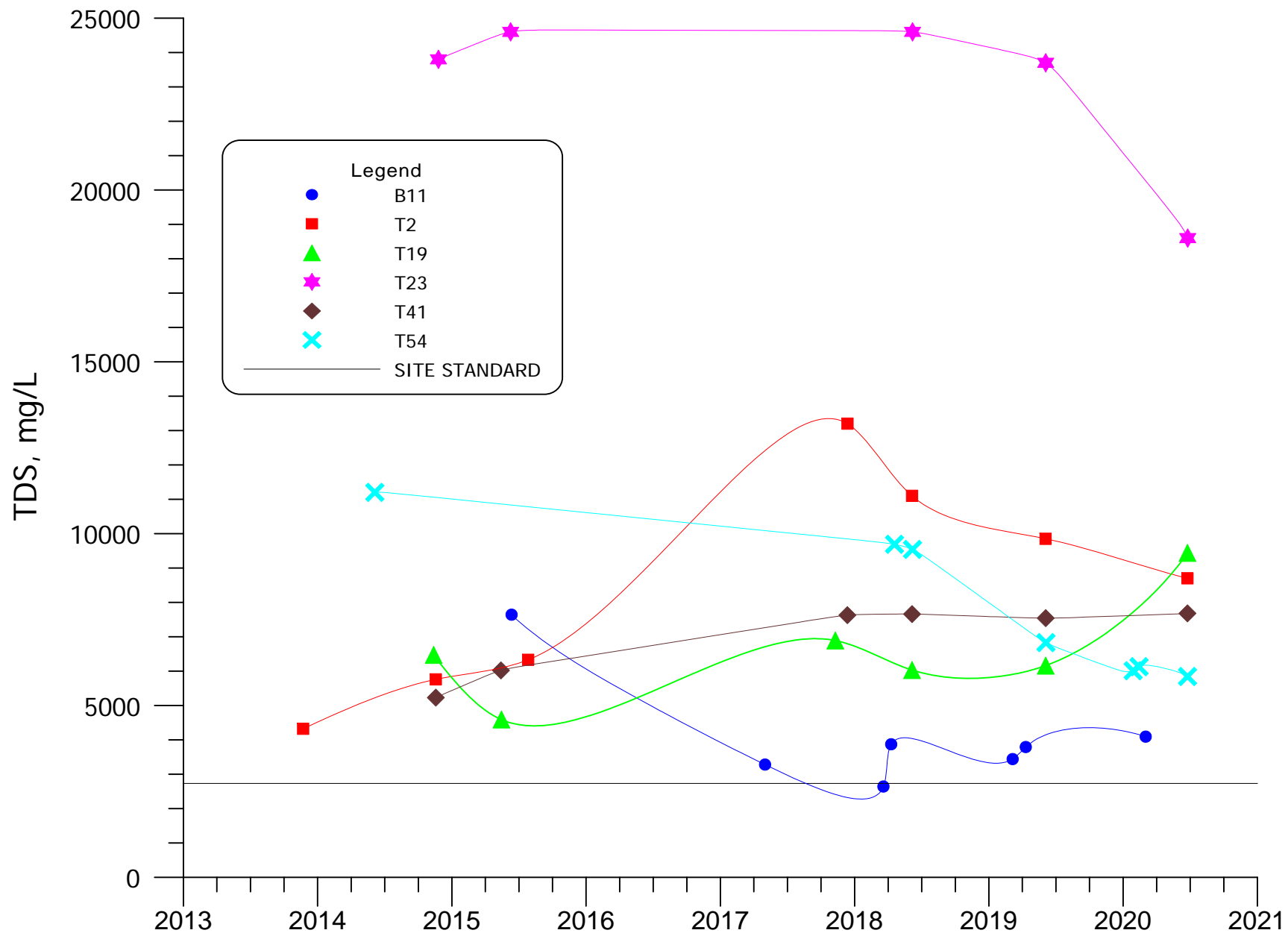




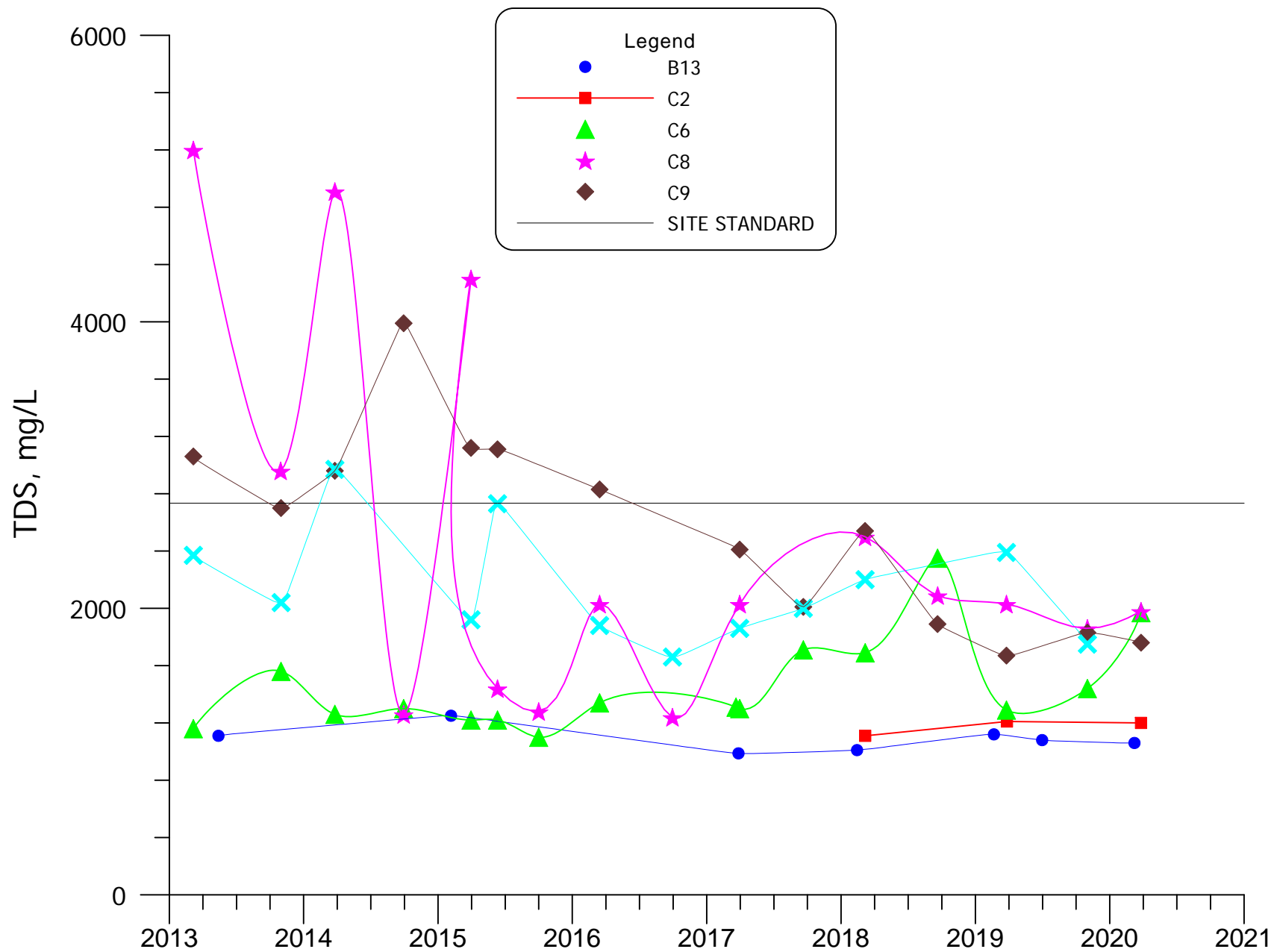
**FIGURE 4.3-22. TDS CONCENTRATIONS FOR WELLS H55, M9, MO, MQ, MR AND MX.**



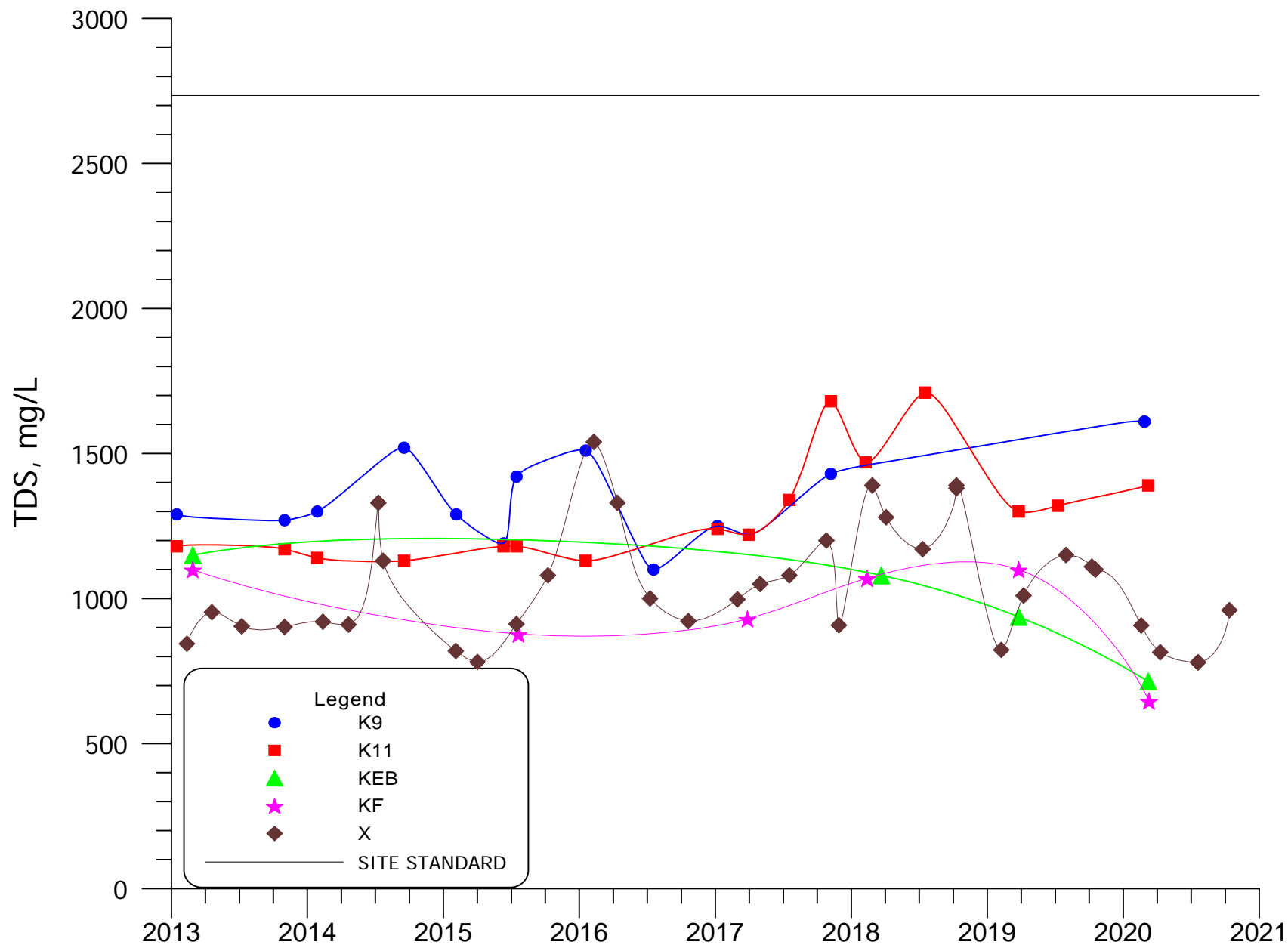
**FIGURE 4.3-23. TDS CONCENTRATIONS FOR WELLS  
802, B12, D1, M3 AND MB.**



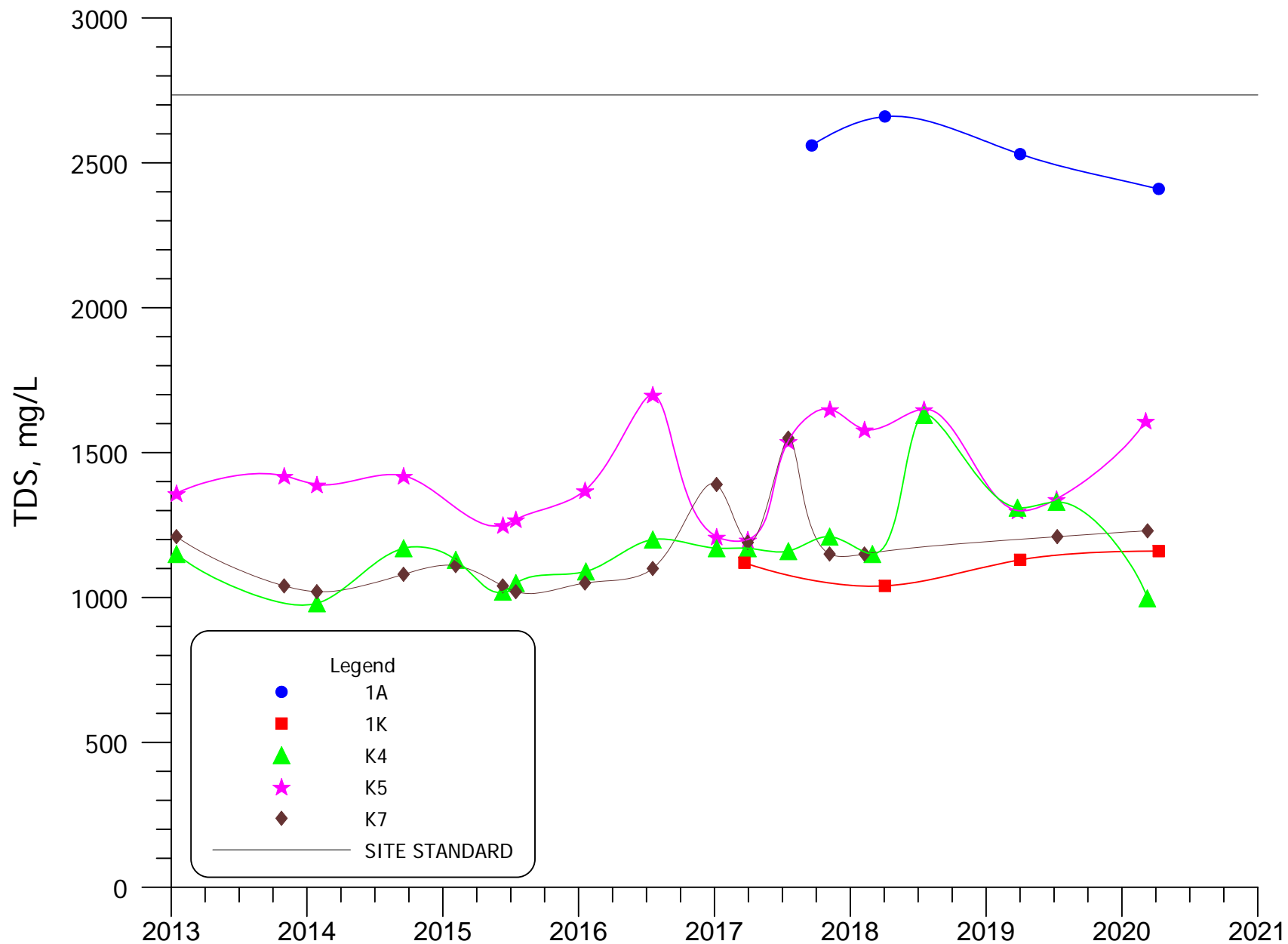
**FIGURE 4.3-24. TDS CONCENTRATIONS FOR WELLS B11, T2, T19, T23, T41 AND T54.**



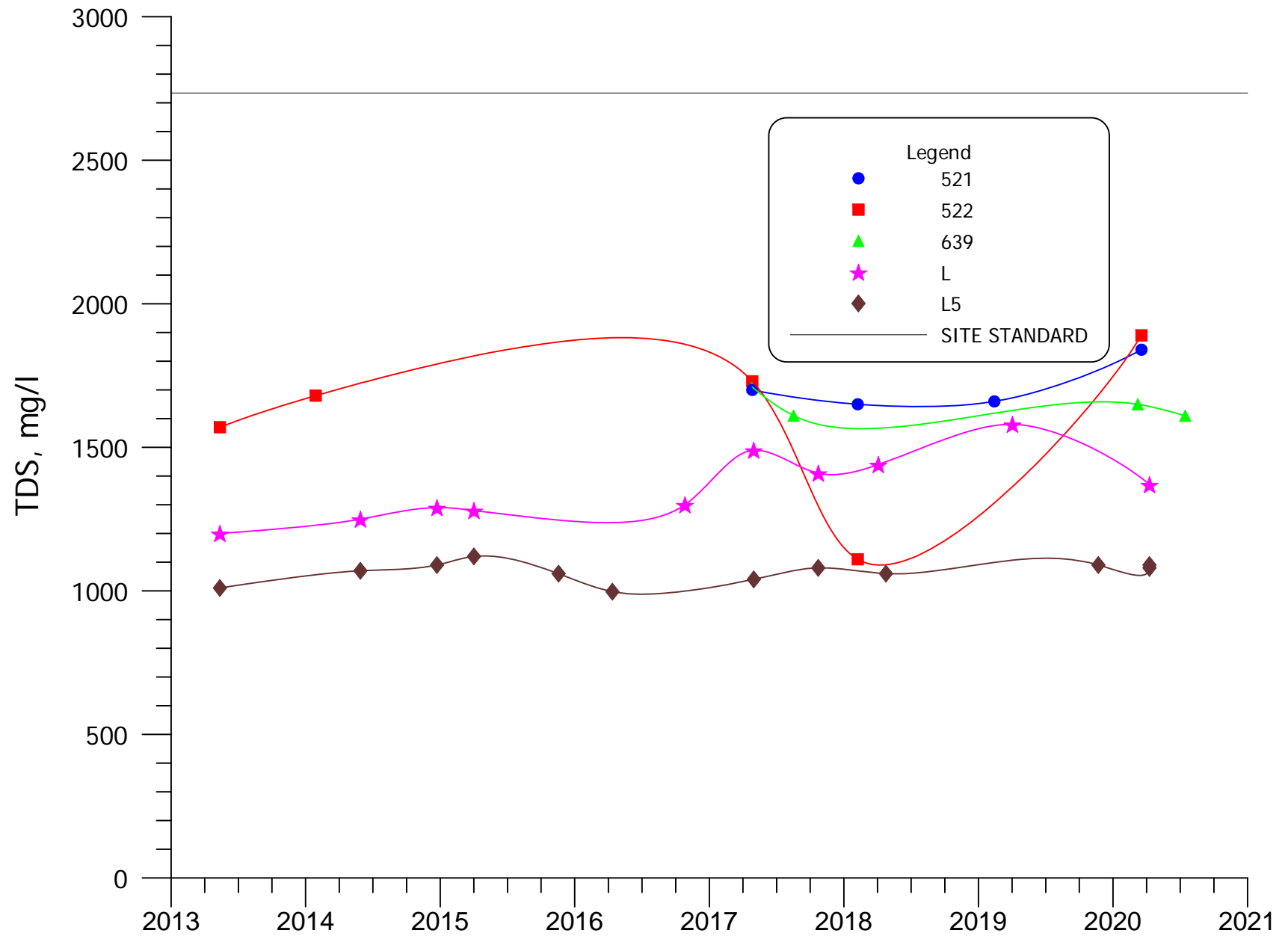
**FIGURE 4.3-25. TDS CONCENTRATIONS FOR WELLS B13, C2, C6, C8 AND C9.**



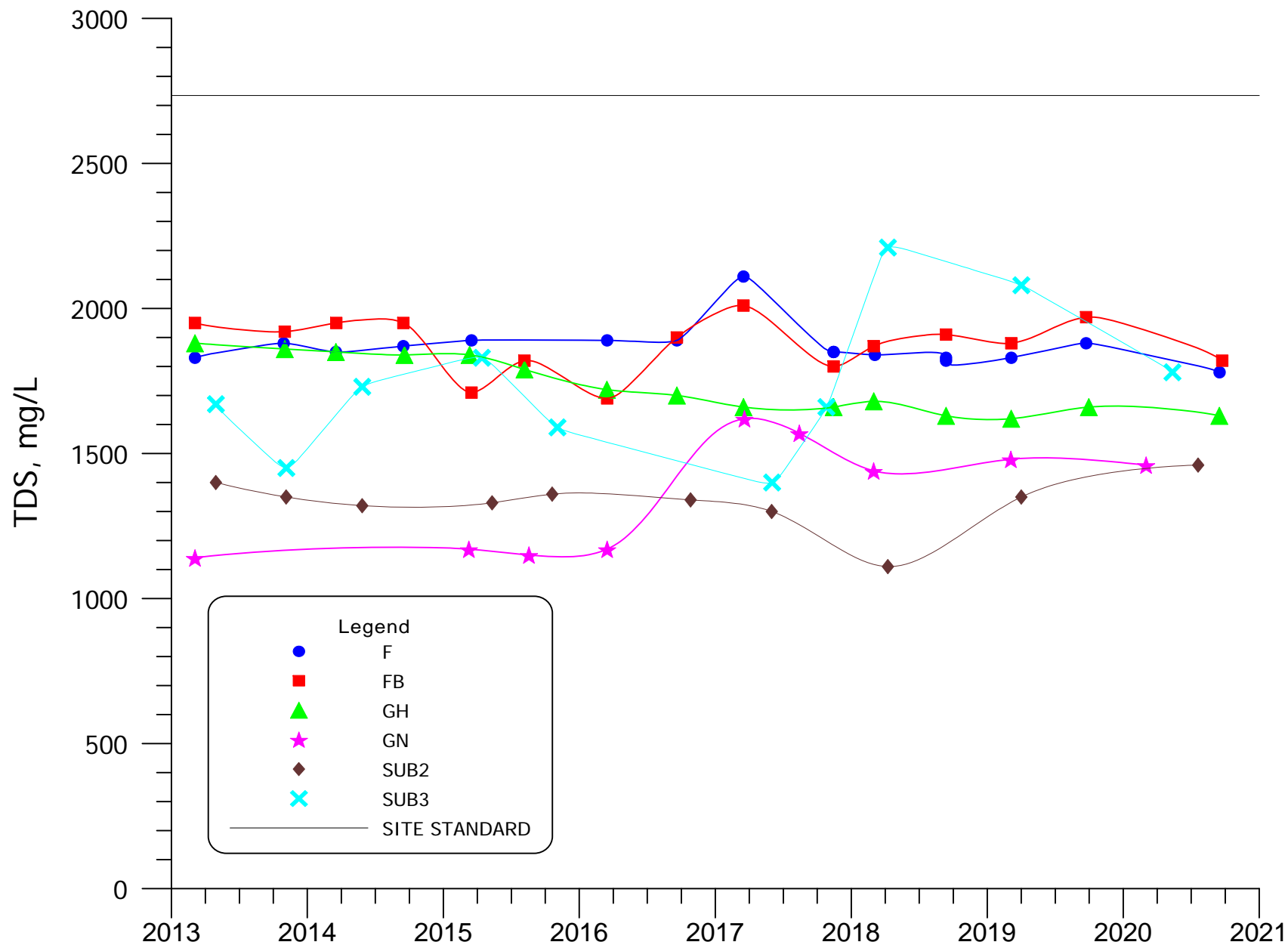
**FIGURE 4.3-26. TDS CONCENTRATIONS FOR WELLS K9, K11, KEB, KF AND X.**



**FIGURE 4.3-27. TDS CONCENTRATIONS FOR WELLS 1A, 1K, K4, K5 AND K7.**

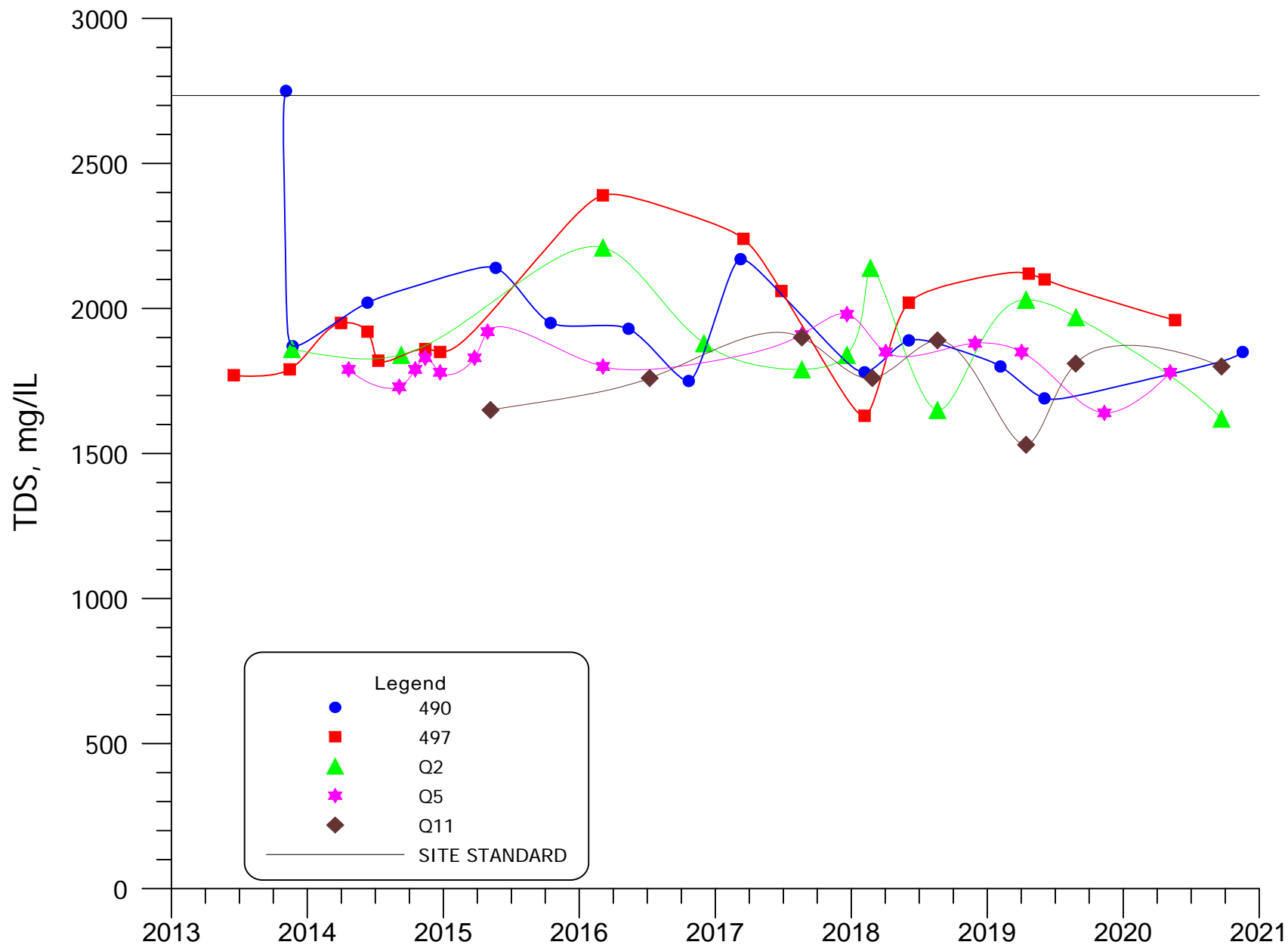


**FIGURE 4.3-28. TDS CONCENTRATIONS FOR WELLS  
521, 522, 639, L AND L5.**

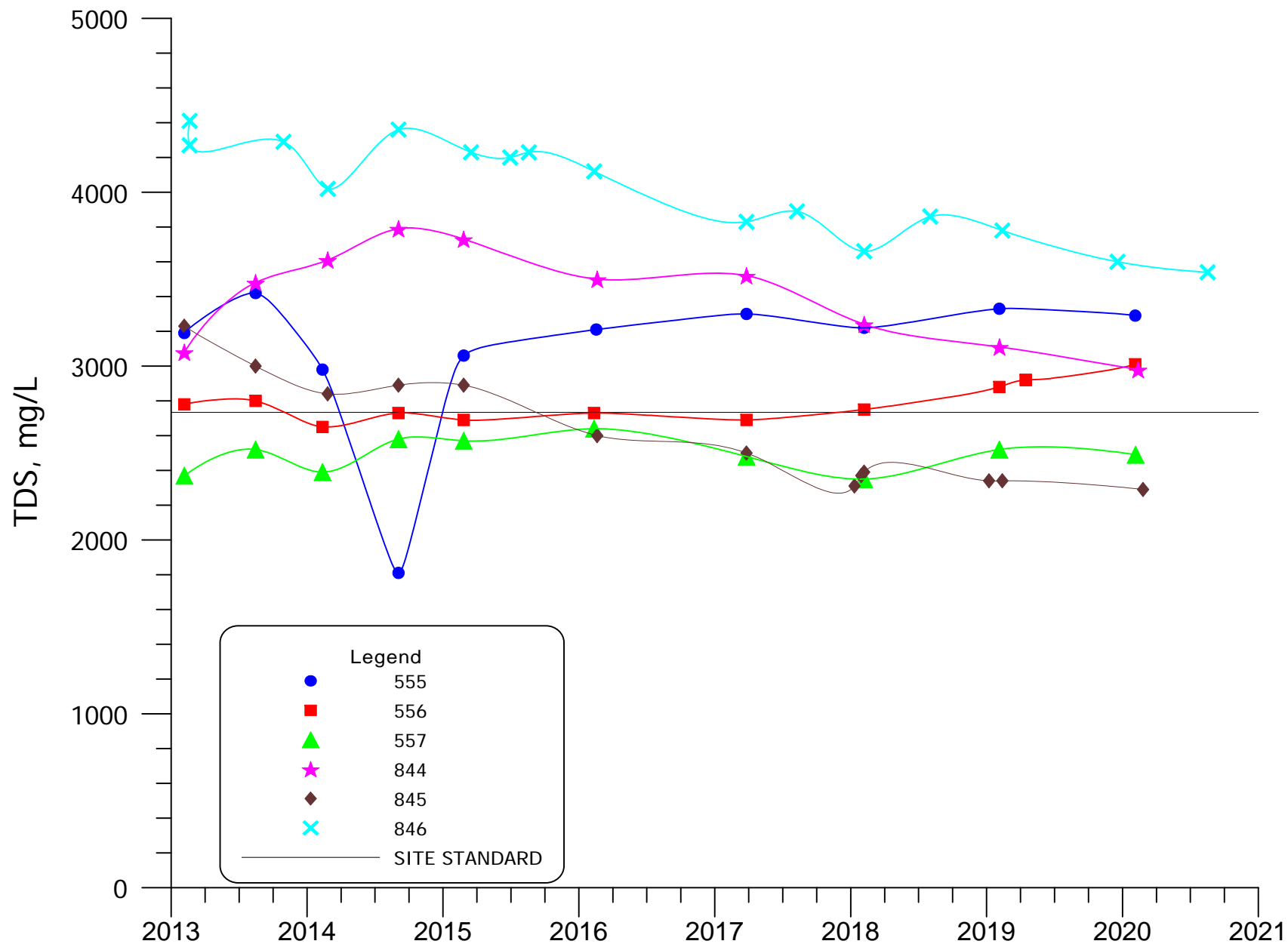


**FIGURE 4.3-29. TDS CONCENTRATIONS FOR WELLS F, FB, GH, GN, SUB2 AND SUB3.**

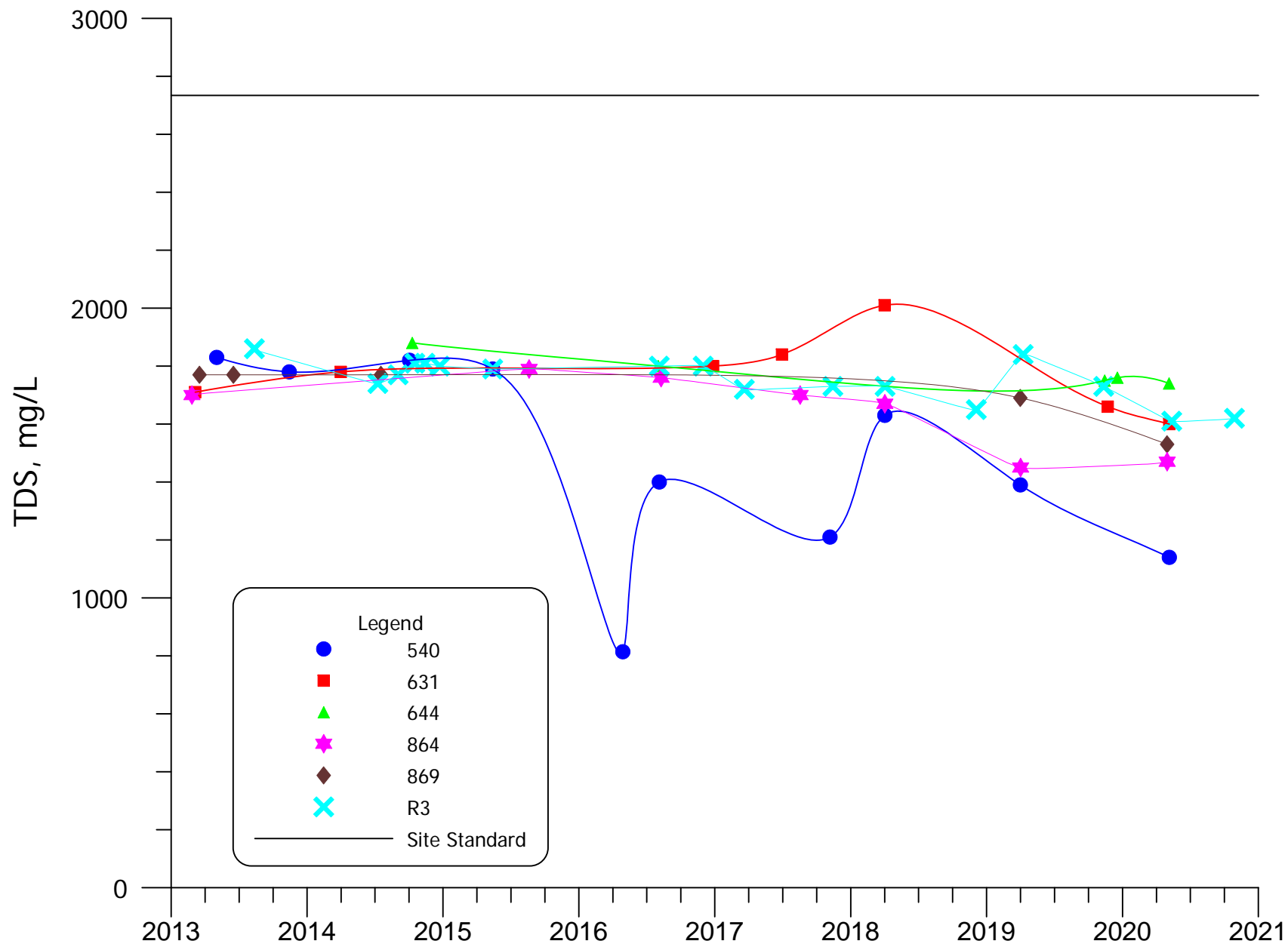




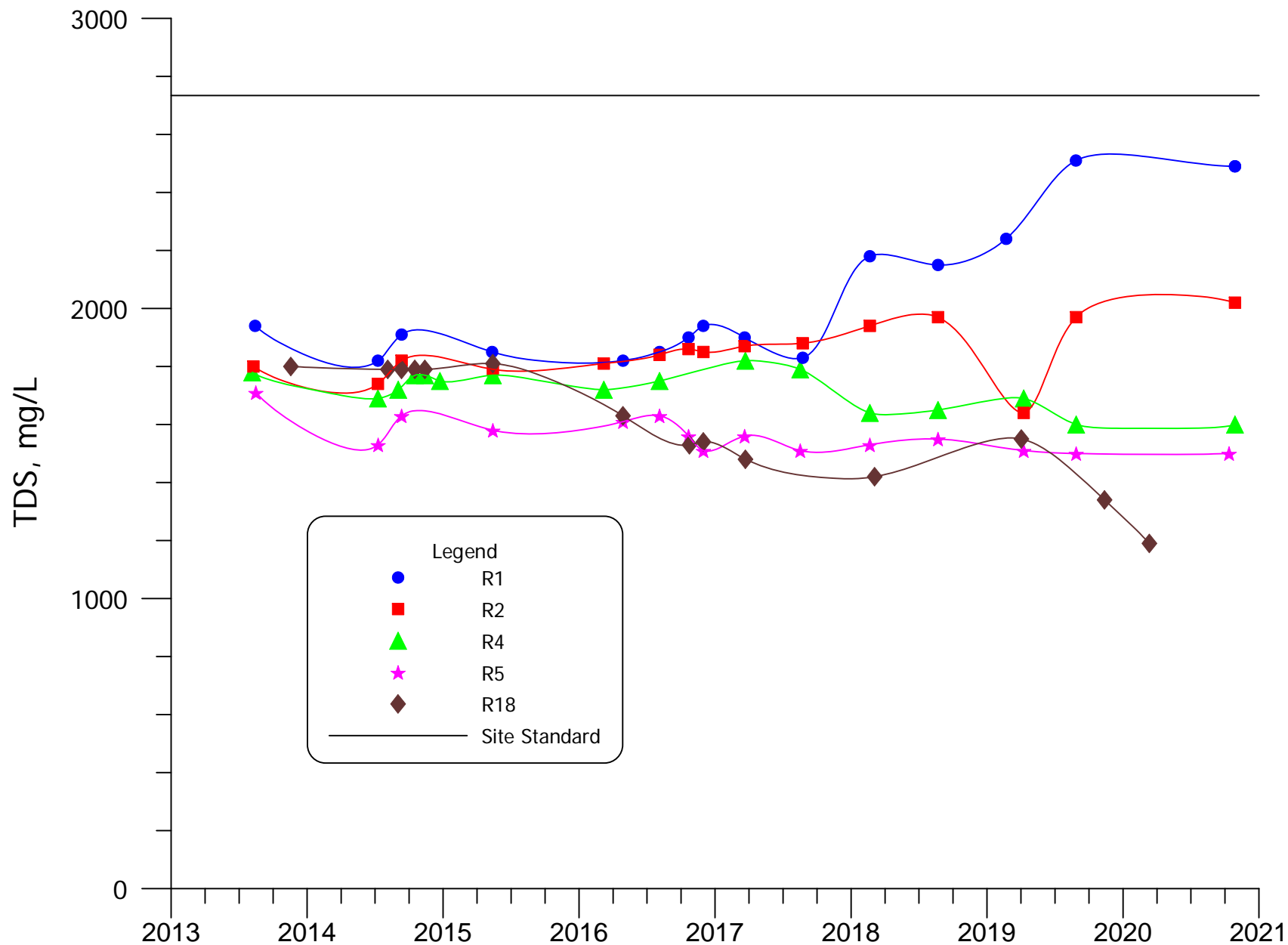
**FIGURE 4.3-30. TDS CONCENTRATIONS FOR WELLS 490, 497, Q2, Q5 AND Q11.**



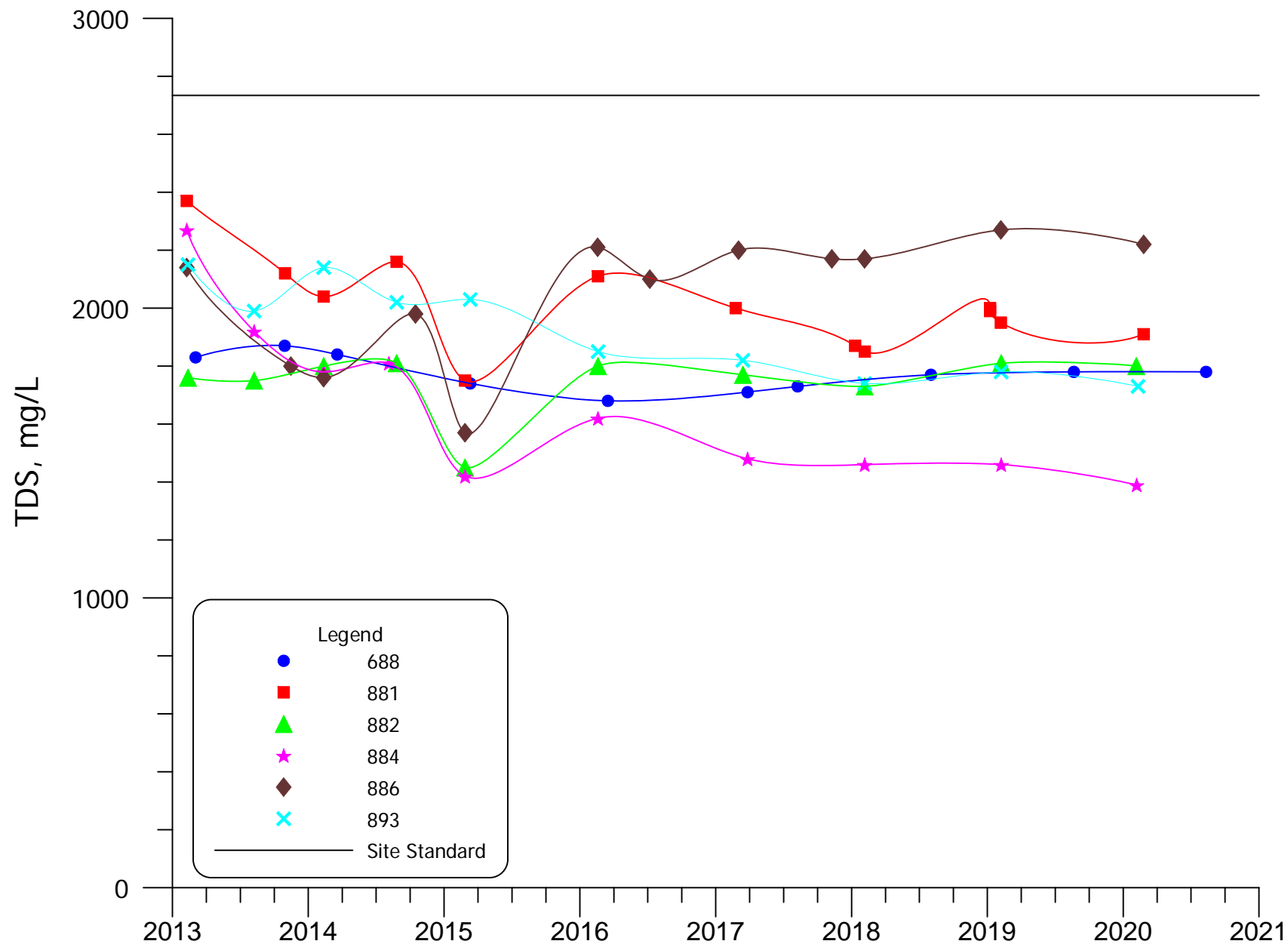
**FIGURE 4.3-31. TDS CONCENTRATIONS FOR WELLS 555, 556, 557, 844, 845 AND 846.**



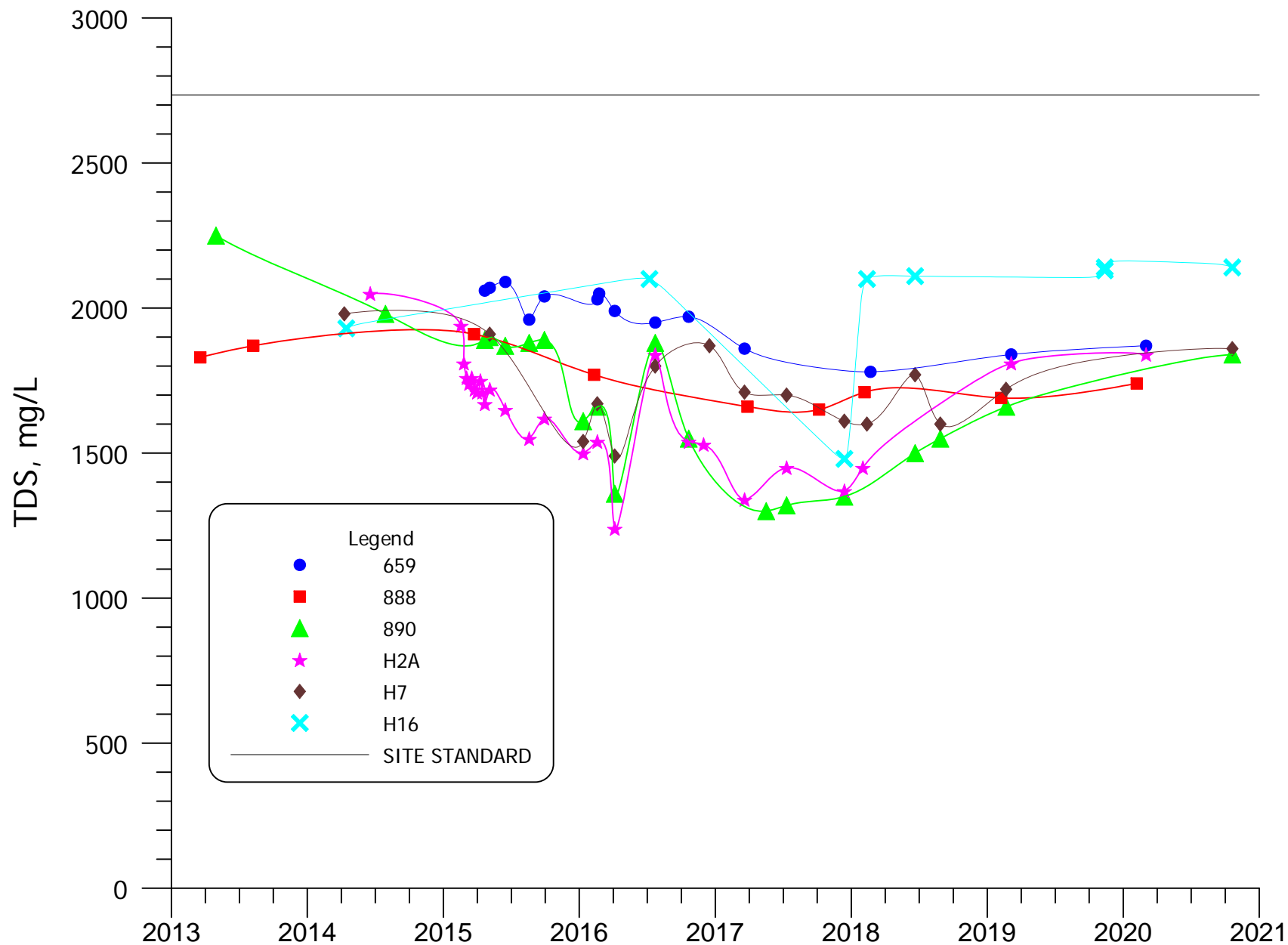
**FIGURE 4.3-32. TDS CONCENTRATIONS FOR WELLS 540, 631, 644, 864, 869 AND R3.**



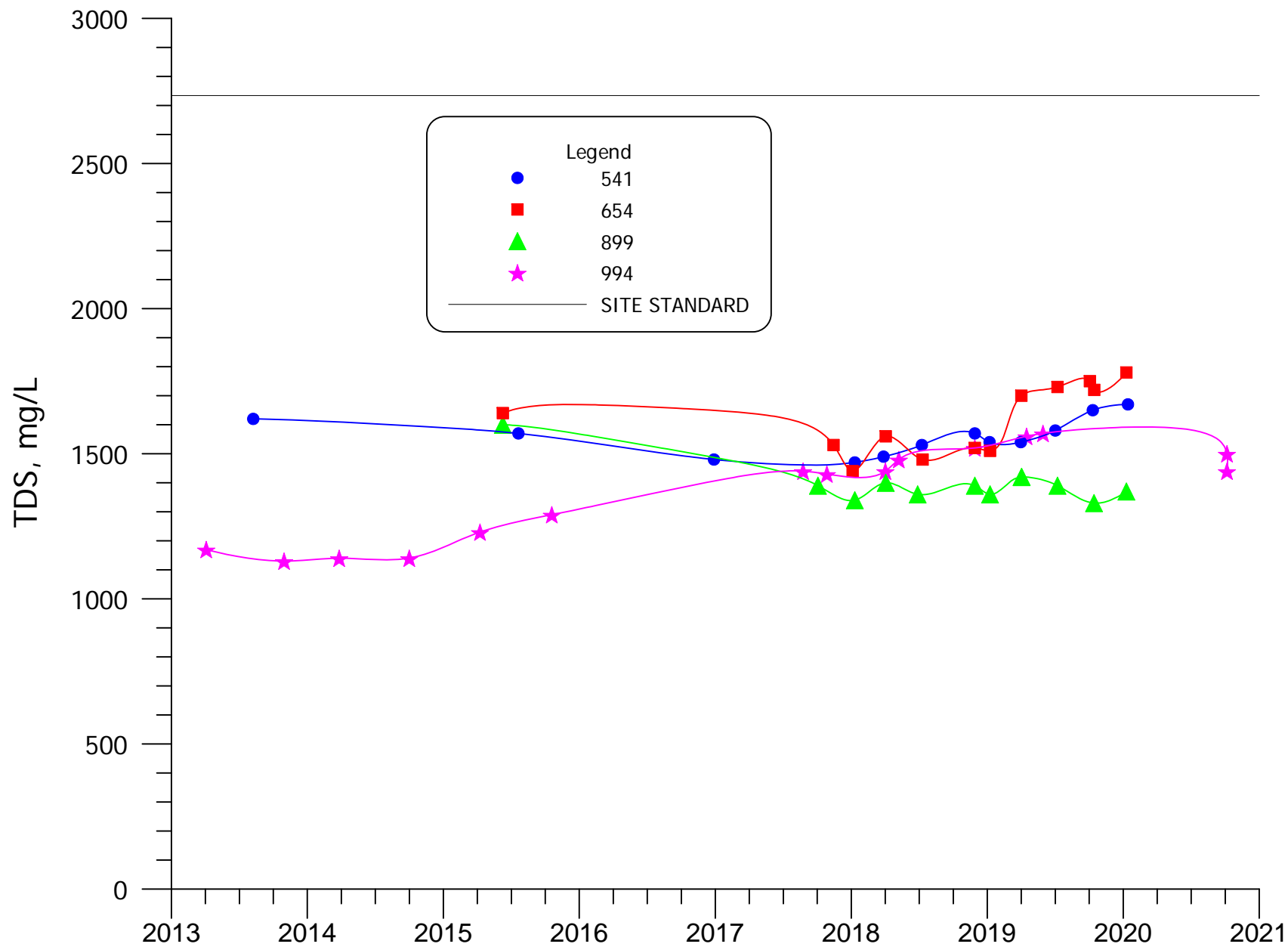
**FIGURE 4.3-32A. TDS CONCENTRATIONS FOR WELLS R1, R2, R4, R5 AND R18.**



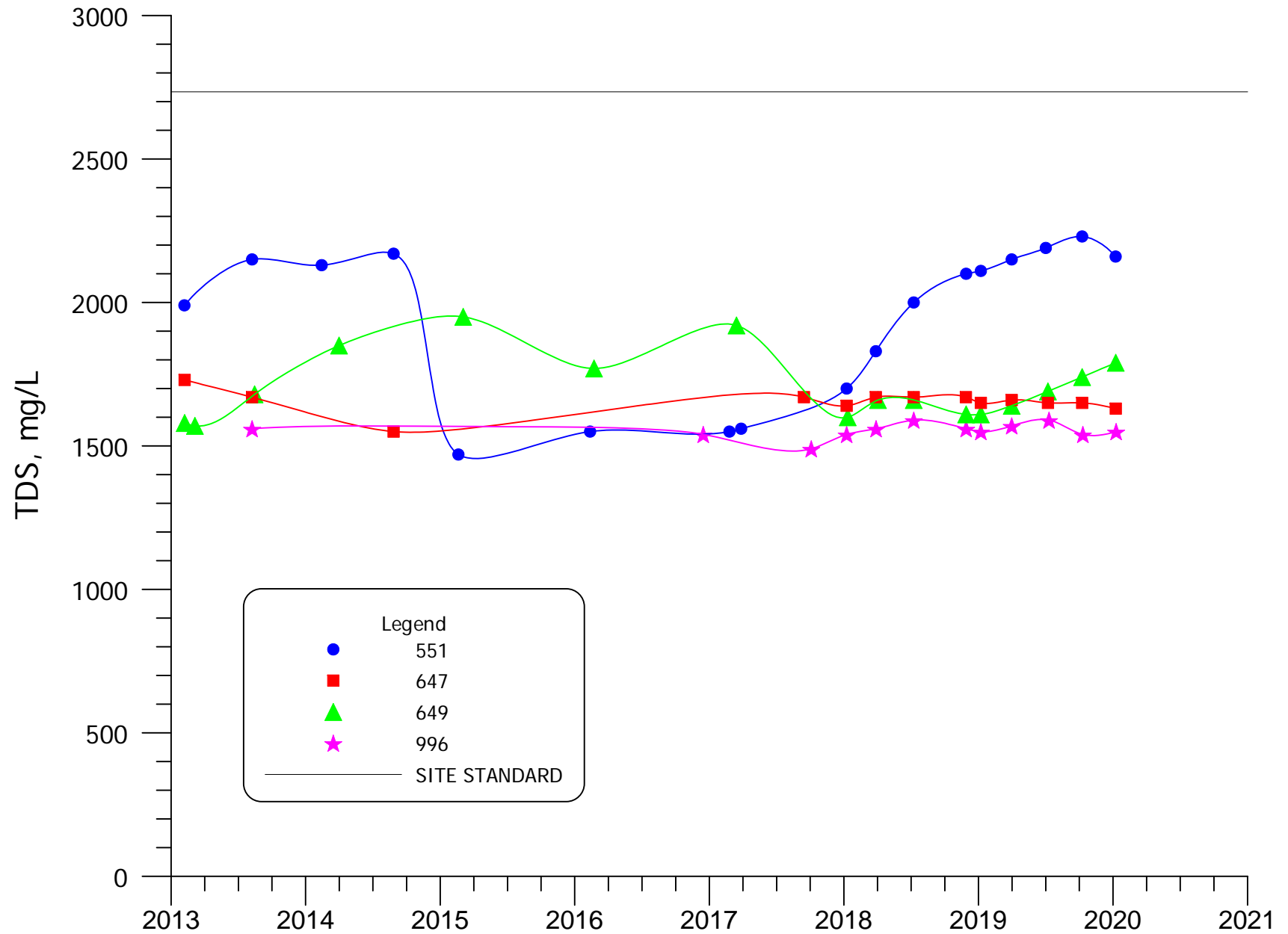
**FIGURE 4.3-33. TDS CONCENTRATIONS FOR WELLS 688, 881, 882, 884, 886 AND 893.**



**FIGURE 4.3-33A. TDS CONCENTRATIONS FOR WELLS 659, 888, 890, H2A, H7 AND H16.**



**FIGURE 4.3-34. TDS CONCENTRATIONS FOR WELLS 541, 654, 899 and 994.**



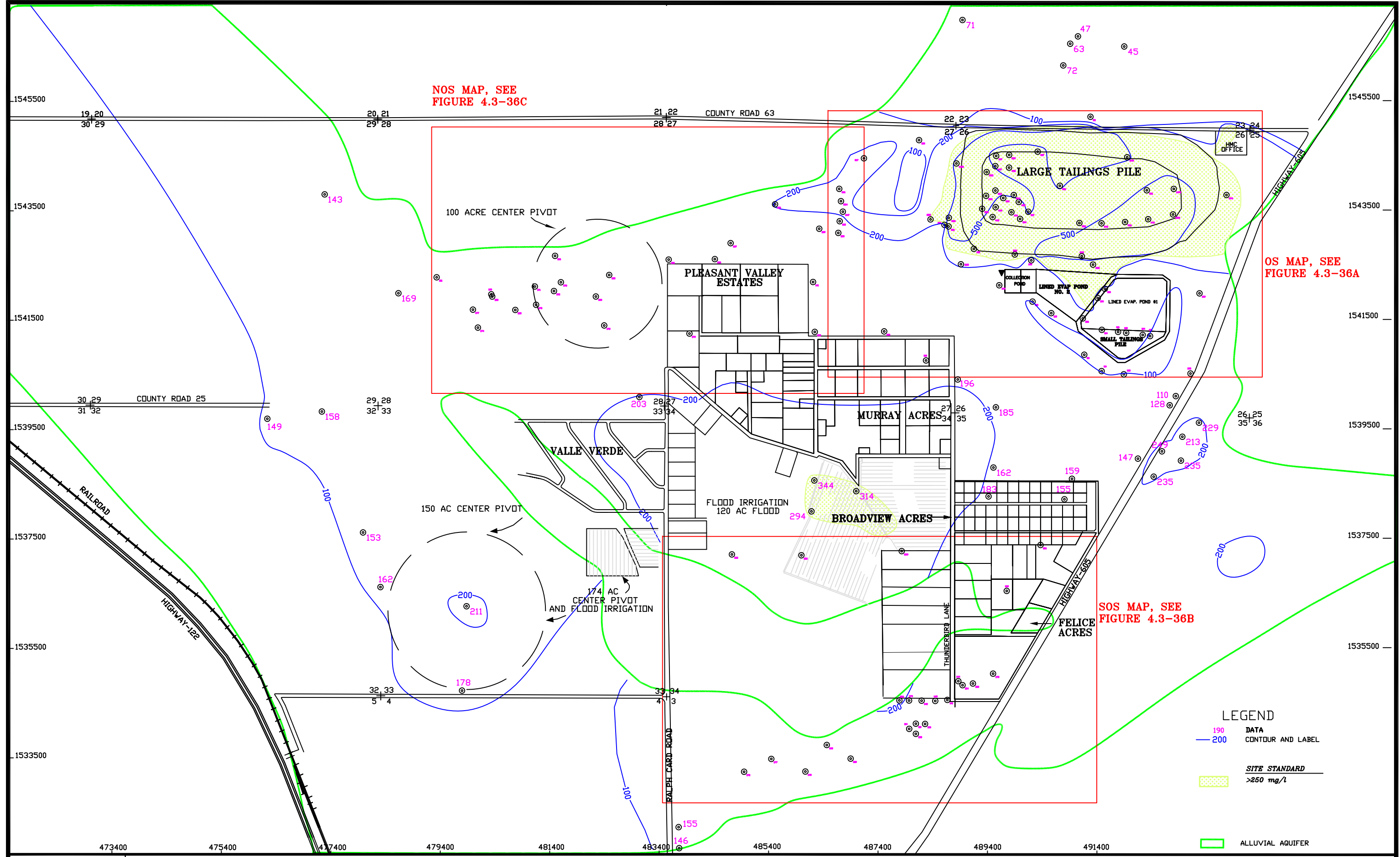
**FIGURE 4.3-35. TDS CONCENTRATIONS FOR WELLS 551, 647, 649 AND 996.**



NOS MAP, SEE  
FIGURE 4.3-36C

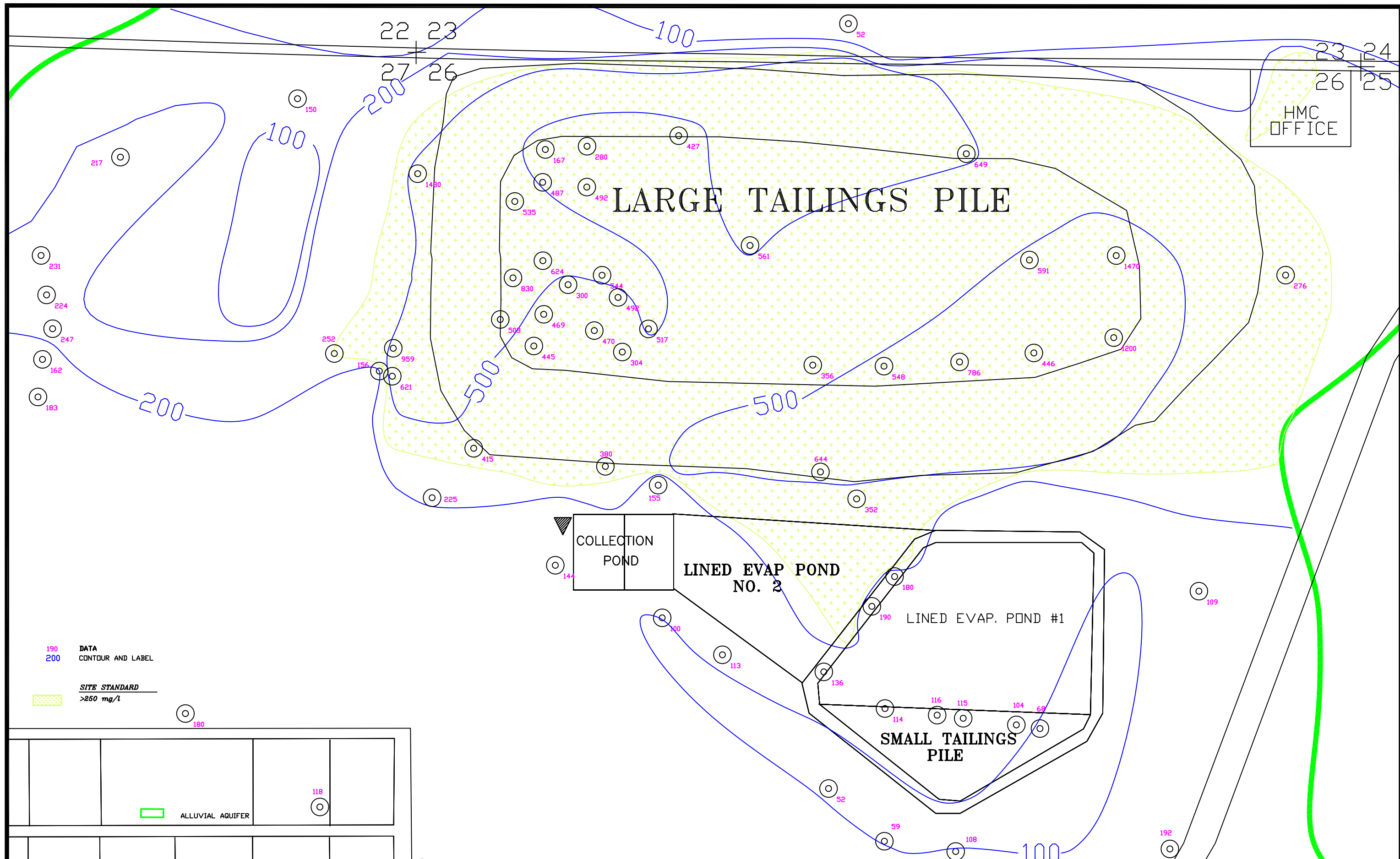
OS MAP, SEE  
FIGURE 4.3-36A

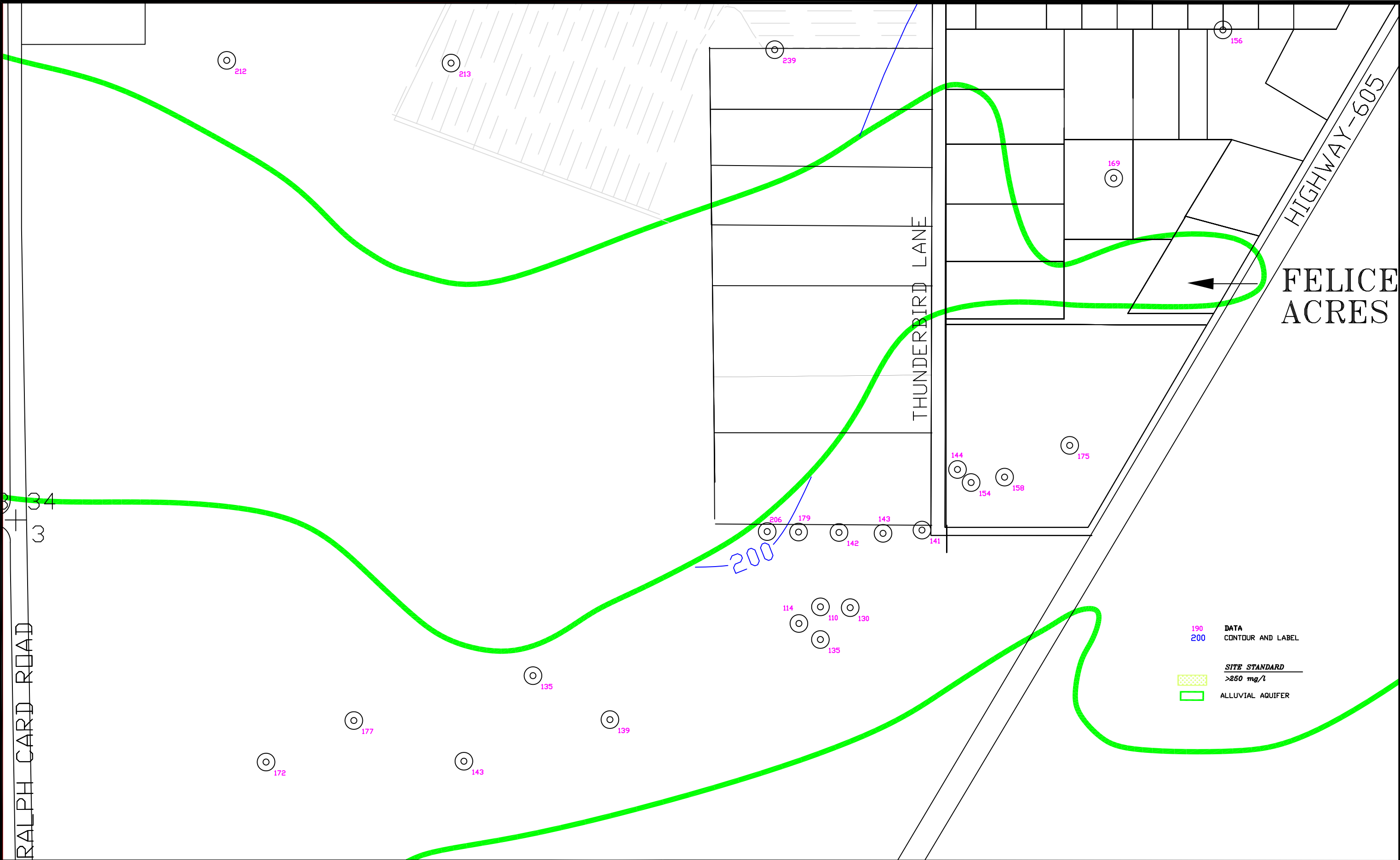
SOS MAP, SEE  
FIGURE 4.3-36B



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FIGURE 4.3-36. CHLORIDE CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, 2020, mg/L

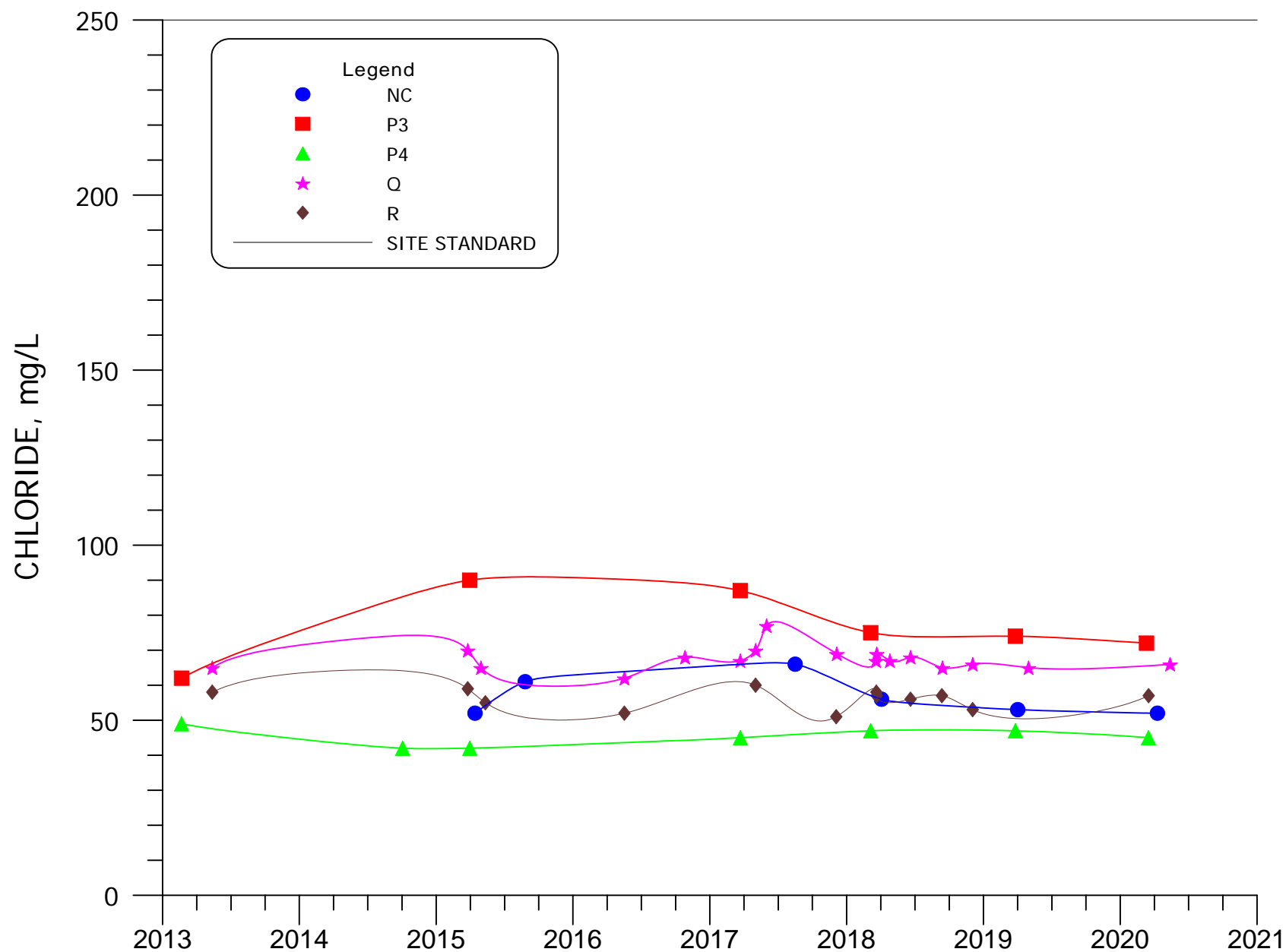




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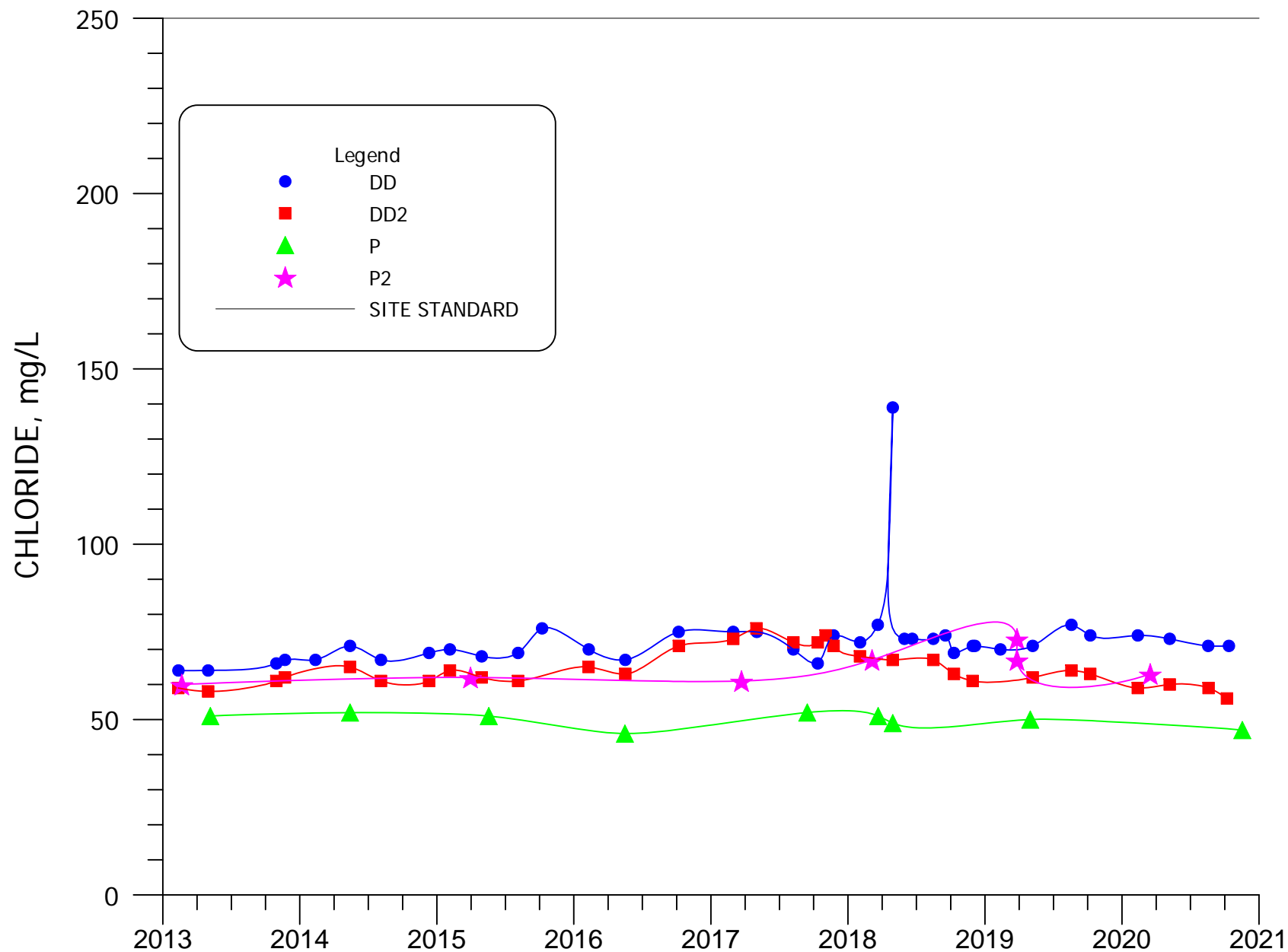
FIGURE 4.3-36B. CHLORIDE CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, SOS, 2020, mg/L



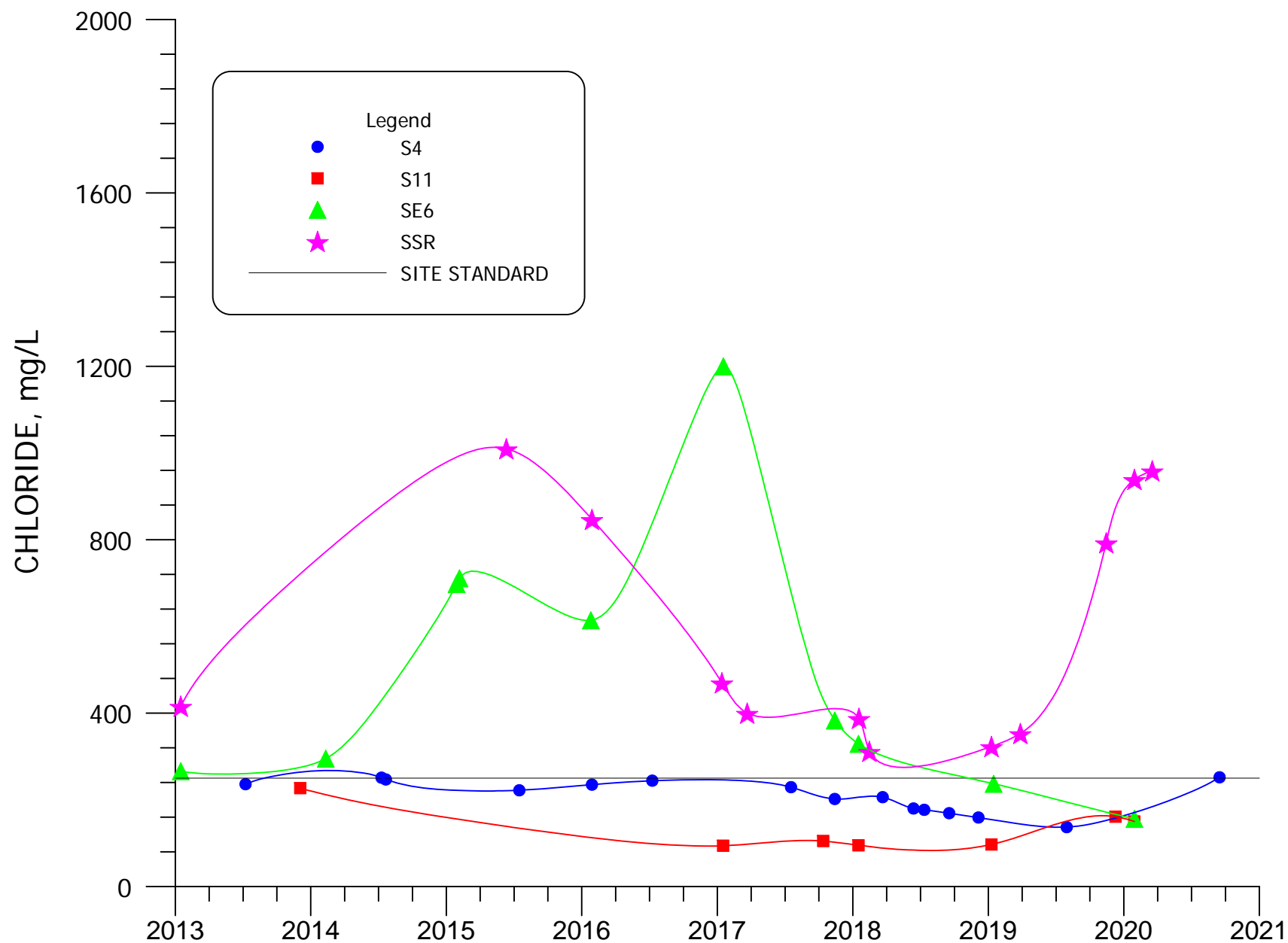


**FIGURE 4.3-37. CHLORIDE CONCENTRATIONS FOR WELLS NC, P3, P4, Q AND R.**

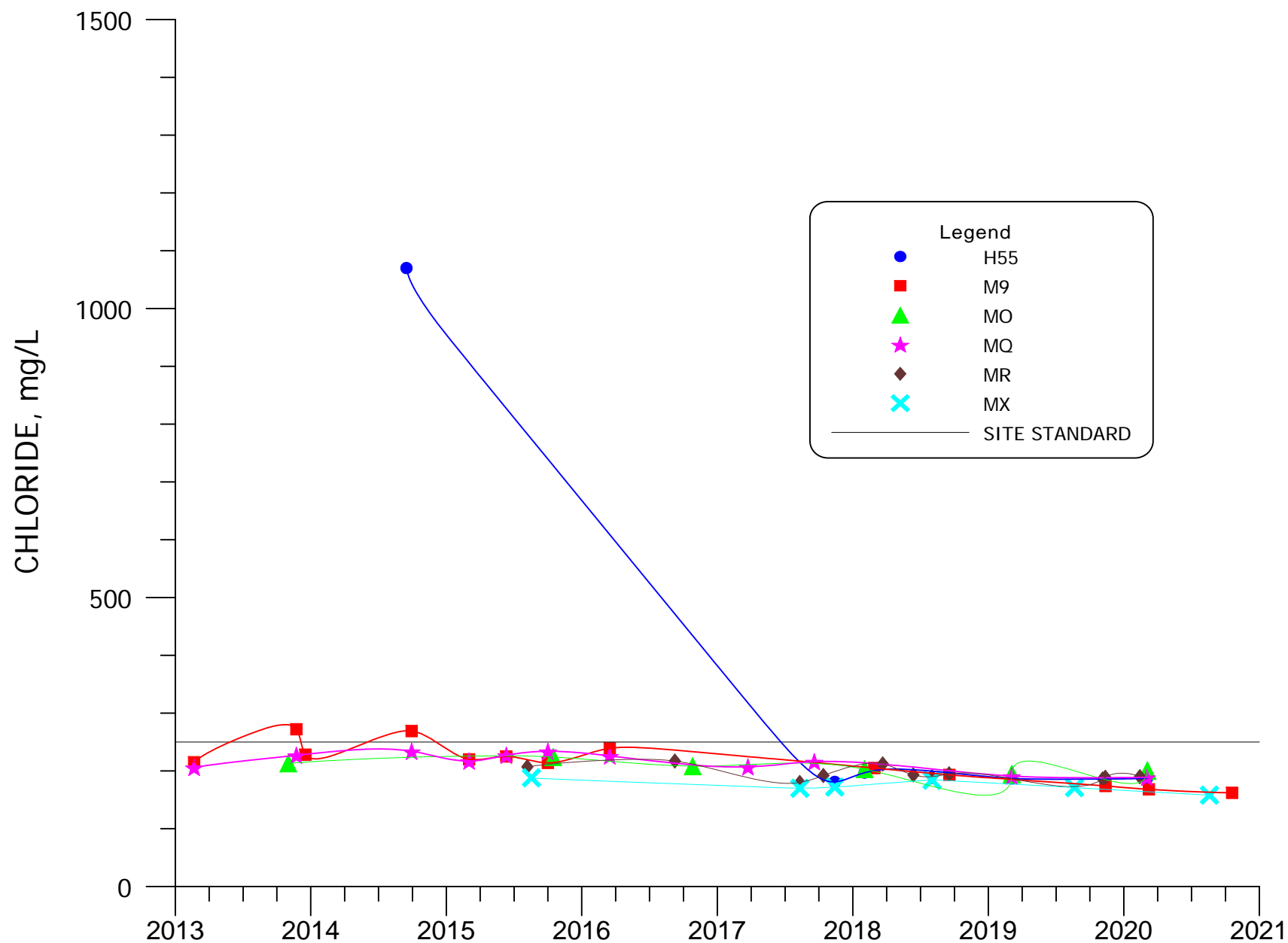
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**FIGURE 4.3-37A. CHLORIDE CONCENTRATIONS FOR WELLS DD, DD2, P AND P2.**

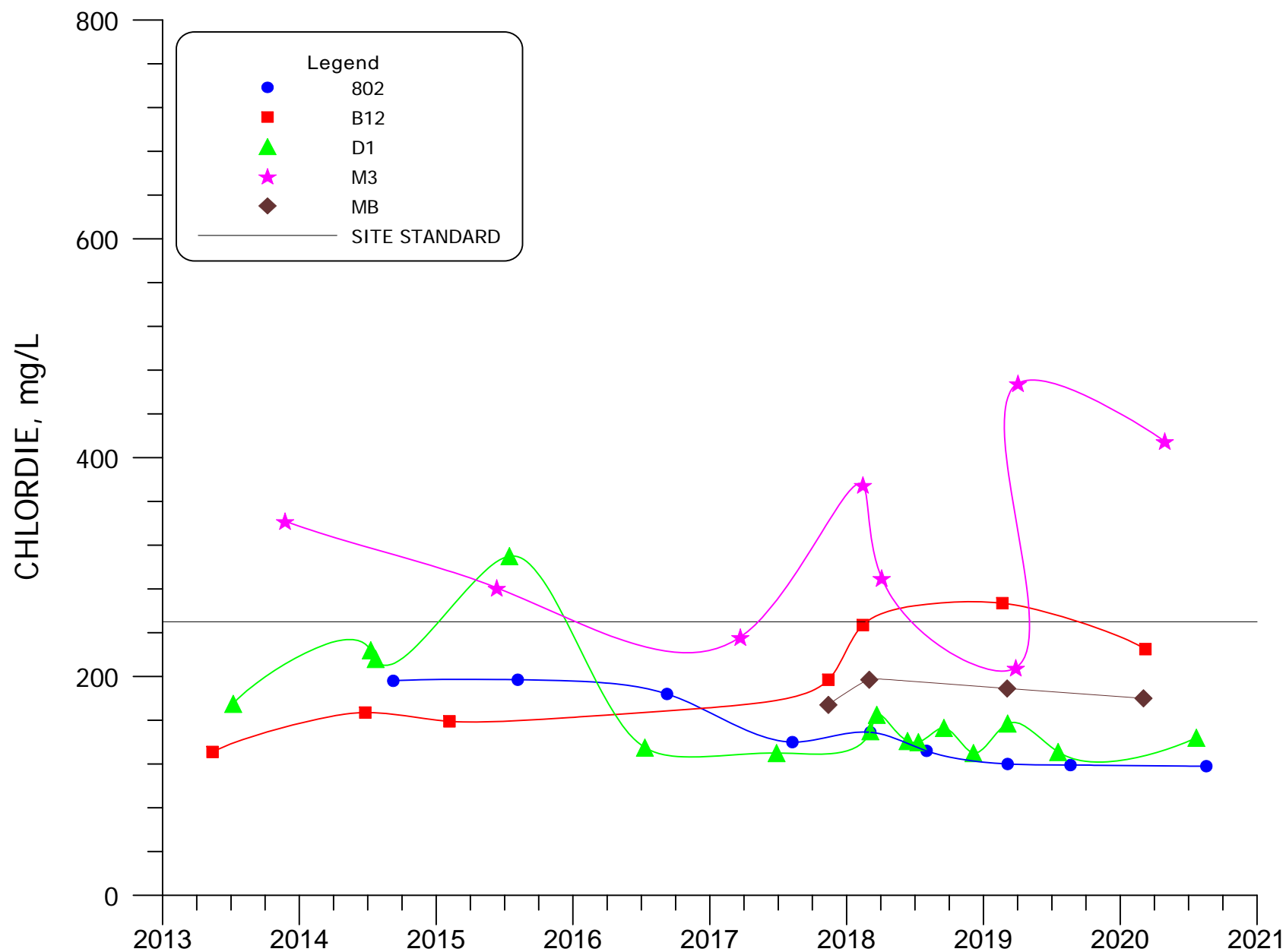


**FIGURE 4.3-38. CHLORIDE CONCENTRATIONS FOR WELLS S4, S11, SE6 AND SSR.**

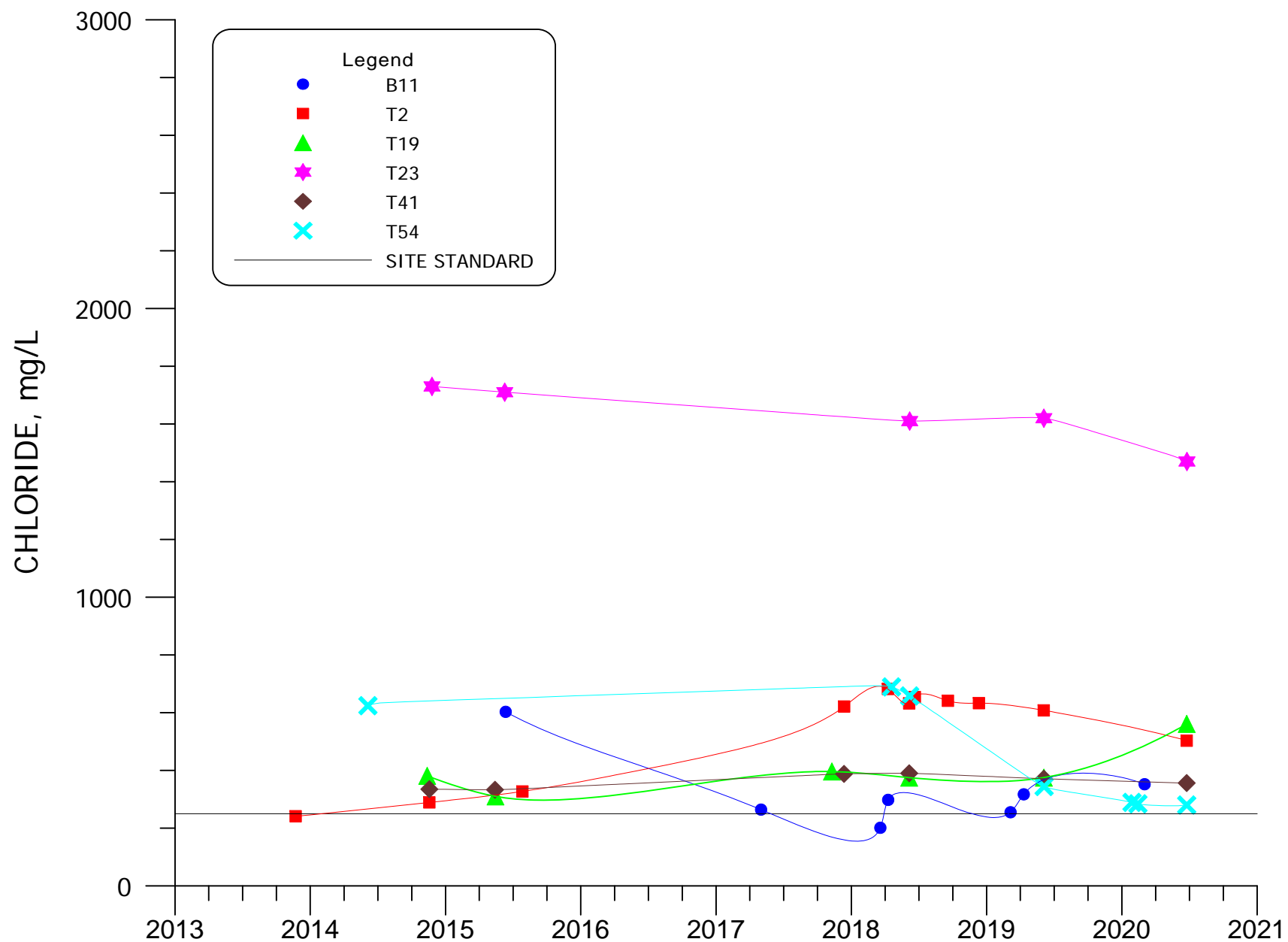


**FIGURE 4.3-39. CHLORIDE CONCENTRATIONS FOR WELLS H55, M9, MO, MQ, MR AND MX.**

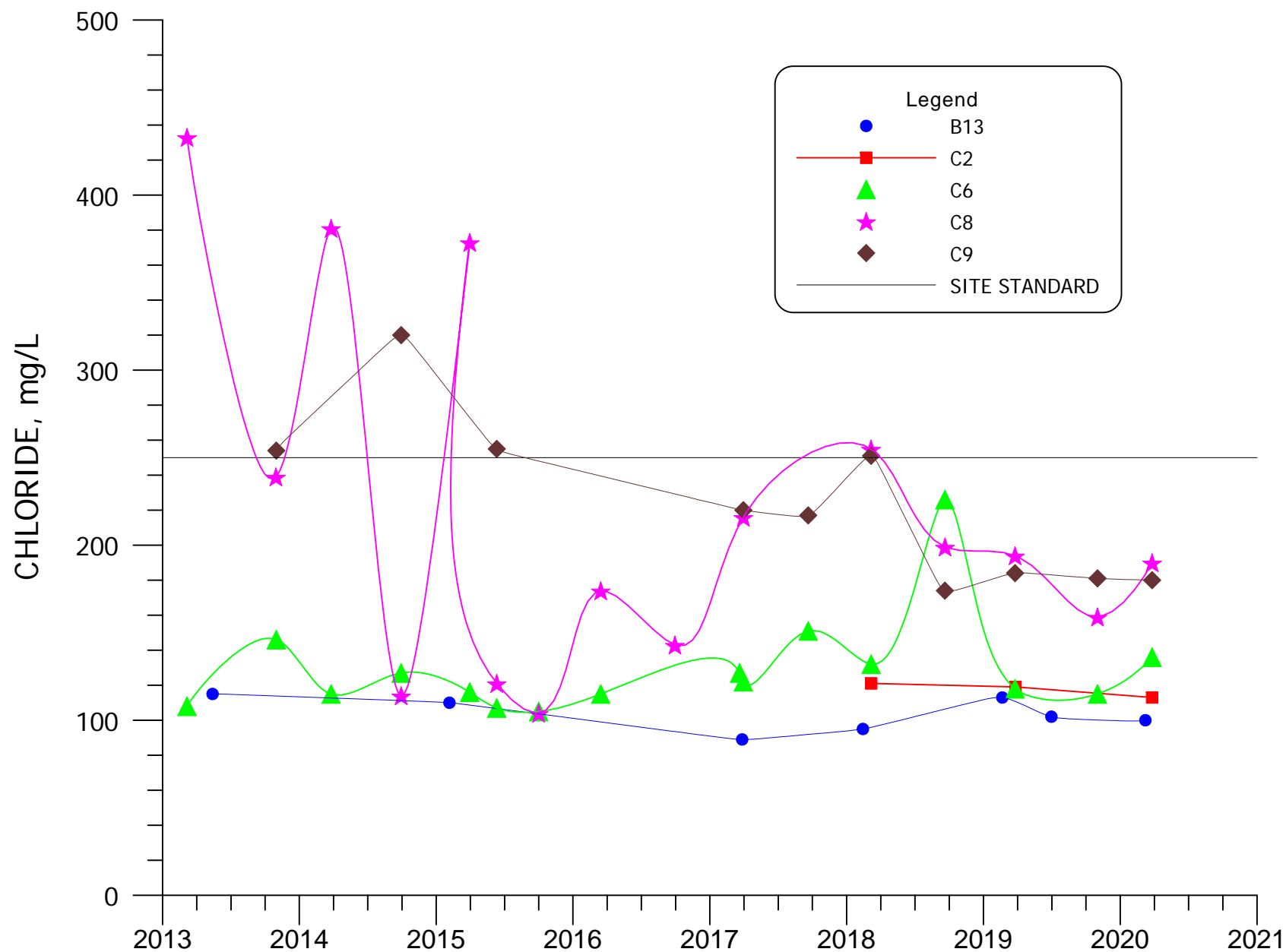




**FIGURE 4.3-40. CHLORIDE CONCENTRATIONS FOR WELLS 802, B12, D1, M3 AND MB.**

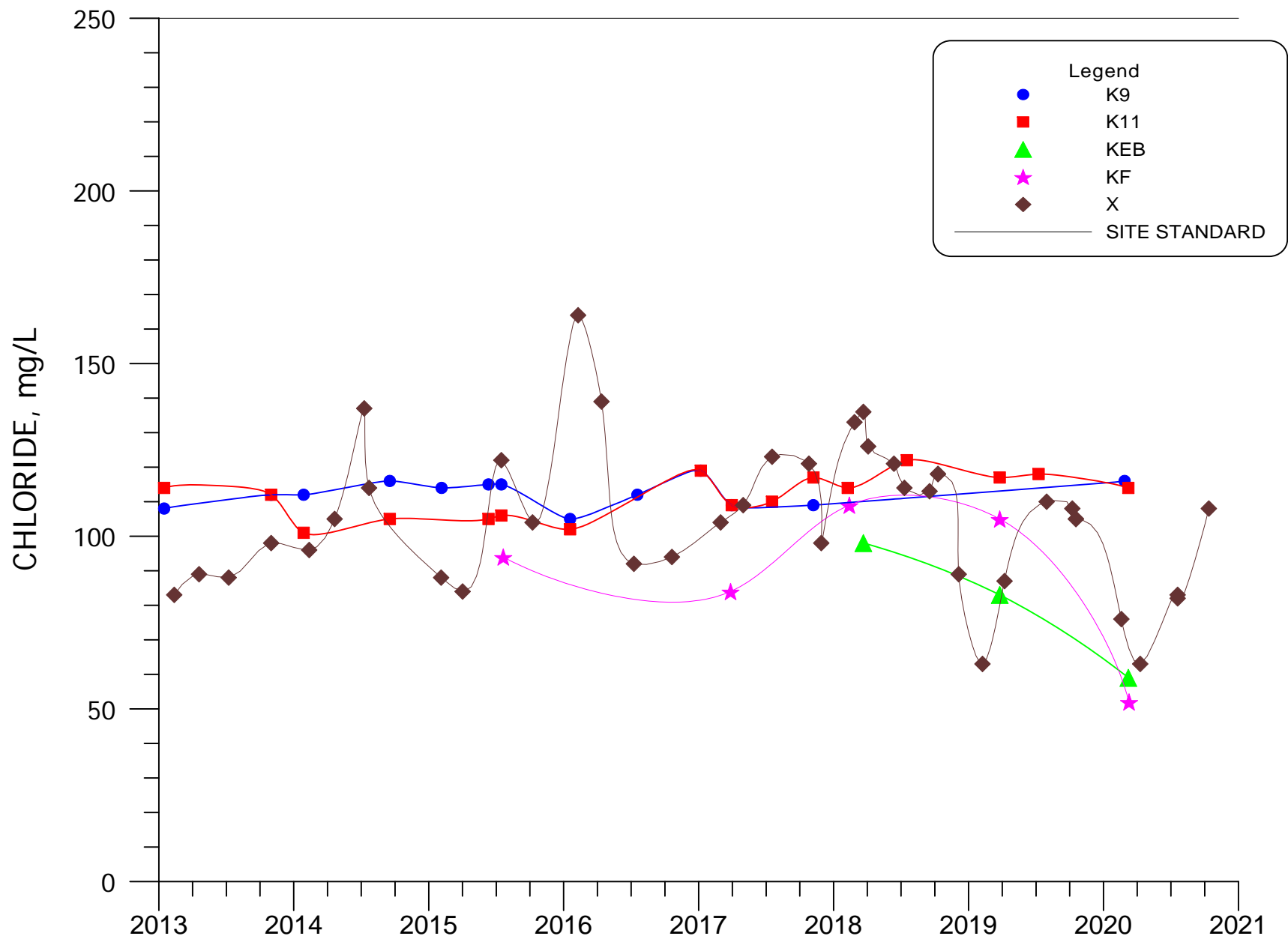


**FIGURE 4.3-41. CHLORIDE CONCENTRATIONS FOR WELLS B11, T2, T19, T23, T41 AND T54.**

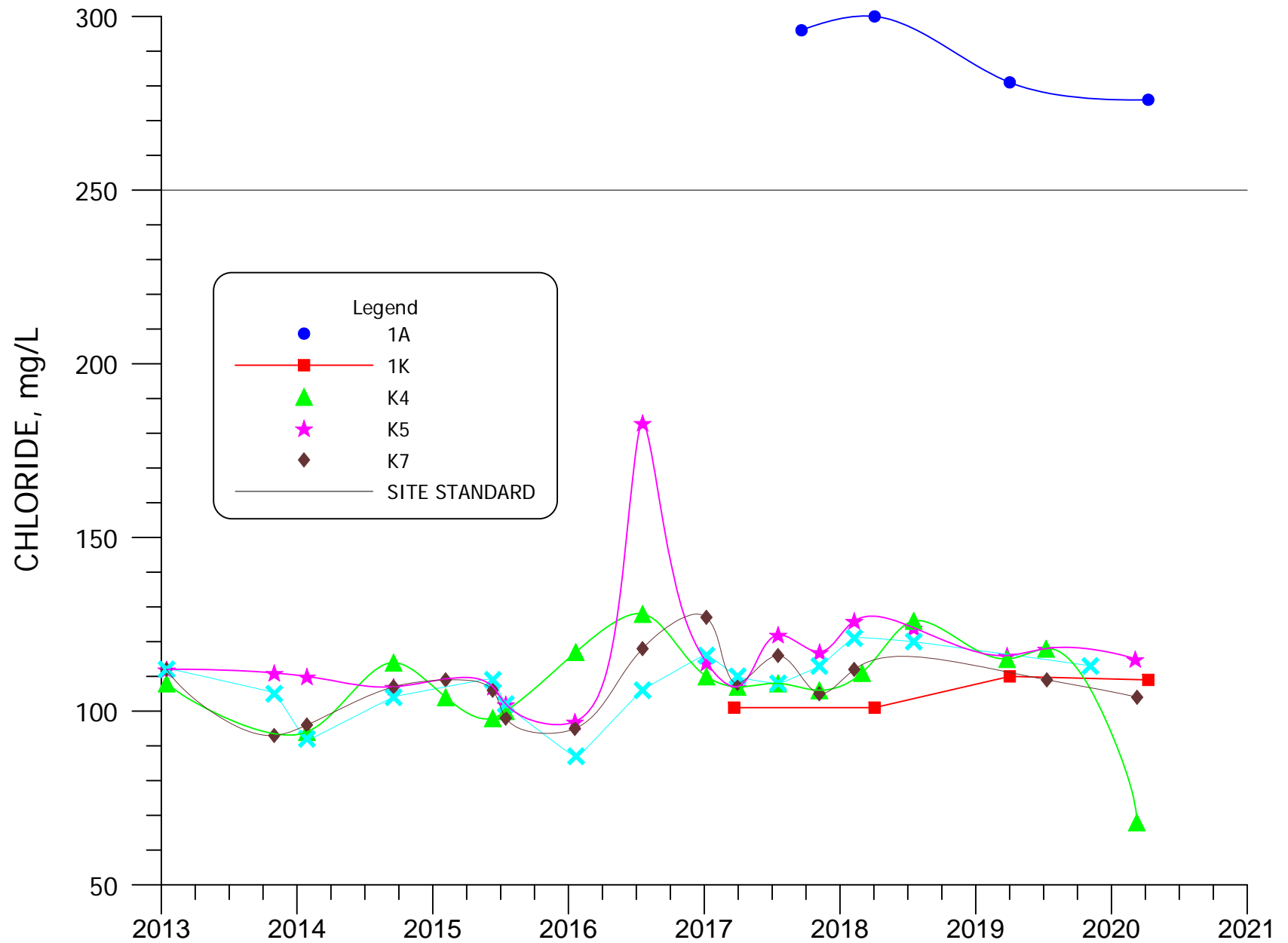


**FIGURE 4.3-42. CHLORIDE CONCENTRATIONS FOR WELLS B13, C2, C6, C8 AND C9.**

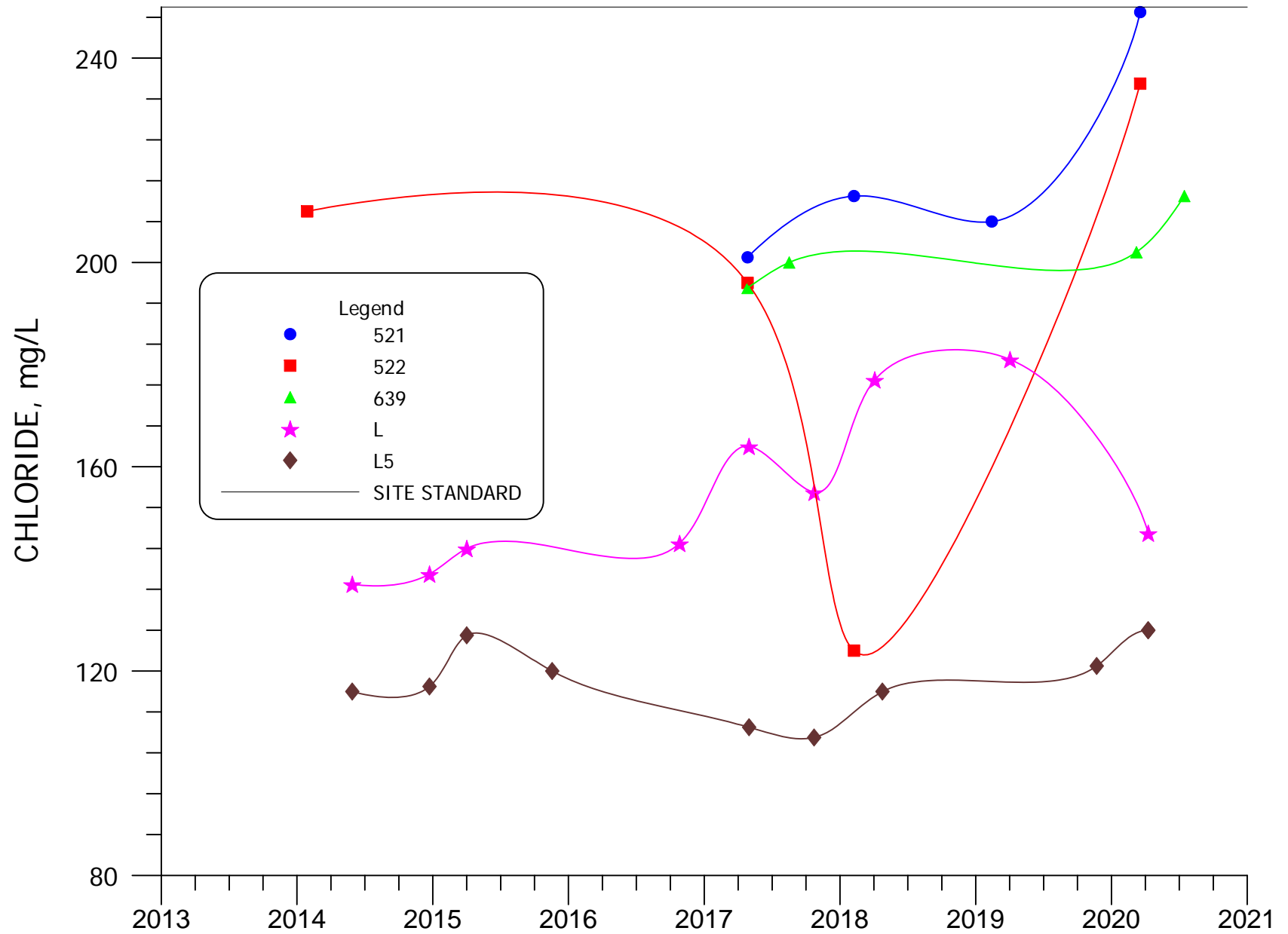
4.3-80



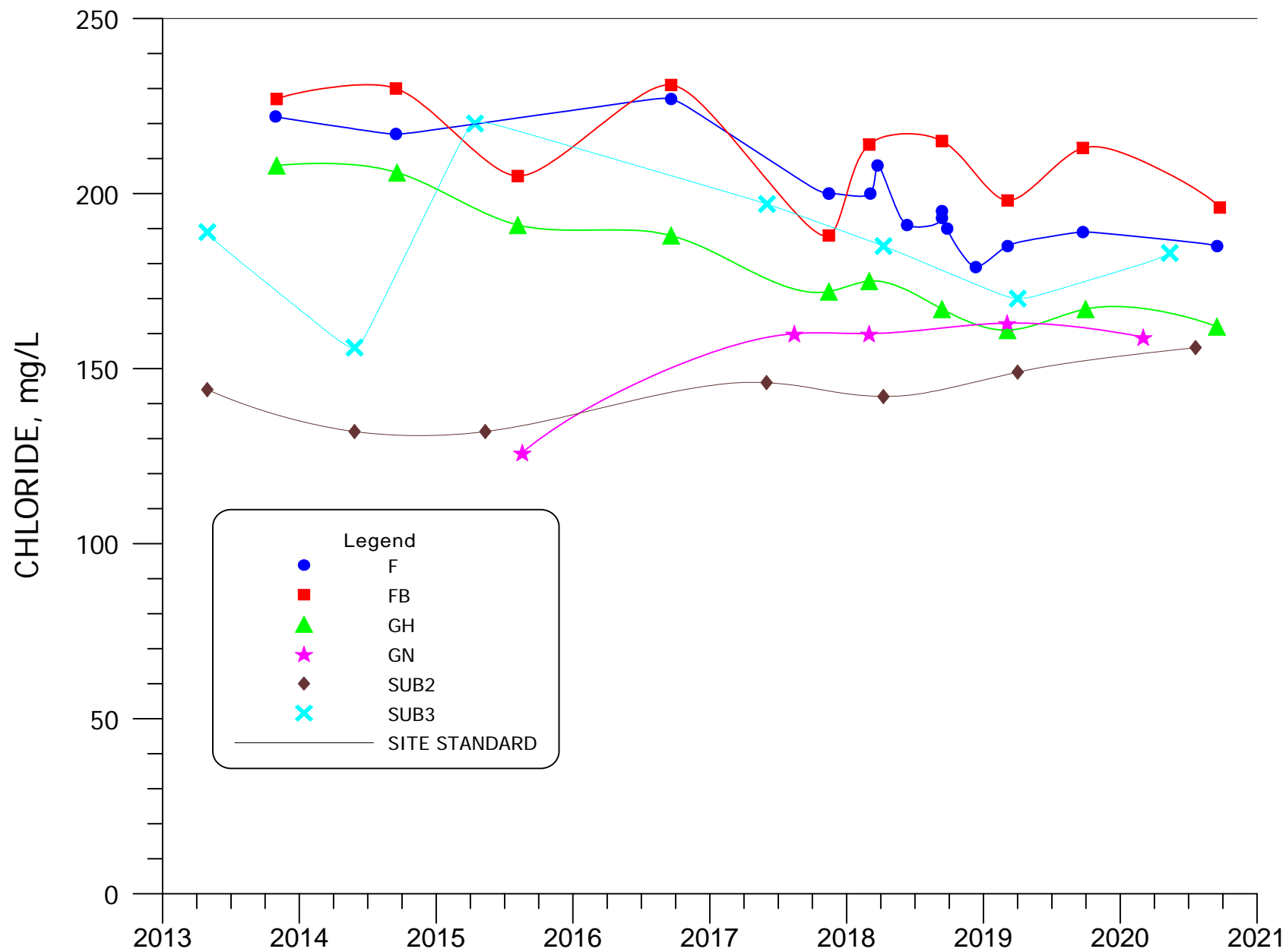
**FIGURE 4.3-43. CHLORIDE CONCENTRATIONS FOR WELLS K9, K11, KEB, KF AND X.**



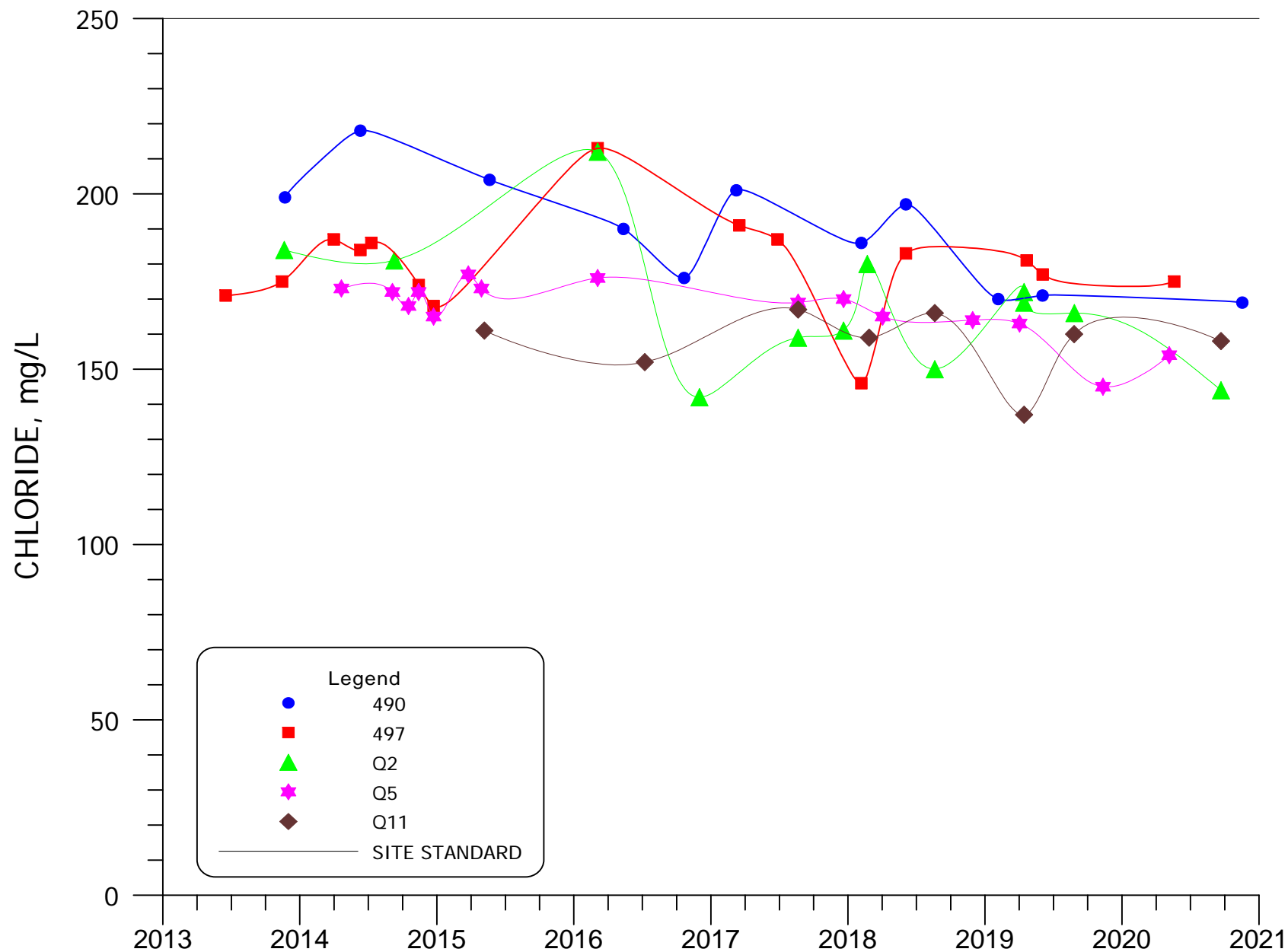
**FIGURE 4.3-44. CHLORIDE CONCENTRATIONS FOR WELLS 1A, 1K, K4, K5 AND K7.**



**FIGURE 4.3-45. CHLORIDE CONCENTRATIONS FOR WELLS 521, 522, 639, L AND L5.**



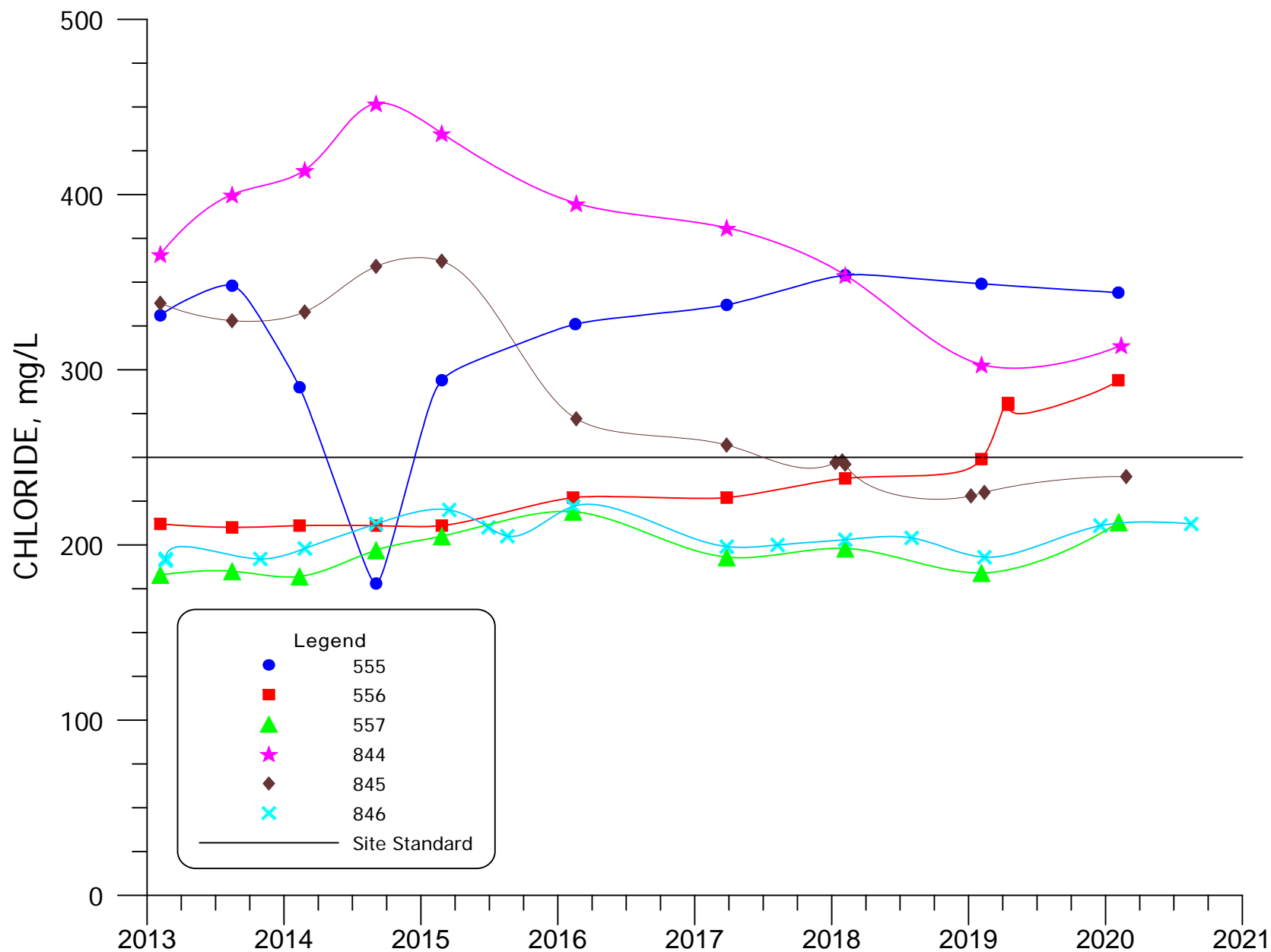
**FIGURE 4.3-46. CHLORIDE CONCENTRATIONS FOR WELLS F, FB, GH, GN, SUB2 AND SUB3.**



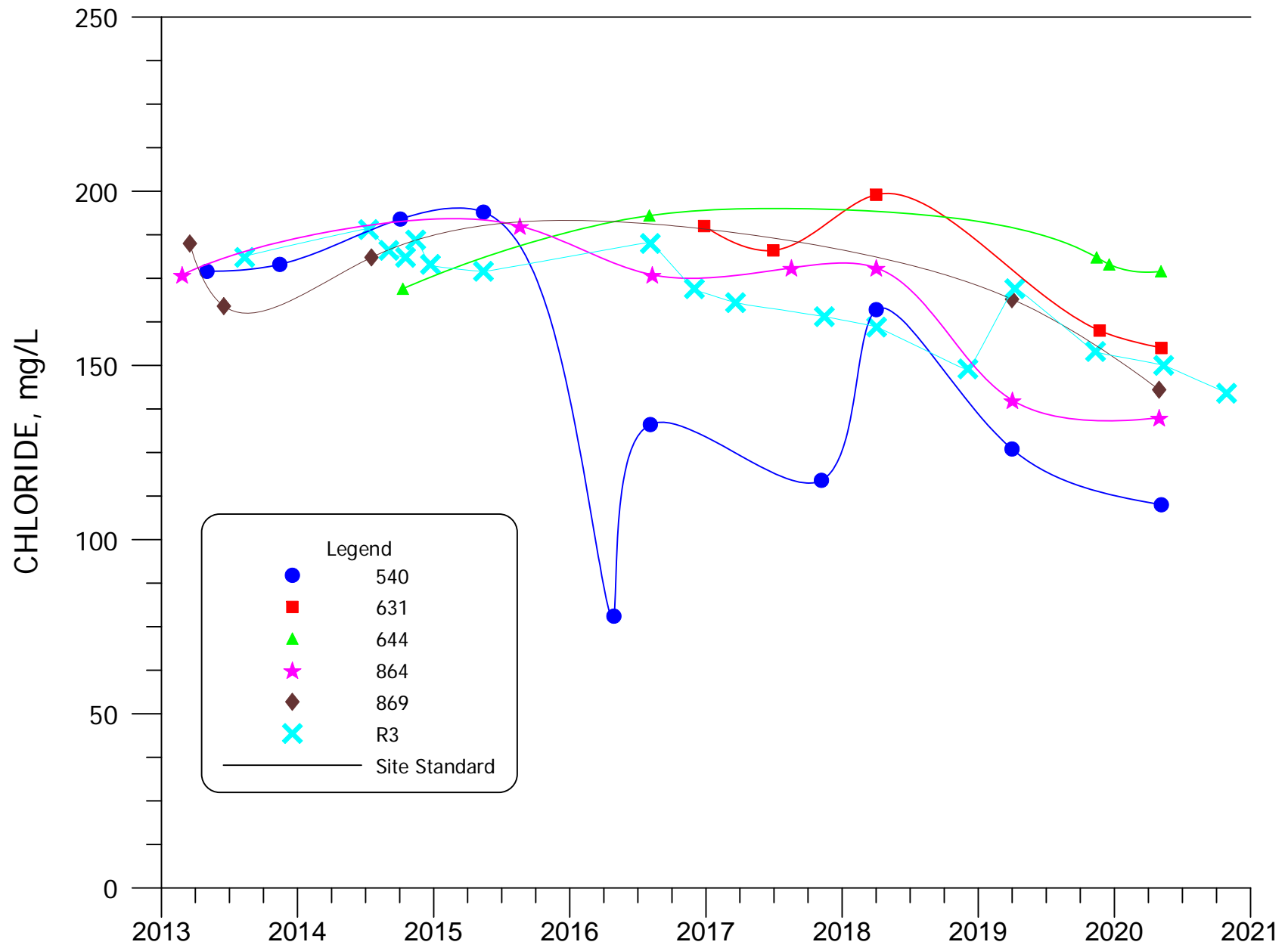
**FIGURE 4.3-47. CHLORIDE CONCENTRATIONS FOR WELLS 490, 497, Q2, Q5 AND Q11.**



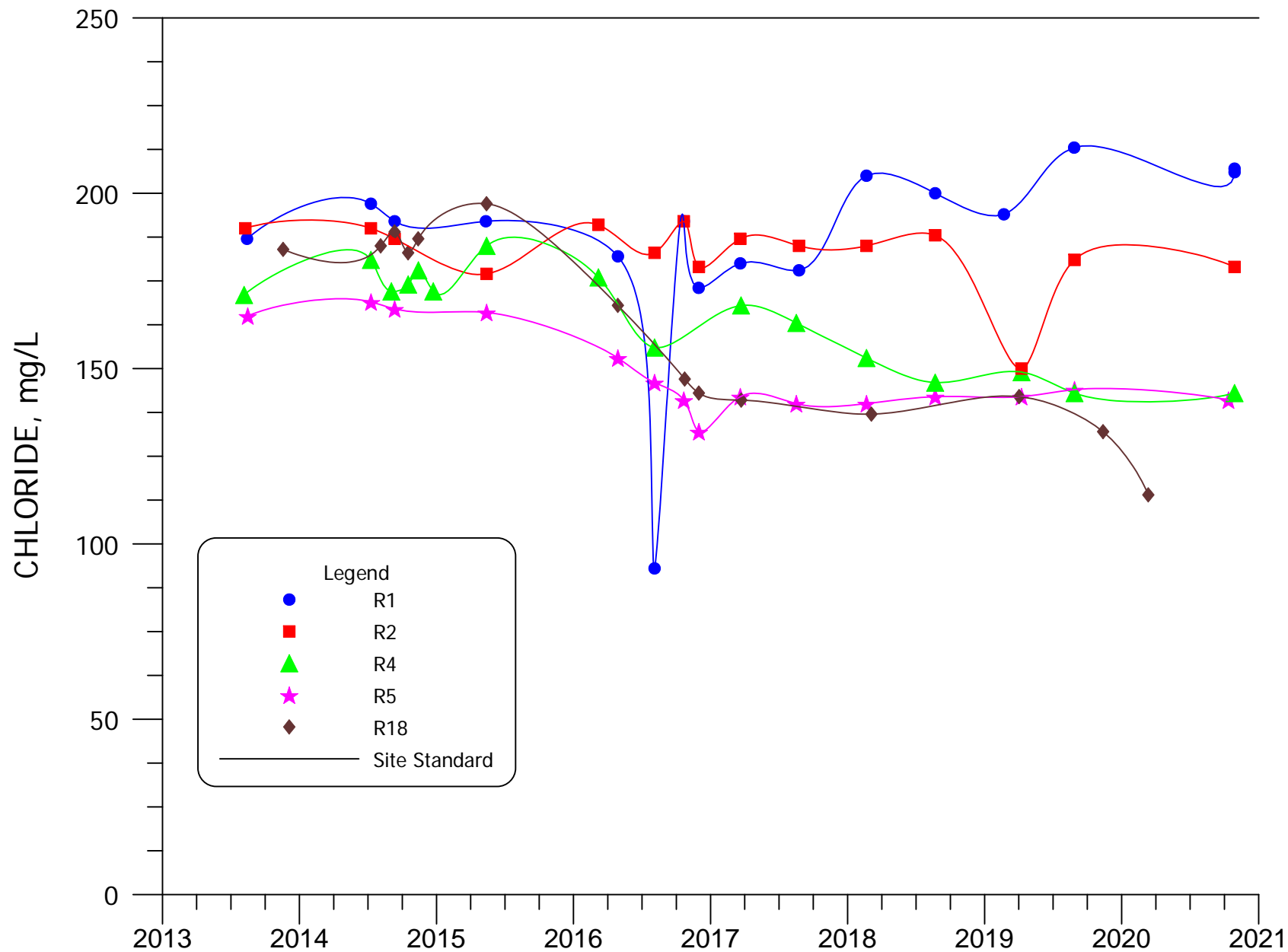
4.3-85



**FIGURE 4.3-48. CHLORIDE CONCENTRATIONS FOR WELLS 555, 556, 557, 844, 845 AND 846.**

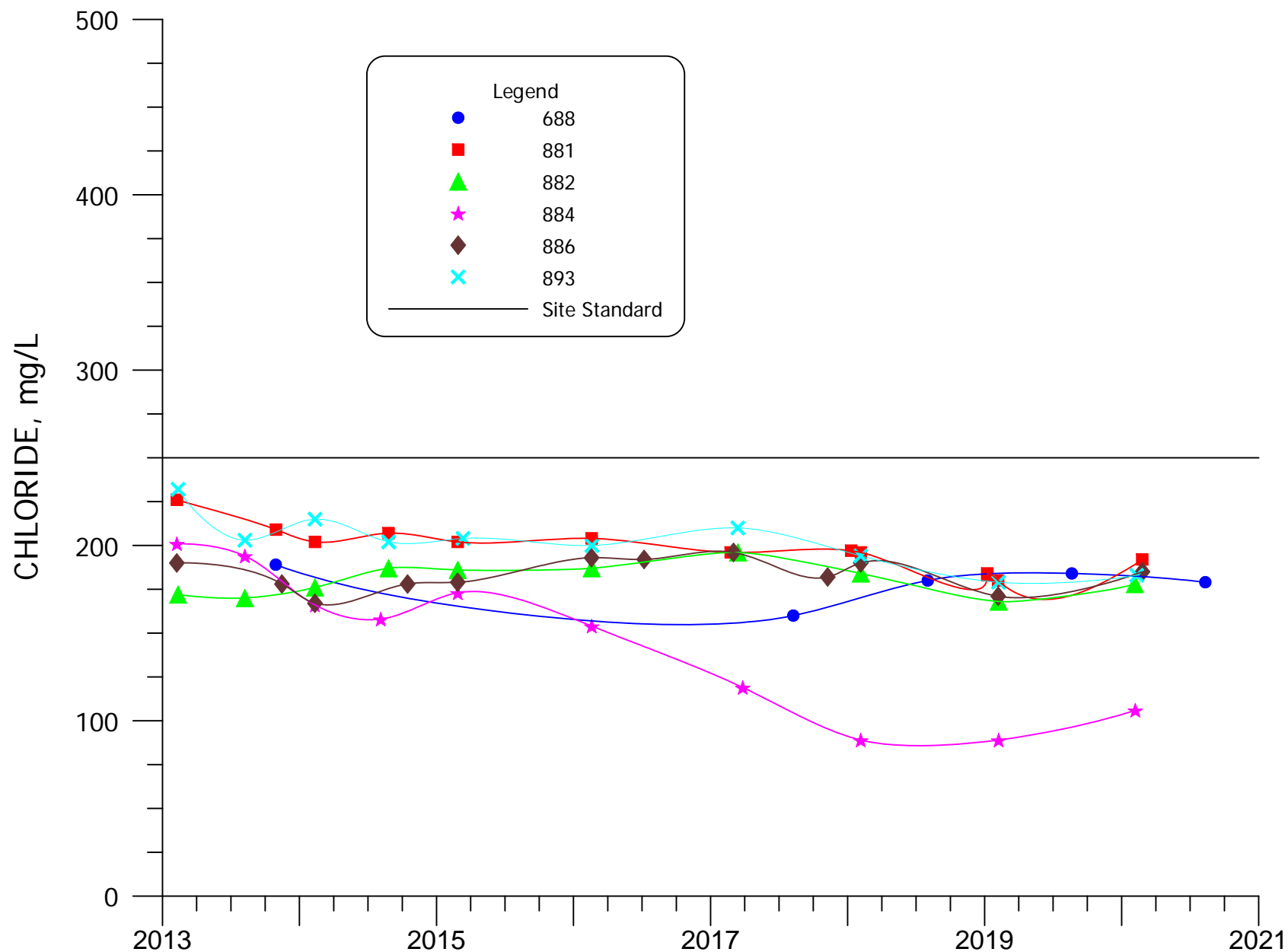


**FIGURE 4.3-49. CHLORIDE CONCENTRATIONS FOR WELLS 540, 631, 644, 864, 869 AND R3.**

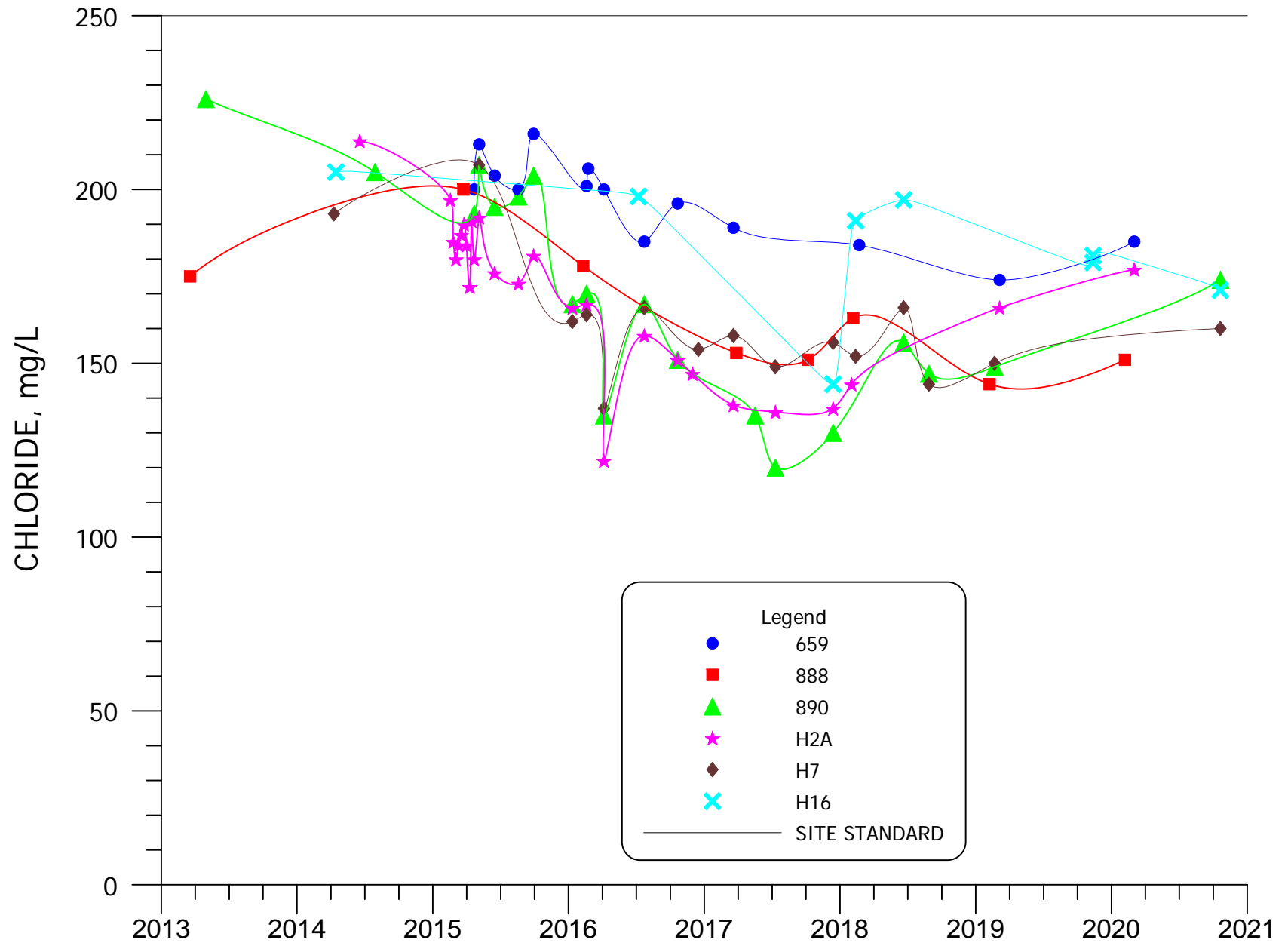


**FIGURE 4.3-49A. CHLORIDE CONCENTRATIONS FOR WELLS R1, R2, R4, R5 AND R18.**

4.3-88

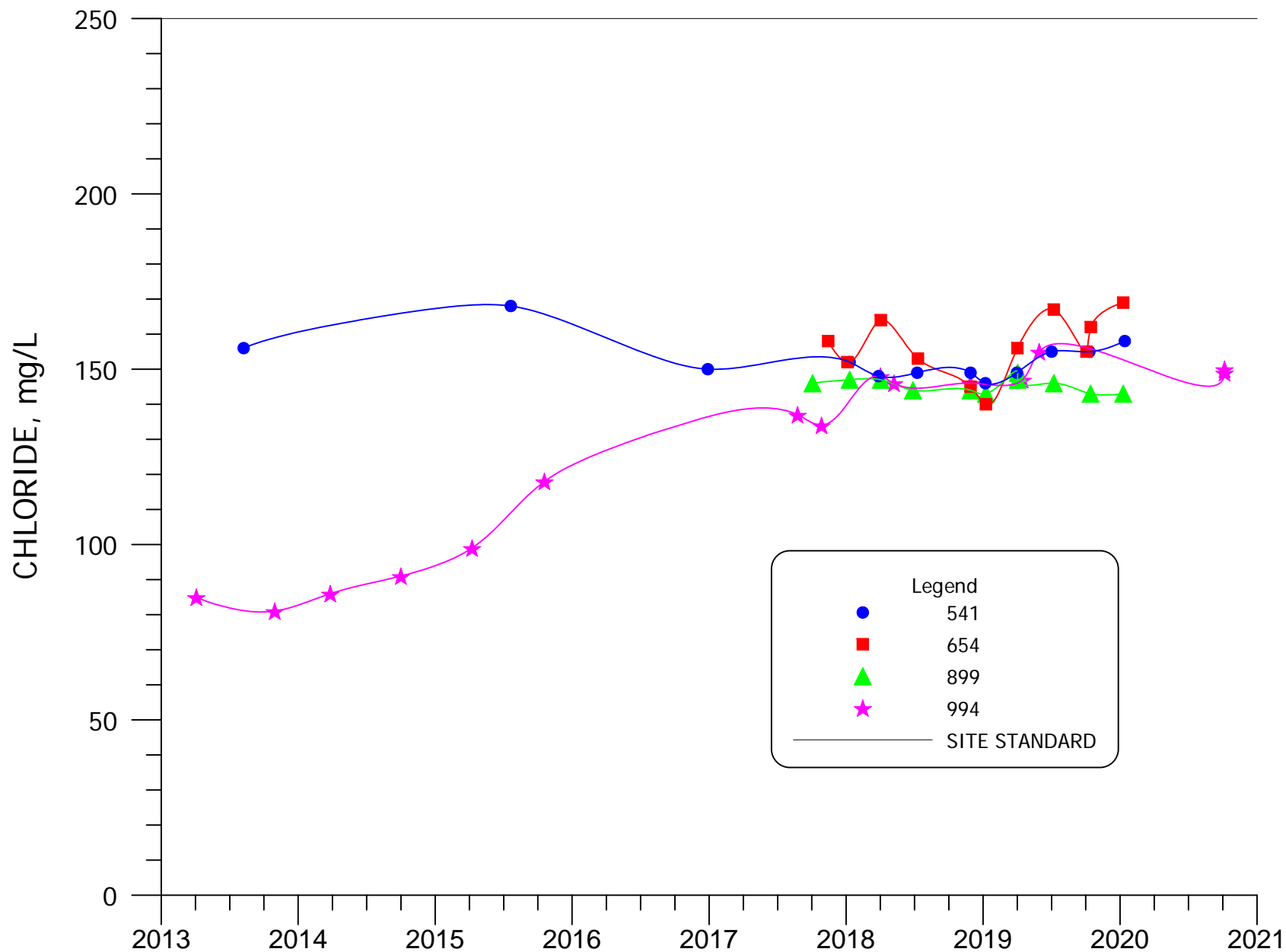


**FIGURE 4.3-50. CHLORIDE CONCENTRATIONS FOR WELLS  
688, 881, 882, 884, 886 AND 893.**

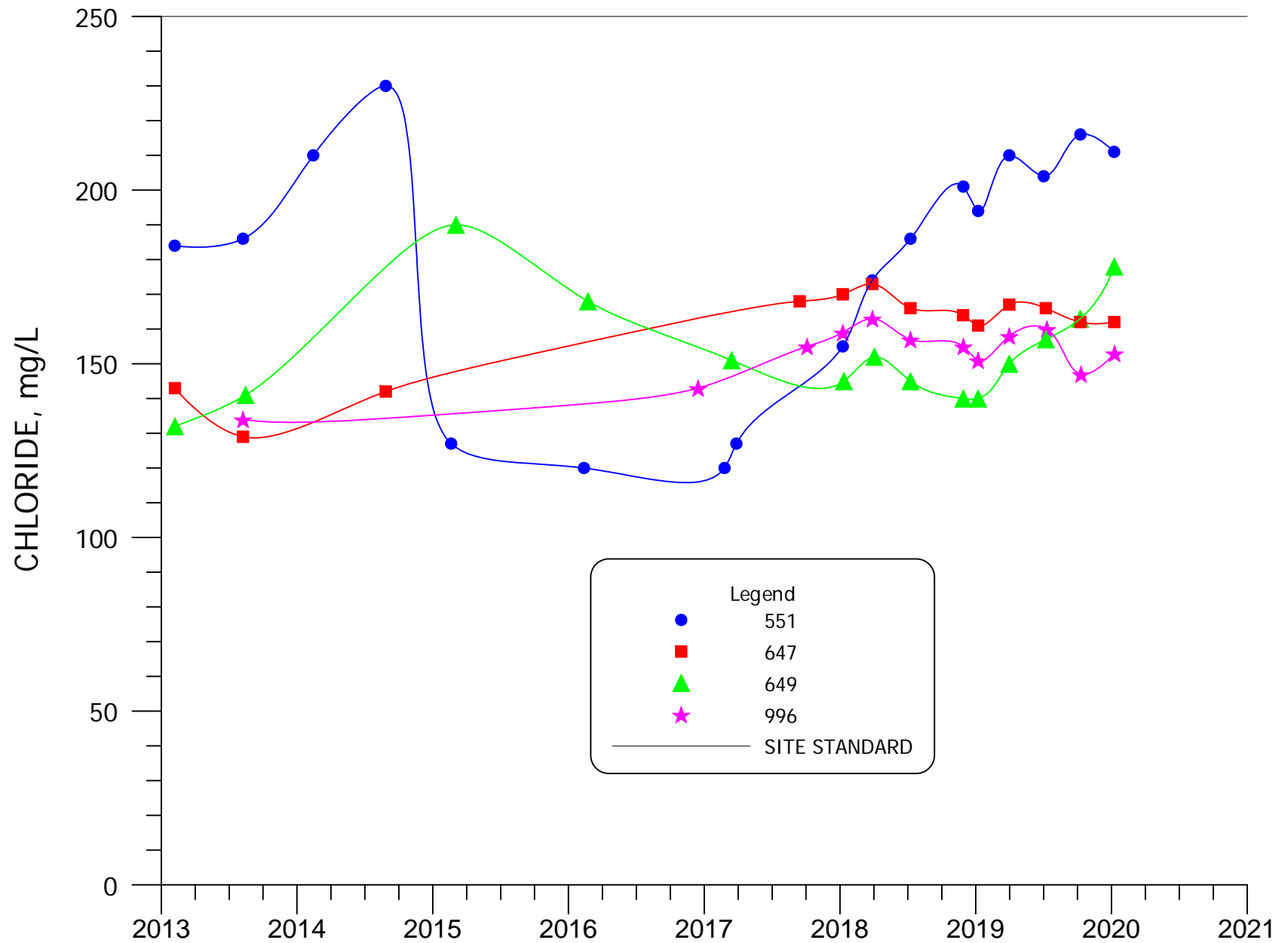


**FIGURE 4.3-50A. CHLORIDE CONCENTRATIONS FOR WELLS 659, 888, 890, H2A, H7 AND H16.**

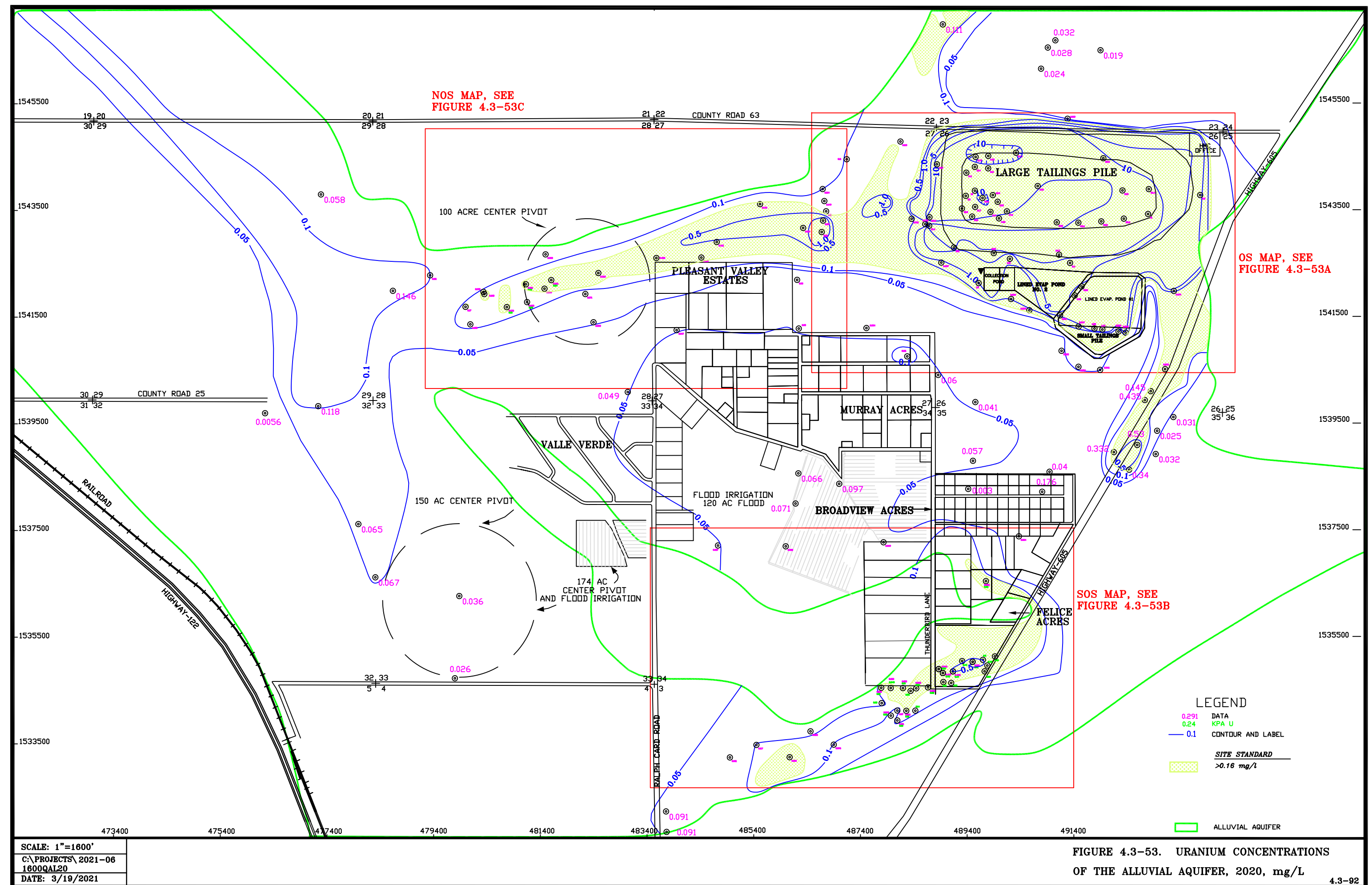
4.3-90



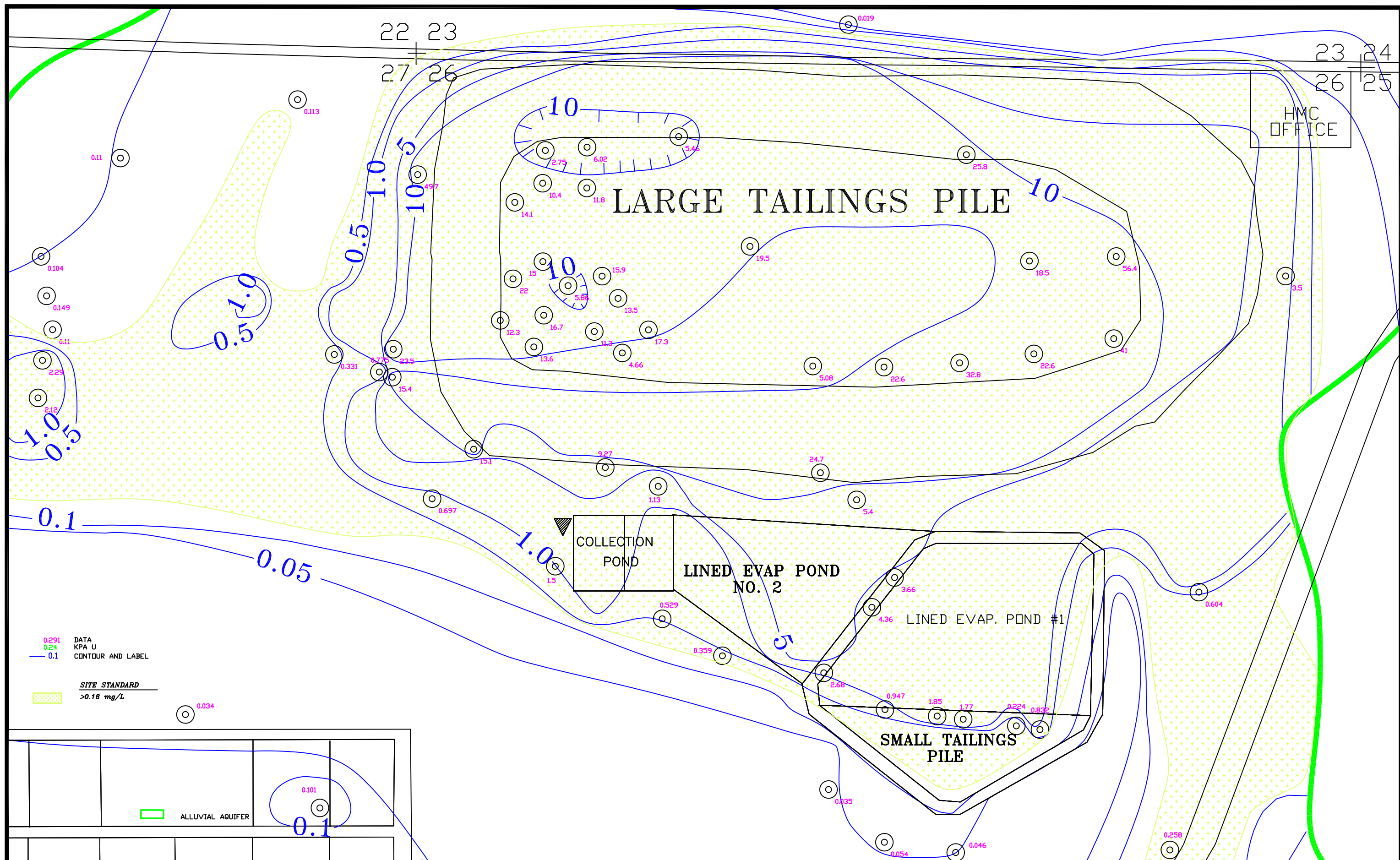
**FIGURE 4.3-51. CHLORIDE CONCENTRATIONS FOR WELLS 541, 654, 899 and 994.**



**FIGURE 4.3-52. CHLORIDE CONCENTRATIONS FOR WELLS 551, 647, 649 AND 996.**

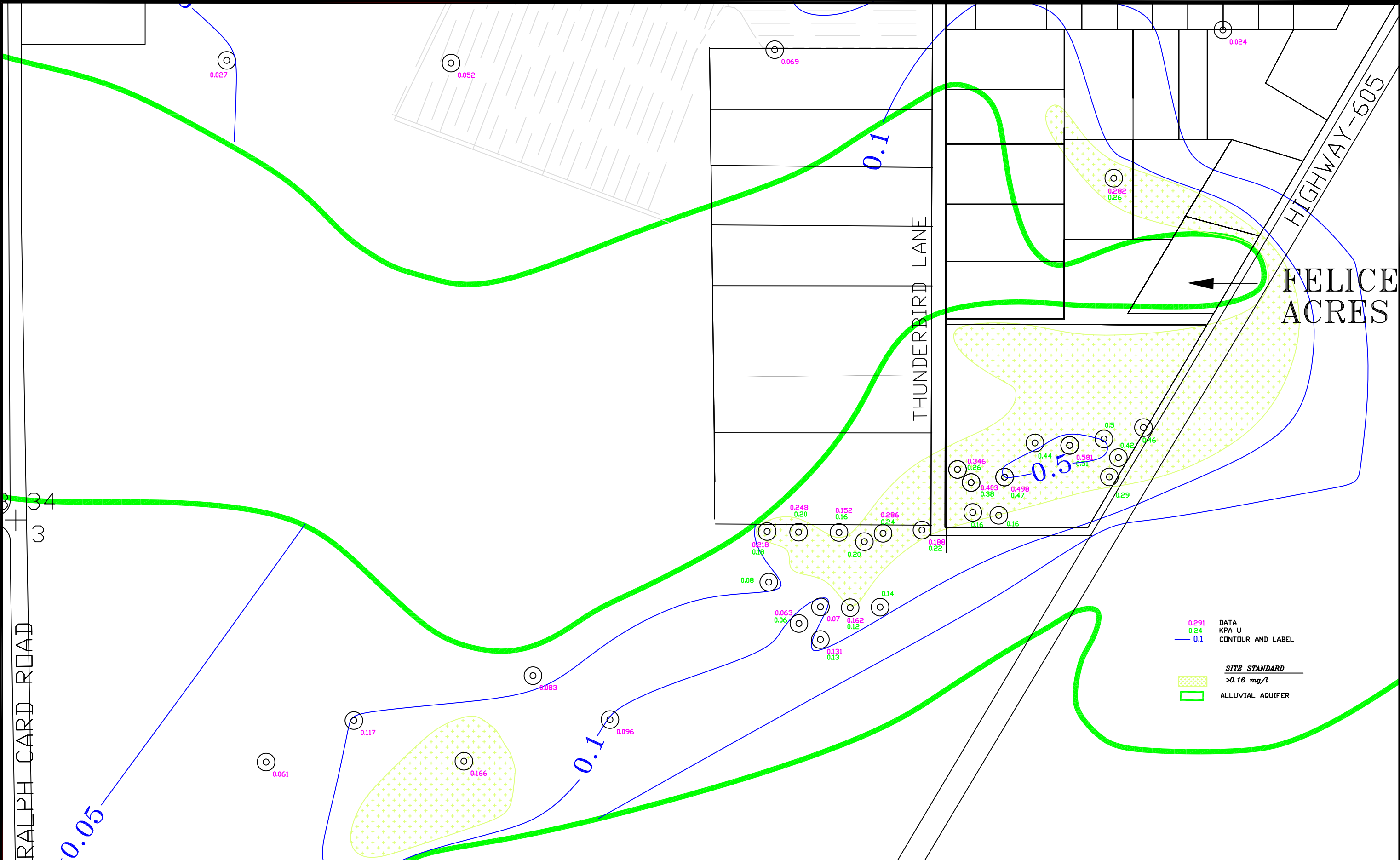






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**FIGURE 4.3-53A. URANIUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, OS, 2020, mg/L**



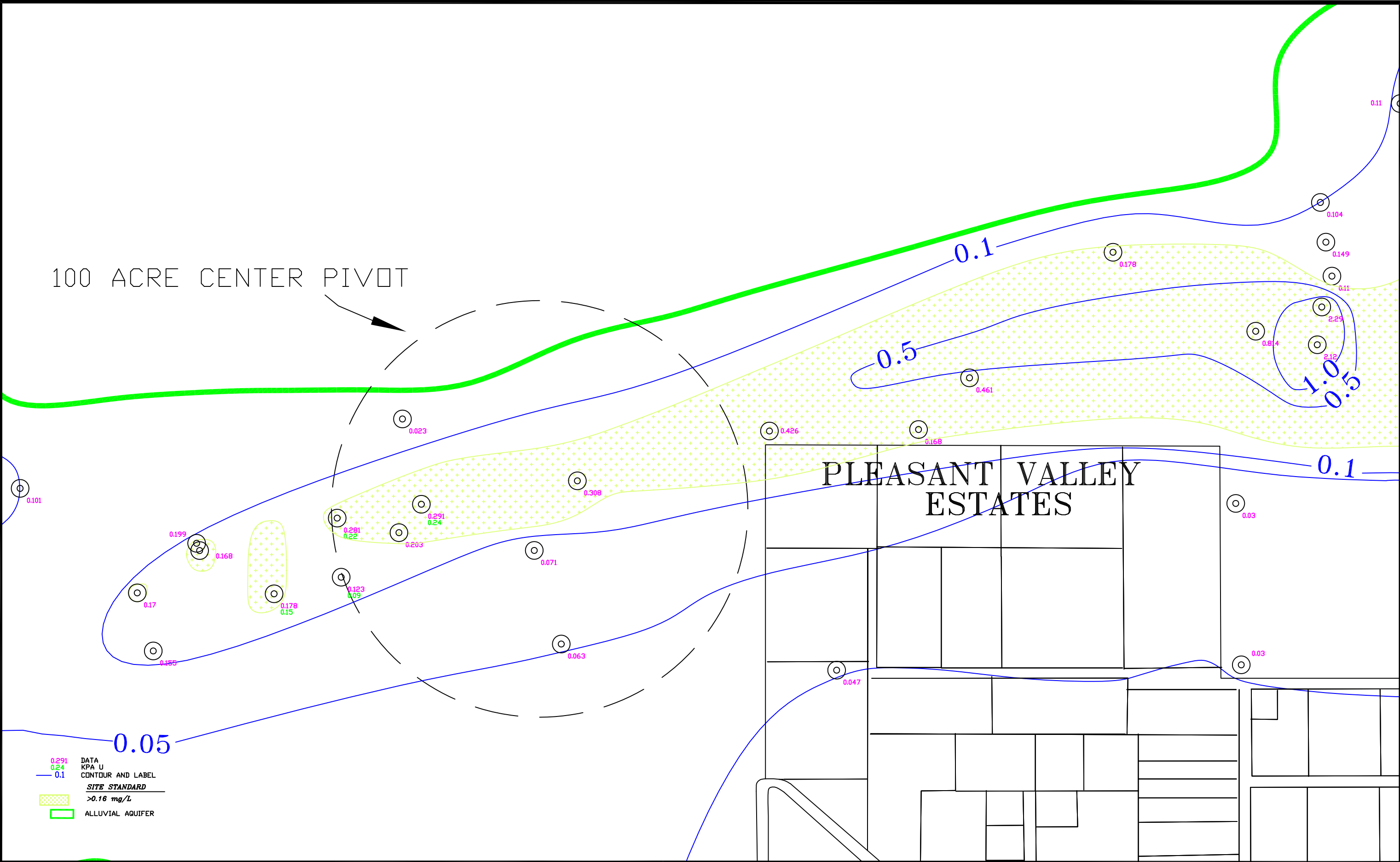
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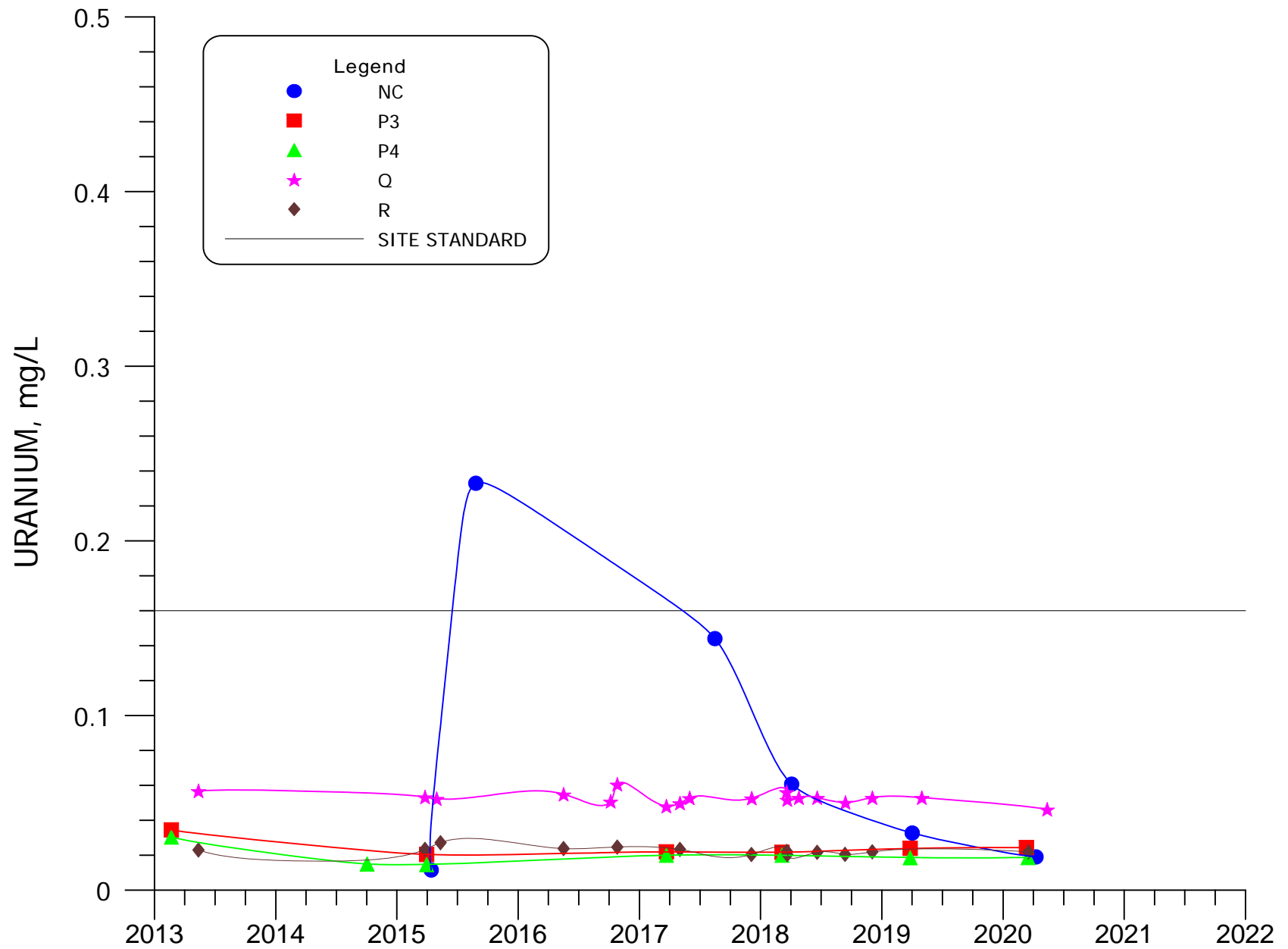
DATE: 3/19/2021

FIGURE 4.3-53B. URANIUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, SOS, 2020, mg/L



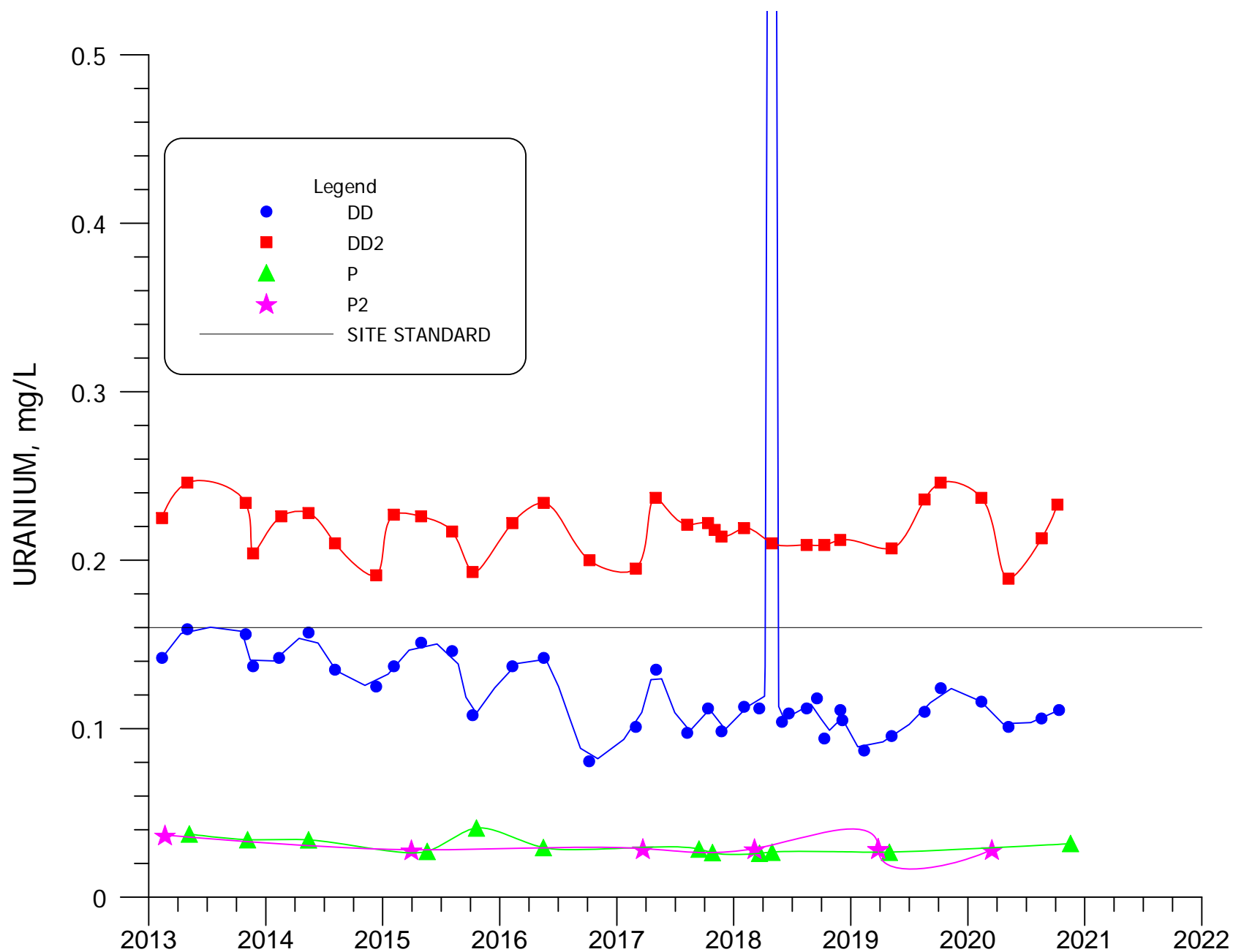
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DATE: 3/19/2021

FIGURE 4.3-53C. URANIUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, NOS, 2020, mg/L

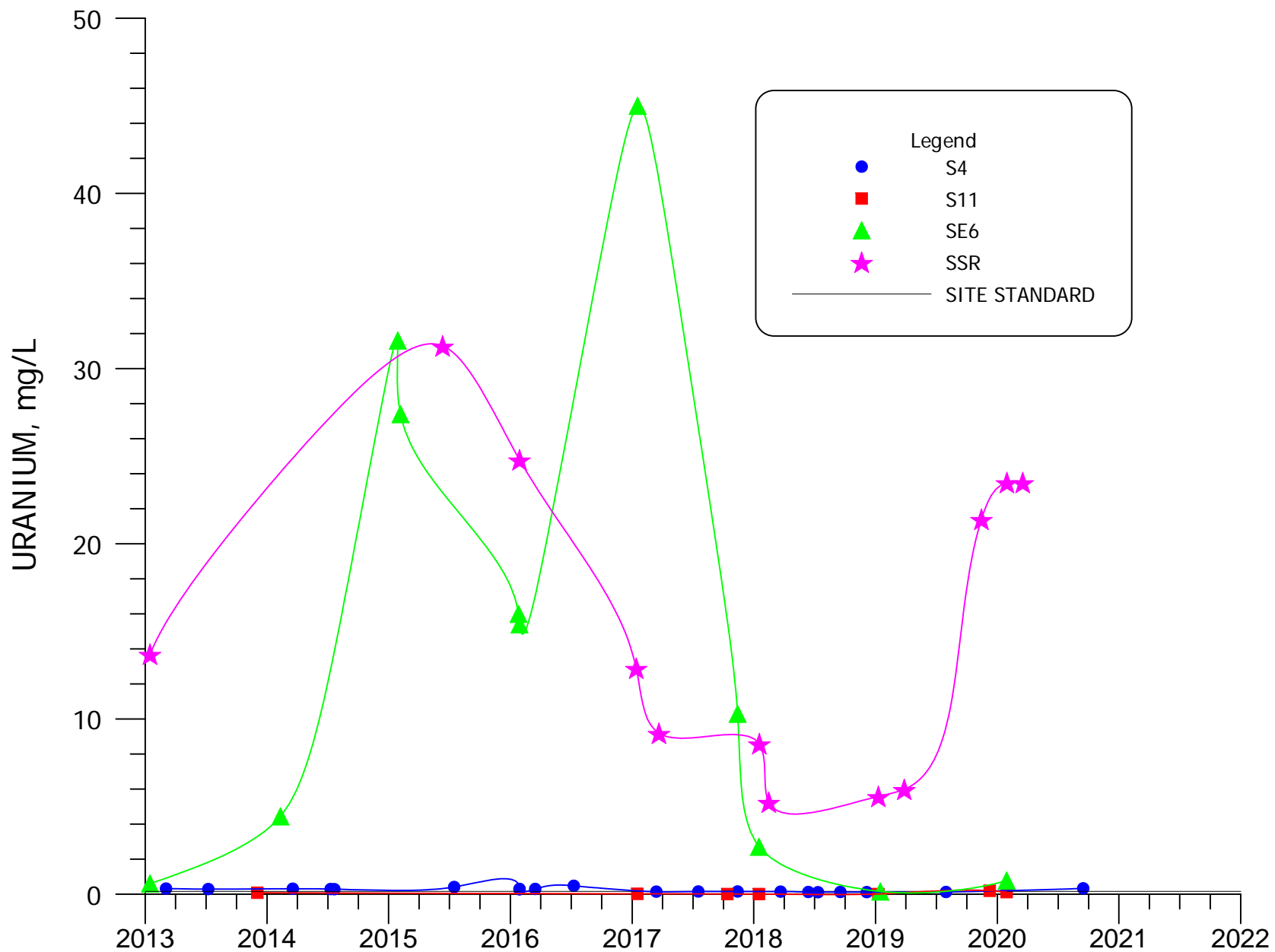


**FIGURE 4.3-54. URANIUM CONCENTRATIONS FOR WELLS NC, P3, P4, Q AND R.**

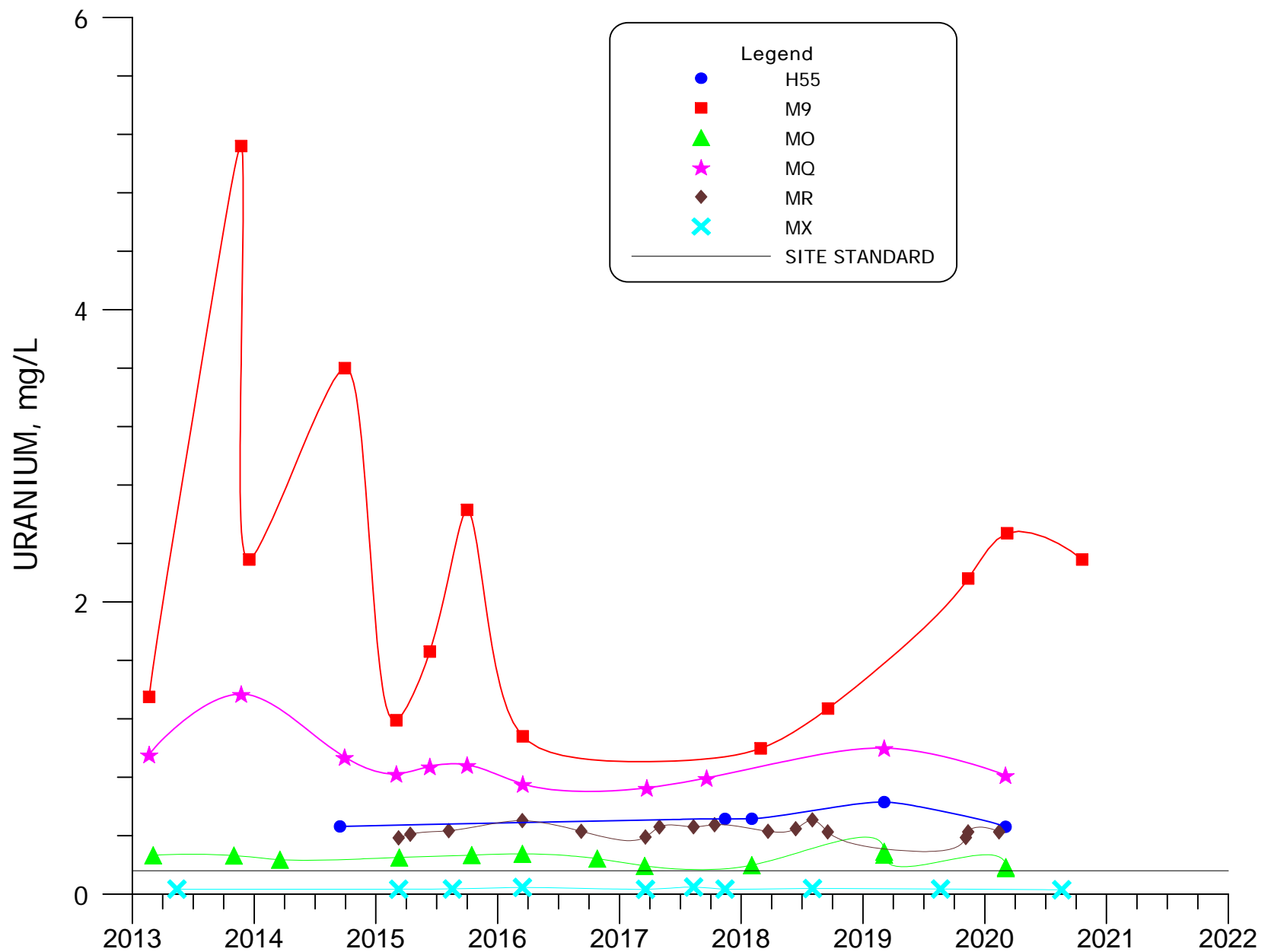
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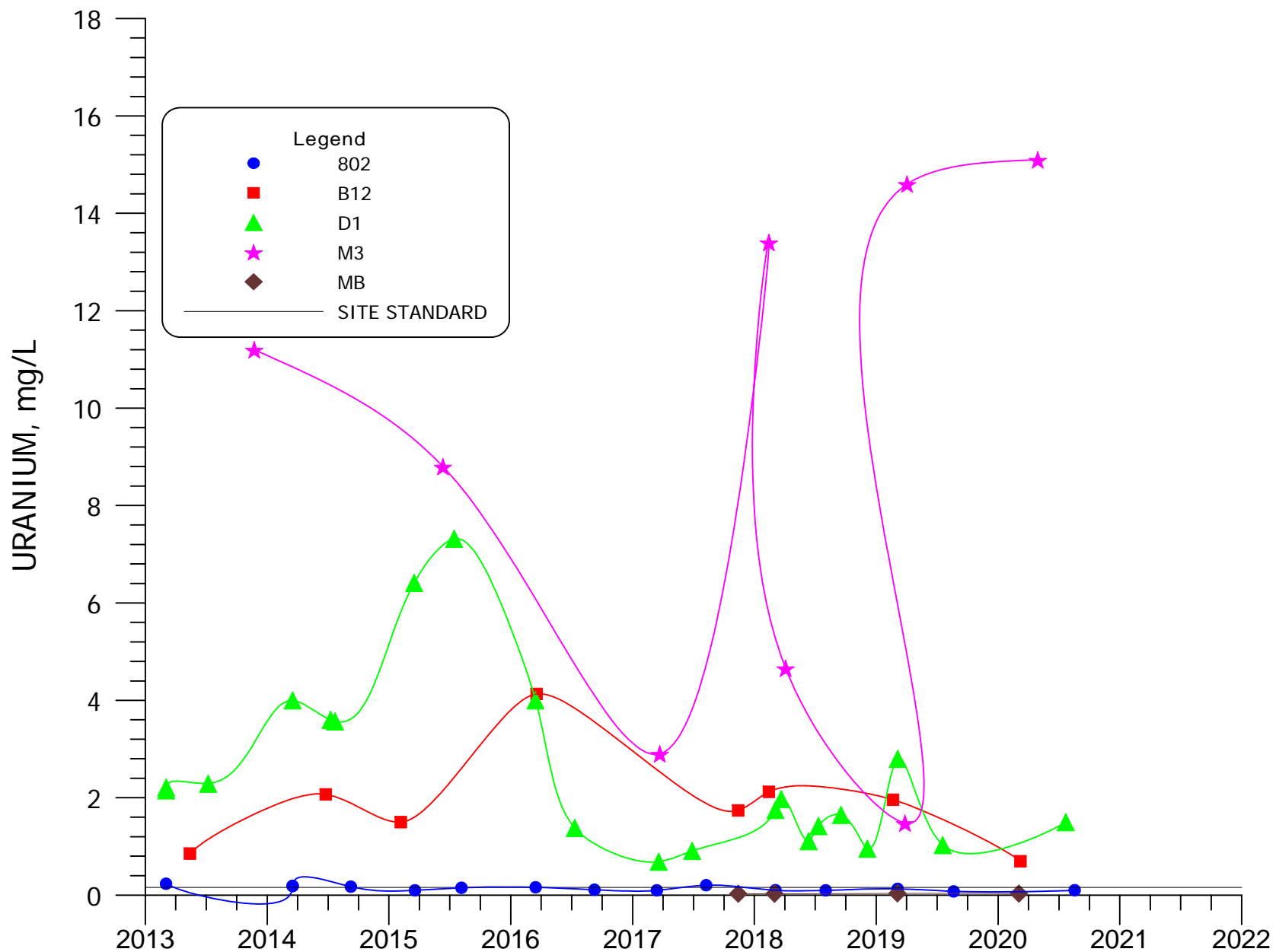
**FIGURE 4.3-54A. URANIUM CONCENTRATIONS FOR WELLS DD, DD2, P AND P2.**



**FIGURE 4.3-55. URANIUM CONCENTRATIONS FOR WELLS S4, S11, SE6 AND SSR.**

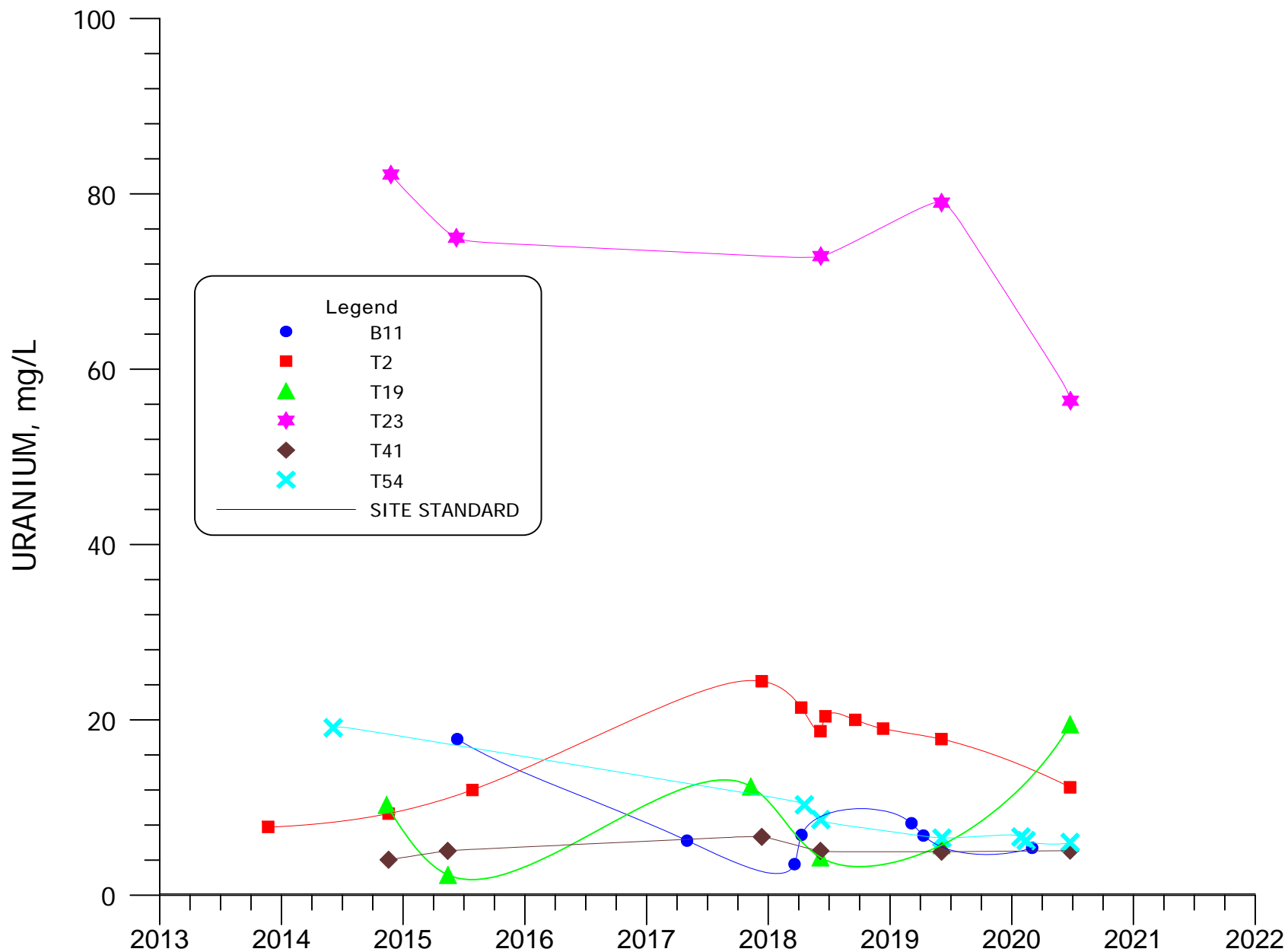


**FIGURE 4.3-56. URANIUM CONCENTRATIONS FOR WELLS H55, M9, MO, MQ, MR AND MX.**

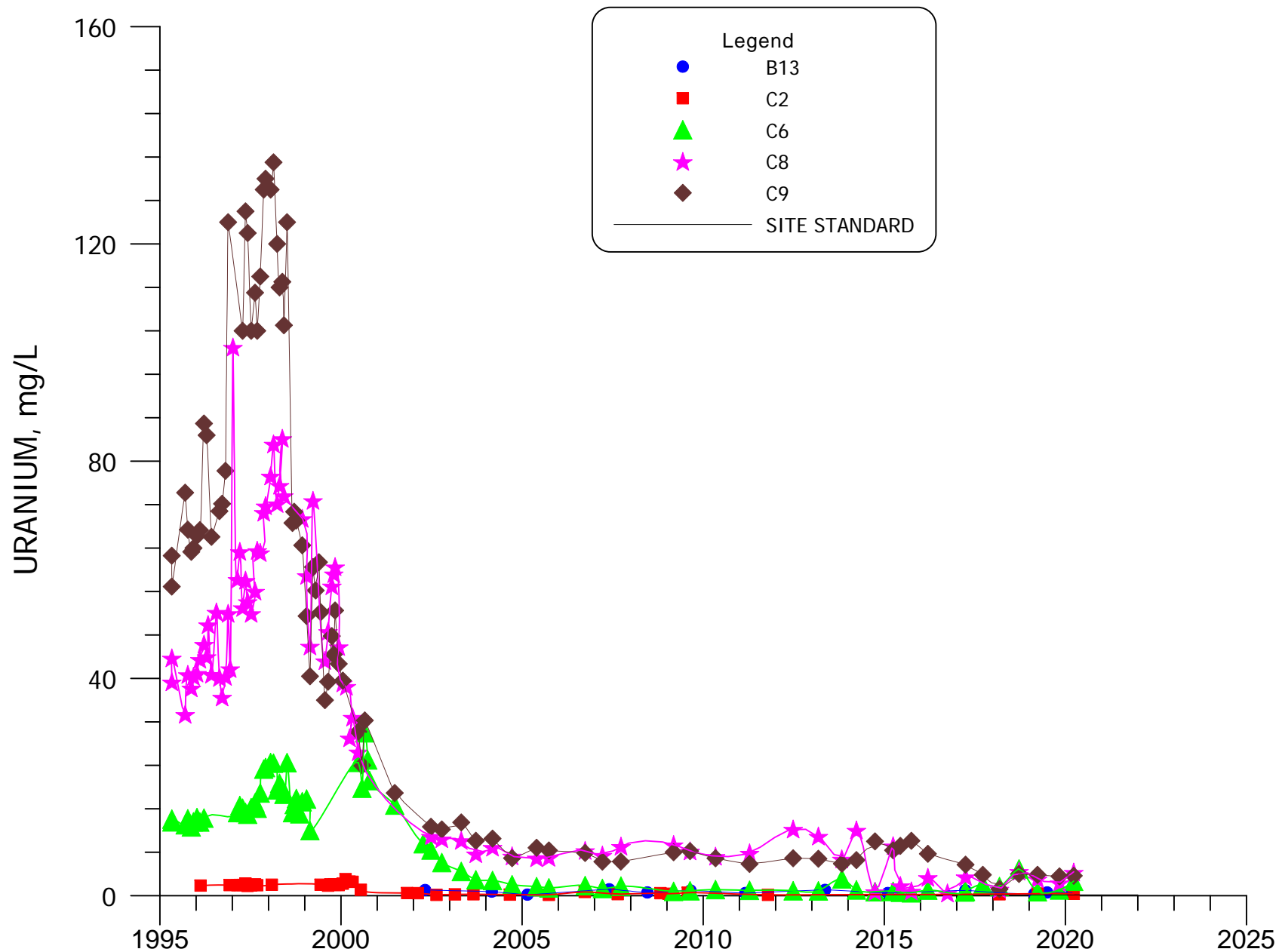


**FIGURE 4.3-57. URANIUM CONCENTRATIONS FOR WELLS 802, B12, D1, M3 AND MB.**

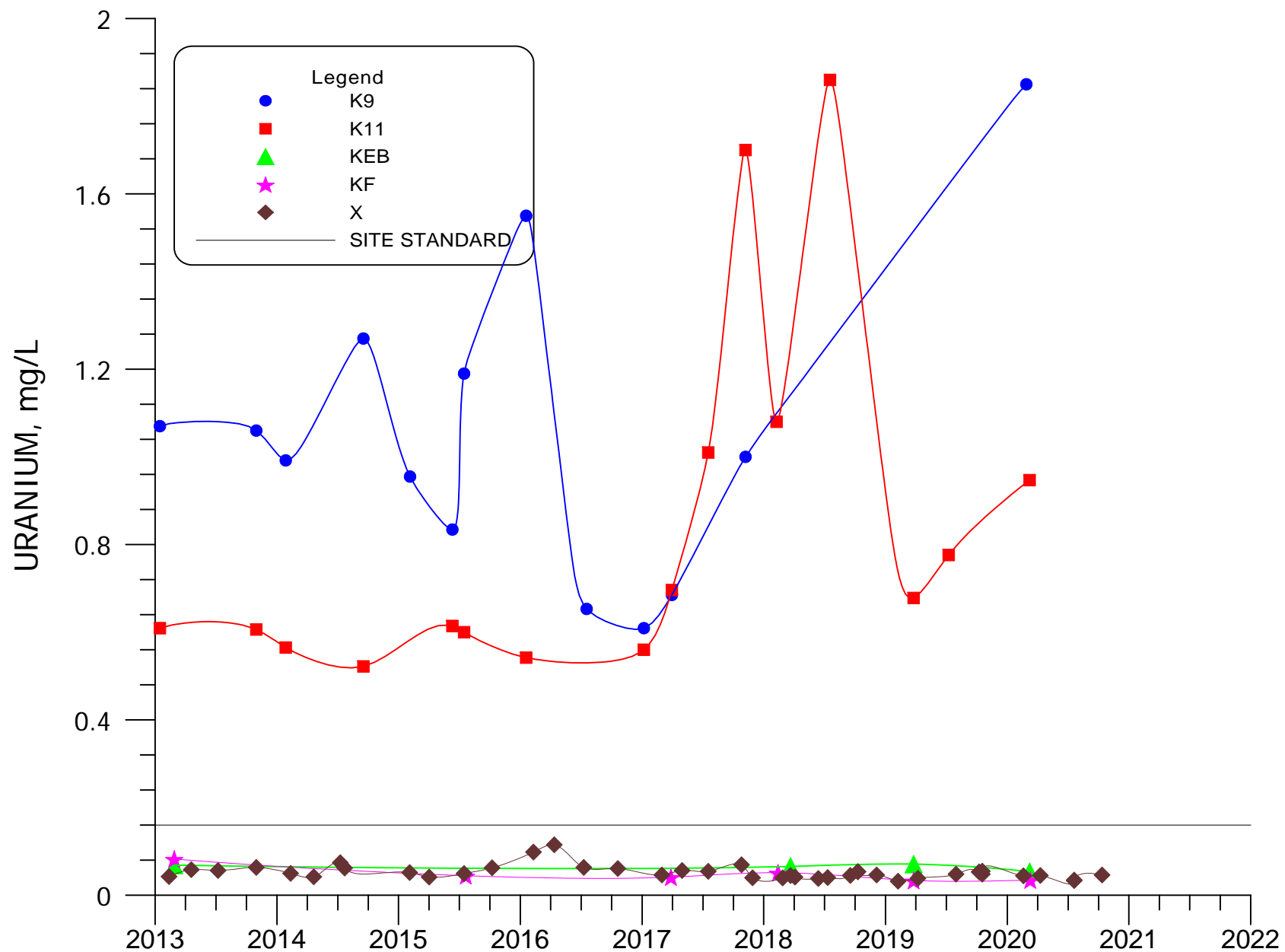




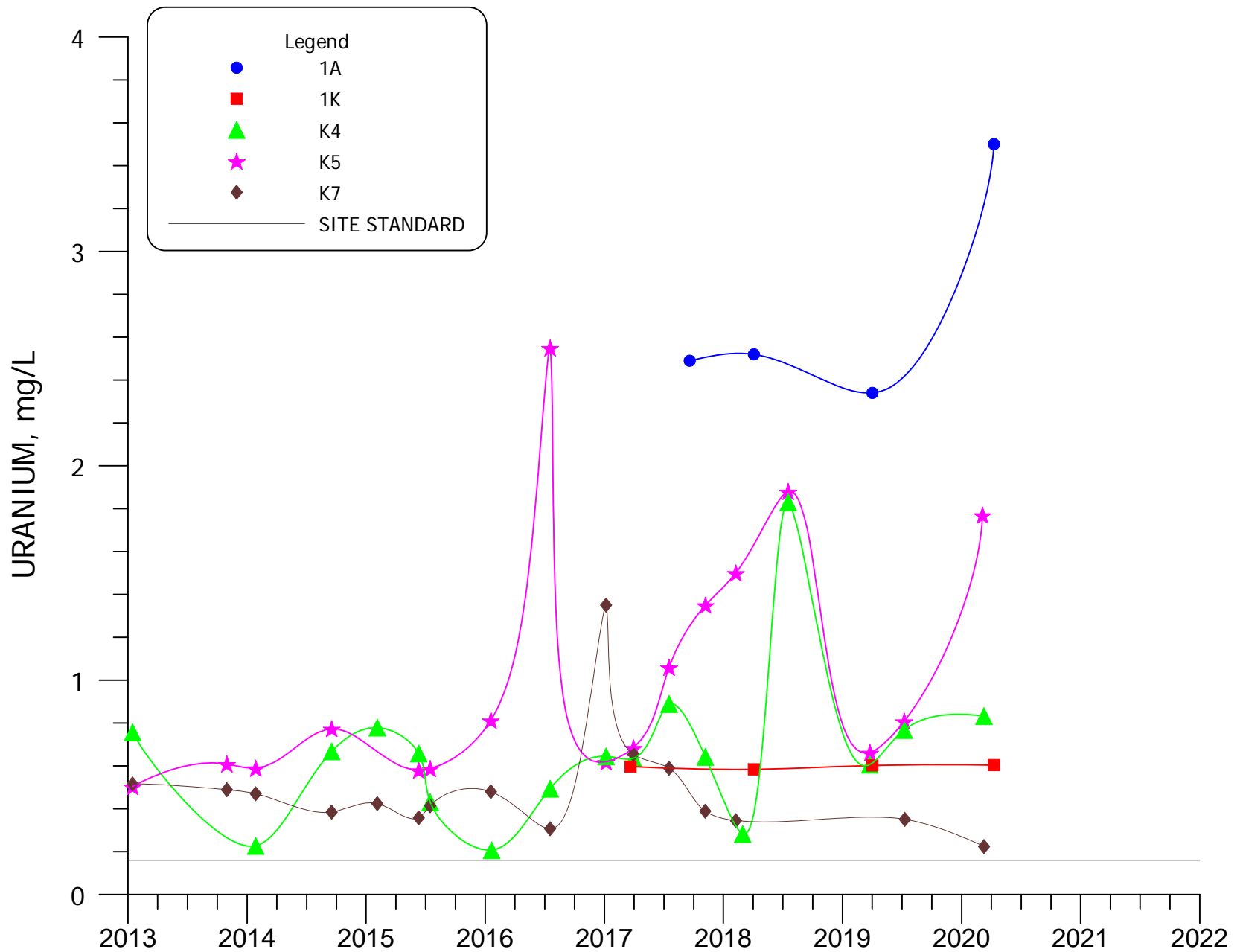
**FIGURE 4.3-58. URANIUM CONCENTRATIONS FOR WELLS B11, T2, T19, T23, T41 AND T54.**



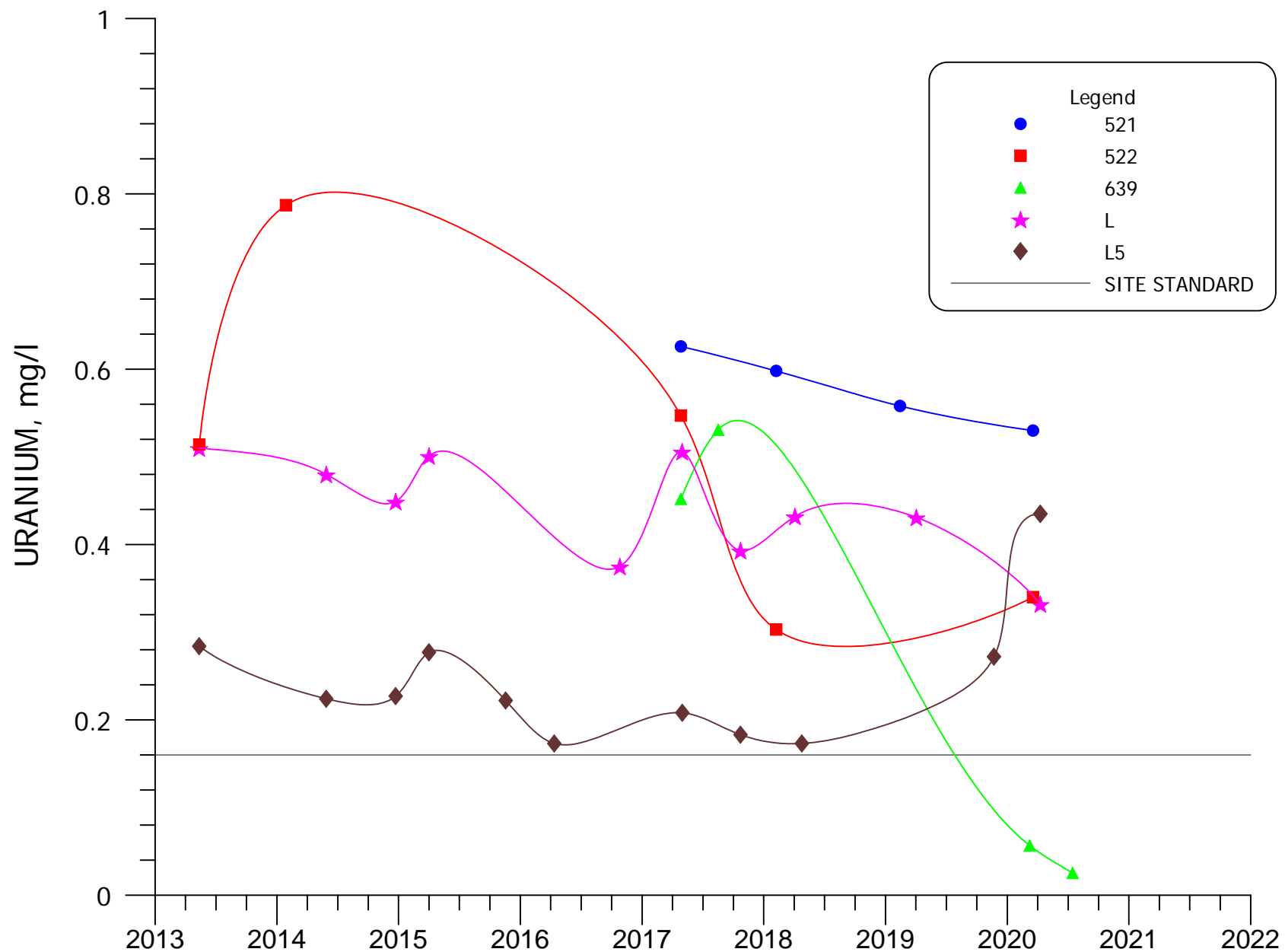
**FIGURE 4.3-59. URANIUM CONCENTRATIONS FOR WELLS B13, C2, C6, C8 AND C9 FOR ALL HISTORICAL DATA.**



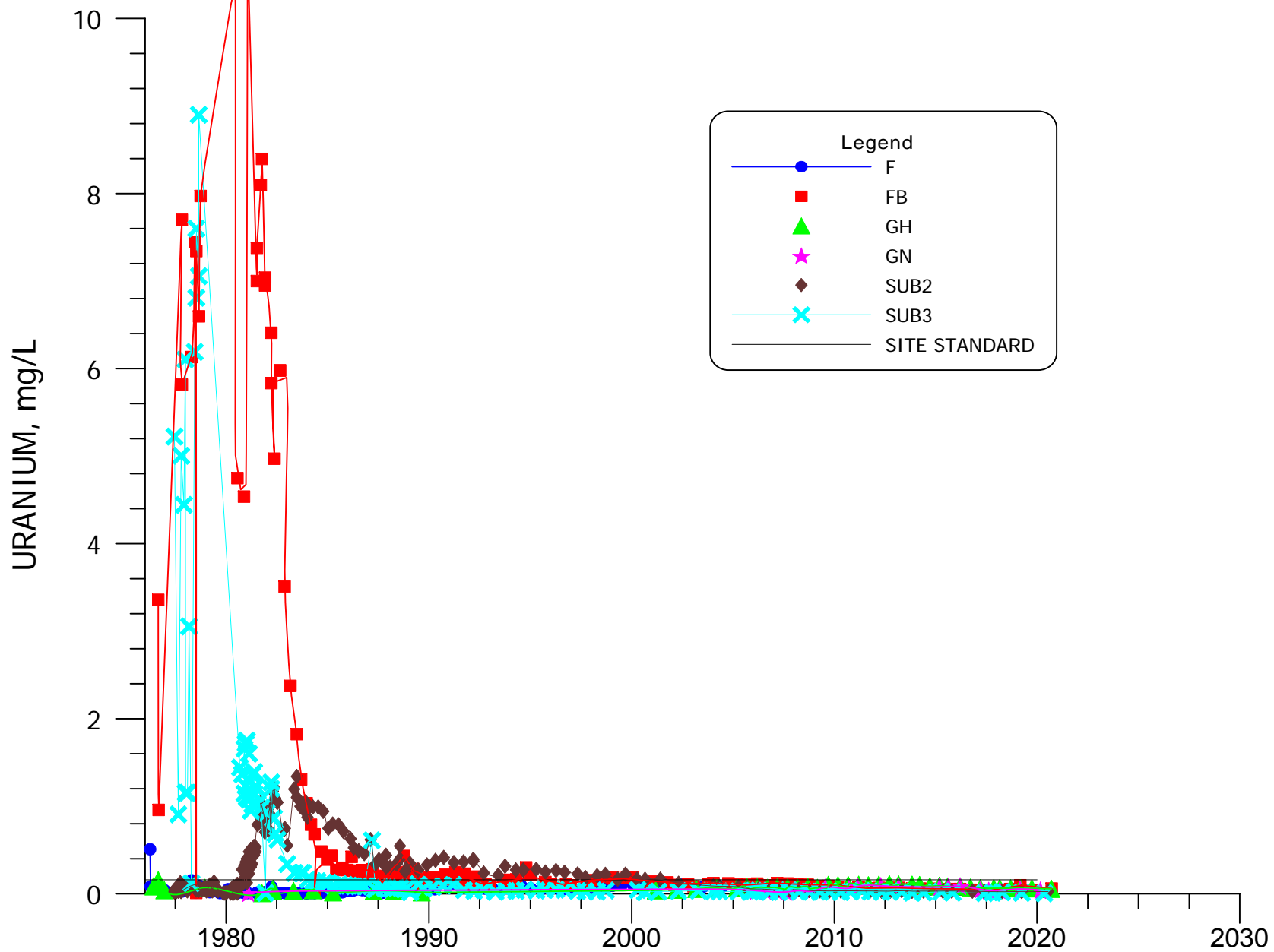
**FIGURE 4.3-60. URANIUM CONCENTRATIONS FOR WELLS K9, K11, KEB, KF AND X.**



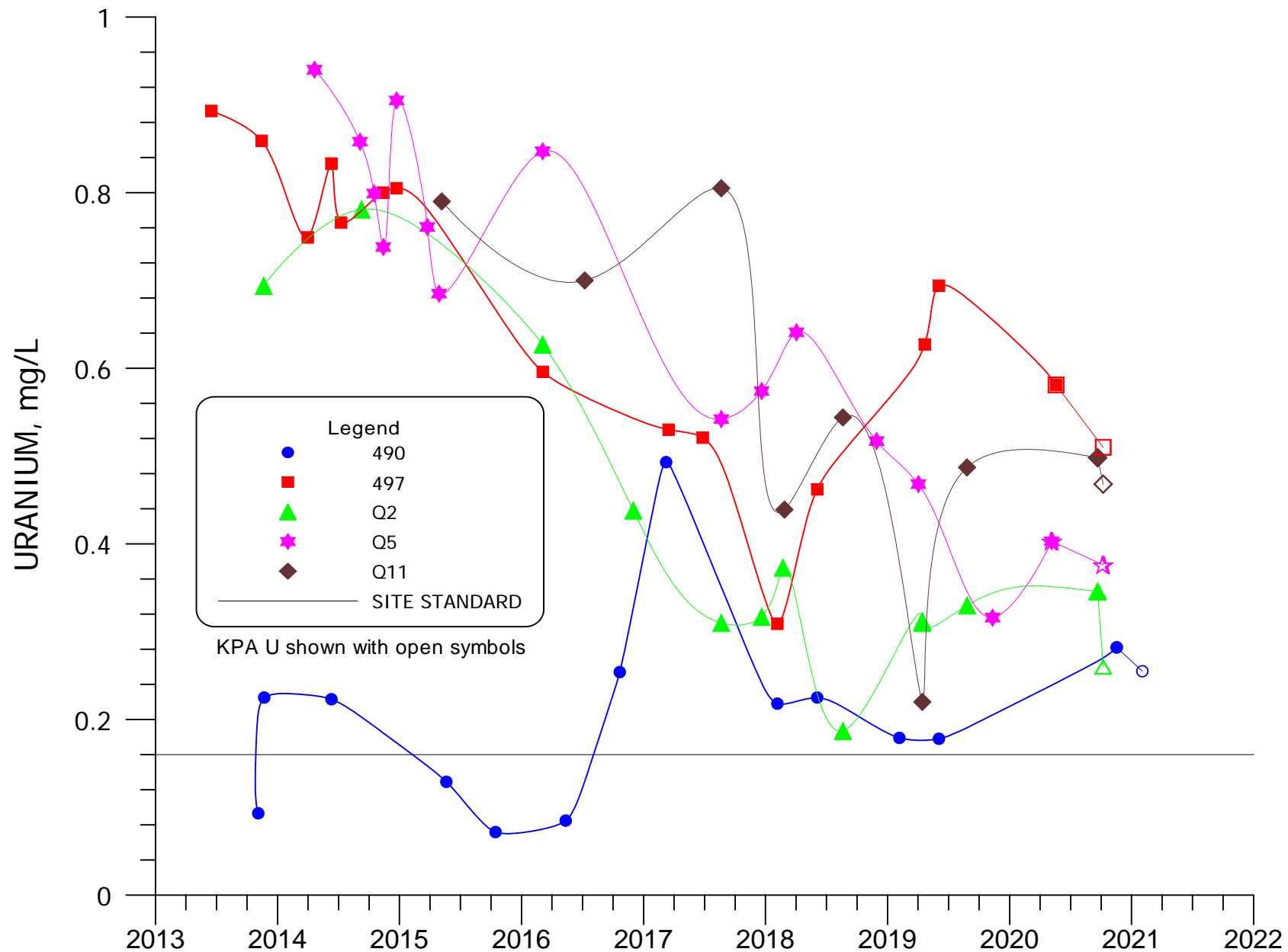
**FIGURE 4.3-61. URANIUM CONCENTRATIONS FOR WELLS 1A, 1K, K4, K5 AND K7.**



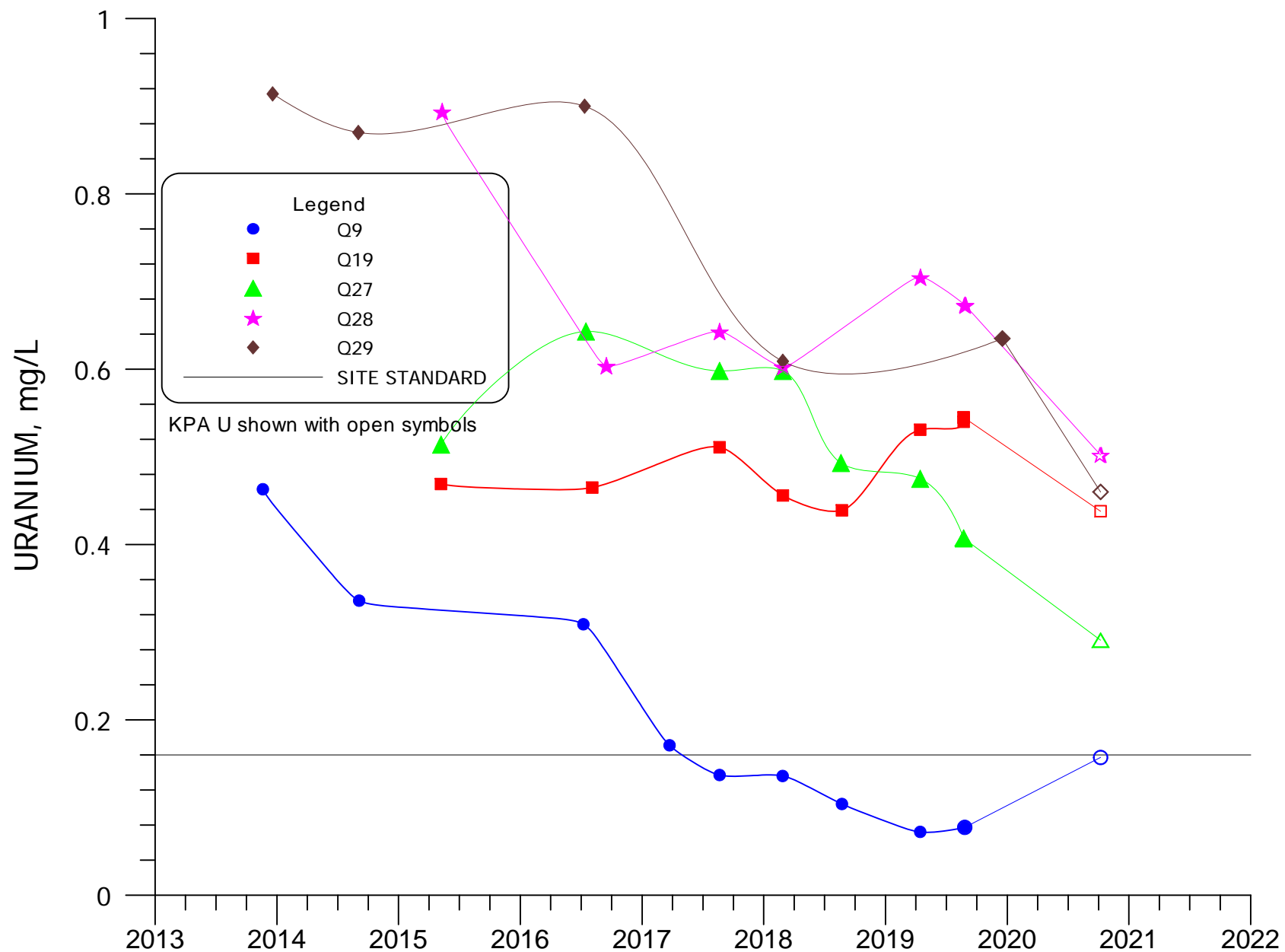
**FIGURE 4.3-62. URANIUM CONCENTRATIONS FOR WELLS 521, 522, 639, L AND L5.**



**FIGURE 4.3-63. URANIUM CONCENTRATIONS FOR WELLS F, FB, GH, GN, SUB2 AND SUB3 FOR ALL HISTORICAL DATA.**

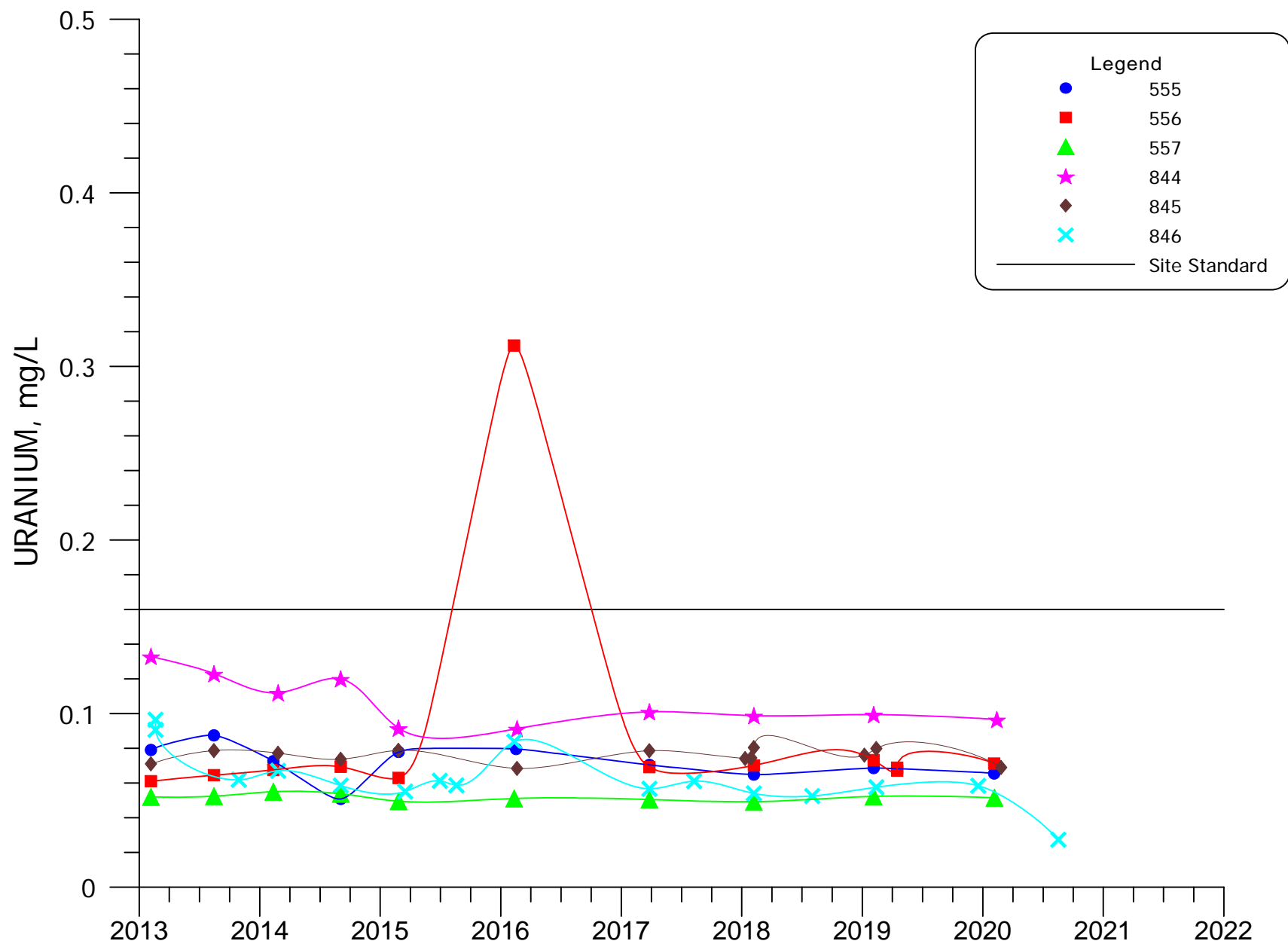


**FIGURE 4.3-64. URANIUM CONCENTRATIONS FOR WELLS 490, 497, Q2, Q5 AND Q11.**



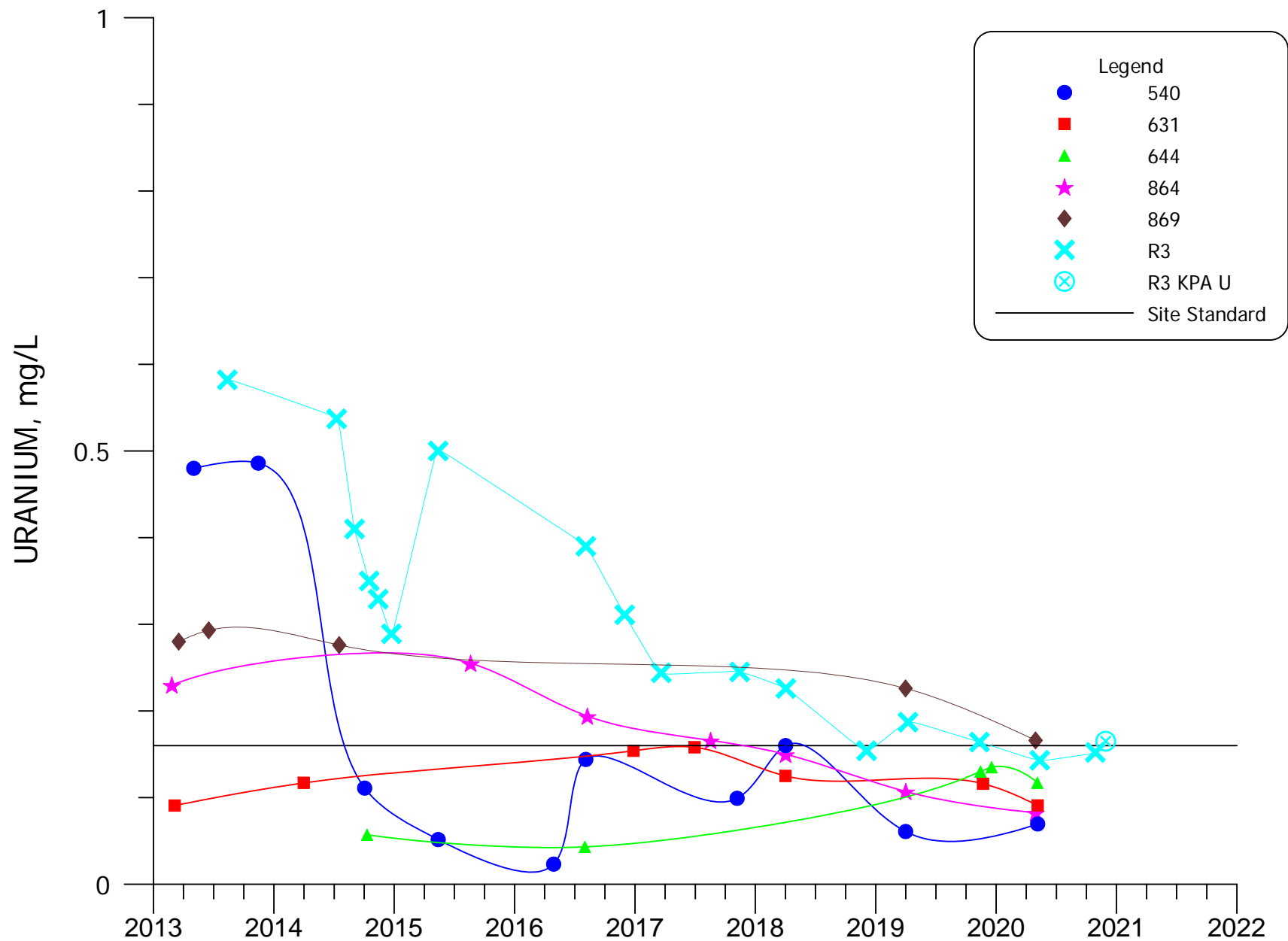
**FIGURE 4.3-64A. URANIUM CONCENTRATIONS FOR WELLS Q9, Q19, Q27, Q28, Q29 AND Q30.**





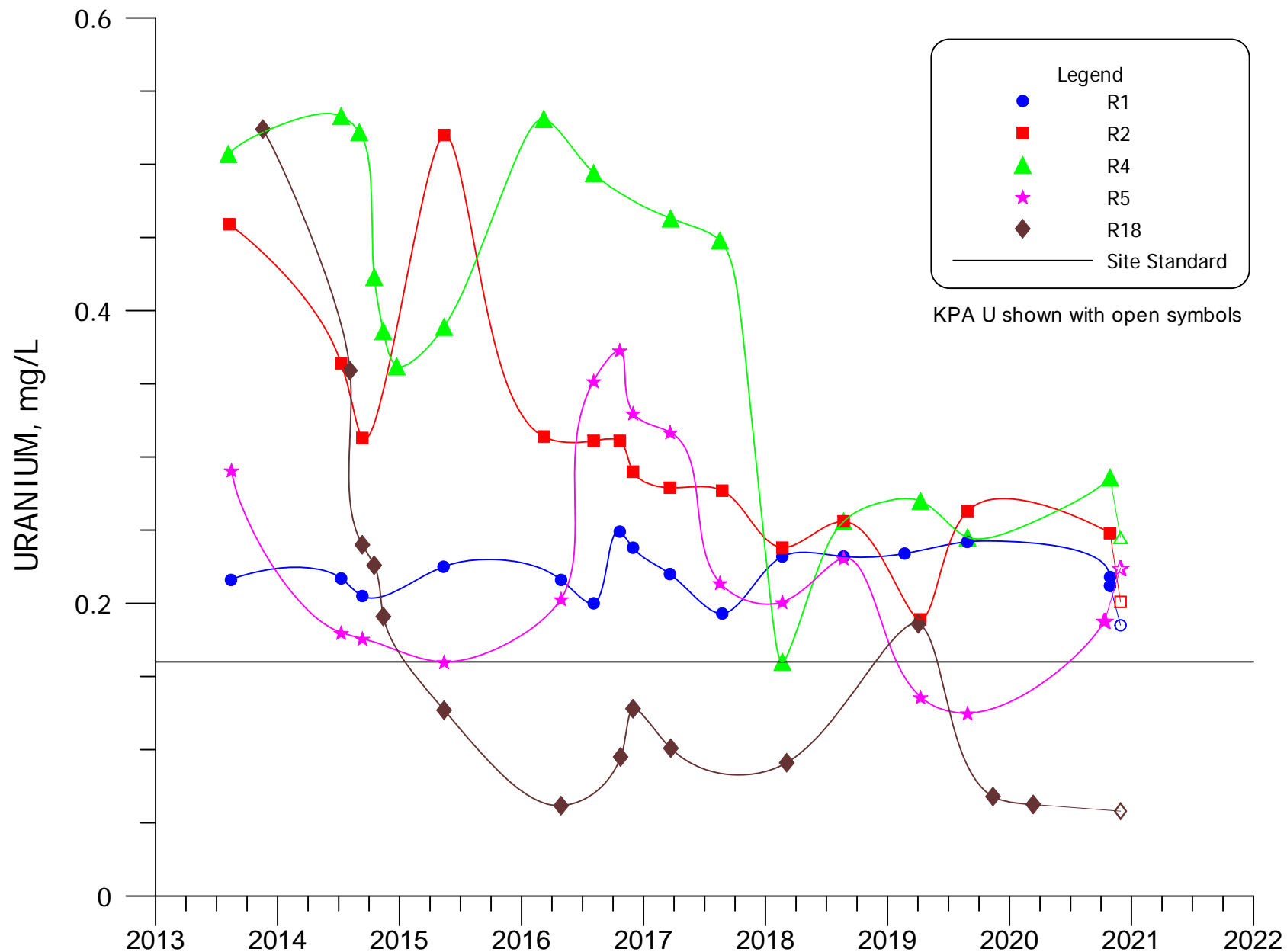
**FIGURE 4.3-65. URANIUM CONCENTRATIONS FOR WELLS 555, 556, 557, 844, 845, AND 846.**

4.3-110

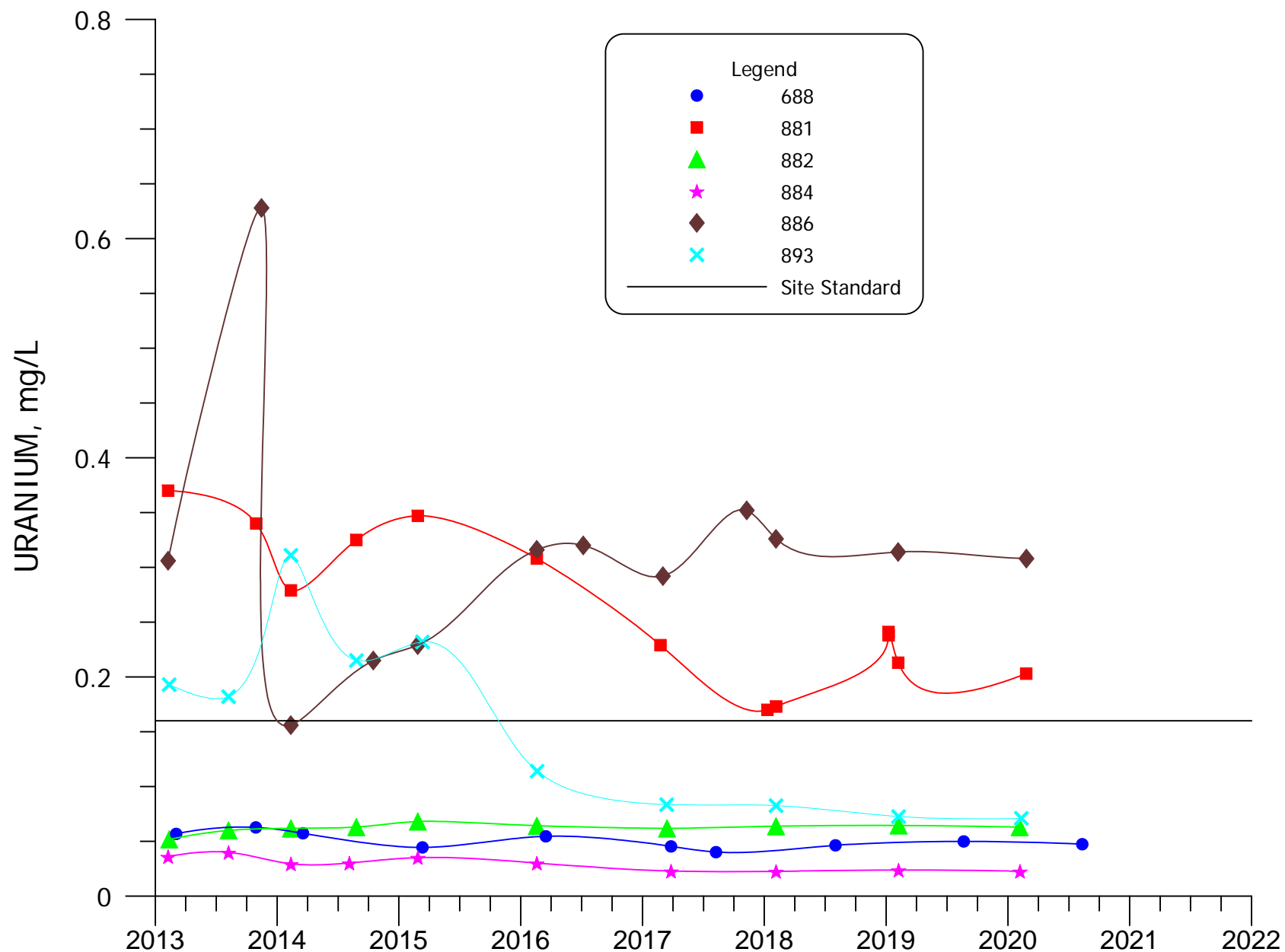


**FIGURE 4.3-66. URANIUM CONCENTRATIONS FOR WELLS 540, 631, 644, 864, 869 AND R3.**

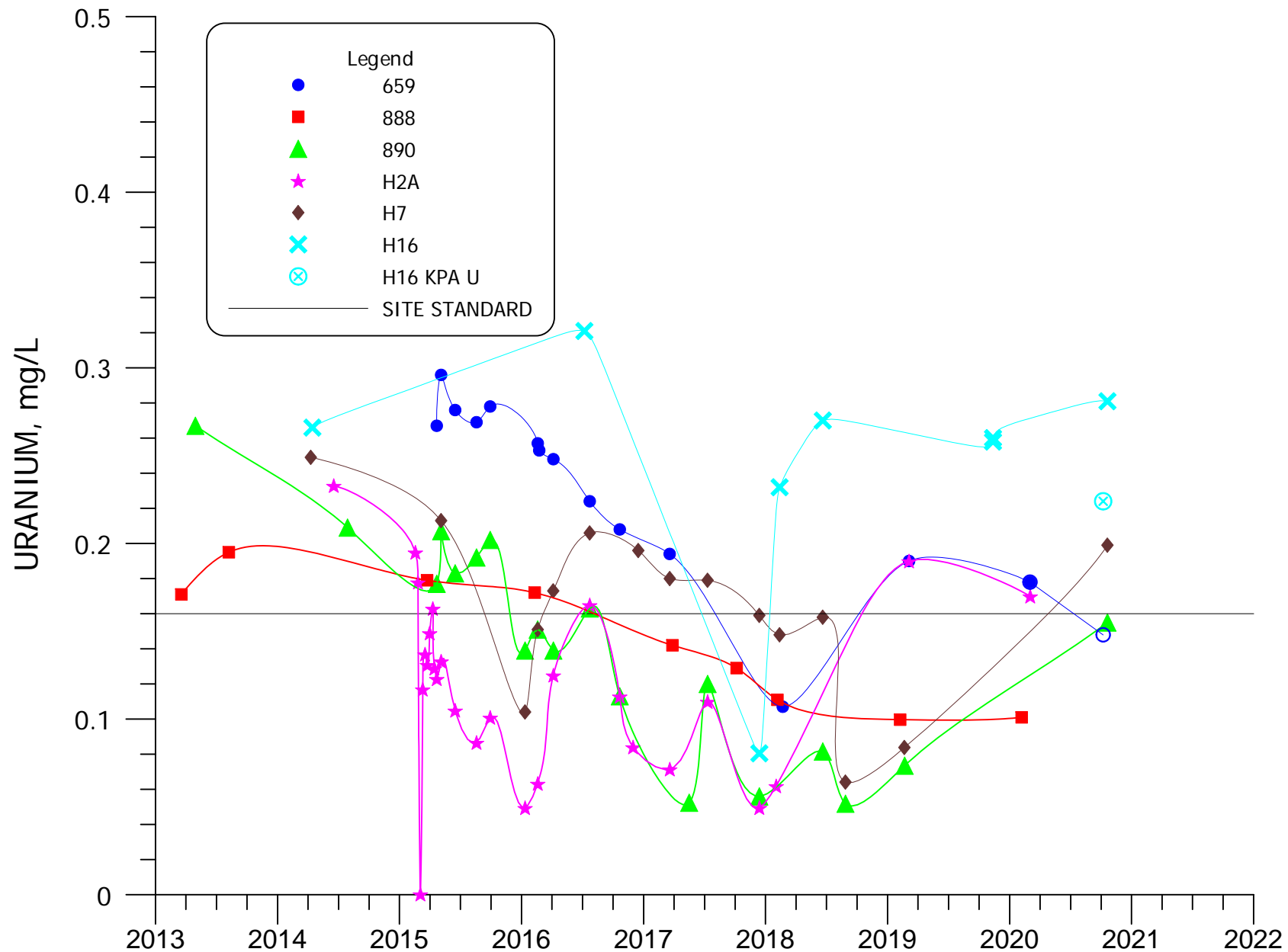
4.3-111



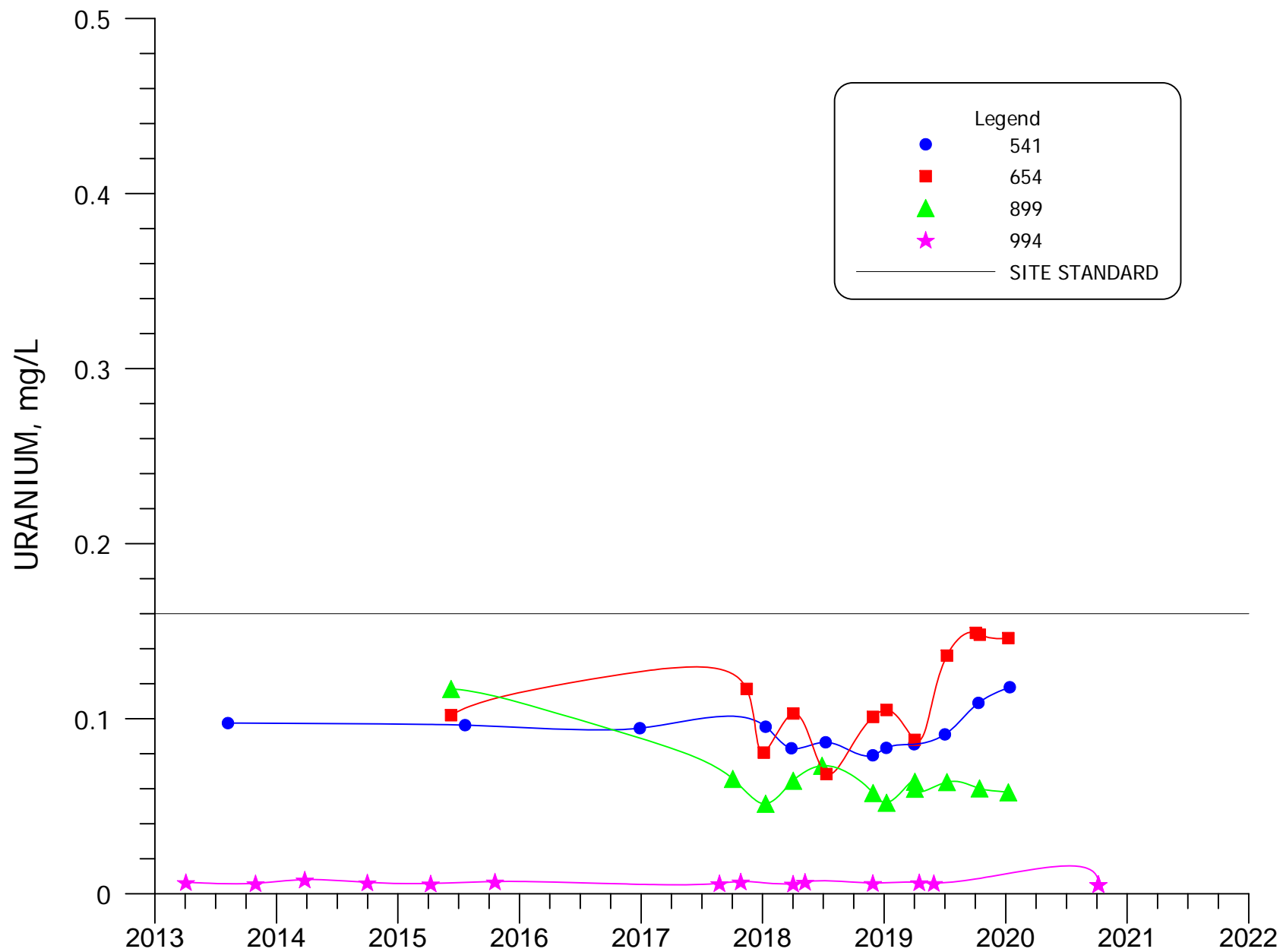
**FIGURE 4.3-66A. URANIUM CONCENTRATIONS FOR WELLS R1, R2, R4, R5 AND R18.**



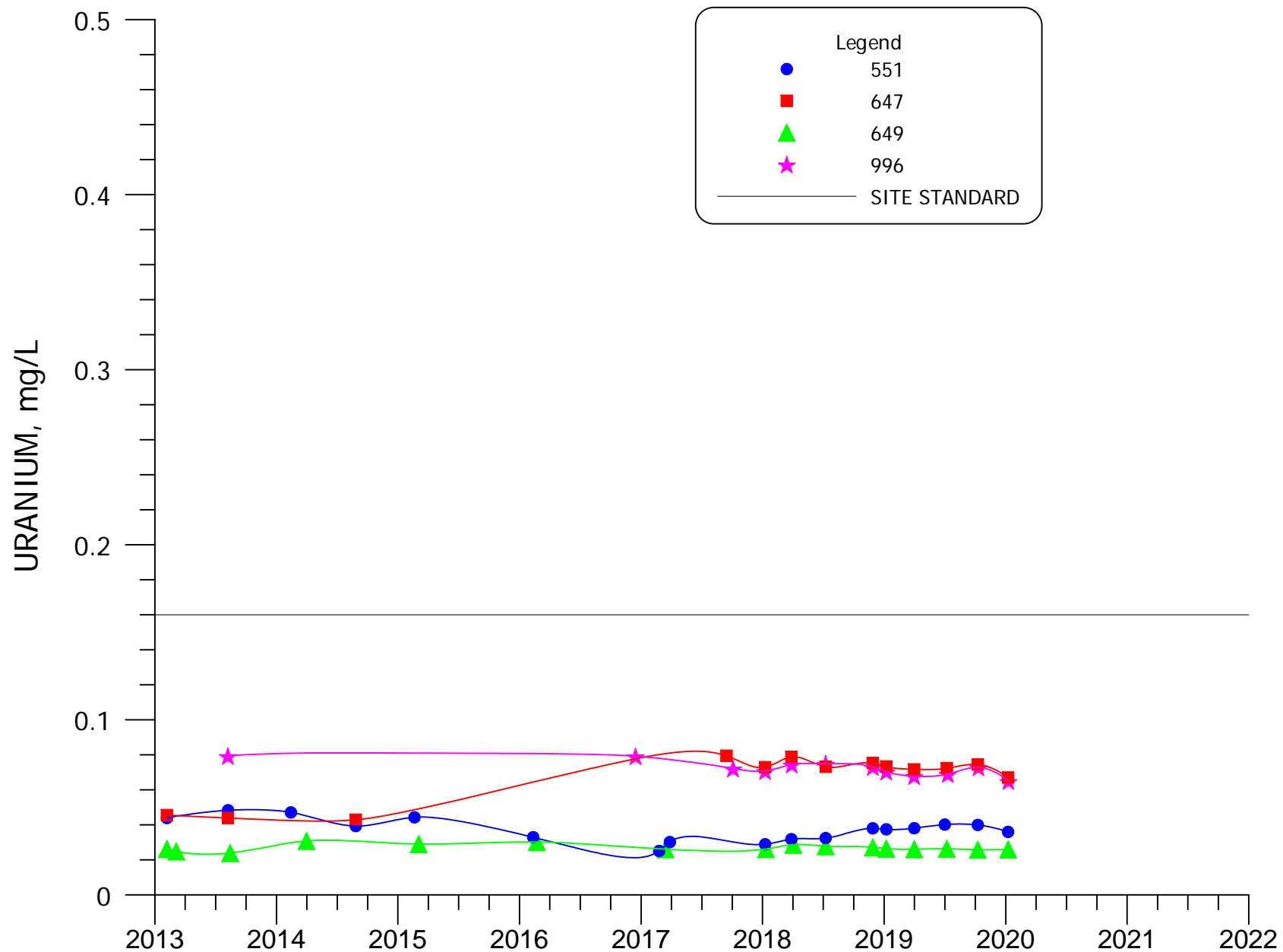
**FIGURE 4.3-67. URANIUM CONCENTRATIONS FOR WELLS 688, 881, 882, 884, 886 AND 893.**



**FIGURE 4.3-67A. URANIUM CONCENTRATIONS FOR WELLS 659, 888, 890, H1, H2A AND H12.**



**FIGURE 4.3-68. URANIUM CONCENTRATIONS FOR WELLS 541, 654, 899 and 994.**



**FIGURE 4.3-69. URANIUM CONCENTRATIONS FOR WELLS 551, 647, 649 AND 996.**

NOS MAP, SEE  
FIGURE 4.3-70C

OS MAP, SEE  
FIGURE 4.3-70A

SOS MAP, SEE  
FIGURE 4.3-70B

LEGEND

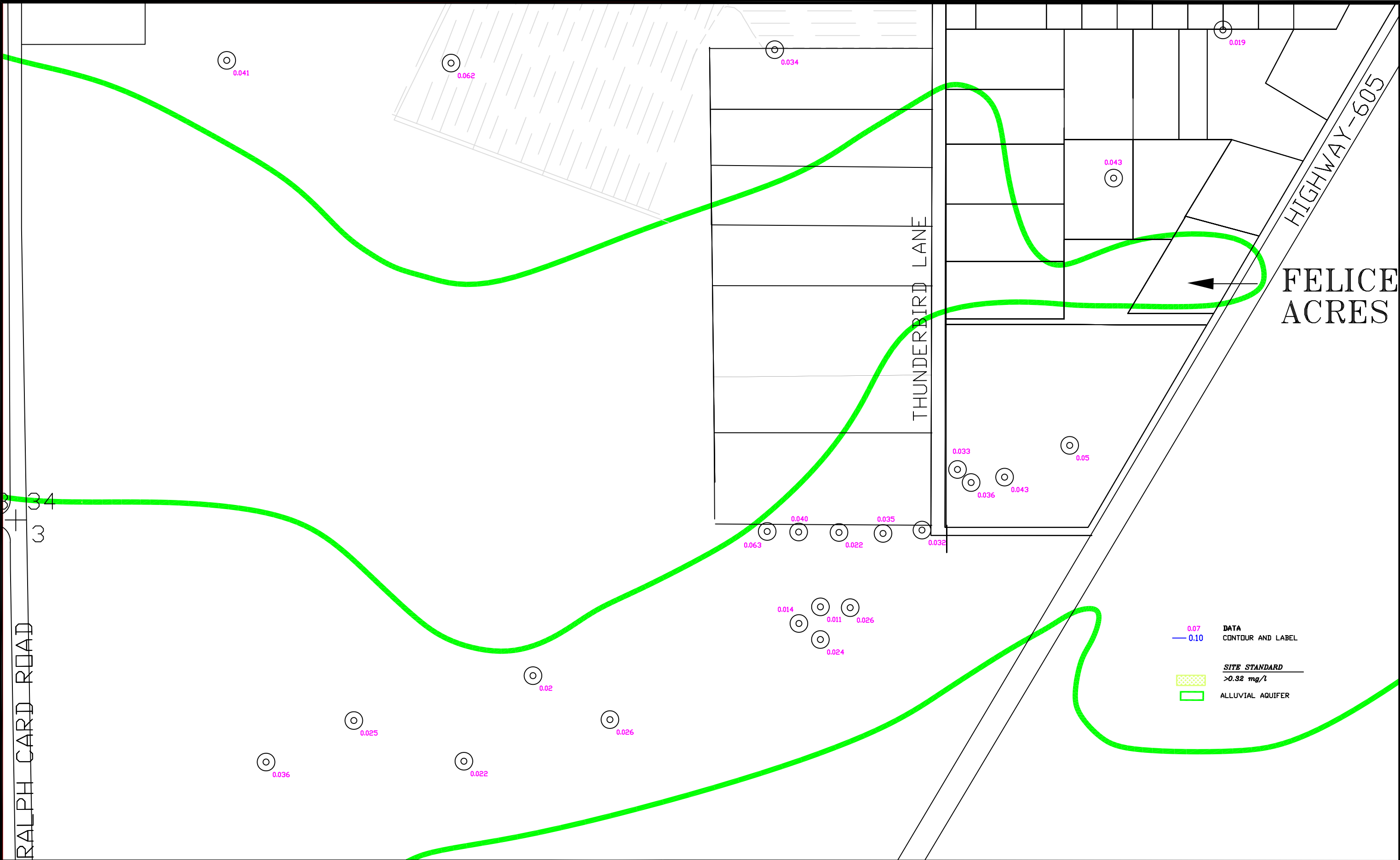
- 0.07 DATA
- 0.10 CONTOUR AND LABEL
- SITE STANDARD
- >0.32 mg/l
- ALLUVIAL AQUIFER

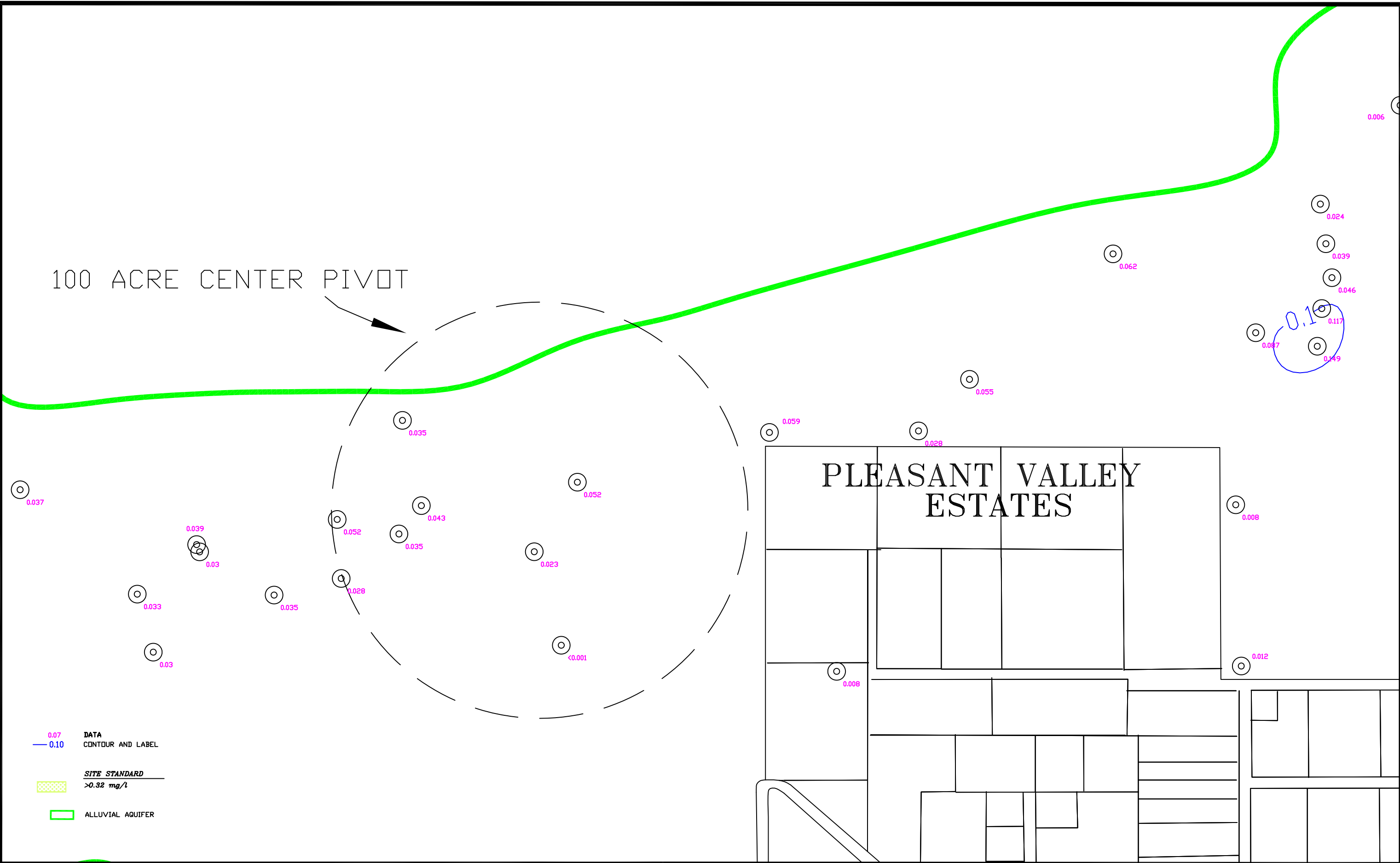
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DATE: 3/19/2021

FIGURE 4.3-70. SELENIUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, 2020, mg/L



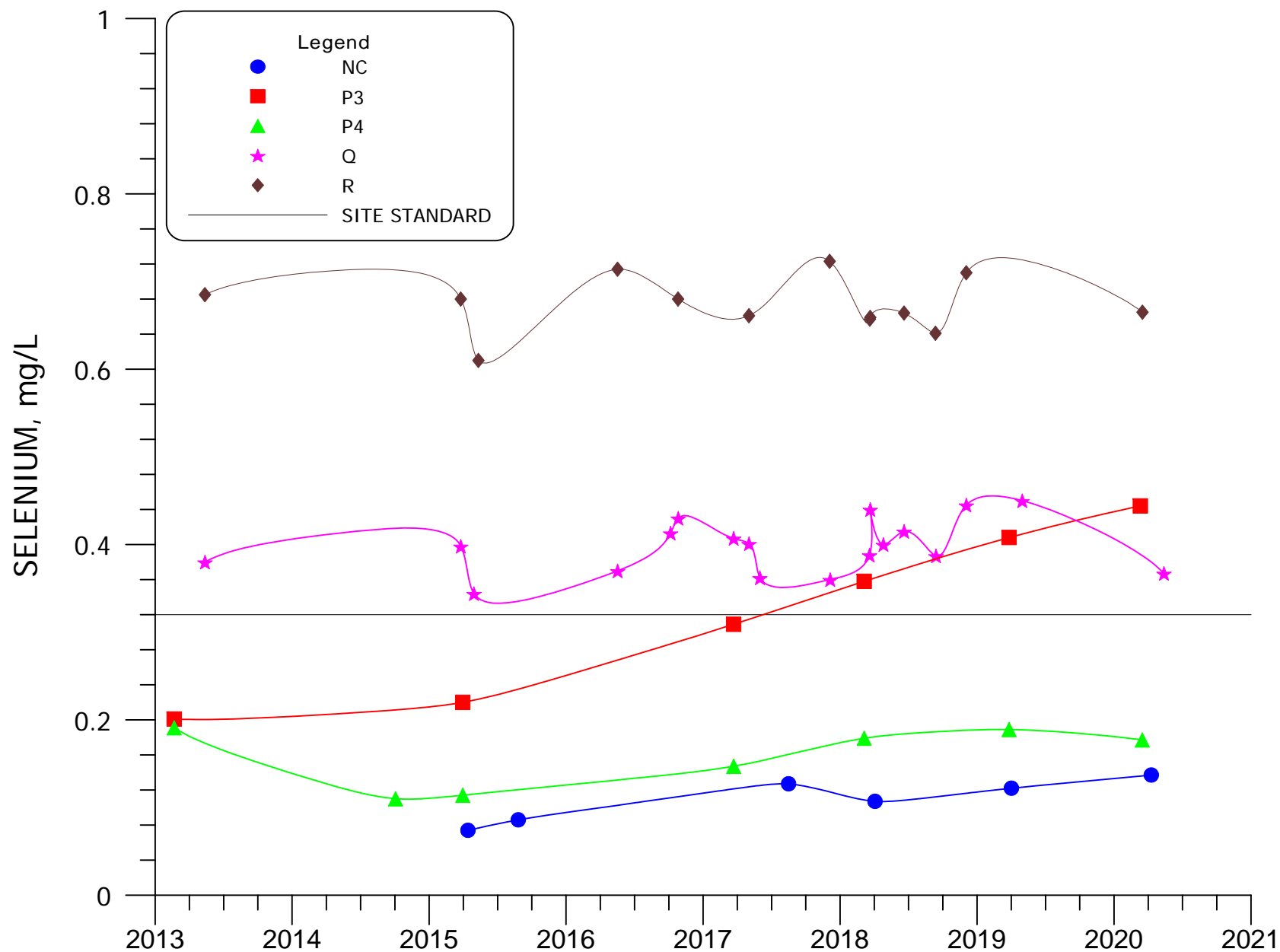




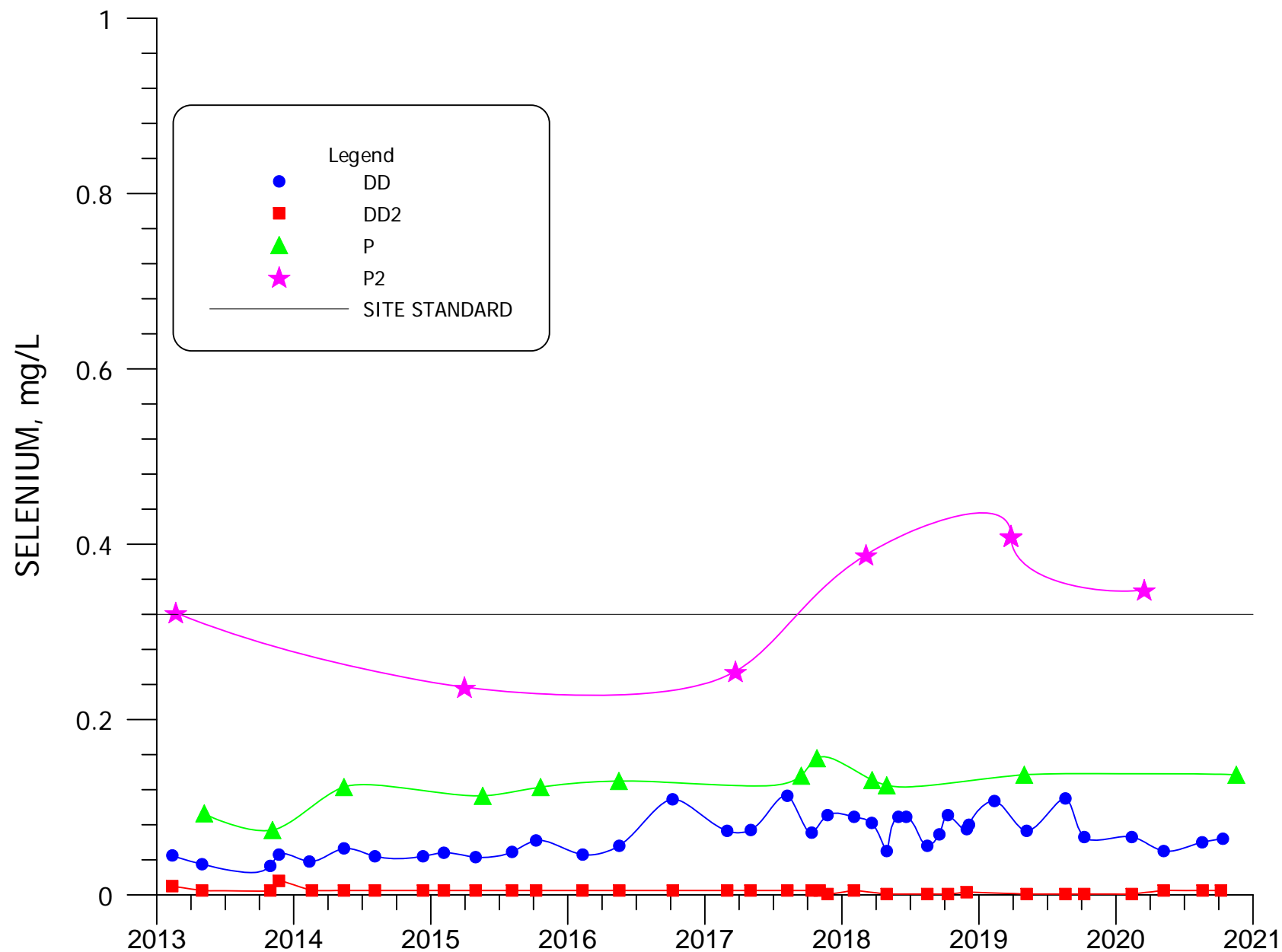


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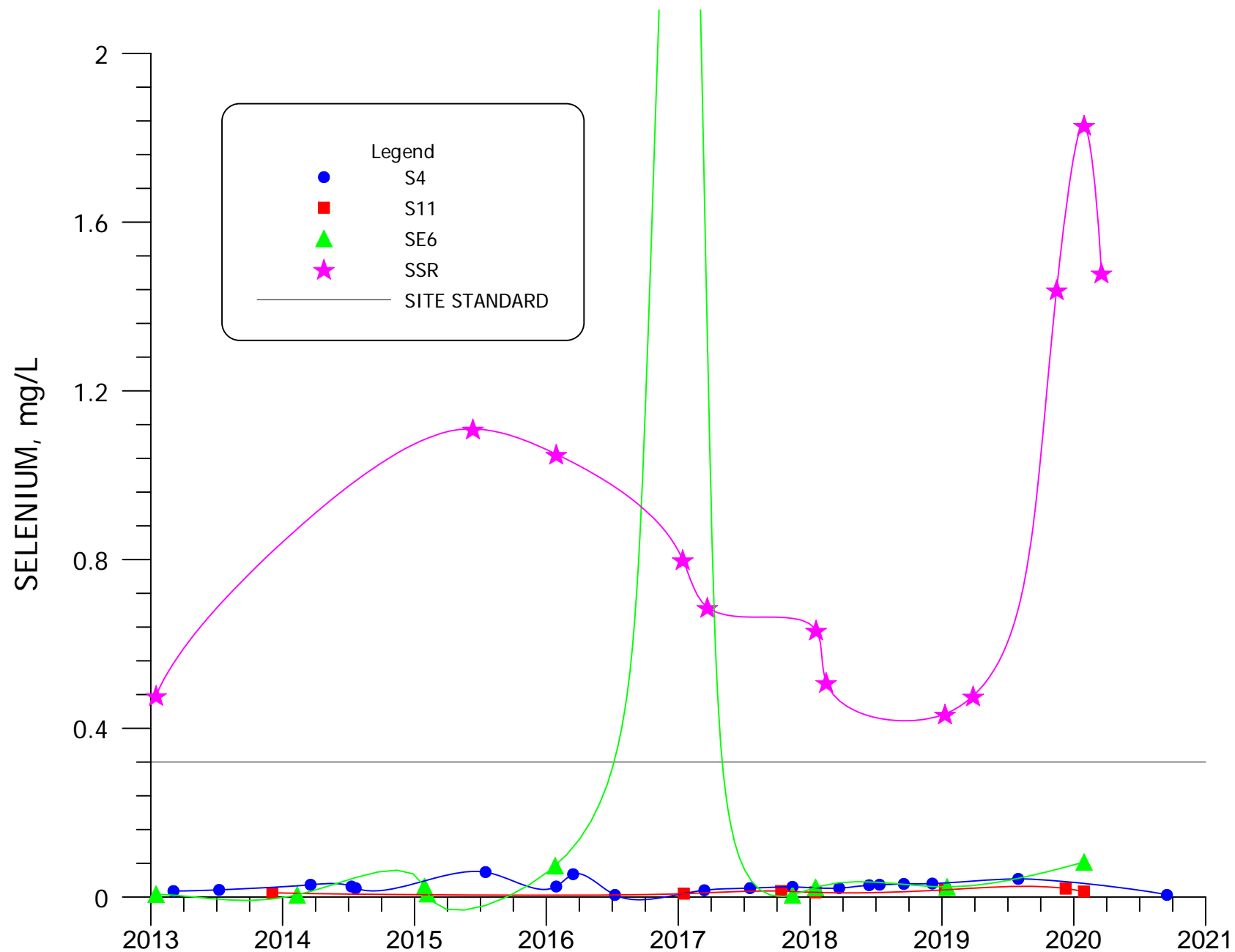
FIGURE 4.3-70C. SELENIUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, NOS, 2020, mg/L  
4.3-119



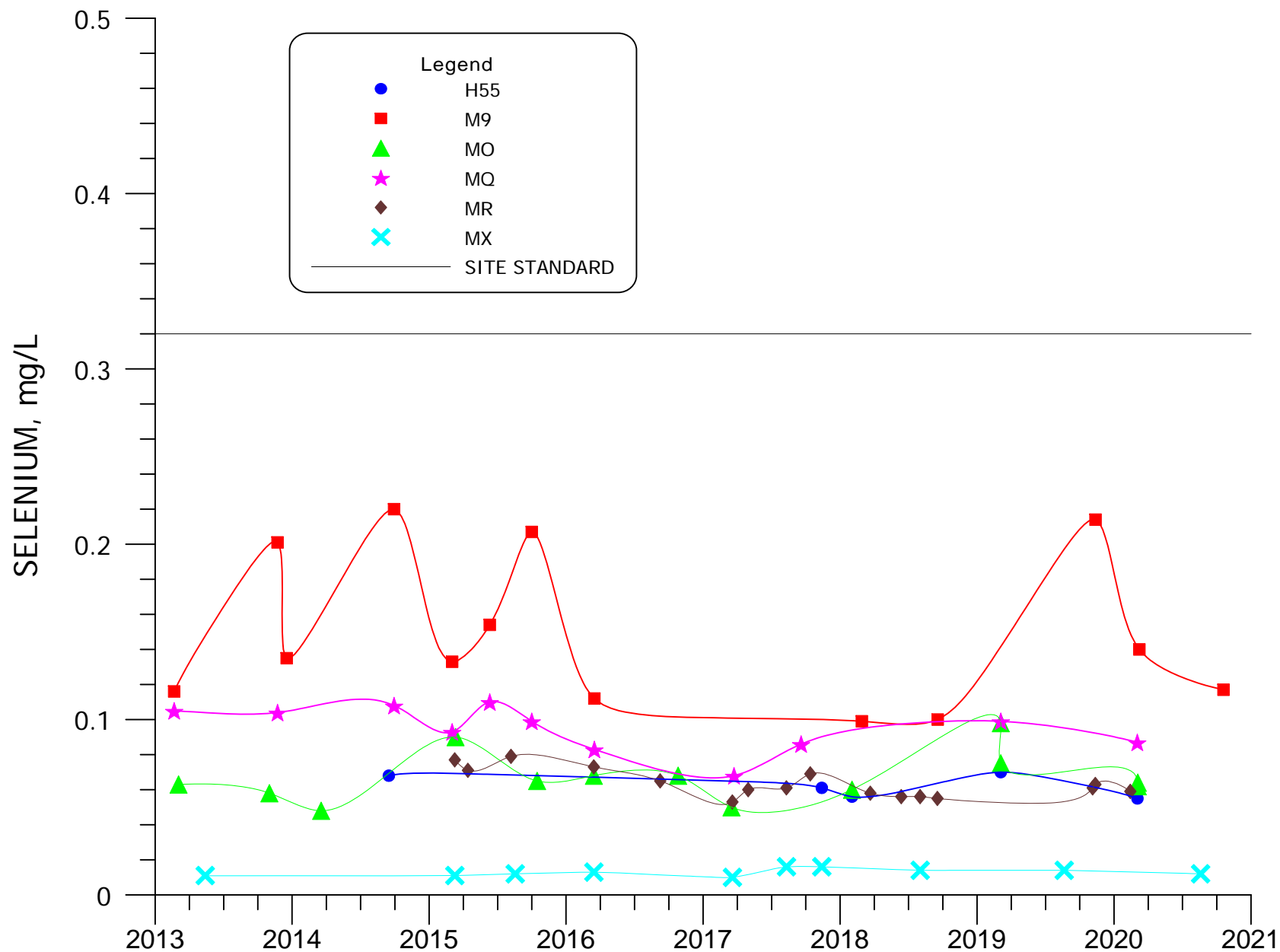
**FIGURE 4.3-71. SELENIUM CONCENTRATIONS FOR WELLS NC, P3, P4, Q AND R.**



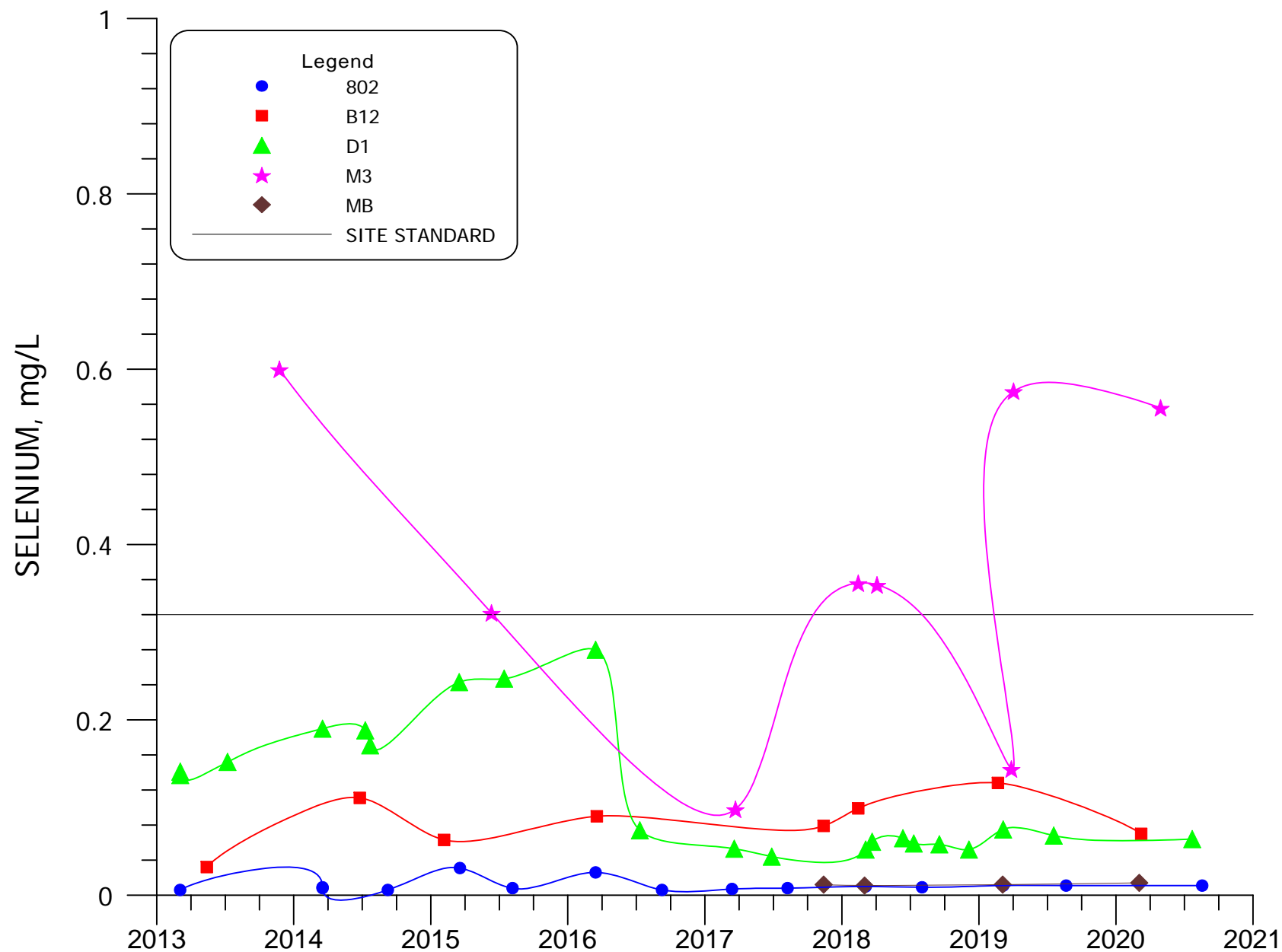
**FIGURE 4.3-71A. SELENIUM CONCENTRATIONS FOR WELLS DD, DD2, P AND P2.**



**FIGURE 4.3-72. SELENIUM CONCENTRATIONS FOR WELLS S4, S11, SE6 AND SSR.**

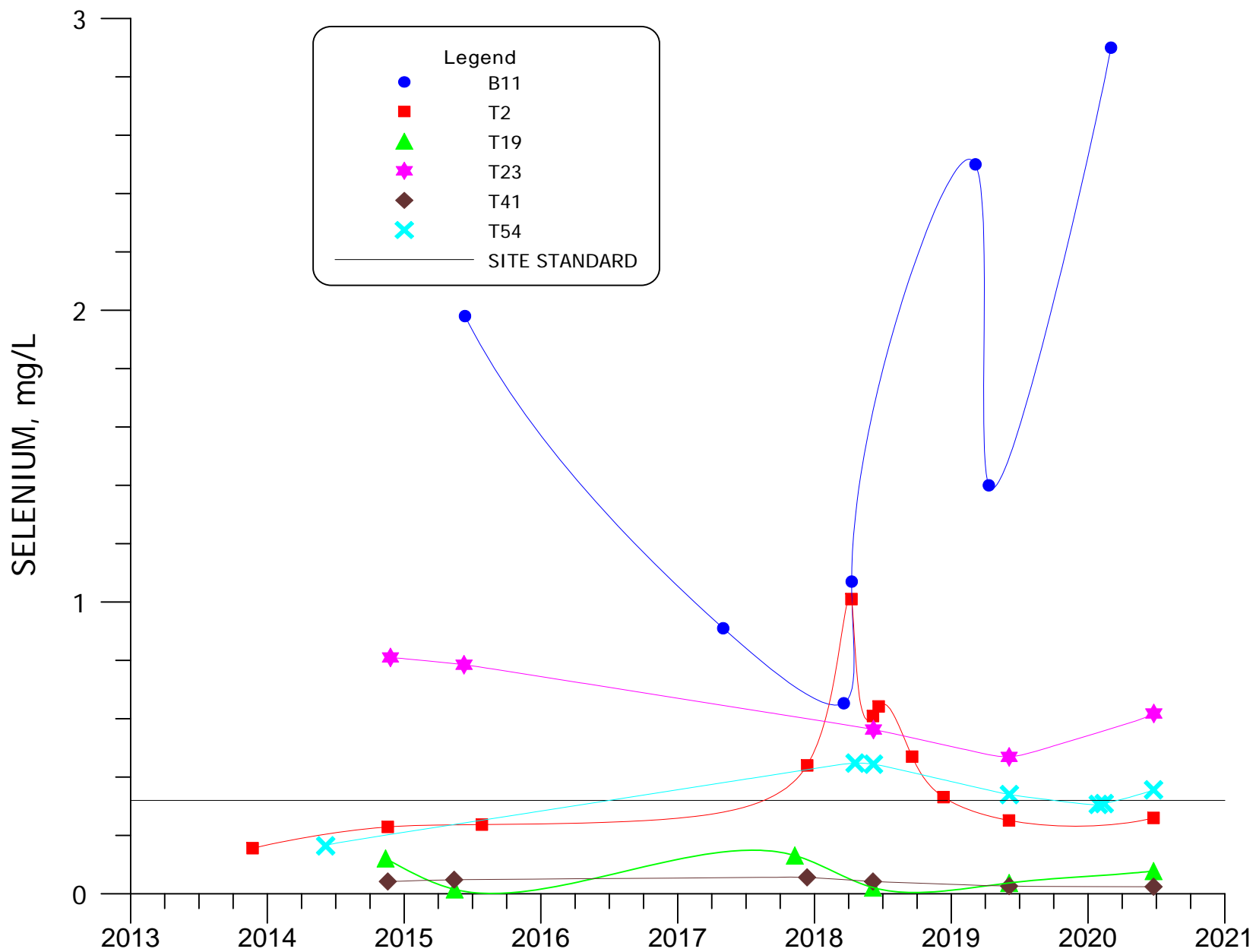


**FIGURE 4.3-73. SELENIUM CONCENTRATIONS FOR WELLS H55, M9, MO, MQ, MR AND MX.**

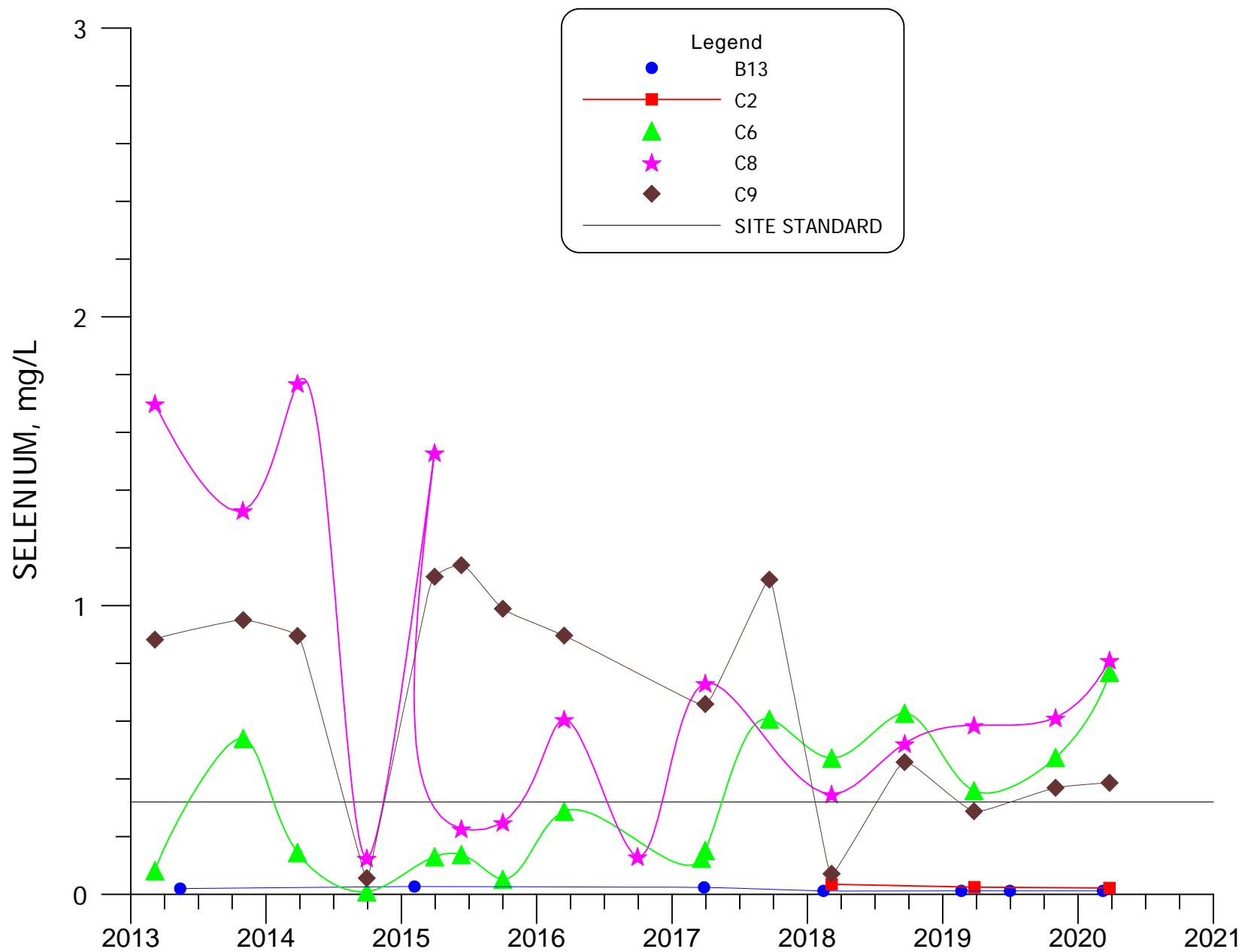


**FIGURE 4.3-74. SELENIUM CONCENTRATIONS FOR WELLS 802, B12, D1, M3 AND MB.**

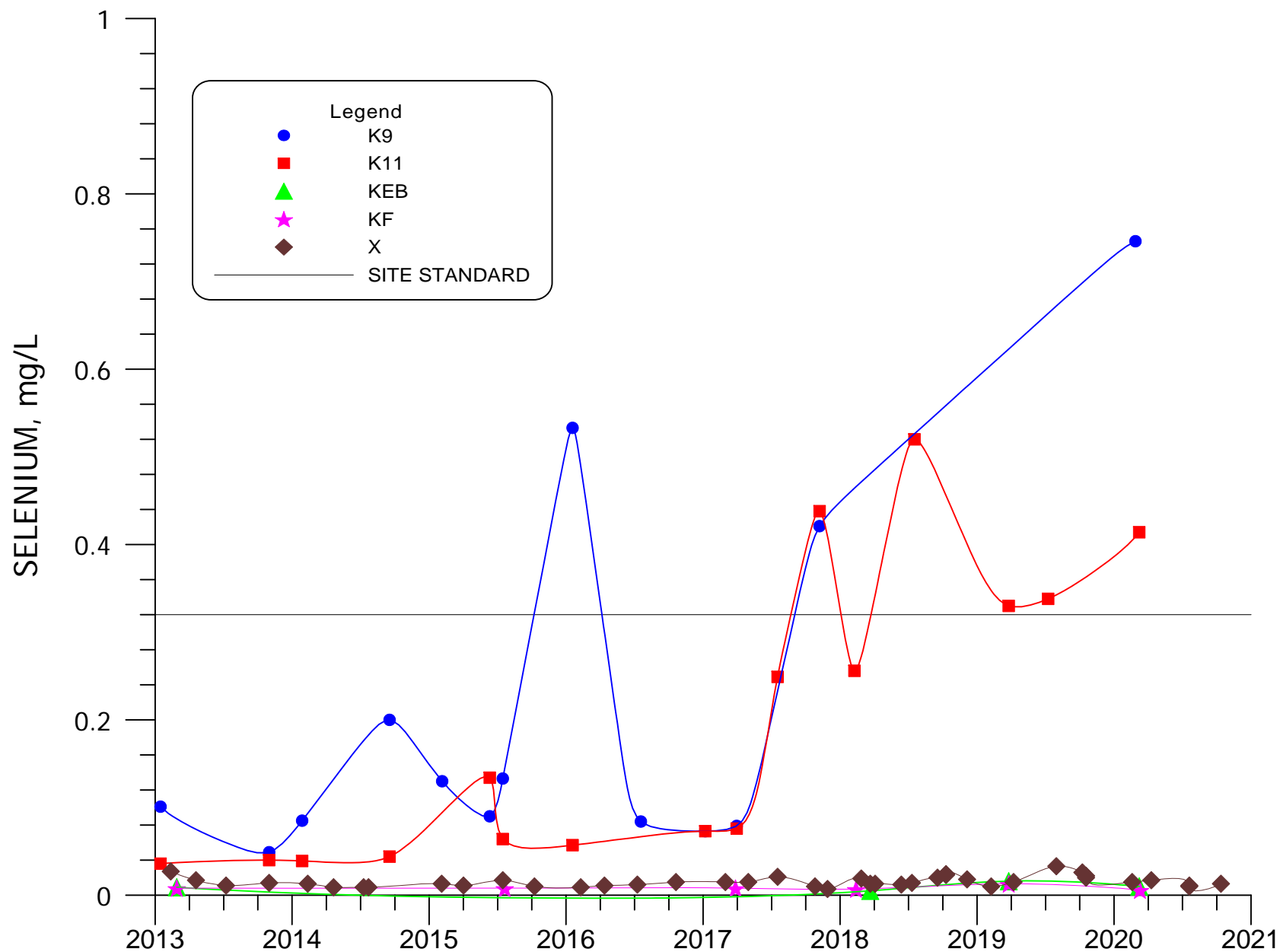




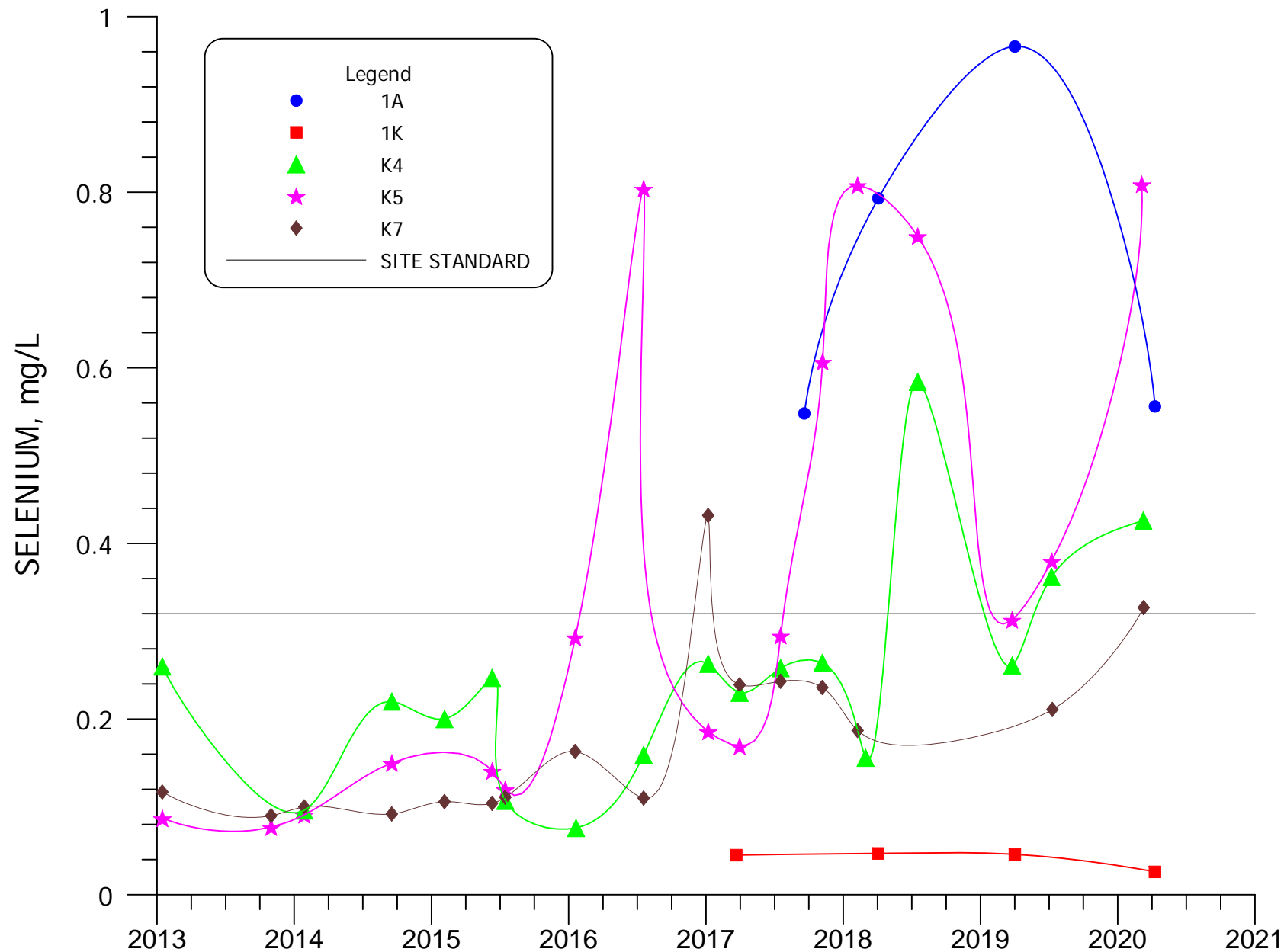
**FIGURE 4.3-75. SELENIUM CONCENTRATIONS FOR WELLS B11, T2, T19, T23, T41 AND T54.**



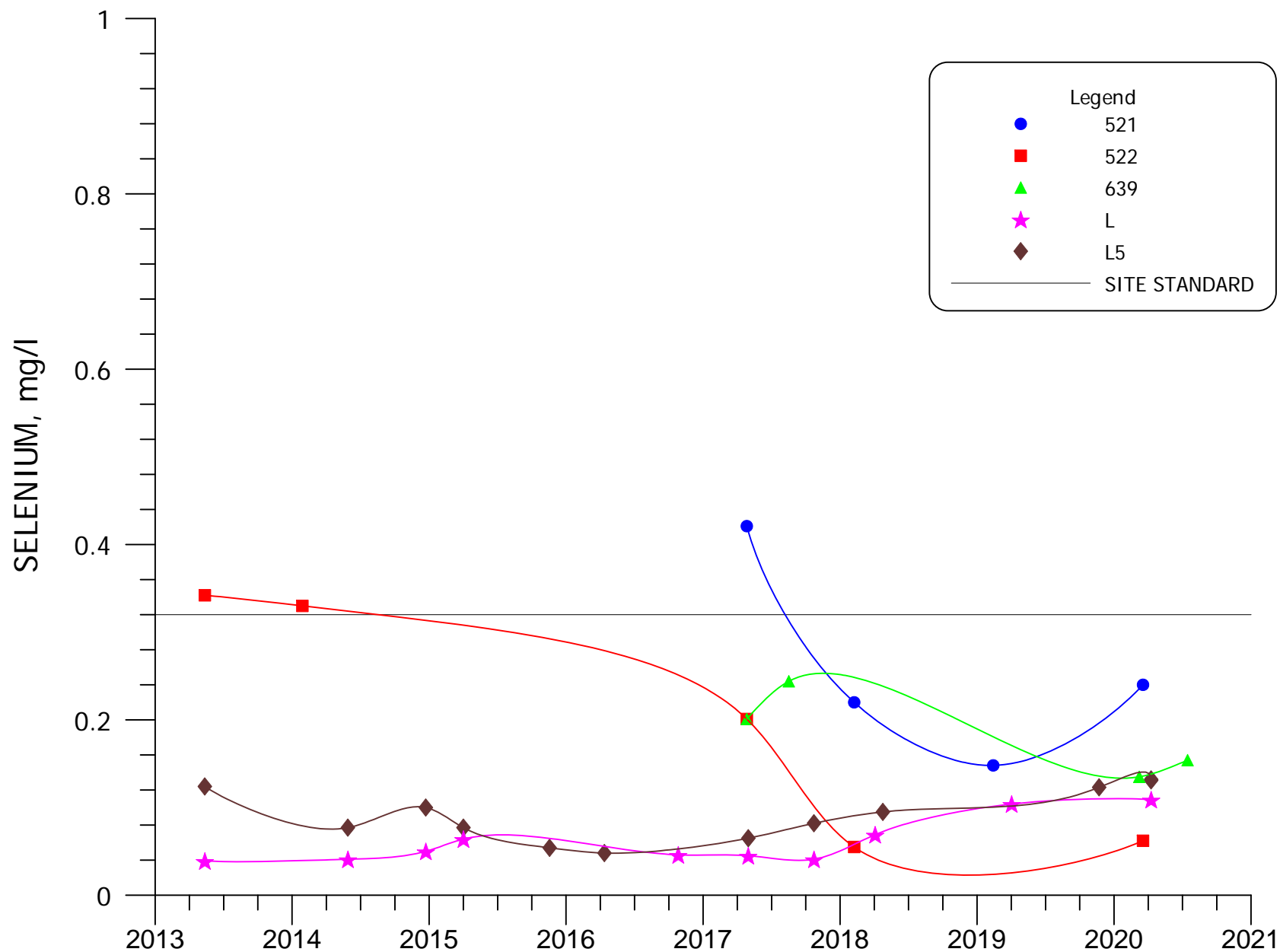
**FIGURE 4.3-76. SELENIUM CONCENTRATIONS FOR WELLS B13, C2, C6, C8 AND C9.**



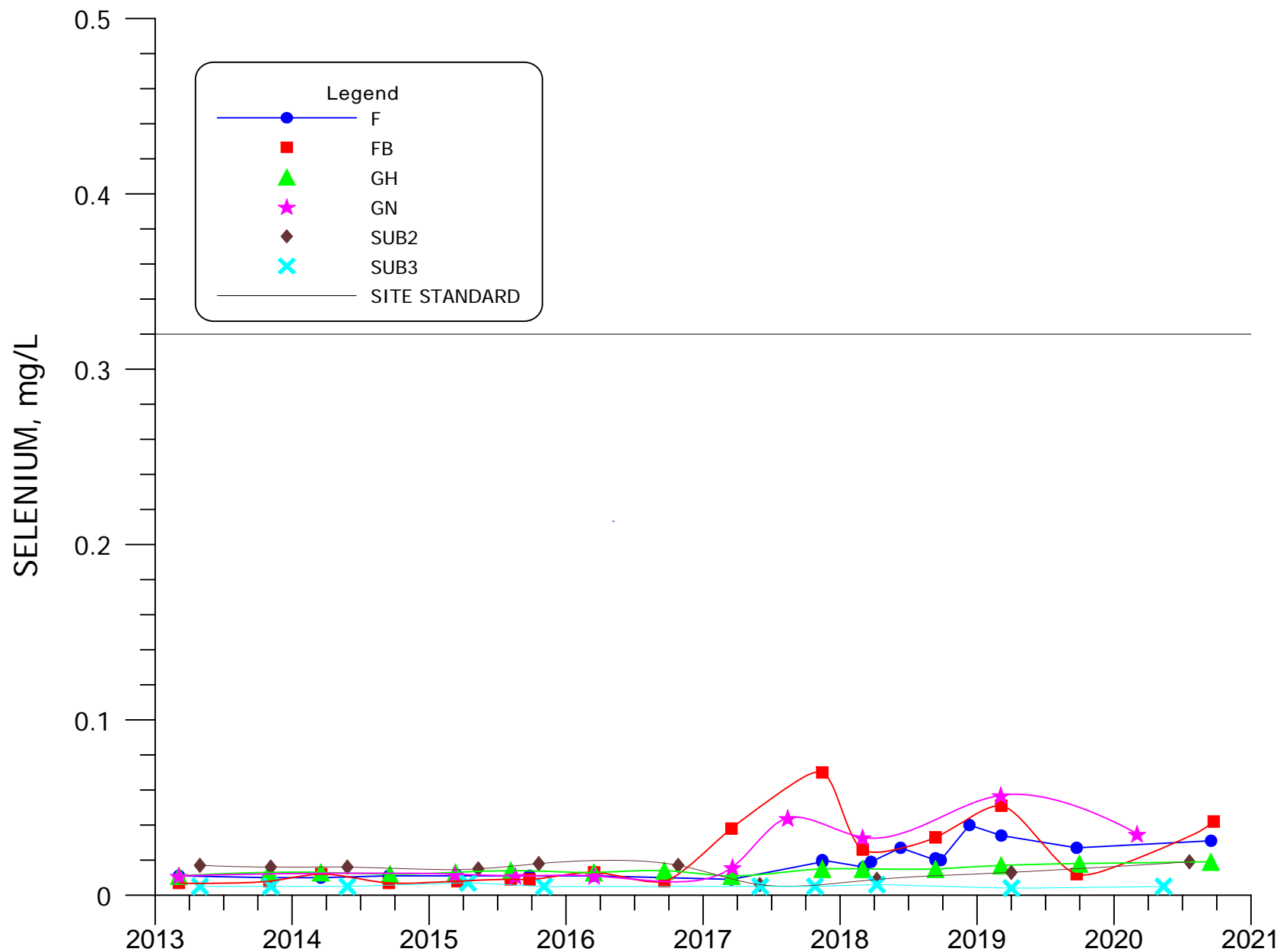
**FIGURE 4.3-77. SELENIUM CONCENTRATIONS FOR WELLS K9, K11, KEB, KF AND X.**



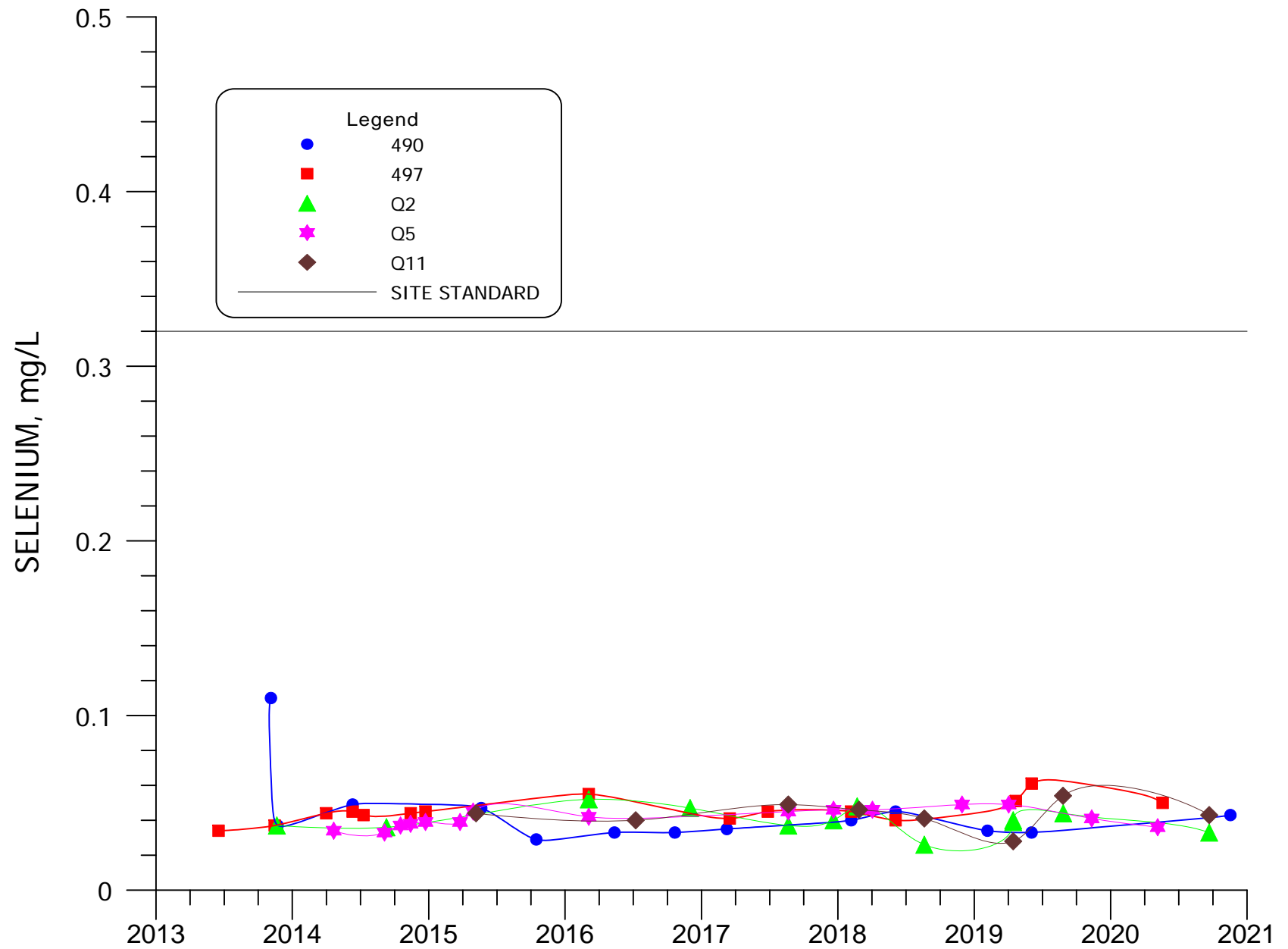
**FIGURE 4.3-78. SELENIUM CONCENTRATIONS FOR WELLS 1A, 1K, K4, K5 AND K7.**



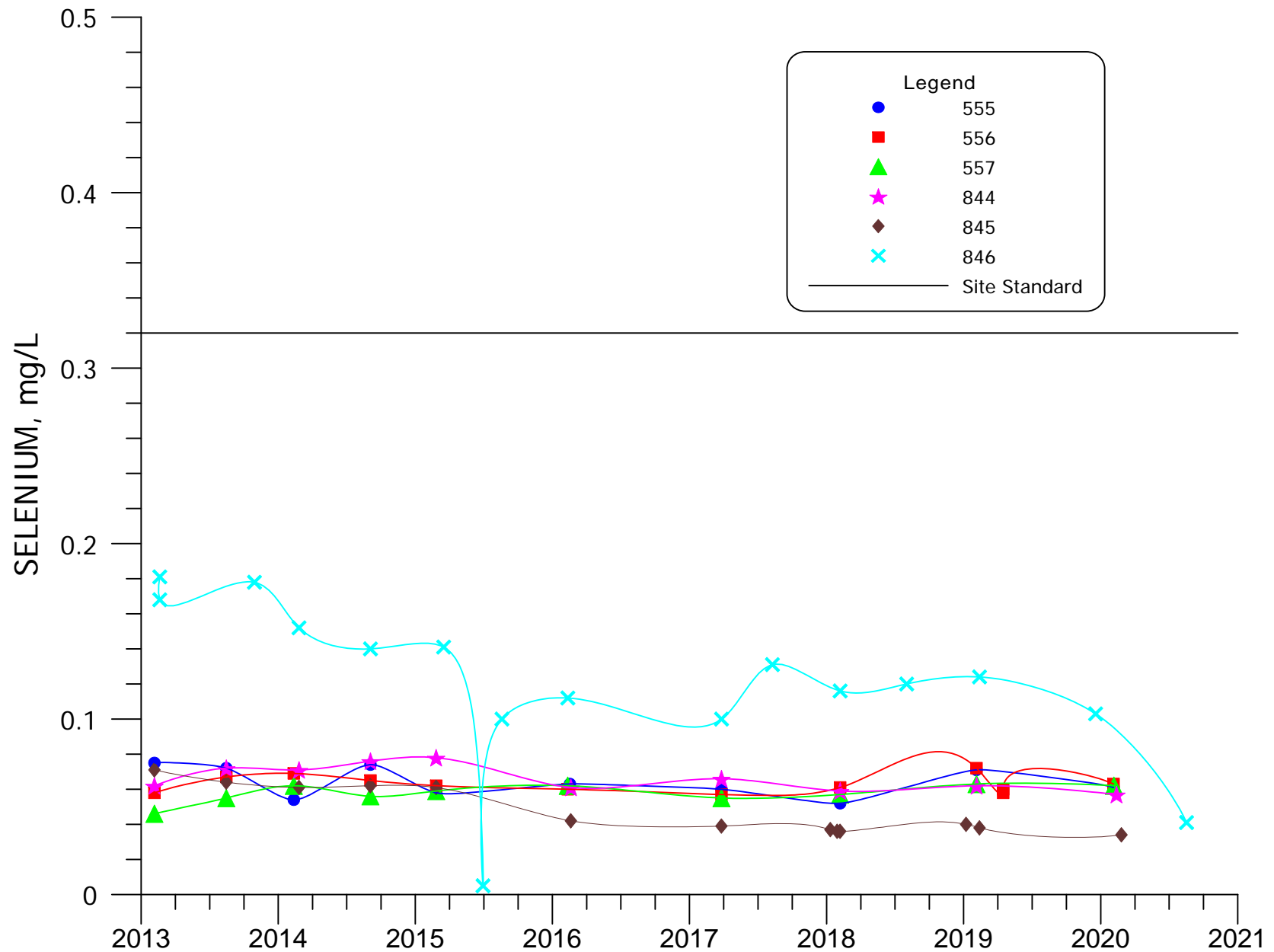
**FIGURE 4.3-79. SELENIUM CONCENTRATIONS FOR WELLS 521, 522, 639, L AND L5.**



**FIGURE 4.3-80. SELENIUM CONCENTRATIONS FOR WELLS F, FB, GH, GN, SUB2 AND SUB3.**

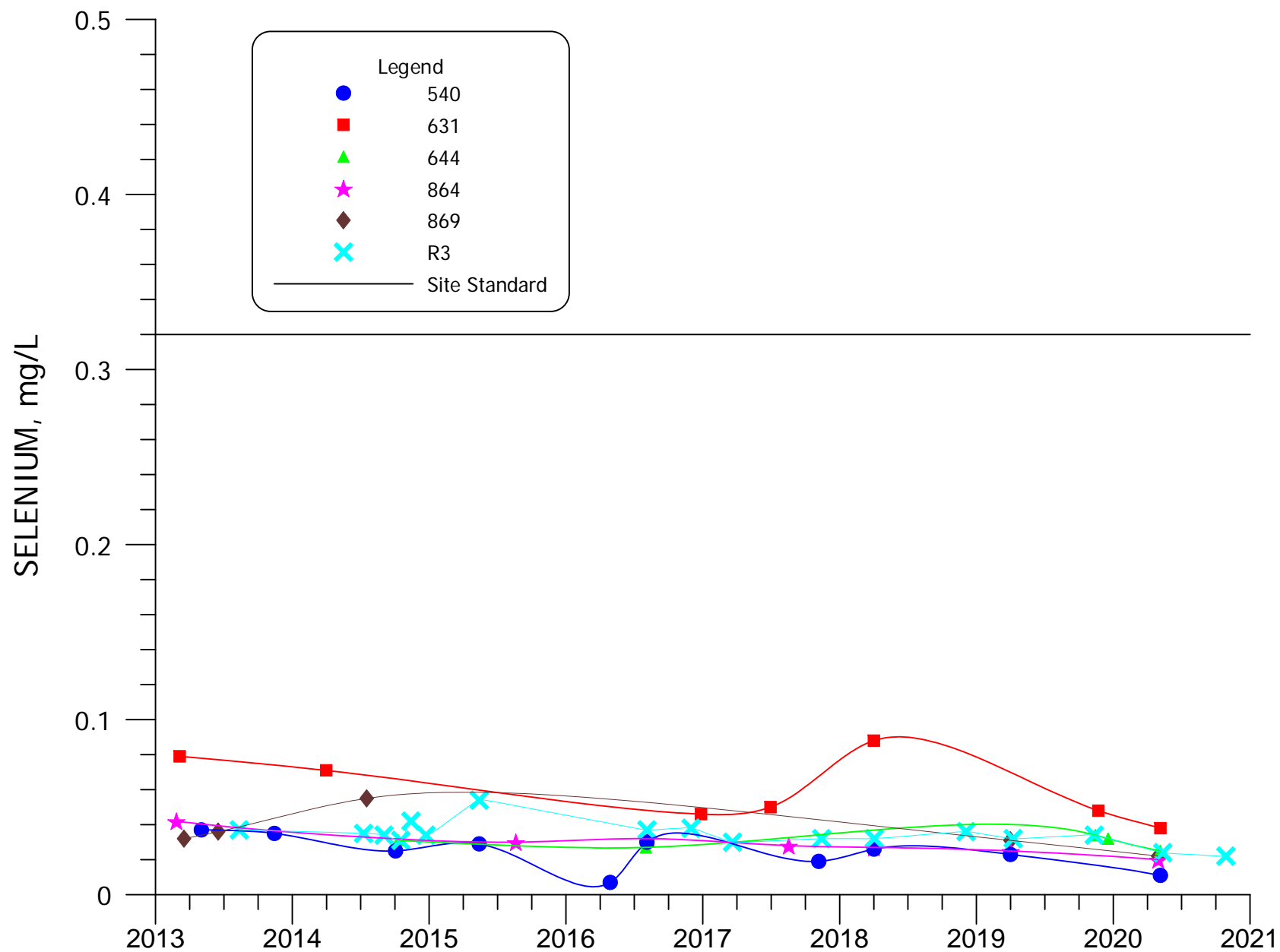


**FIGURE 4.3-81. SELENIUM CONCENTRATIONS FOR WELLS 490, 497, Q2, Q5 AND Q11.**

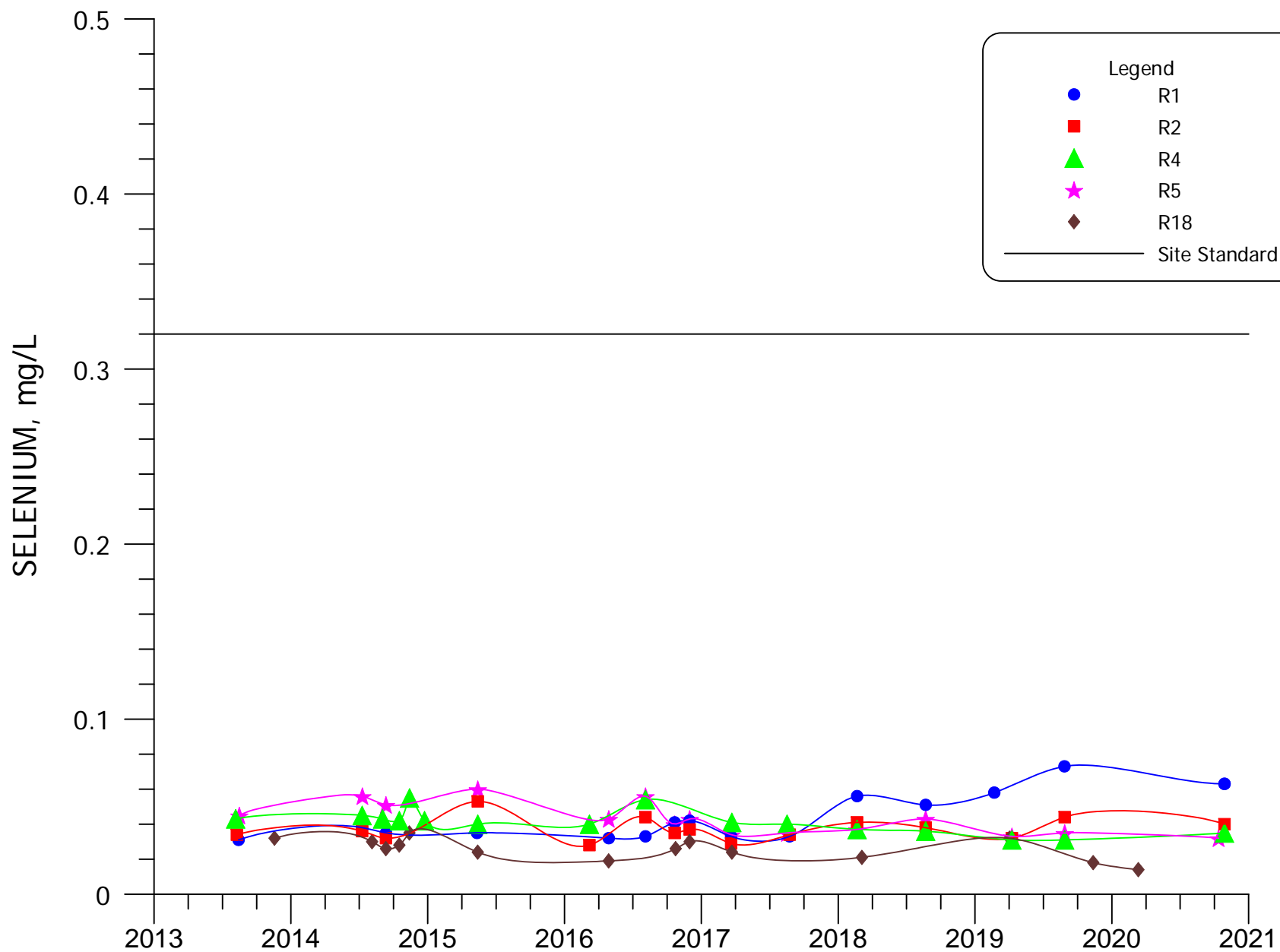


**FIGURE 4.3-82. SELENIUM CONCENTRATIONS FOR WELLS 555, 556, 557, 844, 845, AND 846.**

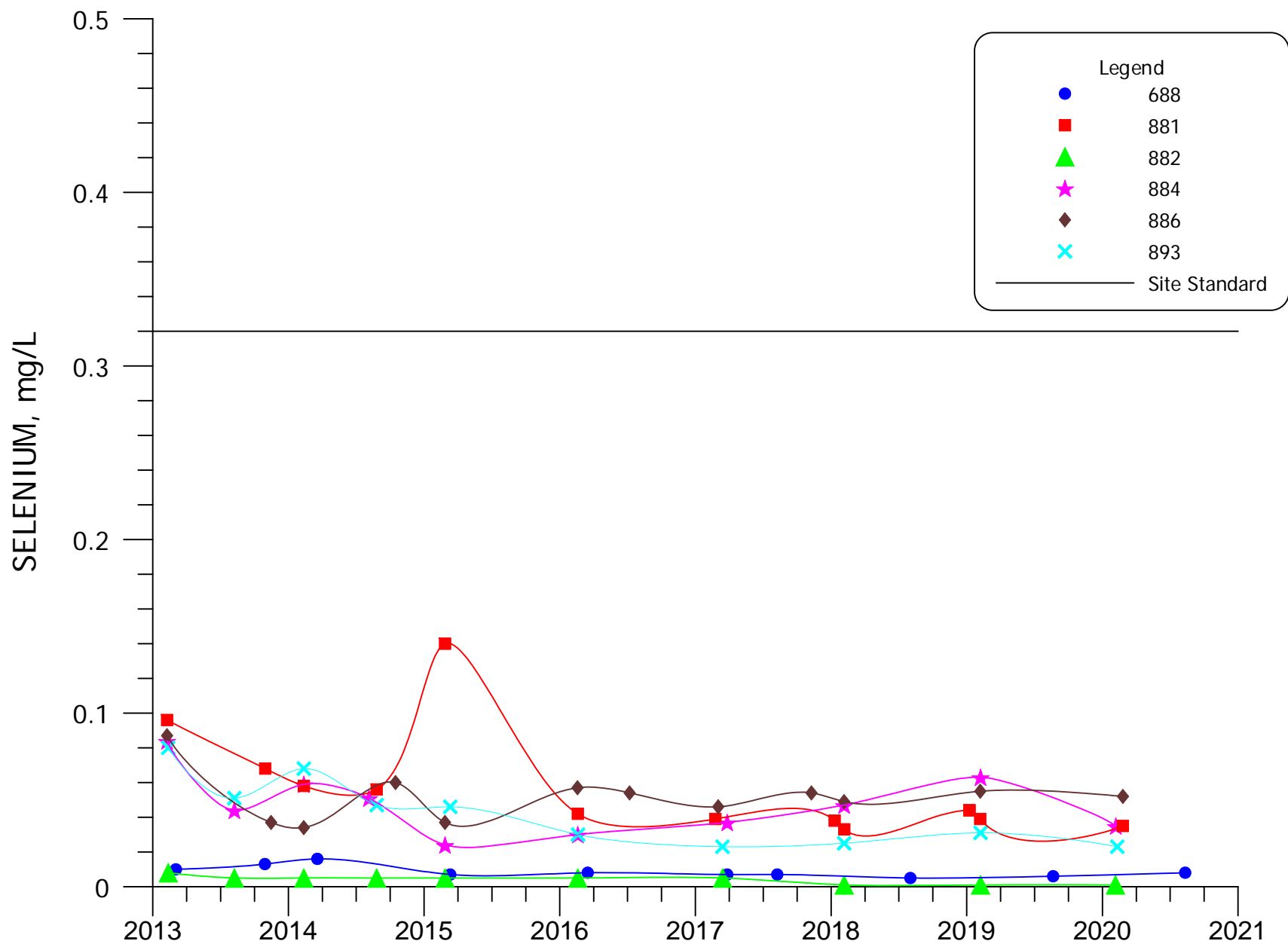




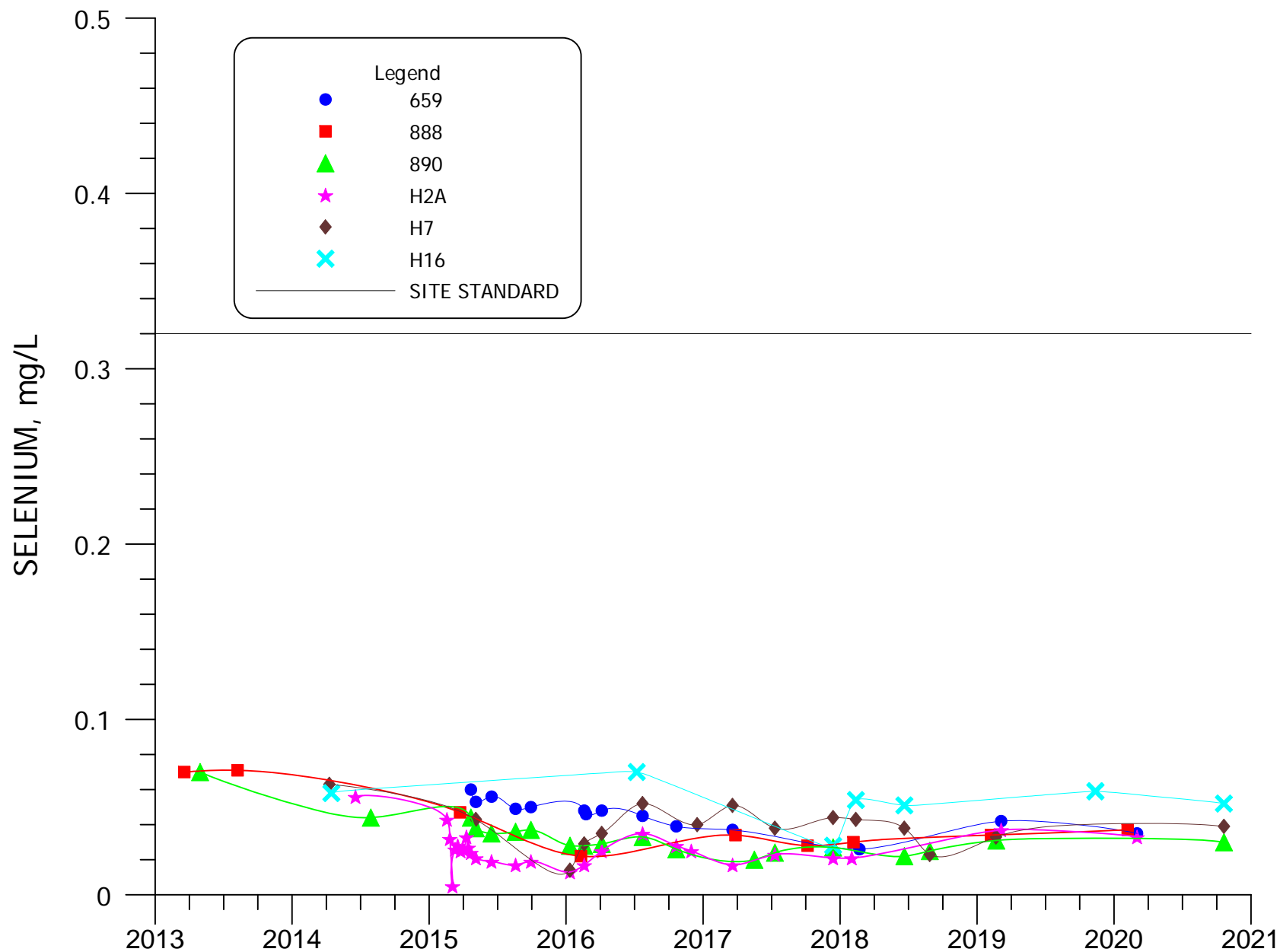
**FIGURE 4.3-83. SELENIUM CONCENTRATIONS FOR WELLS 540, 631, 644, 864, 869 AND R3.**



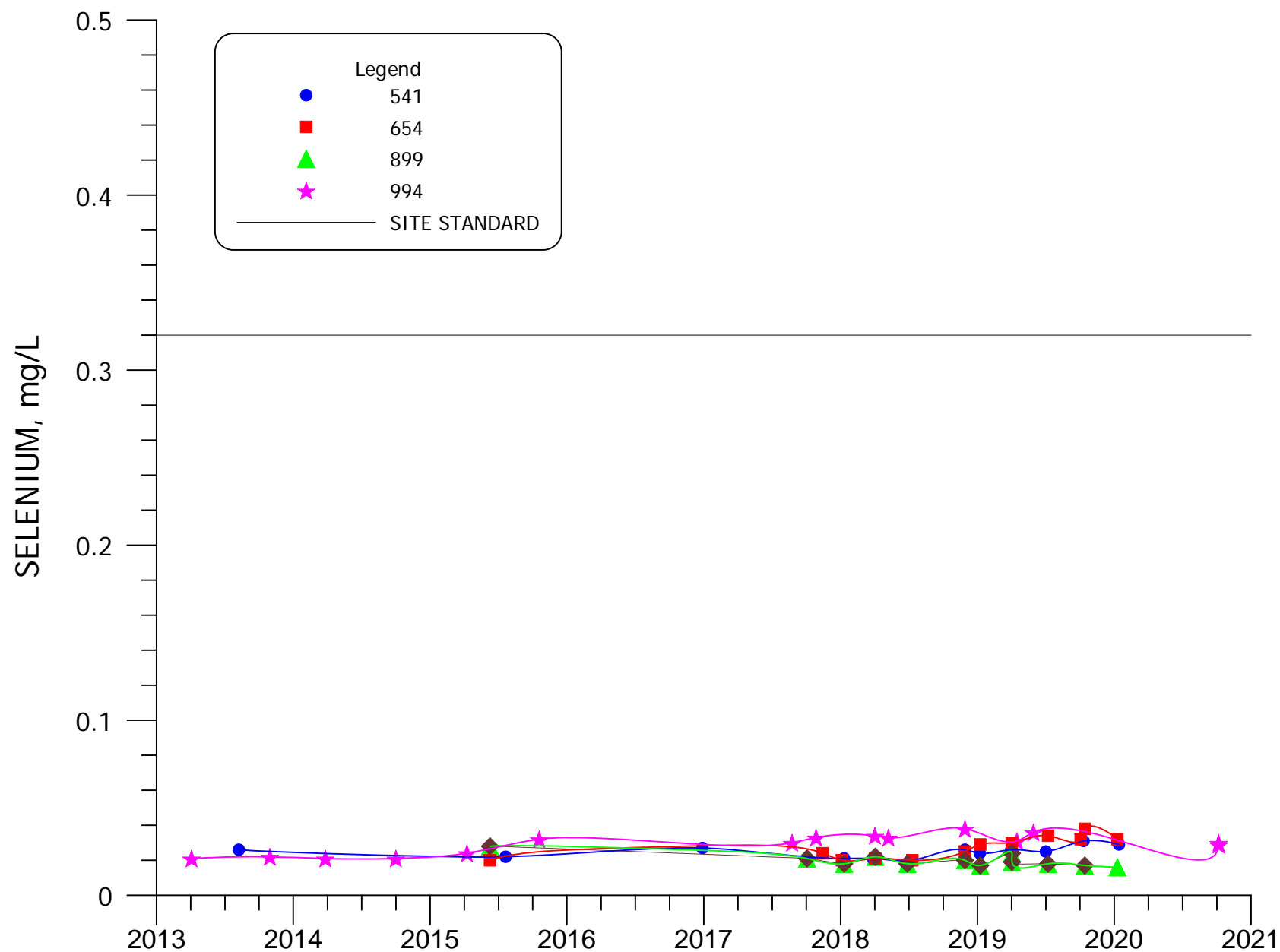
**FIGURE 4.3-83A. SELENIUM CONCENTRATIONS FOR WELLS R1, R2, R4, R5 AND R18.**



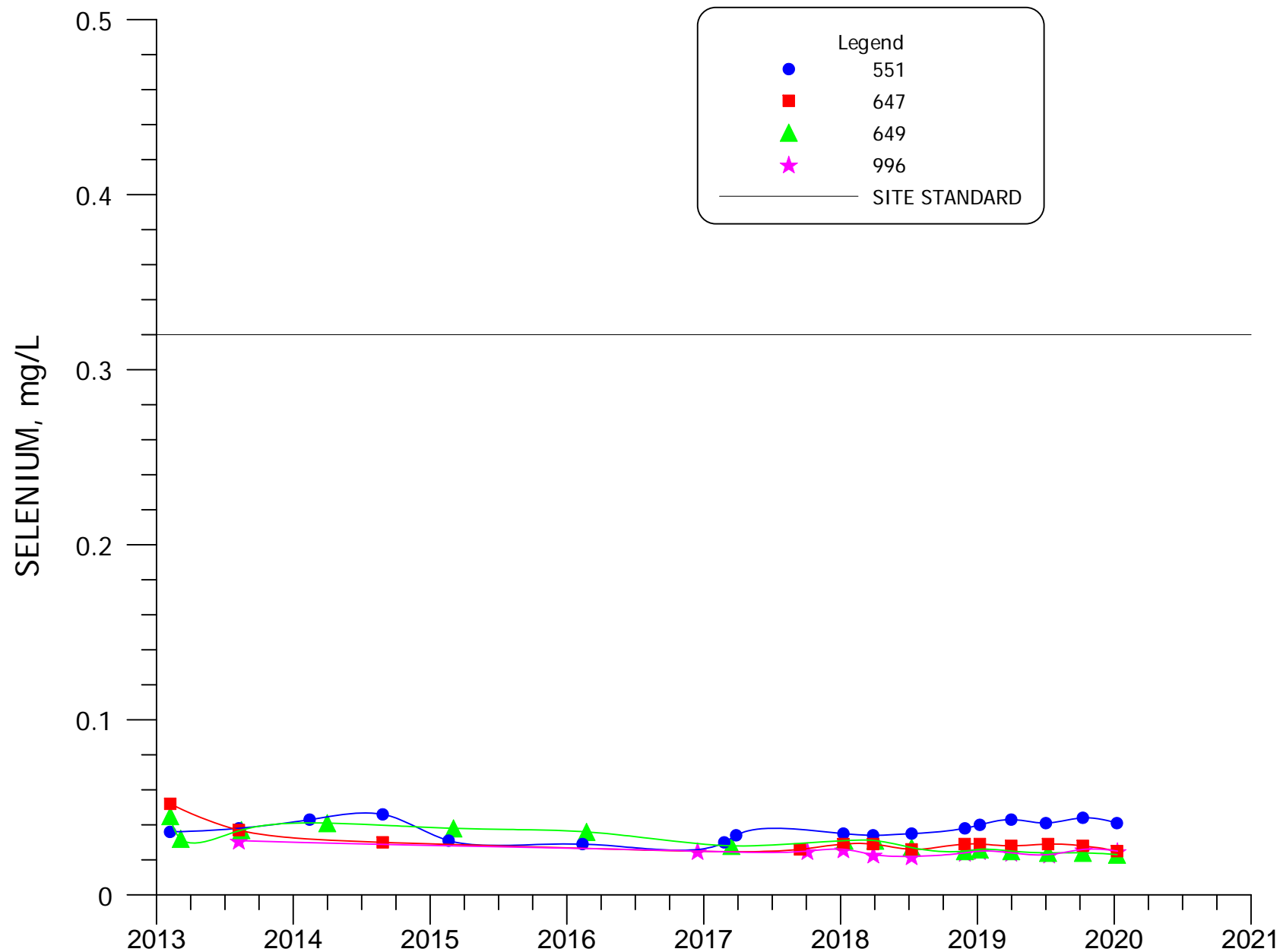
**FIGURE 4.3-84. SELENIUM CONCENTRATIONS FOR WELLS 688, 881, 882, 884, 886, AND 893.**



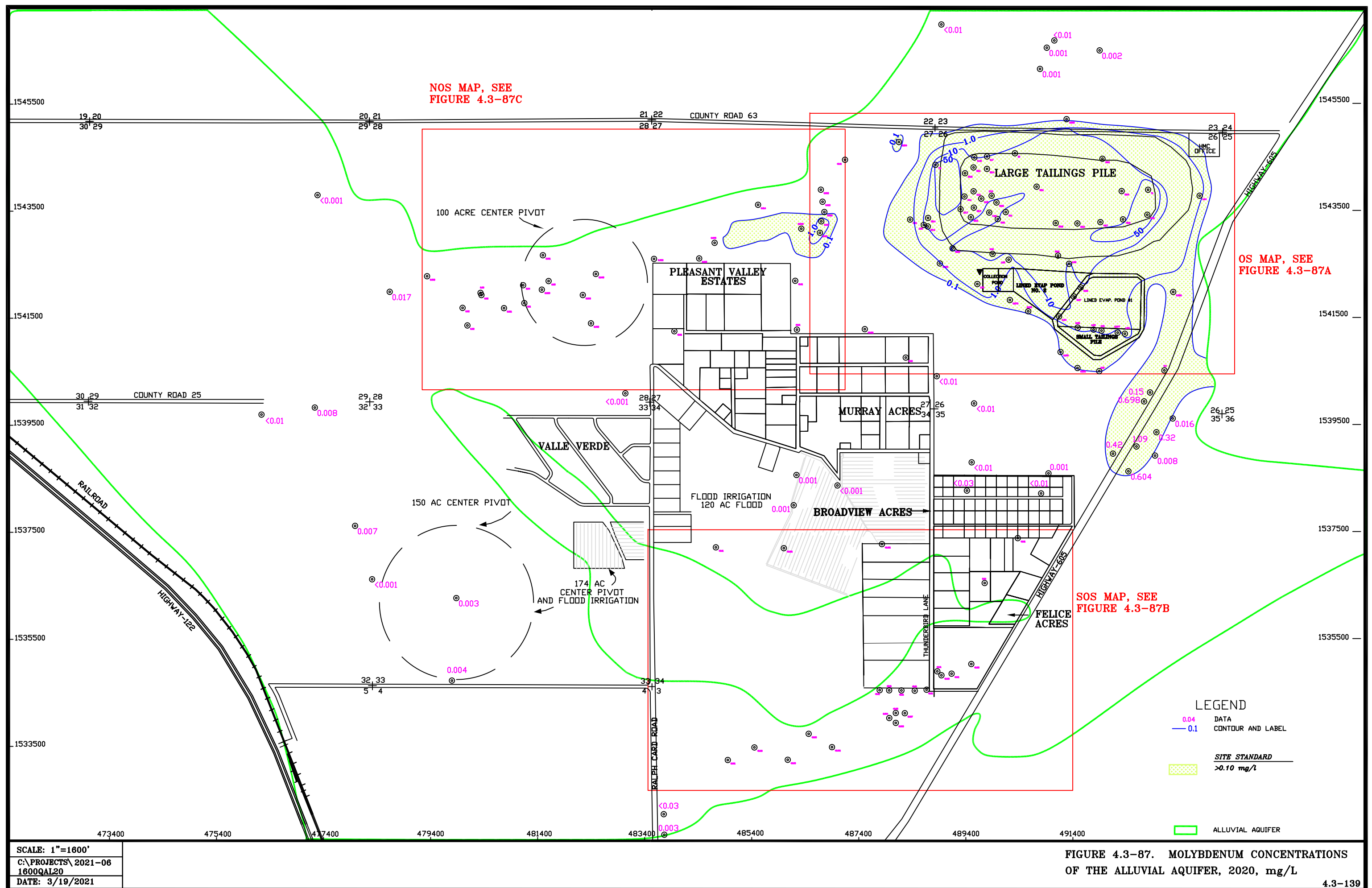
**FIGURE 4.3-84A. SELENIUM CONCENTRATIONS FOR WELLS 659, 888, 890, H2A, H7 AND H16.**

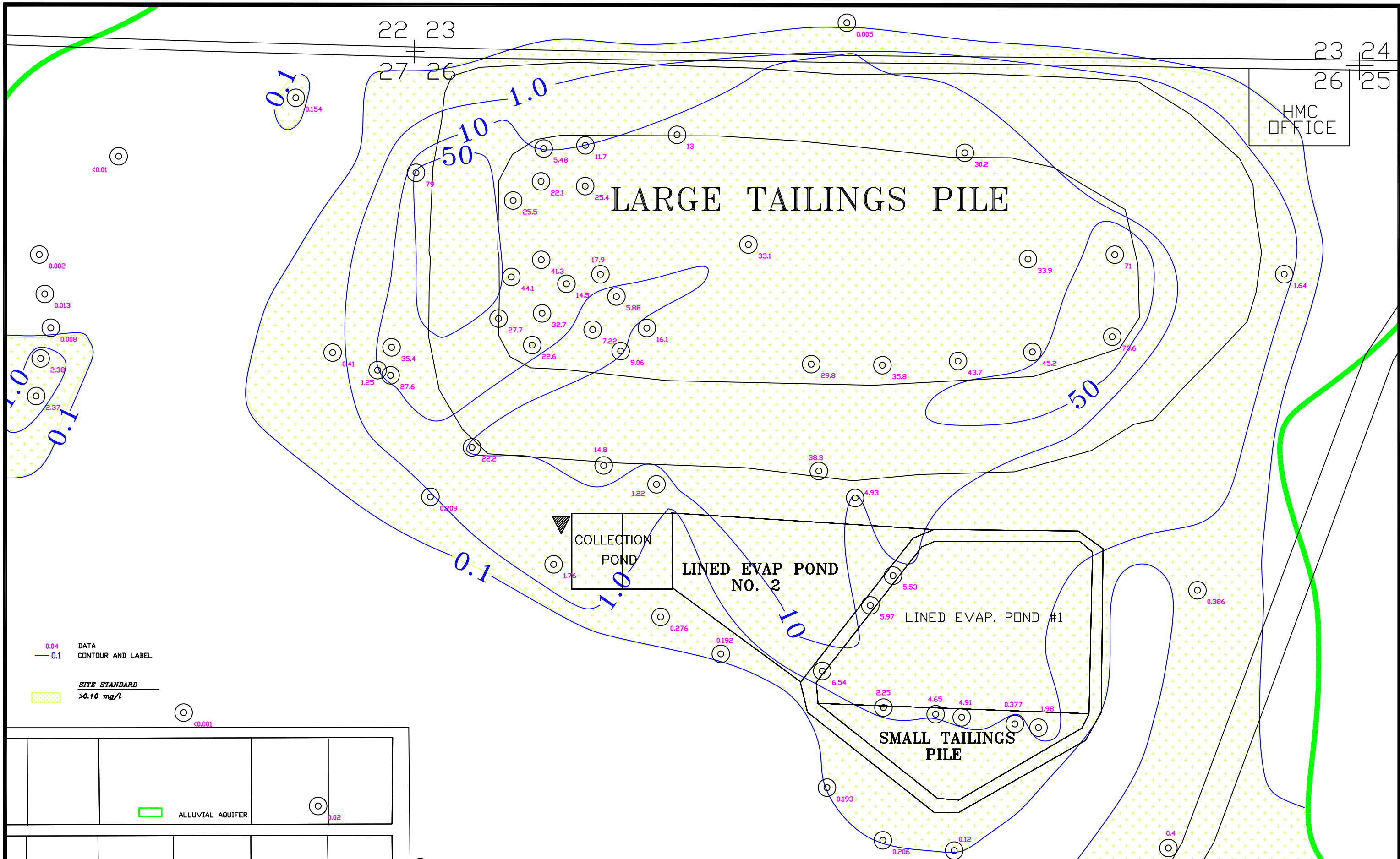


**FIGURE 4.3-85. SELENIUM CONCENTRATIONS FOR WELLS 541, 654, 899 and 994.**

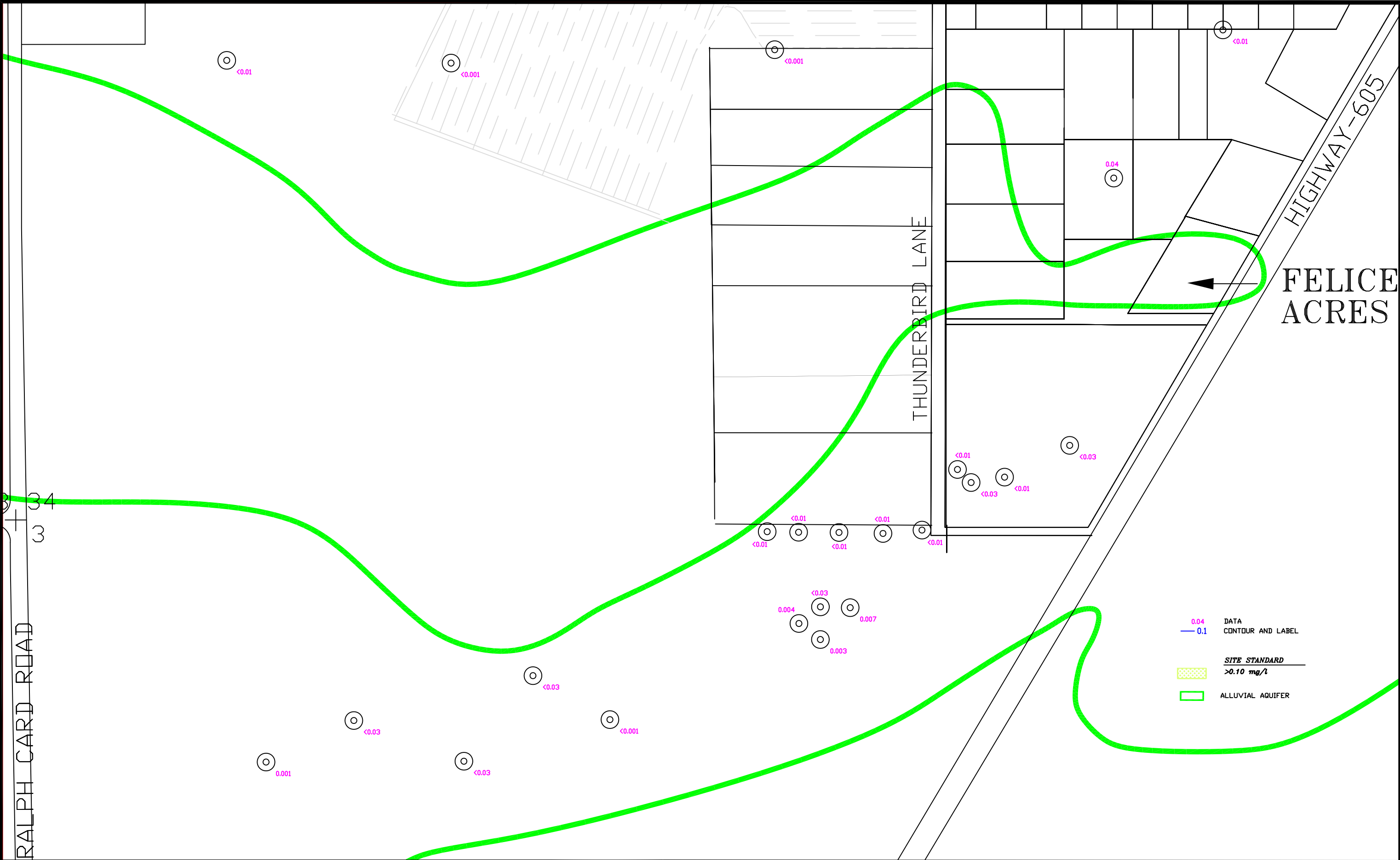


**FIGURE 4.3-86. SELENIUM CONCENTRATIONS FOR WELLS 551, 647, 649 AND 996.**



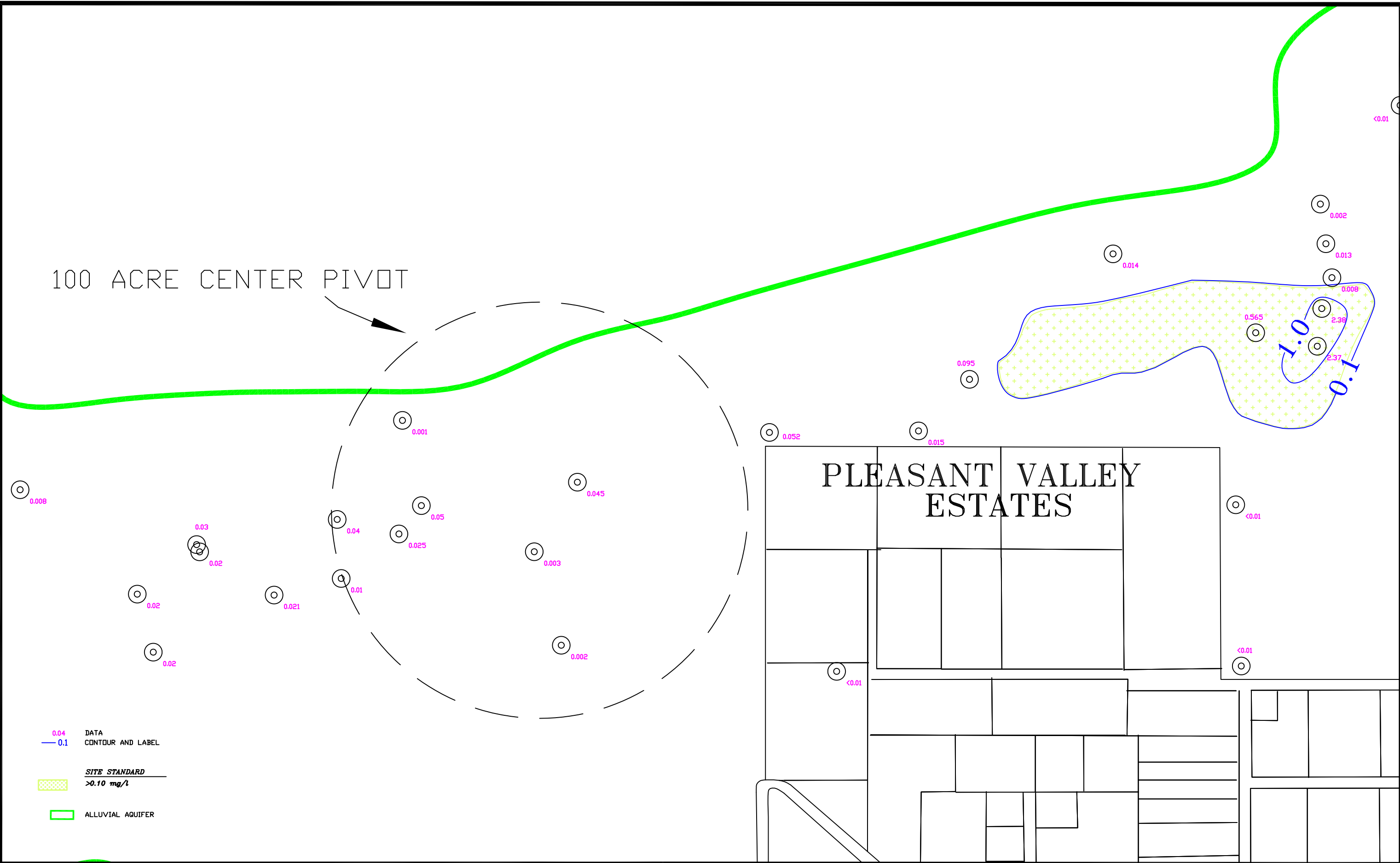






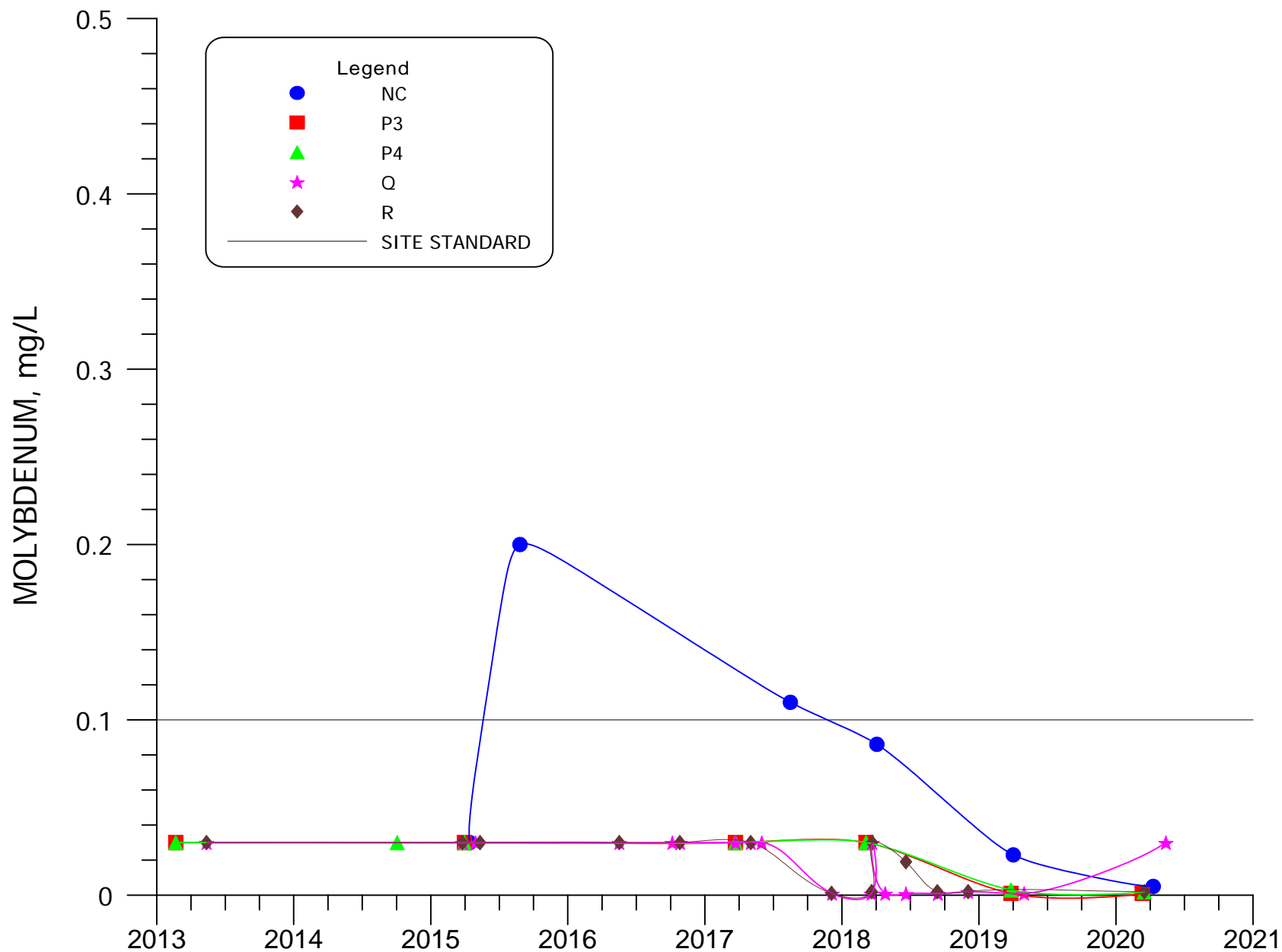
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DATE: 3/19/2021

FIGURE 4.3-87B. MOLYBDENUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, SOS, 2020, mg/L  
4.3-141

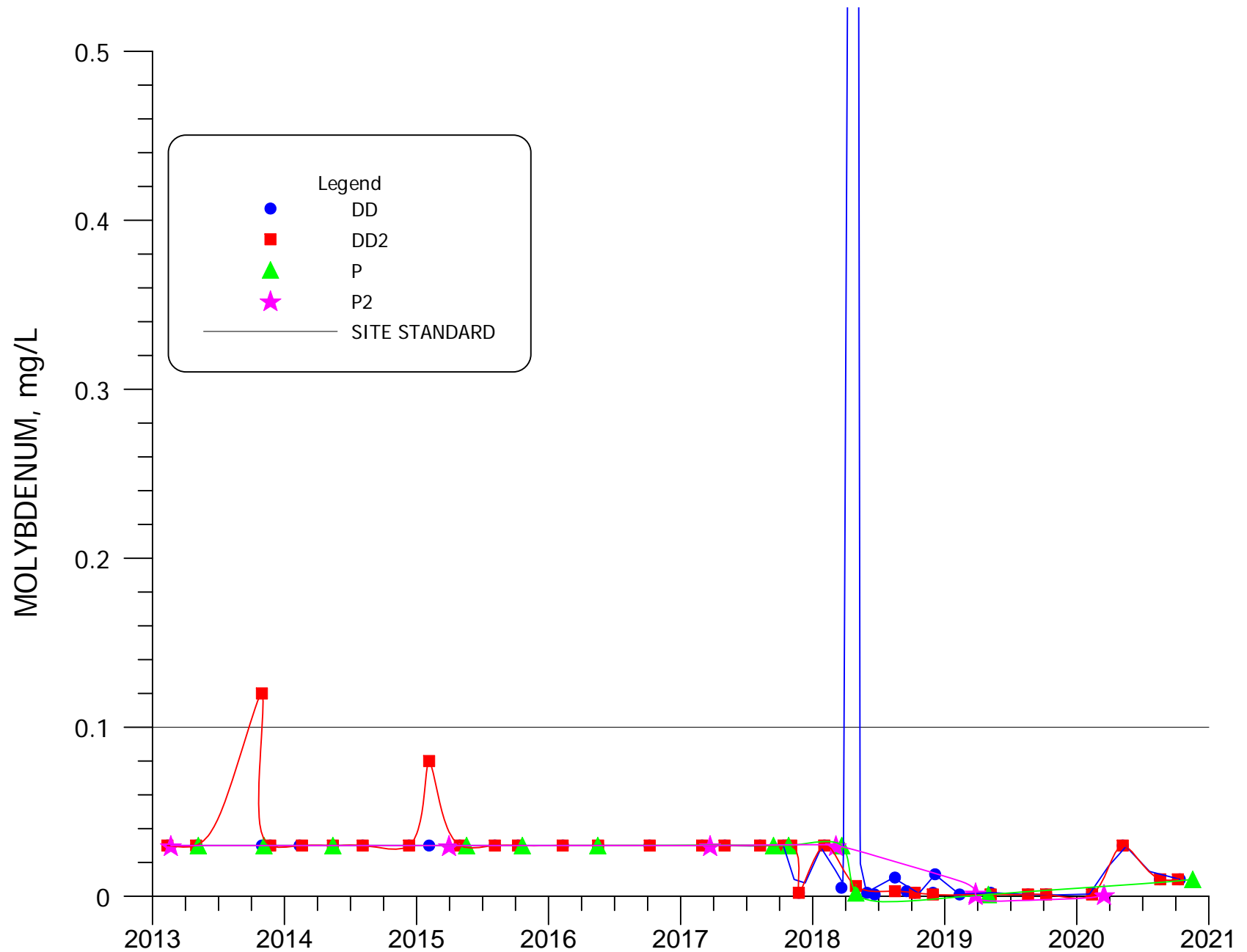


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DATE: 3/19/2021

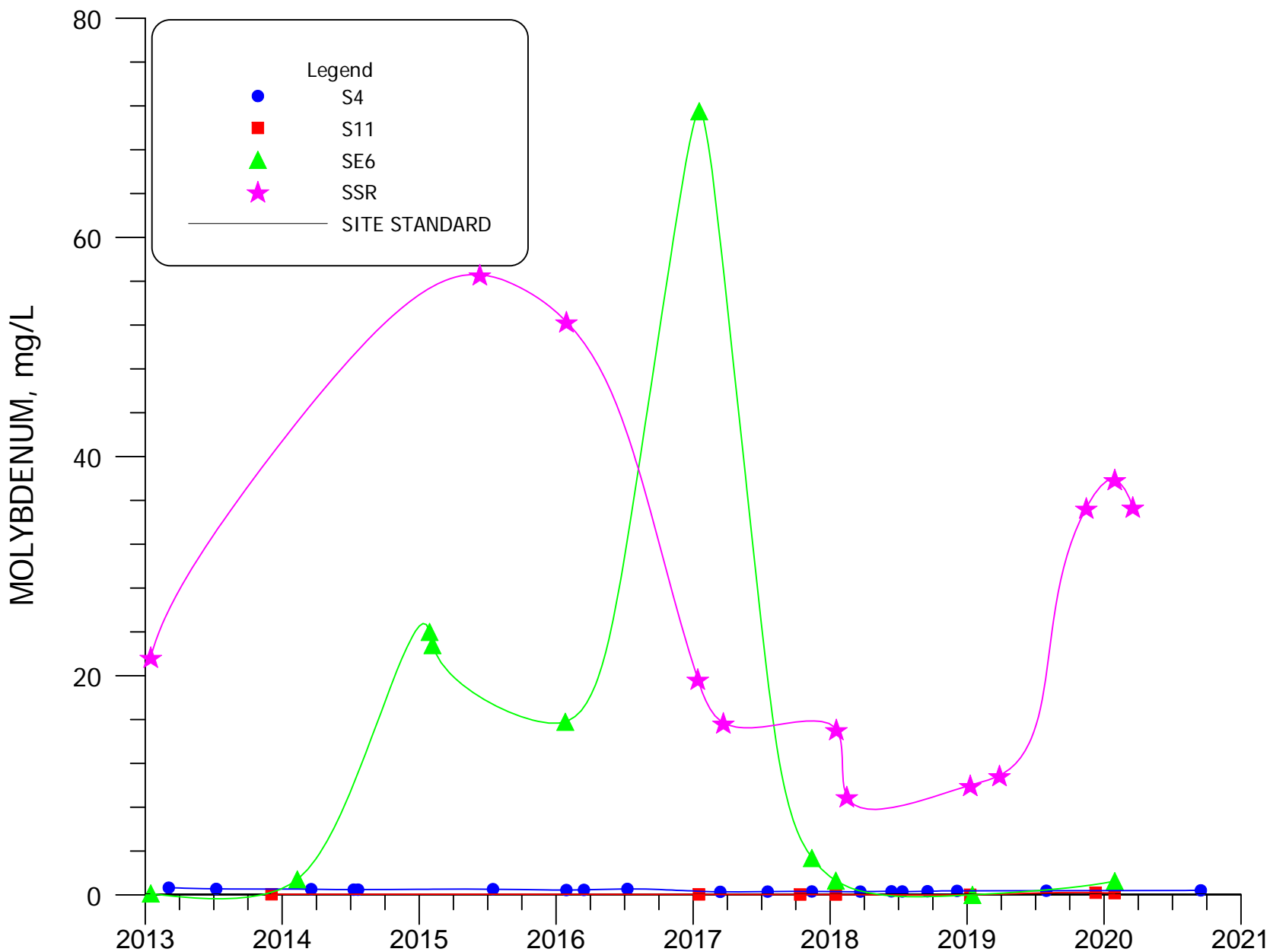
FIGURE 4.3-87C. MOLYBDENUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, NOS, 2020, mg/L  
4.3-142



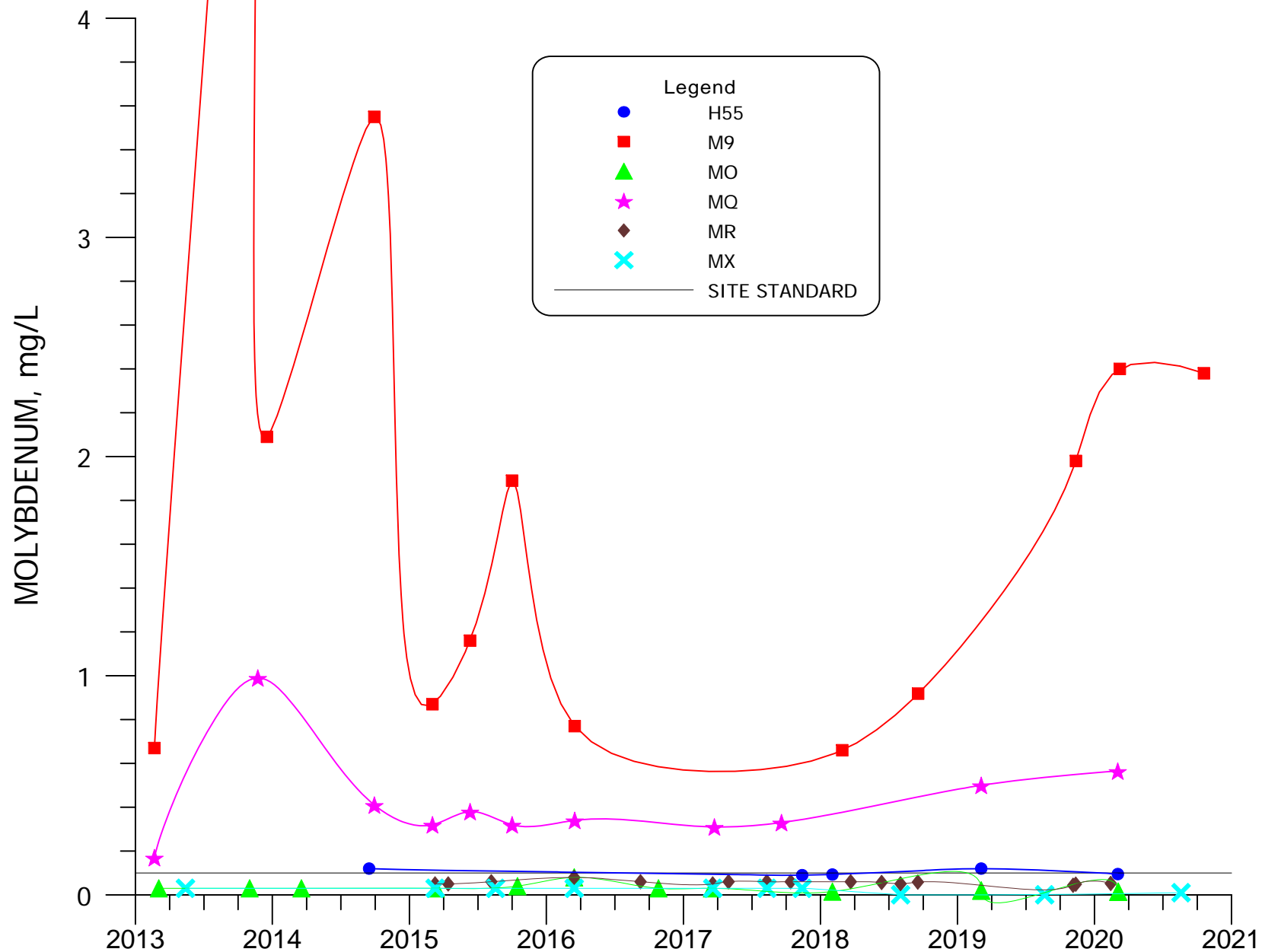
**FIGURE 4.3-88. MOLYBDENUM CONCENTRATIONS FOR WELLS NC, P3, P4, Q AND R.**



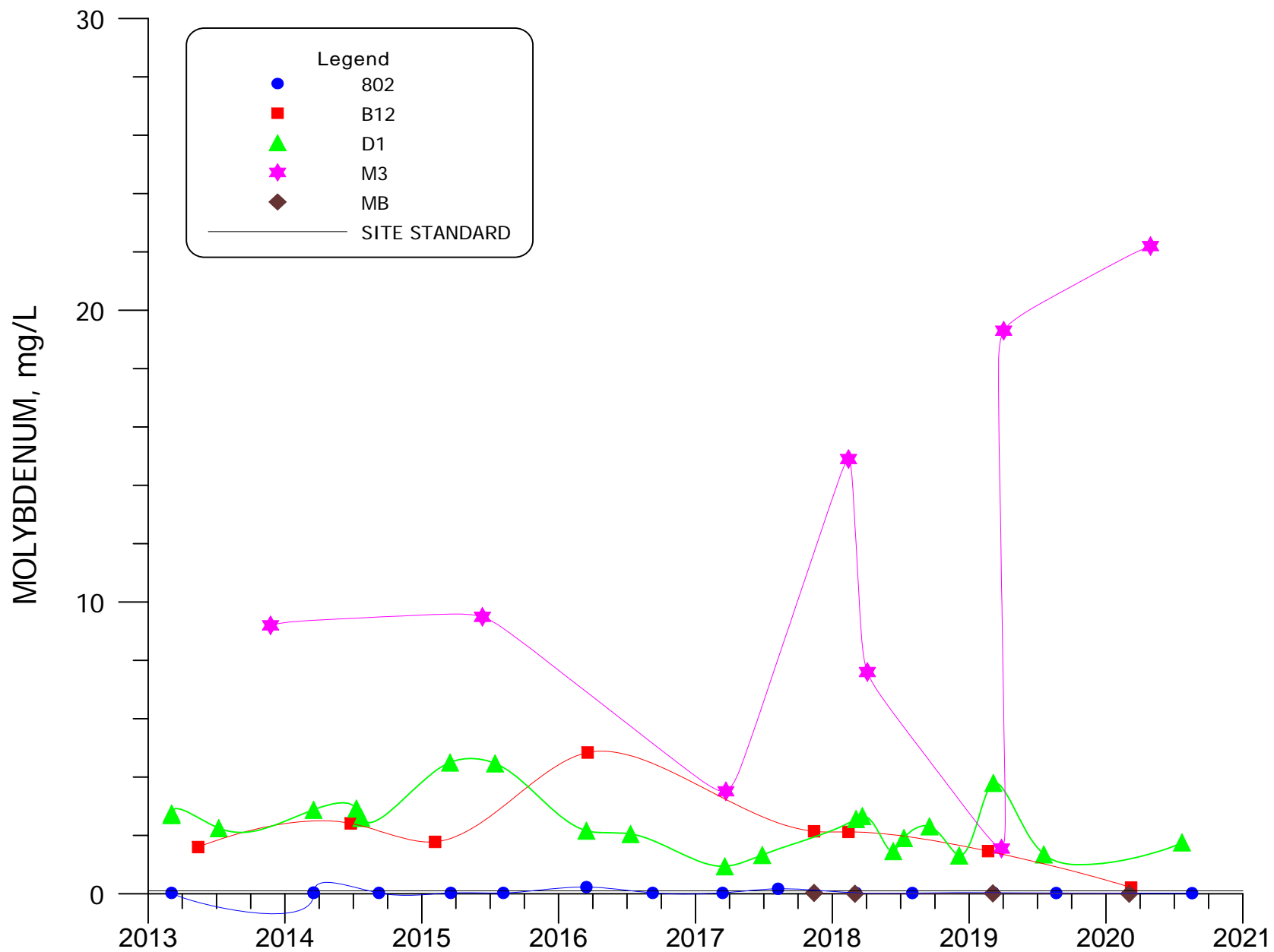
**FIGURE 4.3-88A. MOLYBDENUM CONCENTRATIONS FOR WELLS DD, DD2, P AND P2.**



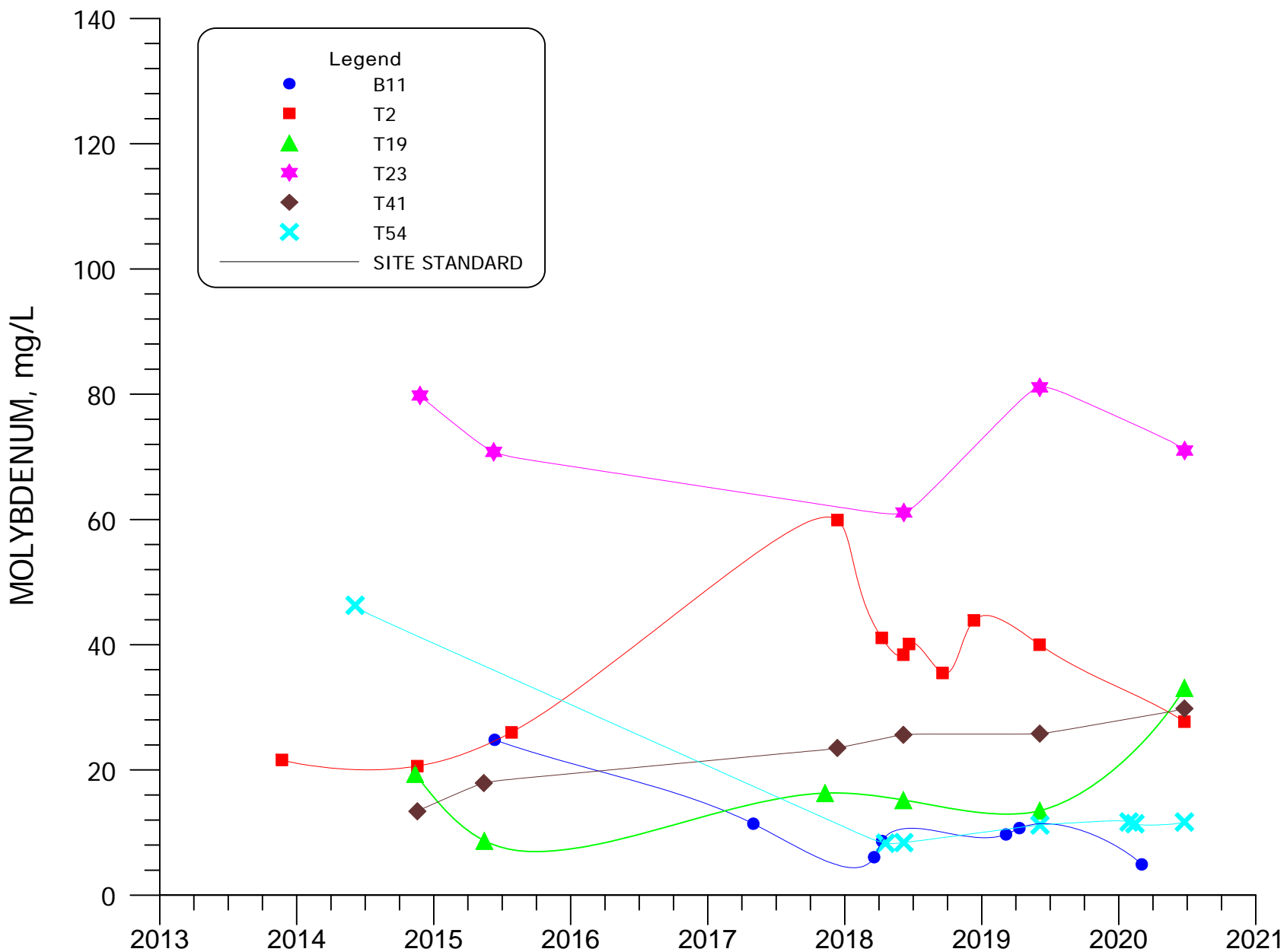
**FIGURE 4.3-89. MOLYBDENUM CONCENTRATIONS FOR WELLS S4, S11, SE6 AND SSR.**



**FIGURE 4.3-90. MOLYBDENUM CONCENTRATIONS FOR WELLS H55, M9, MO, MQ, MR AND MX.**

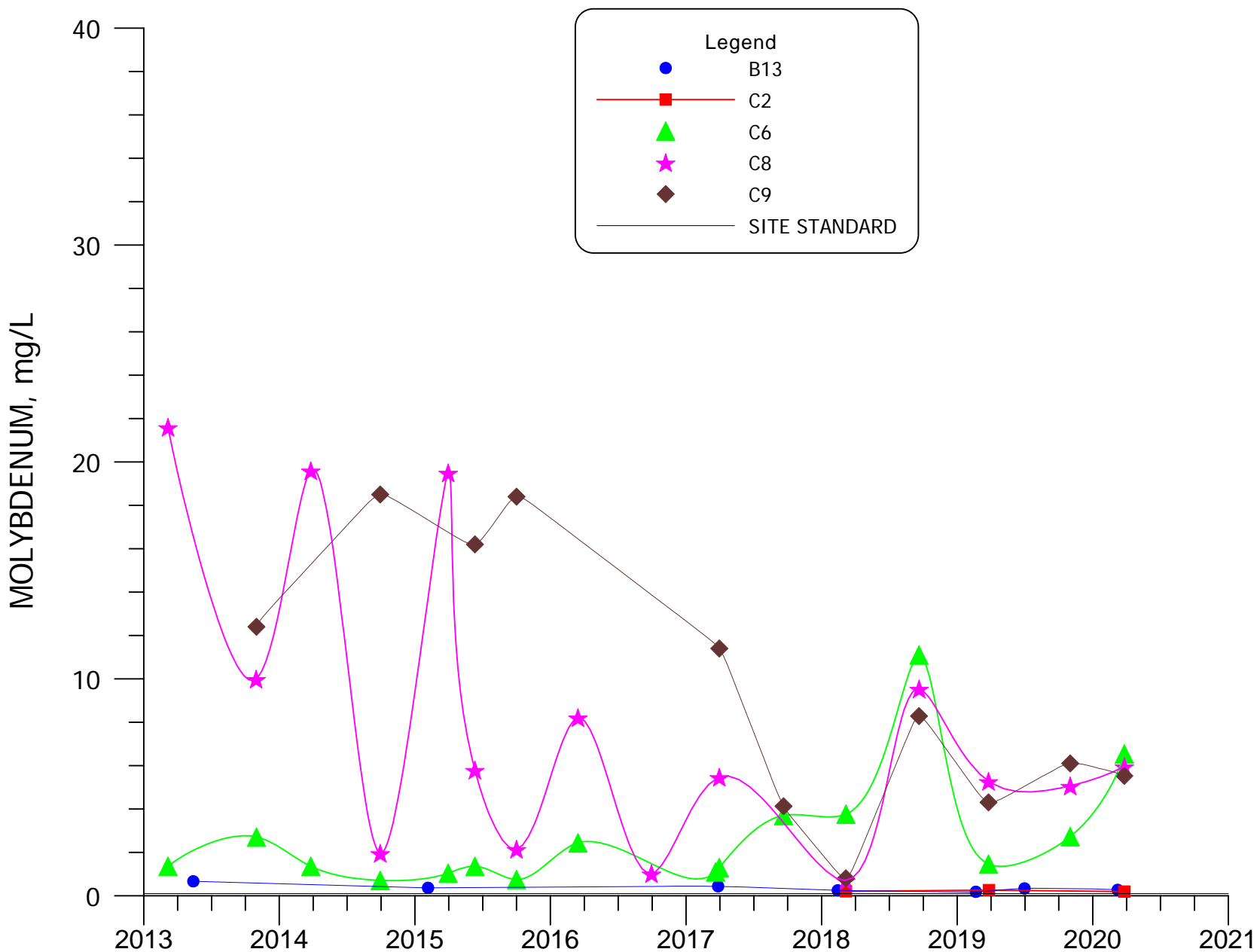


**FIGURE 4.3-91. MOLYBDENUM CONCENTRATIONS FOR WELLS 802, B12, D1, M3 AND MB.**



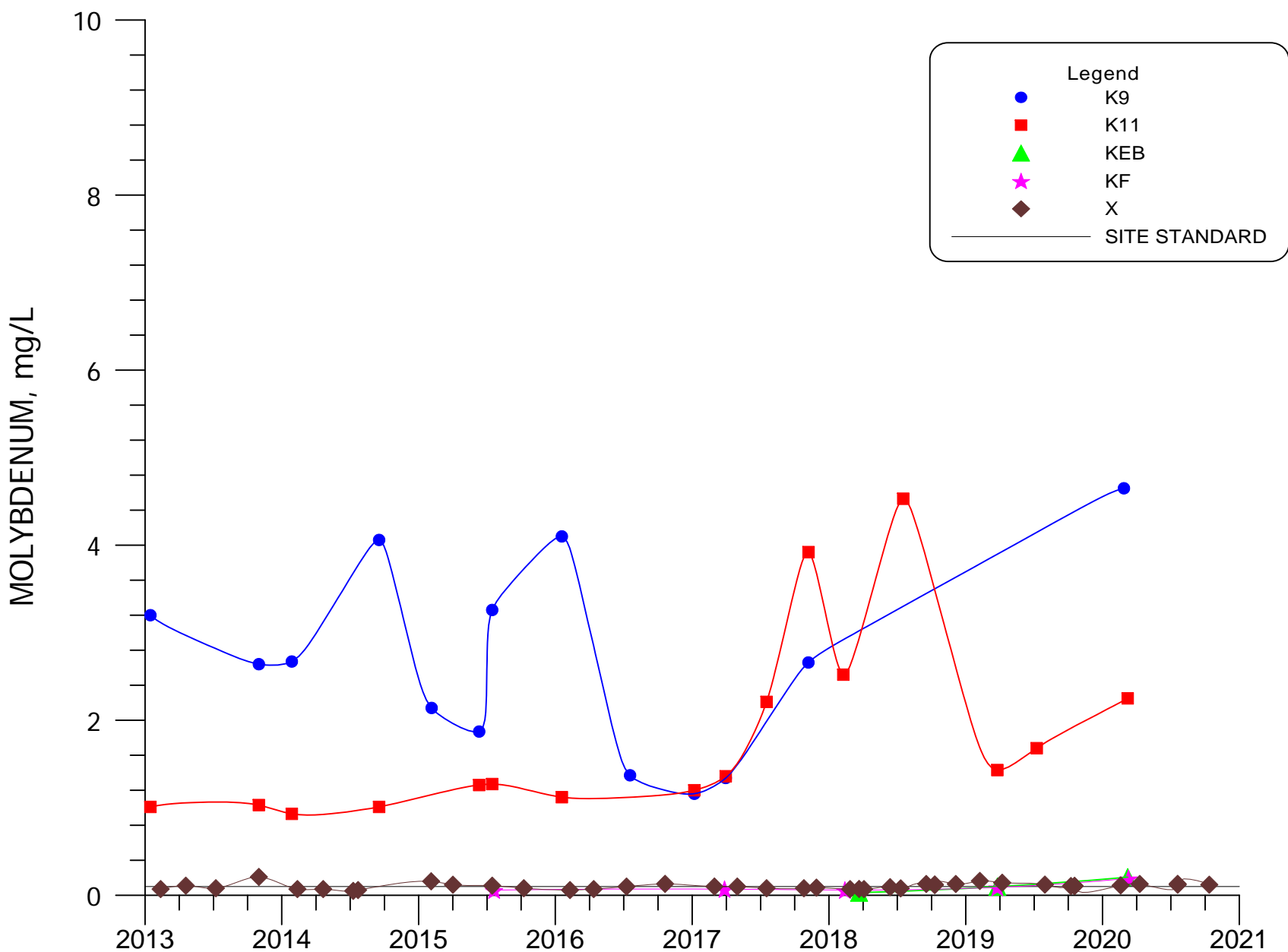
**FIGURE 4.3-92. MOLYBDENUM CONCENTRATIONS FOR WELLS B11, T2, T19, T23, T41 AND T54.**



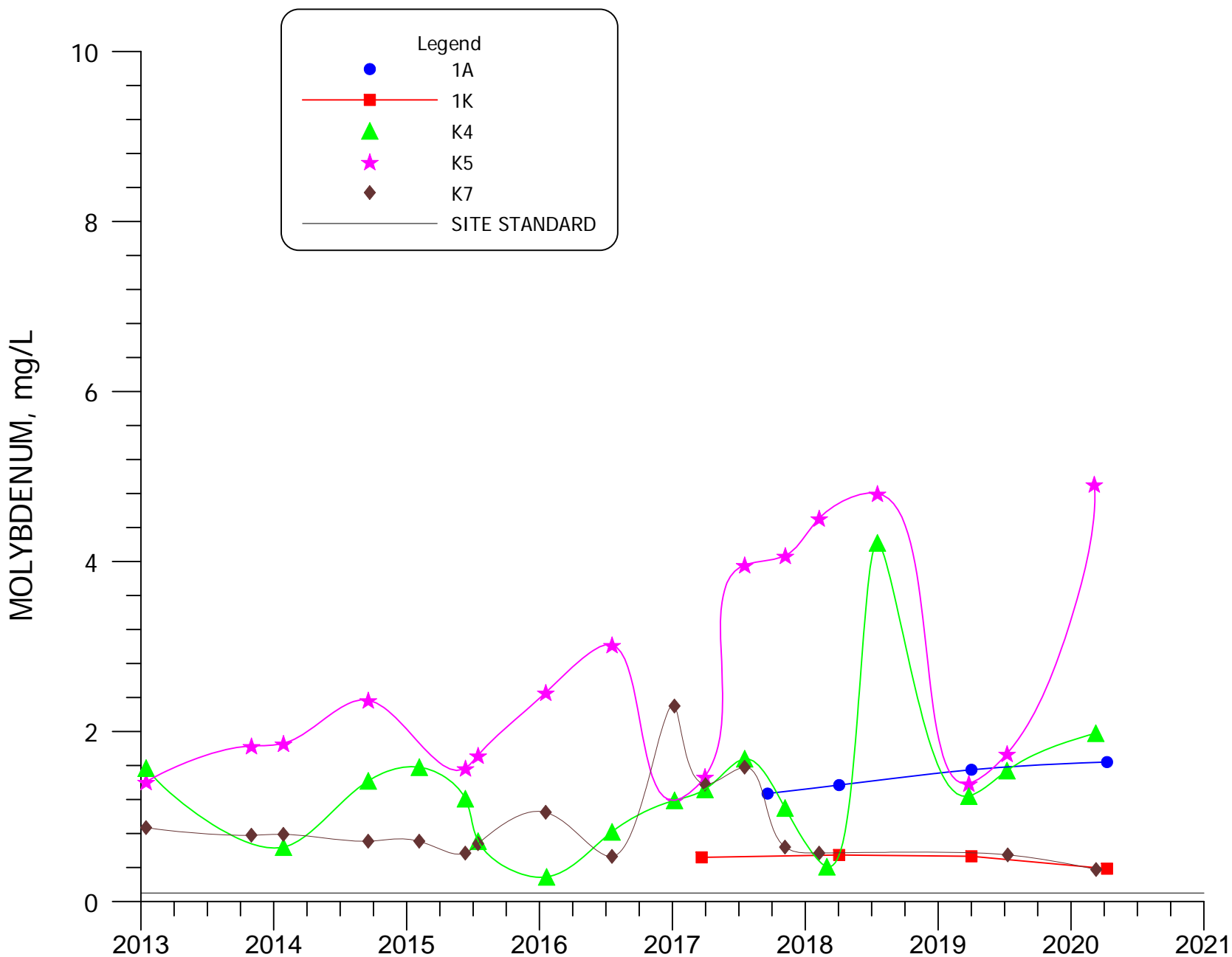


**FIGURE 4.3-93. MOLYBDENUM CONCENTRATIONS FOR WELLS B13, C2, C6, C8 AND C9.**

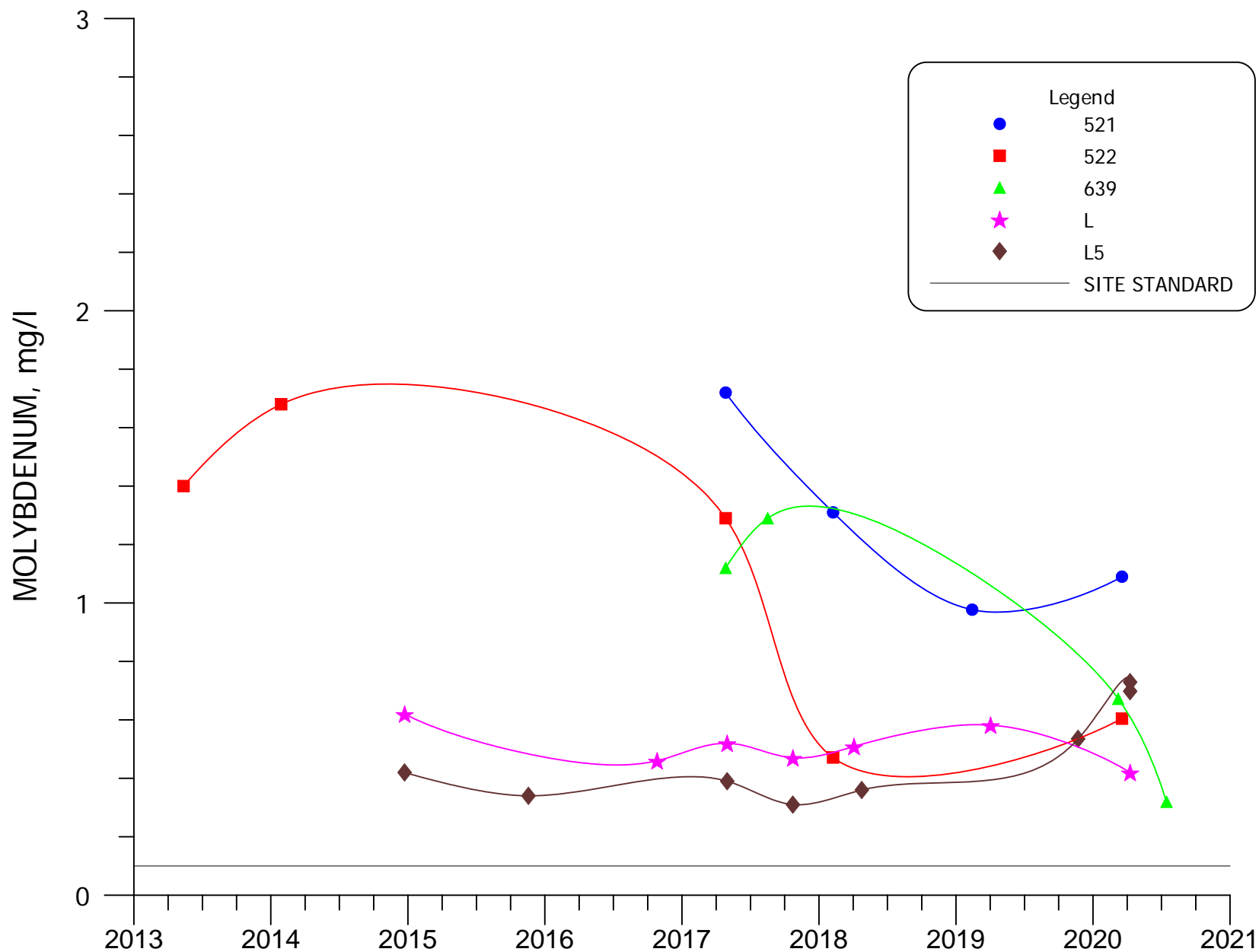
4.3-150



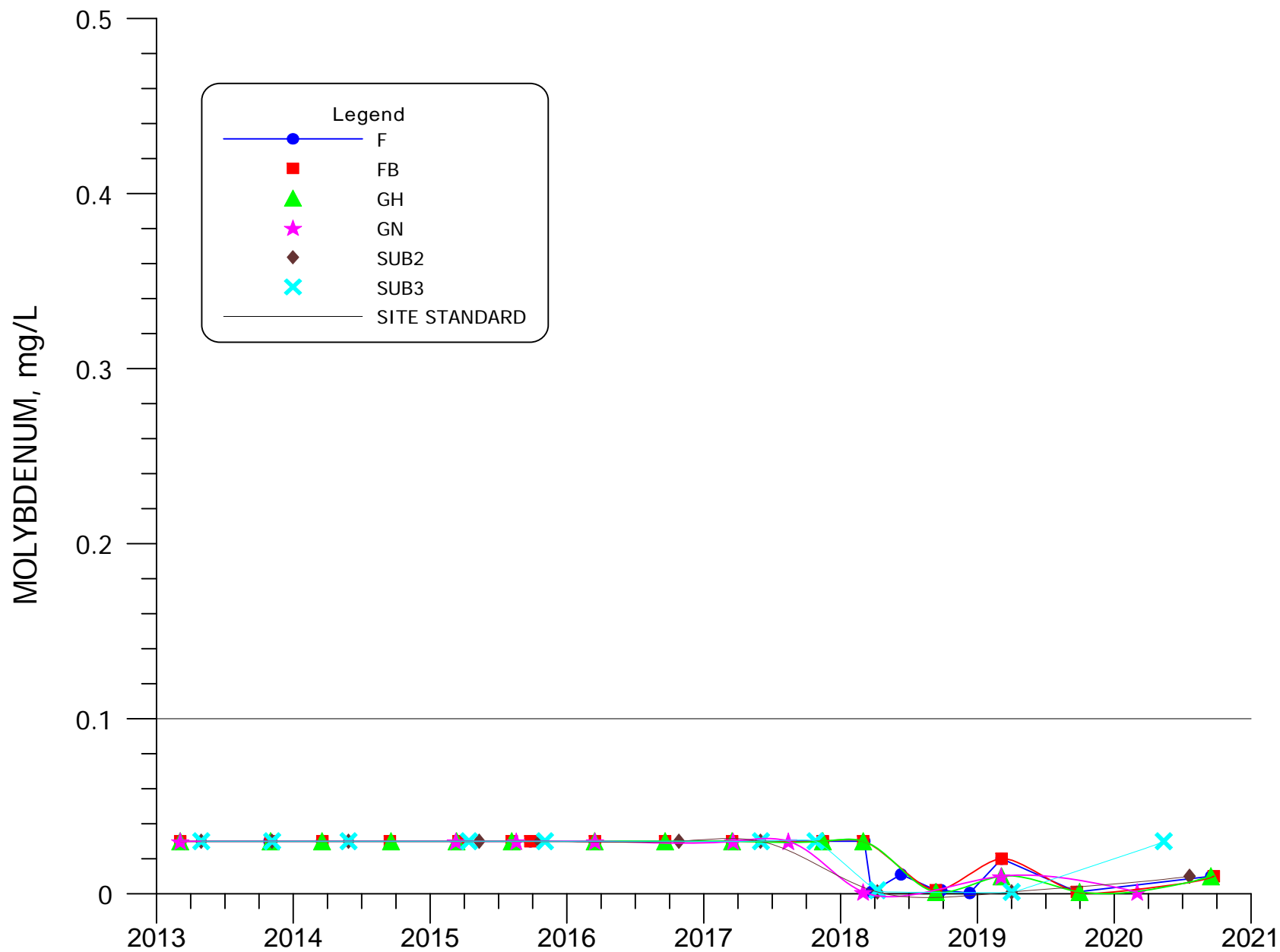
**FIGURE 4.3-94. MOLYBDENUM CONCENTRATIONS FOR WELLS K9, K11, KEB, KF AND X.**



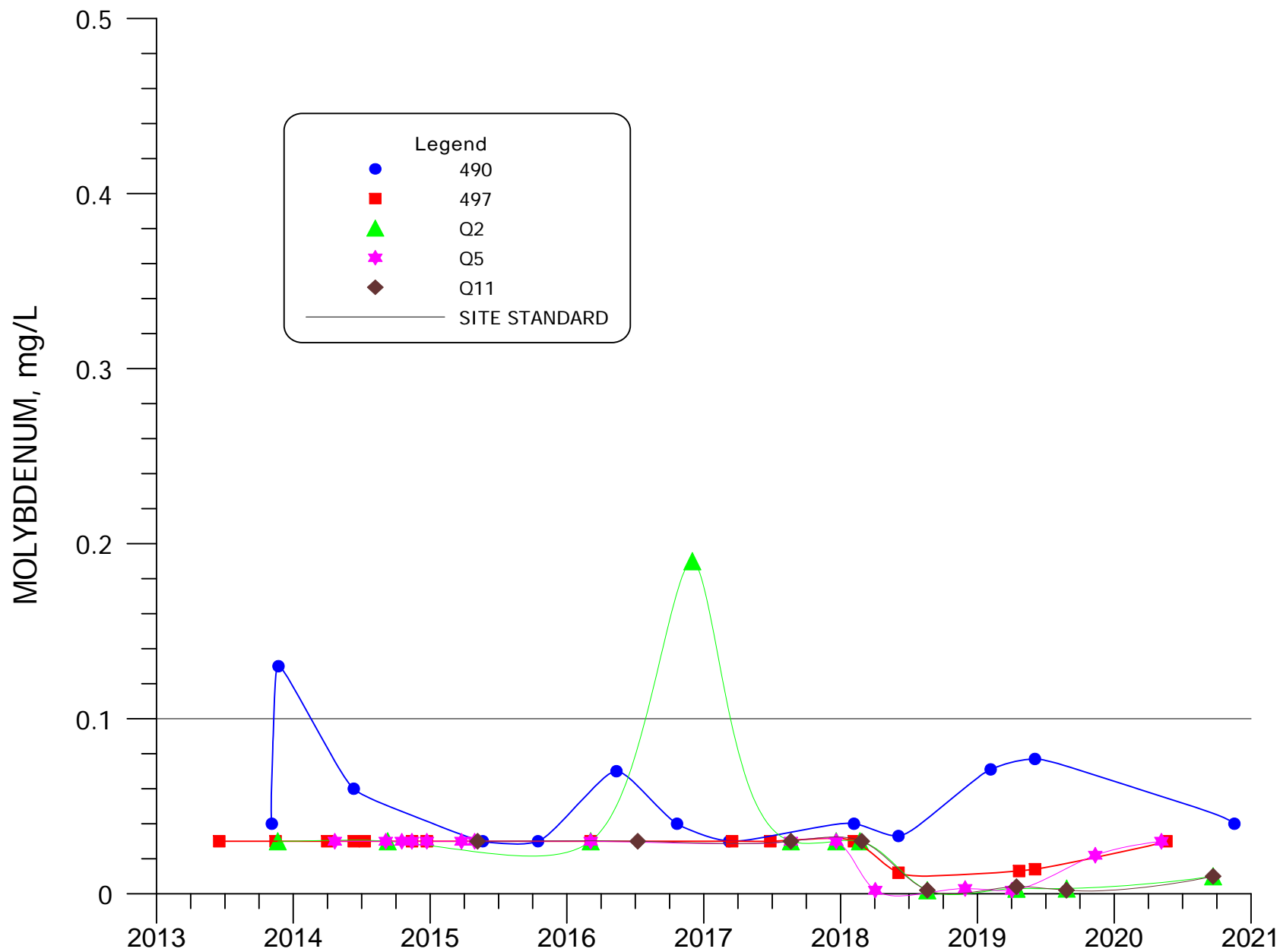
**FIGURE 4.3-95. MOLYBDENUM CONCENTRATIONS FOR WELLS 1A, 1K, K4, K5 AND K7.**



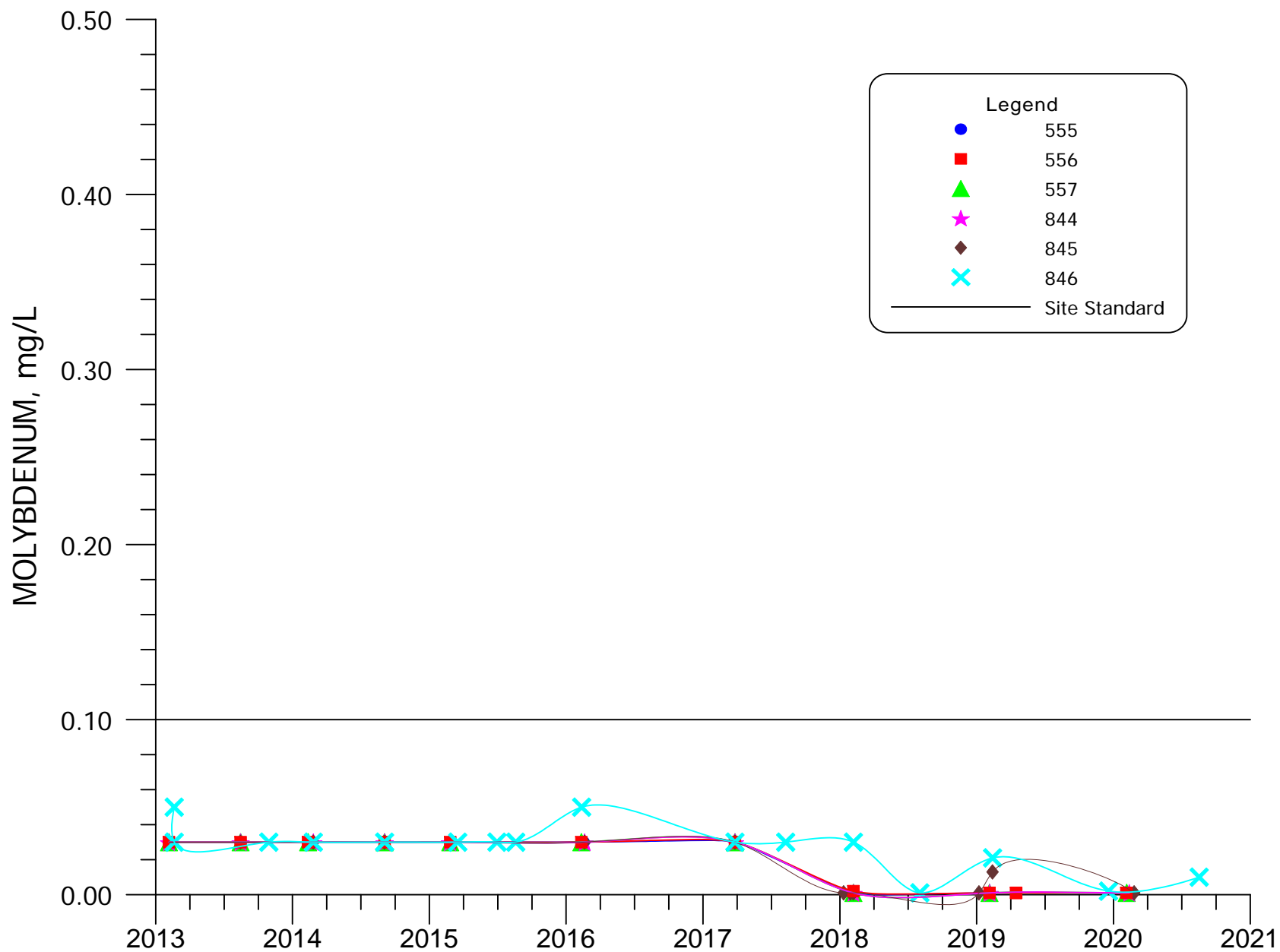
**FIGURE 4.3-96. MOLYBDENUM CONCENTRATIONS FOR WELLS 521, 522, 639, L AND L5.**



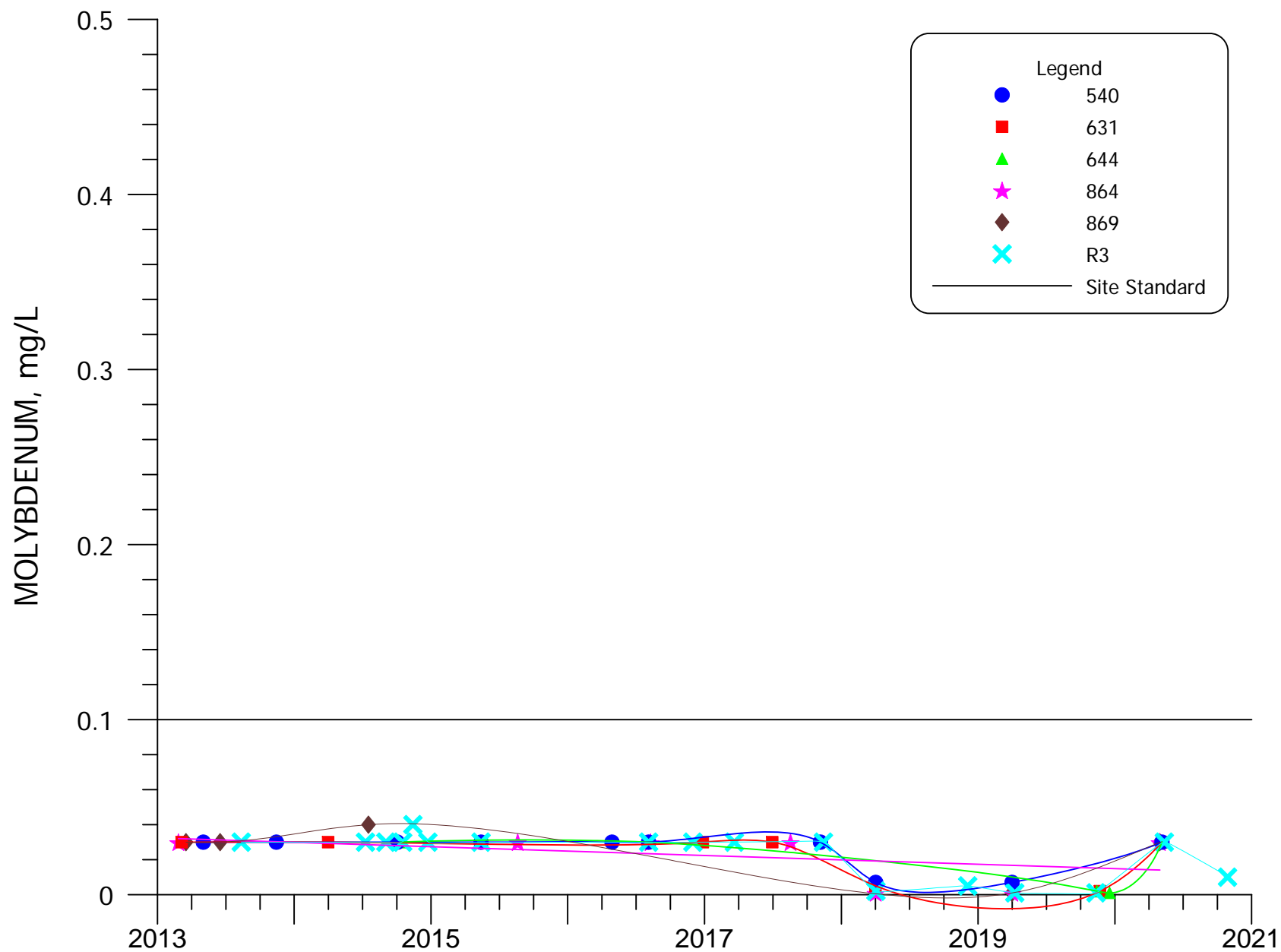
**FIGURE 4.3-97. MOLYBDENUM CONCENTRATIONS FOR WELLS F, FB, GH, GN, SUB2 AND SUB3.**



**FIGURE 4.3-98. MOLYBDENUM CONCENTRATIONS FOR WELLS 490, 497, Q2, Q5 AND Q11.**

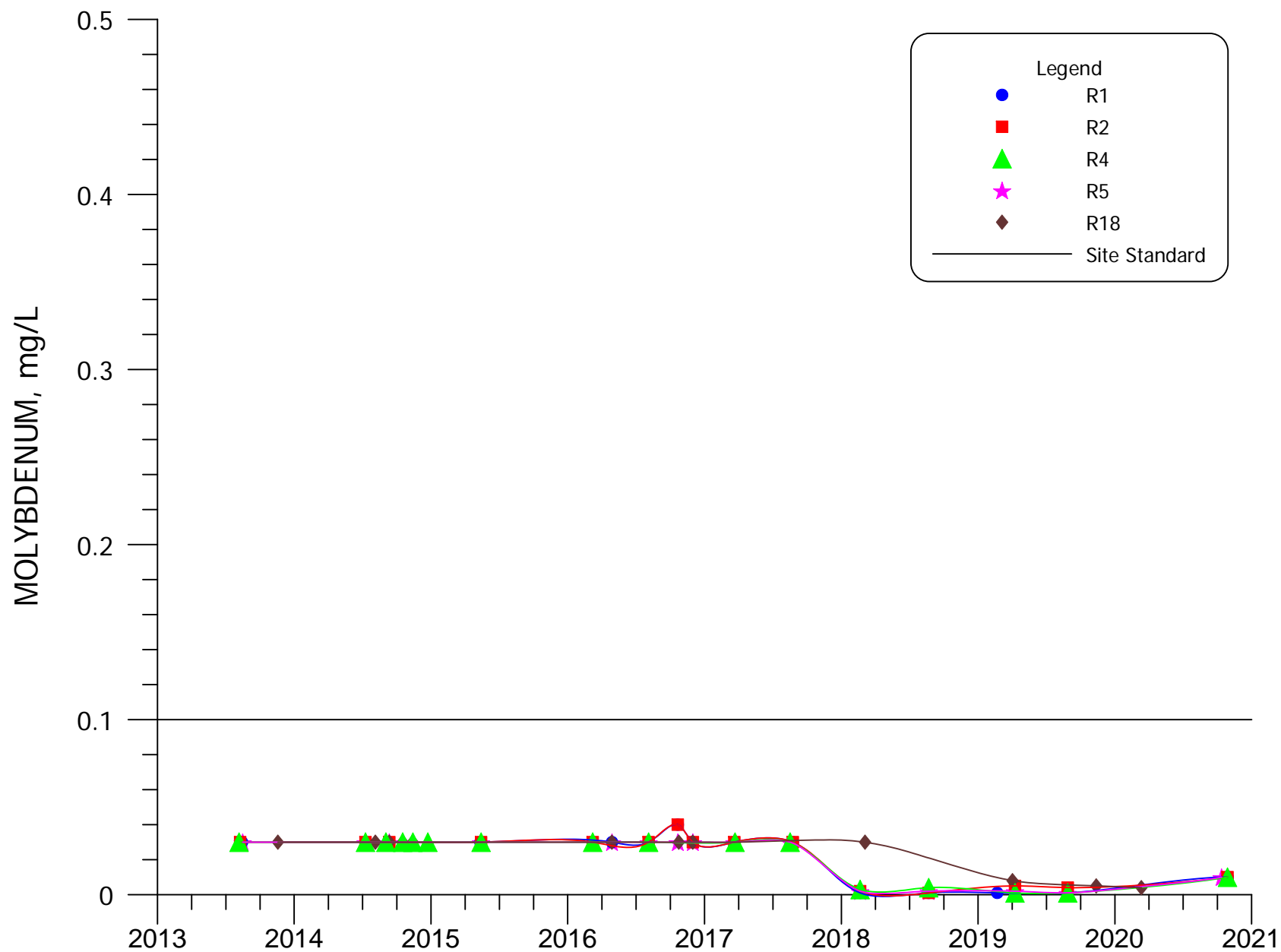


**FIGURE 4.3-99. MOLYBDENUM CONCENTRATIONS FOR WELLS 555, 556, 557, 844, 845, AND 846.**

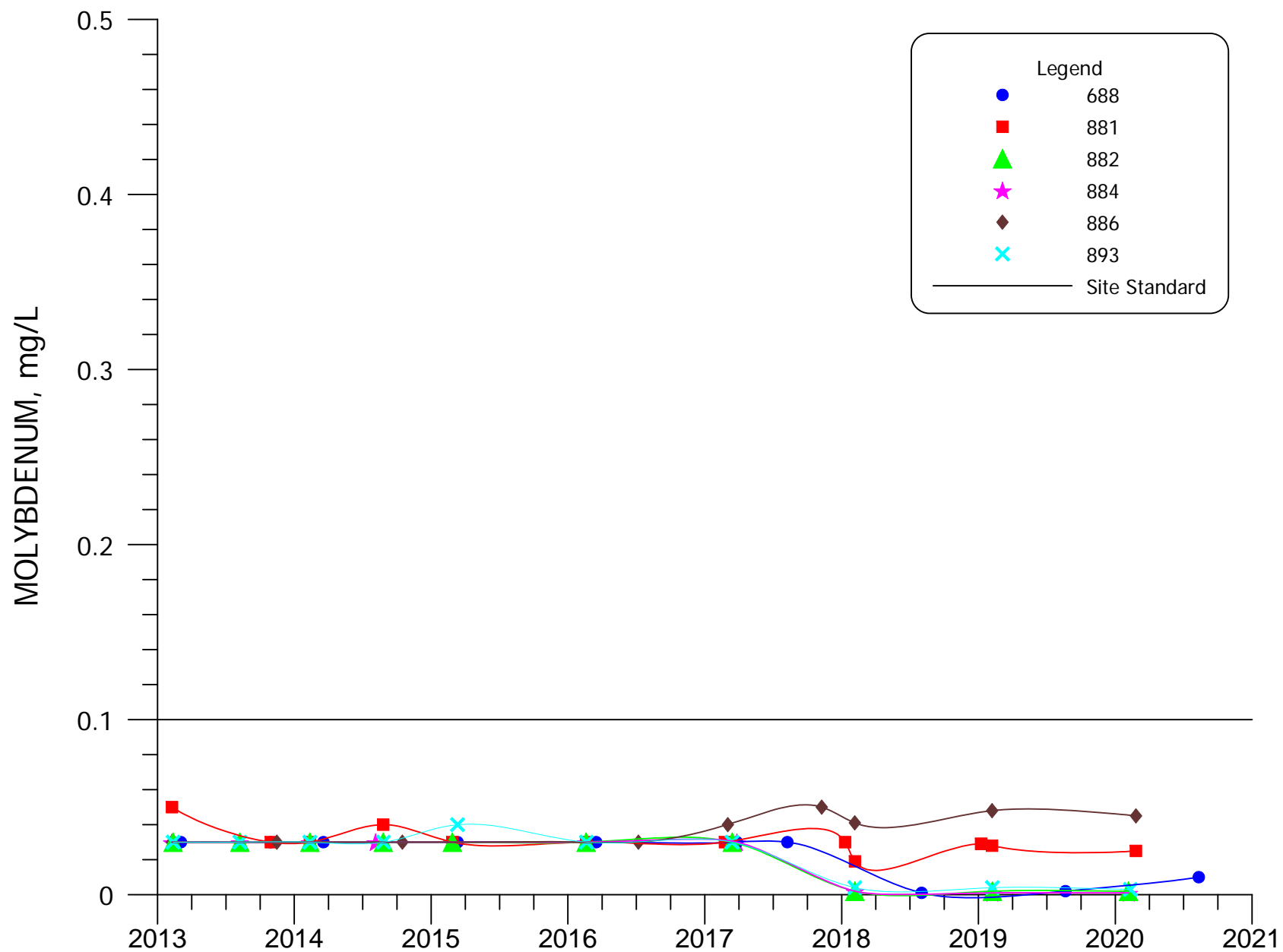


**FIGURE 4.3-100. MOLYBDENUM CONCENTRATIONS FOR WELLS 540, 631, 644, 864, 869 AND R3.**

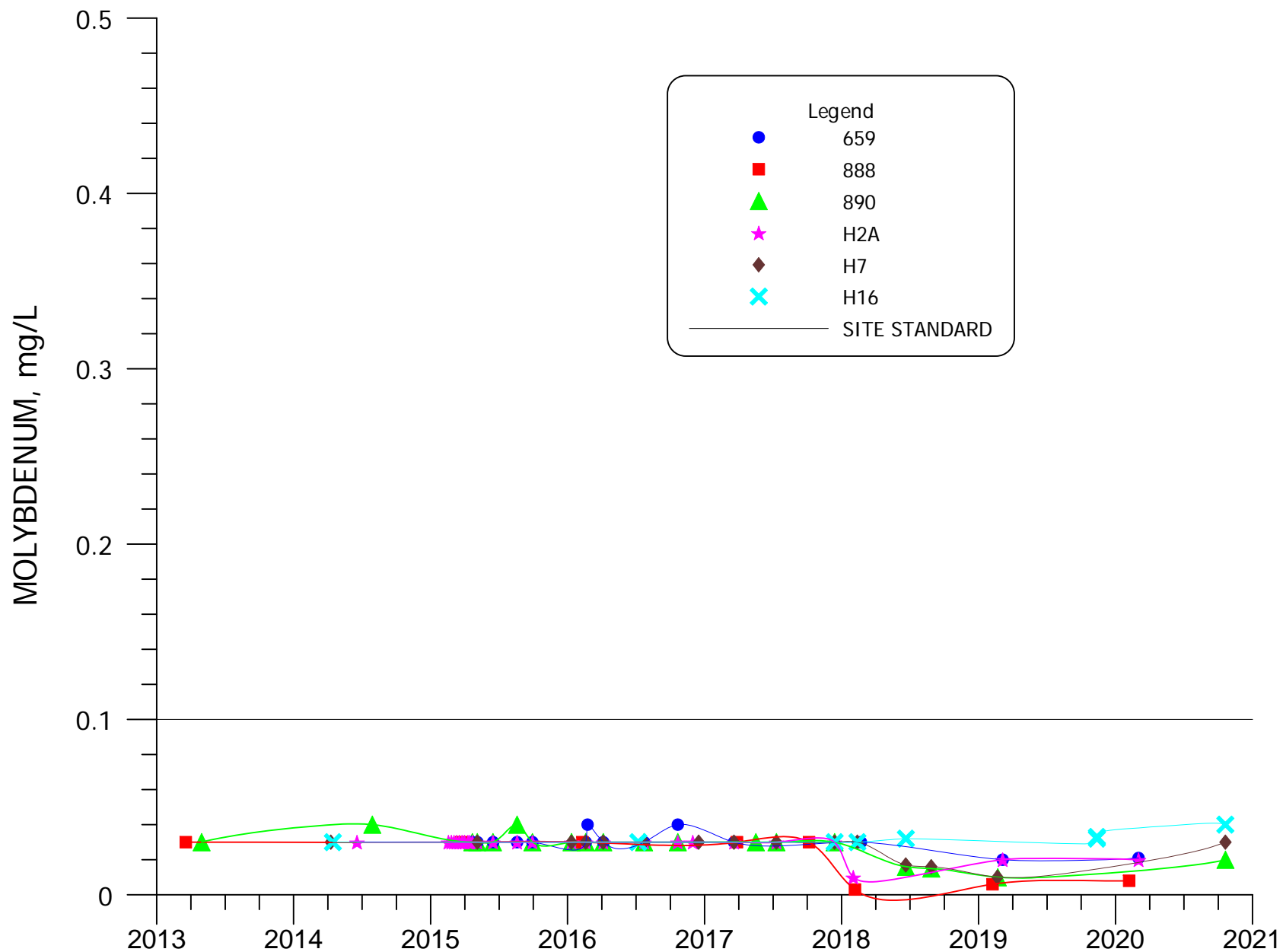




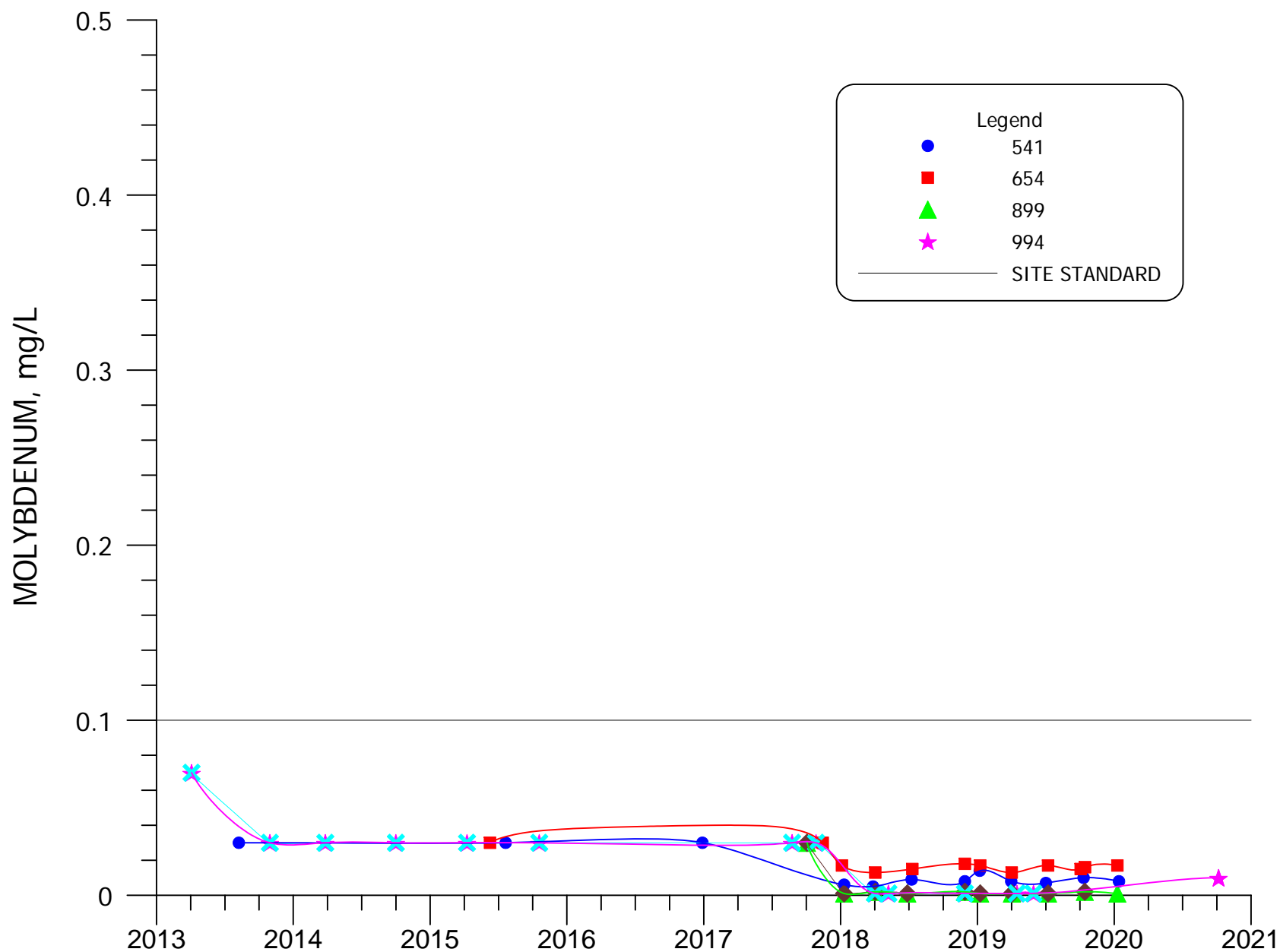
**FIGURE 4.3-100A. MOLYBDENUM CONCENTRATIONS FOR WELLS R1, R2, R4, R5 AND R18.**



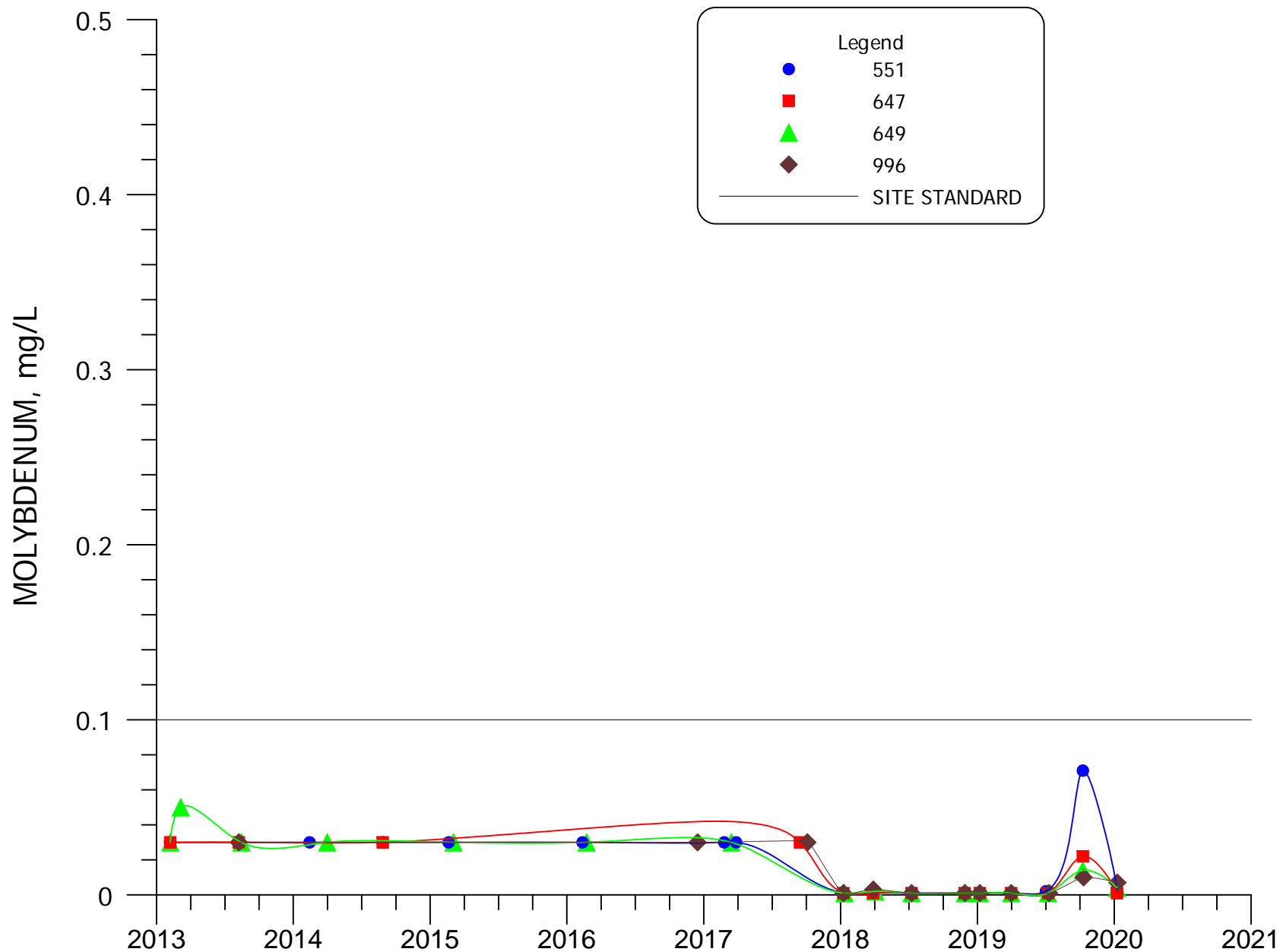
**FIGURE 4.3-101. MOLYBDENUM CONCENTRATIONS FOR WELLS 688, 881, 882, 884, 886 AND 893.**



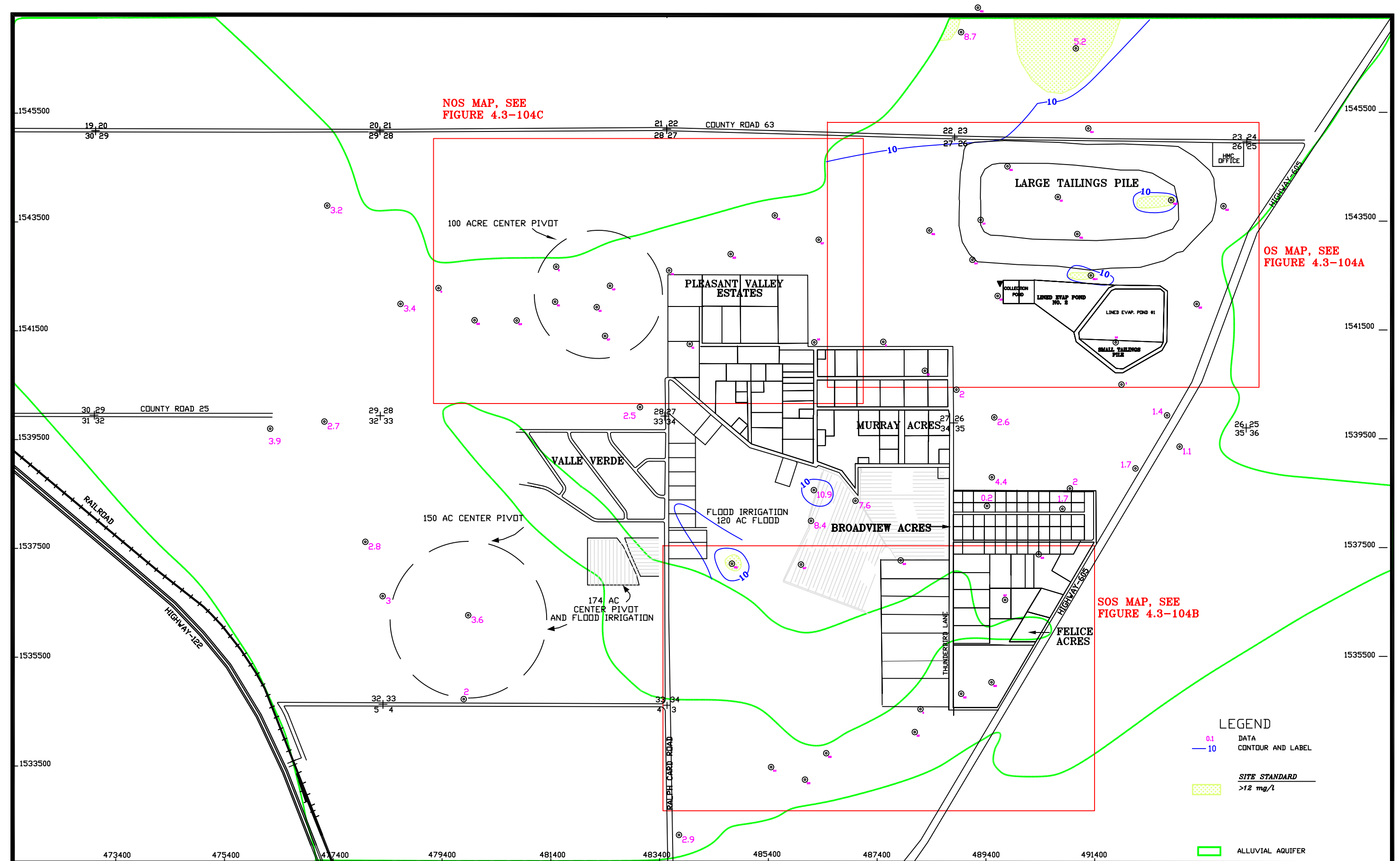
**FIGURE 4.3-101A. MOLYBDENUM CONCENTRATIONS FOR WELLS 659, 888, 890, H2A, H7 AND H16.**



**FIGURE 4.3-102. MOLYBDENUM CONCENTRATIONS FOR WELLS 541, 654, 899 and 994.**

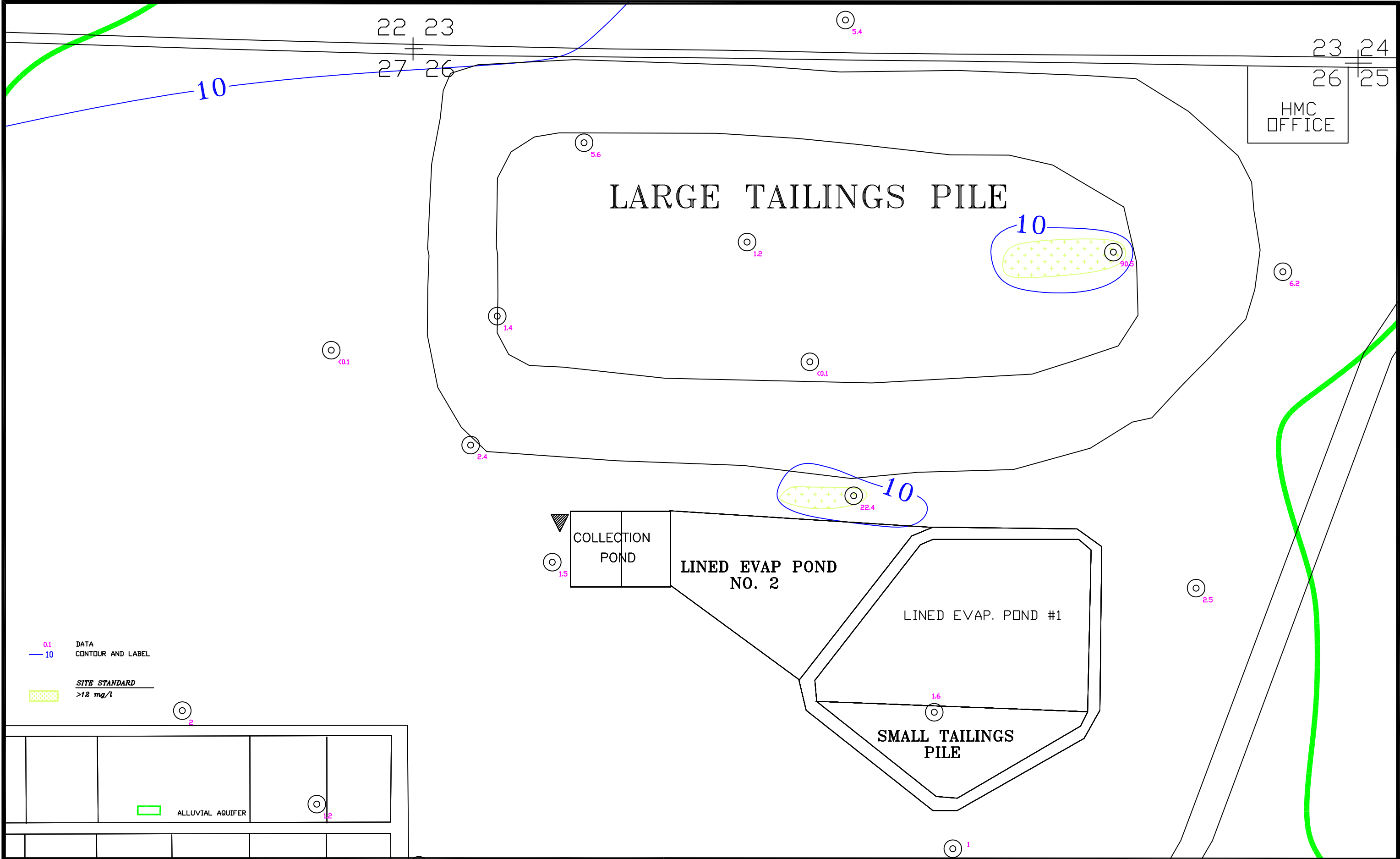


**FIGURE 4.3-103. MOLYBDENUM CONCENTRATIONS FOR WELLS 551, 647, 649 AND 996.**



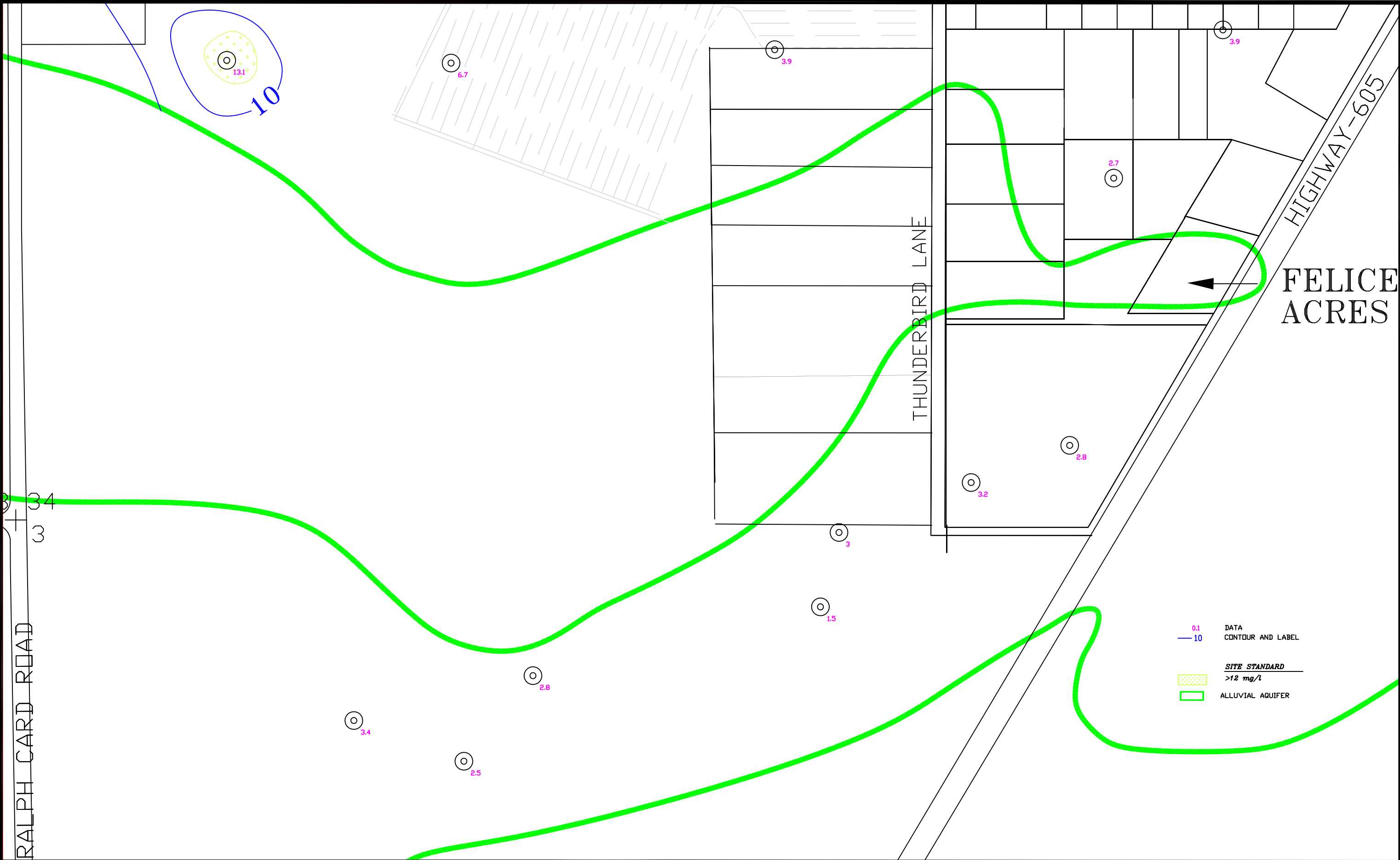
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FIGURE 4.3-104. NITRATE CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, 2020, mg/L



SCALE: 1"=500'  
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1600QAL20  
DATE: 3/19/2021

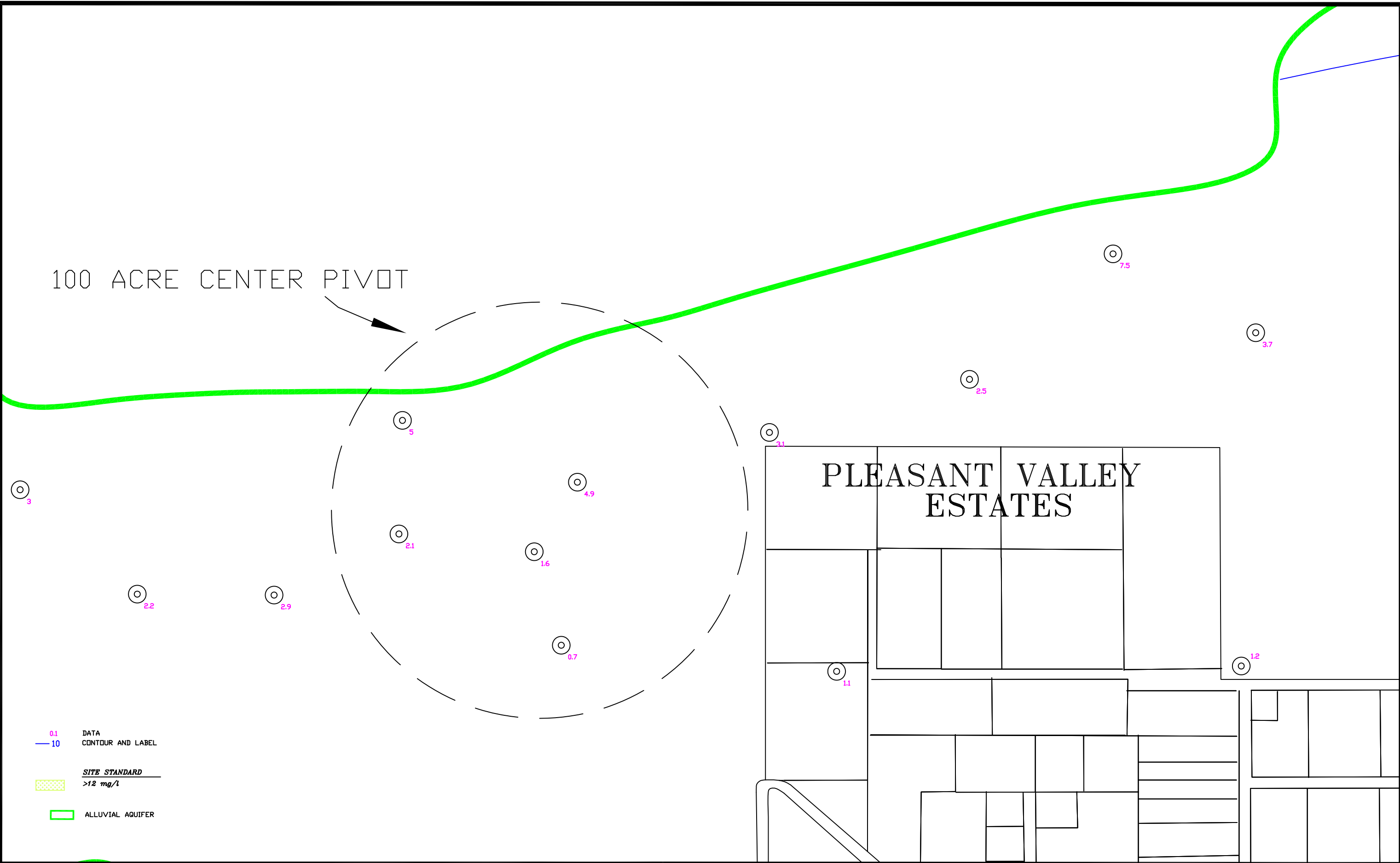
FIGURE 4.3-104A. NITRATE CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, OS, 2020, mg/L  
4.3-163

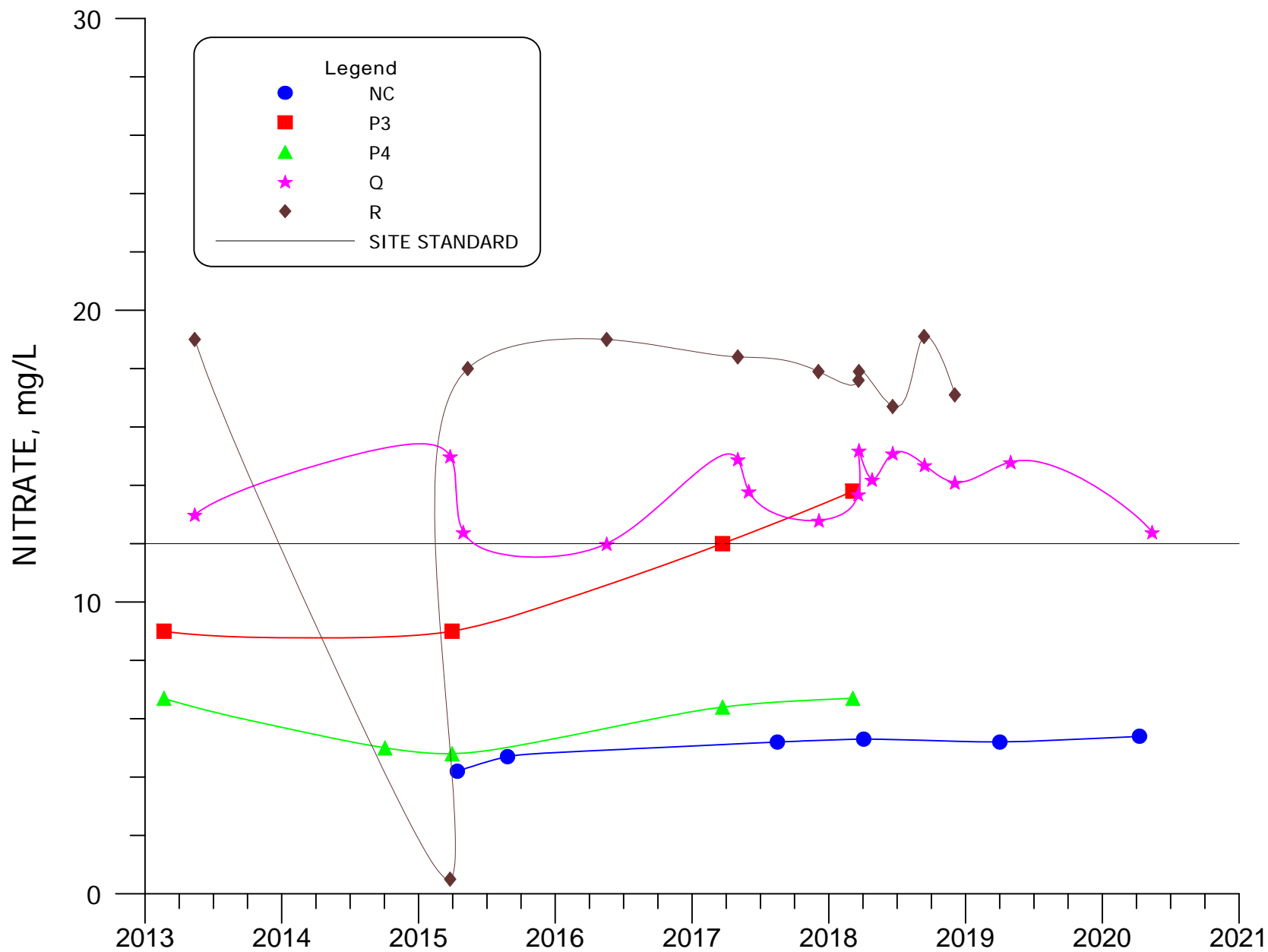


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DATE: 3/19/2021

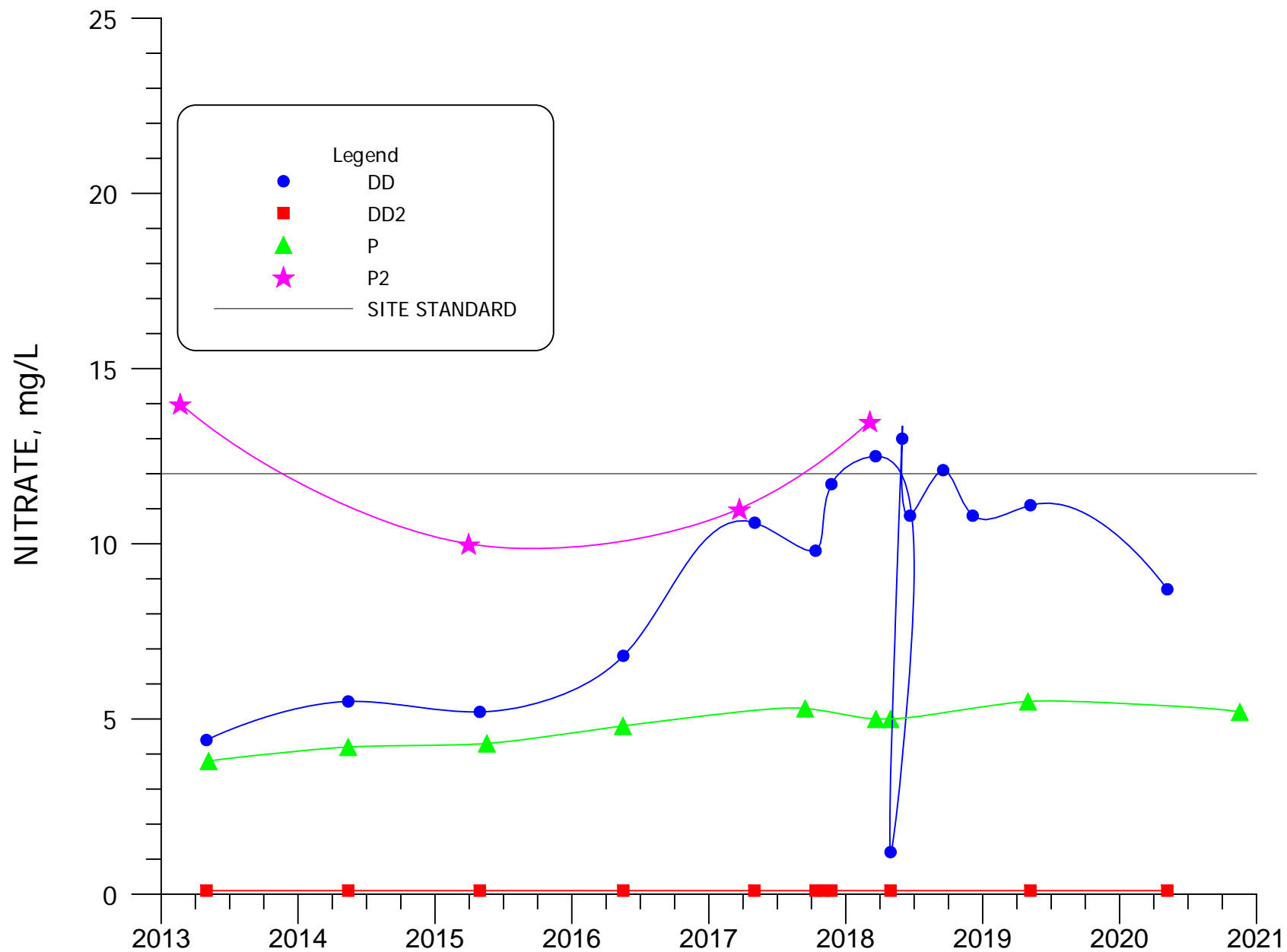
FIGURE 4.3-104B. NITRATE CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, SOS, 2020, mg/L  
4.3-164



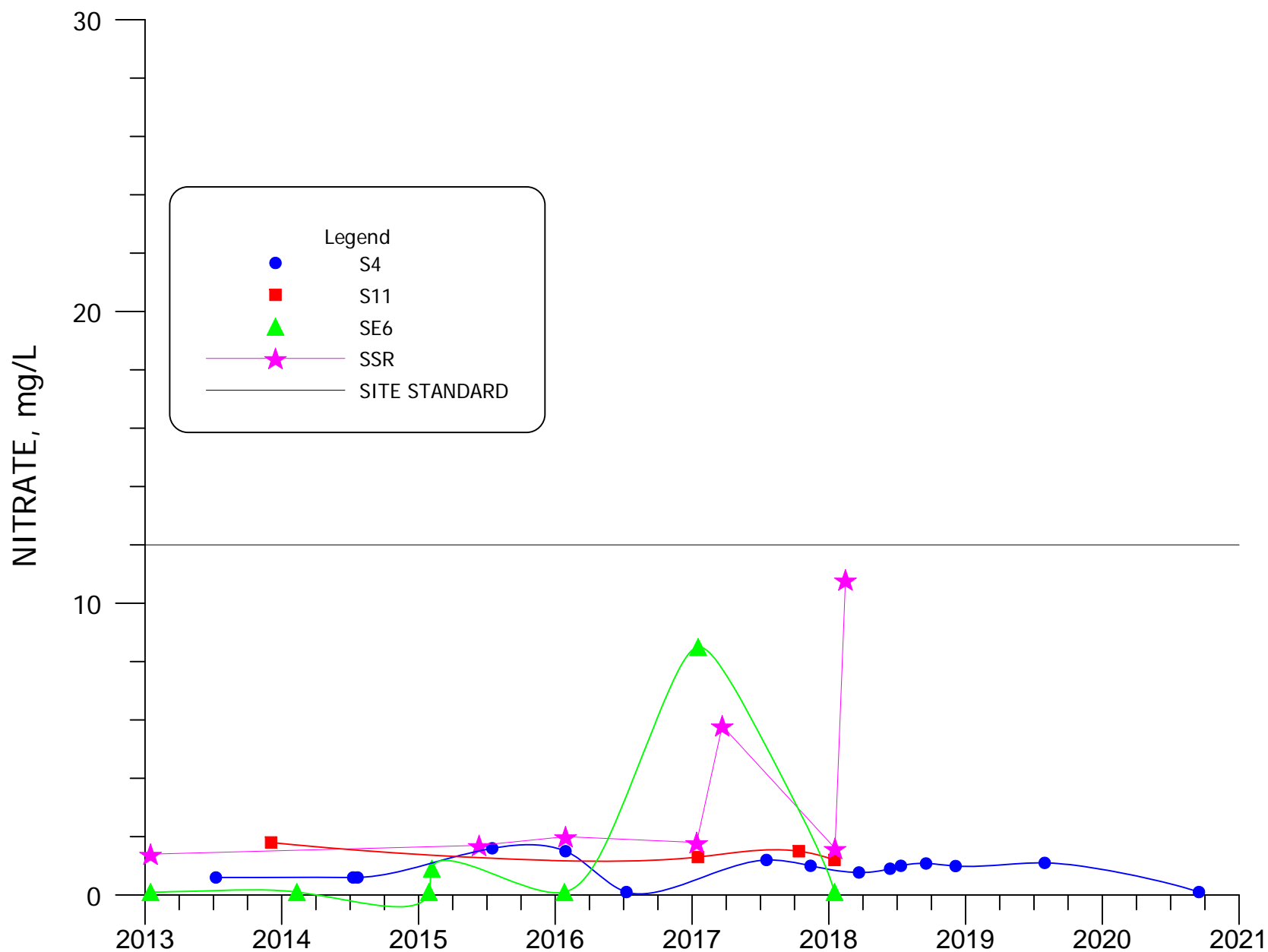




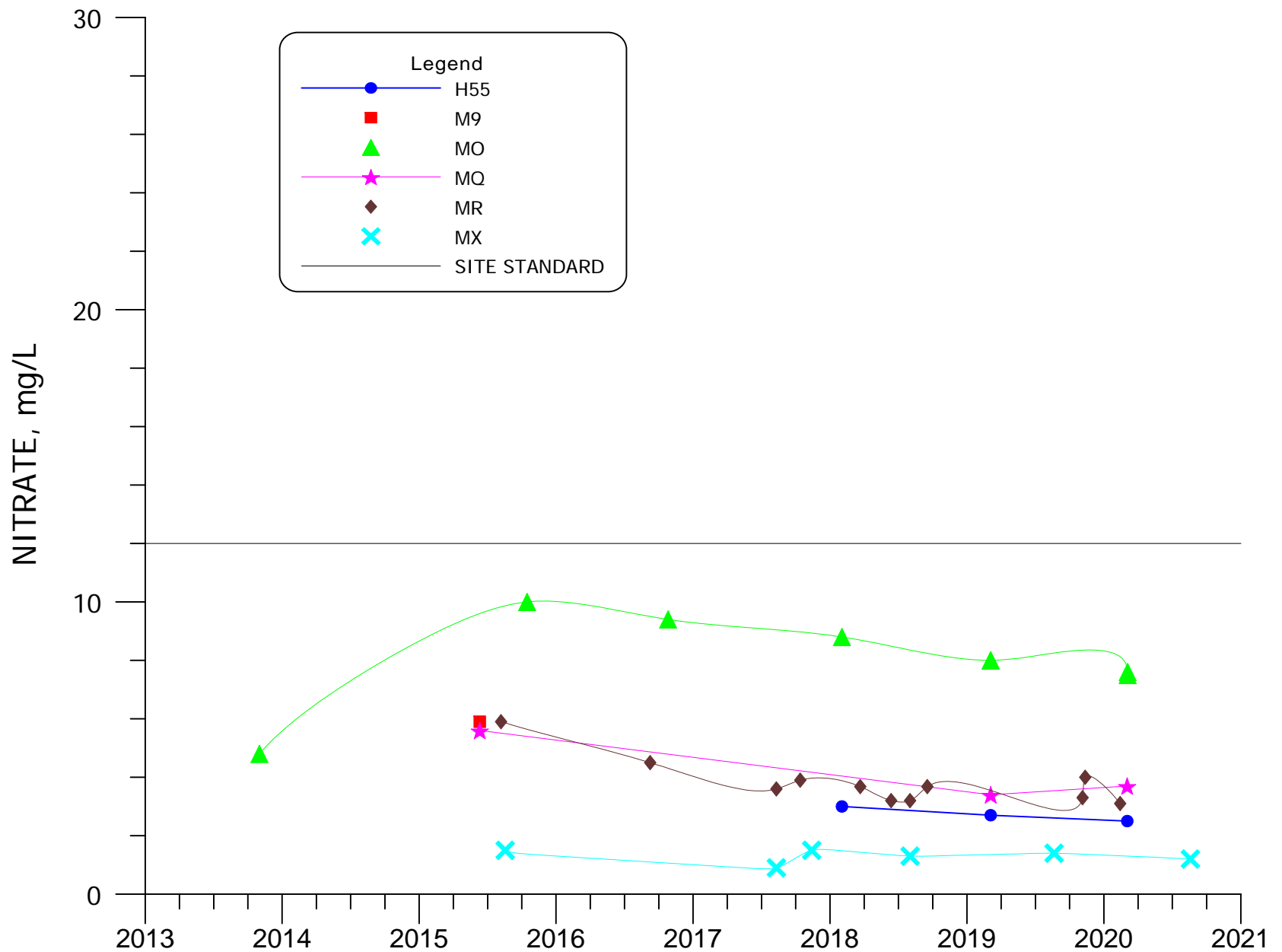
**FIGURE 4.3-105. NITRATE CONCENTRATIONS FOR WELLS NC, P3, P4, Q AND R.**



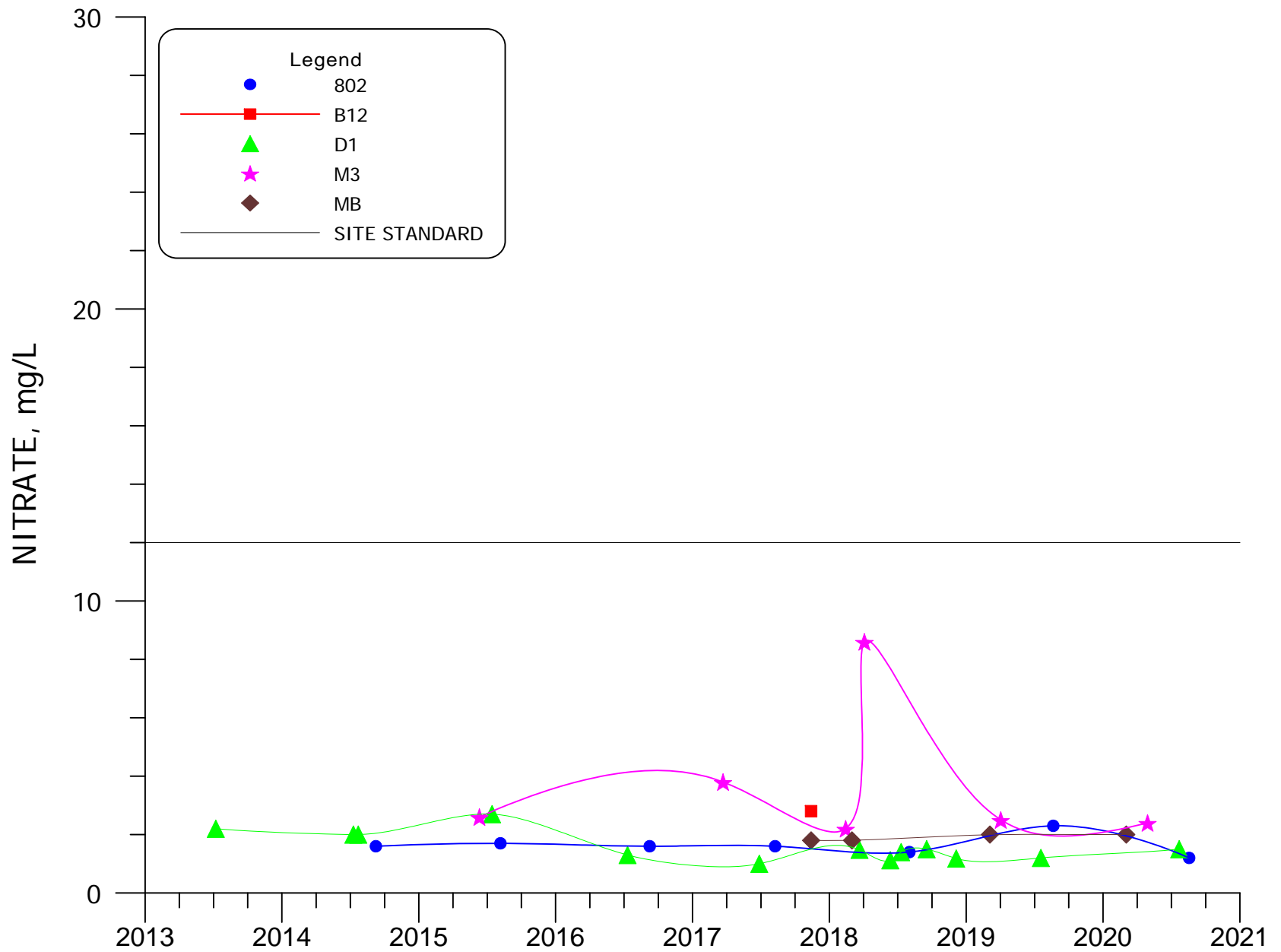
**FIGURE 4.3-105A. NITRATE CONCENTRATIONS FOR WELLS DD, DD2, P AND P2.**



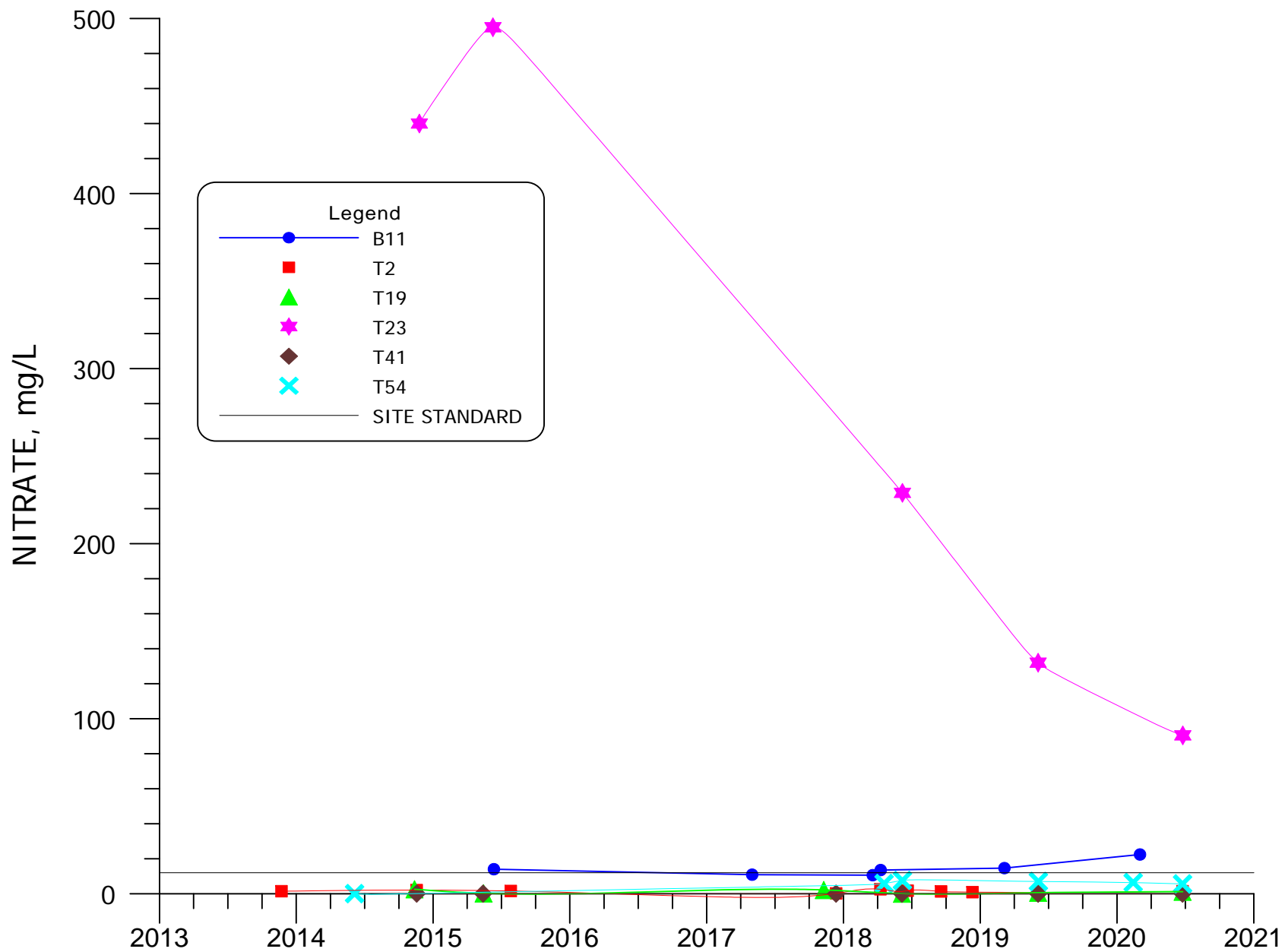
**FIGURE 4.3-106. NITRATE CONCENTRATIONS FOR WELLS S4, S11, SE6 AND SSR.**



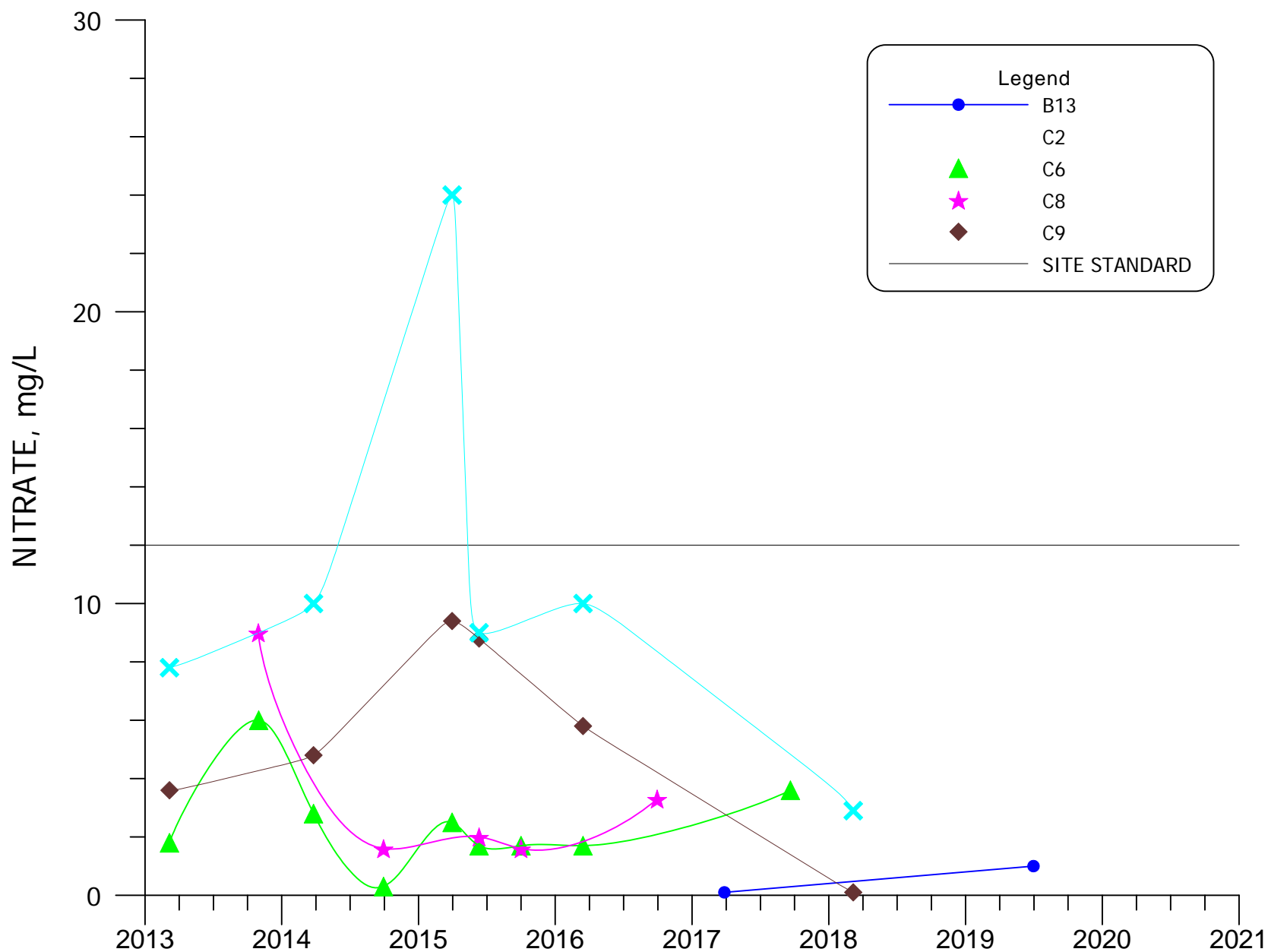
**FIGURE 4.3-107. NITRATE CONCENTRATIONS FOR WELLS H55, M9, MO, MQ, MR AND MX.**



**FIGURE 4.3-108. NITRATE CONCENTRATIONS FOR WELLS 802, B12, D1, M3 AND MB.**

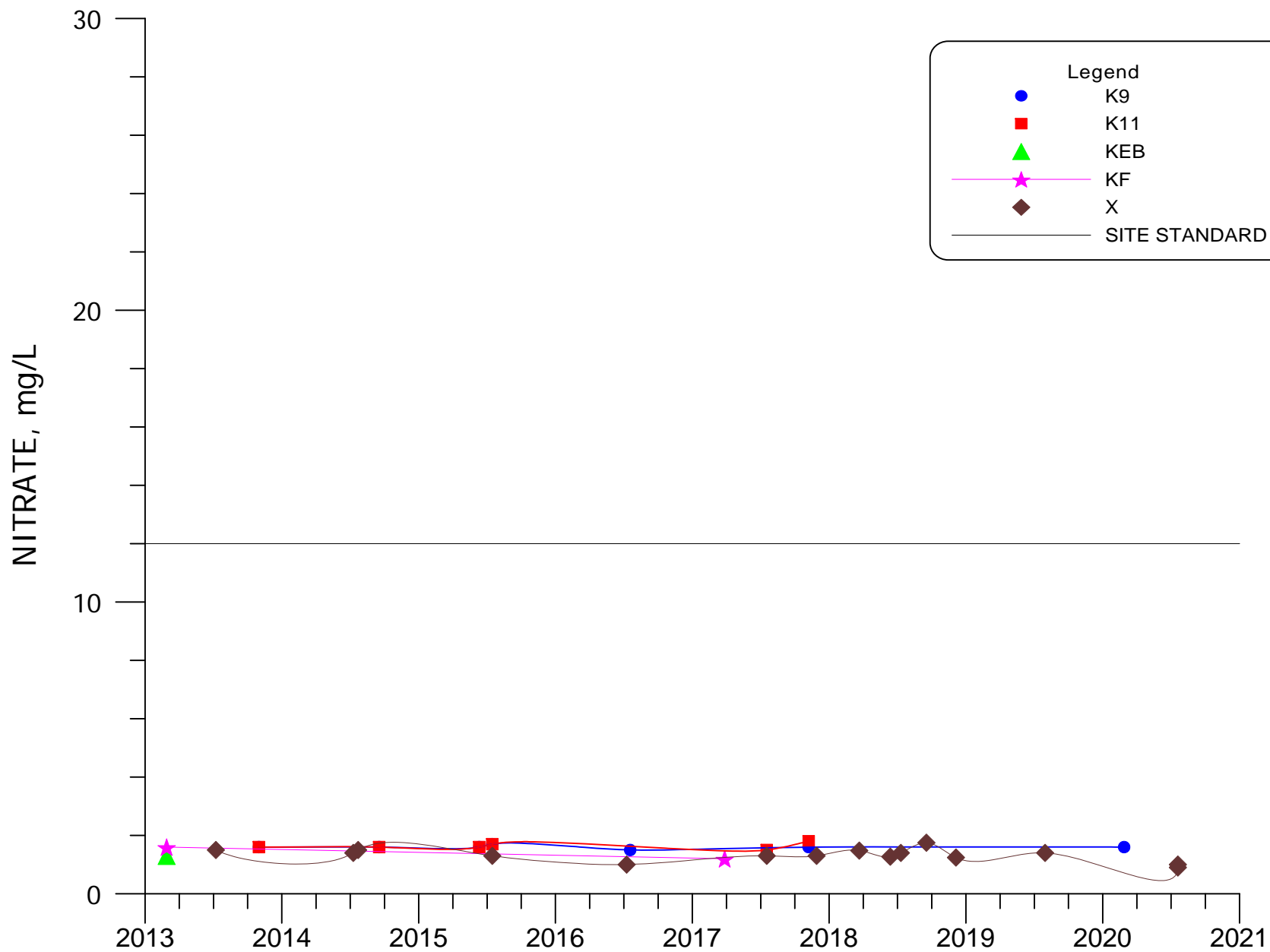


**FIGURE 4.3-109. NITRATE CONCENTRATIONS FOR WELLS B11, T2, T19, T23, T41 AND T54.**

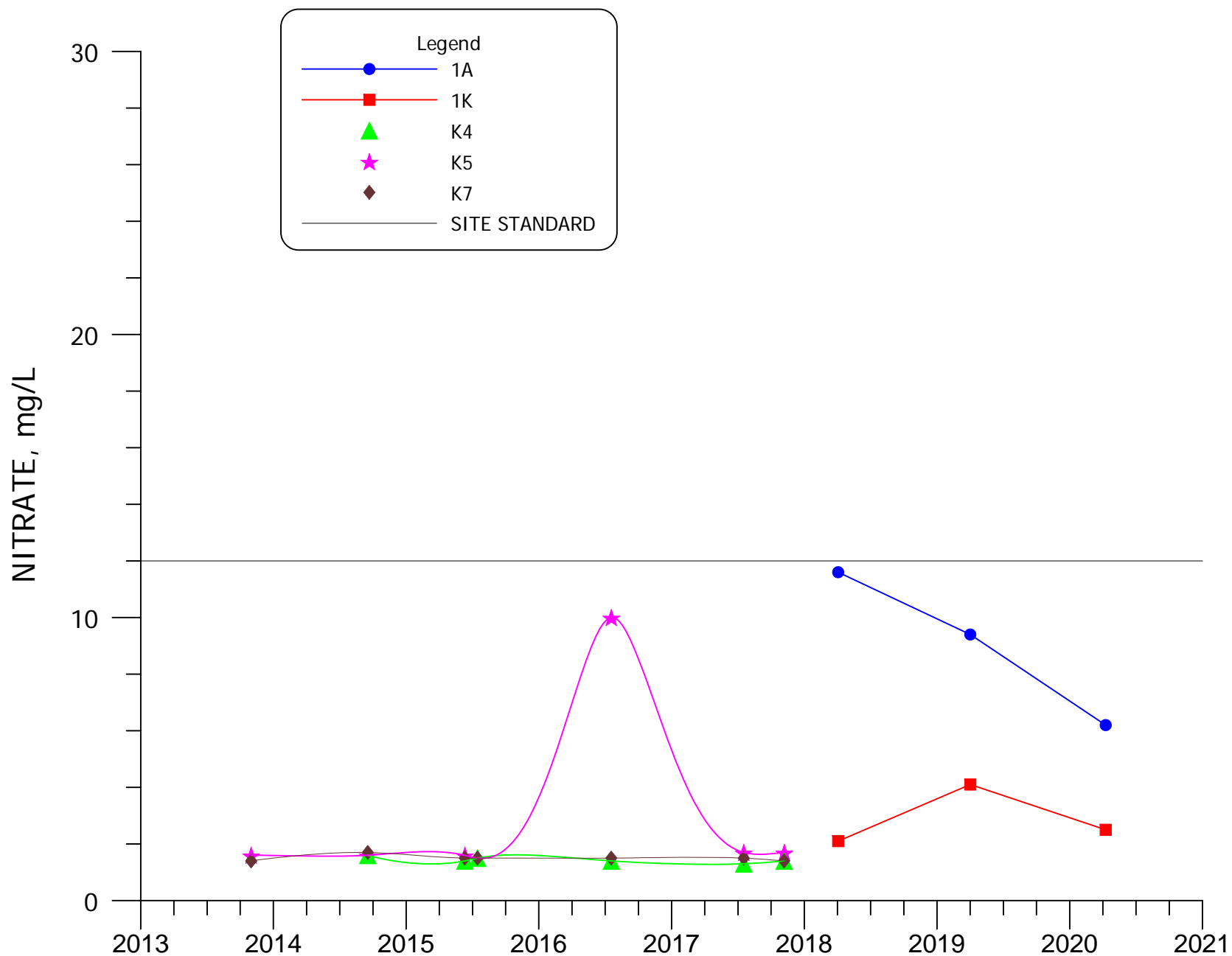


**FIGURE 4.3-110. NITRATE CONCENTRATIONS FOR WELLS B13, C2, C6, C8 AND C9.**

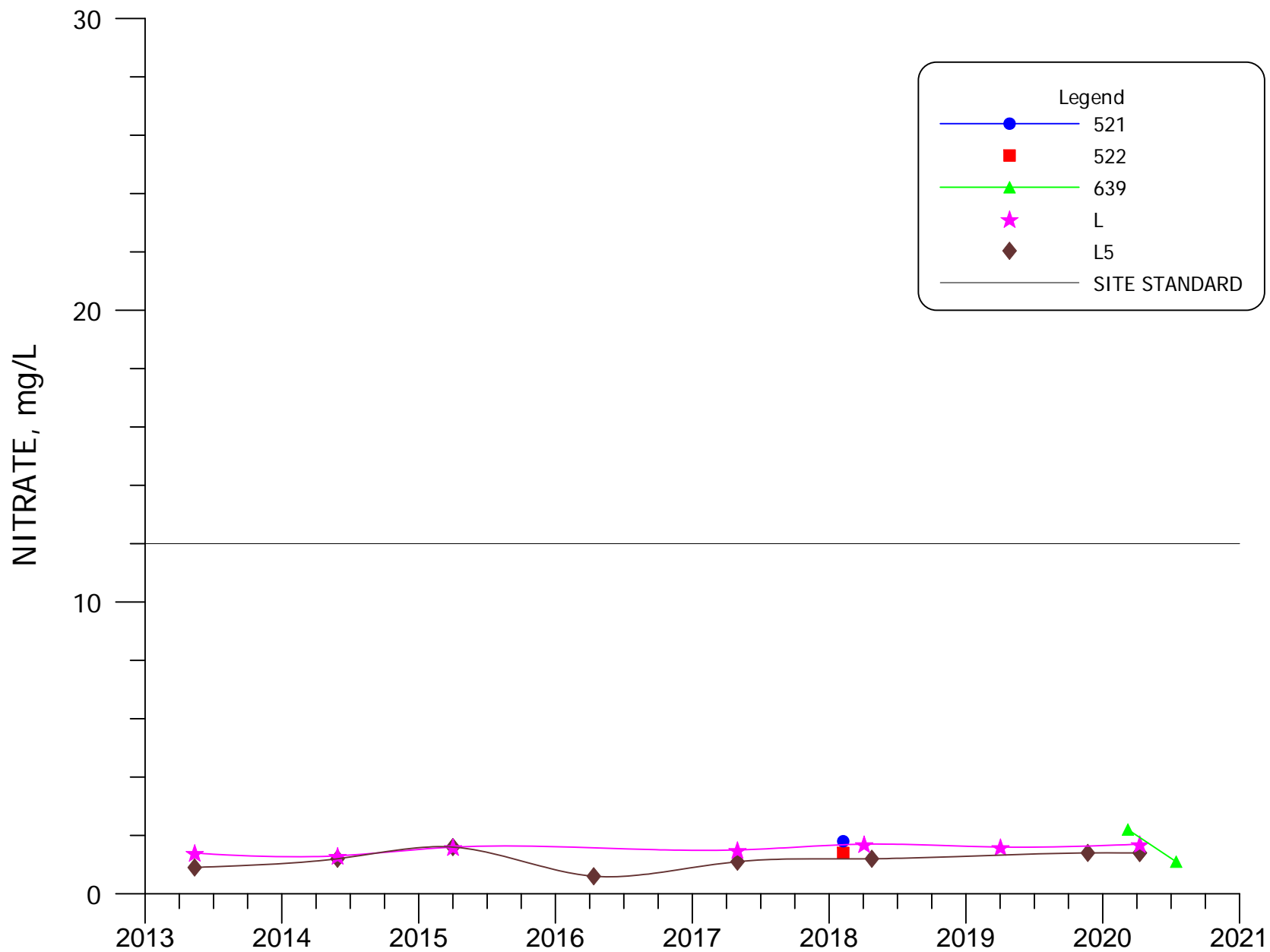




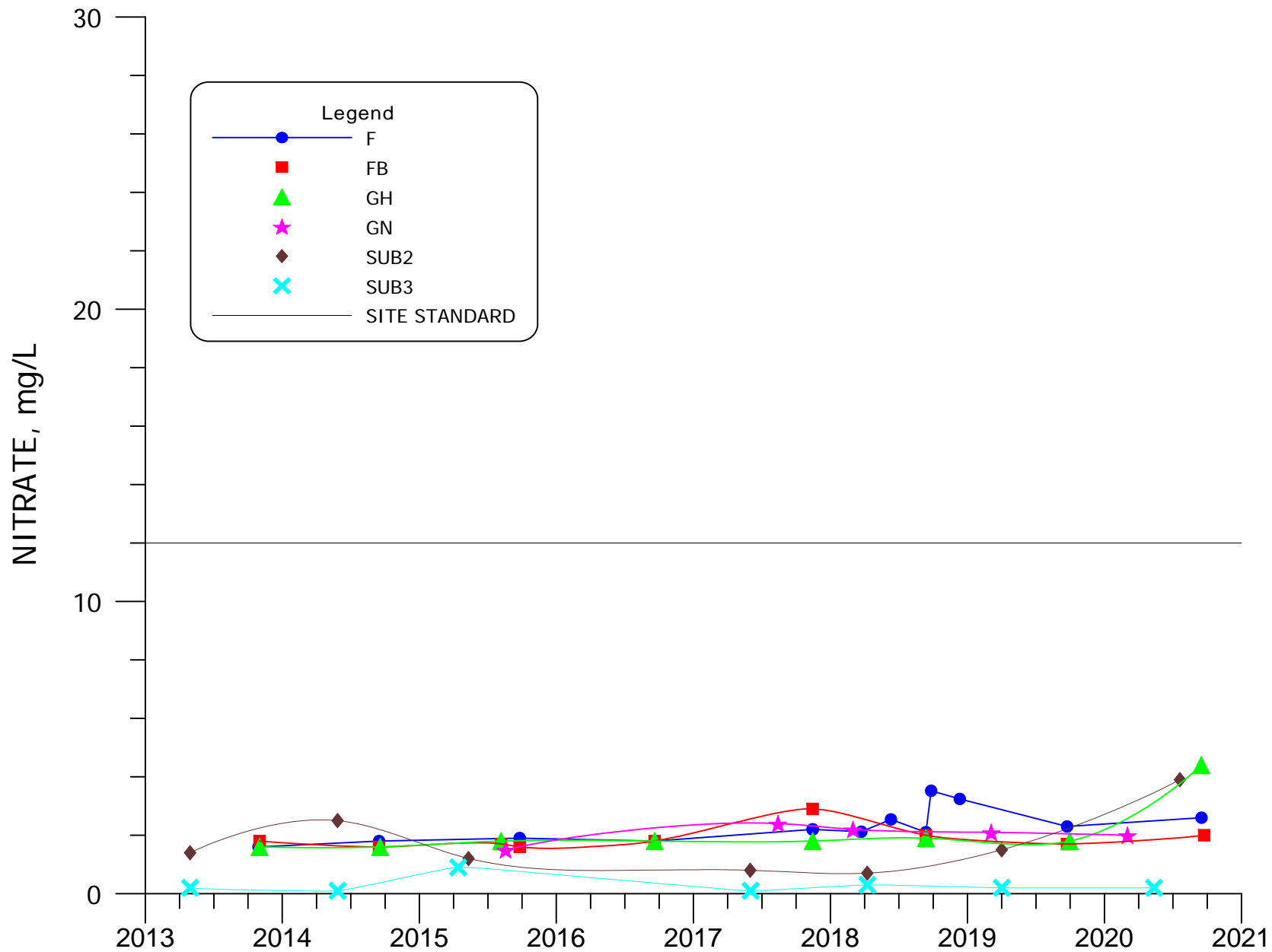
**FIGURE 4.3-111. NITRATE CONCENTRATIONS FOR WELLS K9, K11, KEB, KF AND X.**



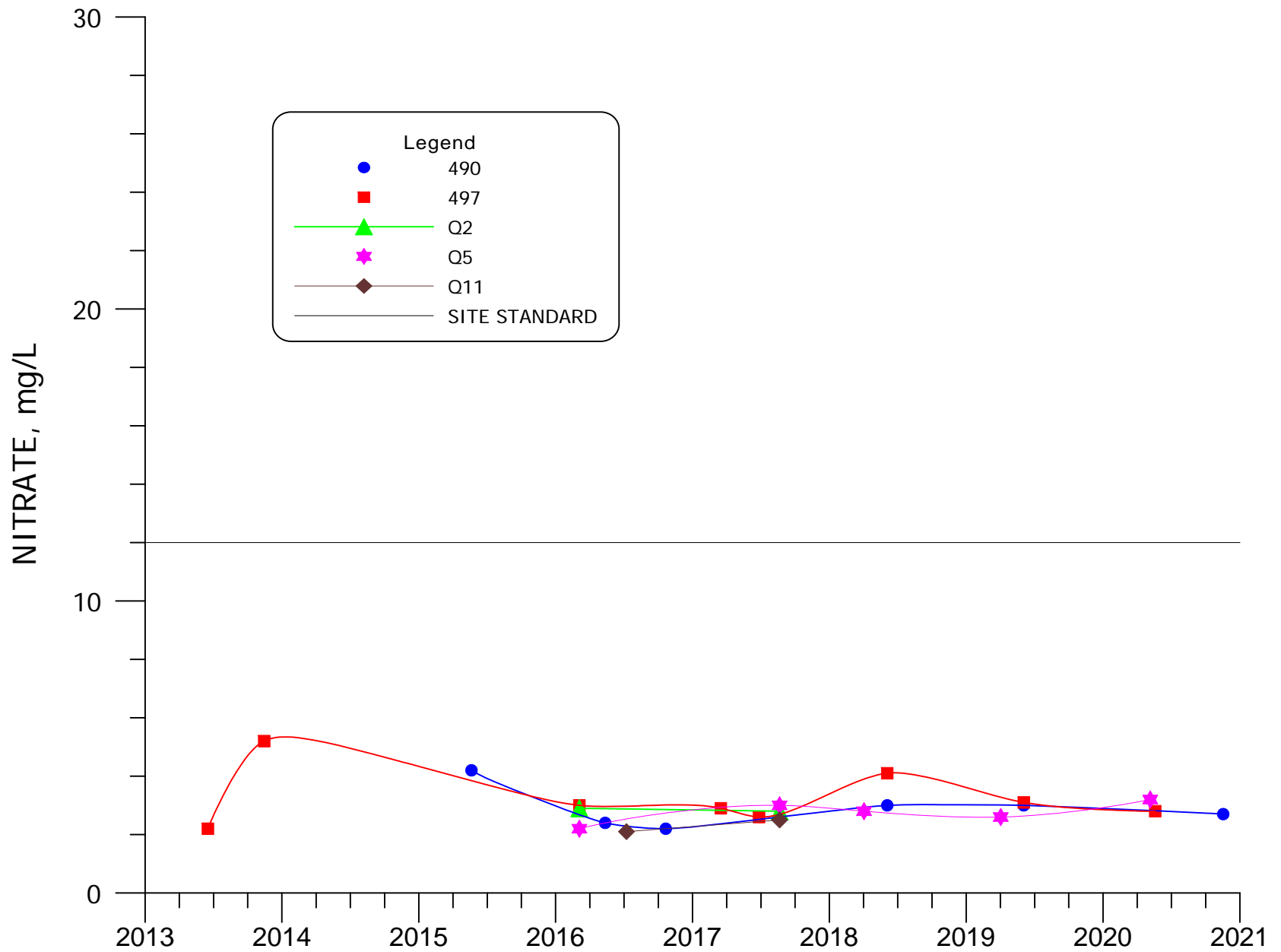
**FIGURE 4.3-112. NITRATE CONCENTRATIONS FOR WELLS 1A, 1K, K4, K5 AND K7.**



**FIGURE 4.3-113. NITRATE CONCENTRATIONS FOR WELLS  
521, 522, 639, L AND L5.**

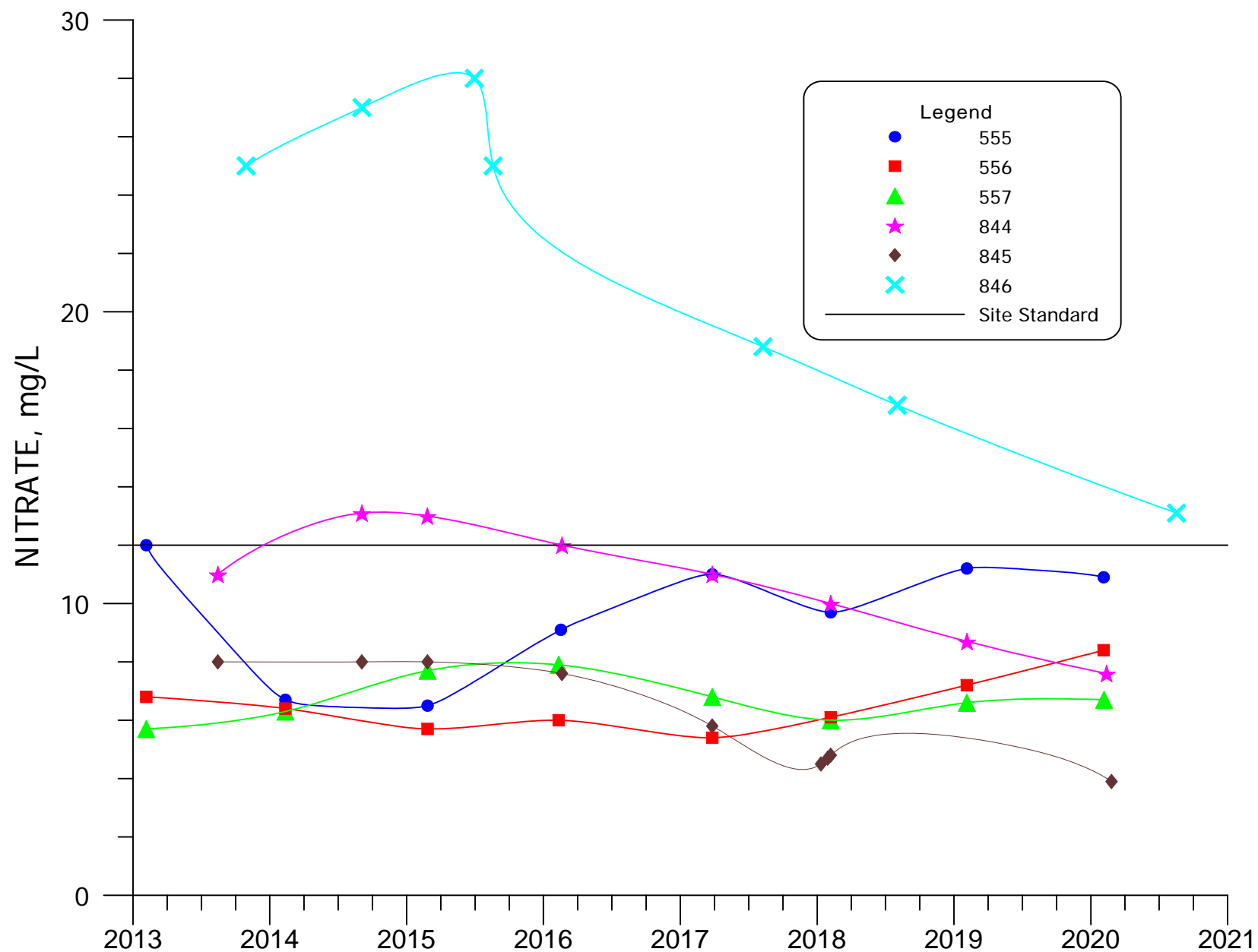


**FIGURE 4.3-114. NITRATE CONCENTRATIONS FOR WELLS F, FB, GH, GN, SUB2 AND SUB3.**



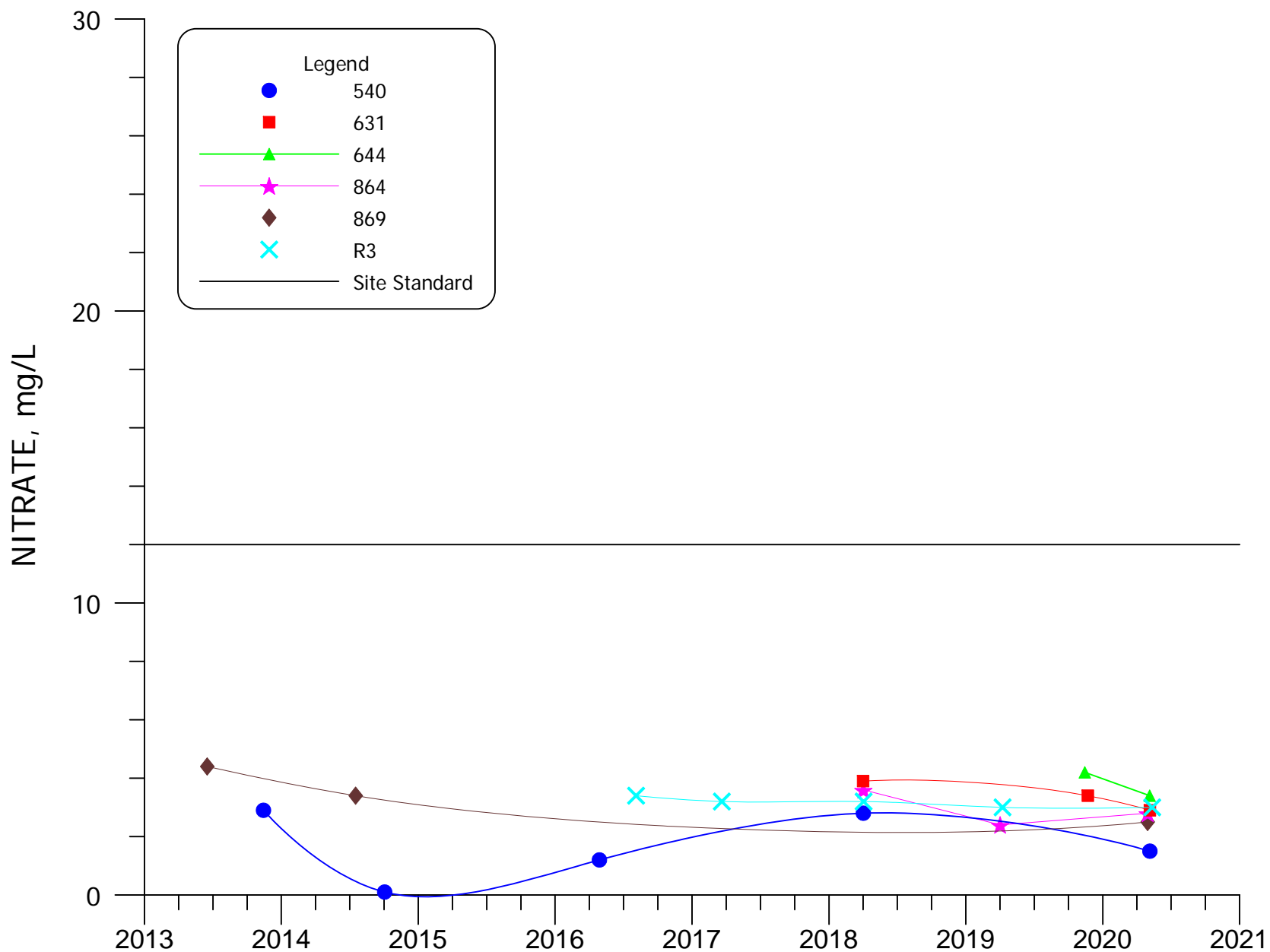
**FIGURE 4.3-115. NITRATE CONCENTRATIONS FOR WELLS 490, 497, Q2, Q5 AND Q11.**

4.3-178



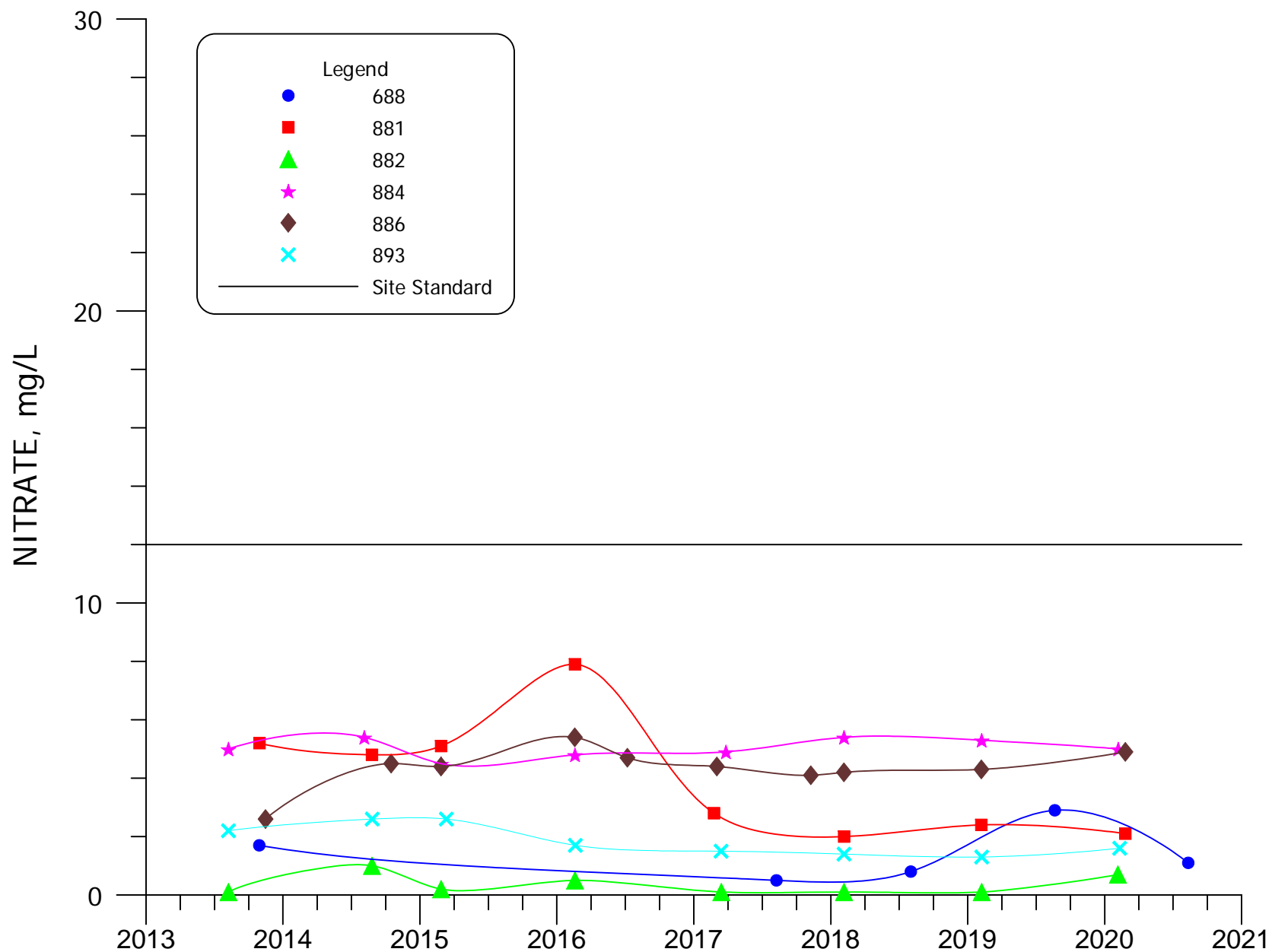
**FIGURE 4.3-116. NITRATE CONCENTRATIONS FOR WELLS 555, 556, 557, 844, 845, AND 846.**

4.3-179



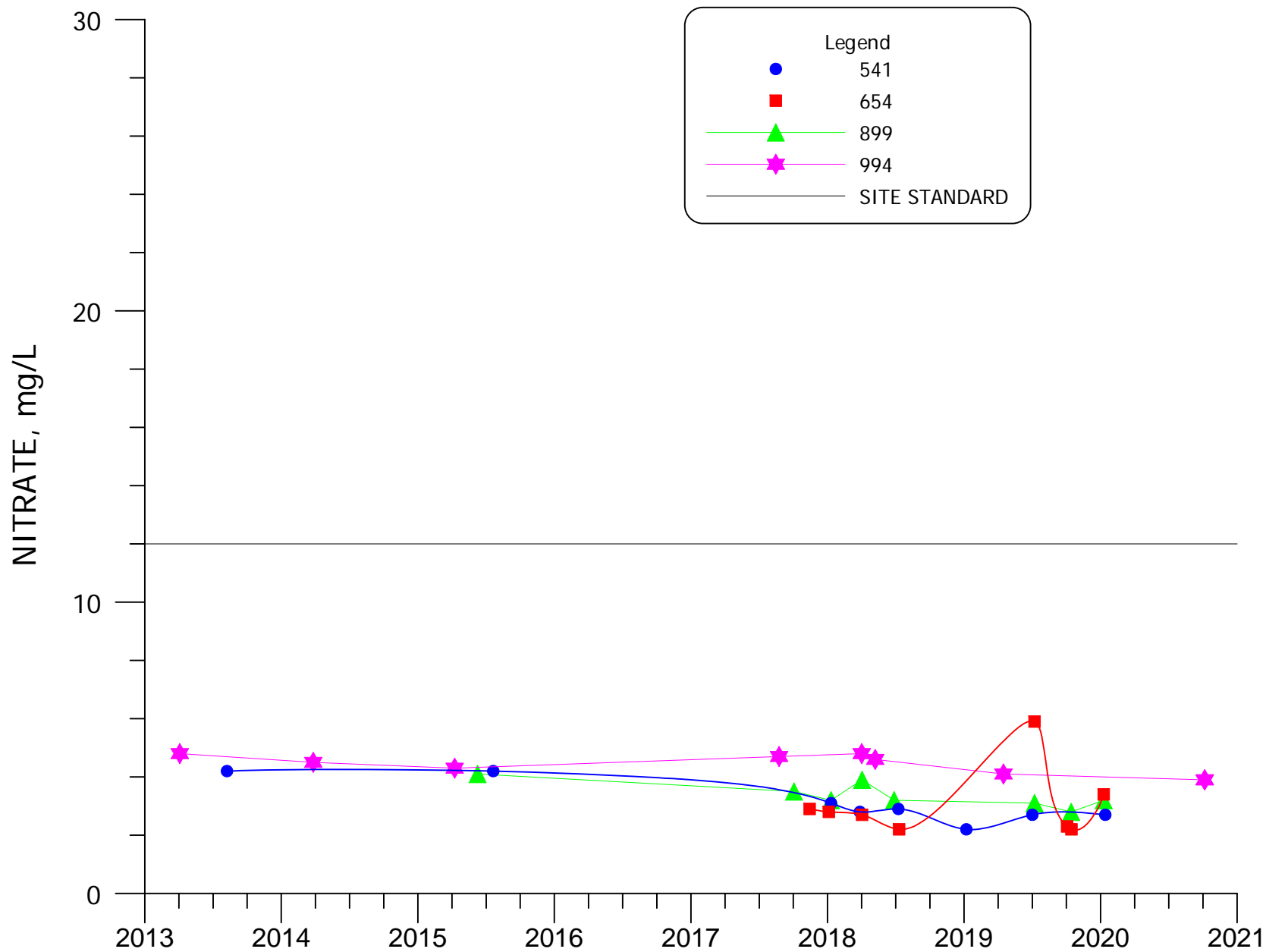
**FIGURE 4.3-117. NITRATE CONCENTRATIONS FOR WELLS 540, 631, 644, 864, 869 AND R3.**

4.3-180

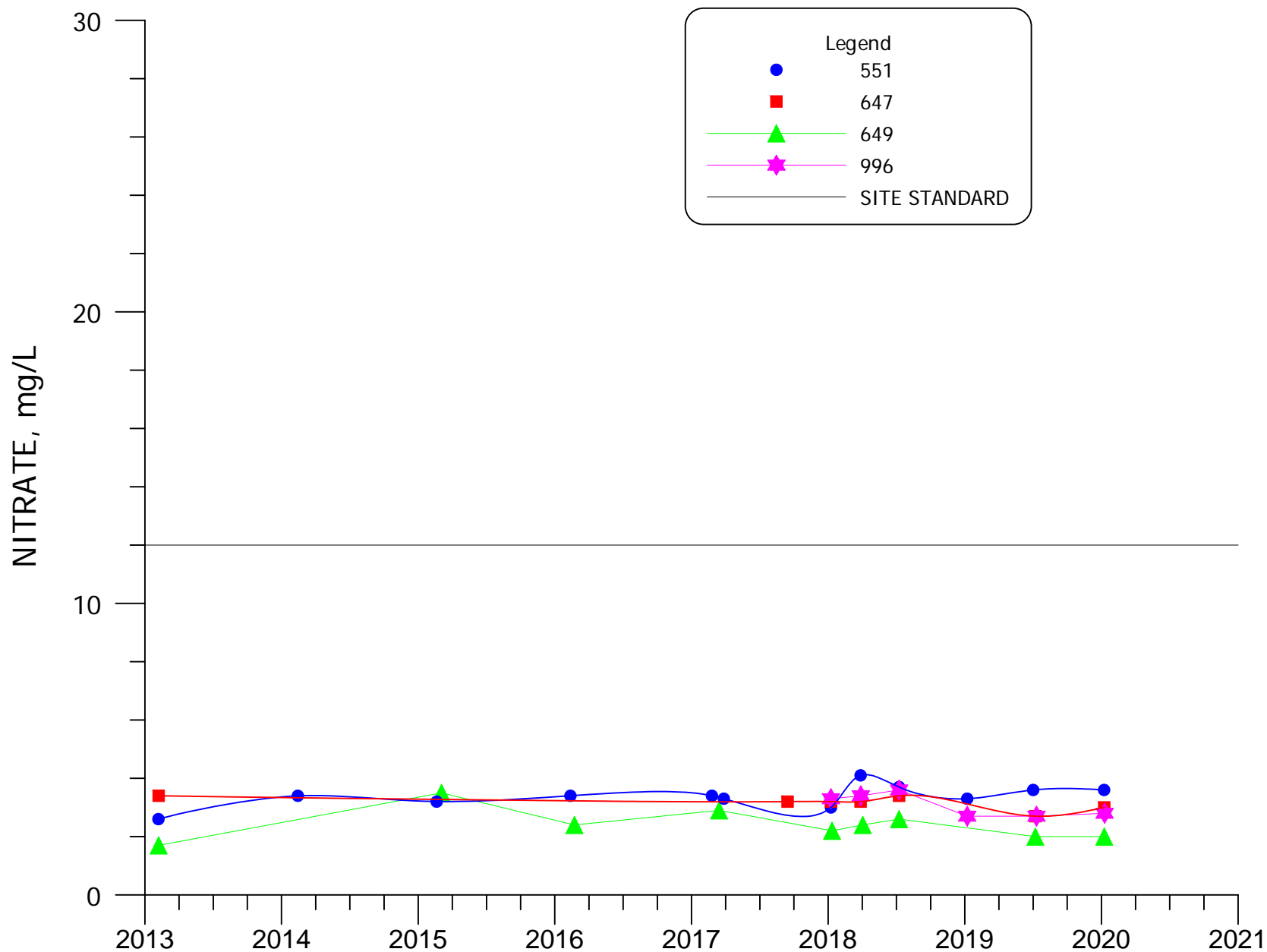


**FIGURE 4.3-118. NITRATE CONCENTRATIONS FOR WELLS 688, 881, 882, 884, 886 AND 893.**

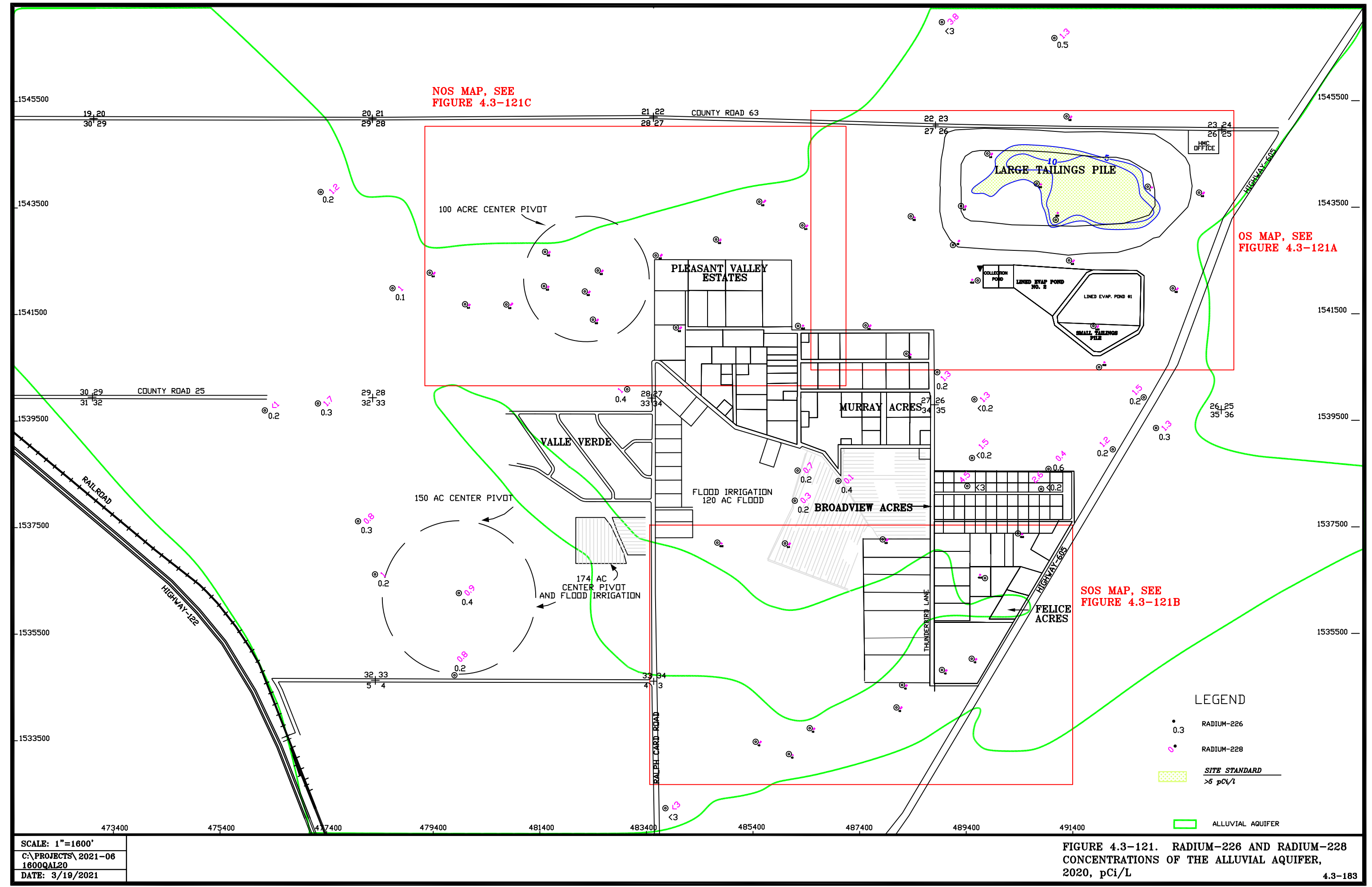


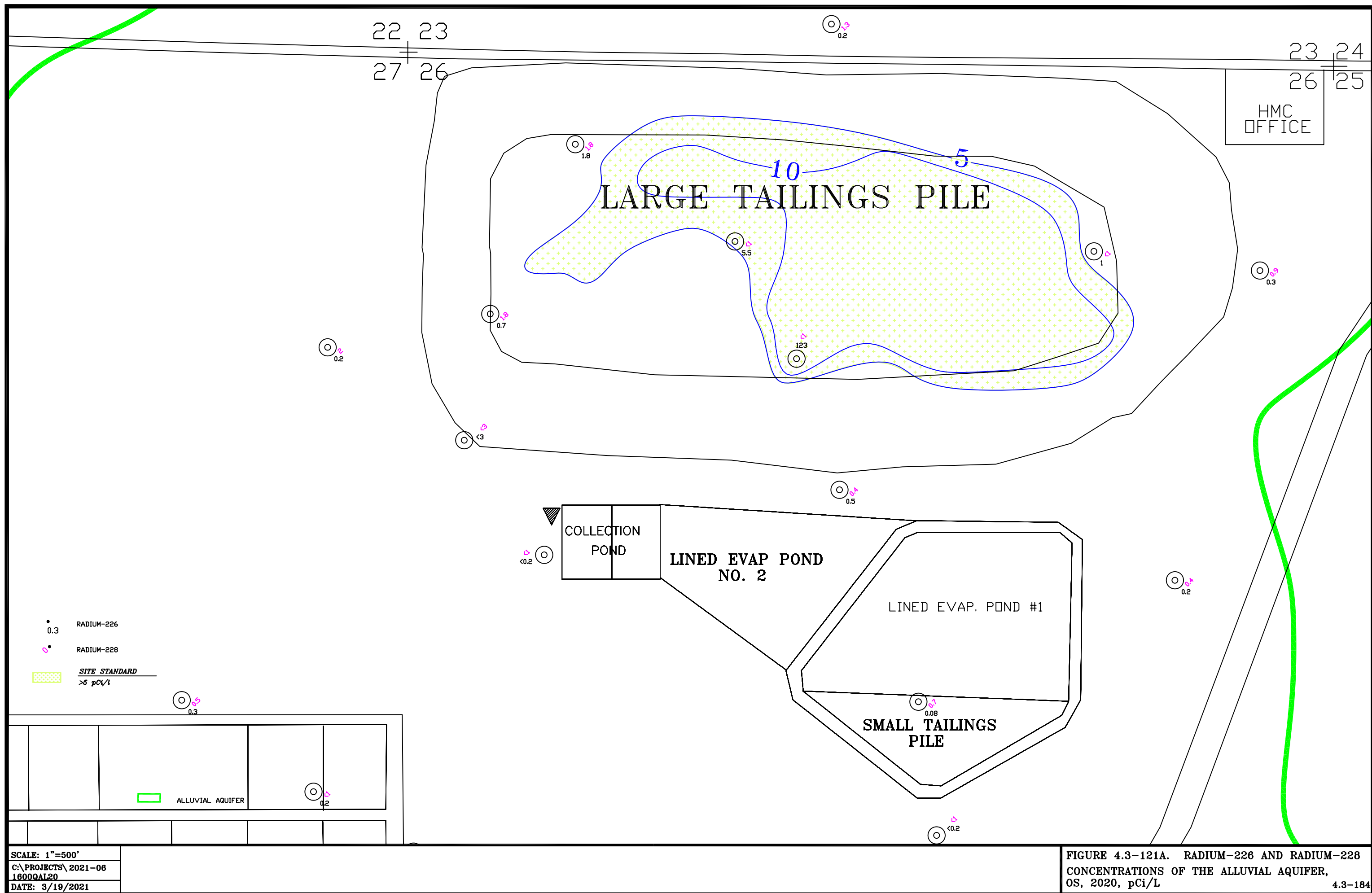


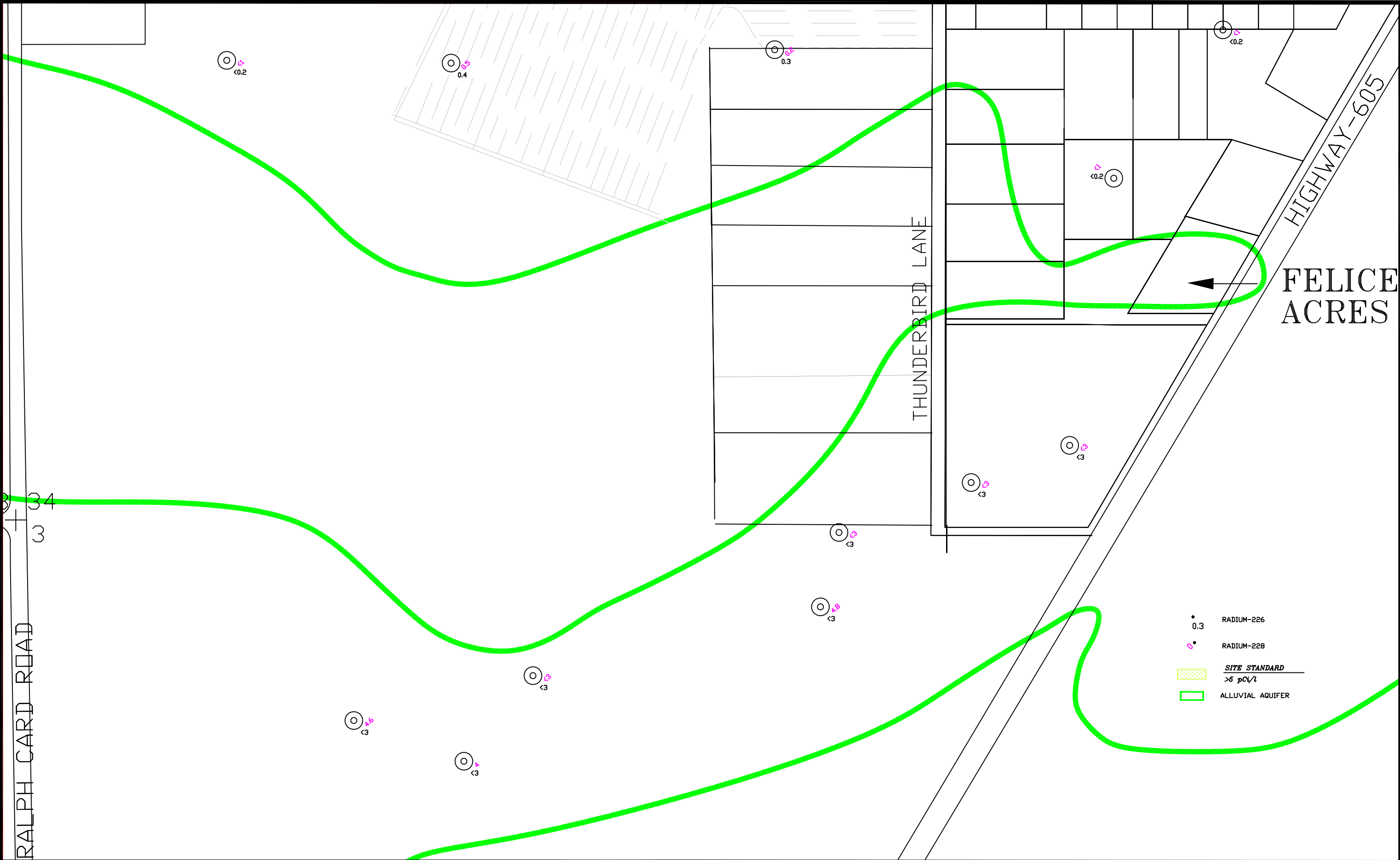
**FIGURE 4.3-119. NITRATE CONCENTRATIONS FOR WELLS 541, 654, 899 AND 994.**



**FIGURE 4.3-120. NITRATE CONCENTRATIONS FOR WELLS 551, 647, 649 AND 996.**

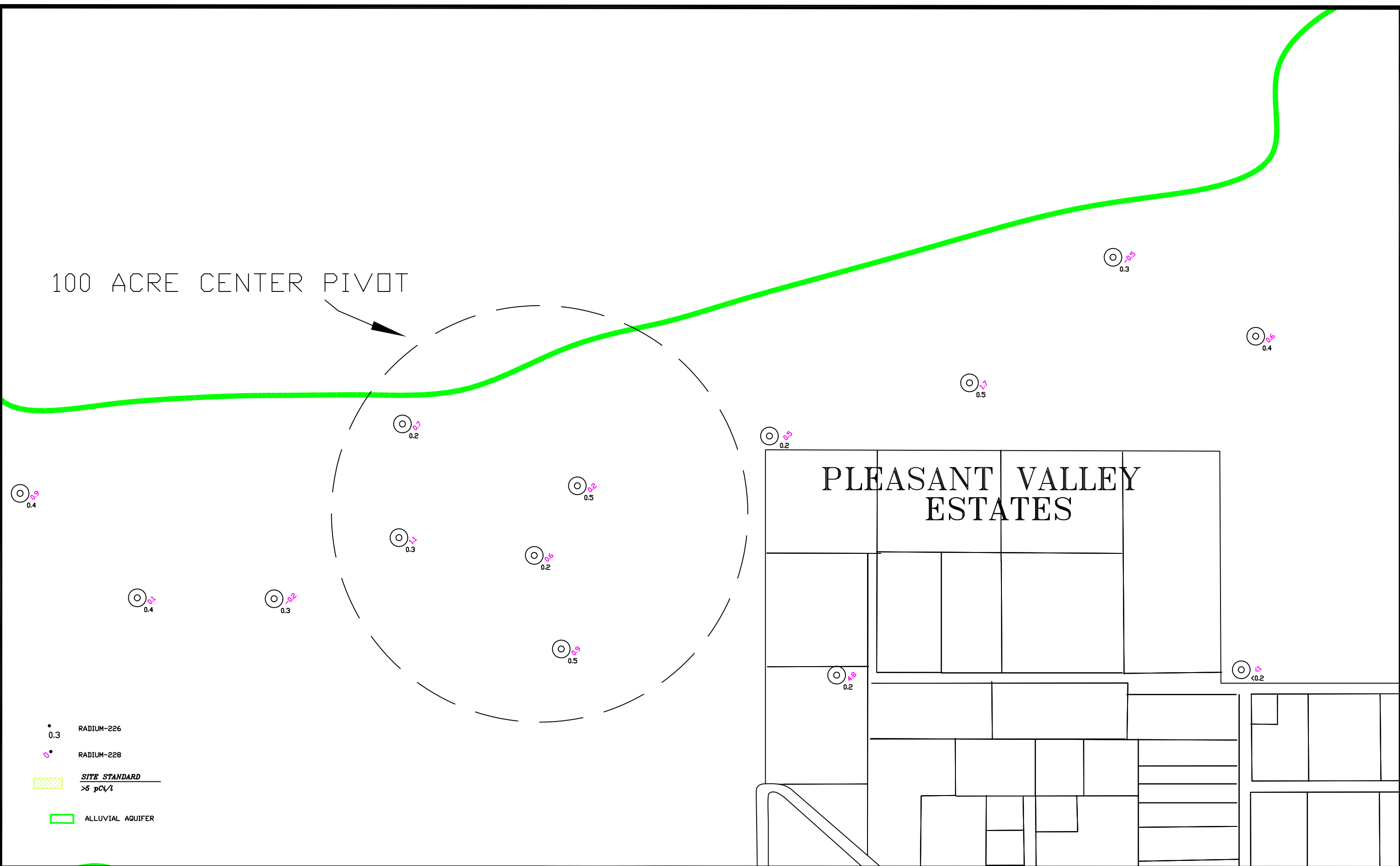






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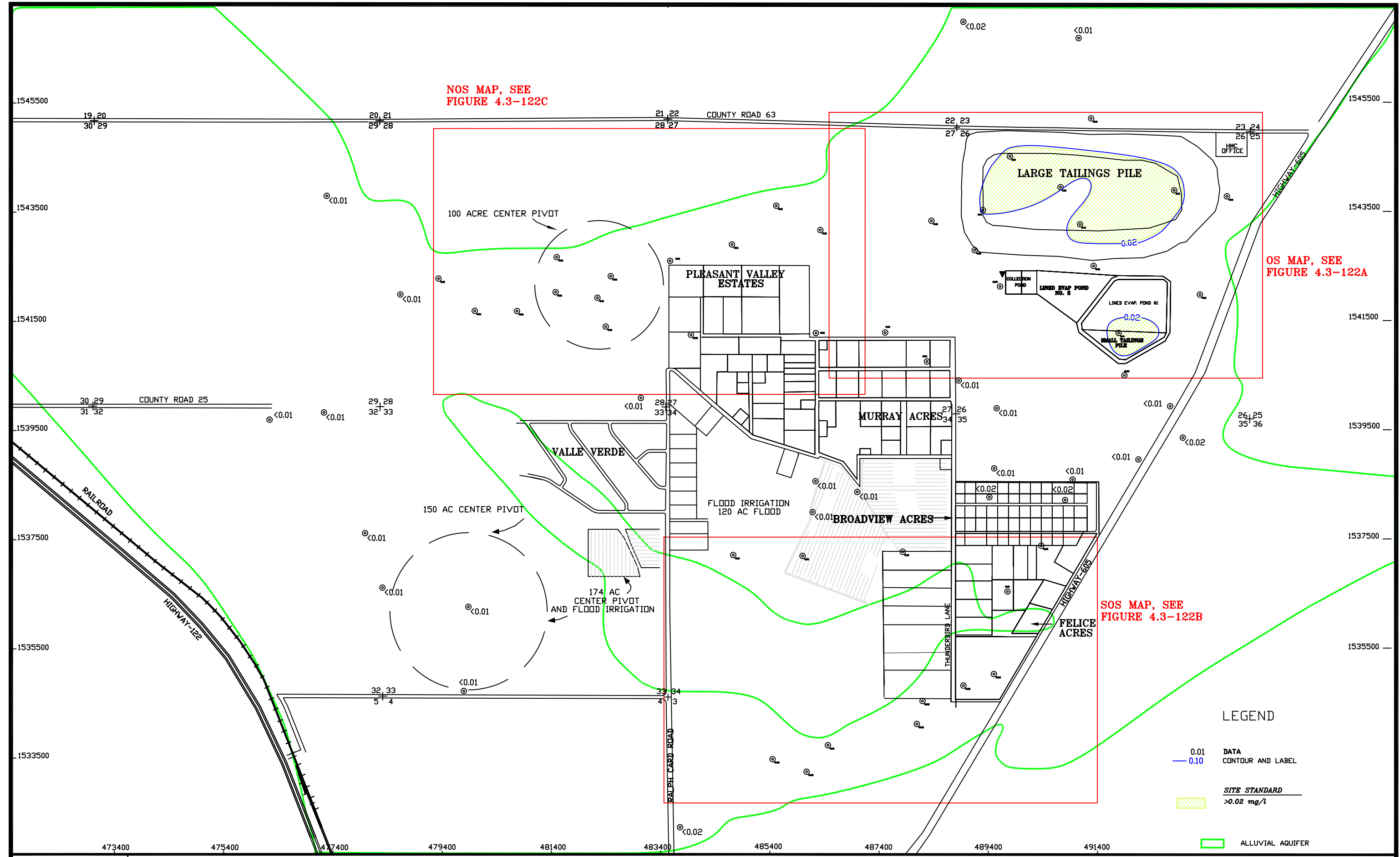
FIGURE 4.3-121B. RADIUM-226 AND RADIUM-228  
CONCENTRATIONS OF THE ALLUVIAL AQUIFER,  
SOS, 2020, pCi/L



SCALE: 1"=500'  
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DATE: 3/19/2021

FIGURE 4.3-121C. RADIUM-226 AND RADIUM-228  
CONCENTRATIONS OF THE ALLUVIAL AQUIFER,  
NOS, 2020, pCi/L

4.3-186



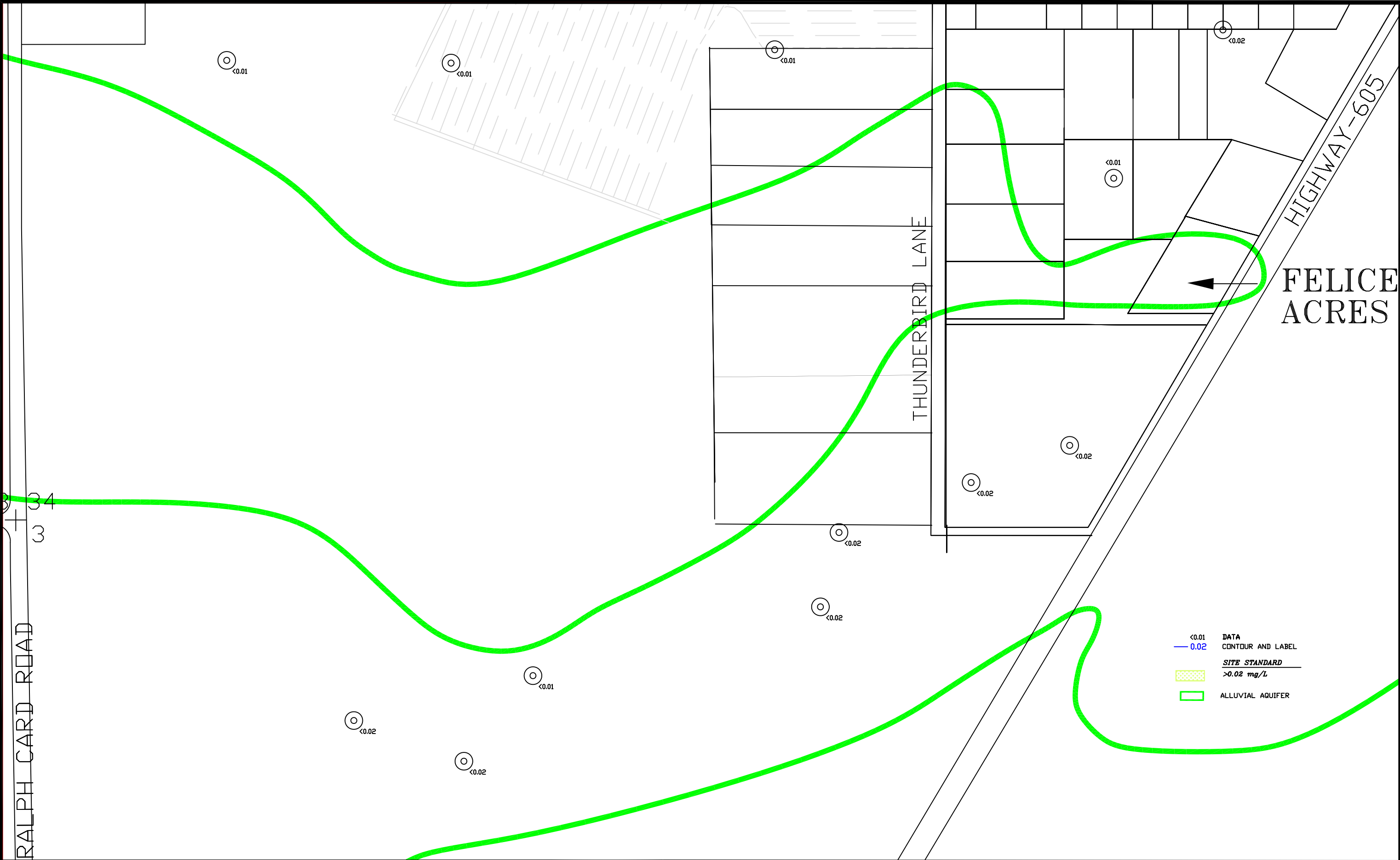
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DATE: 3/19/2021

FIGURE 4.3-122. VANADIUM CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2020, mg/L

4.3-187



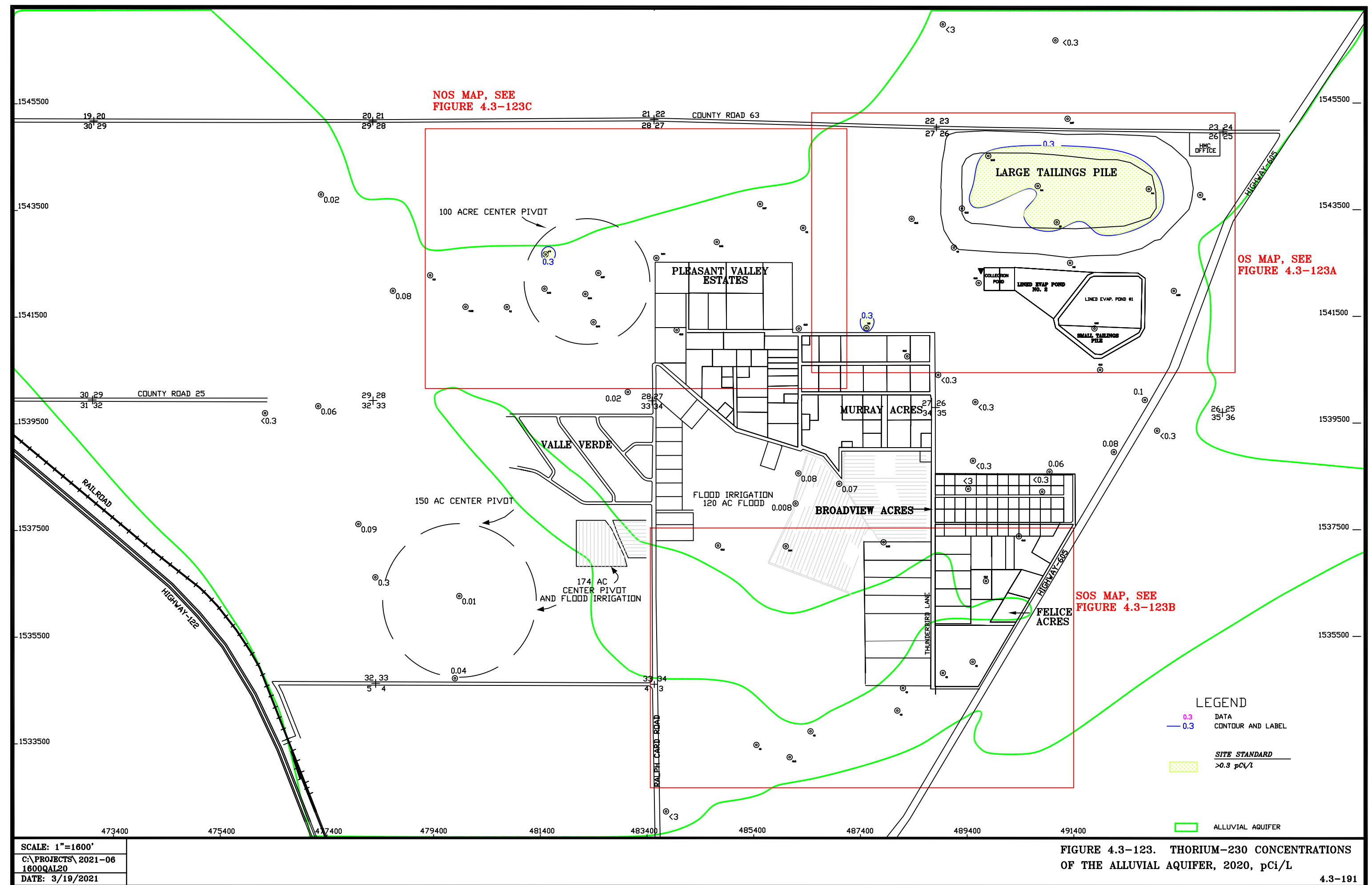




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1600QAL20  
DATE: 3/19/2021

FIGURE 4.3-122B. VANADIUM CONCENTRATIONS  
OF THE ALLUVIAL AQUIFER, SOS, 2020, mg/L











**TABLE 4.3-1. GRANTS PROJECT ALLUVIAL SITE  
STANDARDS.**

<b>Constituents</b>	<b>NRC License Site Standards</b>	<b>New Mexico Site Standards*</b>
Uranium	0.16	0.16
Selenium	0.32	0.32
Molybdenum	0.10	1.0**
Vanadium	0.02	-----
RA-226 + Ra-228	5	30
Thorium-230	0.3	-----
Sulfate	1500	1500
Chloride	250	250
TDS	2734	2734
Nitrate	12	12

NOTE: All concentrations are in mg/L except: Ra-226 + Ra-228 and Th-230, which are in pCi/L.

\* = NMED renewal of DP-200 Discharge Plan

\*\* = New Mexico Irrigation Standard

**TABLE 4.3-2 2020 BACKGROUND WELL DATA - ALLUVIUM**

	PARAMETERS						
	Se	U	Mo	SO4	Cl	TDS	NO <sub>3</sub>
NRC Site Standard	0.32	0.16	0.10	1500	250	2734	12
NMED Site Standard	0.32	0.16	1.0	1500	250	2734	12
NEAR UP-GRADIENT WELLS							
DD	0.06	0.11	<0.01	1850	71	3420	8.7
DD2	<0.005	0.23	<0.01	1530	56	2700	<0.1
DD3	-	-	-	-	-	-	-
DD4	-	-	-	-	-	-	-
DD5	-	-	-	-	-	-	-
ND	-	-	-	-	-	-	-
P	0.14	0.03	<0.01	1010	47	1860	5.2
P2	0.35	0.03	0.001	1320	63	2340	-
P3	0.44	0.02	0.001	1380	72	2420	-
P4	0.18	0.02	0.002	881	45	1620	-
Q	0.37	0.05	<0.03	1630	66	2670	12.4
R	0.66	0.02	0.002	1410	57	2370	-
FAR UP-GRADIENT WELLS							
914	-	-	-	-	-	-	-
920	-	-	-	-	-	-	-
921	0.54	0.20	0.003	1670	65	2800	15.6
922	-	-	-	-	-	-	-
950	-	-	-	-	-	-	-

<sup>1</sup> Wells DD, DD2, P, P2, P3, P4, Q, R, and 921 are up-gradient wells sampled in 2020.

<sup>2</sup> Wells DD, ND, P, P1, P2, P3, P4, Q and R were used to establish site standards.



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## 5.0 UPPER CHINLE AQUIFER MONITORING

Numerous Upper Chinle wells were monitored in 2020 to define conditions in this aquifer and define Upper Chinle restoration for the year.

### 5.1 UPPER CHINLE WELL COMPLETIONS

Chinle aquifer well locations are shown on [Figures 5.1-1, 5.1-1A and 5.1-1B](#). The Upper and Middle Chinle aquifers do not exist in the area west of Ralph Card Road. [Table 5.1-1](#) presents basic information for the Chinle wells located on the HMC property. This table indicates well coordinates, well depth, casing diameter, water level, measuring point in feet above land surface and elevation, and depth and elevation to the top of the Chinle aquifers. A “U” follows the elevation of the top of the Upper Chinle aquifer, and an “M” and an “L” have the same meaning for the Middle and Lower Chinle aquifers, respectively. Some of the wells have been used to define the depth to the base of the alluvium, and an “A” is presented following the elevation to denote that these values are for the base of the alluvium. The casing perforation interval and aquifer unit are also presented in this table.

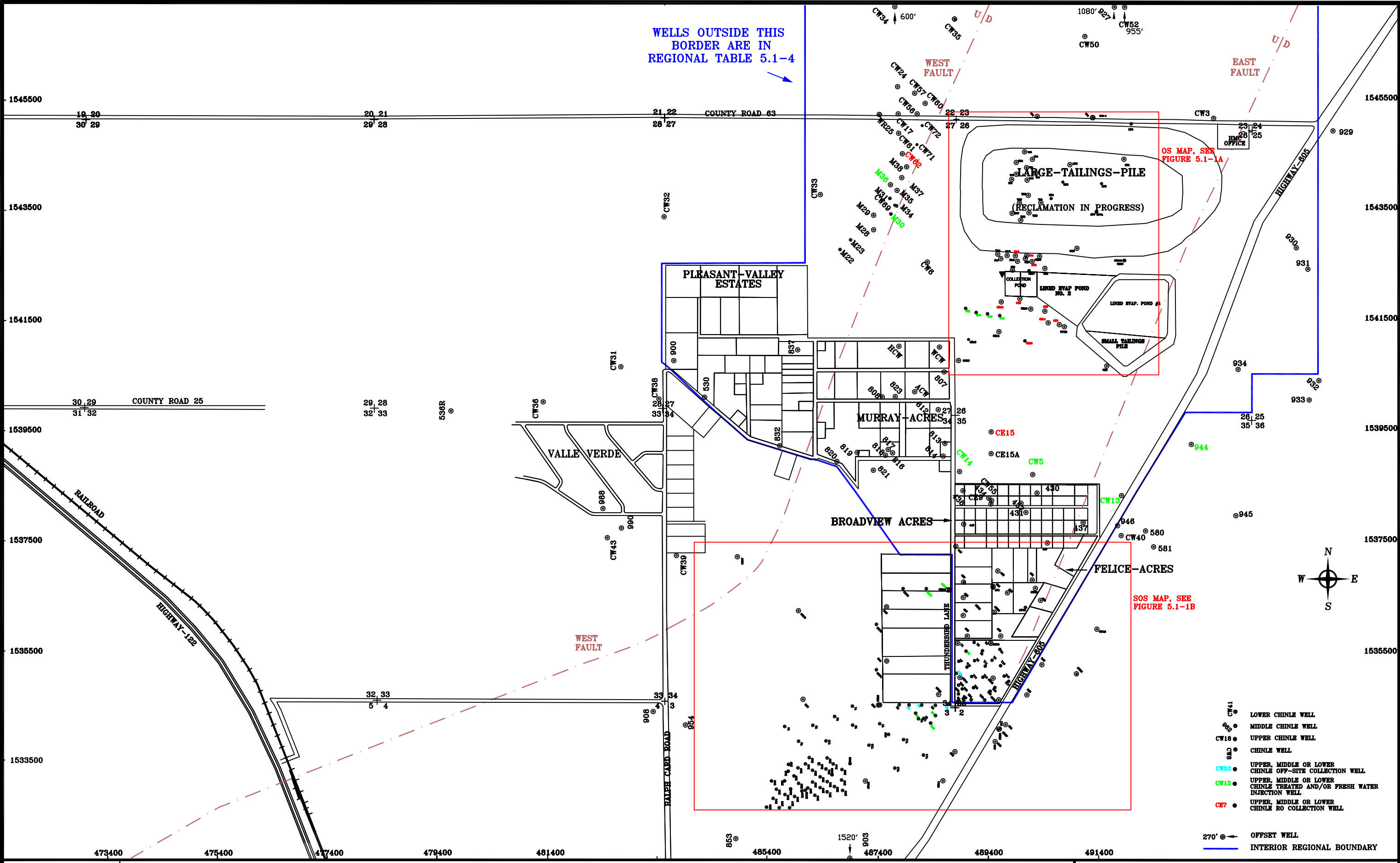
[Table 5.1-2](#) presents basic well data for Chinle wells in Broadview Acres and Felice Acres. [Table 5.1-3](#) presents similar data for Murray Acres and Pleasant Valley Estates Chinle wells. Wells that are not located within the immediate Grants Project property or within the four subdivision boundaries are denoted as the regional Chinle wells and are presented in [Table 5.1-4](#) (see [Figure 5.1-1](#) for inner regional boundary shown in blue). [Figure 5.1-1A](#) shows the locations of the On-Site Chinle wells while [Figure 5.1-1B](#) presents the Chinle well locations for the South Off-Site wells. No Upper, Middle and Lower Chinle wells were drilled by HMC in 2020.

The location of Upper Chinle wells and the areal extent of the Upper Chinle aquifer at the Grants Project are shown on [Figures 5.1-2 and 5.1-2A](#). Upper Chinle wells 944, C18, C19, C20, C21, CW5 and CW13 are shown in green to denote that these are treated and/or fresh-water injection wells. Upper Chinle wells B16, B31, B32, CE2, CE5, CE6, CE11, CE12, CE15 and CE19 were pumped to supply the R.O. plant in 2020 and are shown in red.

[Figure 5.1-2](#) also shows the location of the West and East Faults. A blue dot pattern is used to show the limits of the Upper Chinle sandstone where Chinle shale exists between the sandstone and the alluvium. [Figure 1.1-2](#) presents a typical geologic cross section to show the

relative position of the alluvial and Chinle aquifers (see [Figure 1.1-1](#) for the location of this cross section). [Figures 1.1-3](#) and [1.1-4](#) present additional geologic cross sections which show the relative position of the Chinle aquifers (see [Figure 1.1-1](#) for the locations of these cross sections).

The subcrop of the Upper Chinle sandstone where the alluvium is saturated or unsaturated above the Upper Chinle sandstone is also shown on [Figures 5.1-2](#) and [5.1-2A](#). The Upper Chinle aquifer does not exist to the west and south of the subcrop area. The Upper Chinle sandstone, therefore, does not exist west of the West Fault.

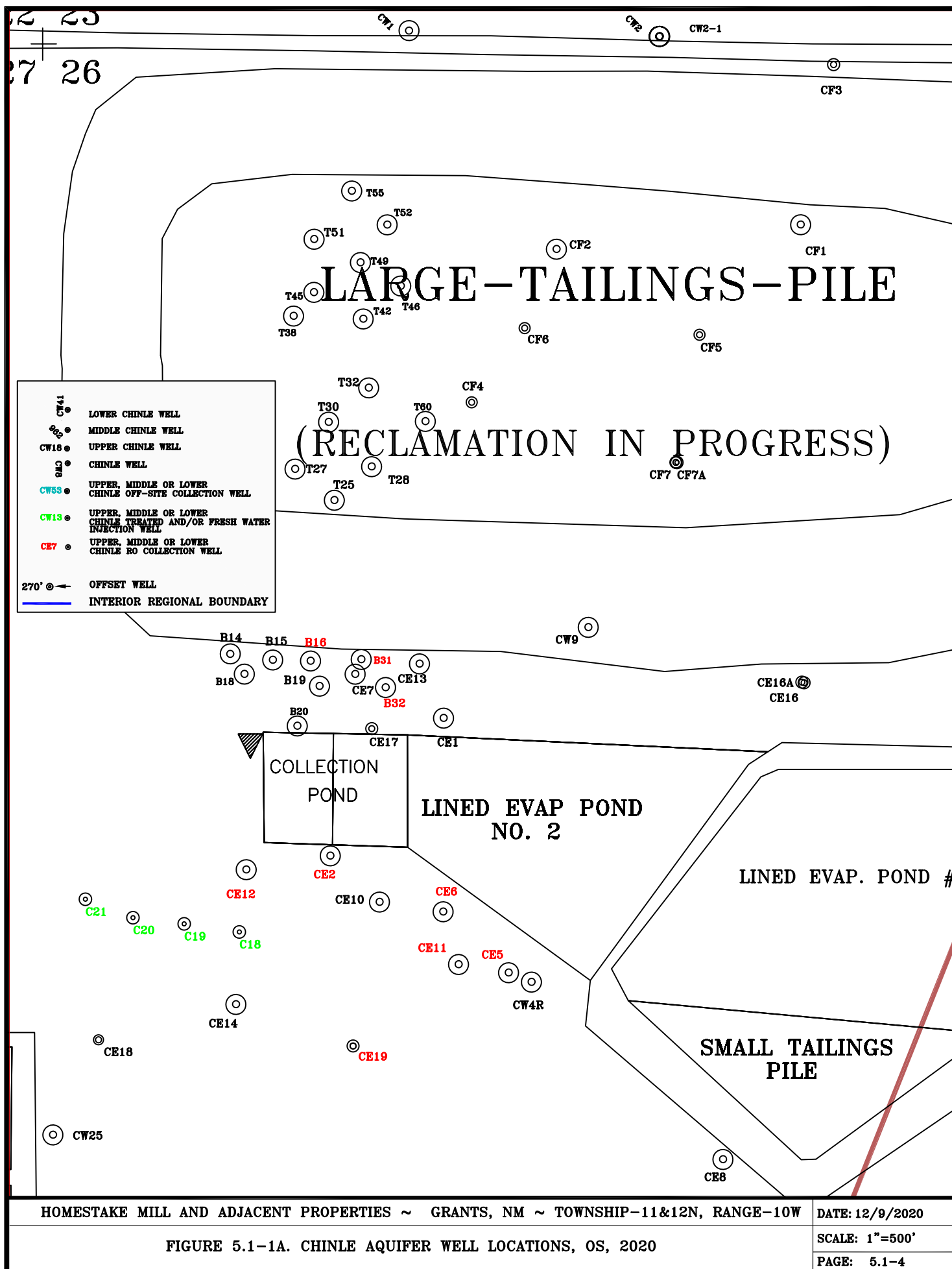


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BASE20chinle.DWG

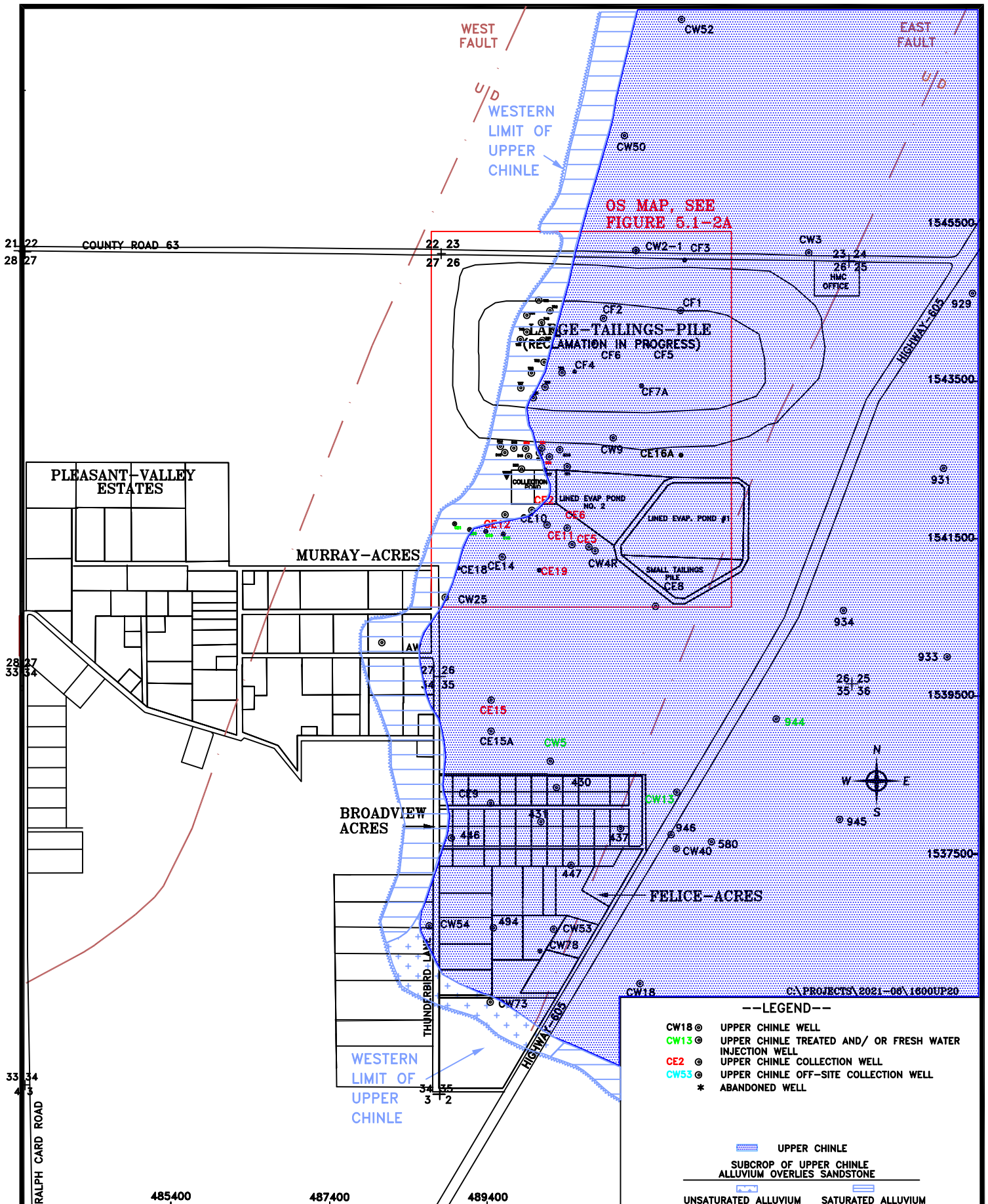
DATE: 12/9/2020

FIGURE 5.1-1. CHINLE AQUIFER WELL LOCATIONS, 2020









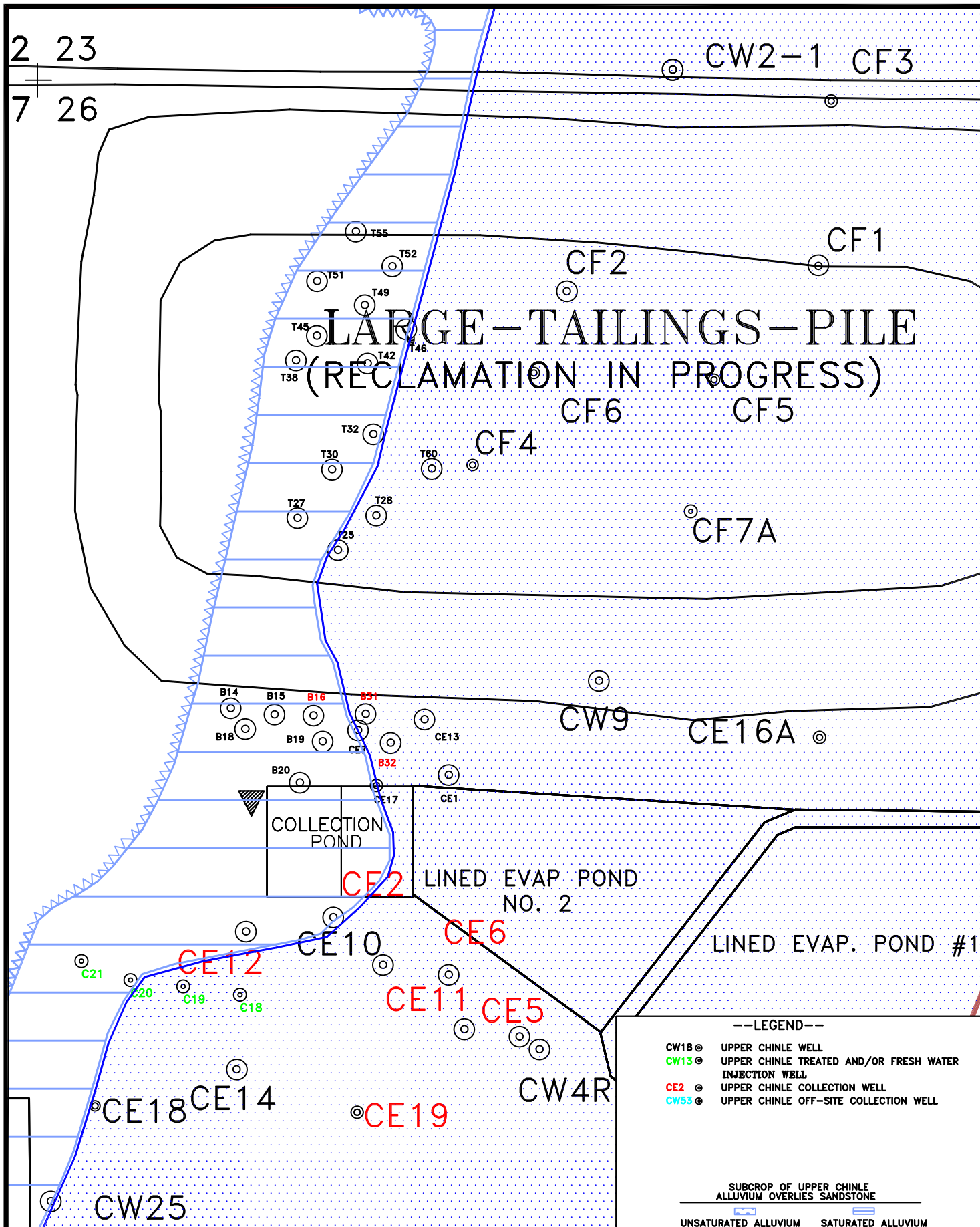
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 3/11/2021

FIGURE 5.1-2 LIMITS OF UPPER CHINLE AQUIFER AND WELL LOCATIONS, 2020

SCALE: 1"= 1600'

PAGE: 5.1-6



HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 12/9/2020

FIGURE 5.1-2A. LIMITS OF UPPER CHINLE AQUIFER AND WELL LOCATIONS, OS, 2020

SCALE: 1"= 500'

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**TABLE 5.1-1. WELL DATA FOR THE CHINLE HOMESTAKE WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
0930	1542848	494997	410.0	6.0	11/11/2020	103.40	6495.14	0.0	6598.54	30	6569	A -	---
										335	6264	M 330-400	Middle
0931	1542461	495207	366.7	6.0	11/11/2020	92.97	6517.59	0.9	6610.56	339	6271	U -	Upper
0934	1540641	493941	293.0	6.0	8/27/2012	110.97	6474.62	2.0	6585.59	30	6554	A -	---
										282	6302	U -	Upper
B14	1542733	489579	120.0	4.5	4/22/2014	34.46	6541.19	2.0	6575.65	68	6506	U 60-120	Upper
										68	6506	A 60-120	Alluvium
B15	1542708	489749	120.0	4.5	10/28/2019	46.20	6530.11	2.0	6576.31	72	6502	A 60-120	Alluvium
										72	6502	U 60-120	Upper
B16	1542705	489900	120.0	4.5	10/28/2019	60.75	6514.62	2.0	6575.37	83	6490	U 60-120	Upper
										83	6490	A 60-120	Alluvium
B17	1542659	489493	95.0	4.5	10/28/2019	42.80	6531.51	2.0	6574.31	---	---	A 55-95	Alluvium
										---	---	U 55-95	Upper
B18	1542652	489634	120.0	4.5	10/28/2019	45.60	6530.53	2.0	6576.13	70	6504	U 60-120	Upper
										70	6504	A 60-120	Alluvium
B19	1542605	489936	120.0	4.5	9/11/2014	39.79	6534.22	2.0	6574.01	90	6482	U 60-120	Upper
										90	6482	A 60-120	Alluvium
B20	1542444	489847	120.0	4.5	10/9/2014	40.11	6534.33	2.0	6574.44	90	6482	U 60-120	Upper
										90	6482	A 60-120	Alluvium
B31	1542710	490103	120.0	4.5	10/28/2019	59.40	6516.56	2.0	6575.96	83	6491	A 60-100	Alluvium
										83	6491	U 60-100	Upper
B32	1542598	490201	120.0	4.5	10/28/2019	46.10	6529.29	2.0	6575.39	93	6480	A 60-120	Alluvium
										93	6480	U 60-120	Upper
C18	1541616	489614	120.0	4.5	10/28/2019	10.40	6560.70	0.5	6571.10	---	---	U 40-120	Upper
										60	6511	A 40-120	Alluvium
C19	1541648	489392	120.0	4.5	10/28/2019	18.60	6551.31	0.5	6569.91	---	---	U 40-120	Upper
										80	6489	A 40-120	Alluvium
C20	1541673	489187	110.0	4.5	10/28/2019	17.20	6552.96	0.5	6570.16	---	---	U 50-110	Upper
										70	6500	A 50-110	Alluvium
C21	1541747	488996	100.0	4.5	10/28/2019	26.24	6545.75	0.5	6571.99	---	---	U 40-100	Upper
										90	6481	A 40-100	Alluvium
CE1	1542475	490434	137.0	5.0	11/11/2020	14.03	6556.16	4.4	6570.19	75	6491	A -	---
										106	6460	U 98-138	Upper
CE2	1541923	489979	119.7	5.0	5/28/2020	41.34	6535.01	1.8	6576.35	74	6501	A -	---
										74	6501	U 78-118	Upper
CE5	1541453	490695	140.0	5.0	10/28/2019	42.53	6526.02	1.6	6568.55	63	6504	A -	---
										103	6464	U 100-140	Upper
CE6	1541698	490433	140.0	6.0	10/28/2019	38.55	6526.64	1.5	6565.19	75	6489	U -	Upper
CE7	1542652	490079	120.0	6.0	11/11/2020	44.19	6531.80	1.9	6575.99	95	6479	U 100-140	Upper

**TABLE 5.1-1. WELL DATA FOR THE CHINLE HOMESTAKE WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFORATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
CE8	1540704	491556	216.6	6.0	11/11/2020	47.64	6522.06	1.7	6569.70	166	6402	U 160-200	Upper
CE10	1541737	490177	130.0	6.0	11/11/2020	51.75	6519.11	2.3	6570.86	80	6489	U 90-130	Upper
CE11	1541487	490494	140.0	6.0	12/20/2019	42.20	6523.22	1.6	6565.42	90	6474	U 100-140	Upper
CE12	1541867	489642	120.0	6.0	10/28/2019	41.90	6530.33	2.1	6572.23	80	6490	U 80-120	Upper
CE13	1542693	490338	129.2	6.0	11/11/2020	44.26	6530.38	1.7	6574.64	95	6478	U 90-130	Upper
CE14	1541326	489600	130.0	5.0	11/11/2020	40.03	6529.42	2.0	6569.45	80	6487	U 90-130	Upper
CE15	1539507	489460	130.0	5.0	11/11/2020	47.96	6518.12	2.0	6566.08	77	6487	U 90-130	Upper
CE15A	1539111	489459	130.0	4.5	11/11/2020	42.27	6522.54	2.0	6564.81	75	6488	U 90-130	Upper
										75	6488	A -	---
CE16	1542618	491883	130.0	4.5	12/21/2016	39.50	6541.67	2.0	6581.17	---	---	C 90-130	Chinle
										76	6503	A -	---
CE16A	1542619	491873	0.0	---	10/2/2019	47.13	6532.91	2.0	6580.04	---	---	U 125-185	Upper
CE17	1542434	490146	130.0	4.5	4/15/2014	38.43	6537.97	2.0	6576.40	94	6480	A -	---
										94	6480	U 90-130	Upper
CE18	1541185	489048	130.0	4.5	10/17/2019	39.41	6529.47	2.0	6568.88	74	6493	A -	---
										74	6493	U 90-130	Upper
CE19	1541160	490070	130.0	4.5	8/20/2020	66.70	6502.13	2.0	6568.83	88	6479	U 90-130	Upper
										88	6479	A -	---
CF1	1544456	491868	285.0	5.0	10/25/2019	131.91	6534.00	2.8	6665.91	230	6433	U 240-285	Upper
CF2	1544358	490888	260.0	5.0	12/20/2019	122.03	6544.13	2.0	6666.16	220	6444	U 220-260	Upper
CF3	1545098	492000	166.0	4.5	11/11/2020	51.76	6535.03	2.0	6586.79	156	6429	U 146-166	Upper
CF4	1543680	490520	197.0	4.5	11/11/2020	75.11	6588.58	2.0	6663.69	166	6496	U 177-197	Upper
										166	6496	A -	---
CF5	1544013	491463	233.0	4.5	11/29/2020	138.20	6533.26	2.0	6671.46	163	6506	A -	---
										222	6447	U 213-233	Upper
CF6	1544040	490759	205.0	4.5	11/29/2020	107.00	6560.43	2.0	6667.43	163	6502	A -	---
										199	6466	U 185-205	Upper
CF7	1543501	491362	220.0	4.5	8/13/2014	116.76	6551.56	2.0	6668.32	---	---	C 200-220	Chinle
										155	6511	A -	---
CF7A	1543500	491371	265.0	4.5	11/11/2020	136.26	6531.85	2.0	6668.11	160	6506	A -	---
										220	6446	U 225-265	Upper
CW1	1545235	490295	325.0	5.0	11/11/2020	85.85	6499.37	0.7	6585.22	105	6480	A -	---
										272	6313	M 212-323	Middle
CW2	1545212	491302	355.0	5.0	11/11/2020	86.05	6499.43	1.7	6585.48	85	6499	A -	---
										136	6448	U -	---
										305	6279	M 306-353	Middle
CW2-1	1545212	491302	168.0	5.0	11/11/2020	46.75	6538.73	1.7	6585.48	85	6499	A -	---
										136	6448	U 243-253	Upper
CW3	1545200	493496	235.0	5.0	11/11/2020	57.80	6529.38	0.7	6587.18	70	6516	A -	---

**TABLE 5.1-1. WELL DATA FOR THE CHINLE HOMESTAKE WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
CW3	1545200	493496	235.0	5.0	11/11/2020	57.80	6529.38	0.7	6587.18	209 348	6377 6238	U 210-235 M -	Upper ---
* CW4	1541682	490874	145.0	5.0	9/7/1994	39.06	6531.89	0.8	6570.95	70 112	6500 6458	A - U 110-145	--- Upper
CW4R	1541416	490787	138.9	6.0	10/28/2019	43.65	6525.08	1.3	6568.73	61 104	6506 6463	A - U 102-142	--- Upper
CW5	1538729	490221	170.0	5.0	10/28/2019	10.40	6558.94	1.6	6569.34	65 137	6503 6431	A - U 135-170	--- Upper
CW6	1542588	488301	282.0	4.0	11/11/2020	71.69	6503.95	1.0	6575.64	236	6339	M 246-276	Middle
CW7	1545285	488773	---	---	10/17/1995	60.80	6522.79	0.0	6583.59	---	---	C 120-130	Chinle
CW8	1545009	491238	285.0	6.0	12/5/2000	38.90	6552.93	0.0	6591.83	---	---	C 276-286	Chinle
										85	6507	A -	---
CW9	1542840	491015	180.0	5.0	11/11/2020	62.01	6529.82	0.0	6591.83	---	---	U 130-180	Upper
										80	6512	A -	---
* CW10	1542823	491803	185.0	5.0	11/13/1995	50.03	6537.86	0.0	6587.89	75 167	6513 6421	A - U 155-185	--- Upper
CW13	1538349	491827	267.7	6.0	10/28/2019	22.60	6554.10	2.7	6576.70	230 378	6344 6196	U 225-265 M -	Upper ---
CW14	1538786	488884	360.9	6.0	10/28/2019	36.00	6530.09	2.9	6566.09	56 66 310	6507 6497 6253	A - U - M 278-358	--- --- Middle
CW17	1545279	487771	108.0	5.0	11/11/2020	66.55	6522.77	3.1	6589.32	73 85	6513 6501	A - M 83-103	--- Middle
CW24	1545773	487760	118.0	5.0	11/11/2020	51.90	6536.77	3.0	6588.67	61 65	6525 6521	A - M 78-118	--- Middle
CW25	1540802	488866	102.0	5.0	10/28/2019	32.60	6534.60	3.0	6567.20	53 53	6511 6511	A - U 62-102	--- Upper
CW33	1543814	486347	347.0	6.0	11/11/2020	106.40	6468.49	1.8	6574.89	63 63 272 272	6510 6510 6301 6301	M - A - L 307-347 L 267-287	--- --- --- Lower
CW34	1547827	487707	65.7	6.0	11/11/2020	53.55	6540.85	3.2	6594.40	20 40	6571 6551	A - M 33-63	--- Middle
CW35	1547001	488794	120.0	5.0	11/11/2020	52.80	6538.37	1.9	6591.17	63 90	6526 6499	A - M 93-118	--- Middle
CW50	1546687	491159	170.0	5.0	11/11/2020	49.15	6539.41	3.0	6588.56	128	6458	U 130-170	Upper
CW52	1548171	491887	180.0	5.0	11/11/2020	38.60	6553.80	2.0	6592.40	138	6452	U 140-180	Upper
CW56	1545279	488115	130.0	5.0	8/29/2019	57.07	6530.79	2.6	6587.86	51 98	6534 6487	A - M 90-110	--- Middle
CW57	1545654	488070	140.0	5.0	11/11/2020	50.30	6534.60	2.1	6584.90	55	6528	A -	---

**TABLE 5.1-1. WELL DATA FOR THE CHINLE HOMESTAKE WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
CW57	1545654	488070	140.0	5.0	11/11/2020	50.30	6534.60	2.1	6584.90	101	6482	M 100-140	Middle
CW60	1545470	488262	150.0	5.0	11/11/2020	47.95	6536.25	2.8	6584.20	50	6531	A -	---
										114	6467	M 100-140	Middle
CW61	1544927	487779	130.0	5.0	11/11/2020	62.23	6520.60	2.2	6582.83	62	6519	A -	---
										108	6473	M 90-130	Middle
CW62	1544555	487847	150.0	5.0	7/16/2020	54.50	6525.36	1.9	6579.86	60	6518	A -	---
										134	6444	M 130-150	Middle
CW69	1543638	487679	180.0	4.5	---	---	---	2.0	6576.42	---	---	C 160-180	Chinle
										66	6508	A -	---
CW71	1544724	488111	140.0	4.5	4/14/2014	37.63	6542.34	2.0	6579.97	72	6506	A -	---
										121	6457	M 120-140	Middle
CW72	1545034	488229	140.0	4.5	11/11/2020	83.76	6496.37	2.0	6580.13	75	6503	A -	---
										105	6473	M 80-140	Middle
M22	1542817	486716	100.0	4.5	---	---	---	2.0	6575.43	---	---	M 60-100	Middle
										100	6473	A 60-100	Alluvium
M23	1542992	486908	100.0	4.5	---	---	---	2.0	6575.97	---	---	M 60-100	Middle
										100	6474	A 60-100	Alluvium
M28	1543175	487326	120.0	4.5	4/23/2014	42.11	6536.65	2.0	6578.76	69	6508	A 60-120	Alluvium
										92	6485	M 60-120	Middle
M29	1543440	487326	120.0	4.5	4/23/2014	36.92	6535.95	2.0	6572.87	61	6510	A 60-120	Alluvium
										89	6482	M 60-120	Middle
M30	1543462	487639	110.0	4.5	9/30/2019	36.00	6538.91	2.0	6574.91	---	---	M 80-110	Middle
										80	6493	A 80-110	Alluvium
M31	1543745	487620	120.0	4.5	10/28/2019	40.40	6535.53	2.0	6575.93	---	---	M 70-120	Middle
										80	6494	A 70-120	Alluvium
M34	1543608	487743	120.0	4.5	---	---	---	2.0	6574.55	---	---	M 60-120	Middle
										66	6507	A 60-120	Alluvium
M35	1543889	487750	120.0	4.5	4/15/2014	35.13	6539.59	2.0	6574.72	71	6502	A 60-120	Alluvium
										97	6476	M 60-120	Middle
M36	1543993	487631	120.0	4.5	4/15/2014	36.56	6538.88	2.0	6575.44	72	6501	A 60-120	Alluvium
										97	6476	M 60-120	Middle
M37	1544120	487835	120.0	4.5	4/15/2014	38.37	6537.07	2.0	6575.44	73	6500	A 60-120	Alluvium
										107	6466	M 60-120	Middle
M38	1544319	487923	120.0	4.5	4/15/2014	37.91	6541.71	2.0	6579.62	---	---	M 60-120	Middle
										79	6499	A 60-120	Alluvium
T25	1543352	489996	200.0	4.5	1/14/2020	122.80	6534.54	2.0	6657.34	---	---	A 140-200	Alluvium
										---	---	U 140-200	Upper
T27	1543474	489837	200.0	4.5	1/15/2020	121.80	6535.34	2.0	6657.14	---	---	A 140-200	Alluvium
										---	---	U 140-200	Upper
T28	1543484	490145	200.0	4.5	1/15/2020	121.75	6536.96	2.0	6658.71	---	---	A 140-200	Alluvium

**TABLE 5.1-1. WELL DATA FOR THE CHINLE HOMESTAKE WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
T28	1543484	490145	200.0	4.5	1/15/2020	121.75	6536.96	2.0	6658.71	---	---	U 140-200	Upper
T30	1543663	489972	200.0	4.5	1/16/2020	123.00	6536.62	2.0	6659.62	---	---	U 140-200	Upper
										---	---	A 140-200	Alluvium
T32	1543801	490134	200.0	4.5	10/28/2019	123.70	6537.91	2.0	6661.61	---	---	U 140-200	Upper
										---	---	A 140-200	Alluvium
T38	1544089	489832	200.0	4.5	---	---	---	2.0	6658.46	---	---	A 140-200	Alluvium
										---	---	U 140-200	Upper
T42	1544077	490112	200.0	4.5	6/5/2014	113.69	6546.32	2.0	6660.01	---	---	U 140-200	Upper
										---	---	A 140-200	Alluvium
T45	1544183	489914	200.0	4.5	10/28/2019	118.40	6539.66	2.0	6658.06	---	---	A 140-200	Alluvium
										---	---	U 140-200	Upper
T46	1544210	490262	200.0	4.5	6/3/2014	114.24	6546.41	2.0	6660.65	---	---	A 140-200	Alluvium
										---	---	U 140-200	Upper
T49	1544304	490100	200.0	4.5	6/3/2014	111.80	6546.59	2.0	6658.39	---	---	A 140-200	Alluvium
										---	---	U 140-200	Upper
T51	1544397	489914	200.0	4.5	3/14/2018	121.18	6536.16	2.0	6657.34	---	---	A 140-200	Alluvium
										---	---	U 140-200	Upper
T52	1544456	490208	200.0	4.5	6/3/2014	109.87	6548.13	2.0	6658.00	---	---	U 140-200	Upper
										---	---	A 140-200	Alluvium
T55	1544592	490063	195.0	4.5	6/3/2014	110.87	6546.79	2.0	6657.66	---	---	A 135-195	Alluvium
										---	---	U 135-195	Upper
T60	1543666	490362	200.0	4.5	8/8/2014	116.76	6545.10	2.0	6661.86	---	---	U 140-200	Upper
										---	---	A 140-200	Alluvium
WR25	1545267	487430	113.3	5.0	11/11/2020	55.82	6530.64	2.8	6586.46	50	6534	A -	---
										71	6513	M 71-111	Middle

NOTE: A = Alluvial Aquifer, Base  
U = Upper Chinle Aquifer, Top  
M = Middle Chinle Aquifer, Top  
L = Lower Chinle Aquifer, Top  
\* = Abandoned



**TABLE 5.1-2. WELL DATA FOR THE CHINLE BROADVIEW AND FELICE ACRES WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)		AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)							
Broadview														
0430	1538469	490300	145.0	---	---	---	---	0.0	6568.00	72	6496	A	-	Alluvium
										135	6433	U	-	Upper
0431	1538045	490090	130.0	6.0	4/12/1994	35.00	6533.00	0.0	6568.00	60	6508	A	125-130	Alluvium
										118	6450	U	125-130	Upper
0434	1538303	489415	280.0	6.0	10/4/2007	39.51	6524.17	0.0	6563.68	75	6489	A	-	---
										265	6299	M	-	Middle
0436	1538439	488947	295.0	5.0	10/29/1996	71.82	6490.91	0.0	6562.73	90	6473	A	-	---
										280	6283	M	280-295	Middle
0437	1537859	491128	340.0	5.0	10/29/1996	63.23	6508.77	1.8	6572.00	90	6480	A	-	---
										180	6390	U	-	---
										280	6290	M	240-300	Middle
0446	1537830	488960	110.0	6.0	9/8/1983	41.28	6518.72	0.0	6560.00	60	6500	A	60-95	Alluvium
										60	6500	U	60-95	Upper
0447	1537490	490480	142.0	6.0	4/11/1985	41.18	6526.82	0.0	6568.00	80	6488	A	120-142	Alluvium
										138	6430	U	120-142	Upper
0449	1537440	488830	267.0	6.0	12/5/1994	63.42	6496.58	0.0	6560.00	---	---	M	-	Middle
0457	1538210	490000	300.0	5.0	7/2/2008	124.88	6446.12	---	6571.00	---	---	M	-	Middle
CE9	1538203	489458	130.0	6.0	11/11/2020	39.86	6523.26	1.2	6563.12	---	---	U	90-130	Upper
CW55	1538283	489471	360.0	6.0	11/11/2020	52.83	6511.33	2.3	6564.16	260	6302	M	-	Middle
Felice Acres														
0481	1536820	490210	320.0	4.0	6/27/2019	72.00	6496.00	2.0	6568.00	0	---	M	270-310	Middle
0482	1536981	489579	260.0	5.0	5/14/2014	46.60	6516.06	0.0	6562.66	80	6483	A	220-260	Alluvium
										210	6353	M	220-260	Middle
0483	1536586	489753	280.0	5.0	4/29/2019	41.45	6521.21	0.0	6562.66	40	6523	A	-	Alluvium
										65	6498	U	-	---
										236	6327	M	270-300	Middle
0484	1536448	490356	320.0	5.0	12/26/1996	39.43	6524.55	0.0	6563.98	38	6526	A	-	---
										129	6435	U	-	---
										280	6284	M	220-300	Middle
0485	1535800	489630	260.0	6.0	7/18/1996	70.90	6494.10	0.0	6565.00	35	6530	A	-	---
										70	6495	U	-	---
										223	6342	M	220-260	Middle
0486	1535800	489024	260.0	4.0	8/4/2004	90.40	6468.00	0.0	6558.40	---	---	M	200-260	Middle
										21	6537	A	-	---
										21	6537	U	-	---
0487	1536175	488950	260.0	---	7/24/1996	49.20	6511.80	0.0	6561.00	---	---	M	-	Middle
0488	1536500	488950	190.0	6.0	8/19/2003	113.80	6448.20	0.0	6562.00	---	---	M	-	Middle
0489	1536778	488961	---	---	---	---	---	0.0	6562.00	---	---	M	-	Middle

**TABLE 5.1-2. WELL DATA FOR THE CHINLE BROADVIEW AND FELICE ACRES WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)		CASING PERFORATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)							
0493	1536702	489492	300.0	5.0	11/11/2020	60.34	6499.94	0.9	6560.28	40	6519	A	-	---
										65	6494	U	-	---
										236	6323	M	270-300	Middle
0494	1536689	489494	85.0	5.0	11/11/2020	38.78	6521.36	0.6	6560.14	40	6520	A	-	---
										65	6495	U	65-85	Upper
0498	1534661	488953	150.0	6.0	4/9/2019	54.23	6506.36	2.0	6560.59	80	6479	M	130-150	Middle
										80	6479	A	70-110	Alluvium
CW44	1535048	488891	208.0	6.0	3/25/2019	55.51	6505.23	2.5	6560.74	94	6464	A	-	Alluvium
										130	6428	M	69-208	Middle
CW45	1535036	489494	193.0	5.0	11/11/2020	53.36	6507.95	0.6	6561.31	90	6471	A	-	---
										166	6395	M	163-193	Middle
CW46	1534642	489595	187.3	5.0	3/25/2019	56.31	6505.95	1.5	6562.26	88	6473	A	-	---
										112	6449	M	125-185	Middle
CW53	1536668	490262	157.0	5.0	11/11/2020	48.96	6515.98	3.0	6564.94	110	6452	U	117-157	Upper
CW58	1536230	489520	305.0	4.5	11/11/2020	61.72	6499.08	2.0	6560.80	45	6514	A	-	---
										45	6514	U	-	---
										226	6333	M	265-305	Middle
CW73	1535670	489450	100.0	4.5	11/11/2020	51.05	6512.40	2.0	6563.45	68	6493	A	-	---
										68	6493	U	80-100	Upper
CW78	1536319	490080	160.0	4.5	11/11/2020	48.82	6518.33	2.0	6567.15	46	6519	A	-	---
										61	6504	U	120-160	Upper
Q4	1534635	488880	160.0	4.5	12/1/2014	60.53	6499.79	2.0	6560.32	90	6468	M	100-160	Middle
Q42	1536662	489606	80.0	4.5	6/5/2019	40.98	6523.50	1.6	6564.48	61	6502	A	40-80	Alluvium
										61	6502	U	40-80	Upper
Q48	1535653	490120	105.0	4.5	11/25/2020	51.22	6516.62	2.0	6567.84	73	6493	U	65-105	Upper
										73	6493	A	65-105	Alluvium
Q50	1536680	490288	85.0	4.5	6/6/2019	44.97	6523.96	2.0	6568.93	43	6524	A	45-85	Alluvium
										61	6506	U	45-85	Upper
Y1	1535670	488850	260.0	4.5	11/11/2020	59.21	6502.23	2.0	6561.44	77	6482	A	-	---
										77	6482	U	-	---
										172	6387	M	220-260	Middle
Y2	1535678	489151	250.0	4.5	11/11/2020	59.80	6501.81	2.9	6561.61	64	6495	A	-	---
										66	6493	U	-	---
										198	6361	M	210-250	Middle
Y3	1535660	489440	280.0	4.5	11/11/2020	62.46	6500.92	2.0	6563.38	61	6500	U	-	---
										61	6500	A	-	---
										196	6365	M	260-280	Middle
										196	6365	M	220-240	Middle
Y4	1535558	489612	260.0	4.5	12/1/2014	82.68	6480.46	2.4	6563.14	64	6497	A	-	---
										64	6497	U	-	---
										194	6367	M	220-260	Middle

**TABLE 5.1-2. WELL DATA FOR THE CHINLE BROADVIEW AND FELICE ACRES WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)		AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)							
Y5	1535528	489302	260.0	4.5	12/1/2014	87.82	6474.92	3.6	6562.74	82	6477	A	-	---
										82	6477	U	-	---
										178	6381	M	220-260	Middle
Y6	1535518	489002	250.0	4.5	3/25/2019	57.68	6501.40	0.9	6559.08	100	6458	A	-	---
										178	6380	M	210-250	Middle
Y7	1535339	488870	220.0	4.5	8/19/2020	58.00	6502.43	2.5	6560.43	90	6468	A	-	---
										158	6400	M	180-220	Middle
Y8	1535349	489161	240.0	4.5	11/11/2020	59.49	6501.98	2.1	6561.47	101	6458	A	-	---
										185	6374	M	200-240	Middle
Y9	1535358	489503	235.0	4.5	12/1/2014	76.27	6486.45	2.6	6562.72	84	6476	A	-	---
										84	6476	U	-	---
										178	6382	M	195-235	Middle
Y10	1535258	489632	220.0	4.5	11/11/2020	65.04	6501.14	4.4	6566.18	72	6490	A	-	---
										72	6490	U	-	---
										183	6379	M	180-220	Middle
Y11	1535218	489352	220.0	4.5	12/19/2016	62.22	6499.83	1.7	6562.05	112	6448	A	-	---
										169	6391	M	180-220	Middle
Y12	1535208	489022	210.0	4.5	3/25/2019	60.24	6499.44	1.2	6559.68	95	6463	A	-	---
										156	6402	M	170-210	Middle
Y13	1535135	488830	212.0	4.5	11/11/2020	59.17	6501.67	2.0	6560.84	106	6453	A	-	---
										140	6419	M	172-212	Middle
Y14	1535057	489113	200.0	4.5	11/11/2020	52.53	6508.49	1.2	6561.02	90	6470	A	-	---
										139	6421	M	160-200	Middle
Y15	1535046	489312	190.0	4.5	12/1/2014	63.19	6499.17	2.3	6562.36	103	6457	A	-	---
										155	6405	M	150-190	Middle
Y16	1535068	489702	200.0	4.5	12/1/2014	66.16	6497.54	2.0	6563.70	89	6473	A	-	---
										158	6404	M	160-200	Middle
Y17	1534978	489782	210.0	4.5	11/11/2020	59.95	6504.68	2.4	6564.63	96	6466	A	-	---
										158	6404	M	170-210	Middle
Y22	1534912	488868	210.0	4.5	12/1/2014	89.49	6472.20	2.0	6561.69	112	6448	M	160-210	Middle
Y23	1534838	488942	160.0	4.5	8/27/2019	54.90	6506.40	2.7	6561.30	106	6453	A	-	---
										106	6453	M	120-160	Middle
Y24	1534859	489143	180.0	4.5	12/1/2014	61.68	6500.26	2.6	6561.94	97	6462	A	-	---
										119	6440	M	140-180	Middle
Y25	1534798	489442	180.0	4.5	11/11/2020	59.92	6502.75	1.8	6562.67	91	6470	A	-	---
										125	6436	M	140-180	Middle
Y26	1534858	489532	185.0	4.5	12/1/2014	62.39	6502.01	2.3	6564.40	111	6451	A	-	---
										122	6440	M	145-185	Middle
Y30	1534752	488865	180.0	4.5	11/11/2020	58.39	6501.66	2.0	6560.05	108	6450	M	140-180	Middle
Y33	1534639	489337	180.0	4.5	3/25/2019	57.06	6506.16	2.0	6563.22	100	6461	M	140-180	Middle

**TABLE 5.1-2. WELL DATA FOR THE CHINLE BROADVIEW AND FELICE ACRES WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
Y34	1534642	489091	180.0	4.5	3/25/2019	52.16	6508.76	2.0	6560.92	131	6428	M 140-180	Middle

NOTE: A = Alluvial Aquifer, Base  
 U = Upper Chinle Aquifer, Top  
 M = Middle Chinle Aquifer, Top  
 L = Lower Chinle Aquifer, Top  
 \* = Abandoned

**TABLE 5.1-3. WELL DATA FOR THE CHINLE MURRAY ACRES AND PLEASANT VALLEY WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
Murray													
0803	1540800	487430	---	6.0	9/19/1983	84.86	6476.14	0.0	6561.00	---	---	C 85-180	Chinle
										85	6476	A 85-180	Alluvium
0807	1540598	488610	287.0	6.0	---	---	---	0.0	6565.00	63	6502	A -	---
										275	6290	M 275-285	Middle
0808	1540141	487482	290.0	5.0	7/12/2019	67.70	6493.30	1.6	6561.00	85	6474	A -	---
										255	6304	M 260-290	Middle
0812	1539910	488505	300.0	6.0	---	---	---	0.6	6566.00	68	6497	A -	---
										268	6297	M 264-284	Middle
0813	1539300	488620	280.0	6.0	---	---	---	0.0	6565.00	63	6502	A -	---
										230	6335	M 235-255	Middle
0814	1539030	488590	280.0	6.0	---	---	---	0.0	6565.00	---	---	M -	Middle
0816	1539110	487705	255.0	6.0	---	---	---	0.0	6557.00	35	6522	A -	---
										240	6317	M 240-250	Middle
0817	1539190	487590	---	---	7/22/1995	70.34	6486.66	0.0	6557.00	---	---	M -	Middle
0818	1539085	487547	243.0	4.0	---	---	---	0.0	6557.00	62	6495	A -	---
										230	6327	M 223-243	Middle
0819	1539133	487026	222.0	6.0	---	---	---	0.0	6557.00	62	6495	A -	---
										210	6347	M 210-220	Middle
0820	1538970	486658	230.0	---	5/9/2002	99.20	6458.80	0.0	6558.00	---	---	M 125-230	Middle
0821	1538810	487320	260.0	7.0	11/30/2017	67.56	6492.44	0.0	6560.00	---	---	M -	Middle
0823	1540150	487720	265.0	6.0	---	---	---	0.0	6561.00	---	---	M 257-267	Middle
										40	6521	A -	---
ACW	1540235	488070	325.0	6.0	11/11/2020	64.85	6498.95	1.2	6563.80	40	6523	A -	---
										57	6506	U -	---
										264	6299	M 265-325	Middle
AW	1540235	488015	156.0	6.0	11/11/2020	38.40	6525.03	0.1	6563.43	63	6500	A -	Alluvium
										100	6463	U 66-155	Upper
HCW	1541060	487785	295.0	6.0	7/20/2000	75.61	6486.39	1.0	6562.00	82	6479	A -	---
										264	6297	M 264-295	Middle
WCW	1541045	488520	307.0	6.0	11/11/2020	46.20	6521.17	0.8	6567.37	83	6484	A -	---
										254	6313	M 257-307	Middle
Pleasant Valley													
0530	1540137	484259	490.0	5.0	10/30/1998	95.78	6463.41	1.5	6559.19	265	6293	L -	Lower
0832	1539263	485629	280.0	4.0	---	---	---	0.0	6557.00	85	6472	A -	---
										240	6317	L 238-278	Lower
0837	1540995	485950	200.0	5.0	9/7/1983	59.87	6507.13	0.0	6567.00	80	6487	A -	---
										160	6407	L 160-200	Lower
* 0842	1541650	483980	250.0	---	---	---	---	0.0	6558.00	---	---	L -	Lower

**TABLE 5.1-3. WELL DATA FOR THE CHINLE MURRAY ACRES AND PLEASANT VALLEY WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
0900	1540800	483700	172.1	---	7/24/1995	91.41	6468.59	1.5	6560.00	---	---	L -	Lower
NOTE: A = Alluvial Aquifer, Base U = Upper Chinle Aquifer, Top M = Middle Chinle Aquifer, Top L = Lower Chinle Aquifer, Top * = Abandoned													

**TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFORATIONS (FT-LSD)		AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)							
0536	1539560	479701	160.0	5.0	9/12/2000	144.70	---	-2.0	---	---	---	L	-	Lower
0536R	1539888	479654	264.0	4.0	4/16/2019	88.19	6466.81	2.0	6555.00	62	6491	A	-	---
										160	6393	L	-	Lower
0538	1533486	486899	170.0	6.0	3/4/2020	67.80	6481.14	2.0	6548.94	95	6452	A	50-90	Alluvium
										133	6414	L	130-170	Lower
0539	1534014	487596	210.0	6.0	11/20/2020	210.00	6345.32	2.0	6555.32	100	6453	A	80-100	---
										100	6453	A	50-70	Alluvium
										175	6378	L	170-210	Lower
0544	1535480	487573	80.0	4.0	---	---	---	---	6558.00	60	---	M	60-80	Middle
0546	1536330	487560	160.0	5.0	7/19/2010	72.50	6486.50	---	6559.00	80	---	M	130-160	Middle
0546R	1536330	487560	160.0	5.0	11/29/2018	63.05	---	---	---	---	---	U	-	Upper
0547	1529133	483106	127.0	---	---	---	---	---	---	---	---	L	-	Lower
0548	1521230	482903	220.0	---	---	---	---	---	---	---	---	L	-	Lower
0549	1528942	483572	313.0	---	---	---	---	---	---	---	---	L	-	Lower
0580	1537708	492260	235.0	4.5	---	---	---	---	6579.00	---	---	U	-	Upper
0653	1533283	486570	206.0	6.0	11/20/2020	65.93	6479.04	1.6	6544.97	97	6446	A	69-206	Alluvium
										135	6408	L	-	Lower
0850	1534652	486044	54.0	5.0	11/11/2020	54.60	6494.55	3.2	6549.15	37	6509	M	29-54	Middle
										37	6509	A	-	---
0853	1532124	484824	95.0	5.0	11/11/2020	66.00	6475.38	1.7	6541.38	60	6480	A	-	---
										60	6480	L	55-95	Lower
0859	1534549	487426	83.0	5.0	11/11/2020	58.00	6494.76	2.7	6552.76	52	6498	M	50-83	Middle
0901	1531531	492846	270.0	5.0	11/4/1981	46.88	6552.12	0.0	6599.00	40	6559	A	-	---
										190	6409	L	240-260	Lower
0902	1533700	488800	150.0	6.0	1/28/1995	52.10	6507.90	0.0	6560.00	72	6488	M	78-102	Middle
										72	6488	A	-	---
0903	1530250	486900	281.0	5.0	---	---	---	0.0	6559.00	220	6339	L	120-260	Lower
0904	1531100	487150	200.0	4.0	---	---	---	0.0	6560.00	---	---	L	170-200	Lower
0908	1534430	483325	282.8	5.0	11/11/2020	123.98	6420.39	1.5	6544.37	107	6436	A	-	---
										232	6311	L	-	Lower
0909	1531900	483400	140.0	4.0	5/12/2015	84.49	6454.41	0.0	6538.90	112	6427	A	80-135	Alluvium
										112	6427	L	80-135	Lower
0927	1548300	491700	---	---	11/11/2020	99.10	6495.90	1.0	6595.00	---	---	M	-	Middle
										---	---	C	-	Chinle
0929	1544970	495662	320.0	5.0	11/11/2020	74.10	6518.47	2.0	6592.57	---	---	U	290-320	Upper
0932	1540436	495407	501.0	6.0	4/19/2001	86.73	6515.38	0.0	6602.11	354	6248	U	-	---
										492	6110	M	450-490	Middle
0933	1540087	495231	---	5.0	12/14/2009	78.28	6522.23	0.5	6600.51	---	---	U	-	Upper

**TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
0937	1542180	471478	182.0	5.0	---	---	---	0.0	6578.00	70	6508	A -	---
										160	6418	L 95-182	Lower
0944	1539280	493091	300.0	5.0	10/28/2019	66.20	6522.41	1.6	6588.61	64	6523	A -	---
										252	6335	U 220-280	Upper
0945	1537986	493900	300.0	---	3/21/1985	92.41	6498.08	0.0	6590.49	---	---	U -	Upper
0946	1537804	491754	260.0	5.0	10/17/1996	37.45	6541.59	0.0	6579.04	220	6359	U 230-260	Upper
0948	1535280	490377	255.0	5.0	---	---	---	0.0	6568.10	200	6368	M 200-255	Middle
0954	1534187	483910	307.0	5.0	12/27/1994	77.22	6467.78	0.0	6545.00	225	6320	L 285-307	Lower
0960	1534730	490110	305.0	6.0	4/5/1995	67.46	6497.54	0.0	6565.00	280	6285	M 285-305	Middle
0961	1534190	489720	240.0	5.0	4/5/1995	67.40	6497.60	6.9	6565.00	200	6358	M 200-240	Middle
0962	1533883	489530	238.0	6.0	---	---	---	0.0	6560.00	225	6335	M 220-238	Middle
0963	1532555	488792	---	4.0	---	---	---	0.0	6557.00	---	---	L -	Lower
0964	1531817	488371	200.0	6.0	---	---	---	0.0	6560.00	170	6390	L 170-200	Lower
0965	1531550	489100	200.0	4.0	8/21/2003	3.00	6572.00	0.0	6575.00	---	---	L 130-200	Lower
0966	1531300	489000	---	---	---	---	---	0.0	6575.00	---	---	L -	Lower
0967	1530500	487600	---	---	---	---	---	0.0	6570.00	---	---	L -	Lower
0968	1529700	488400	---	---	---	---	---	0.0	6630.00	---	---	L -	Lower
0969	1529400	488450	---	---	---	---	---	0.0	6640.00	---	---	L -	Lower
0970	1529100	488500	---	5.0	---	---	---	0.0	6660.00	---	---	L -	Lower
0988	1538116	482413	155.0	5.0	7/18/1996	59.86	6589.14	1.3	6649.00	18	6630	A -	---
										152	6496	L 152-155	Lower
0990	15377630	482750	---	---	---	---	---	0.5	6550.00	---	---	L -	Lower
CW15	1536259	485961	134.6	5.0	11/11/2020	52.30	6499.02	2.6	6551.32	50	6499	A -	---
										91	6458	M 73-133	Middle
										311	6238	L -	---
CW16	1534747	488507	---	5.0	12/26/1996	68.02	6490.52	0.0	6558.54	82	6477	A -	---
										82	6477	M 112-152	Middle
CW18	1535924	491378	230.7	5.0	11/11/2020	55.27	6517.38	1.5	6572.65	90	6481	A -	---
										190	6381	U 177-232	Upper
										340	6231	M -	---
CW26	1534116	489593	300.0	5.0	12/11/2013	91.10	6470.33	0.5	6561.43	50	6511	A -	---
										50	6511	M -	---
										231	6330	L 245-285	Lower
CW27	1534109	489600	110.0	5.0	12/11/2013	60.18	6502.70	1.9	6562.88	50	6511	A -	---
										50	6511	M 80-110	Middle
CW28	1535112	491008	370.0	5.0	11/11/2020	70.27	6501.41	1.9	6571.68	90	6480	A -	---
										110	6460	U -	---
										294	6276	M 280-360	Middle
CW29	1534551	487435	290.0	5.0	11/11/2020	77.90	6474.32	1.7	6552.22	52	6499	A -	---



**TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
CW29	1534551	487435	290.0	5.0	11/11/2020	77.90	6474.32	1.7	6552.22	52	6499 M	-	---
										228	6323 L	230-270	Lower
CW30	1536642	488704	251.5	5.0	3/25/2019	65.22	6493.09	2.0	6558.31	35	6521 A	-	---
										220	6336 M	219-249	Middle
CW31	1540689	482738	311.0	6.0	11/11/2020	86.50	6473.76	2.0	6560.26	111	6447 A	-	---
										254	6304 L	231-271	---
										254	6304 L	136-156	Lower
										254	6304 L	291-311	---
CW32	1543413	483523	300.0	6.0	11/11/2020	147.40	6419.88	1.7	6567.28	77	6489 A	-	---
										157	6409 L	158-188	Lower
										157	6409 L	218-303	---
CW36	1540053	481329	180.0	5.0	11/11/2020	42.60	6508.49	2.8	6551.09	96	6452 A	-	---
										152	6396 L	155-177	Lower
CW37	1537240	484853	150.1	5.0	11/11/2020	62.85	6488.32	1.3	6551.17	55	6495 A	-	---
										100	6450 L	100-150	Lower
CW38	1540103	483429	174.8	5.0	11/14/1997	55.18	6500.42	2.1	6555.60	108	6446 A	-	---
										130	6424 L	133-173	Lower
CW39	1537260	483754	126.3	5.0	10/22/2012	28.56	6522.15	3.4	6550.71	40	6507 A	-	---
										87	6460 L	90-123	Lower
CW40	1537624	491819	264.0	5.0	11/11/2020	61.60	6517.34	2.6	6578.94	75	6501 A	-	---
										220	6356 U	224-264	Upper
CW41	1533174	488584	206.0	6.0	11/11/2020	78.60	6476.81	1.5	6555.41	59	6495 A	-	---
										138	6416 L	146-206	Lower
CW42	1533169	487177	205.0	6.0	11/11/2020	69.60	6479.18	0.0	6548.78	98	6451 A	-	---
										124	6425 L	125-205	Lower
CW43	1537587	482493	104.1	5.0	11/11/2020	67.90	6480.89	2.0	6548.79	57	6490 A	-	---
										57	6490 L	81-101	Lower
CW54	1536645	488675	103.1	5.0	11/11/2020	33.70	6524.85	2.2	6558.55	70	6486 C	60-100	Chinle
CW74	1535188	487376	130.0	4.5	11/11/2020	55.00	6498.41	3.1	6553.41	40	6510 A	-	---
										100	6450 M	90-130	Middle
CW75	1536012	487376	190.0	4.5	11/11/2020	55.40	6498.18	1.8	6553.58	59	6493 A	-	---
										136	6416 M	150-190	Middle
CW76	1536661	487861	270.0	4.5	11/11/2020	56.20	6500.41	2.4	6556.61	40	6514 A	-	---
										210	6344 M	230-270	Middle
CW77	1536659	488282	280.0	4.5	3/25/2019	57.22	6502.09	2.3	6559.31	53	6504 A	-	---
										210	6347 M	240-280	Middle
R1	1534551	487790	120.0	5.0	11/20/2020	50.78	6504.34	2.0	6555.12	84	6469 A	80-120	Alluvium
										84	6469 M	80-120	Middle
R2	1534548	487968	115.0	5.0	10/28/2020	67.39	6486.77	2.0	6554.16	83	6469 A	75-115	Alluvium
										83	6469 M	75-115	Middle

**TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)		CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)							
R3	1534546	488196	140.0	5.0	10/28/2020	62.64	6493.09	2.0	6555.73	88	6466	M	100-140	Middle
										88	6466	A	60-80	Alluvium
R4	1534541	488446	130.0	5.0	10/28/2020	54.04	6504.74	2.0	6558.78	84	6473	M	90-130	Middle
										84	6473	A	90-130	Alluvium
R5	1534560	488666	125.0	5.0	10/29/2020	54.43	6503.32	2.0	6557.75	71	6485	A	65-125	Alluvium
										71	6485	M	65-125	Middle
R6	1534356	488448	130.0	5.0	3/25/2019	38.42	6521.22	2.0	6559.64	68	6490	M	110-130	Middle
										68	6490	A	50-90	Alluvium
R7	1534399	488087	145.0	5.0	3/25/2019	31.52	6523.29	2.0	6554.81	74	6479	M	125-145	Middle
										74	6479	A	65-105	Alluvium
R11	1534320	488280	120.0	4.5	12/17/2019	62.11	6496.34	2.0	6558.45	70	6486	A	60-120	Alluvium
										70	6486	M	60-120	Middle
R12	1534220	488360	120.0	4.5	3/25/2019	36.82	6520.13	2.0	6556.95	66	6489	A	60-120	Alluvium
										66	6489	M	60-120	Middle
R36	1533594	486157	200.0	4.5	8/3/2016	69.05	6476.41	2.0	6545.46	92	6451	A	-	---
										146	6397	L	160-200	Lower
R37	1533586	486481	200.0	4.5	8/10/2016	68.66	6478.18	2.0	6546.84	92	6453	A	-	---
										143	6402	L	160-200	Lower
R44	1533478	486593	200.0	4.5	8/10/2016	68.99	6478.60	2.0	6547.59	100	6446	A	-	---
										130	6416	L	160-200	Lower
R45	1533481	486334	200.0	4.5	8/3/2016	68.62	6477.81	2.0	6546.43	80	6464	A	-	---
										130	6414	L	160-200	Lower
R46	1533478	486088	200.0	4.5	8/2/2016	68.44	6477.80	2.0	6546.24	---	---	L	160-200	Lower
										90	6454	A	-	---
R47	1533470	485780	160.0	4.5	12/20/2013	75.59	6471.58	2.0	6547.17	103	6442	L	100-160	Lower
										103	6442	A	100-160	Alluvium
R48	1533345	485775	160.0	4.5	---	---	---	2.0	6545.24	100	6443	A	100-160	Alluvium
										100	6443	L	100-160	Lower
R49	1533407	485953	200.0	4.5	11/20/2020	71.33	6474.66	2.0	6545.99	109	6435	L	160-200	Lower
										109	6435	A	-	---
R50	1533362	486216	200.0	4.5	4/3/2017	66.41	6479.21	2.0	6545.62	100	6444	A	-	---
										120	6424	L	160-200	Lower
R51	1533284	486570	200.0	4.5	8/3/2016	68.09	6478.41	2.0	6546.50	120	6425	A	-	---
										140	6405	L	160-200	Lower
R52	1533377	486751	200.0	4.5	5/15/2015	69.74	6477.95	2.5	6547.69	94	6451	A	-	---
										136	6409	L	160-200	Lower
R56	1533244	486354	180.0	4.5	8/8/2016	67.00	6478.38	2.0	6545.38	---	---	L	140-180	Lower
R57	1533260	485880	135.0	4.5	12/20/2013	74.67	6472.40	2.0	6547.07	99	6446	L	75-135	Lower
										99	6446	A	75-135	Alluvium
R58	1533170	485710	160.0	4.5	4/8/2014	70.98	6473.47	2.0	6544.45	98	6444	A	100-160	Alluvium

**TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
R58	1533170	485710	160.0	4.5	4/8/2014	70.98	6473.47	2.0	6544.45	98	6444	L 100-160	Lower
R59	1533125	485963	150.0	4.5	8/2/2016	66.61	6478.40	2.0	6545.01	107	6436	L 110-150	Lower
										107	6436	A 110-150	Alluvium
R60	1533149	486216	180.0	4.5	8/2/2016	67.17	6478.13	2.0	6545.30	105	6438	A -	---
										105	6438	L 140-180	Lower
R61	1533157	486484	180.0	4.5	8/8/2016	67.01	6478.78	2.0	6545.79	70	6474	A -	---
										150	6394	L 140-180	Lower
R62	1533186	486744	180.0	4.5	8/8/2016	67.13	6479.57	2.0	6546.70	100	6445	A -	---
										180	6365	L 140-180	Lower
R65	1533068	486614	180.0	4.5	5/15/2015	69.24	6476.86	2.3	6546.10	96	6448	A -	---
										122	6422	L 140-180	Lower
R66	1533048	486354	180.0	4.5	5/15/2015	69.33	6476.18	2.0	6545.51	120	6424	A -	---
										120	6424	L 140-180	Lower
R67	1533041	486129	180.0	4.5	11/20/2020	69.74	6475.79	2.0	6545.53	105	6439	L 140-180	Lower
										105	6439	A -	---
R67B	1533000	486086	145.0	4.5	---	---	---	2.0	6544.87	100	6443	L 105-145	Lower
R68	1533025	485819	160.0	4.5	10/10/2014	69.44	6475.41	2.0	6544.85	99	6444	A 100-160	Alluvium
										99	6444	L 100-160	Lower
R69	1532987	486024	160.0	4.5	4/8/2014	70.53	6474.82	2.0	6545.35	96	6447	L 100-160	Lower
										96	6447	A 100-160	Alluvium
R70	1532909	486258	180.0	4.5	5/15/2015	68.01	6477.20	2.1	6545.21	---	---	L 140-180	Lower
										80	6463	A -	---
R71	1532972	486481	180.0	4.5	5/15/2015	68.36	6477.39	2.4	6545.75	---	---	L 140-180	Lower
										100	6443	A -	---
R72	1532997	486762	180.0	4.5	8/8/2016	66.02	6480.90	2.0	6546.92	100	6445	A -	---
										120	6425	L 140-180	Lower
R73	1533019	485560	150.0	4.5	5/13/2015	69.92	6474.42	2.3	6544.34	99	6443	A 110-150	Alluvium
										99	6443	L 110-150	Lower
R74	1532852	485502	140.0	4.5	11/20/2020	71.33	6472.70	2.4	6544.03	104	6438	L 100-140	Lower
										104	6438	A 100-140	Alluvium
R75	1532922	485716	140.0	4.5	5/13/2015	69.14	6475.74	2.3	6544.88	98	6445	L 100-140	Lower
										98	6445	A 100-140	Alluvium
R76	1532888	485891	140.0	4.5	5/13/2015	68.37	6476.72	2.3	6545.09	106	6437	L 100-140	Lower
										106	6437	A 100-140	Alluvium
R77	1532683	485800	140.0	4.5	5/13/2015	68.28	6476.69	2.4	6544.97	80	6463	A 100-140	Alluvium
										80	6463	L 100-140	Lower
R78	1532683	485612	140.0	4.5	5/13/2015	69.16	6474.87	2.0	6544.03	85	6457	A 100-140	Alluvium
										85	6457	L 100-140	Lower
R79	1532703	485379	120.0	4.5	---	---	---	2.0	6542.94	80	6461	L 80-120	Lower
										80	6461	A 80-120	Alluvium

**TABLE 5.1-4. WELL DATA FOR THE CHINLE REGIONAL WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO AQUIFER (FT-LSD)	ELEV. OF AQUIFER (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	AQUIFER
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
R80	1533169	485471	120.0	4.5	---	---	---	2.0	6543.72	---	---	A 80-120	Alluvium
										---	---	L 80-120	Lower
V1	1534527	486940	270.0	4.5	11/11/2020	77.20	6474.91	2.0	6552.11	220	6330	L 230-270	Lower
V2	1534339	486618	270.0	4.5	11/11/2020	75.30	6474.79	2.0	6550.09	102	6446	A -	---
										206	6342	L 230-270	Lower
V3	1534192	486207	260.0	4.5	8/22/2017	74.60	6475.55	2.2	6550.15	240	6308	L 220-260	Lower
V4	1533890	485961	240.0	4.5	8/22/2017	70.00	6475.43	2.1	6545.43	200	6343	L 200-240	Lower
V6	1534156	485710	260.0	4.5	11/11/2020	75.00	6472.43	2.4	6547.43	108	6437	A -	---
										182	6363	L 220-260	Lower
V7	1534208	487436	270.0	4.5	11/11/2020	79.15	6476.08	2.0	6555.23	---	---	L 230-270	Lower
										80	6473	A -	---
V8	1534183	486945	260.0	4.5	11/11/2020	74.30	6477.19	2.0	6551.49	100	6449	A -	---
										211	6338	L 220-260	Lower
V9	1534298	488140	280.0	4.5	11/11/2020	79.10	6476.59	2.0	6555.69	79	6475	A -	---
										231	6323	L 240-280	Lower
V11	1533919	487868	270.0	4.5	11/11/2020	78.90	6477.00	2.0	6555.90	98	6456	A -	---
										210	6344	L 230-270	Lower
V14	1533638	488229	240.0	4.5	11/11/2020	79.90	6475.79	2.0	6555.69	---	---	L 200-240	Lower
										80	6474	A -	---
V16	1533402	487709	220.0	4.5	11/11/2020	74.90	6477.08	2.0	6551.98	90	6460	A -	---
										173	6377	L 180-220	Lower
V17	1533896	486461	240.0	4.5	11/11/2020	75.20	6474.95	2.0	6550.15	93	6455	A -	---
										166	6382	L 200-240	Lower
V18	1533819	487241	240.0	4.5	11/11/2020	75.45	6475.93	2.0	6551.38	95	6454	A -	---
										195	6354	L 200-240	Lower

NOTE: A = Alluvial Aquifer, Base  
U = Upper Chinle Aquifer, Top  
M = Middle Chinle Aquifer, Top  
L = Lower Chinle Aquifer, Top  
\* = Abandoned

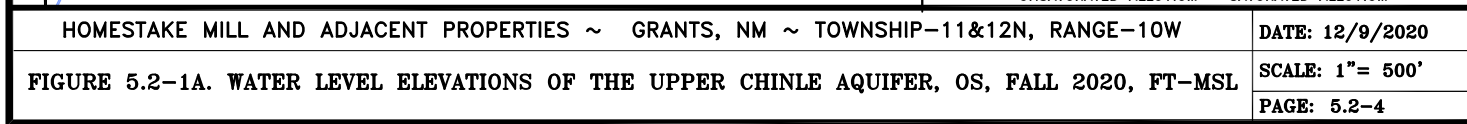
## 5.2 UPPER CHINLE WATER LEVELS

Measured water levels in Homestake's Upper, Middle and Lower Chinle aquifer wells are presented in [Appendix A](#). Table A.2-1 of Appendix A includes water levels for Homestake, subdivision, and regional Chinle wells. [Figures 5.2-1 and 5.2-1A](#) presents water-level elevation contours of the Upper Chinle aquifer during the fall of 2020. The blue arrows on [Figure 5.2-1](#) show the direction of ground-water flow, which is greatly influenced by the treated and/or fresh-water injection into the Upper Chinle at wells 944, C18, C19, C20, C21, CW5 and CW13, and by collection from wells B16, B31, B32, CE2, CE5, CE6, CE11, CE12, CE15 and CE19. Well CW13, an injection well on the east side of the East Fault, is in the high permeability zone of the Upper Chinle aquifer that parallels the East Fault. This high permeability zone extends to a distance of at least 1000 feet parallel and adjacent to the East Fault near well CW18. Injection of fresh water has created a piezometric-surface mound along the east side of the East Fault. The permeability is much smaller at greater distances to the east of the East Fault and, therefore, an easterly gradient occurs in the Upper Chinle away from the East Fault near injection well CW13. The CW13 injection affects water levels on the west side of the East Fault in the area of Upper Chinle wells CW53 and CW78 in Felice Acres. Water level changes in well CW53 occur quickly in response to changes in levels in well CW13 showing that a good connection exists in the Upper Chinle where the East Fault pinches out south of well CW53.

Injection of treated and/or fresh water into Upper Chinle well CW5 is causing ground water flow to the north and south of this area. The flow that moves to the south discharges to the alluvial aquifer in the subcrop area of the Upper Chinle, and the flow that moves to the north converges toward collection wells CE2, CE5, CE6, CE11, CE12, CE15 or CE19. Injection into Upper Chinle well CW25 was started in 2000, and continued through 2019. The naturally occurring flow direction in the Upper Chinle aquifer west of the East Fault is from the north. Well CW3 has not been pumped since January 2007 and therefore does not intercept any of the flow from the north. The recent water-level elevations for wells CF4 and CF6 (see [Figure 5.2-1A](#)) are believed to be influenced by leakage resulting from comprised casing and are not representative of the Upper Chinle aquifer. Wells CF4 and CF6 are not used in the contouring of water-level elevation.

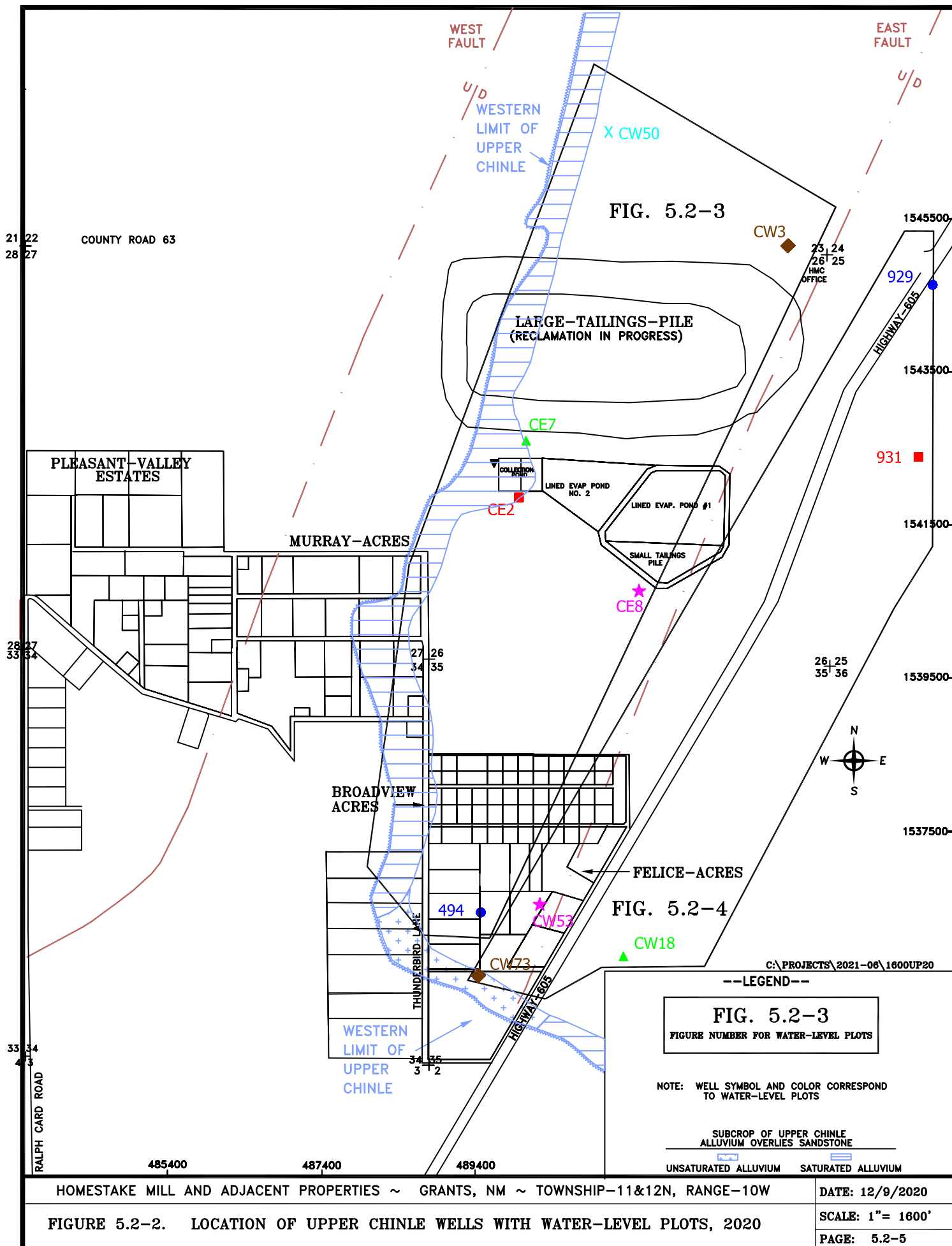
[Figure 5.2-2](#) shows the location of the Upper Chinle wells that are used to monitor water-level changes with time. [Figure 5.2-3](#) presents water-level elevations for Upper Chinle wells 494, CE2, CE7, CE8, CW3 and CW50. The abrupt water-level elevation changes in well CE2 reflect its usage as a collection well with lower water-level elevations indicating an operating pumping level. [Figure 5.2-4](#) presents the water-level elevation changes for the Upper Chinle wells east of the East Fault. The variation in water levels in wells 929, 931, CW18 and CW53 were due to variations in injection rates into well CW13 during 2019 with relatively steady levels in 2020. Water levels from wells CW53 and CW73 were included on [Figure 5.2-4](#) because the water level response in well CW53 is similar to that of the wells east of the East Fault. The water level in well CW73 in the subcrop area in southern Felice Acres has been steady in 2020 and does not seem to be affected by variations in the CW13 injection.

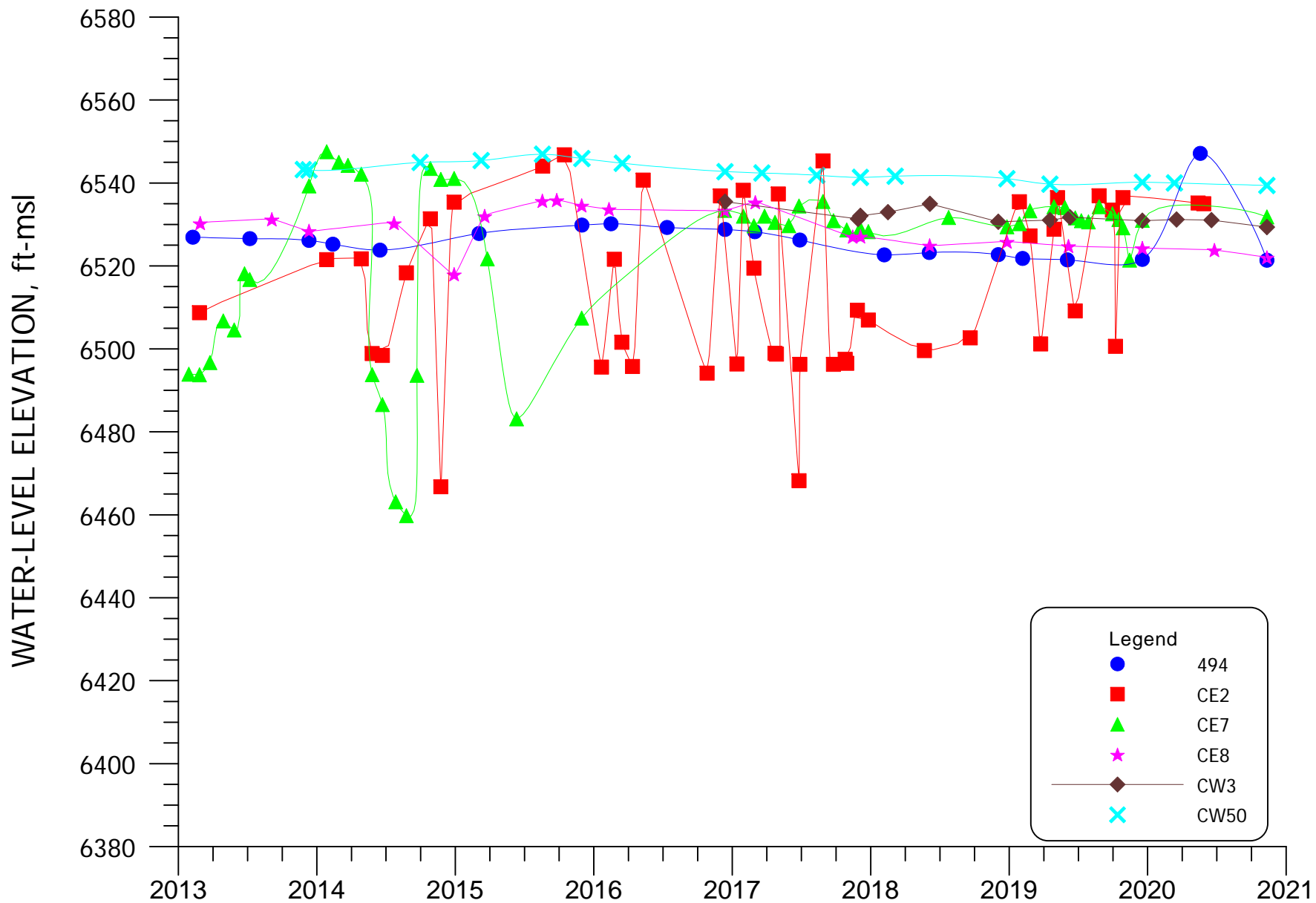




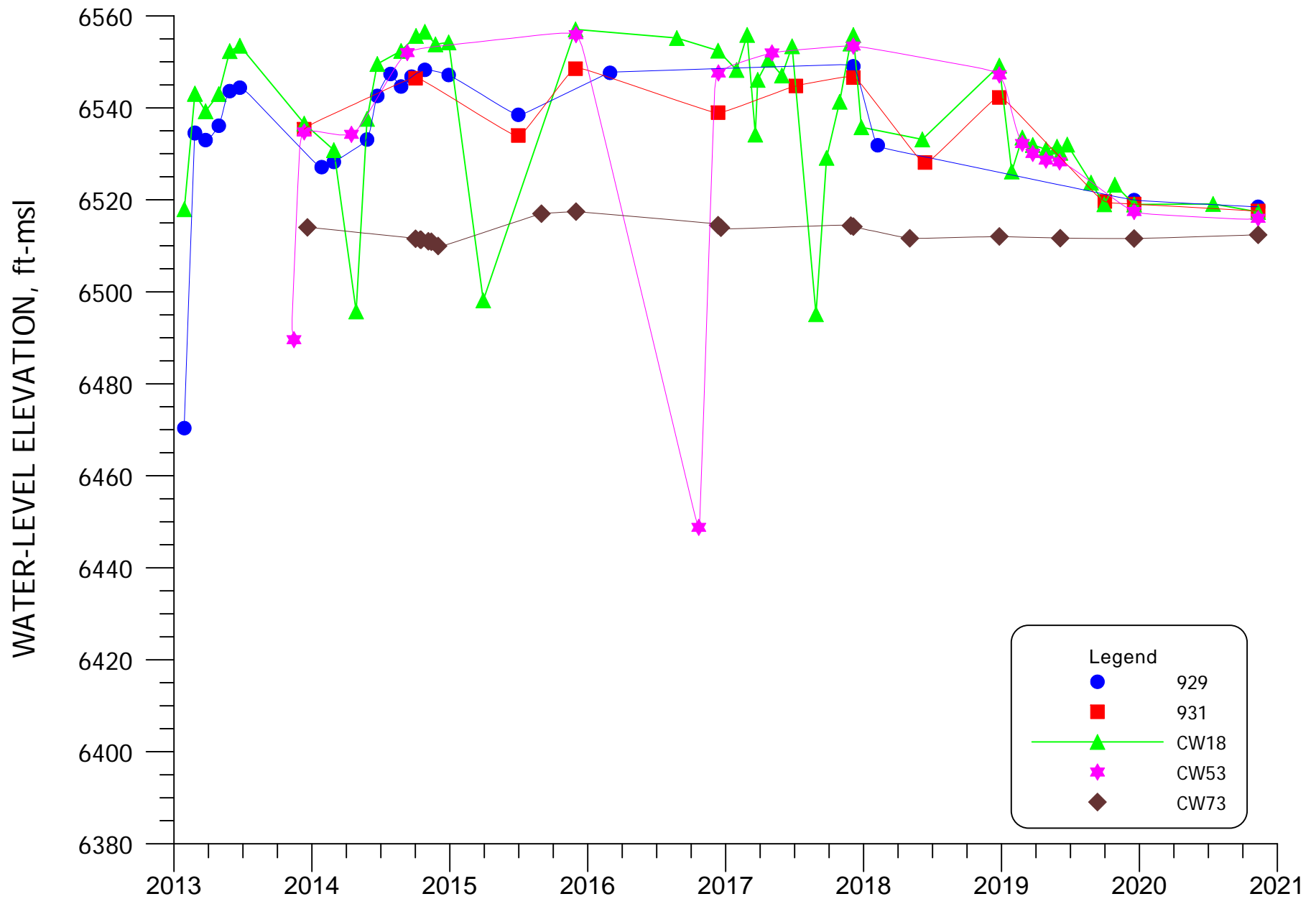
**PAGE: 5.2-4**







**FIGURE 5.2-3. WATER-LEVEL ELEVATION FOR WELLS 494, CE2, CE7, CE8, CW3 AND CW50**



**FIGURE 5.2-4. WATER-LEVEL ELEVATION FOR WELLS 929, 931, CW 18, CW53 AND CW73.**

### 5.3 UPPER CHINLE WATER QUALITY

The Upper Chinle aquifer site standards are initially defined in this subsection because they are useful in evaluating progress in Upper Chinle groundwater restoration and indicate where additional restoration is needed in this aquifer. Water-quality data for 2020 for the Chinle aquifers is presented in [Tables B.5-1](#) and [B.5-2](#) of [Appendix B](#). The basic well data is presented in [Tables 5.1-1](#) through [5.1-4](#), and [Figures 5.1-2](#) and [5.1-2A](#) show locations of the Upper Chinle wells.

An analysis of the background water quality for the Chinle aquifers was presented in Hydro-Engineering (2003b). Background values for the Chinle mixing zone and the Upper, Middle and Lower Chinle non-mixing zones were also defined in the previously cited report. These site standard values are listed in the legend block of the water-quality figures in this report. The Upper Chinle wells used in establishing the Chinle site standards are shown on [Figure 5.3-1](#) with a blue box around the well name indicating which Upper Chinle wells were used to define the non-mixing zone site standard. The yellow pattern on this figure shows the mixing zone for the Upper Chinle aquifer. The Upper Chinle wells used in conjunction with the Middle and Lower Chinle wells (see [Figures 6.3-1](#) and [7.3-1](#) for the Middle and Lower Chinle wells used, respectively) in establishing the mixing zone site standards are shown with a red box around their well names. [Table 5.3-1](#) presents Chinle mixing zone site standards and the non-mixing zone Upper Chinle site standards. This table also presents the 2020 data for the Chinle mixing zone wells and the Upper Chinle non-mixing zone wells.

Concentrations of key constituents exceed site standards for the Upper Chinle aquifer in only a few locations. Sulfate concentrations have been adequately restored in the Upper Chinle aquifer except for an area near the Large Tailings Pile (LTP). Selenium concentrations during 2020 are less than the site standard in all Upper Chinle wells except for wells near the southern portion of the LTP. Uranium concentrations exceed the site standard in wells near the LTP, in one well north of Broadview Acres and in two wells in Felice Acres. Molybdenum concentrations in the Upper Chinle aquifer exceed the site standard in wells in close proximity to the tailings piles and in the area of well CE15.

### 5.3.1 SULFATE - UPPER CHINLE

Figures 5.3-1A and 5.3-1B present sulfate concentrations in the Upper Chinle aquifer during 2020. Figure 5.3-1B has been added for the presentation of the new wells in the LTP area due to the density of these wells. Therefore Figure 5.3-1B should be used for viewing of the concentrations in the area inside the red box shown on Figure 5.3-1A. Only wells near the LTP area exceeded the site standard for the mixing zone of 1750 mg/L (see Figure 5.3-1 for the mixing zone area). The non-mixing zone site standard of 914 mg/L in the Upper Chinle in 2020 is also exceeded in the eastern portion of the LTP. Upper Chinle site standards based on background data are presented for sulfate in the legend of Figures 5.3-1A and 5.3-1B. These site standards have a greater than sign in front of the numeric value which is associated with the pattern for the particular zone. The references describing the analysis of background results used in developing the site standards are presented previously in this section of this report.

The locations of wells used in the time plots of water quality are presented on Figure 5.3-2. The color and symbol of the individual wells correspond with those used on the various water-quality time plots. Sulfate time-plot figure numbers are also shown on Figure 5.3-2 for each group. The same color and symbol scheme is used for other constituents discussed in this section for the Upper Chinle aquifer. Notations on Figure 5.3-2 indicate that mixing zone Upper Chinle wells 494, CE2, CE8, CE9, CE15 and CF4 are grouped together on the water-quality time plots, whereas the non-mixing zone wells CW3 and CW18 are presented on a second plot.

Figure 5.3-3 presents sulfate concentrations versus time for the mixing zone group of wells listed above. The sulfate concentrations in water sampled from each of these wells in 2020 are less than the mixing-zone site standard (see Figure 5.3-3) except the higher value in well CF4. Well CF4 is likely affected by leakage from the tailings and the 2020 water-quality results are not considered representative of the Upper Chinle aquifer. A plot of sulfate concentrations versus time for non-mixing zone Upper Chinle wells CW3 and CW18 is presented on Figure 5.3-4 (see Figure 5.3-2 for location of these wells). All of these plotted sulfate concentrations are below the non-mixing zone site standard and none of the concentration changes indicate a consistent trend.

### 5.3.2 TOTAL DISSOLVED SOLIDS - UPPER CHINLE

Figures 5.3-5 and 5.3-5A present contours of total dissolved solids (TDS) concentrations for the Upper Chinle aquifer during 2020. Like the second sulfate figure in the preceding section, Figure 5.3-5A is useful for viewing the TDS concentrations in the LTP area shown inside of the box on Figure 5.3-5. All concentrations are less than the mixing zone site standard except in areas of the Upper Chinle beneath and near the LTP. The non-mixing zone site standard is exceeded in the LTP area and east of State Highway 605 in Sections 25, 26, 35 and 36 where larger concentrations occur naturally. The TDS concentration naturally increases with increasing distance east of the East Fault due to the slower movement of ground water in this less transmissive portion of the aquifer. The blue dashed pattern on Figures 5.3-5 and 5.3-5A shows where the Upper Chinle TDS concentrations are greater than 2010 mg/L, which is the non-mixing zone site standard. TDS concentrations in this area east of Highway 605 are natural and not attributable to the activities at the Grants site. The TDS concentrations exceed the mixing zone standard of 3140 mg/L near the LTP and also exceed the non-mixing zone standard in the areas near wells CF1 and CF3.

Figure 5.3-6 presents TDS concentrations for mixing zone Upper Chinle wells 494, CE2, CE8, CE9, CE15 and CF4 and shows much higher concentrations in well CF4 during the last few years. A time plot of TDS concentrations for non-mixing zone wells CW3 and CW18 is presented in Figure 5.3-7. The TDS concentration from well CW18 is near the non-mixing zone standard in 2020 as it has been in the last few years.

### 5.3.3 CHLORIDE – UPPER CHINLE

Chloride concentrations in the Upper Chinle aquifer during 2020 are presented on Figures 5.3-8 and 5.3-8A. In the up-gradient Upper Chinle well CW50, chloride concentrations are less than 100 mg/L. Typical measured chloride concentrations are between 100 and 220 mg/L in the Upper Chinle aquifer, because this range encompasses natural variations and the range of chloride concentrations in the injection water. Concentrations near the subcrop located under the LTP and in an area extending to the northeast side of the Collection Ponds exceed 250 mg/L. The highest chloride concentrations exist in the area of the western portion of the LTP near the subcrop. Chloride concentrations east of the East Fault naturally increase due to the

slower movement of ground water with increasing distance east of the East Fault and are not attributable to the Grants site.

The chloride concentrations in water collected from mixing zone Upper Chinle wells 494, CE2, CE8, CE9, CE15 and CF4 are presented on [Figure 5.3-9](#) with all of the recent chloride concentrations below the site standard except for the value in well CF4. The chloride concentrations in the wells in the non-mixing zone are presented on [Figure 5.3-10](#) which shows that these concentrations are well below the non-mixing zone standard.

#### **5.3.4 URANIUM - UPPER CHINLE**

Uranium is an important constituent for identifying impacts to the Upper Chinle aquifer. [Figures 5.3-11](#) and [5.3-11A](#) presents contours of uranium concentrations in the Upper Chinle aquifer for 2020. Uranium concentrations in the Upper Chinle aquifer also exceed the corresponding mixing or non-mixing zone site standards in the LTP area extending down to the south of the Collection Ponds in 2020. One uranium value exceeds the mixing zone site standard of 0.18 mg/L north of Broadview Acres while two wells in Felice Acres likely also exceeds this site standard.

Plots of uranium concentrations versus time for Upper Chinle wells 494, CE2, CE8, CE9, CE15 and CF4 are presented on [Figure 5.3-12](#) (see [Figure 5.3-2](#) for location of these wells). The 2020 sample from well CF4 was affected by leakage from the tailings and also by sample preservation issues and is considered unrepresentative of the Upper Chinle aquifer. [Figure 5.3-13](#) shows uranium concentration plotted versus time for Upper Chinle wells CW3 and CW18 with an overall gradual decline in concentration in well CW3. This plot shows that uranium concentrations in the CW3 area are still above the site standard while the CW18 concentrations are below the standard.

#### **5.3.5 SELENIUM - UPPER CHINLE**

Contours of selenium concentrations for 2020 in the Upper Chinle aquifer are presented on [Figures 5.3-14](#) and [5.3-14A](#). These figures show that the selenium concentrations are less than the mixing-zone site standard of 0.14 mg/L with the exception of wells in and near the subcrop area near the LTP and extending south to the Collection Ponds. The non-mixing zone site standard of 0.06 mg/L is not exceeded in 2020.

[Figure 5.3-15](#) presents selenium concentrations for wells 494, CE2, CE8, CE9, CE15 and CF4. [Figure 5.3-16](#) presents the selenium concentrations for Upper Chinle wells CW3 and CW18 which are all below the non-mixing zone site standard in 2020.

### **5.3.6 MOLYBDENUM - UPPER CHINLE**

[Figures 5.3-17](#) and [5.3-17A](#) present the molybdenum concentrations in the Upper Chinle aquifer during 2020. Molybdenum concentrations near and beneath the LTP exceeded both the mixing and non-mixing zone site standards. Concentrations are greater than 1.0 mg/L in a region extending from the Upper Chinle-alluvium subcrop area, below the LTP, toward the east side of the LTP and to the south of Evaporation Pond 2 and the Collection Ponds. The site standard is exceeded in one well just north of Broadview Acres. All molybdenum concentrations from Broadview Acres to the south and east of the East Fault in the Upper Chinle aquifer are equal or below the site standards in 2020.

[Figure 5.3-18](#) presents molybdenum concentrations for Upper Chinle wells from the mixing zone. This plot shows that the 2020 molybdenum concentrations in wells CE2 and CE15 are above the site standard. [Figure 5.3-19](#) contains time plots of molybdenum concentrations for wells CW3 and CW18 and shows an overall decline in molybdenum concentrations in well CW3 since 2014.

### **5.3.7 NITRATE - UPPER CHINLE**

Nitrate concentrations for the Upper Chinle aquifer were measured in 2020 to confirm that concentrations are significantly below the site standard of 15 mg/L for the mixing zone. [Figures 5.3-20](#) and [5.3-20A](#) present the nitrate concentrations in the Upper Chinle aquifer during 2020. All measured nitrate concentrations in the Upper Chinle aquifer in 2020 are less than the site standard. Routine monitoring of nitrate concentrations in the Upper Chinle aquifer is only warranted near the LTP because concentrations in the alluvial aquifer are elevated only near the LTP.

Plots of nitrate concentration versus time were not prepared because historic values in Upper Chinle wells are similar to the low concentrations measured in 2020. In the future, nitrate concentrations in the Upper Chinle aquifer are not expected to be significant because of the very



limited extent of elevated concentrations in the alluvial aquifer. Therefore, a nitrate site standard for the non-mixing zone for the Upper Chinle aquifer has not been set and is not considered necessary.

### **5.3.8 RADIUM-226 AND RADIUM-228 - UPPER CHINLE**

All radium concentrations in the Upper Chinle aquifer have been relatively low at the Grants site except the high values from well CF4. Past radium values have slightly exceeded 5 pCi/L in the Upper Chinle aquifer in the western portion of the LTP. [Figures 5.3-21](#) and [5.3-21A](#) present the radium-226 and the radium-228 values measured in 2020. The measured 2020 values in the Upper Chinle wells are all small and the 2019 and 2020 values in well CW3 shows that a 2018 sample with elevated radium-226 concentration in this well was an outlier. The 2020 radium concentrations for Upper Chinle well CF4, which is located on top of the LTP, are much larger than historical values and are considered the result of leakage from the tailings in the well. Historical data has shown that radium-226 and radium-228 are not present at concentrations that are significant in the Upper Chinle aquifer outside the immediate area of the LTP at the HMC site. No concentration plots were prepared for radium because observed concentrations have been low. A radium site standard for the Upper Chinle aquifer has not been established.

### **5.3.9 VANADIUM - UPPER CHINLE**

Vanadium concentrations have always been low in the Upper Chinle aquifer except in the area of the LTP where they are slightly above the site standard. The occurrence of significant concentrations in the Upper Chinle aquifer is unlikely because this constituent is not present at elevated concentrations in the alluvial aquifer with the exception of the immediate tailings area. [Figure 5.3-22](#) shows that all of the 2020 measured vanadium concentrations are equal to or less than 0.01 mg/L except for a slightly higher value in well CW3. The 2019 value from background well CW50 indicates the 0.01 mg/L standard may be slightly too small. A site standard was set for vanadium in the Upper Chinle aquifer because of very slightly elevated concentrations in wells close to the LTP.

#### **5.3.10 THORIUM-230 - UPPER CHINLE**

Thorium-230 concentrations have never been significant in the Upper Chinle aquifer. The values measured in 2020 are presented in [Figure 5.3-23](#). This figure shows that all measured thorium-230 concentrations in 2020 were less than or equal to 0.3 pCi/L except for the large value in well CF4. As noted for other constituents, the most recent sample from well CF4 is likely affected by leakage of water from the tailings into the well, and therefore, the thorium-230 concentration in the sample is not considered representative of the Upper Chinle aquifer. Thorium-230 concentrations are small outside of the immediate LTP area. No plots of the thorium-230 concentration with time were developed due to the low concentrations and lack of any significant change over the period of record.

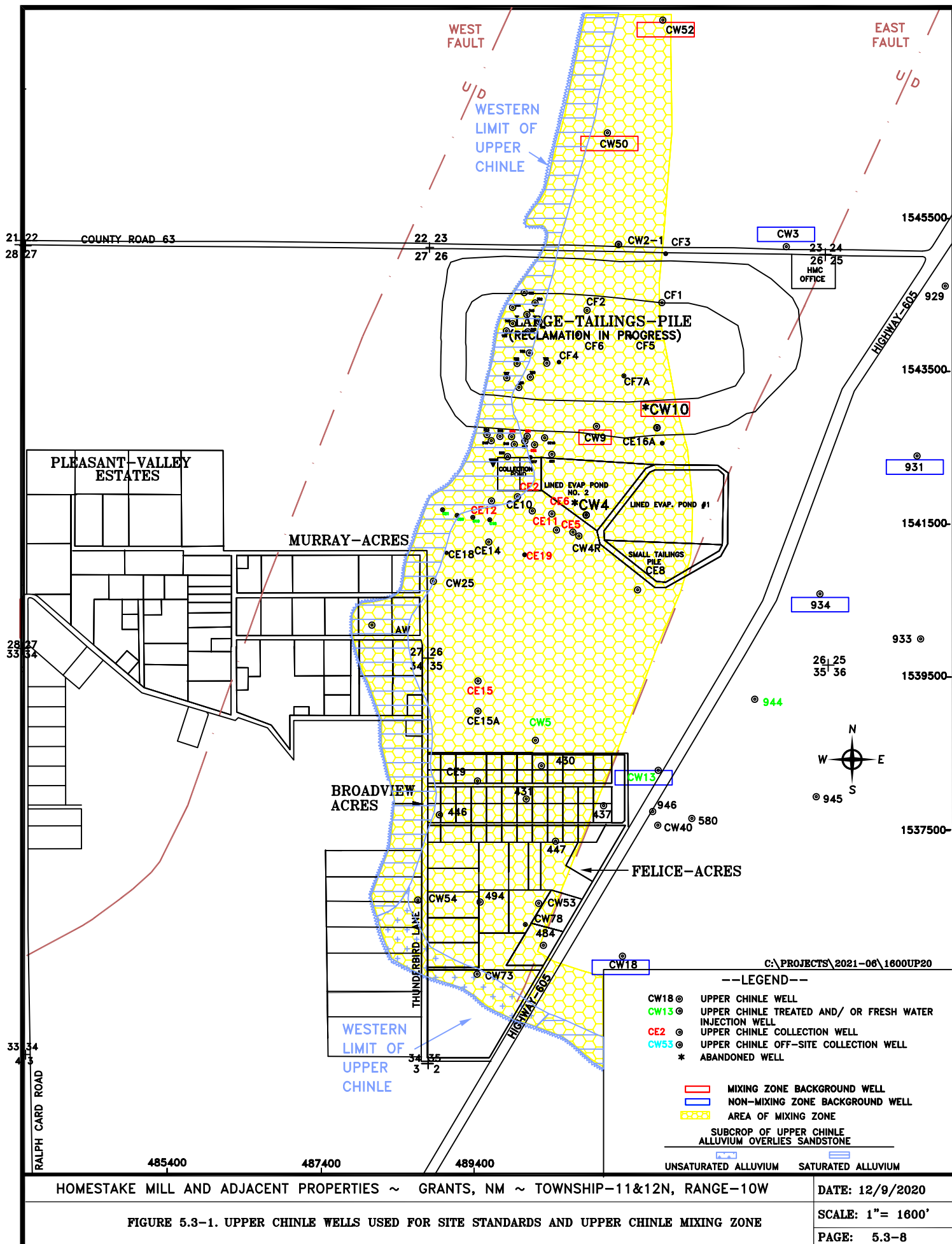
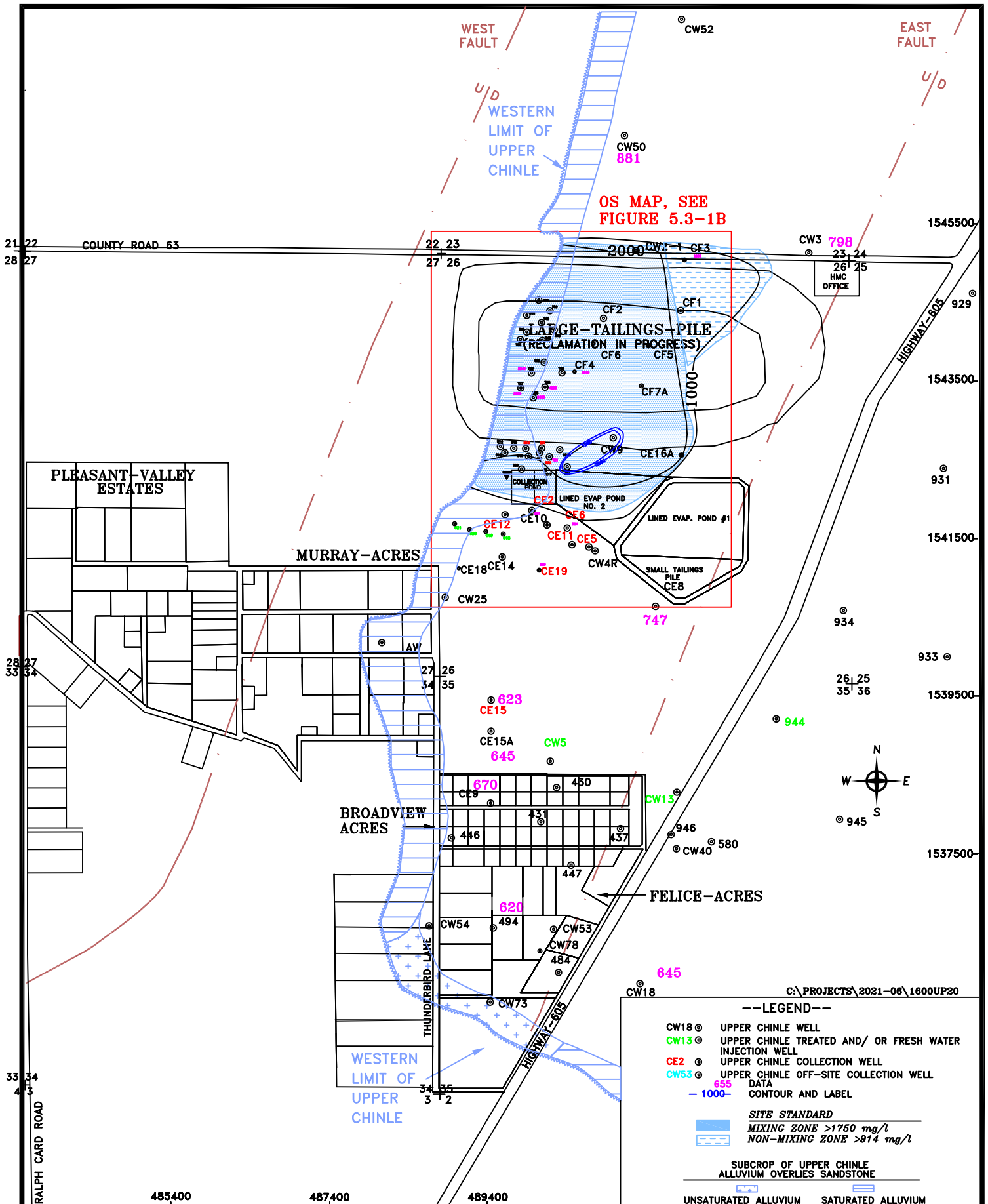


FIGURE 5.3-1. UPPER CHINLE WELLS USED FOR SITE STANDARDS AND UPPER CHINLE MIXING ZONE



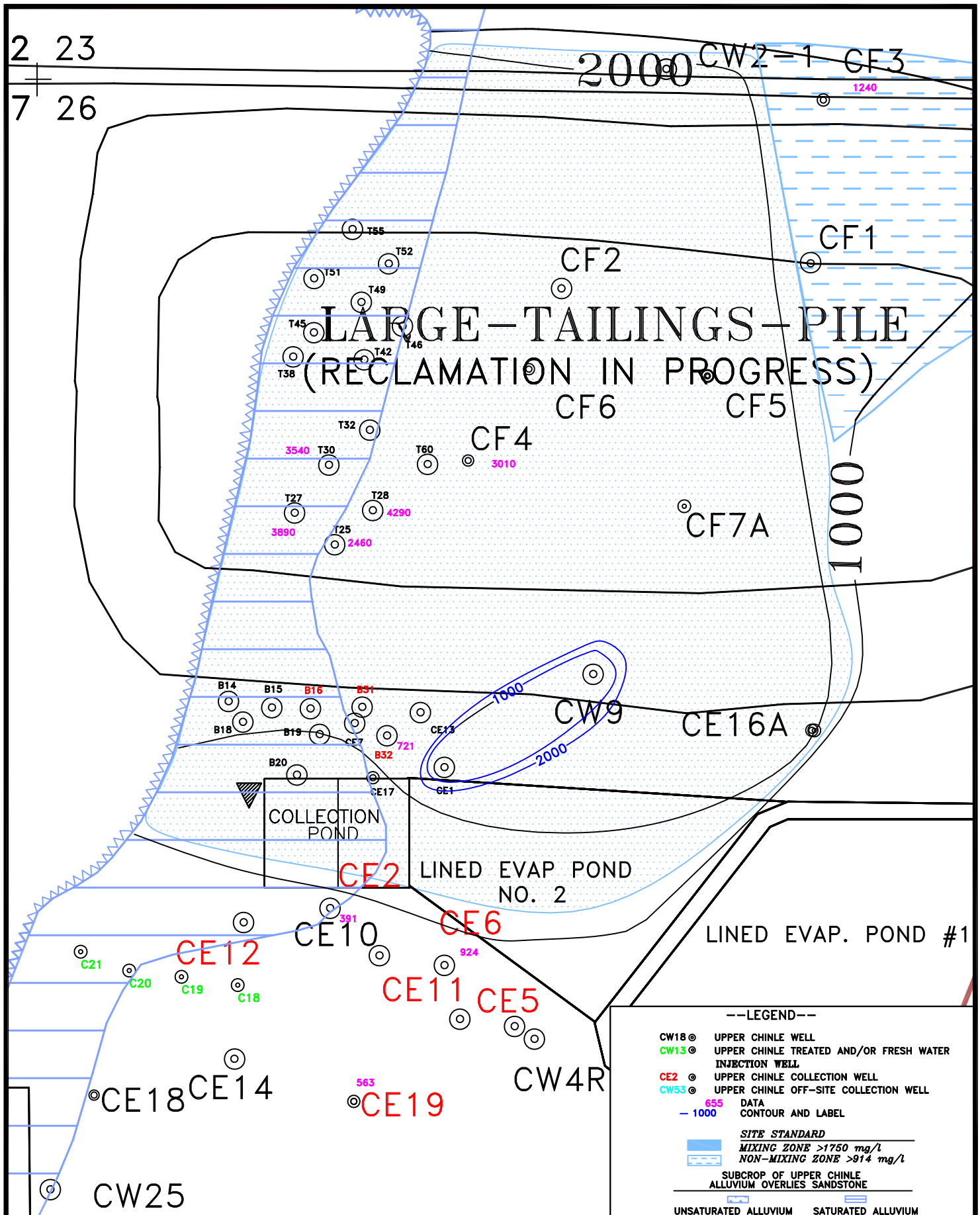
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 1/18/2021

FIGURE 5.3-1A. SULFATE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2020, mg/L

SCALE: 1"= 1600'

PAGE: 5.3-9



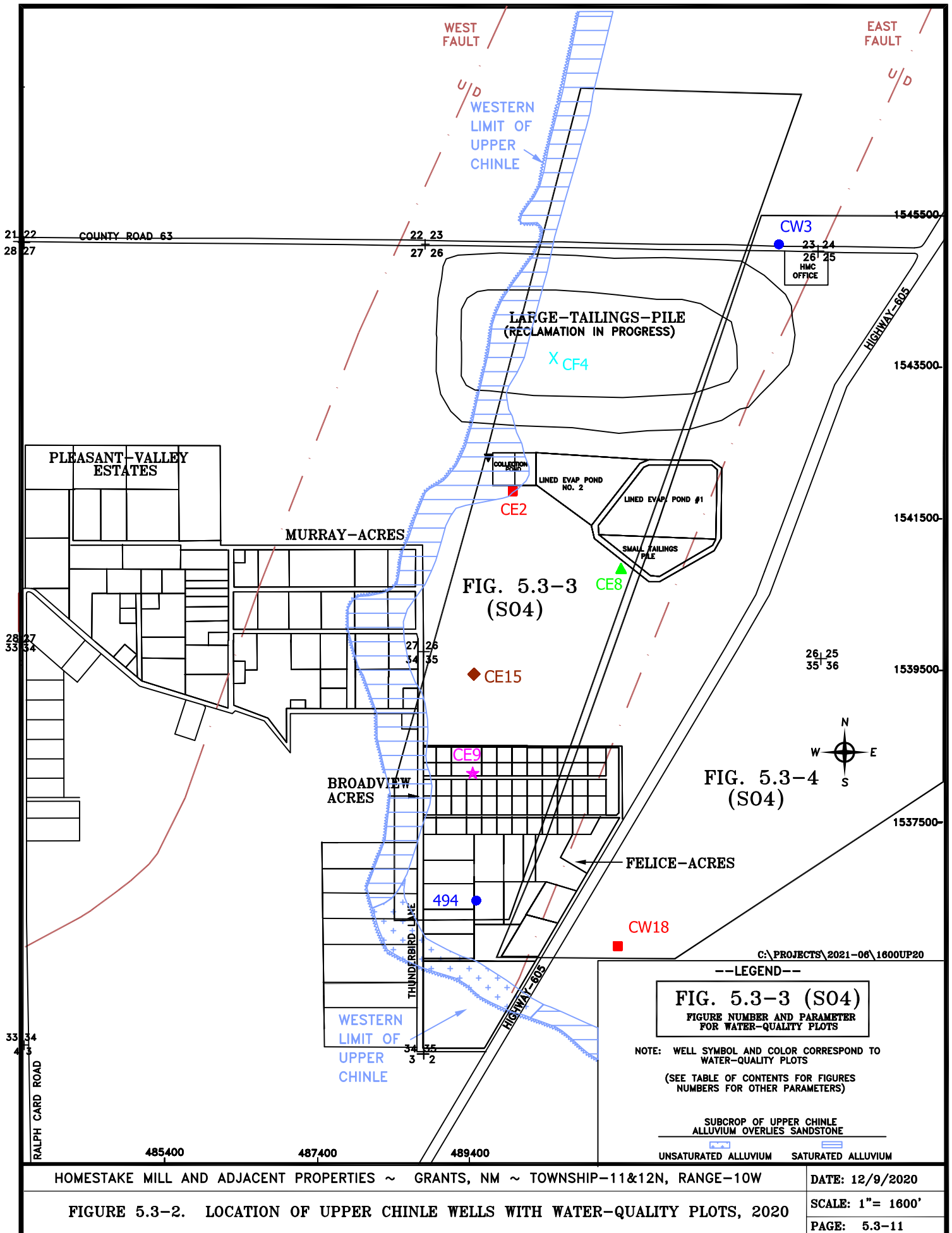
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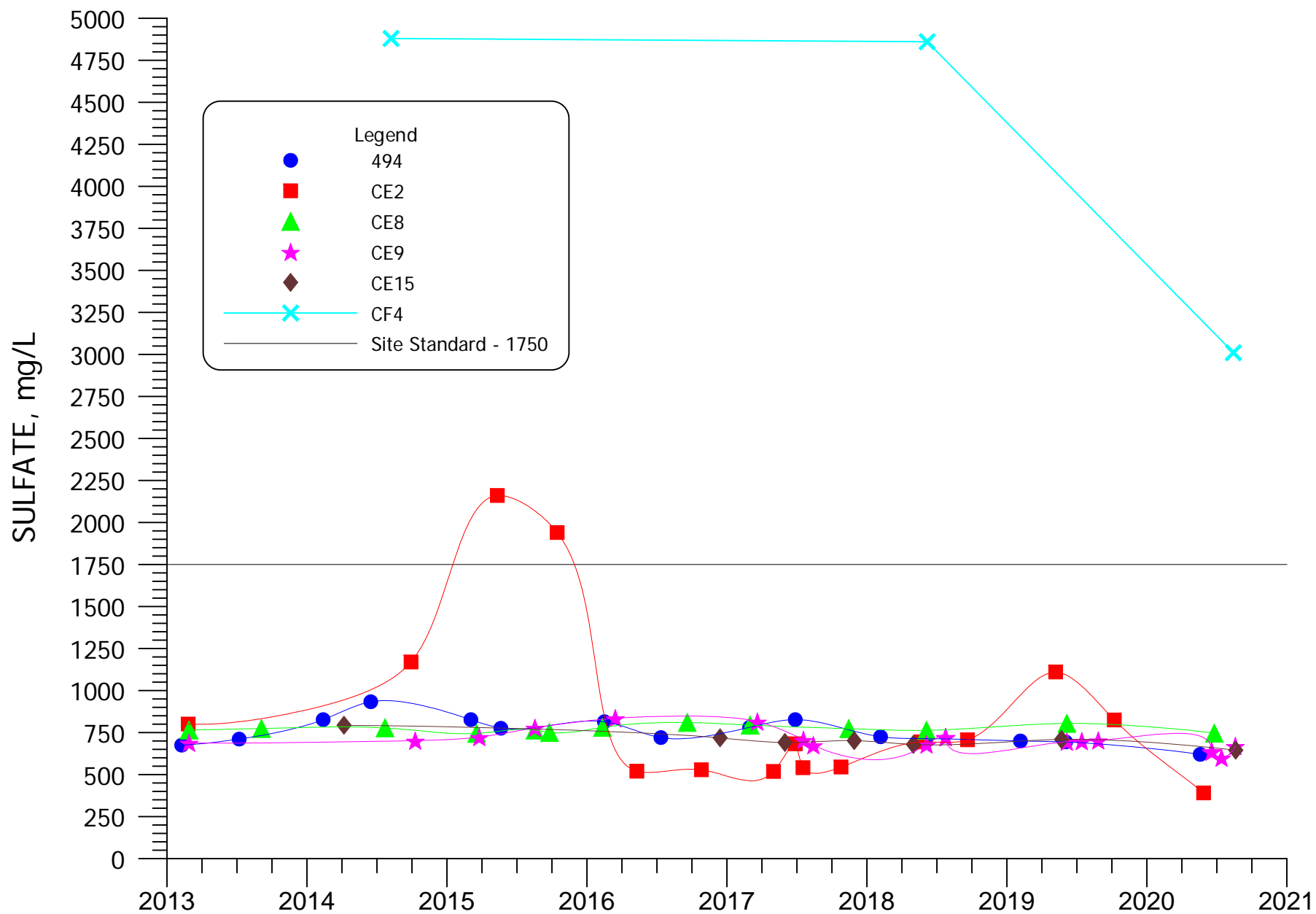
DATE: 1/18/2021

FIGURE 5.3-1B. SULFATE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, OS, 2020, mg/L

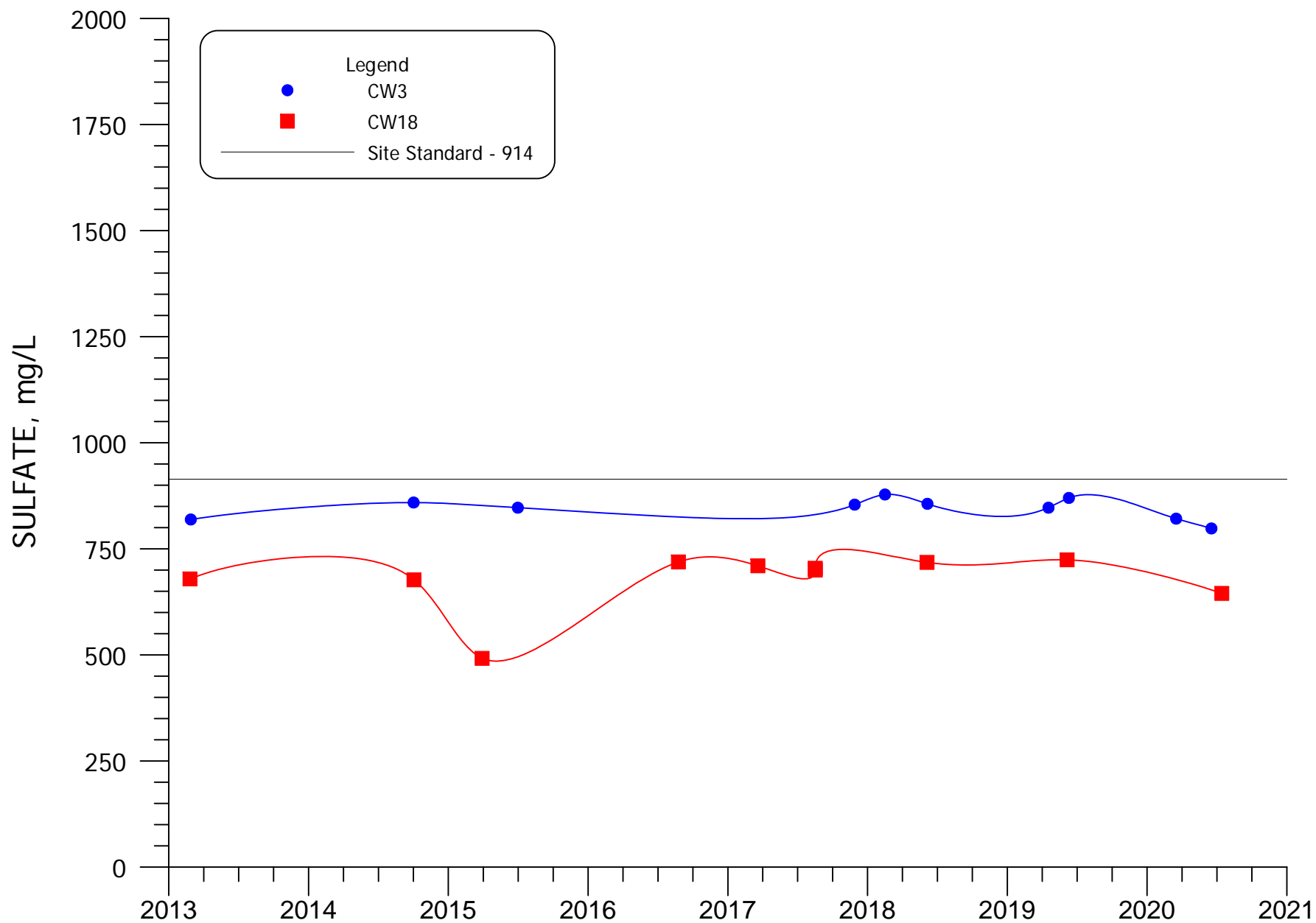
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PAGE: 5.3-10



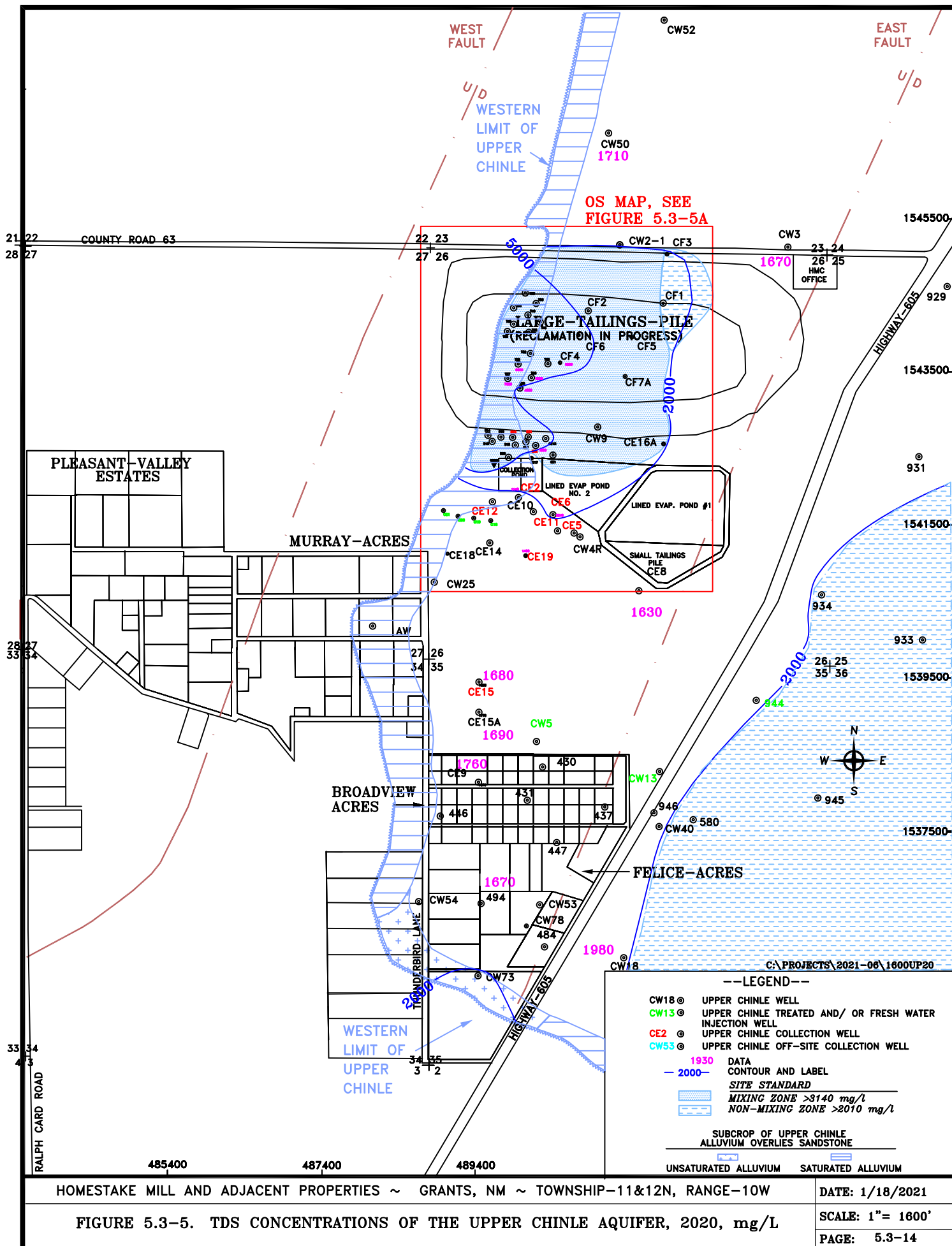


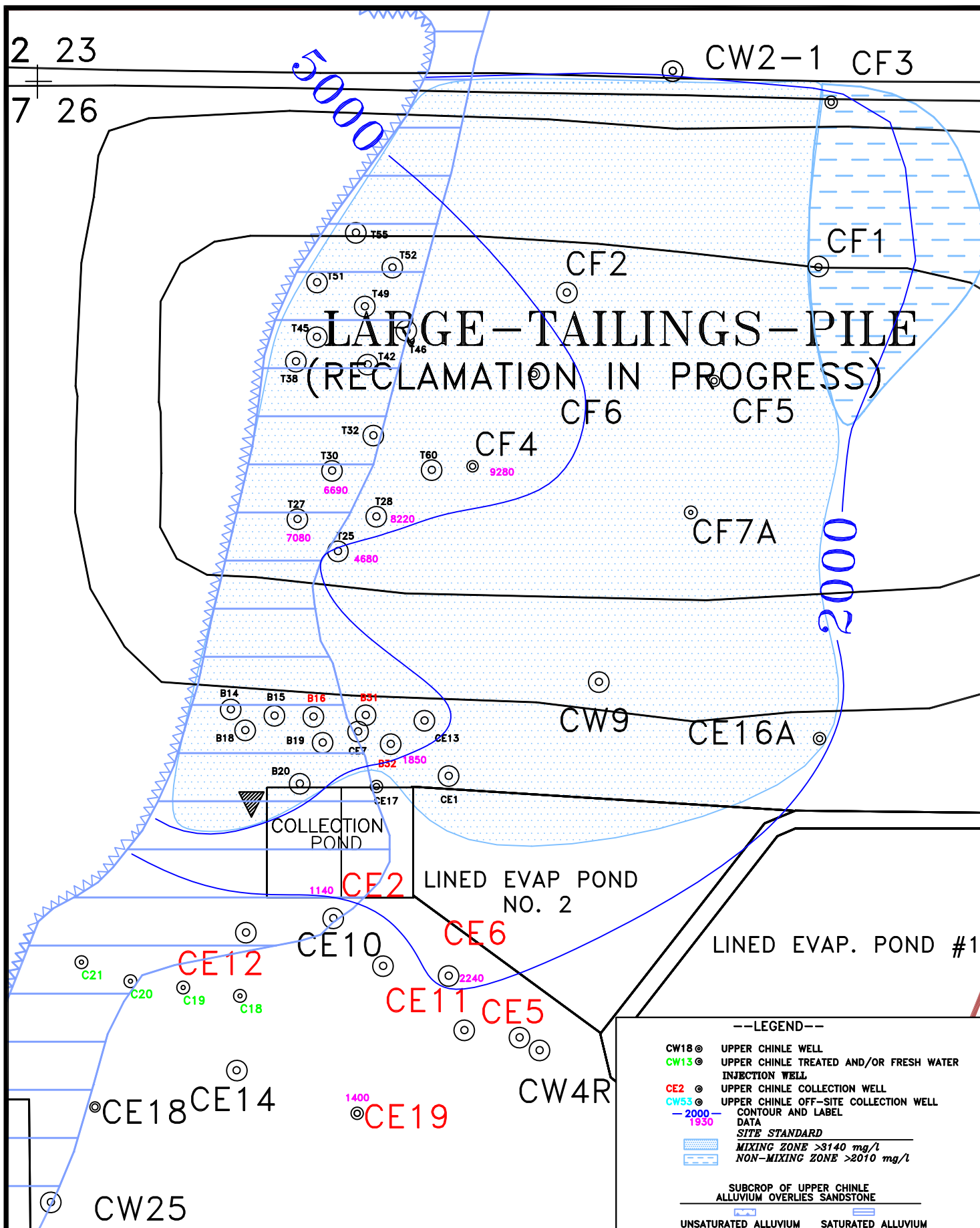
**FIGURE 5.3-3. SULFATE CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE8, CE9, CE15 AND CF4**



**FIGURE 5.3-4. SULFATE CONCENTRATIONS FOR NON-MIXING ZONE WELLS CW3 AND CW18**







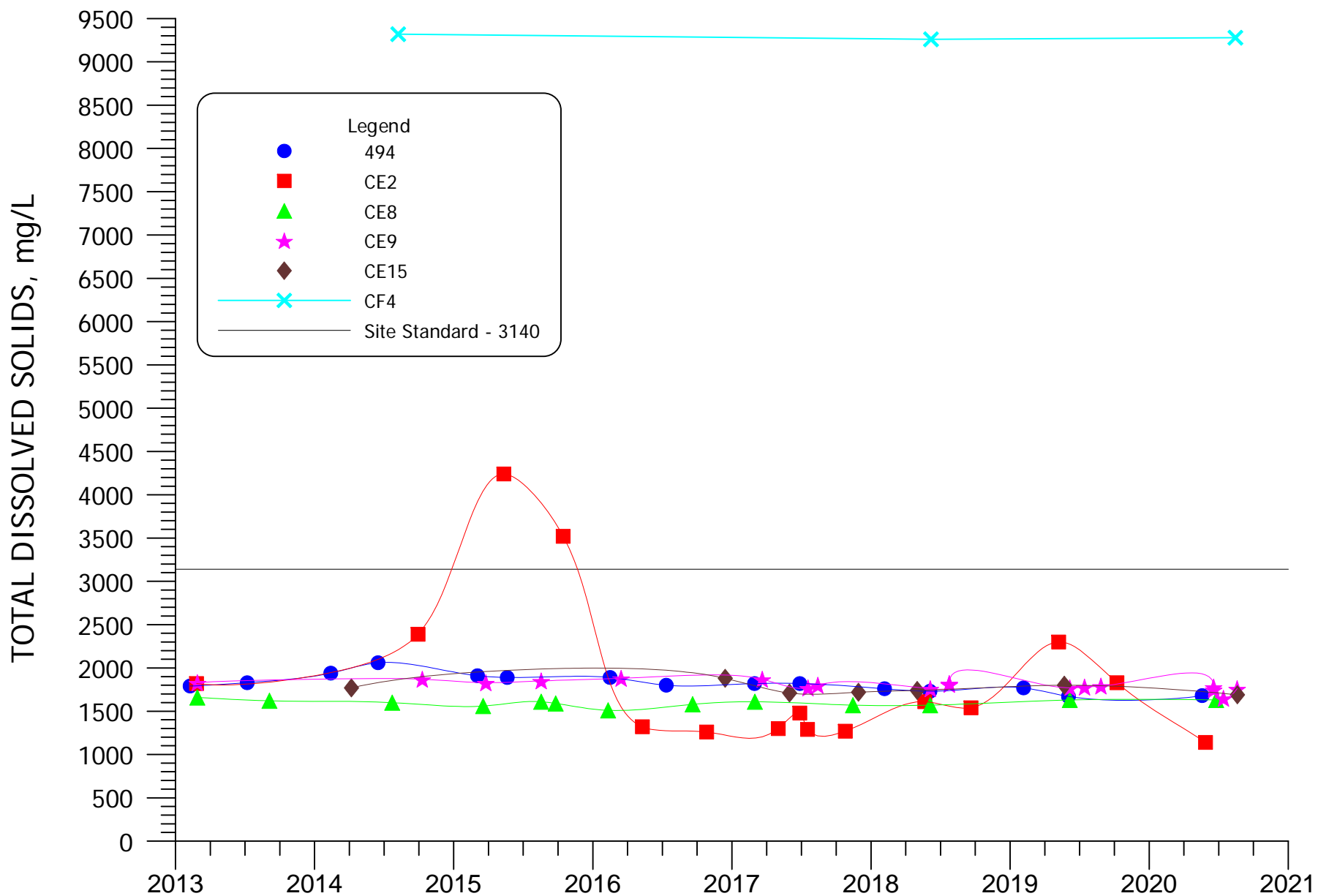
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 1/18/2021

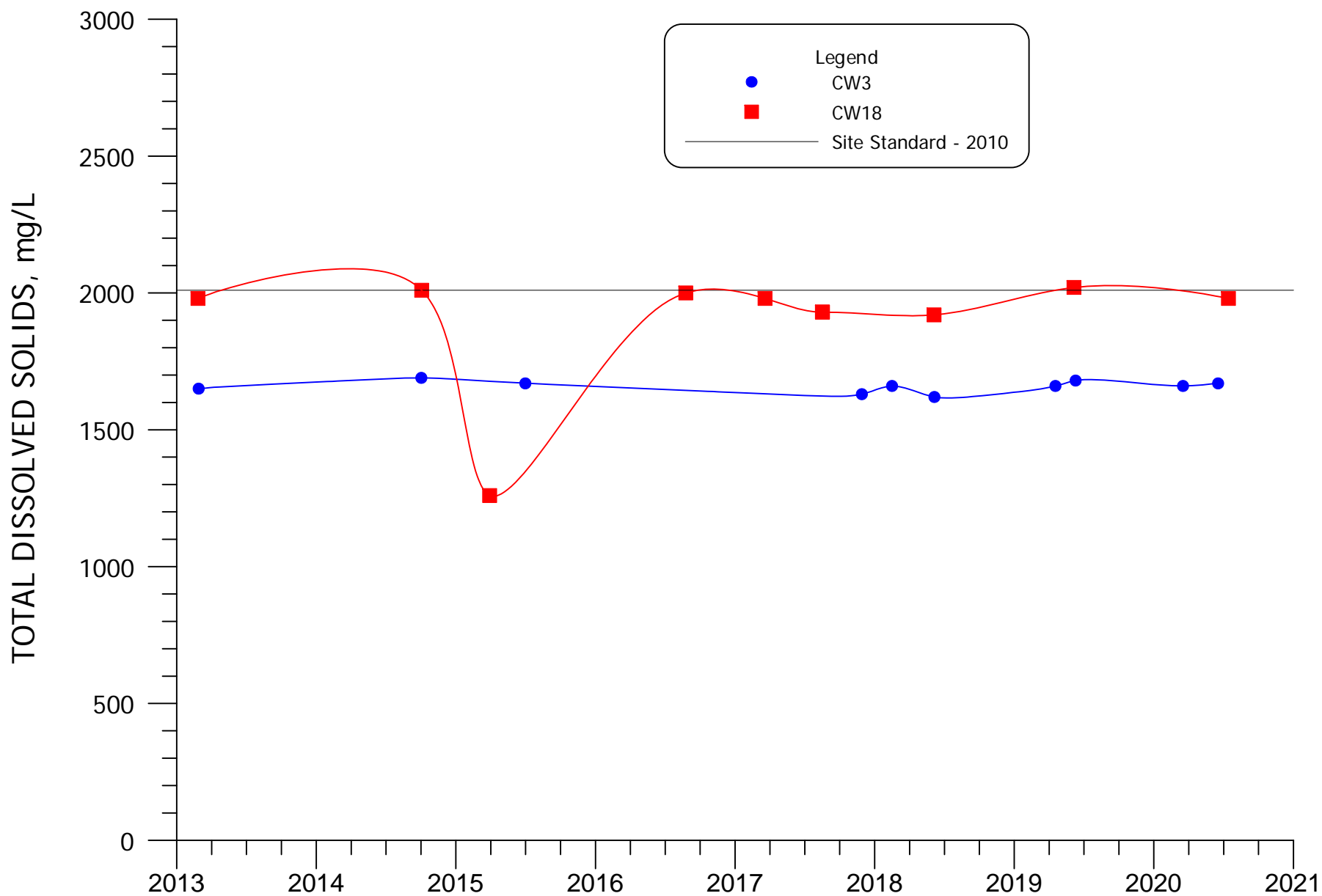
FIGURE 5.3-5A. TDS CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, OS, 2020, mg/L

SCALE: 1"= 500'

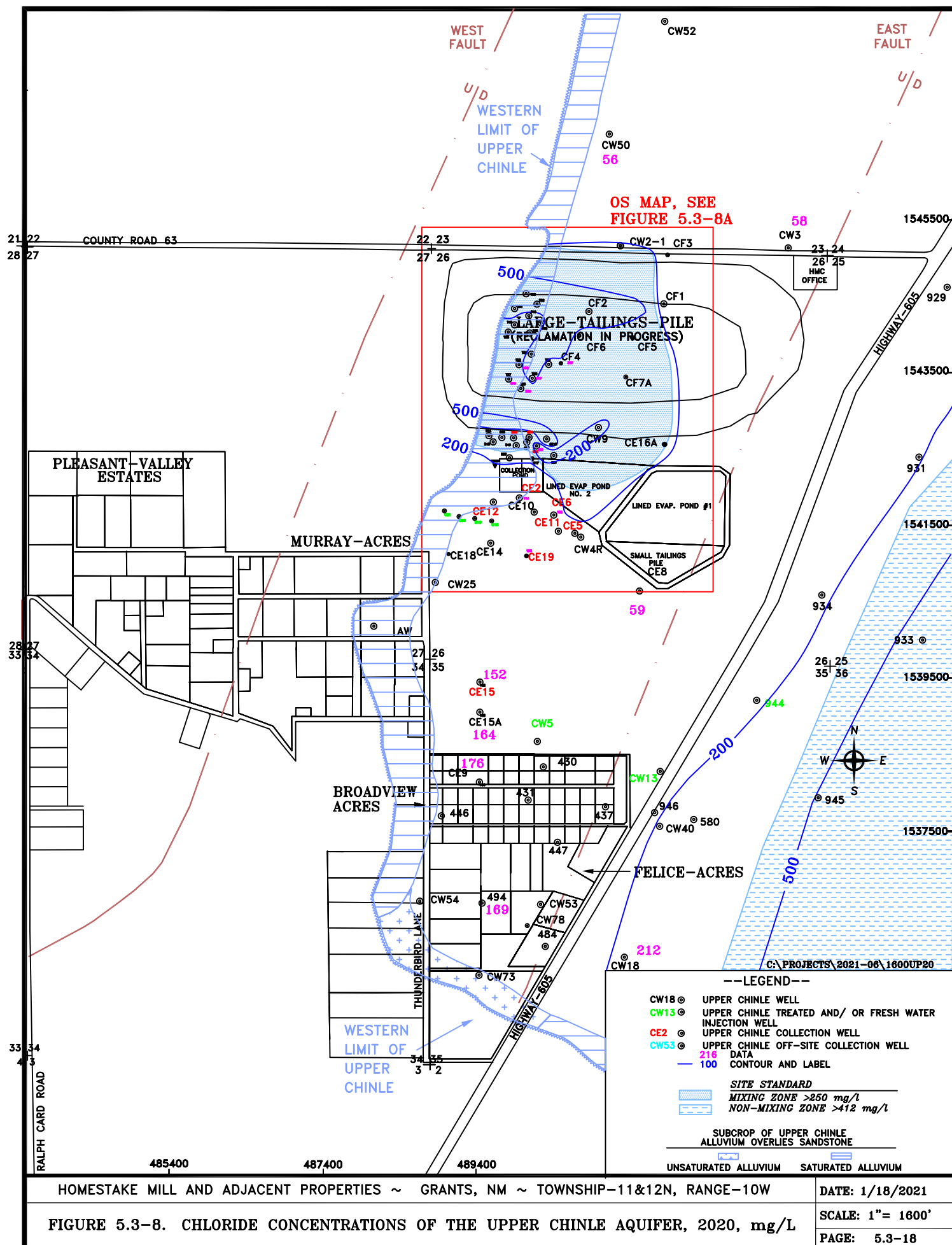
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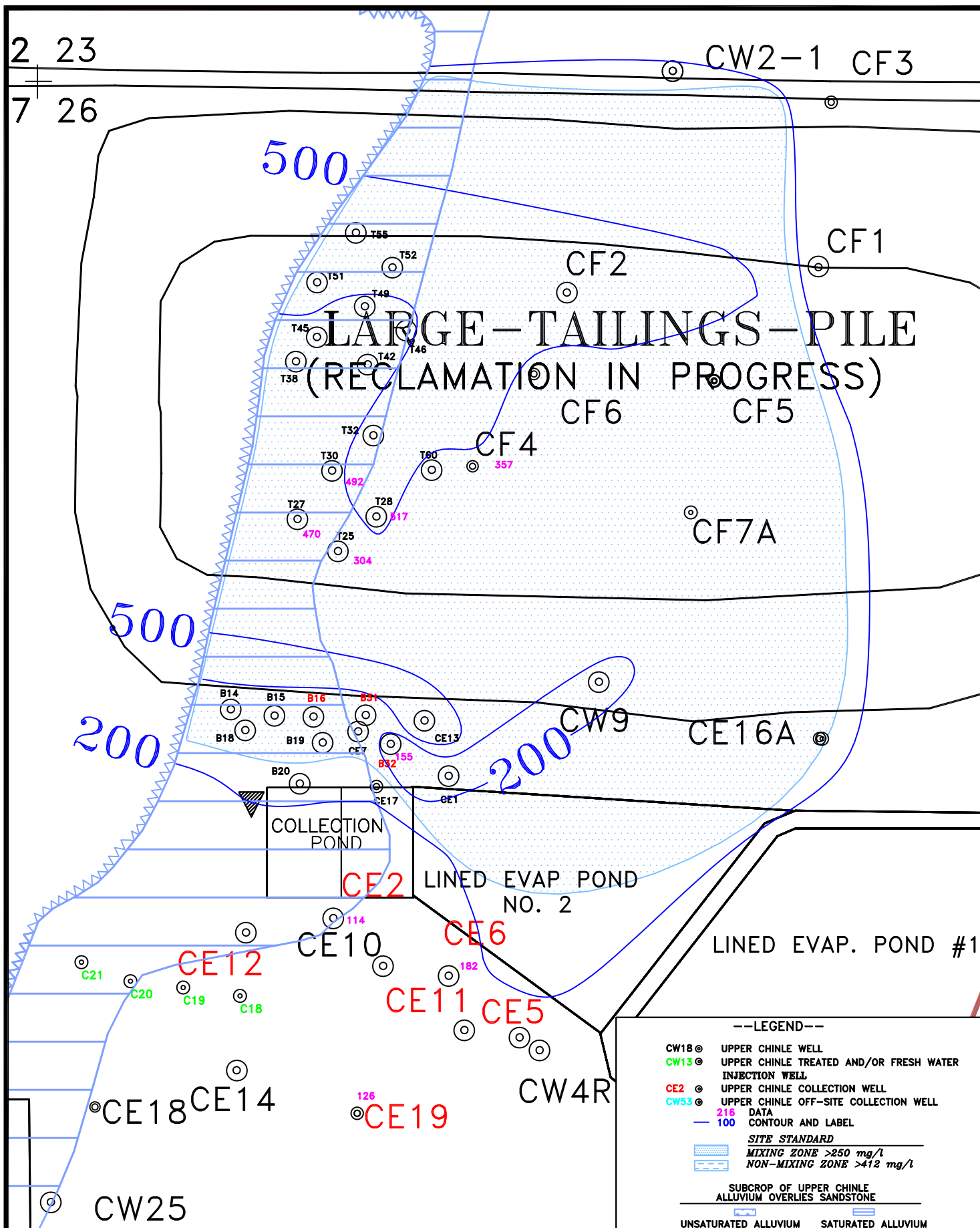


**FIGURE 5.3-6. TDS CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE8, CE9, CE15 AND CF4**



**FIGURE 5.3-7. TDS CONCENTRATIONS FOR NON-MIXING ZONE  
WELLS CW3 AND CW18**

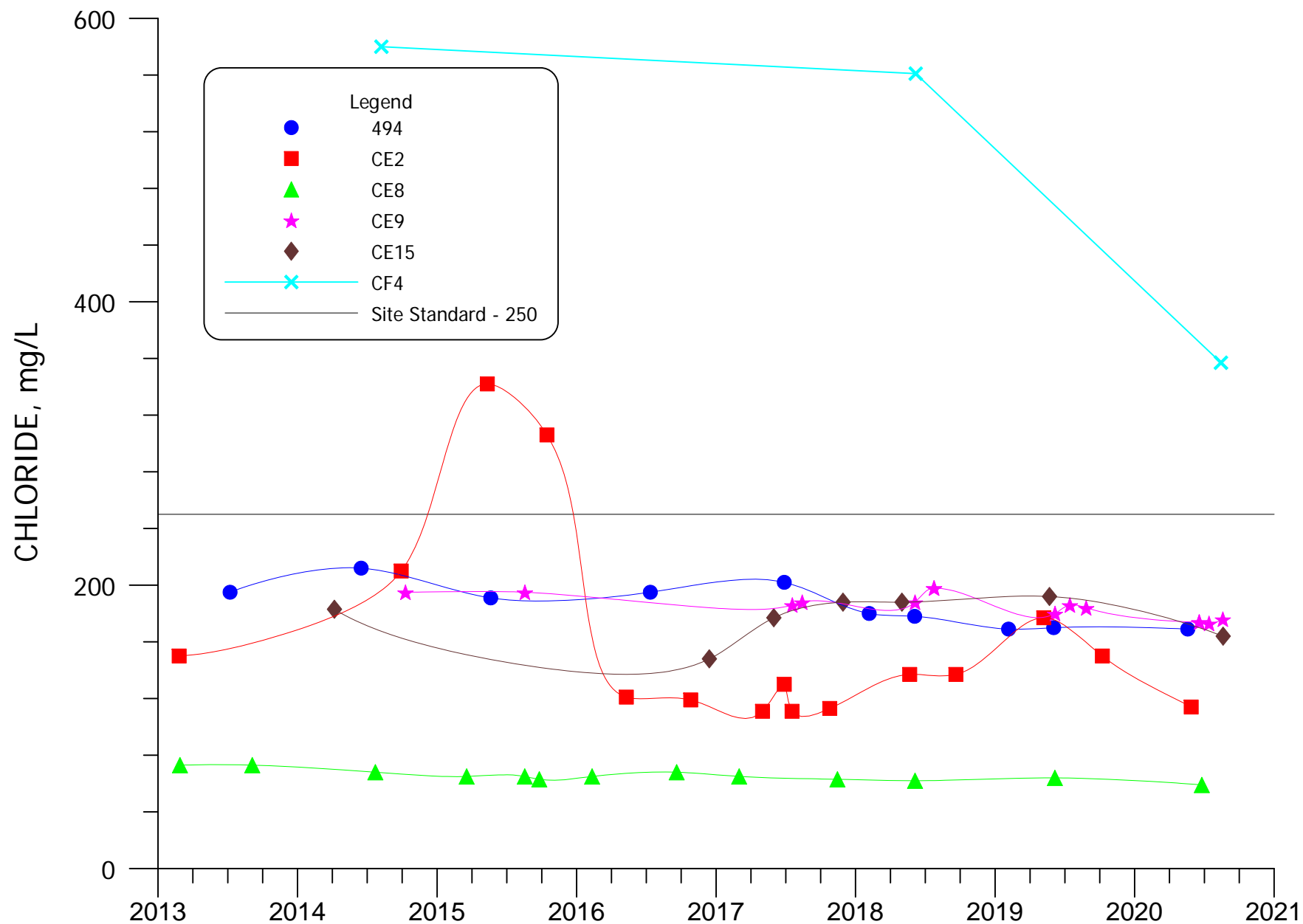




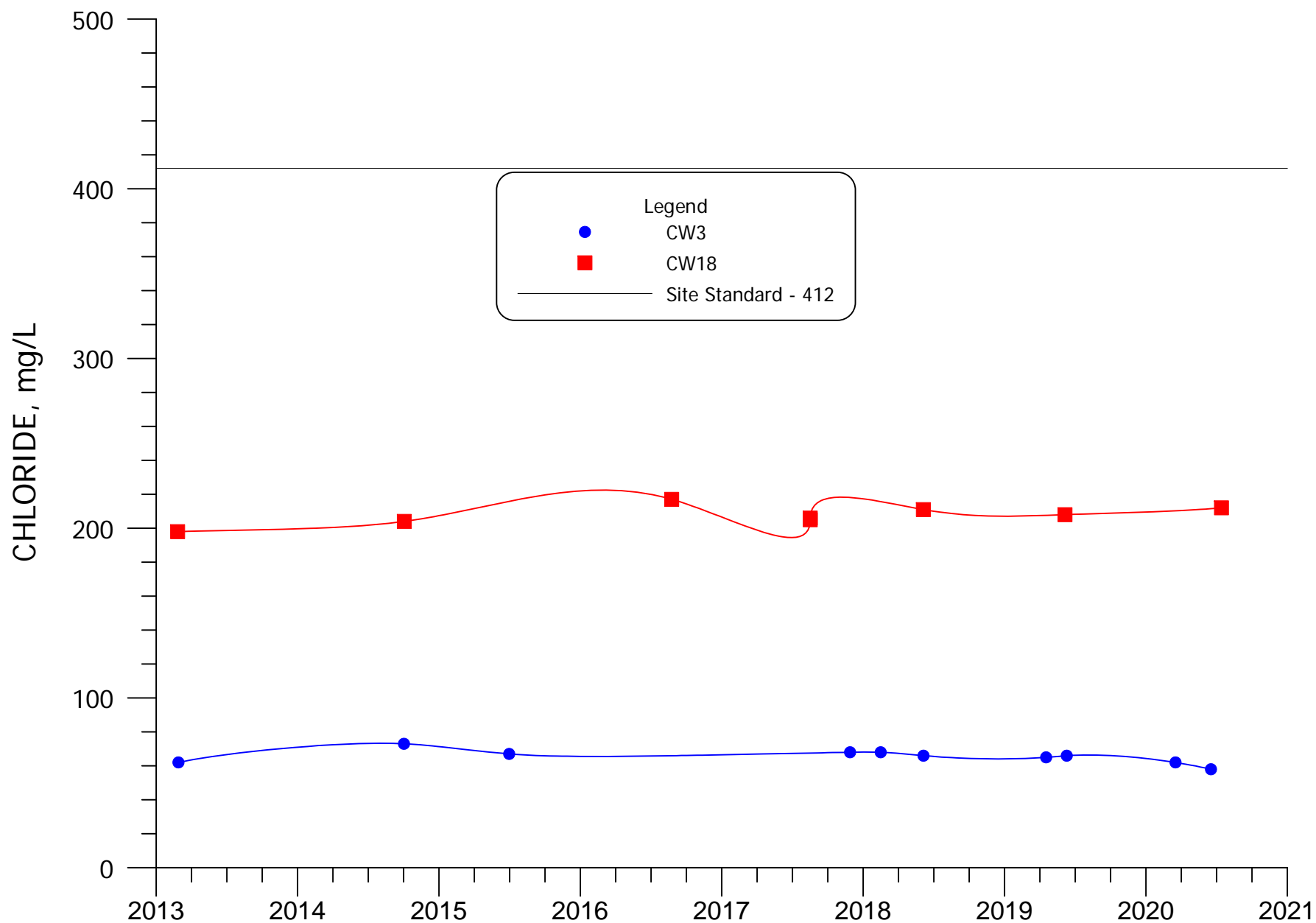
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

FIGURE 5.3-8A. CHLORIDE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, OS, 2020, mg/L

DATE: 1/18/2021  
SCALE: 1"= 500'  
PAGE: 5.3-19

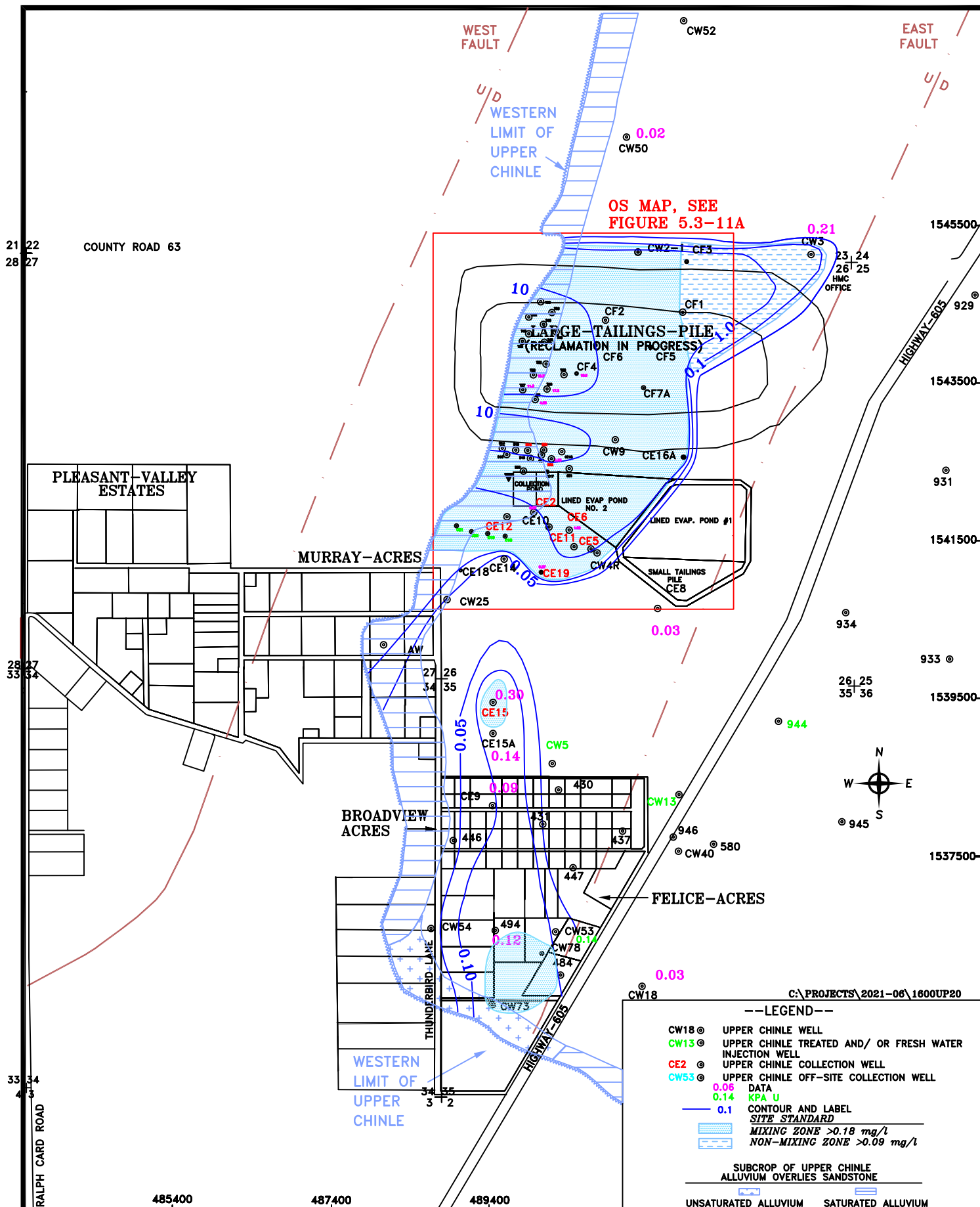


**FIGURE 5.3-9. CHLORIDE CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE8, CE9, CE15 AND CF4**



**FIGURE 5.3-10. CHLORIDE CONCENTRATIONS FOR NON-MIXING ZONE WELLS CW3 AND CW18**





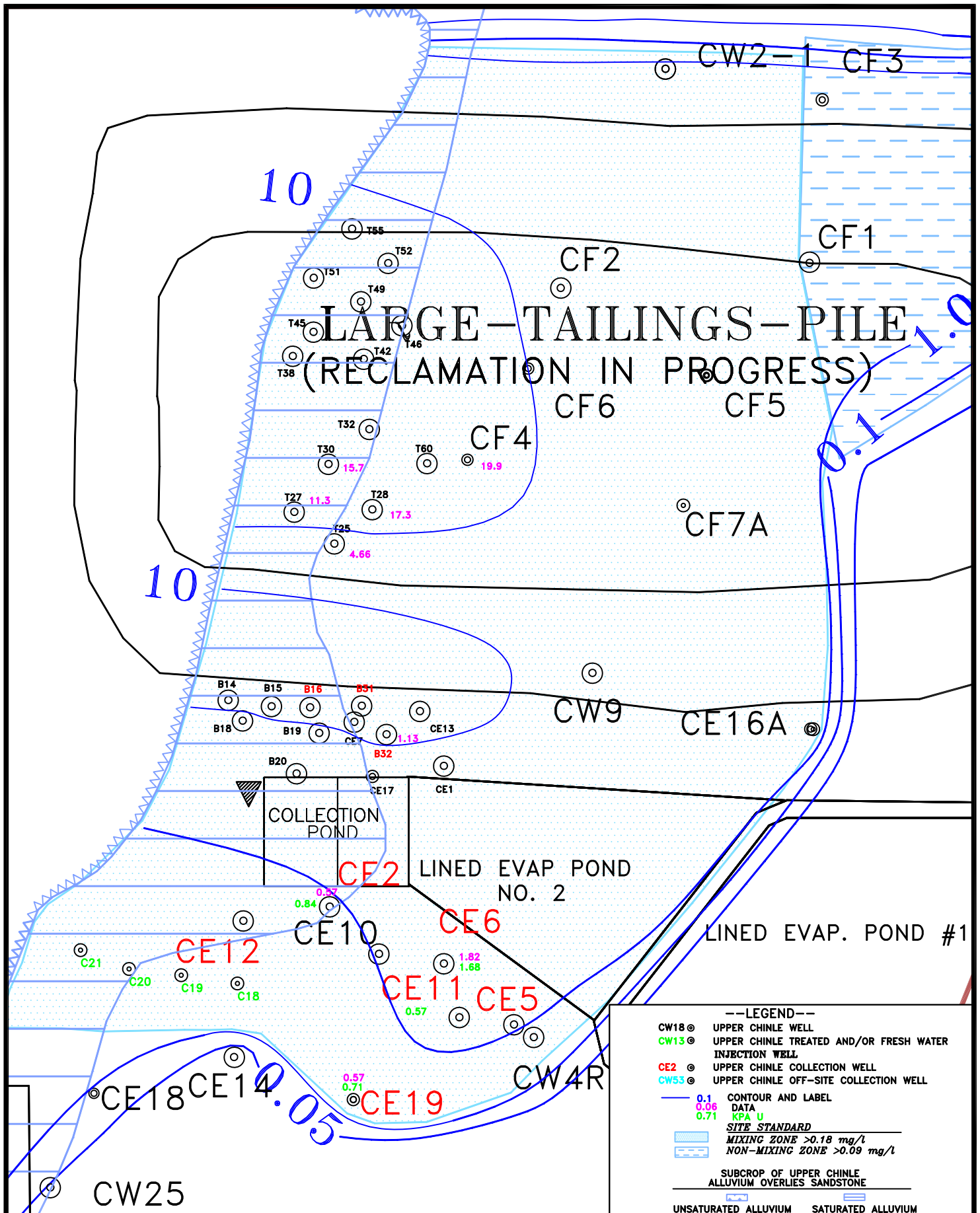
HOMESTEAK MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 3/2/2021

FIGURE 5.3-11. URANIUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2020, mg/L

SCALE: 1"= 1600'

PAGE: 5.3-22



HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

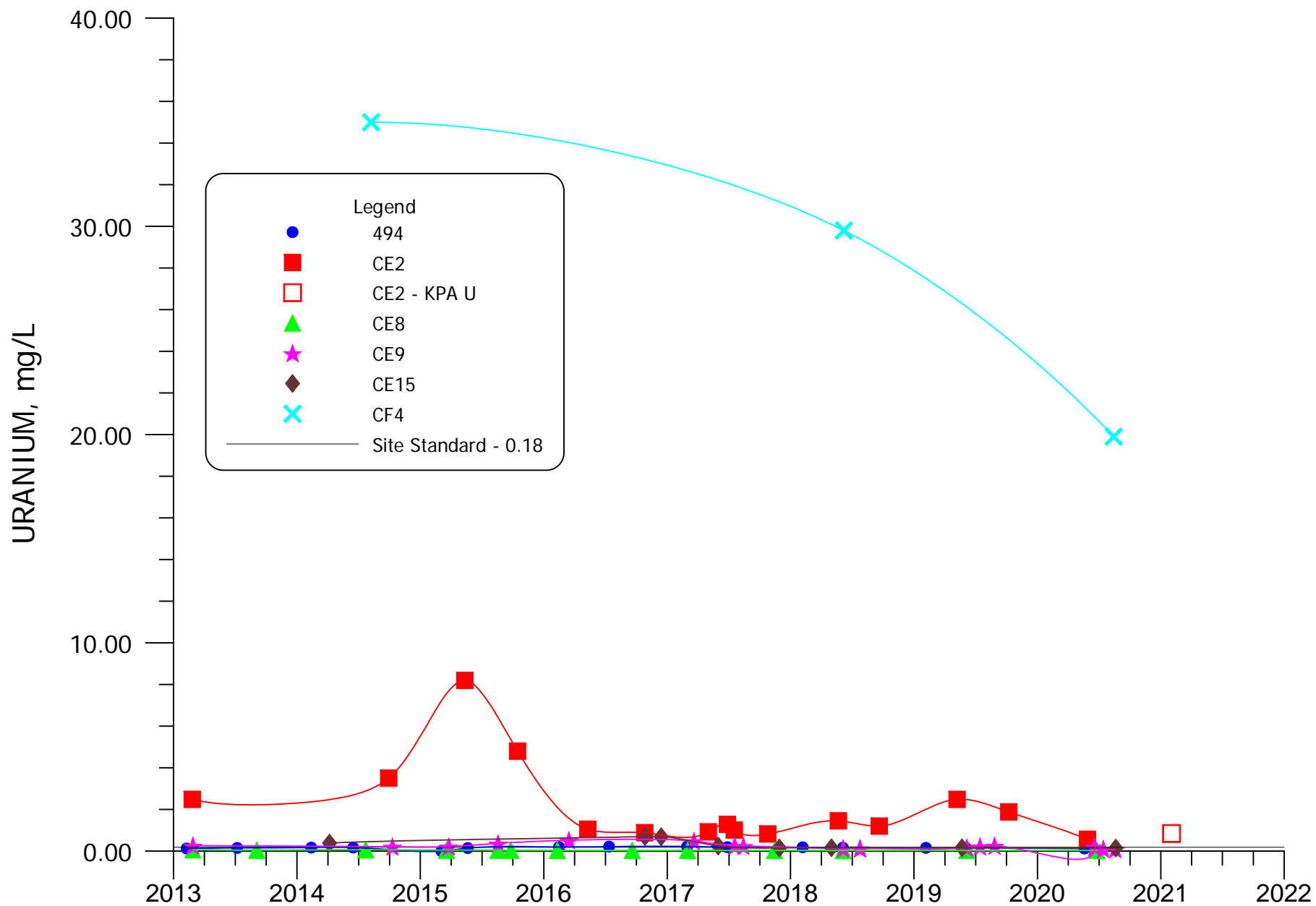
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FIGURE 5.3-11A. URANIUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, OS, 2020, mg/L

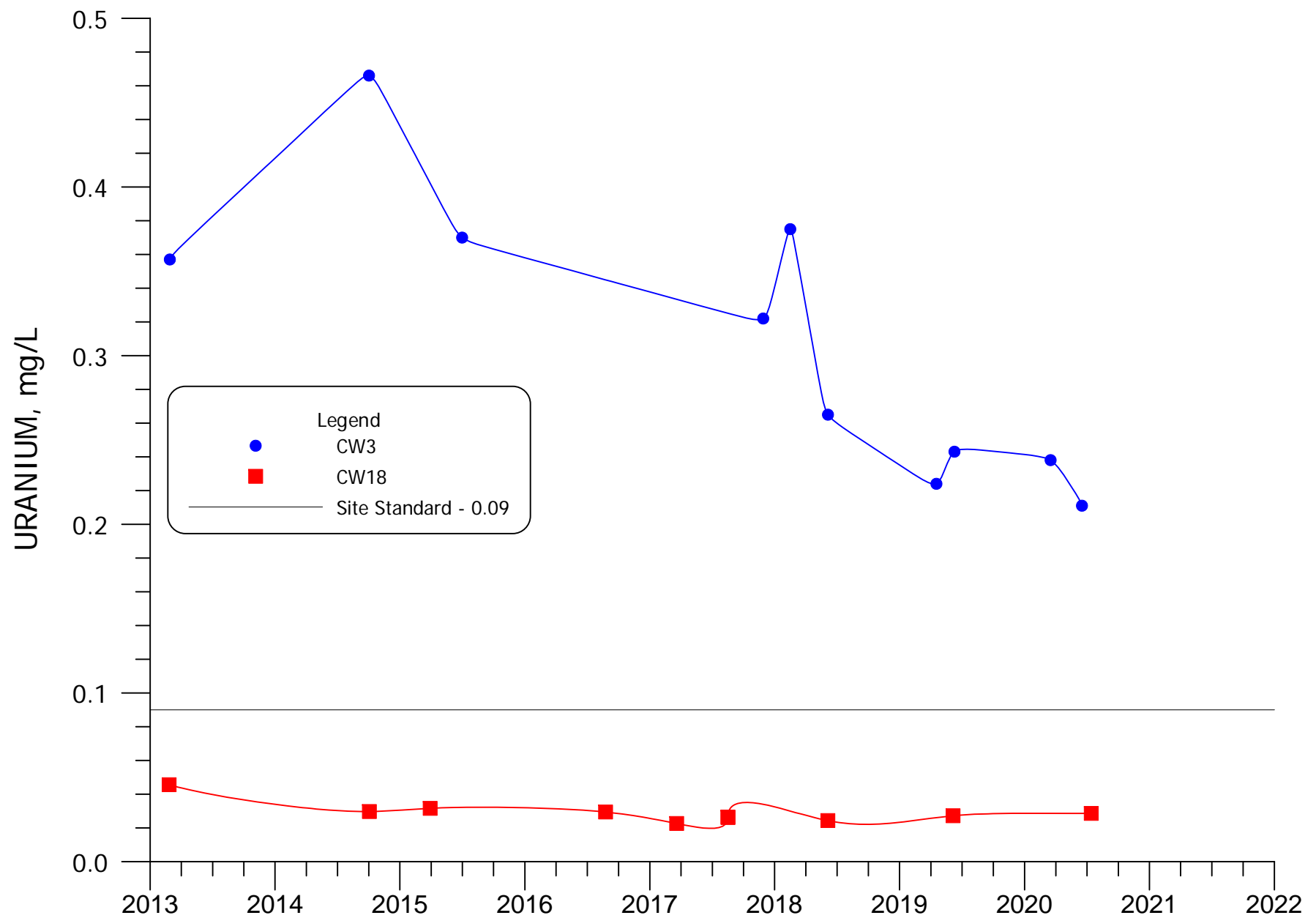
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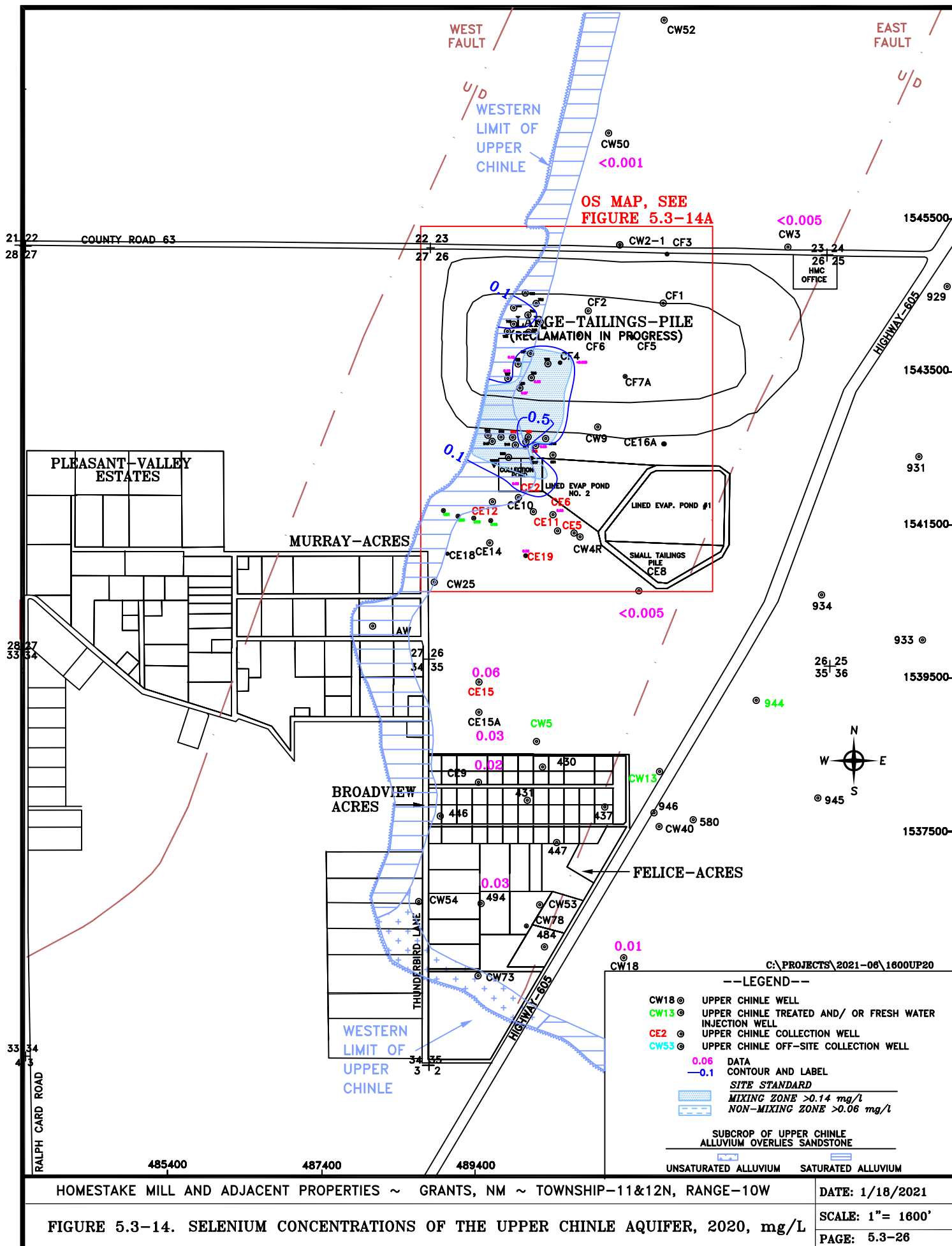
5.3-24

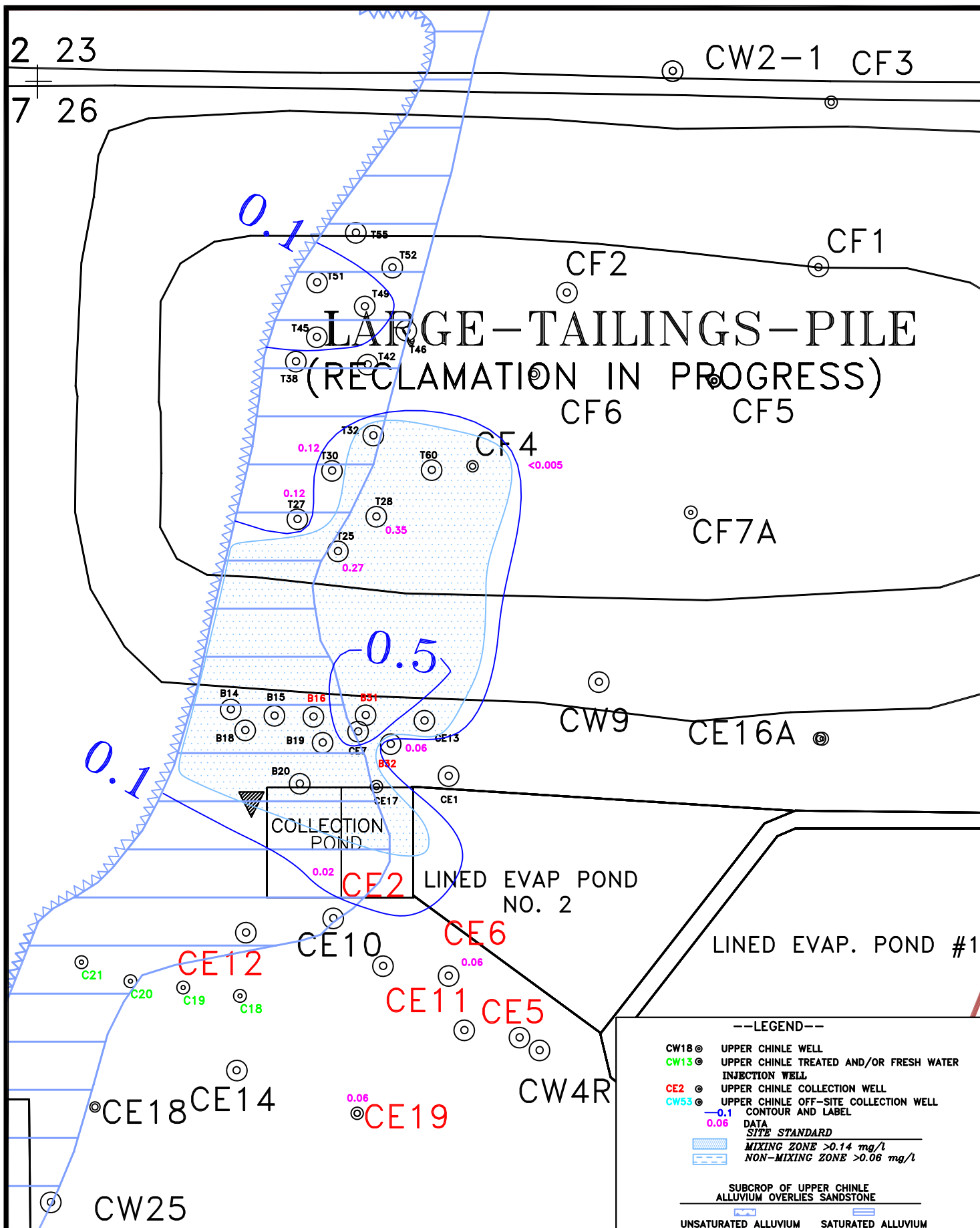


**FIGURE 5.3-12. URANIUM CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE8, CE9, CE15 AND CF4**



**FIGURE 5.3-13. URANIUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS CW3 AND CW18**





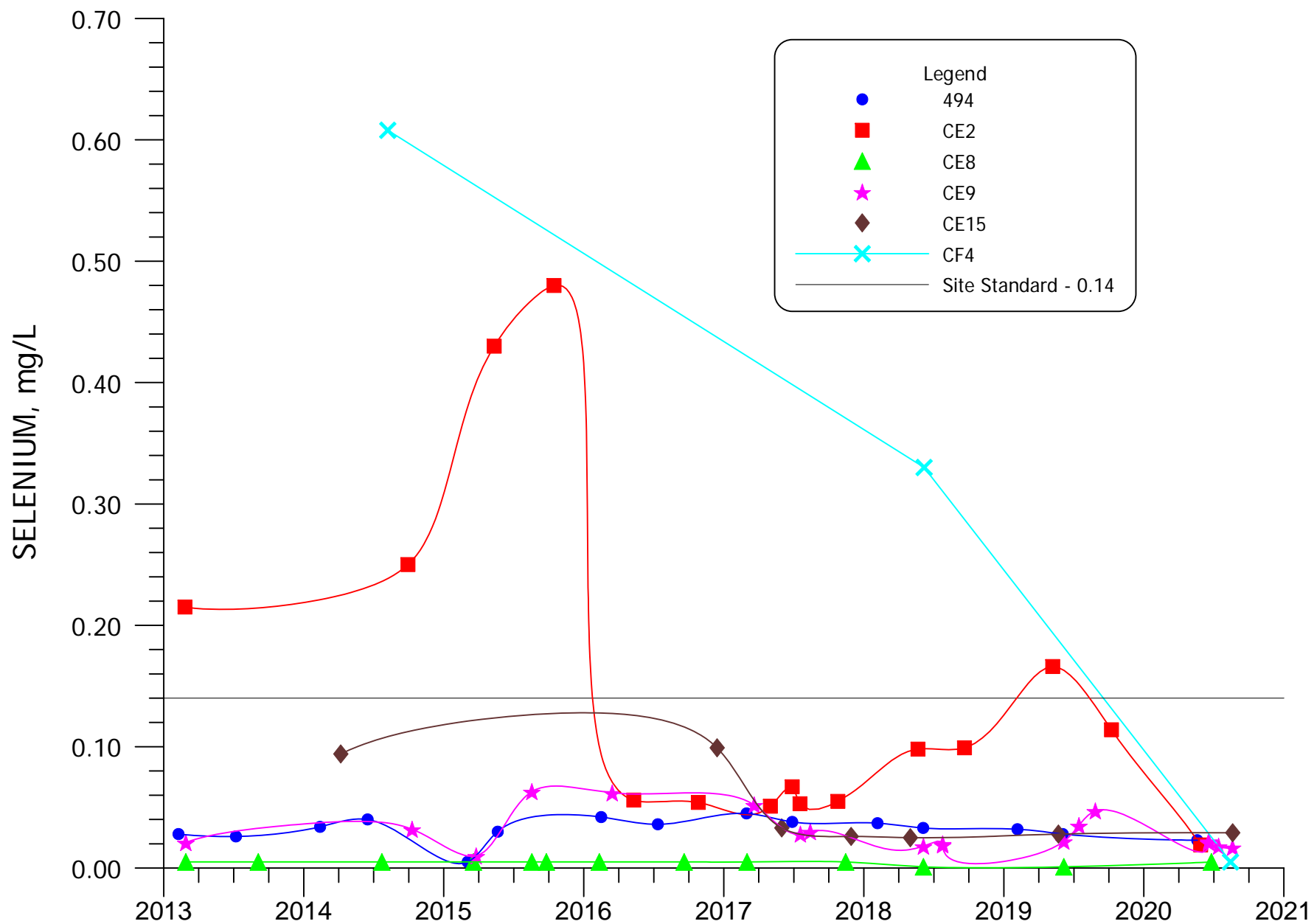
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 1/18/2021

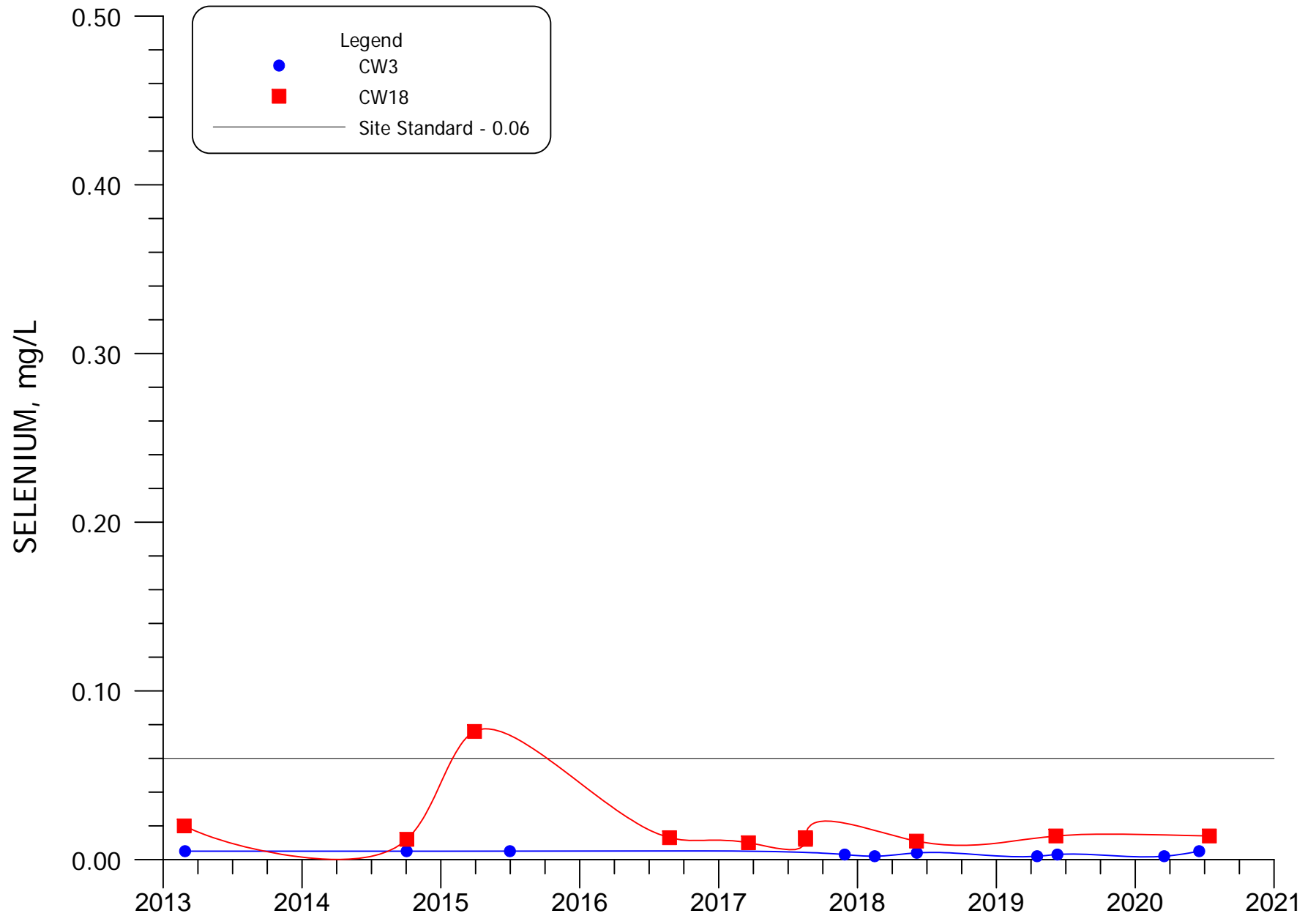
FIGURE 5.3-14A. SELENIUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, OS, 2020, mg/L

SCALE: 1"= 500'

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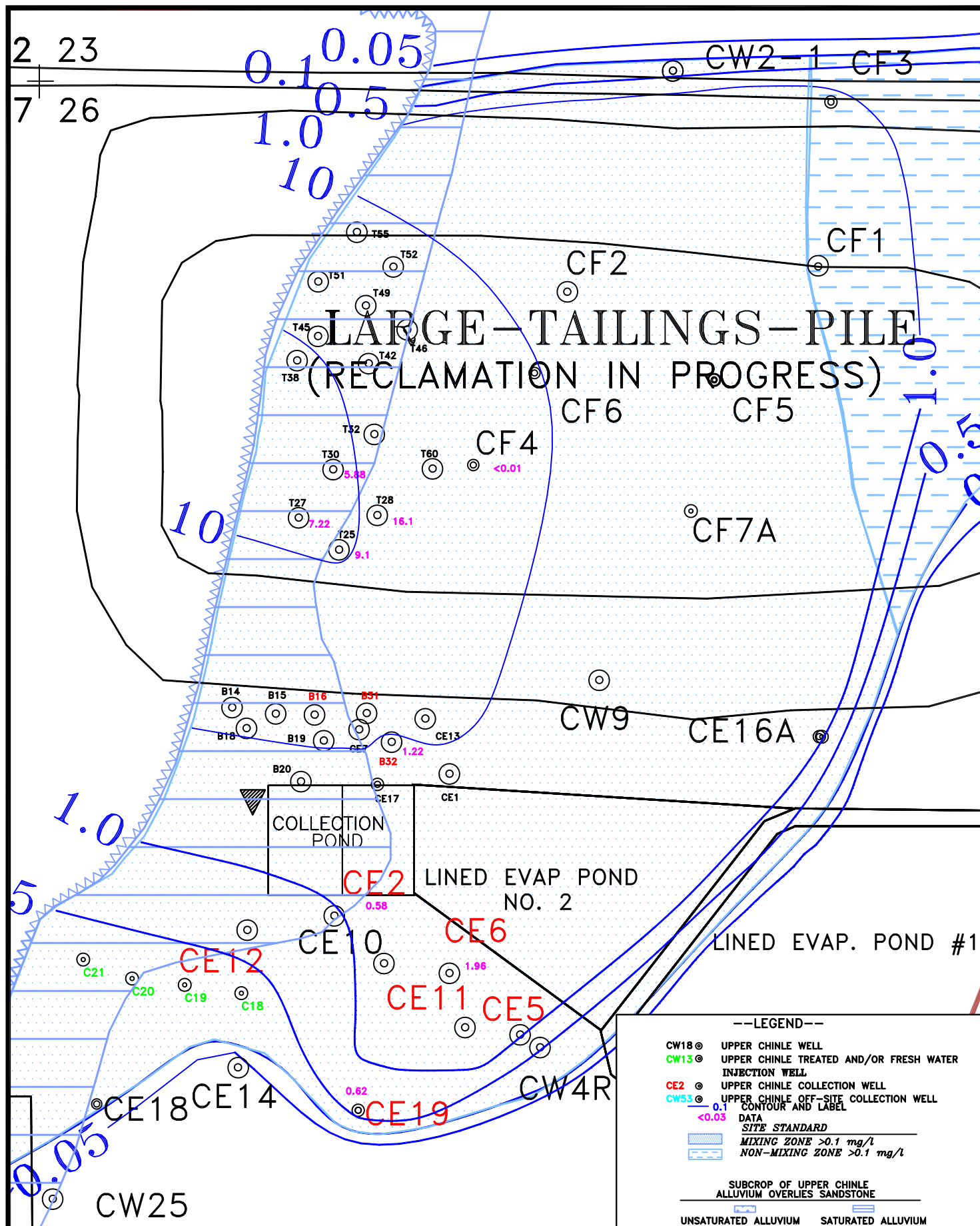
**FIGURE 5.3-15. SELENIUM CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE8, CE9, CE15 AND CF4**



**FIGURE 5.3-16. SELENIUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS CW3 AND CW18**



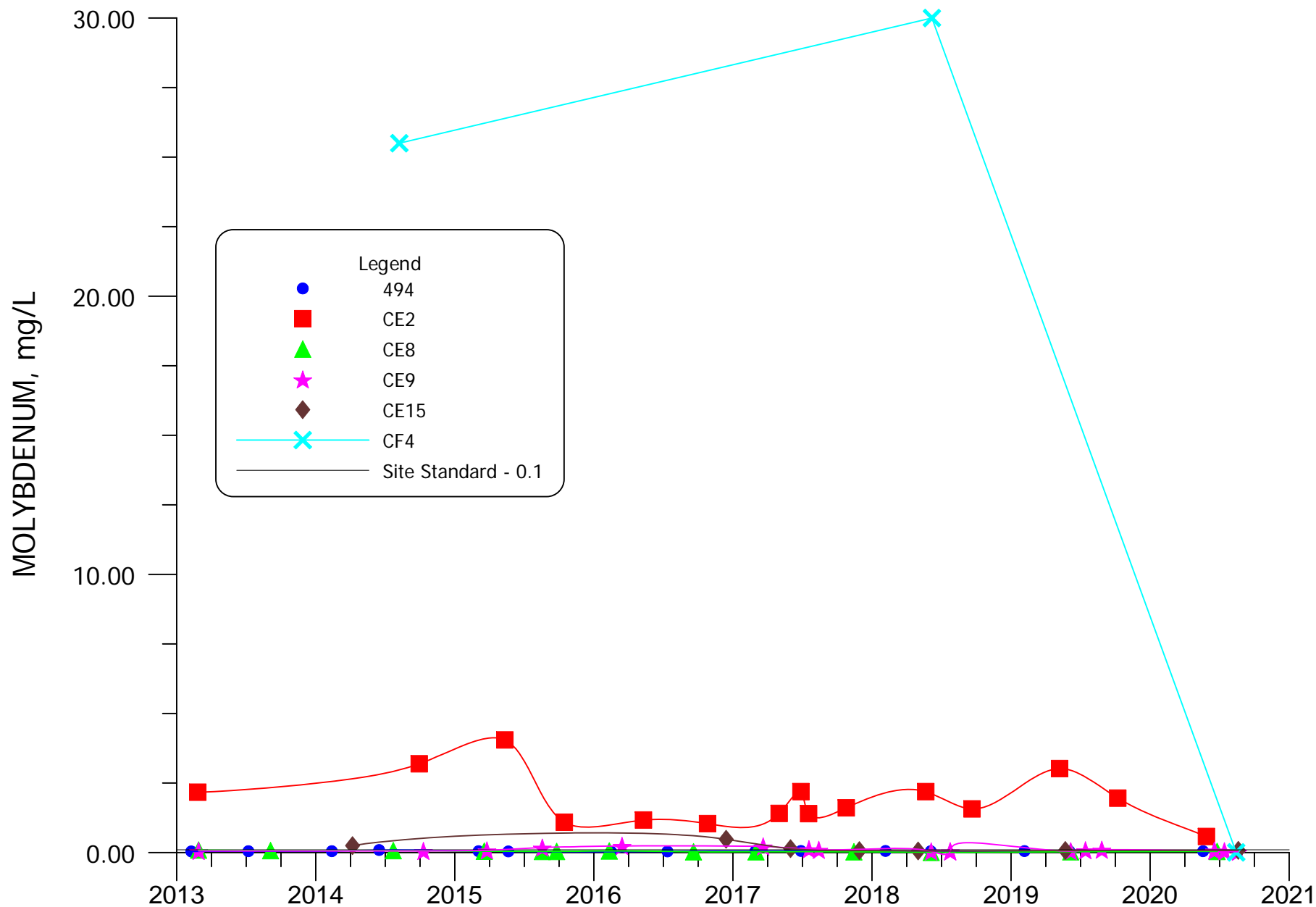




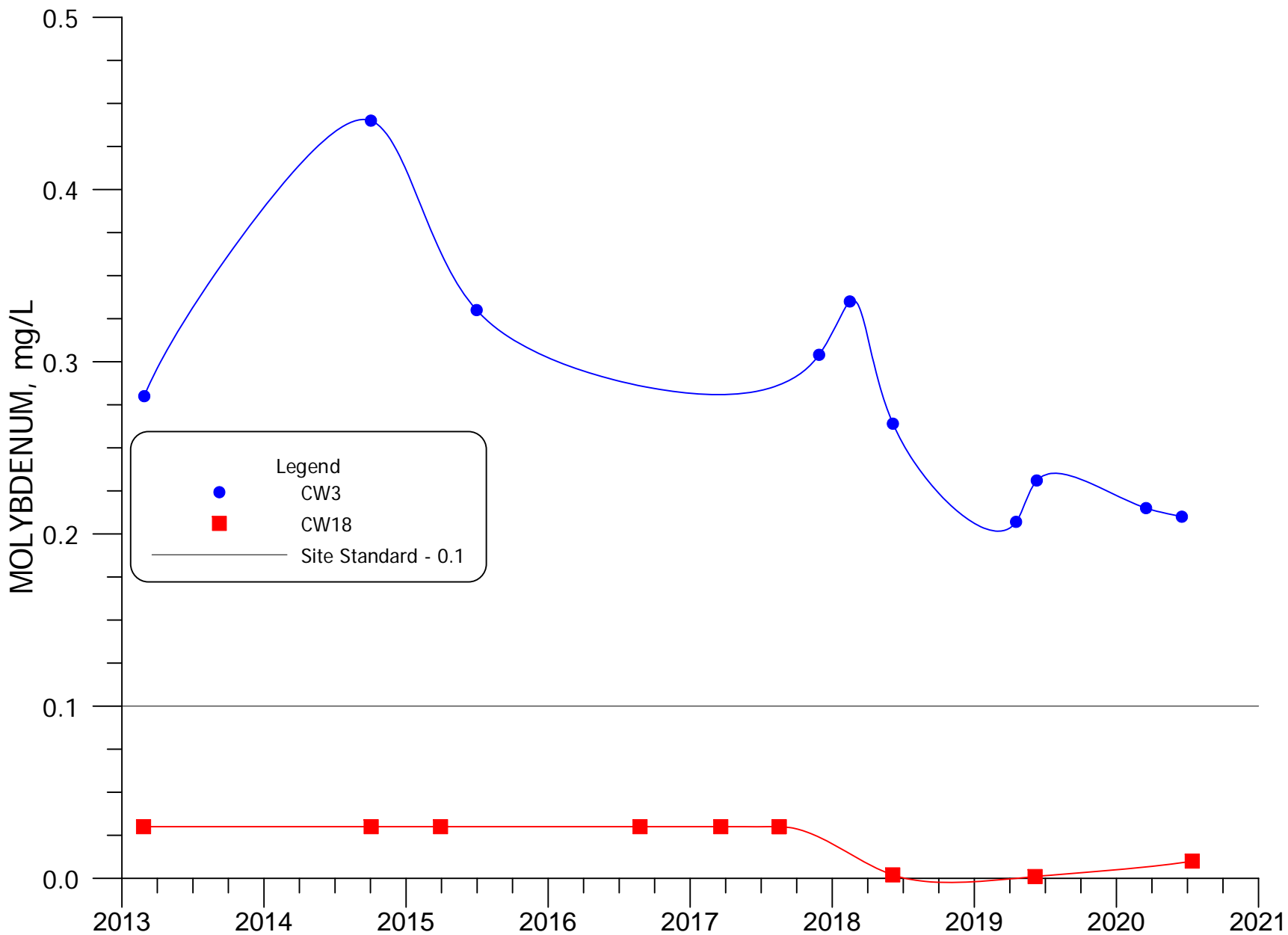
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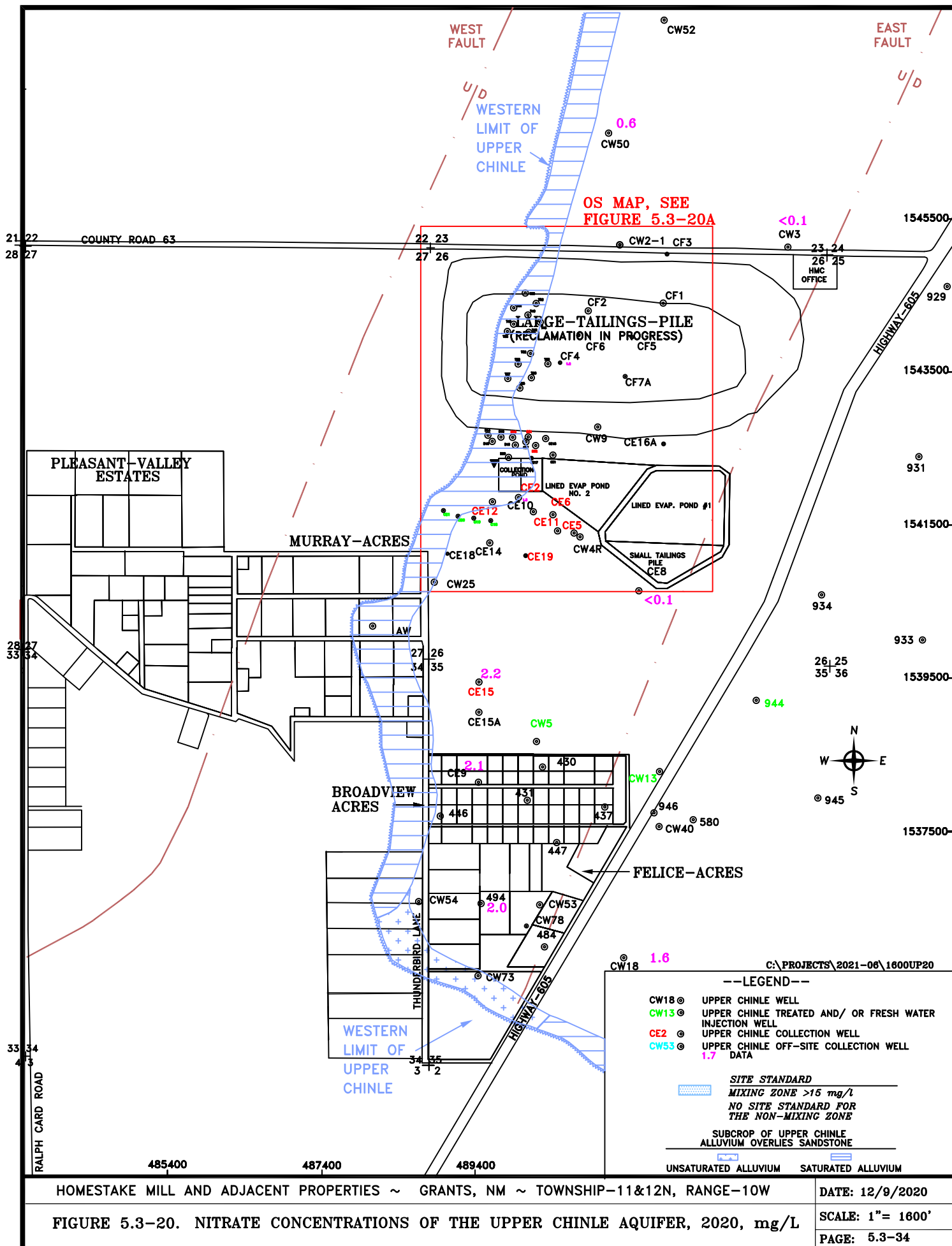
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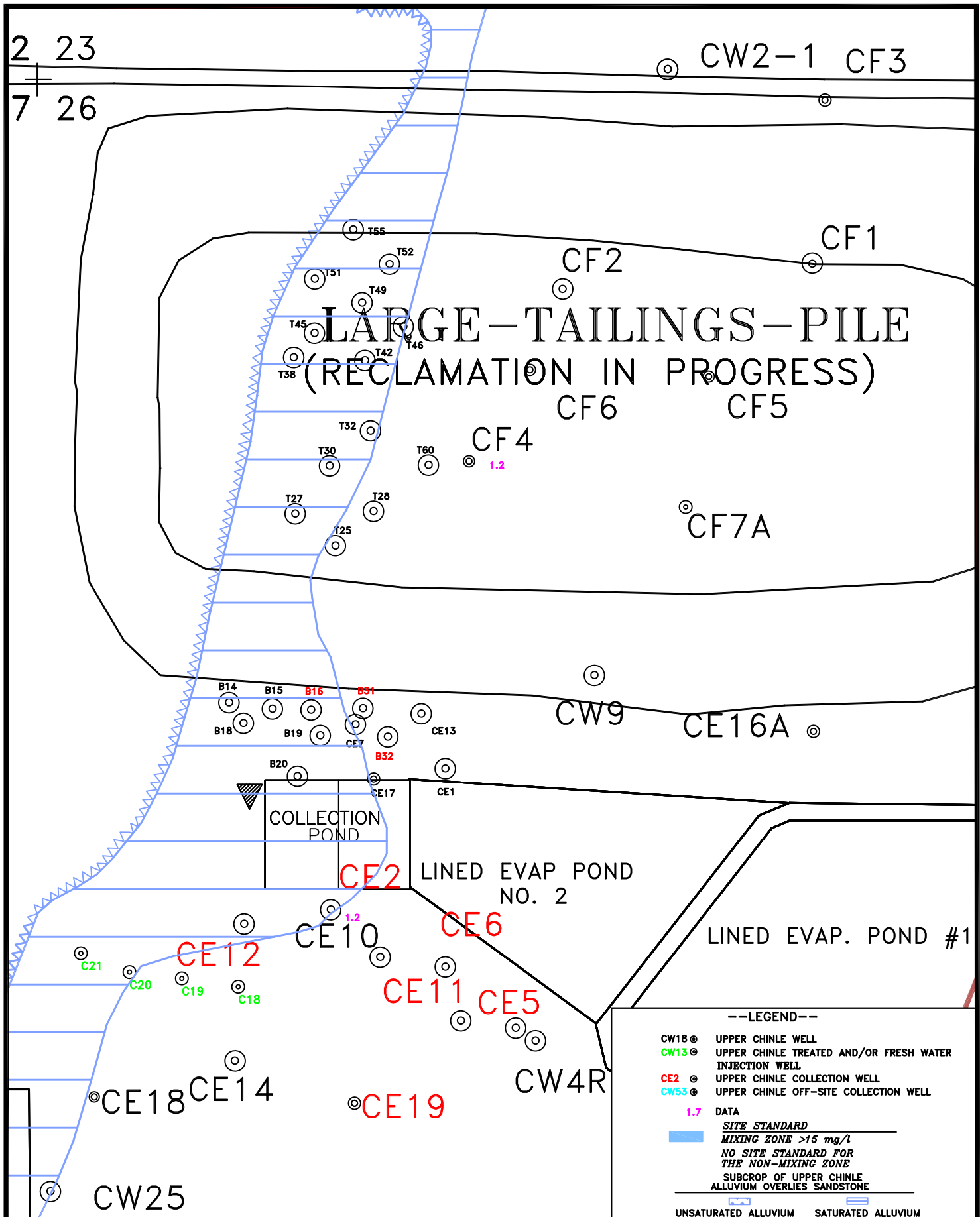


**FIGURE 5.3-18. MOLYBDENUM CONCENTRATIONS FOR MIXING ZONE WELLS 494, CE2, CE8, CE9, CE15 AND CF4**



**FIGURE 5.3-19. MOLYBDENUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS CW3 AND CW18**





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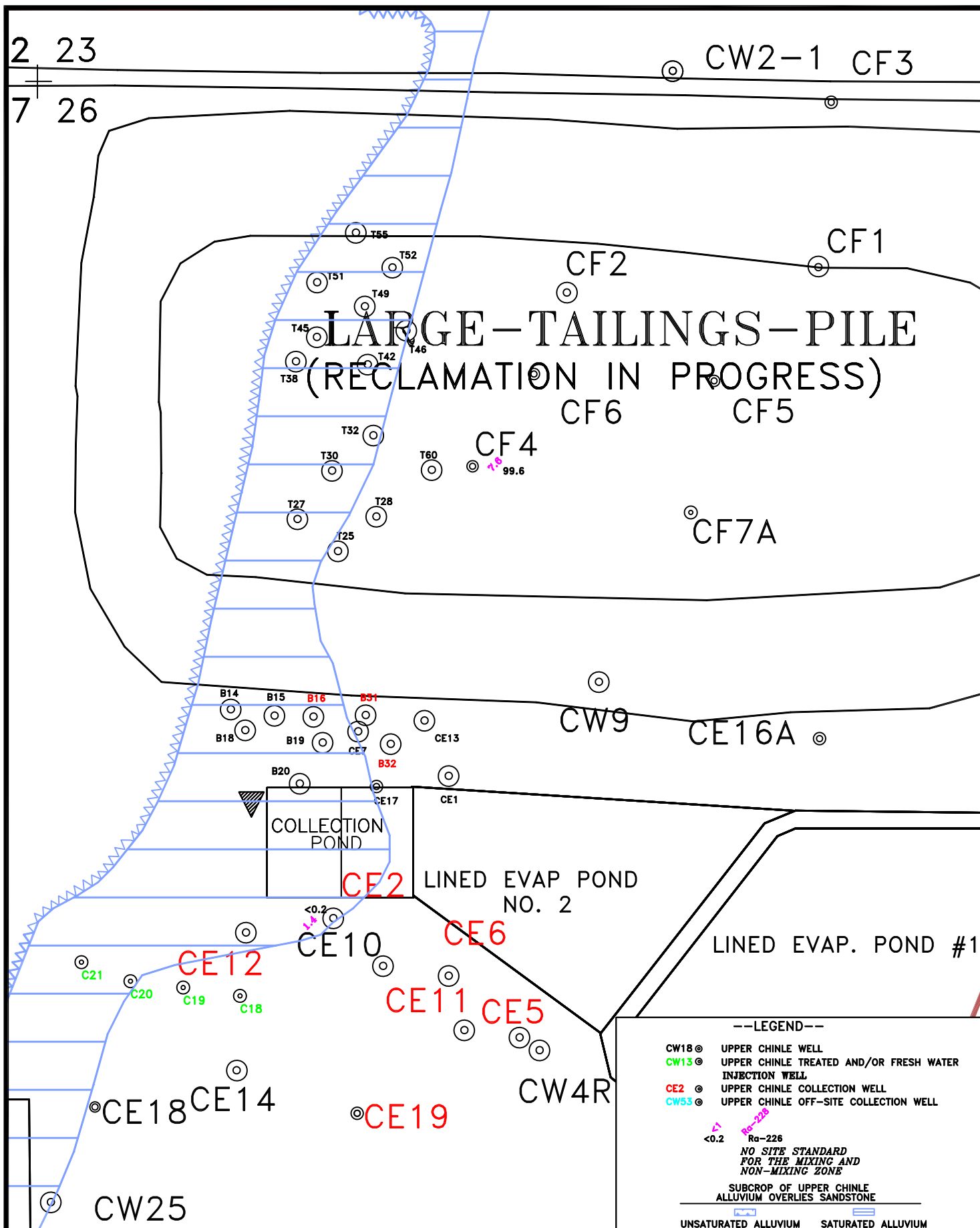
DATE: 12/9/2020

FIGURE 5.3-20A. NITRATE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, OS, 2020, mg/L

SCALE: 1"= 500'

PAGE: 5.3-35





HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

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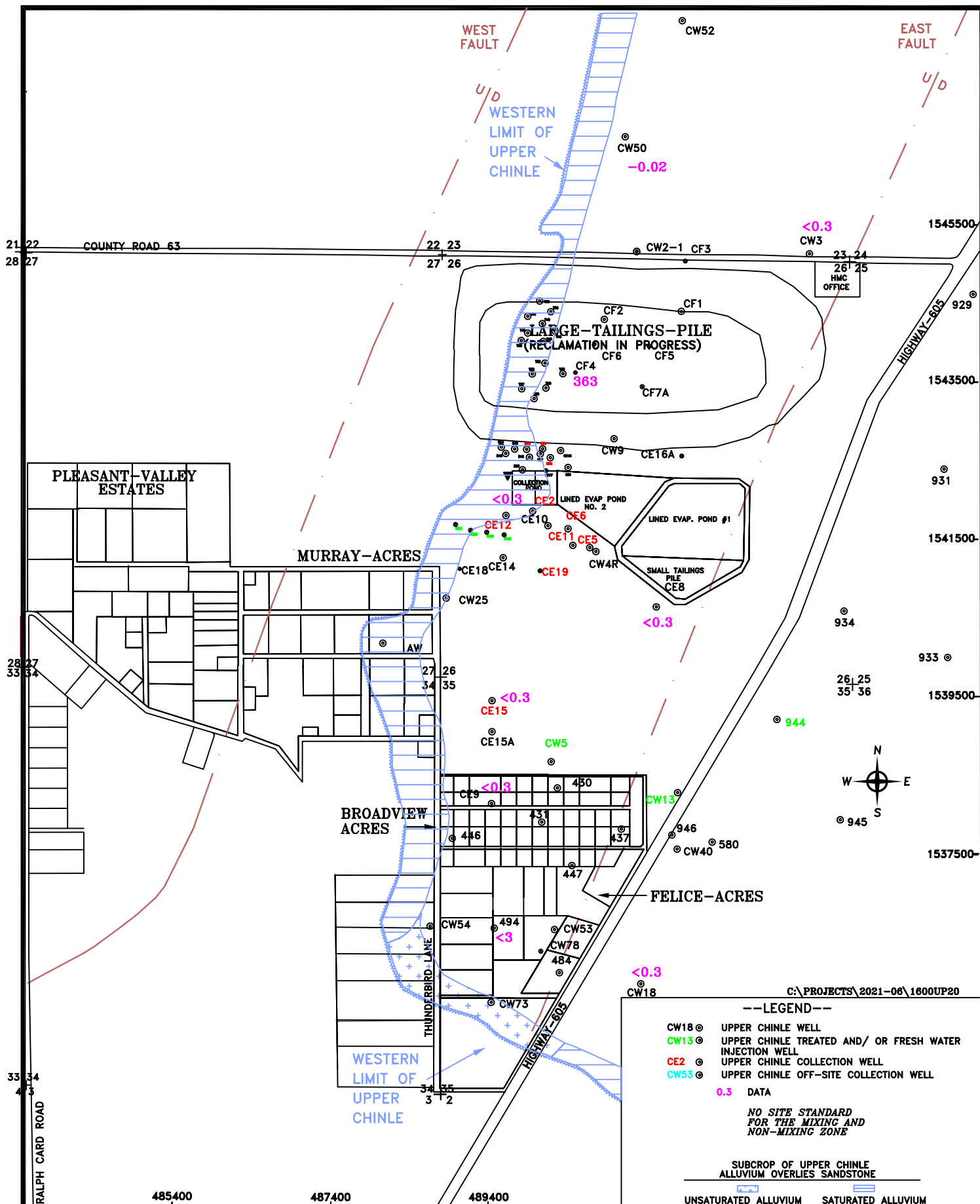
FIGURE 5.3-21A. RADIUM-226 AND RADIUM-228 CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, OS, 2020, pCi/L

SCALE: 1"= 500'

PAGE: 5.3-37







**TABLE 5.3-1. UPPER CHINLE SITE STANDARDS AND 2020 BACKGROUND UPPER CHINLE DATA**

	CONSTITUENT, concentrations in mg/L							
Aquifer Zone	Selenium	Uranium	Molybdenum	TDS	Sulfate	Chloride	Nitrate	Vanadium
<b>CHINLE SITE STANDARDS</b>								
Chinle Mixing	0.14	0.18	0.10	3140	1750	250	15	0.01
Upper Chinle Non-Mixing	0.06	0.09	0.10	2010	914	412	*	0.01
<b>CHINLE MIXING ZONE WELLS</b>								
CW9	-	-	-	-	-	-	-	-
CW50	<0.001	0.02	0.002	1710	881	56	0.6	<0.01
CW52	-	-	-	-	-	-	-	-
CW15	-	-	-	-	-	-	-	-
CW24	-	-	-	-	-	-	-	-
CW35	0.06	0.17	0.001	2360	1280	66	3.0	<0.01
CW36	-	-	-	-	-	-	-	-
CW37	-	-	-	-	-	-	-	-
CW39	-	-	-	-	-	-	-	-
CW43	0.04	0.048	<0.01	2640	1260	222	7.0	<0.2
<b>UPPER CHINLE NON-MIXING ZONE WELLS</b>								
931	-	-	-	-	-	-	-	-
934	-	-	-	-	-	-	-	-
CW18	0.01	0.03	<0.001	2020	724	208	1.7	<0.01

\* Background water quality analyses for constituent determined that site standard is not necessary.

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## SECTION 6

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## **6.0 MIDDLE CHINLE AQUIFER MONITORING**

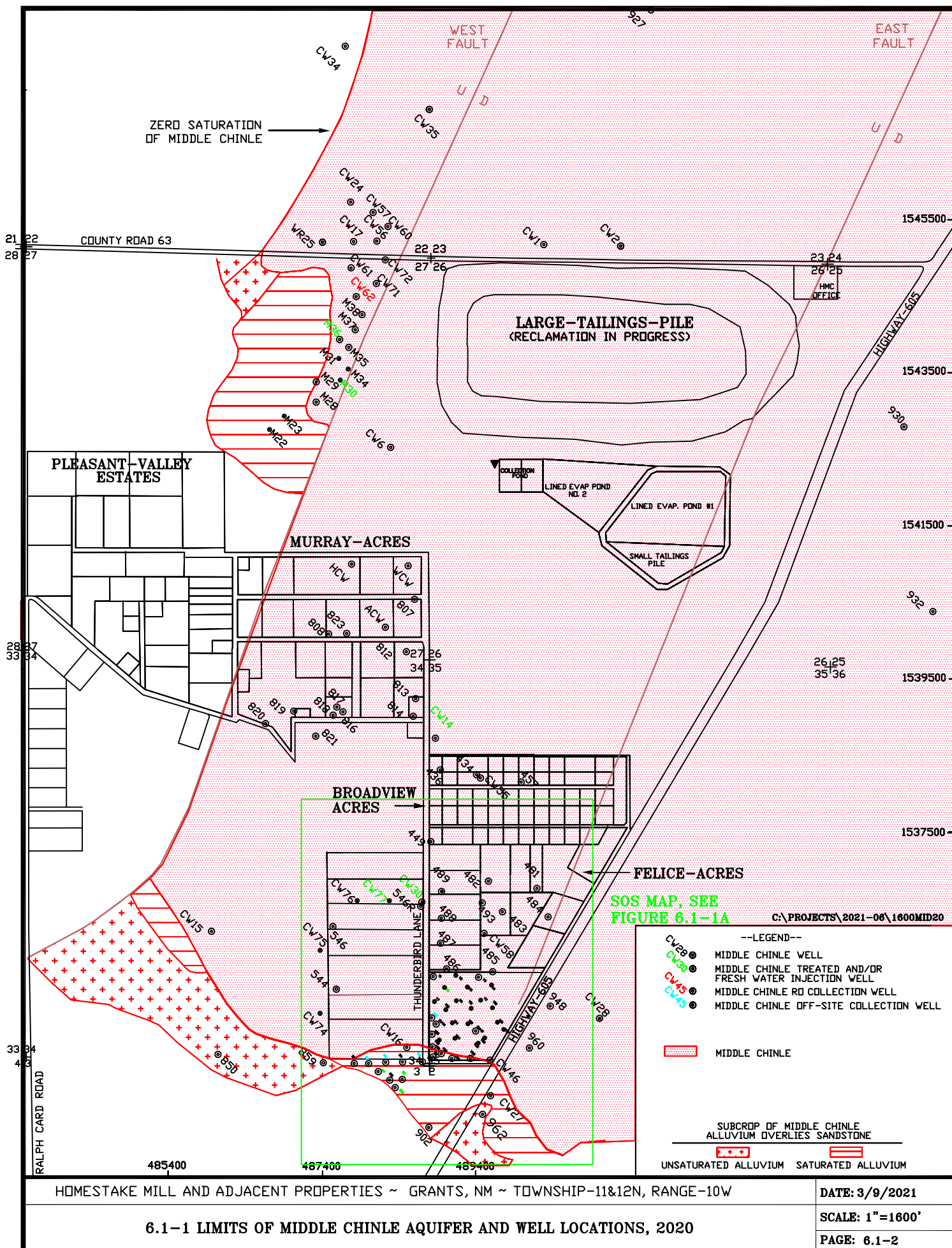
### **6.1 MIDDLE CHINLE WELL COMPLETION AND LOCATION**

Tables 5.1-1 through 5.1-4 (previous section) present the Middle Chinle well data along with other Chinle aquifer wells. Figures 6.1-1 and 6.1-1A show the locations of the Middle Chinle wells and areas where the Middle Chinle aquifer exists at the Grants Project. Figure 6.1-1A shows the closely spaced wells in South Felice Acres and the northeast portion of Section 3. The area where the alluvium is saturated and has direct contact with the Middle Chinle sandstone is important with respect to transfer of water between these two aquifers and is shown with the red horizontal cross hatch pattern. The area where the Middle Chinle subcrops against alluvium that is not saturated is shown by the red plus (+) pattern. Additional geophysical logging of some of the R wells in the northeast corner of Section 3 has refined the limits of the Middle Chinle aquifer in this area and therefore some of the R wells thought to be within the subcrop area at the time of installation are located south of the subcrop and have been removed from the Middle Chinle mapping and analyses.

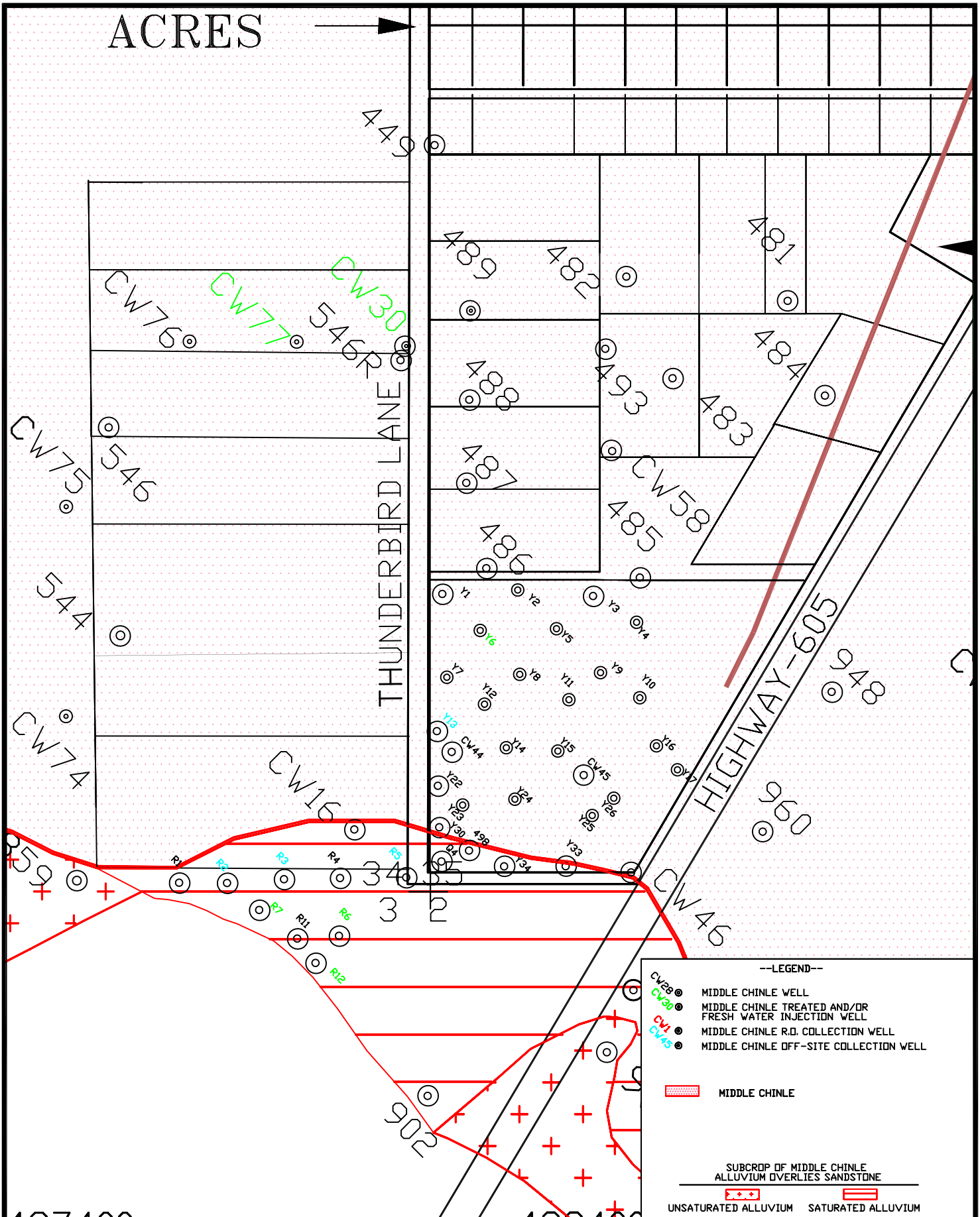
The Middle Chinle aquifer also exists east of the extension of the East Fault (shown as a red pattern area on Figure 6.1-1) with an alluvium-Middle Chinle subcrop zone on the south side of this area. A limited area of Middle Chinle aquifer exists west of the West Fault. All three of these areas in the Middle Chinle aquifer act as separate groundwater systems, except that there is some connection between two of the three areas of the Middle Chinle near the south end of the East Fault in the southwest corner of Section 35. No additional Middle Chinle wells were drilled in 2020.

Wells CW14, CW30, CW77, M30, M36, R6, R7, R12 and Y6 were used for treated and/or fresh-water injection in 2020. Middle Chinle wells R2, R3, R5 and Y13 were used as South Off-site collection wells in 2020 for treatment through the zeolite system. Well CW62 was used as an On-site Middle Chinle collection well supply to the R.O. plant in 2020.





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DATE: 3/9/2021

6.1-1A. LIMITS OF MIDDLE CHINLE AQUIFER AND WELL LOCATIONS, SOS, 2020

SCALE: 1"=500'

PAGE: 6.1-3

## 6.2 MIDDLE CHINLE WATER LEVELS

Water levels in HMC's Upper, Middle and Lower Chinle wells are presented in [Appendix A](#). Fall 2020 water-level elevation contours for the Middle Chinle aquifer are presented on [Figures 6.2-1 and 6.2-1A](#). The hydraulic gradient in the Middle Chinle aquifer is steeper in its alluvial subcrop area in the southern portion of Felice Acres in the Y well area. A depression in the potentiometric surface resulting from pumping Middle Chinle South Collection well Y13 in 2020 existed in the Middle Chinle aquifer in this area prior to the November water level measurement. This depression was mainly recovered in the Middle Chinle in this portion of South Felice Acres when the water levels were measured due to the South collection being off just prior to the water level measurements. The higher heads south of this depression in the Middle Chinle aquifer are due to an influx of water to the Middle Chinle aquifer from the alluvial aquifer. The red arrows on [Figures 6.2-1 and 6.2-1A](#) show the direction of groundwater flow in the Middle Chinle aquifer. Flow on the east side of the East Fault is toward well CW28 near the East Fault.

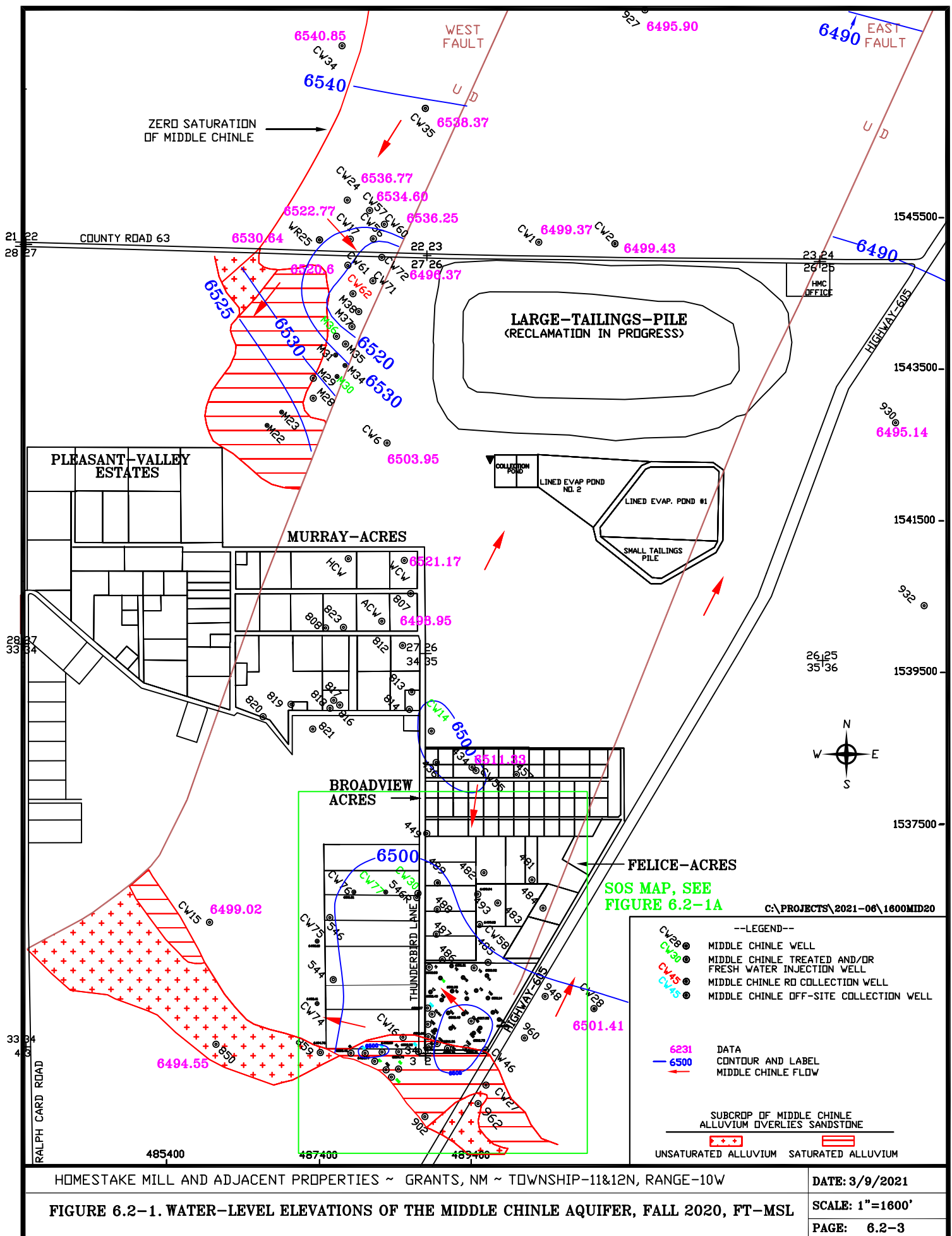
Groundwater flow west of the West Fault in the Middle Chinle aquifer is mainly to the southwest, and it discharges into the alluvial aquifer. The offset of the Middle Chinle sandstone by the faults causes the Middle Chinle aquifers to act as separate aquifers on each side of the faults with significant difference in water-level elevations. The pumping of RO collection well CW62 is pulling Middle Chinle water in this area toward this well. This Middle Chinle water flows from up-gradient of the site into the area west of the LTP. The alluvial injection in the northern portion of Section 27 temporarily had reversed the gradient near well CW17 in 2006 through 2015. This allowed some movement to the north toward well CW17 but the collection at well CW62 is intercepting this flow since collection started in 2016. The remainder of the Middle Chinle aquifer is recharged by the alluvial aquifer south of Felice Acres.

The injection of treated and/or fresh water into wells CW14 (north of Broadview Acres) and wells CW30 and CW77 (west of Felice Acres) has created groundwater mounds in their respective areas. These mounds cause the groundwater to flow both north and south from these three wells. The head in the Middle Chinle aquifer on each side of the two faults is significantly different than the head between the two faults, which demonstrates that the groundwater is not readily connected on each side of these two faults.

[Figure 6.2-2](#) shows the locations of the Middle Chinle wells that are used to monitor water-level changes with time. The colors and symbols used on this figure are the same as those

used on the water-level elevation time plots. [Figure 6.2-3](#) presents the water-level elevation changes versus time in Middle Chinle wells 493, CW28, CW45, CW58, CW75 and CW76. Water levels in wells 493, CW28, CW45, CW58, CW75 and CW76 recovered in 2020 due to the smaller rate of collection from the Middle Chinle aquifer in the Felice Acres area.

The water-level plots for the Middle Chinle wells located west of the West Fault and wells CW2 and ACW are presented on [Figure 6.2-4](#). Water levels had been gradually increasing in the Middle Chinle aquifer west of the West Fault but the CW62 pumping in 2016 through 2020 caused the water levels in the Middle Chinle aquifer west of the West Fault to become fairly steady in 2020 as shown in water level data for wells CW17 and CW35. Water levels overall rose in Middle Chinle wells ACW and CW2 in 2020, which is thought to be due to variations in the South Felice Acres pumping. As expected, the pumping of well CW62 west of the West Fault did not cause any drawdown in water level in well CW2 which is located east of the West Fault.

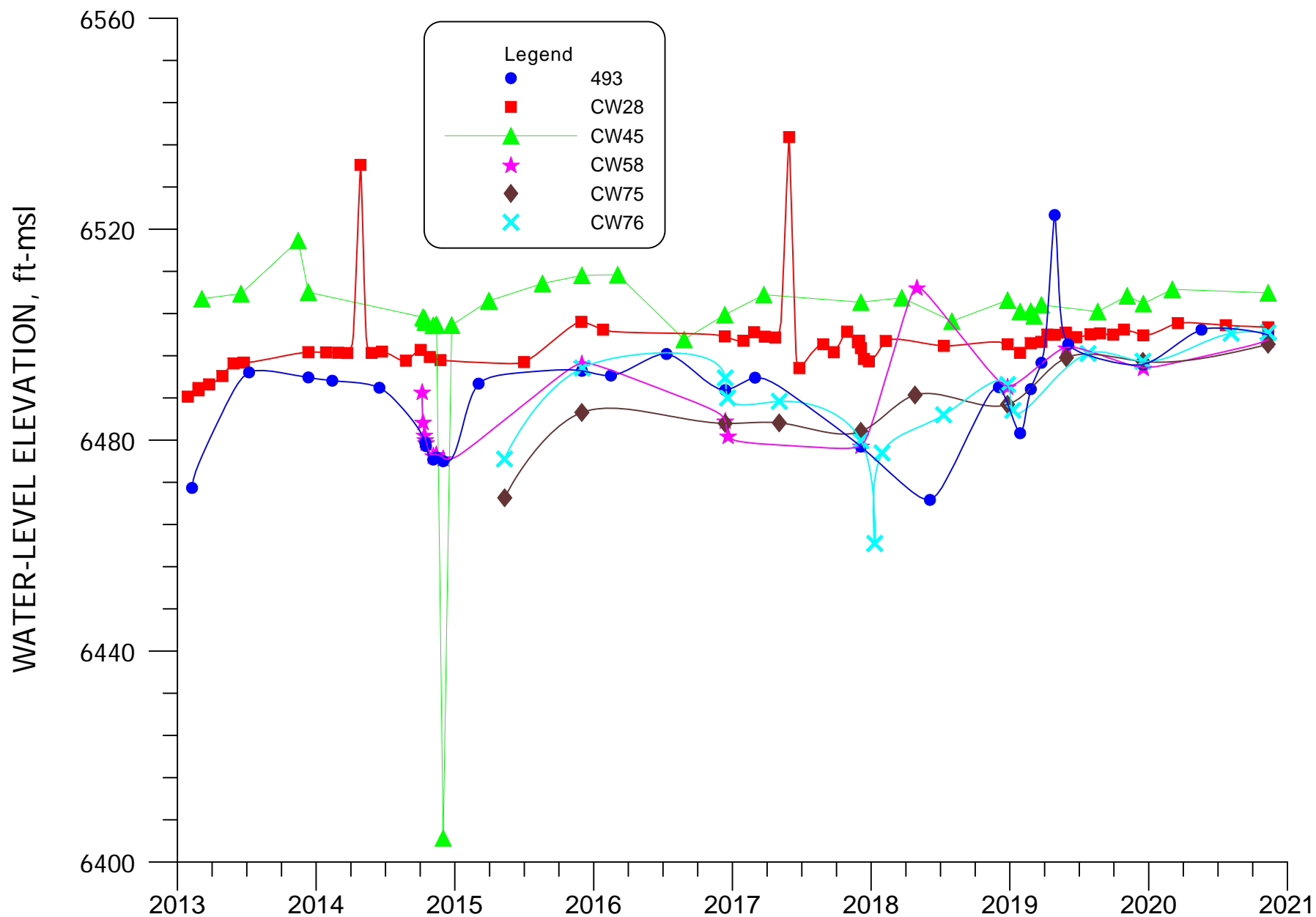


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FIGURE 6.2-1. WATER-LEVEL ELEVATIONS OF THE MIDDLE CHINLE AQUIFER, FALL 2020, FT-MSL



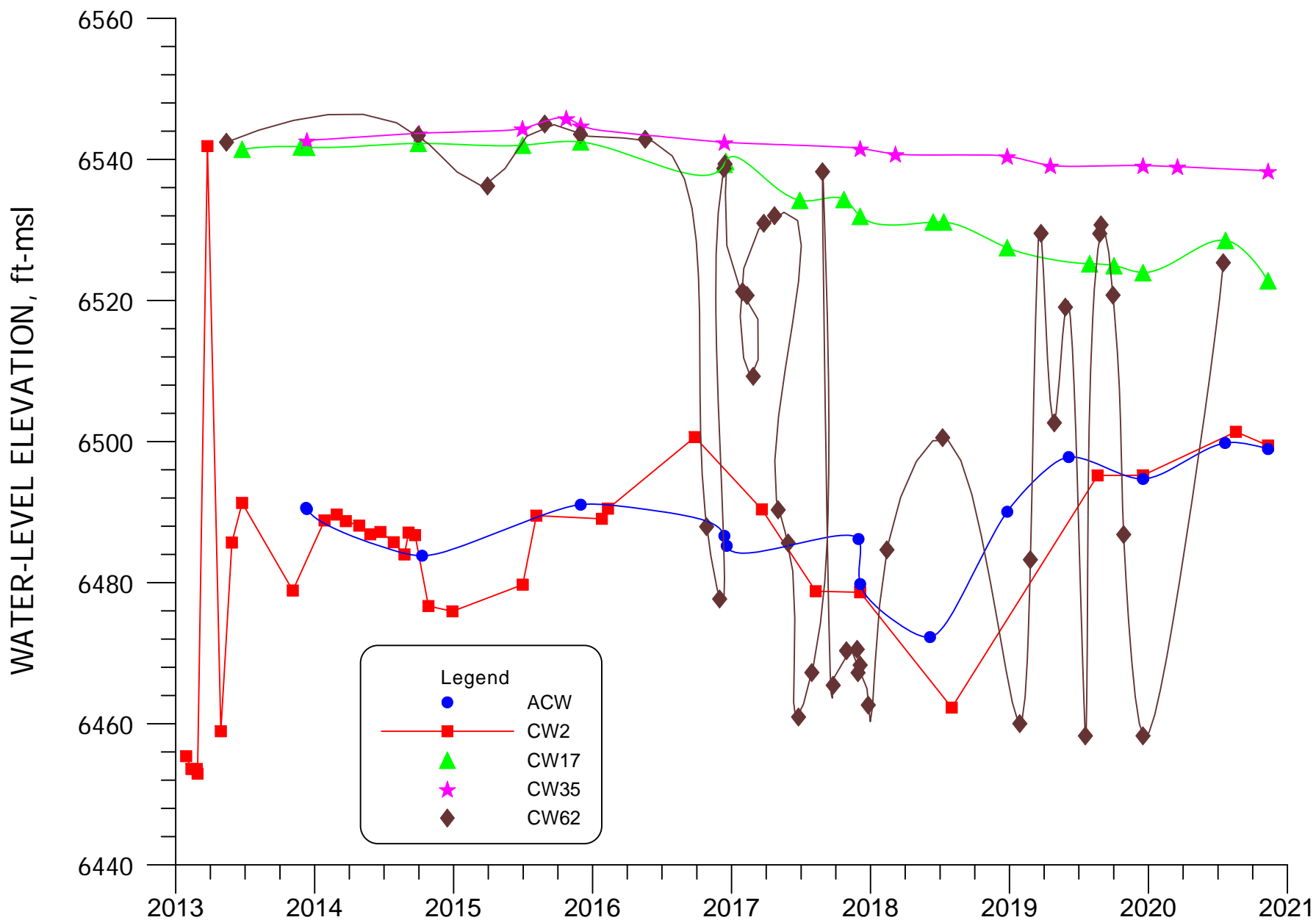




**FIGURE 6.2-3. WATER-LEVEL ELEVATION FOR WELLS 493, CW28, CW45, CW58, CW75 AND CW76**



6.2-7



**FIGURE 6.2-4. WATER-LEVEL ELEVATION FOR WELLS ACW, CW2, CW17, CW35 AND CW62**

### 6.3 MIDDLE CHINLE WATER QUALITY

The 2020 water-quality data for HMC's Middle Chinle aquifer wells is presented with the other Chinle aquifer wells in [Tables B.5-1 and B.5-2 of Appendix B](#). The Chinle aquifer water-quality results for subdivision wells are also presented in these tables. The basic well data for the Middle Chinle aquifer wells is presented in [Tables 5.1-1 through 5.1-4](#) in the Upper Chinle aquifer monitoring section ([Section 5](#)). Several Middle Chinle wells were sampled in 2020 to further define the constituent concentration changes in the Middle Chinle aquifer.

The Middle Chinle wells used in establishing the Chinle site standards are shown on [Figure 6.3-1](#) with a blue box around the well name indicating which Middle Chinle wells were used to define the non-mixing zone site standard. The yellow pattern on this figure shows the mixing zone for the Middle Chinle aquifer. The Middle Chinle wells used in conjunction with the Upper and Lower Middle Chinle wells (see [Figures 5.3-1 and 7.3-1](#) for the Upper and Lower Chinle wells used, respectively) in establishing the mixing zone site standards are shown with a red box around their well names. [Table 6.3-1](#) presents Chinle mixing zone site standards and the non-mixing zone Middle Chinle site standards. This table also presents the 2020 data for the Chinle mixing zone wells and the Middle Chinle non-mixing zone wells.

The area of water-quality concern in the Middle Chinle aquifer exists in portions of Broadview Acres and Felice Acres and west of Felice Acres. All sulfate concentrations in the Middle Chinle aquifer in 2020 are within the site standards. Likewise, TDS and chloride concentrations in the Middle Chinle aquifer do not exceed the site standards in 2020 except for four TDS values in the non-mixing zone. Uranium concentrations are above site standards in western Broadview Acres and Felice Acres and west of the West Fault. The concentrations in well CW35 in the northern portion of the Middle Chinle west of the West Fault are natural due to the groundwater flow to the south in this area. Uranium concentrations in well CW35 have been slightly above the site standard at times in the past. Selenium concentrations also exceed the site standard in one Felice Acres area well, one well east of Felice Acres and a small area west of the West Fault. The only significant molybdenum concentrations identified in the Middle Chinle aquifer are in wells that are in a small area west of the West Fault.

### 6.3.1 SULFATE - MIDDLE CHINLE

Figures 6.3-1A and 6.3-1B present sulfate concentration contours for the Middle Chinle aquifer for 2020 and the sulfate site standard concentrations are given in the legend of these figures. Figure 6.3-1B presents sulfate concentrations of the Middle Chinle wells in South Felice Acres and the R collection wells in the northeast portion of Section 3. All mixing-zone sulfate concentrations in the Middle Chinle aquifer are below the site standard of 1750 mg/L. Sulfate concentrations in the area of well CW62, which is located west of the West Fault have been restored by the collection of Middle Chinle water from this well for RO treatment. The sulfate levels were naturally occurring in this area, until the increase in the head of the alluvial water in the subcrop area caused the alluvial water to flow into the Middle Chinle. Sulfate concentrations in the non-mixing zone of the Middle Chinle are within the natural background range and meet the site standard. The sulfate concentrations for the R wells in the northeast portion of Section 3 and the Y wells in South Felice Acres are posted on Figures 6.3-1B at a scale of 1" = 500', and all of these values are less than the site standard.

Figure 6.3-2 shows the locations of the Middle Chinle wells for which time concentration plots were developed for this report. The sulfate figure number is shown in the group area to define the figure number for each group of wells. Three groups of wells for the Middle Chinle aquifer are presented to show the concentration changes with time. The colors and symbols on Figure 6.3-2 correspond to those used in the concentration time plots.

Figure 6.3-3 presents sulfate concentrations for the mixing zone Middle Chinle wells CW17, CW35, CW45 and CW62. All of the 2020 concentrations on this plot are below the mixing zone site standard which is shown on the plot for ease in comparison. The time concentrations for the Middle Chinle mixing zone wells in Felice Acres are shown on Figure 6.3-3A for wells CW76, Y7 and Y13. None of the 2020 sulfate concentrations in these wells exceed the mixing zone site standard in 2020. Figure 6.3-4 presents the sulfate concentrations for non-mixing zone Middle Chinle wells 493, ACW, CW1, CW2 and CW55 which are located between the two faults and well CW28 which is located east of the East Fault. This plot shows that all of the sulfate concentrations in these wells are less than the non-mixing zone site standard of 857 mg/L.

### **6.3.2 TOTAL DISSOLVED SOLIDS - MIDDLE CHINLE**

Total dissolved solids (TDS) and sulfate are used to define changes in major constituents at the Grants Project site. [Figures 6.3-5 and 6.3-5A](#) present contours of TDS concentrations for the Middle Chinle aquifer during 2020 and shows that all values are below 2000 mg/L near the alluvial subcrop area in the southern portion of the map (see [Figure 6.3-5A](#) for posting of Y wells in South Felice Acres and the R collection wells in the northeast portion of Section 3) except for wells R1 and R2. None of the wells west of the West Fault exceed the TDS mixing zone site standard while three wells in Broadview, Felice and Murray Acres and one north of the LTP exceed the non-mixing zone standard in 2020.

Background data for the Middle Chinle aquifer were used to determine TDS site standards of 3140 and 1560 mg/L for the mixing and non-mixing zones, respectively. All of the TDS values measured in Middle Chinle aquifer water were less than these values in 2020, except for wells 493, ACW and CW55.

Plots of TDS concentrations for Middle Chinle wells CW17, CW35, CW45 and CW62 are presented in [Figure 6.3-6](#). The TDS concentrations are presented for RO collection well CW62 in this figure. The highest TDS measured in wells west of the West Fault in 2020 is below but near the mixing zone site standard. Plots of TDS concentrations for Middle Chinle collection wells Y7 and Y13 and Middle Chinle monitoring well CW76 are presented in [Figure 6.3-6A](#) which shows that all of these concentrations are significantly below the site standard. [Figure 6.3-7](#) presents TDS concentration-time plots for non-mixing zone Middle Chinle wells 493, ACW, CW1, CW2, CW28 and CW55. TDS concentrations in wells 493, ACW and CW55 exceed the non-mixing zone site standard. The increase in TDS concentration for well 493 in 2020 should not be given any significance until confirmed in the future because the sulfate and chloride concentrations for this well did not indicate an increase.

### **6.3.3 CHLORIDE - MIDDLE CHINLE**

[Figures 6.3-8 and 6.3-8A](#) present chloride concentrations in the Middle Chinle aquifer during 2020. None of the concentrations exceeded the site standard of 250 mg/L for the mixing and non-mixing zones of the Middle Chinle aquifer. Therefore, chloride concentrations are not useful for defining the degree of, or the need for, restoration of the Middle Chinle aquifer.

Time plots of chloride concentration are presented because changes in this conservative parameter are useful in analyses of other constituents. [Figure 6.3-9](#) presents the chloride concentrations for Middle Chinle wells CW17, CW35, CW45 and CW62 which show fairly steady concentrations in 2020 except for the decline in well CW17. The plot of chloride concentrations for RO collection well CW62 shows a very gradual declining trend for the last few years. An additional plot of chloride concentrations for the Middle Chinle wells in South Felice Acres was added in [Figure 6.3-9A](#) with all concentrations significantly less than 250 mg/L. The third chloride concentration plot for the Middle Chinle aquifer is presented in [Figure 6.3-10](#) for wells 493, ACW, CW1, CW2, CW28 and CW55 with all of these chloride concentrations below the site standard in 2020.

#### **6.3.4 URANIUM - MIDDLE CHINLE**

Uranium is an important constituent in the Middle Chinle aquifer due to the presence of elevated concentrations in the aquifer in western Broadview Acres and in the southern and western portions of Felice Acres. These elevated concentrations are a result of alluvial recharge to the Middle Chinle aquifer in this area. Water in the saturated portion of the alluvium flows across a subcrop of the Middle Chinle aquifer just south of Felice Acres, and alluvial groundwater has entered the Middle Chinle aquifer in this area. [Figures 6.3-11](#) and [6.3-11A](#) present contours of uranium concentrations in the Middle Chinle aquifer during 2020. An area of concentrations greater than the mixing-zone site standard exists in the western portion of Felice Acres and the northeast portion of Section 3 (see [Figure 6.3-11A](#)). The blowup of South Felice Acres and the northeast portion of Section 3 in [Figure 6.3-11A](#) presents the posting of uranium concentration in the Y and R collection wells in this area. Uranium concentrations in the Middle Chinle aquifer west of the West Fault and northwest of the LTP naturally exceed 0.18 mg/L, but values in several wells have increased above this level as a result of movement of alluvial water in the subcrop to these wells. Flow in the Middle Chinle aquifer west of the West Fault moves from the area near well CW35 toward the subcrop area to the south. Uranium concentrations exceed 0.07 mg/L (non-mixing zone site standard) in an area of the Middle Chinle aquifer in northern Felice Acres and western Broadview Acres.

Figure 6.3-12 presents uranium concentration plots versus time for Middle Chinle wells CW17, CW35, CW45 and CW62 (see Figure 6.3-2 for well locations). This plot shows the decline in uranium concentrations in well CW17 to below the site standard while uranium concentrations in collection well CW62 have been fairly steady after the decline in 2016 from the start of the pumping of this well. Figure 6.3-12A shows the concentrations in pumping South Felice wells Y7 and Y13 and monitoring well CW76 and shows that the uranium concentration is below the site standard in well Y7 but above the standard in well Y13. The uranium concentration plots for the Middle Chinle wells in the non-mixing zone are presented on Figure 6.3-13.

### 6.3.5 SELENIUM - MIDDLE CHINLE

None of the Middle Chinle wells in the mixing zone contained water with selenium concentrations exceeding the 0.14 mg/L site standard in 2020, except for one well west of the West Fault (see Figure 6.3-14). The higher selenium concentrations in this area is caused by movement of alluvial water in the subcrop to this area. None of the R and Y wells in southern Felice Acres or the northeast portion of Section 3 (see Figure 6.3-14A for the posted values) contain water with elevated selenium concentrations. The selenium concentration in the non-mixing zone well 493 currently slightly exceeds the site standard of 0.07 mg/L. This area of elevated concentration has resulted from recharge to the Middle Chinle aquifer from the alluvium in the subcrop area just south of Felice Acres. Flow in the Middle Chinle aquifer in this locale is toward the north causing chemical constituents introduced into the Middle Chinle from the alluvium in the subcrop area to move to the north. Analysis of background selenium concentrations in the mixing and non-mixing zones resulted in setting site standards of 0.14 and 0.07 mg/L, respectively (see legend of Figures 6.3-14 and 6.3-14A).

Selenium concentrations with time for the mixing zone Middle Chinle wells CW17, CW35, CW45 and CW62 are presented in Figure 6.3-15 which shows that all of these concentrations have been below the site standard for a few years except for collection well CW62. The selenium concentration in well CW62 is presently declining and may be below the site standard next year. Figure 6.3-15A shows that the South Felice Acres Middle Chinle

collection wells contain selenium concentrations that have already been restored to levels below the site standard.

Figure 6.3-16 presents the selenium concentrations for Middle Chinle wells in the non-mixing zone. The connection between the alluvial aquifer and the Middle Chinle aquifer south of Felice Acres is the cause for the elevated concentrations in wells 493 and CW28.

### **6.3.6 MOLYBDENUM - MIDDLE CHINLE**

The 2020 molybdenum concentrations in the Middle Chinle aquifer are presented on Figures 6.3-17 and 6.3-17A. None of the molybdenum concentrations for 2020 exceed the site standard of 0.10 mg/L except for a small area west of the West Fault.

Figure 6.3-18 presents the molybdenum concentrations with time for Middle Chinle wells CW17, CW35, CW45 and CW62 and shows a decline in concentrations in well CW17 to below the standard while fairly steady concentration is observed in well CW62. The molybdenum concentrations are below the site standard in the Middle Chinle in the Felice Acres area (see Figure 6.3-18A). Figure 6.3-19 presents the molybdenum concentrations with time for wells ACW, CW1, CW2, CW28 and CW55. The lower concentrations presented for the previous three years are due to the smaller analytical detection limits.

### **6.3.7 NITRATE - MIDDLE CHINLE**

Nitrate concentrations have always been low in the Middle Chinle aquifer and Figure 6.3-20 presents the nitrate concentrations in the Middle Chinle aquifer for 2020. All of the Middle Chinle contain nitrate concentrations below the site standard. This constituent does not require a site standard for the non-mixing zone of the Middle Chinle aquifer.

### **6.3.8 RADIUM-226 AND RADIUM-228 - MIDDLE CHINLE**

Radium concentrations in the Middle Chinle aquifer have always been low, showing that these two parameters are not important relative to the Middle Chinle aquifer. All of the radium-226 and radium-228 values measured in 2020 were very small. A site standard is not warranted and has not been set for these two constituents.

### **6.3.9 VANADIUM - MIDDLE CHINLE**

Vanadium concentrations in the Middle Chinle aquifer have always been low. Previous monitoring of vanadium in the Middle Chinle aquifer has demonstrated that vanadium is not a significant constituent in this aquifer. Monitoring of vanadium for the Middle Chinle should be eliminated, because only a few relatively low values have previously been detected in the alluvial aquifer near the tailings piles. All of the 2020 vanadium measurements for the Middle Chinle aquifer are at or below the detection limit. These values are consistent with values observed previously and, therefore, reinforce the conclusion that continued monitoring of vanadium concentrations in the Middle Chinle aquifer should not be required. A site standard for vanadium has therefore not been set for the Middle Chinle aquifer.

### **6.3.10 THORIUM-230 - MIDDLE CHINLE**

Thorium-230 concentrations are not significant in the alluvial aquifer outside of the Large Tailings Pile. Thorium-230 is, therefore, not a significant constituent in the Middle Chinle aquifer and should be eliminated from future monitoring in the Middle Chinle aquifer. All of the thorium-230 values measured in 2020 were very small at values of less than or equal to 0.3 pCi/L except for one higher value of less than 3 pCi/L. The laboratory adjusted its detection level after their initial measurements. These thorium-230 levels are consistent with concentrations previously measured in the Middle Chinle aquifer, which shows that thorium-230 is not an important parameter in the Middle Chinle aquifer and thus a site standard has not been set.



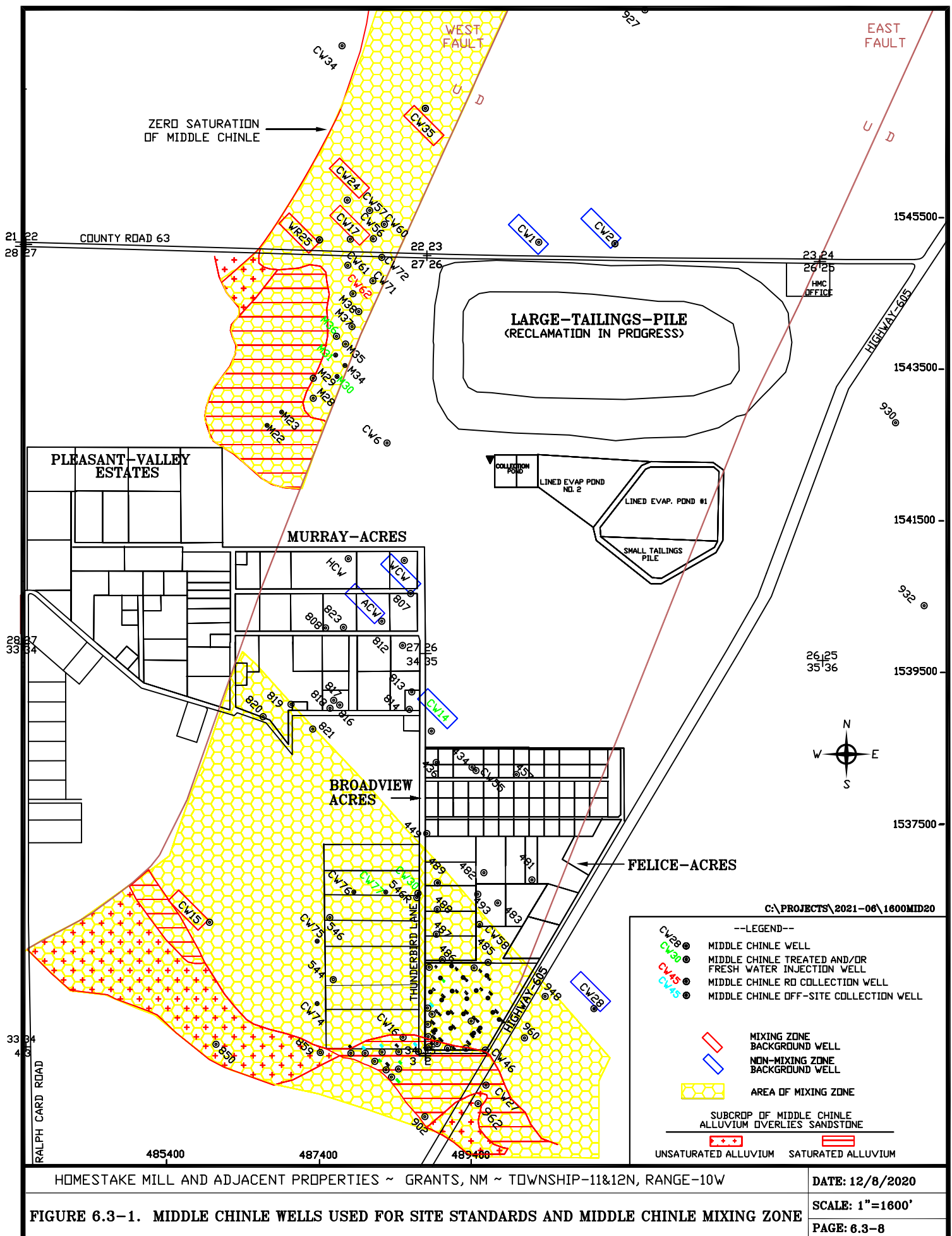
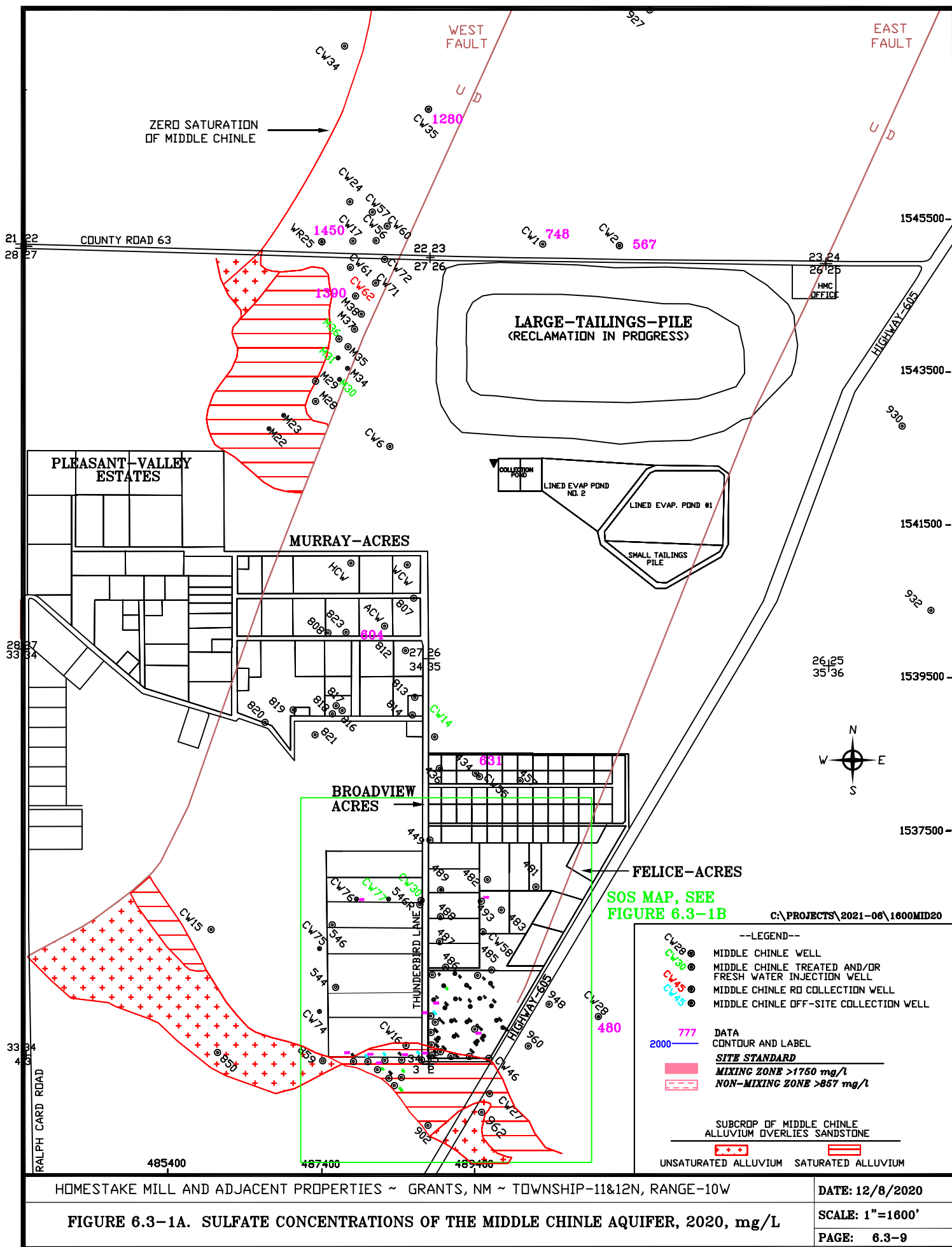
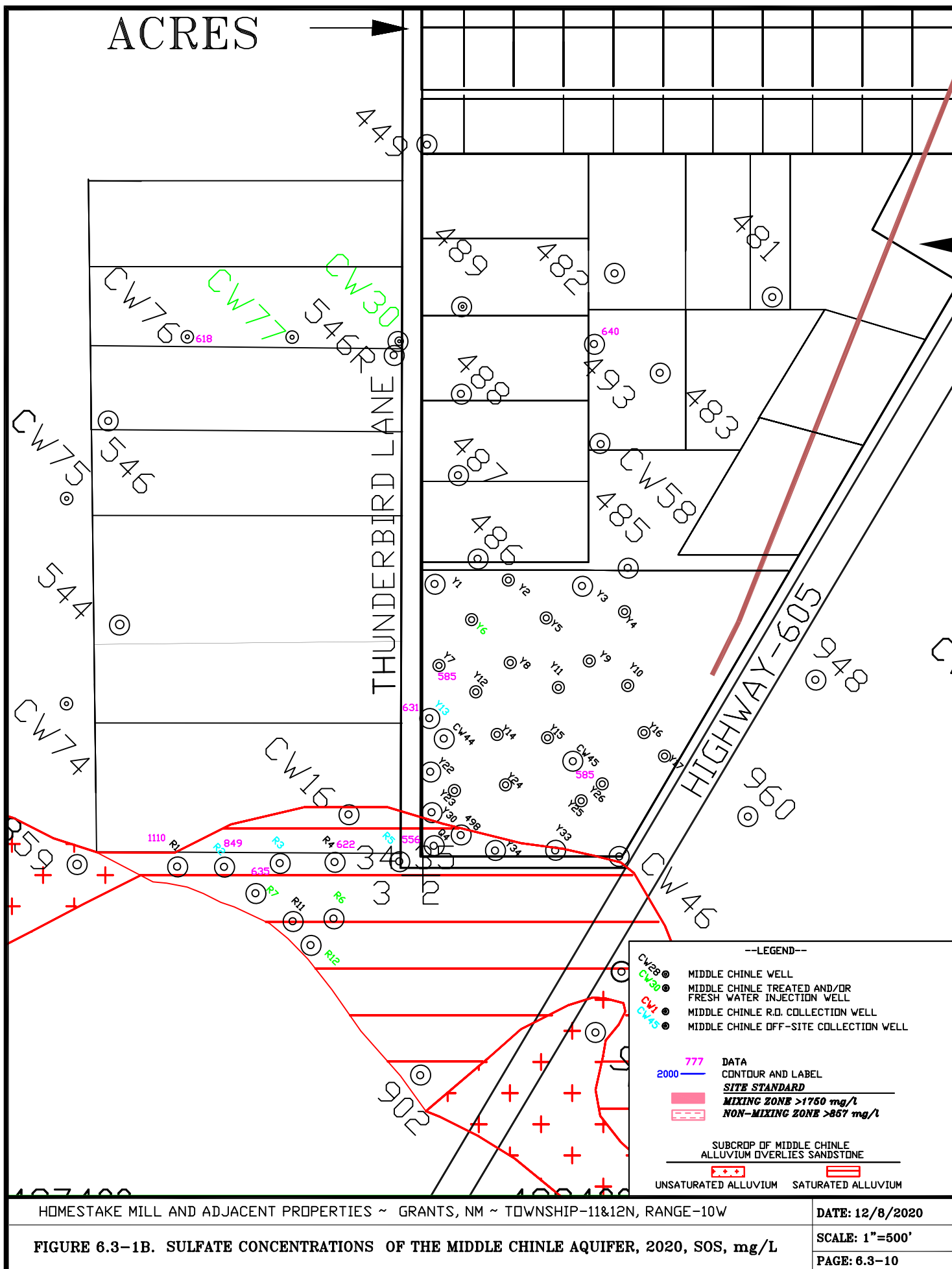


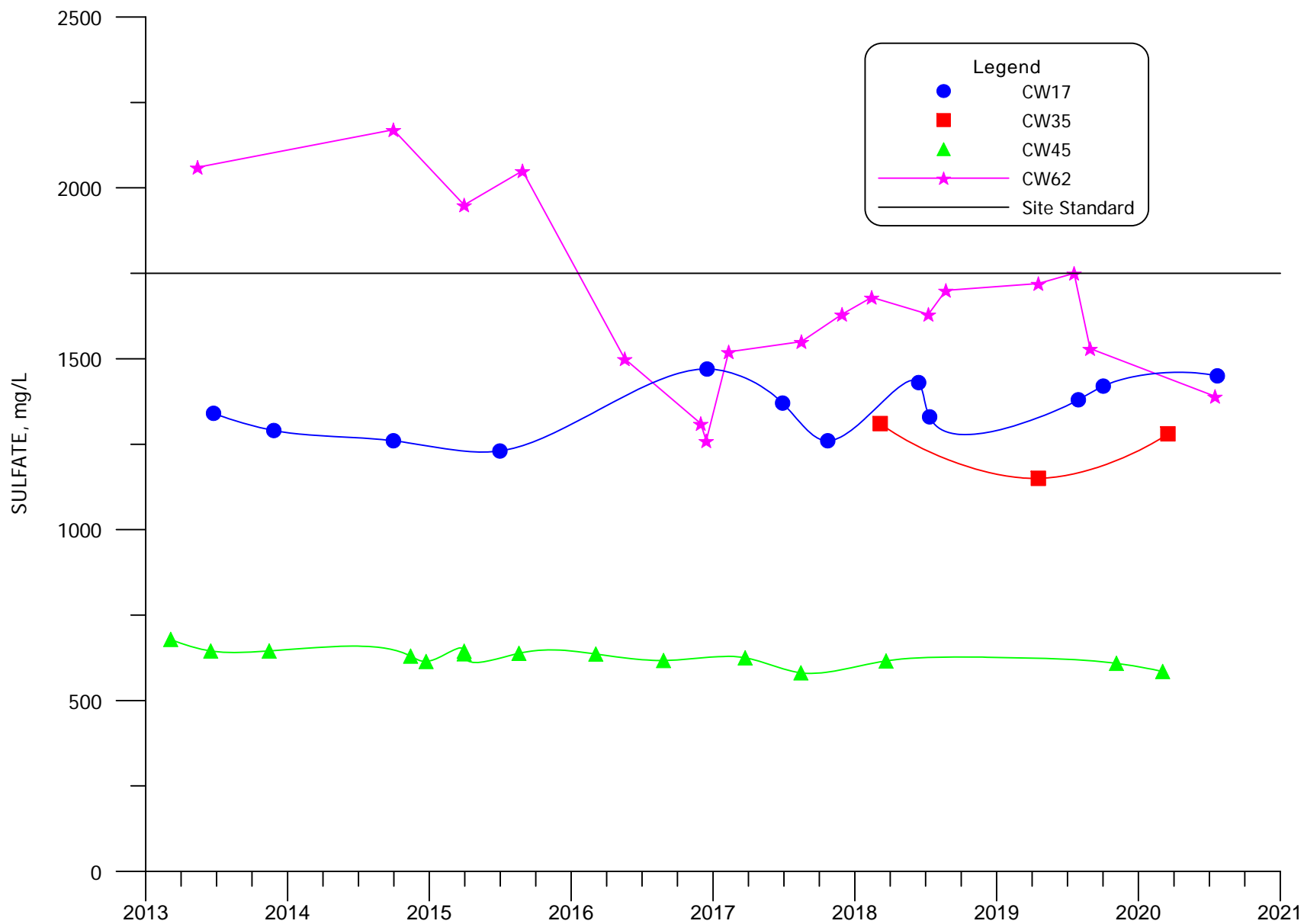
FIGURE 6.3-1. MIDDLE CHINLE WELLS USED FOR SITE STANDARDS AND MIDDLE CHINLE MIXING ZONE





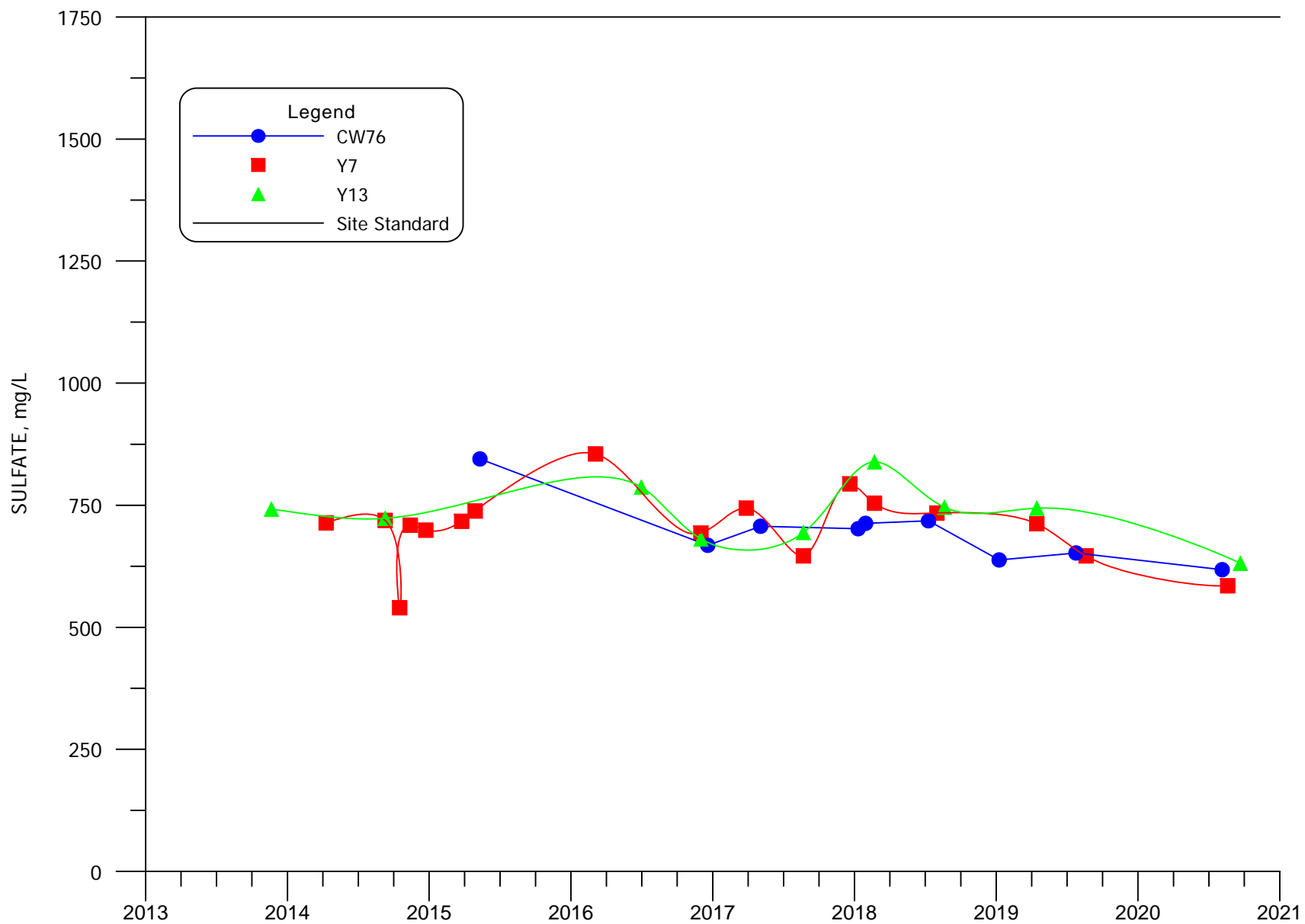


6.3-12



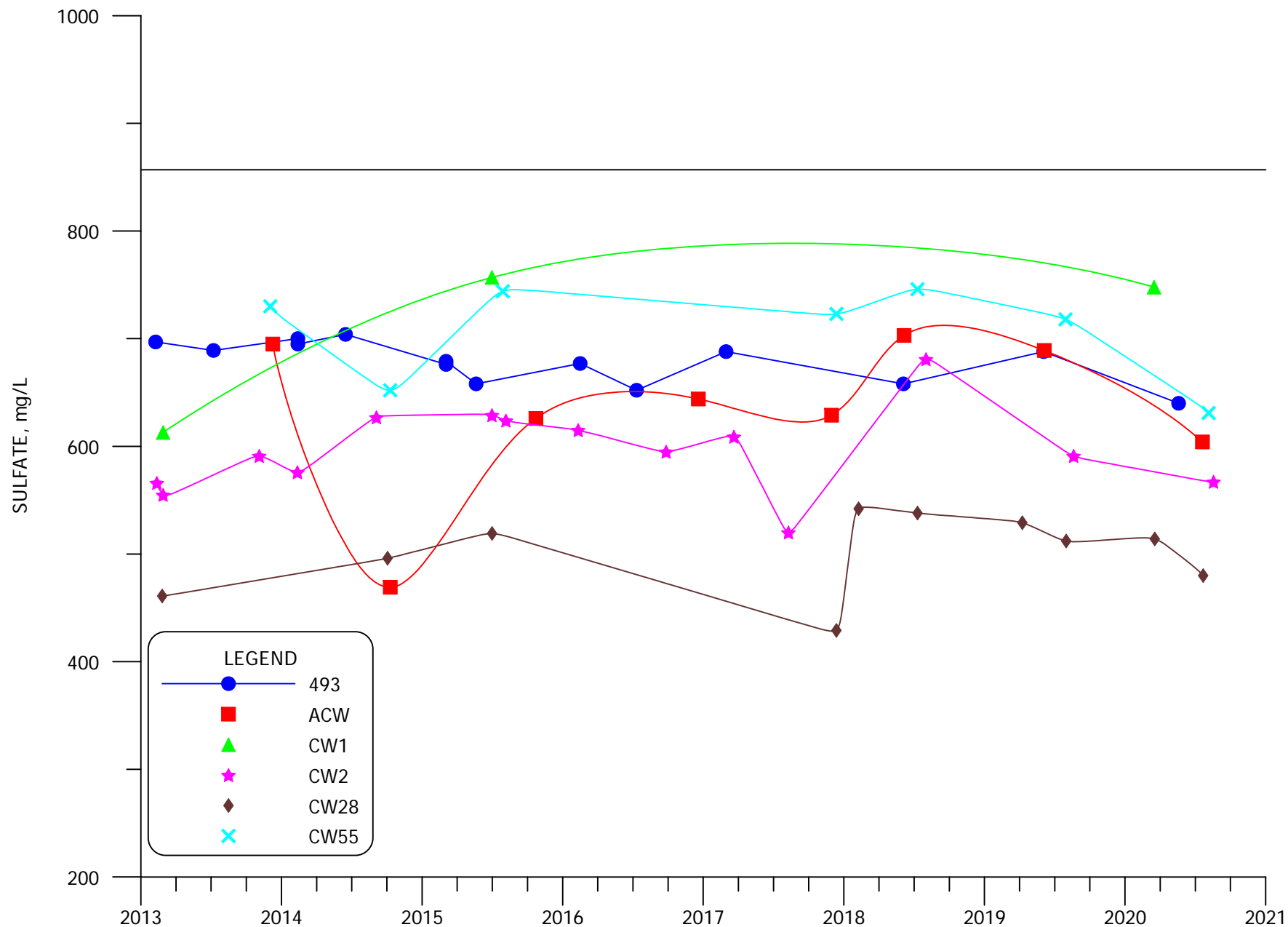
**FIGURE 6.3-3. SULFATE CONCENTRATIONS FOR MIXING ZONE WELLS  
CW17, CW35, CW45 AND CW62**

6.3-13



**FIGURE 6.3-3A. SULFATE CONCENTRATIONS FOR MIXING ZONE WELLS  
CW76, Y7 AND Y13**

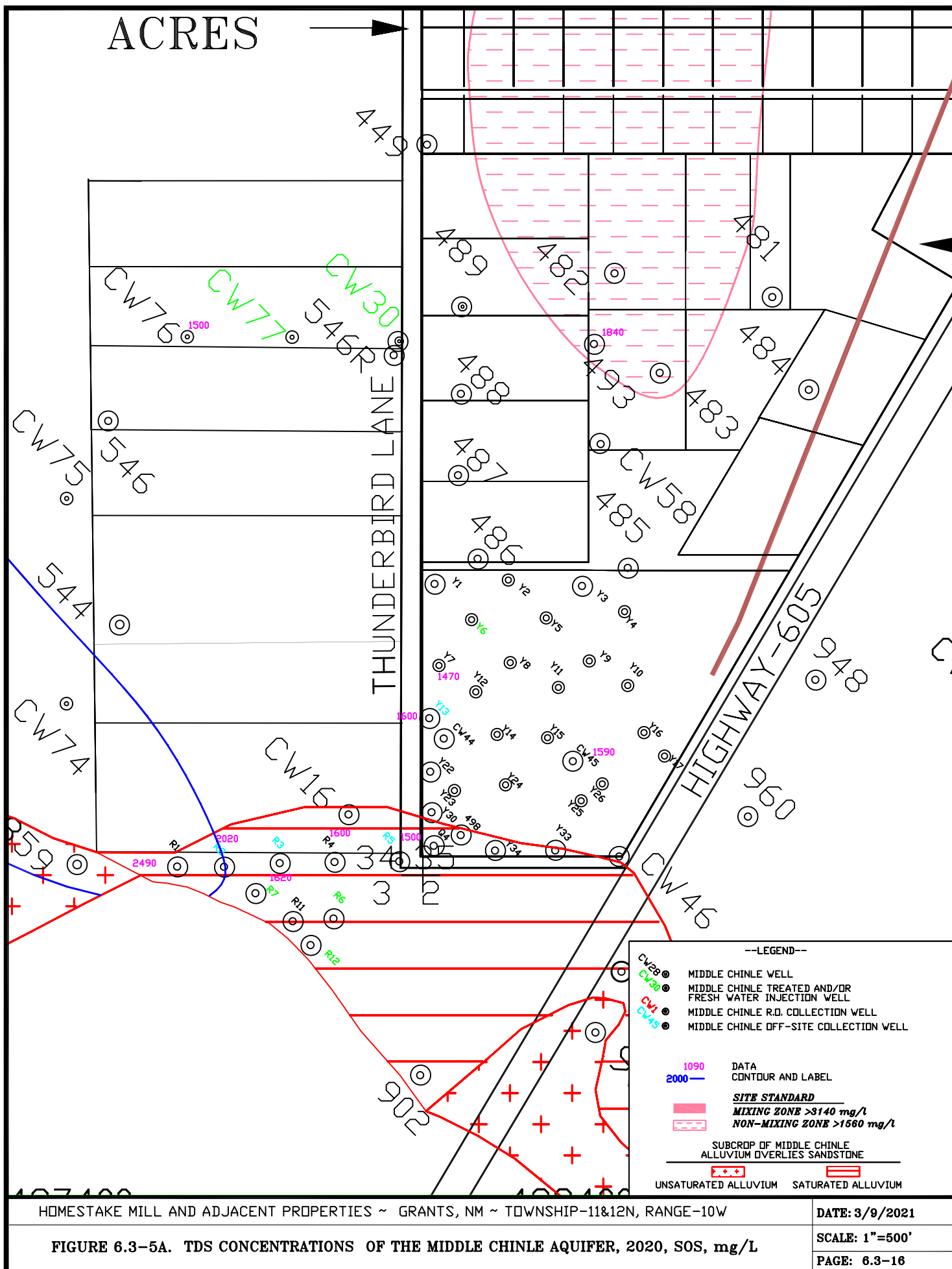
6.3-14

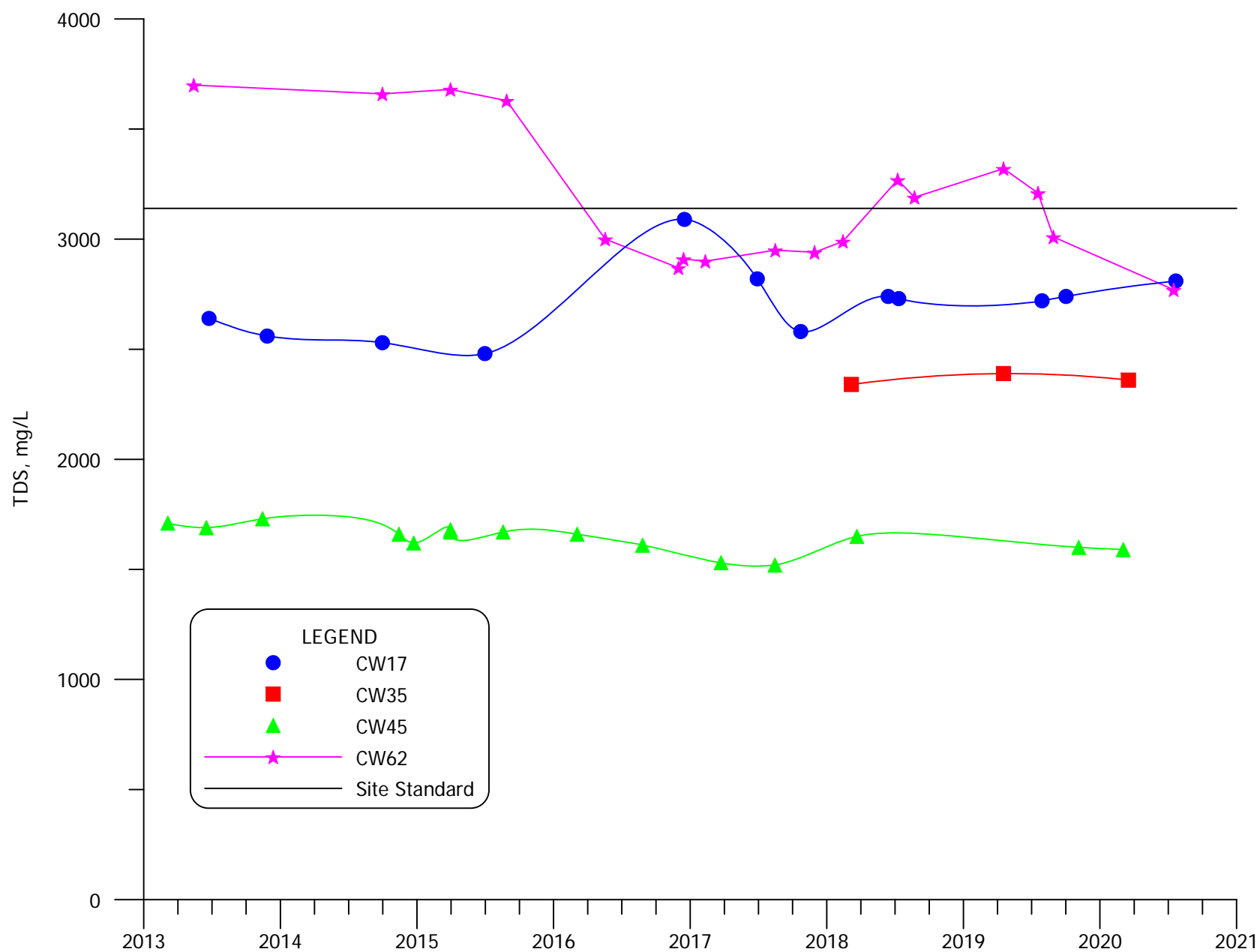


**FIGURE 6.3-4. SULFATE CONCENTRATIONS FOR NON-MIXING ZONE WELLS  
493, ACW, CW1, CW2, CW28 AND CW55**



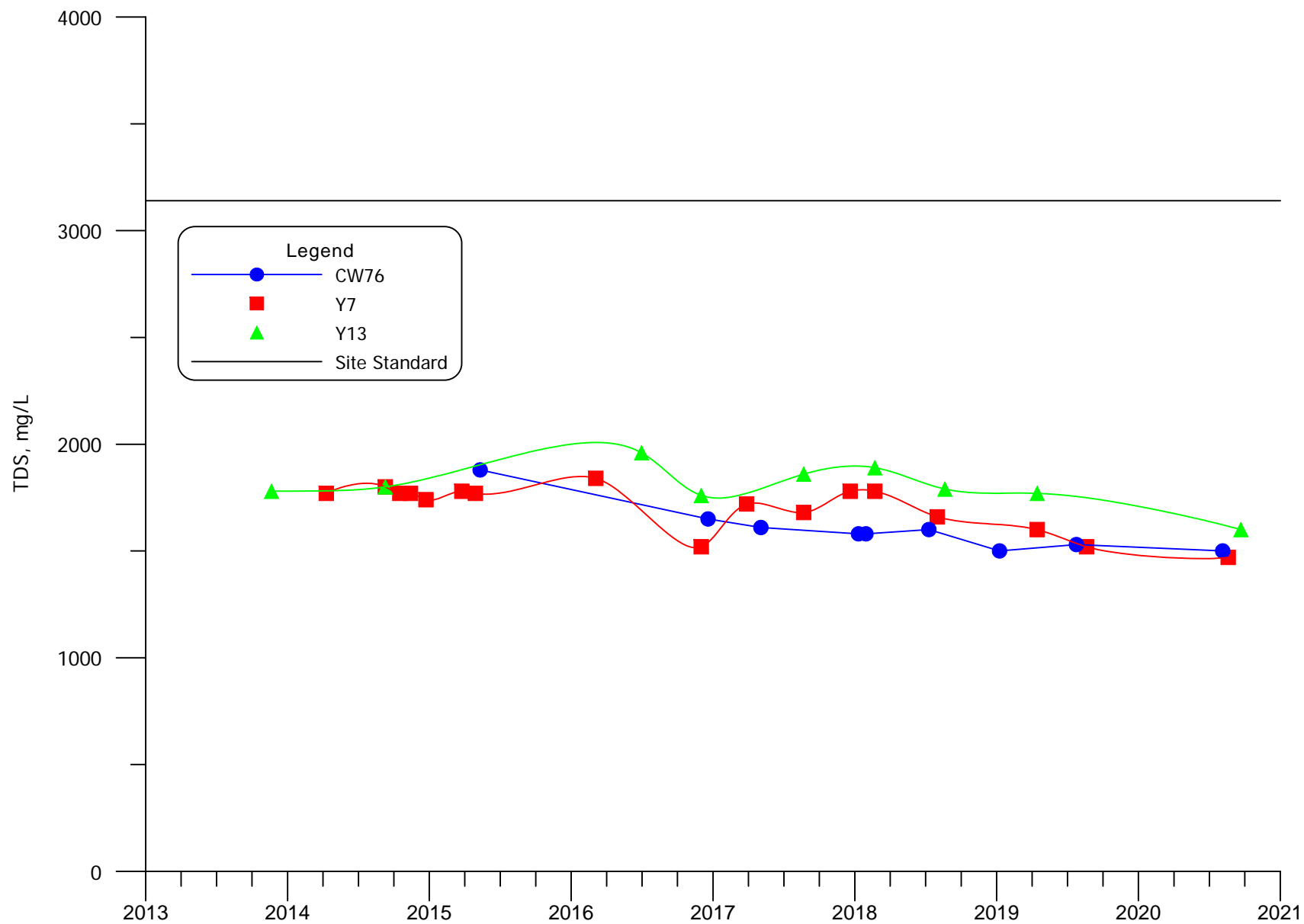




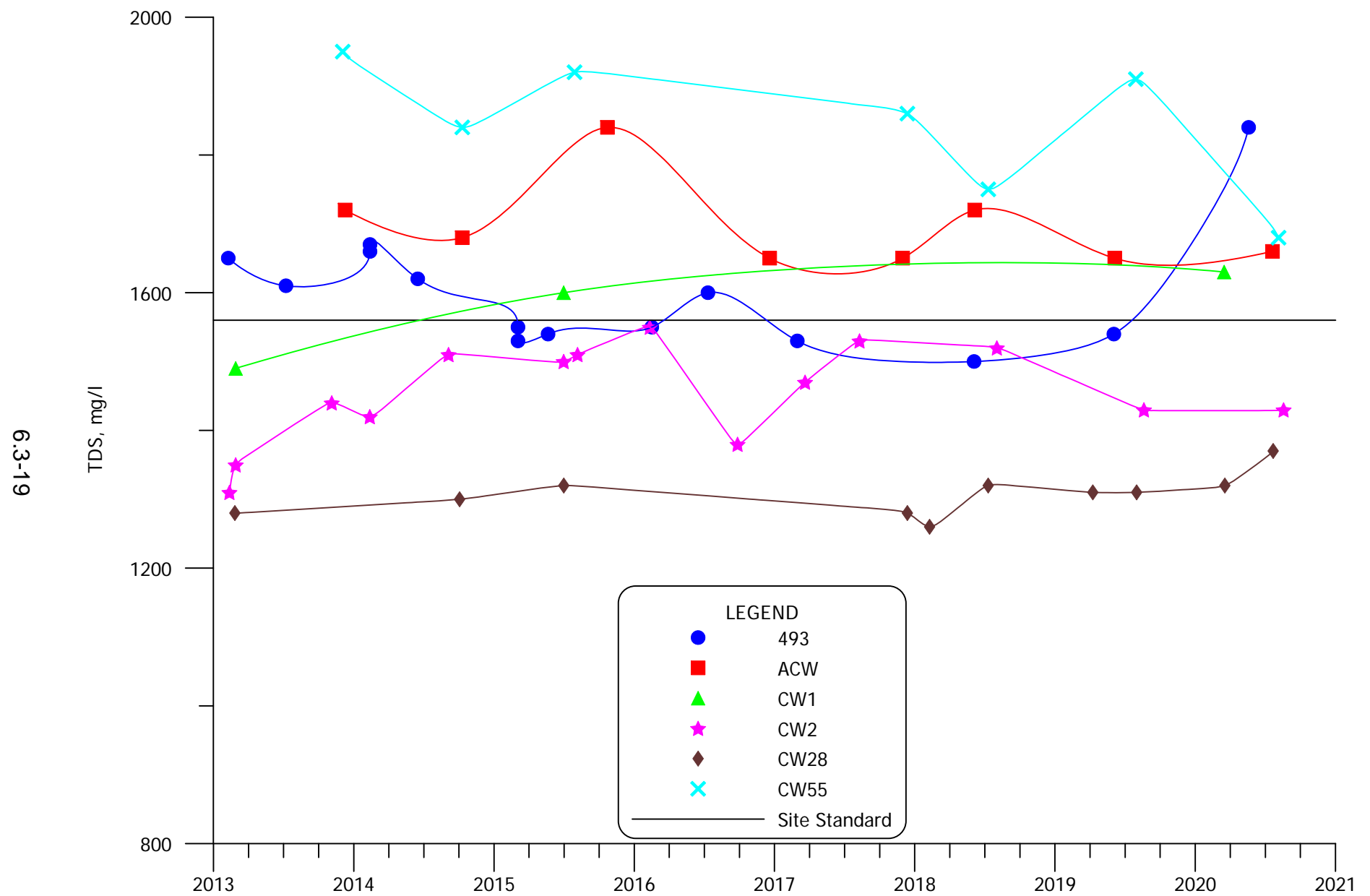


**FIGURE 6.3-6. TDS CONCENTRATIONS FOR MIXING ZONE WELLS  
CW17, CW35, CW45 AND CW62**

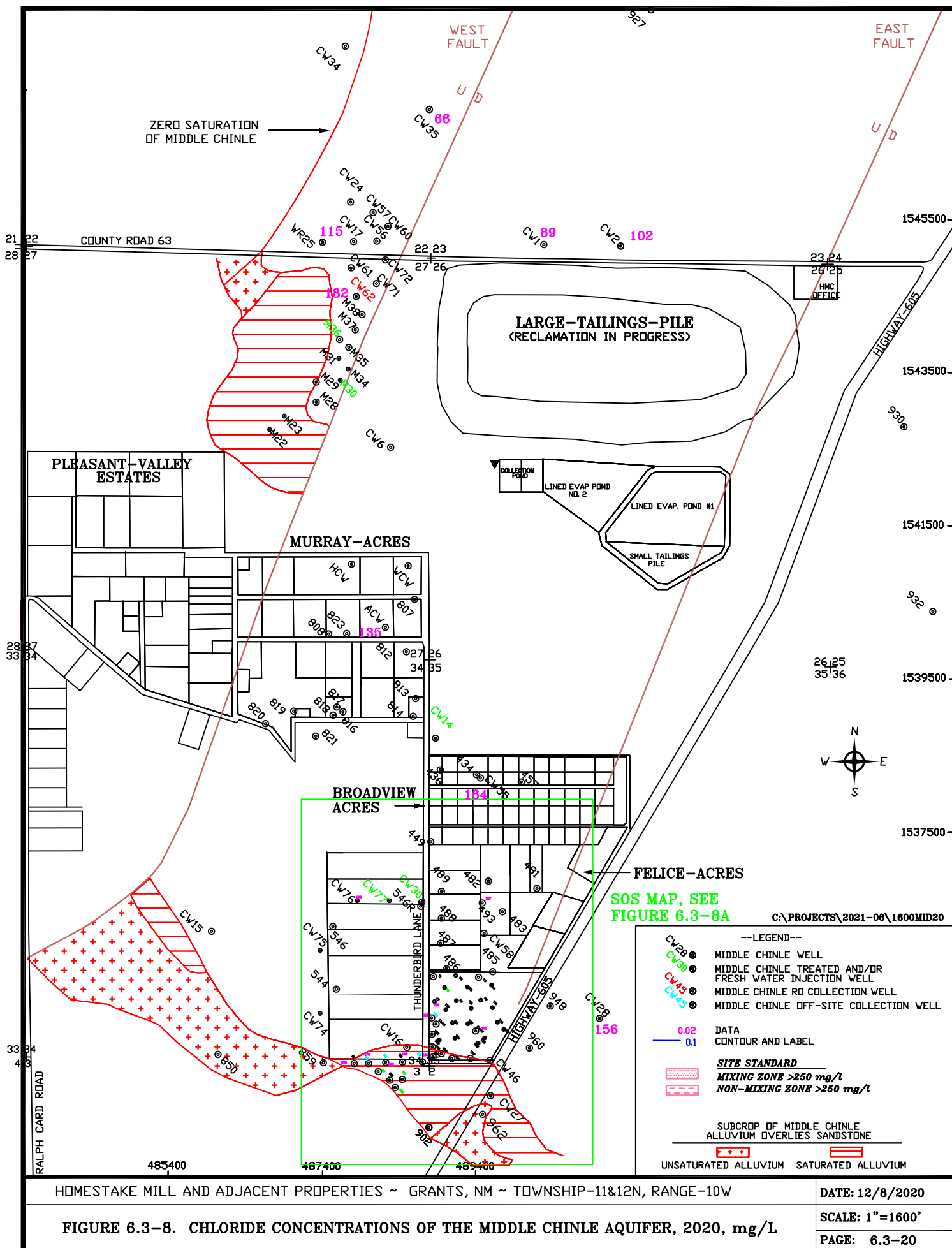
6.3-18

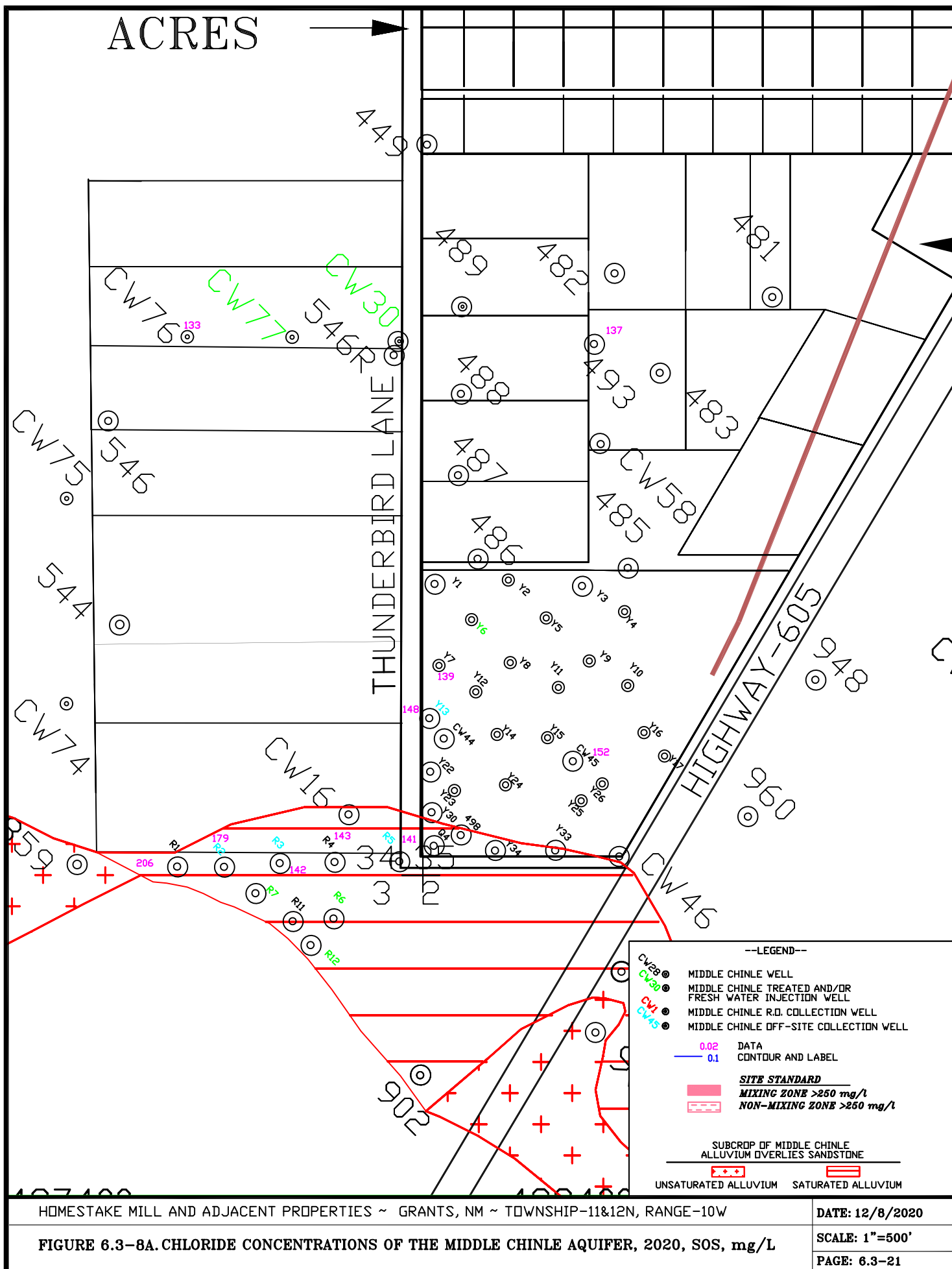


**FIGURE 6.3-6A. TDS CONCENTRATIONS FOR MIXING ZONE WELLS  
CW76, Y7 AND Y13**

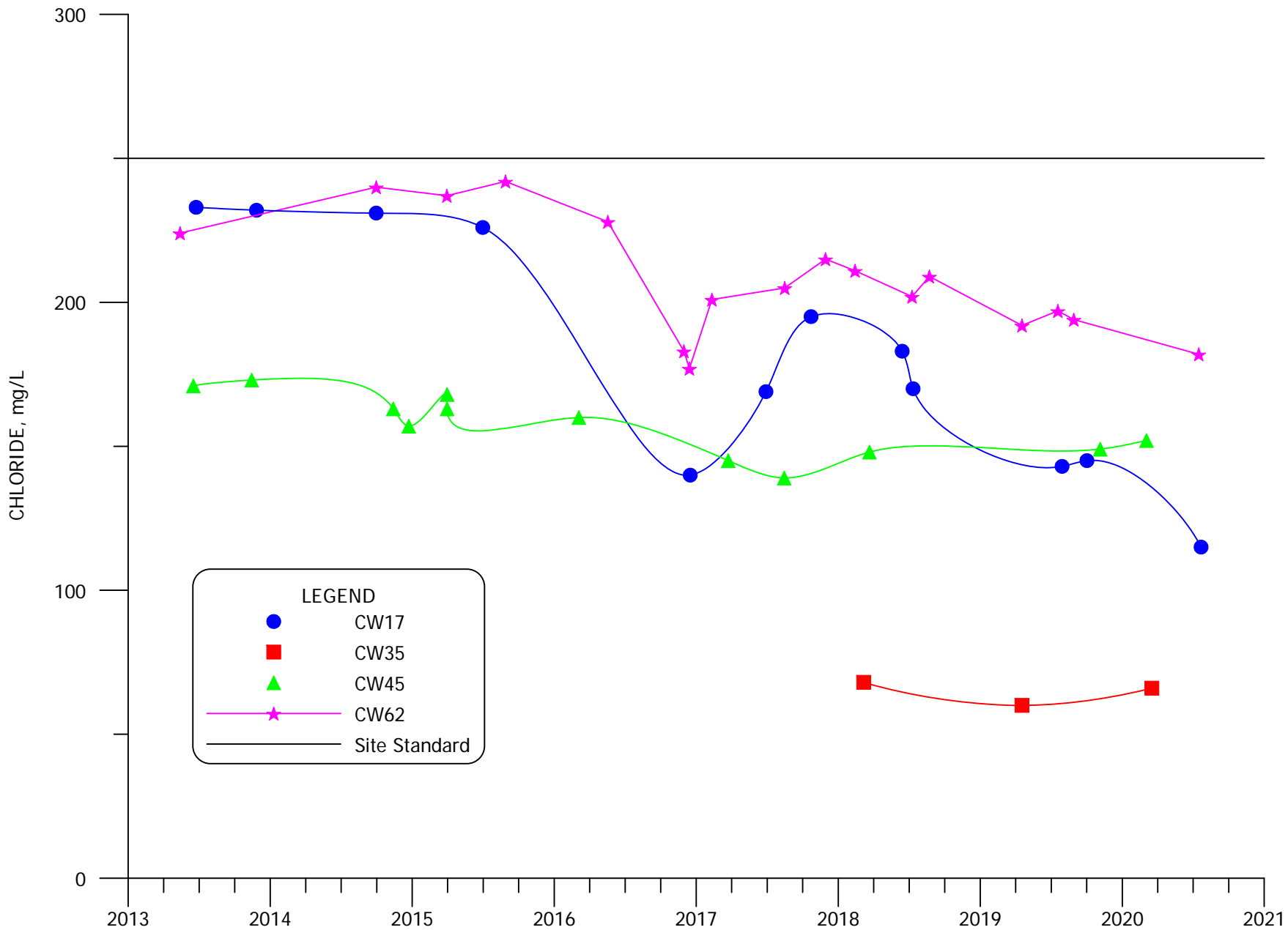


**FIGURE 6.3-7. TDS CONCENTRATIONS FOR NON-MIXING ZONE WELLS  
493, ACW, CW1, CW2, CW28 AND CW55**



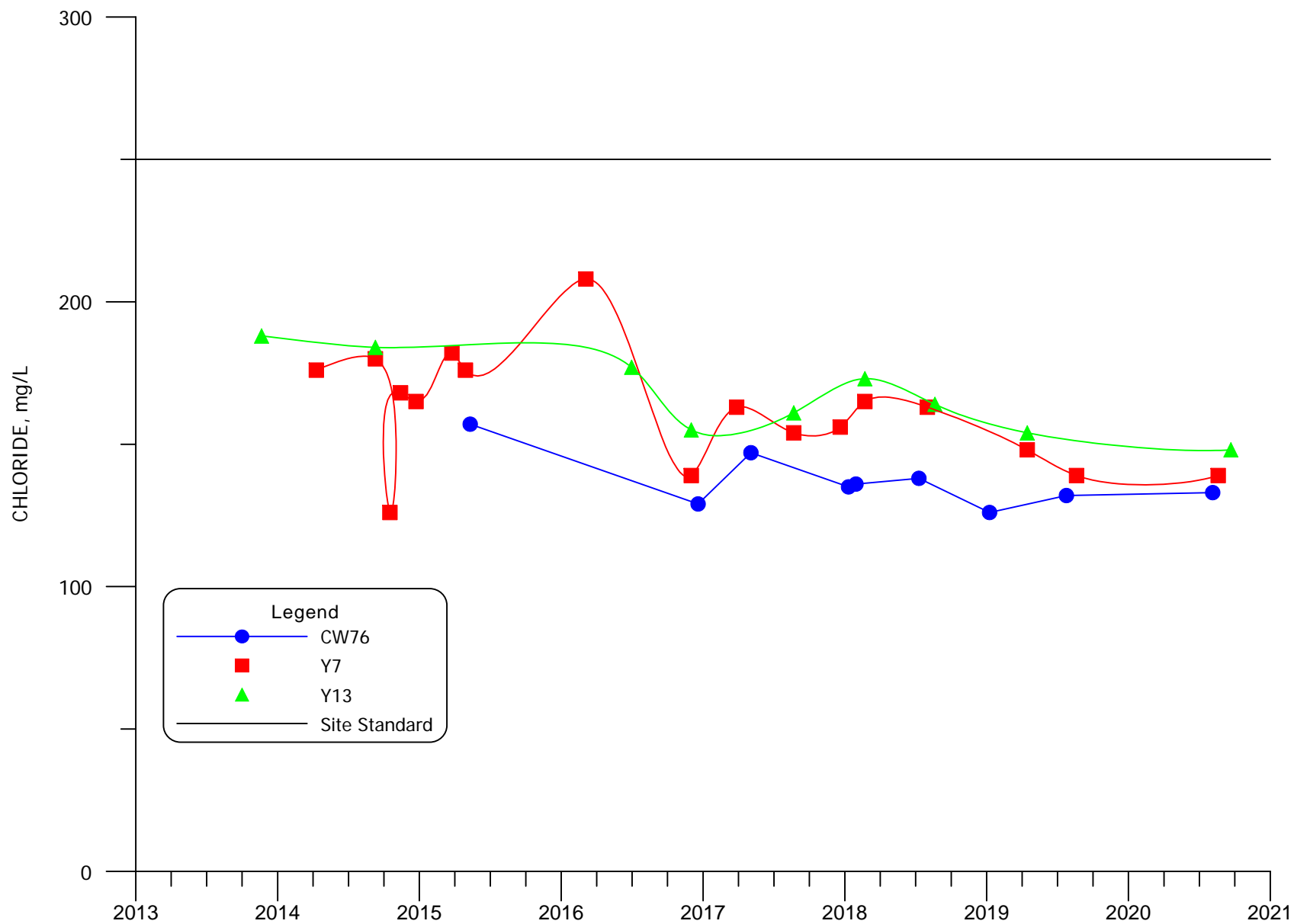


6.3-22



**FIGURE 6.3-9. CHLORIDE CONCENTRATIONS FOR MIXING ZONE WELLS  
CW17, CW35, CW45 AND CW62**

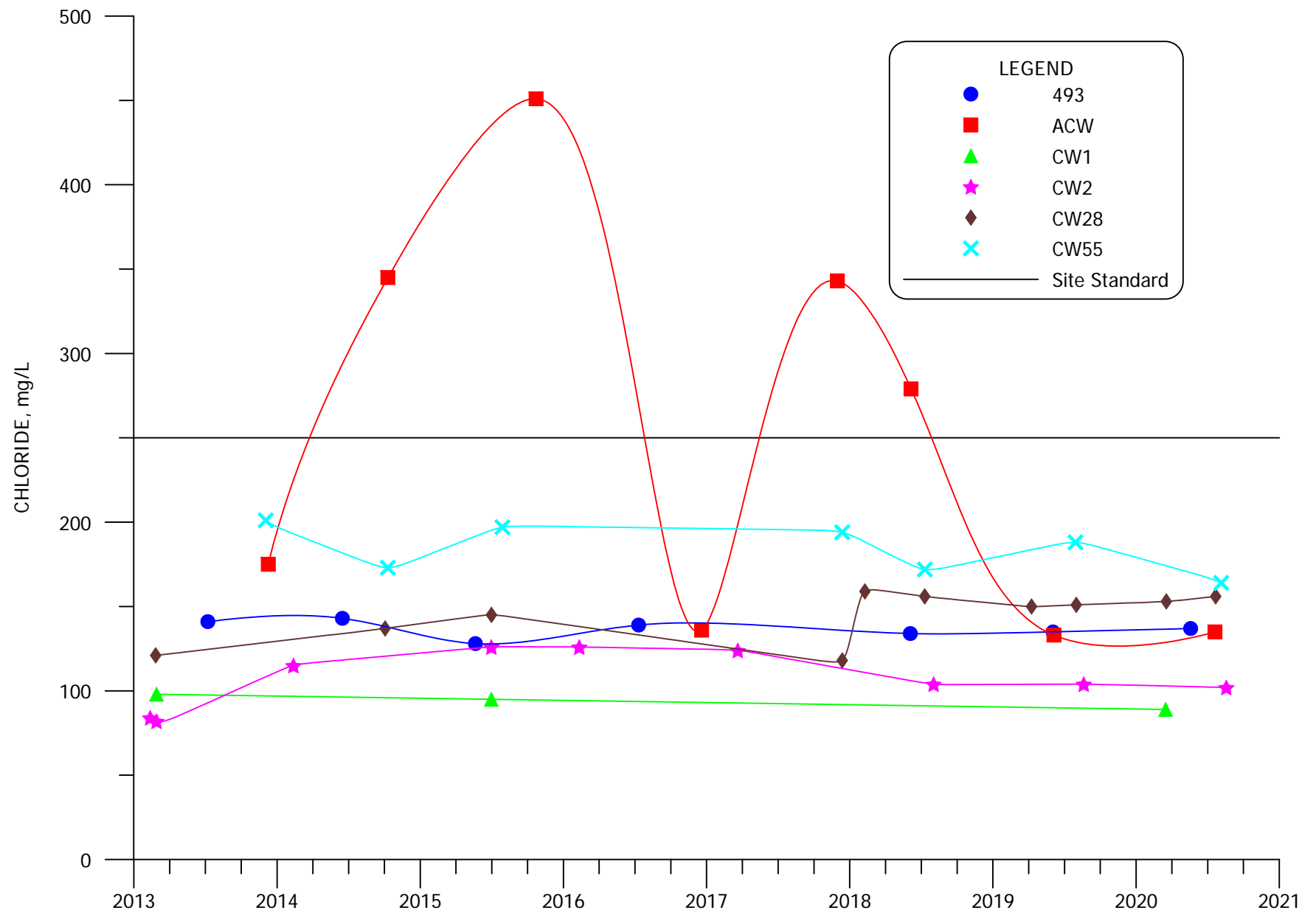
6.3-23



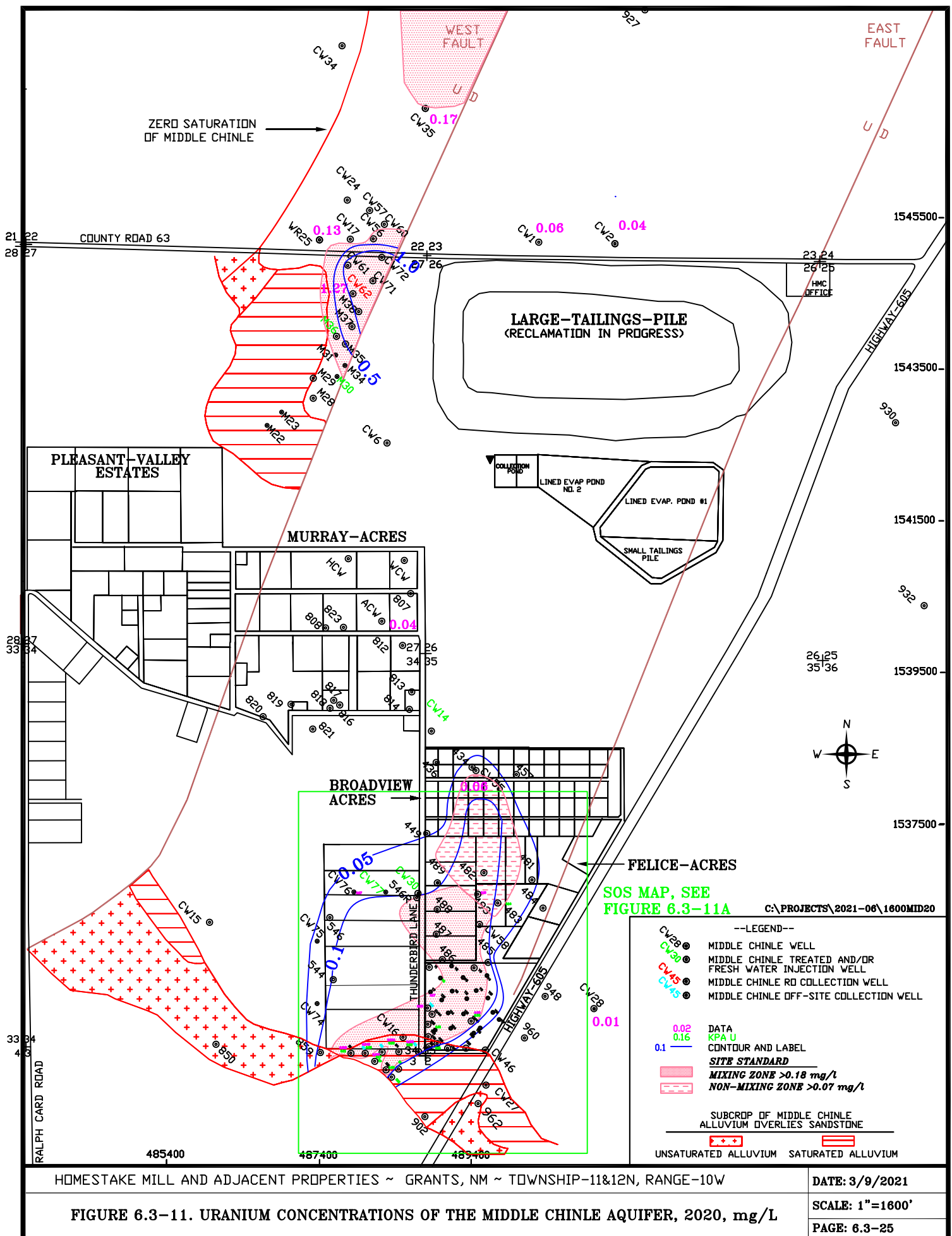
**FIGURE 6.3-9A. CHLORIDE CONCENTRATIONS FOR MIXING ZONE WELLS  
CW76, Y7 AND Y13**



6.3-24



**FIGURE 6.3-10. CHLORIDE CONCENTRATIONS FOR NON-MIXING ZONE WELLS  
493, ACW, CW1, CW2, CW28 AND CW55**



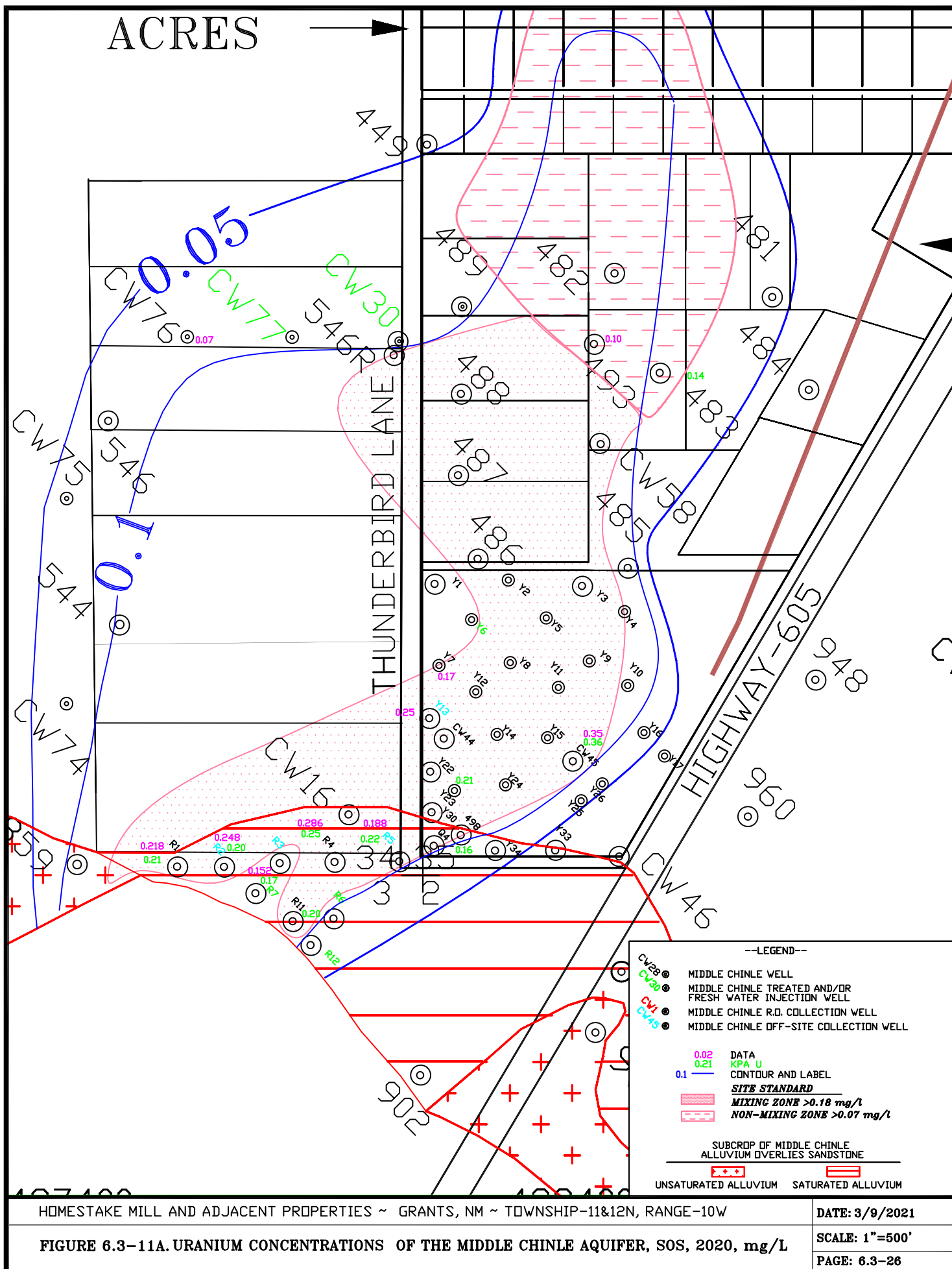
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 3/9/2021

FIGURE 6.3-11. URANIUM CONCENTRATIONS OF THE MIDDLE CHINLE AQUIFER, 2020, mg/L

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PAGE: 6.3-25



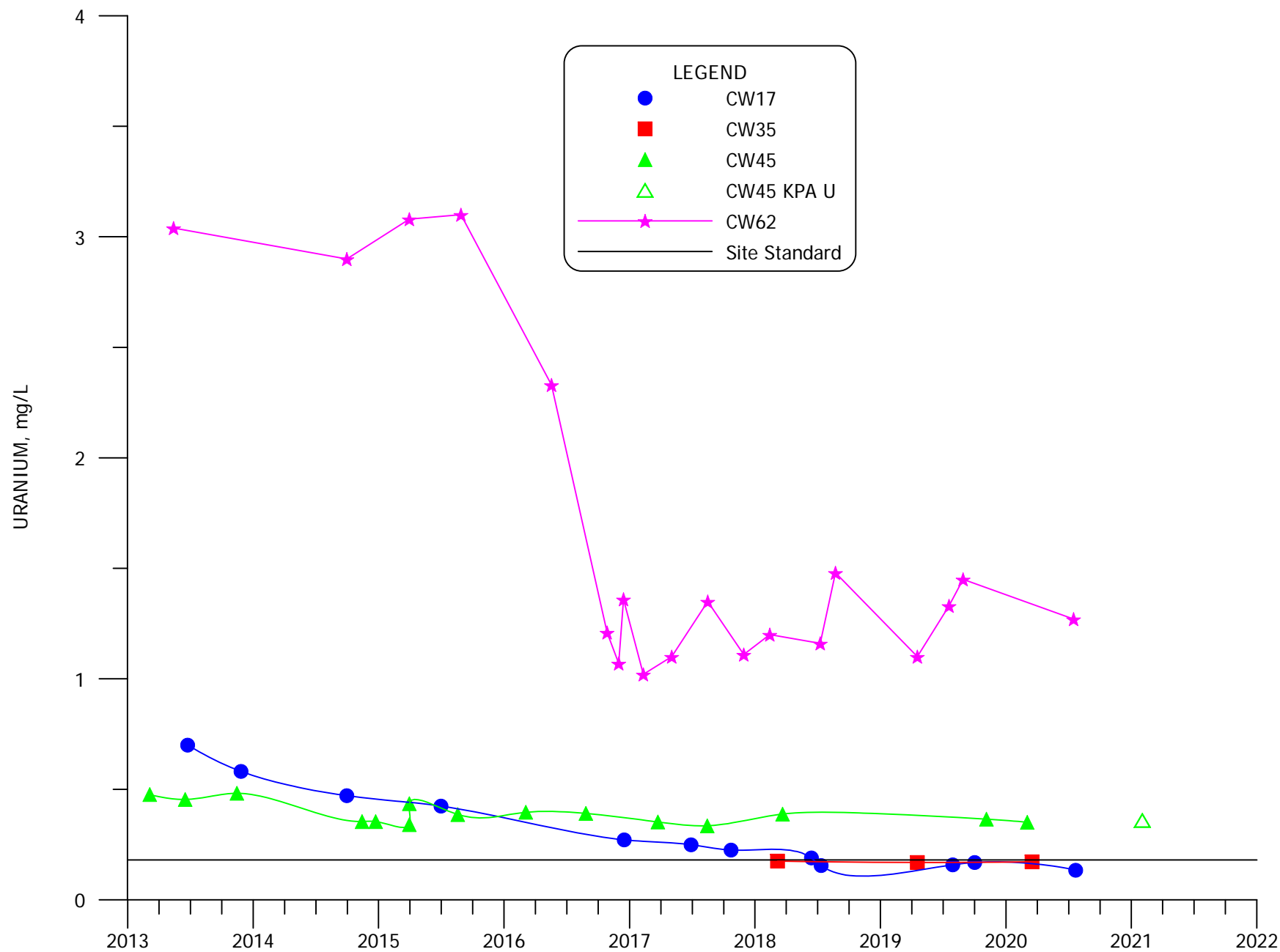
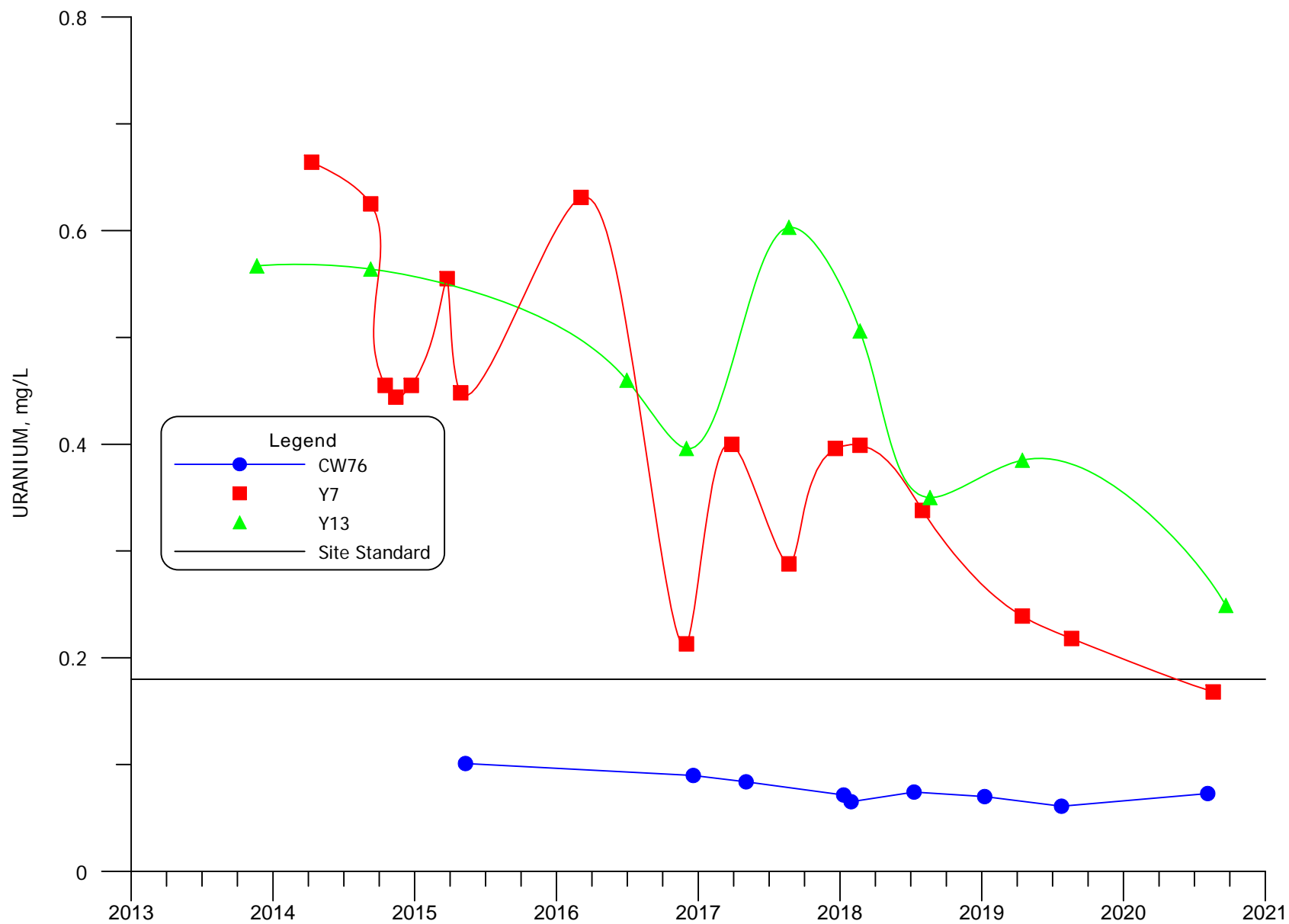


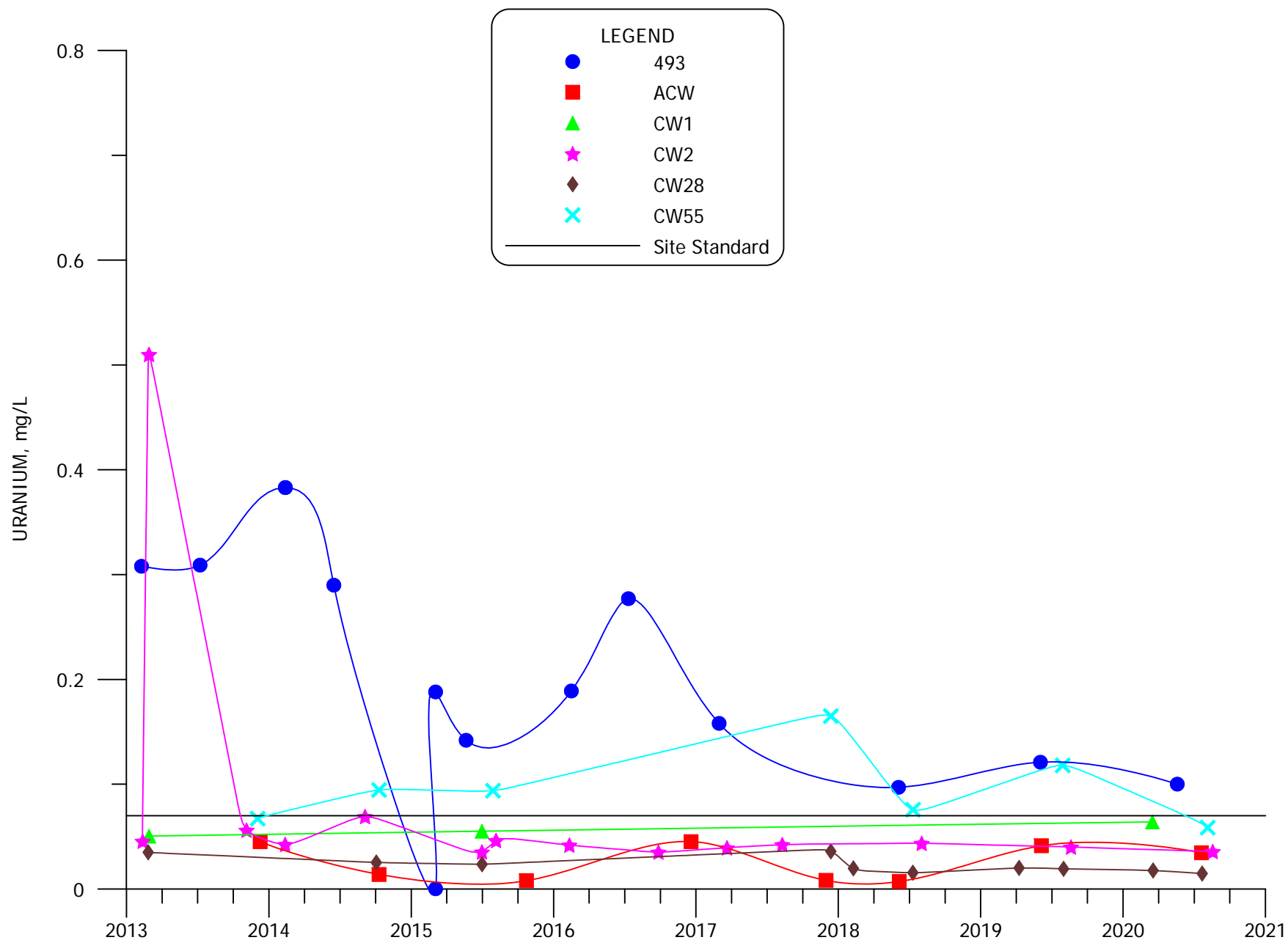
FIGURE 6.3-12. URANIUM CONCENTRATIONS FOR MIXING ZONE WELLS  
CW17, CW35, CW45 AND CW62

6.3-28

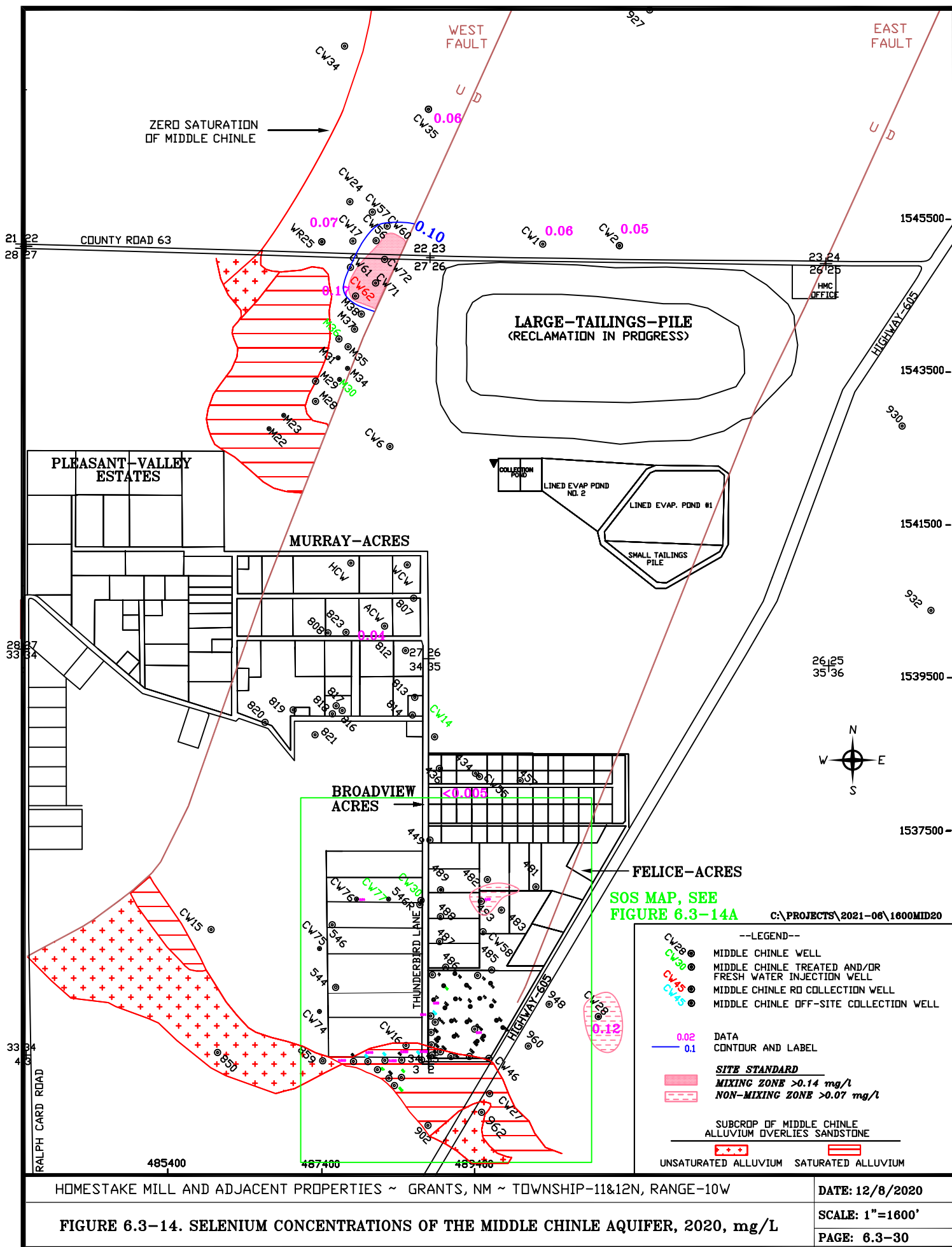


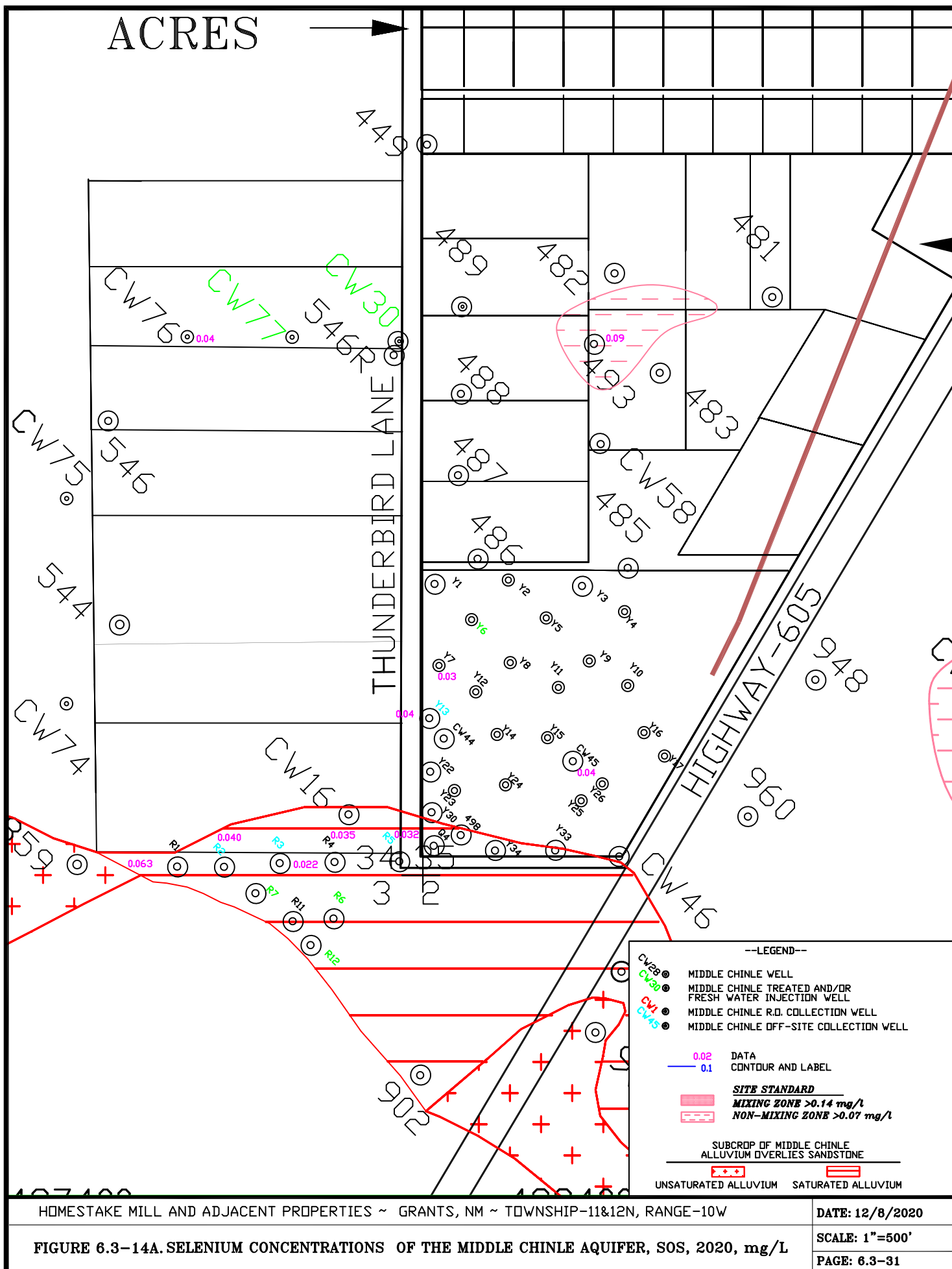
**FIGURE 6.3-12A. URANIUM CONCENTRATIONS FOR MIXING ZONE WELLS  
CW76, Y7 AND Y13**

6.3-29



**FIGURE 6.3-13. URANIUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS  
493, ACW, CW1, CW2, CW28 AND CW55**





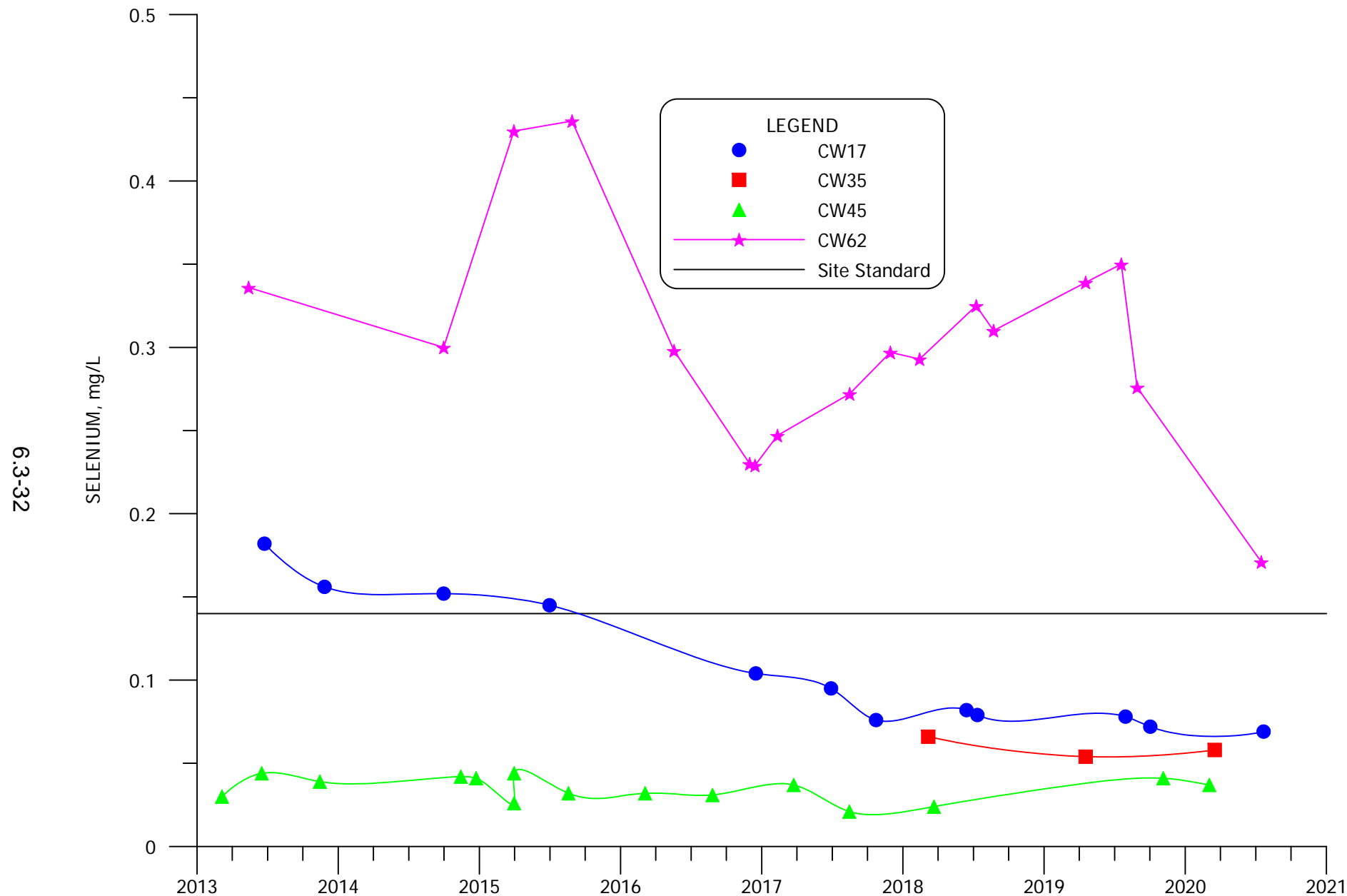
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SCALE: 1"=500'

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**FIGURE 6.3-15. SELENIUM CONCENTRATIONS FOR MIXING ZONE WELLS  
CW17, CW35, CW45 AND CW62**

6.3-33

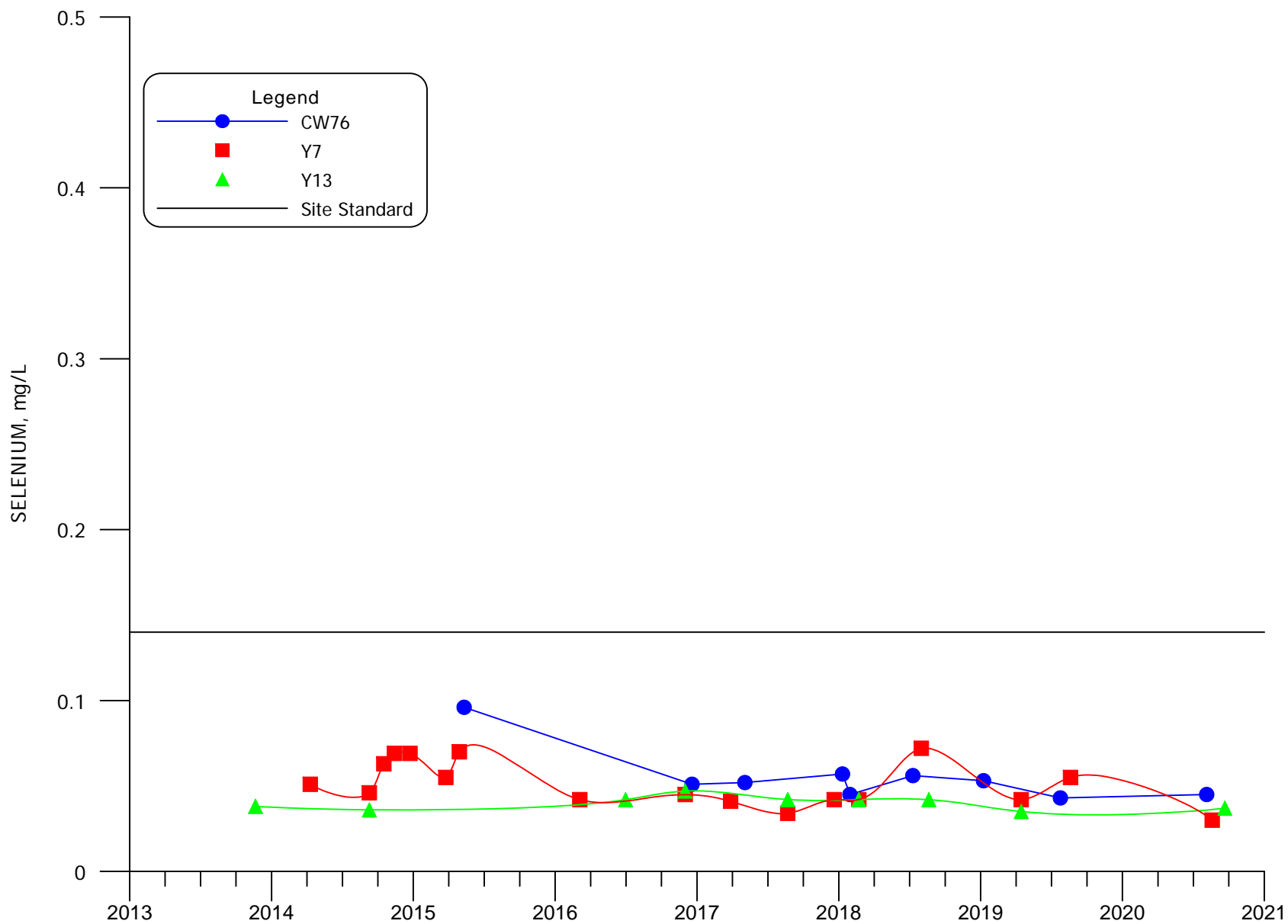
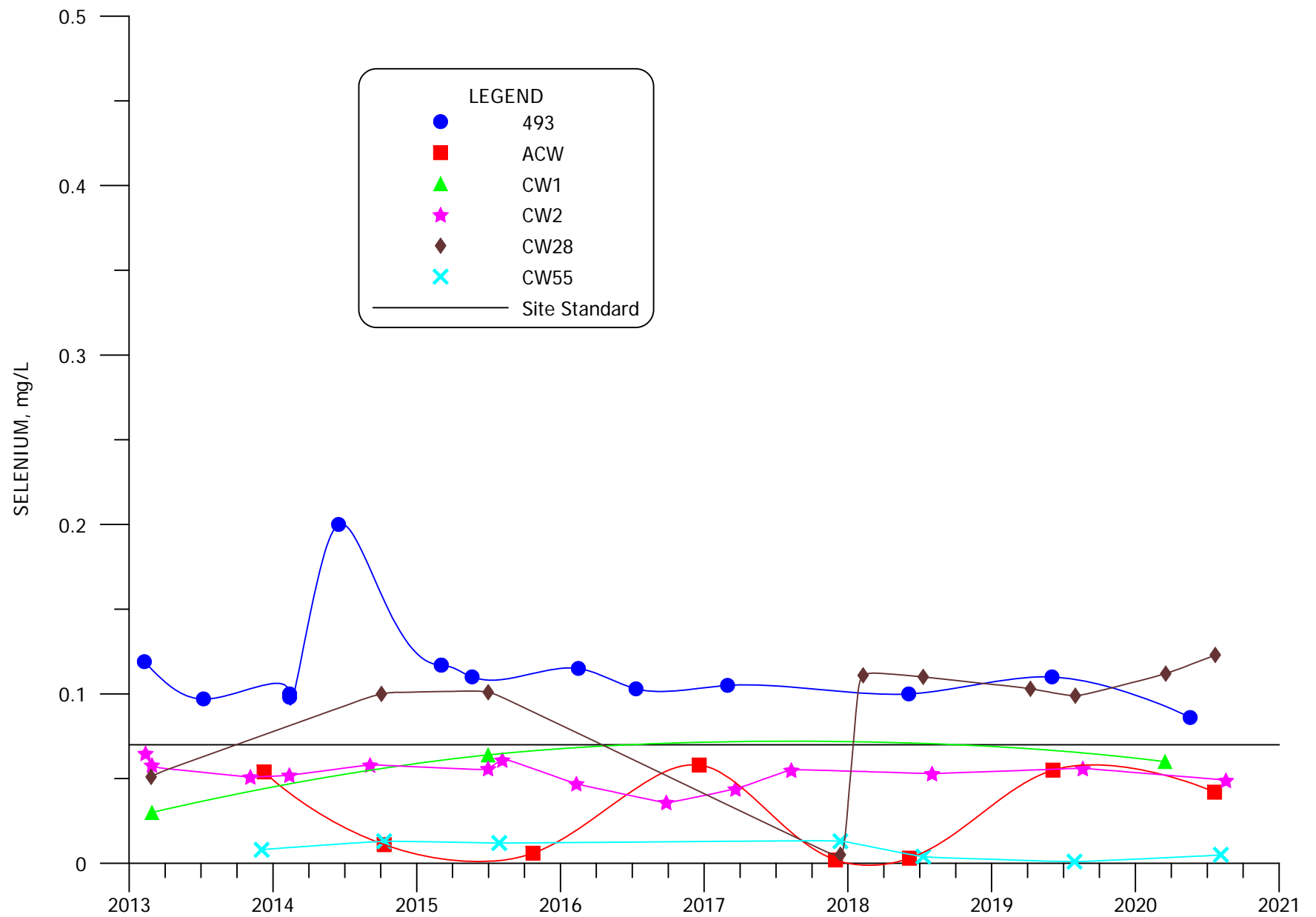


FIGURE 6.3-15A. SELENIUM CONCENTRATIONS FOR MIXING ZONE WELLS  
CW76, Y7 AND Y13



**FIGURE 6.3-16. SELENIUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS  
493, ACW, CW1, CW2, CW28 AND CW55**



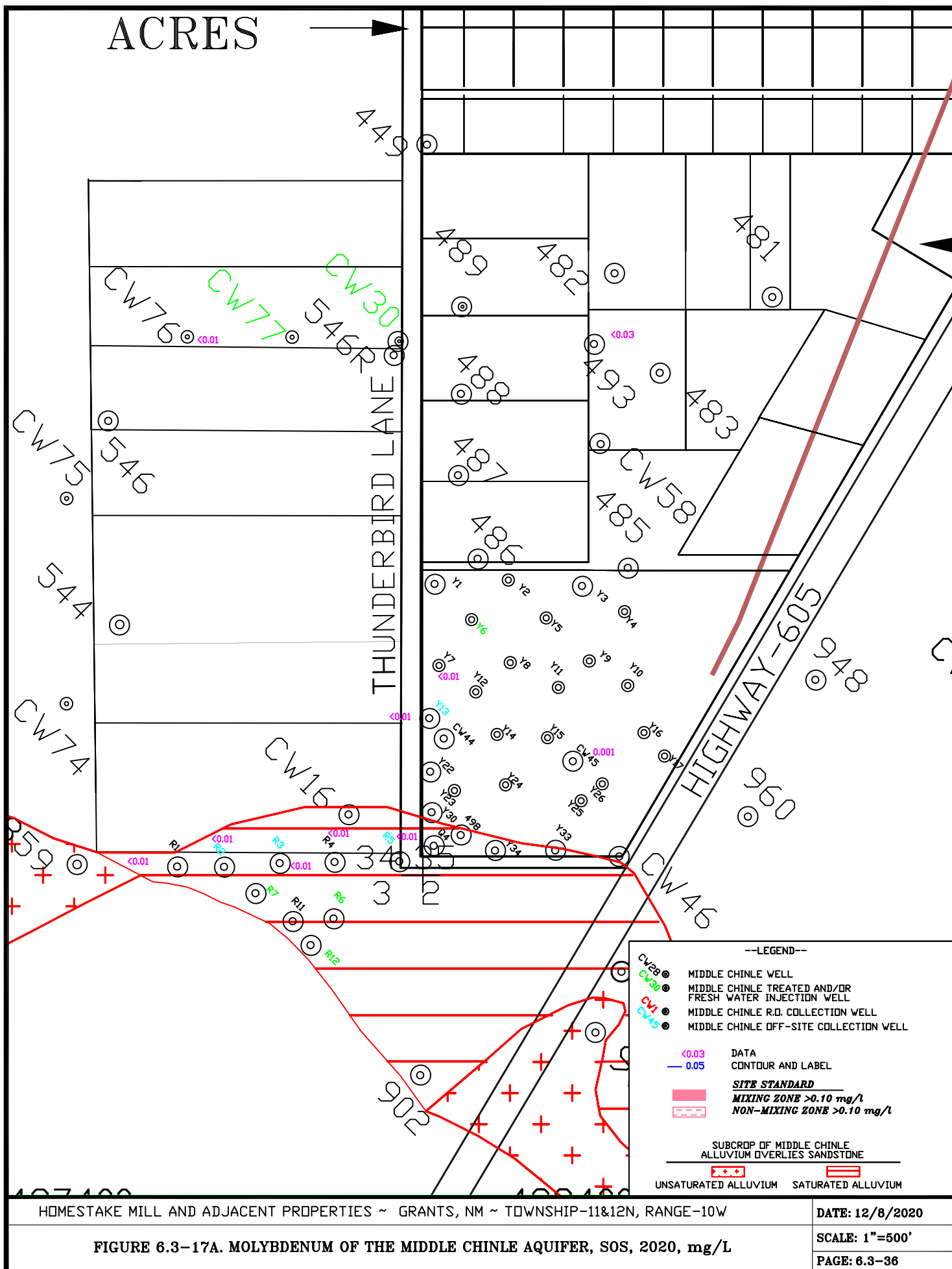
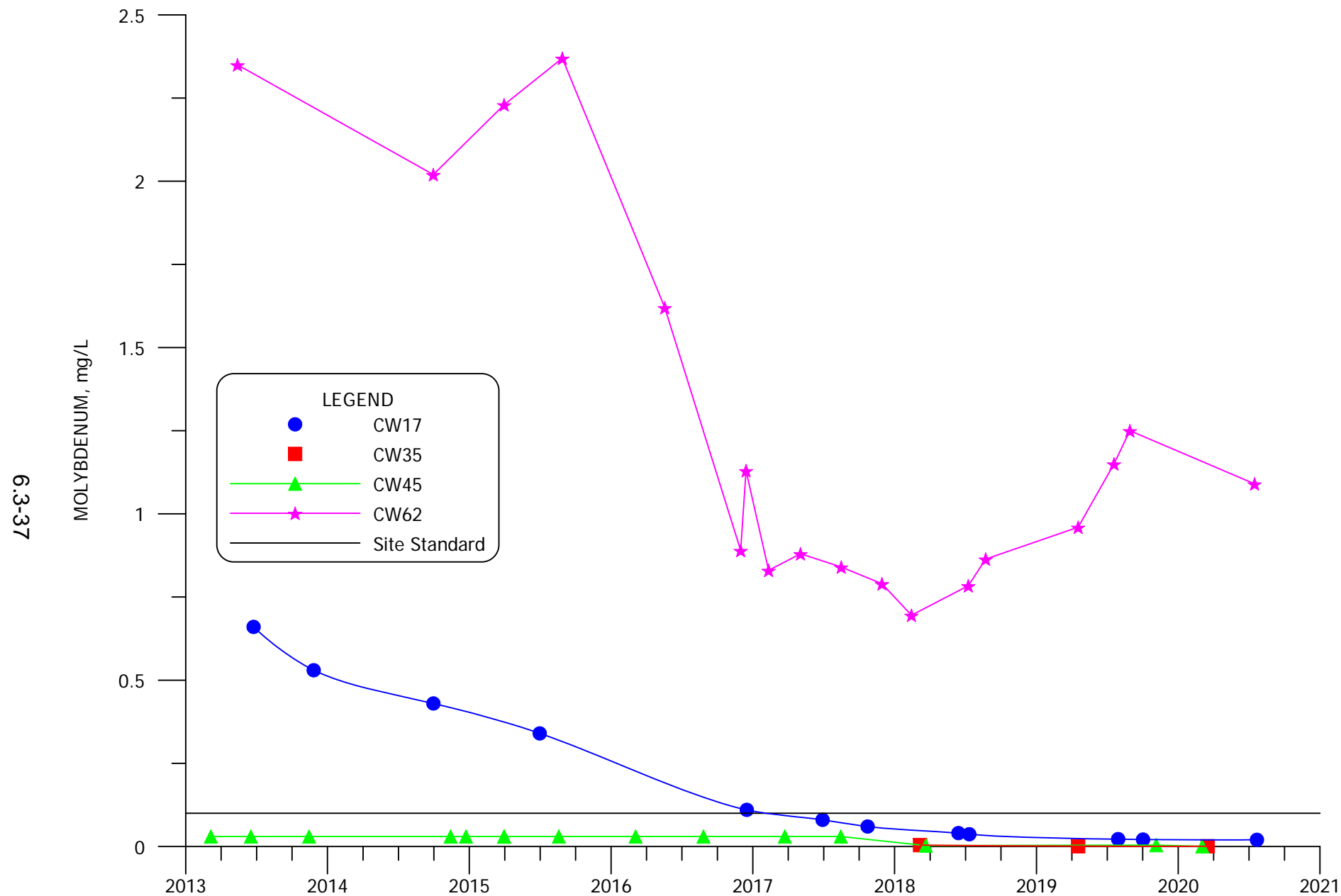
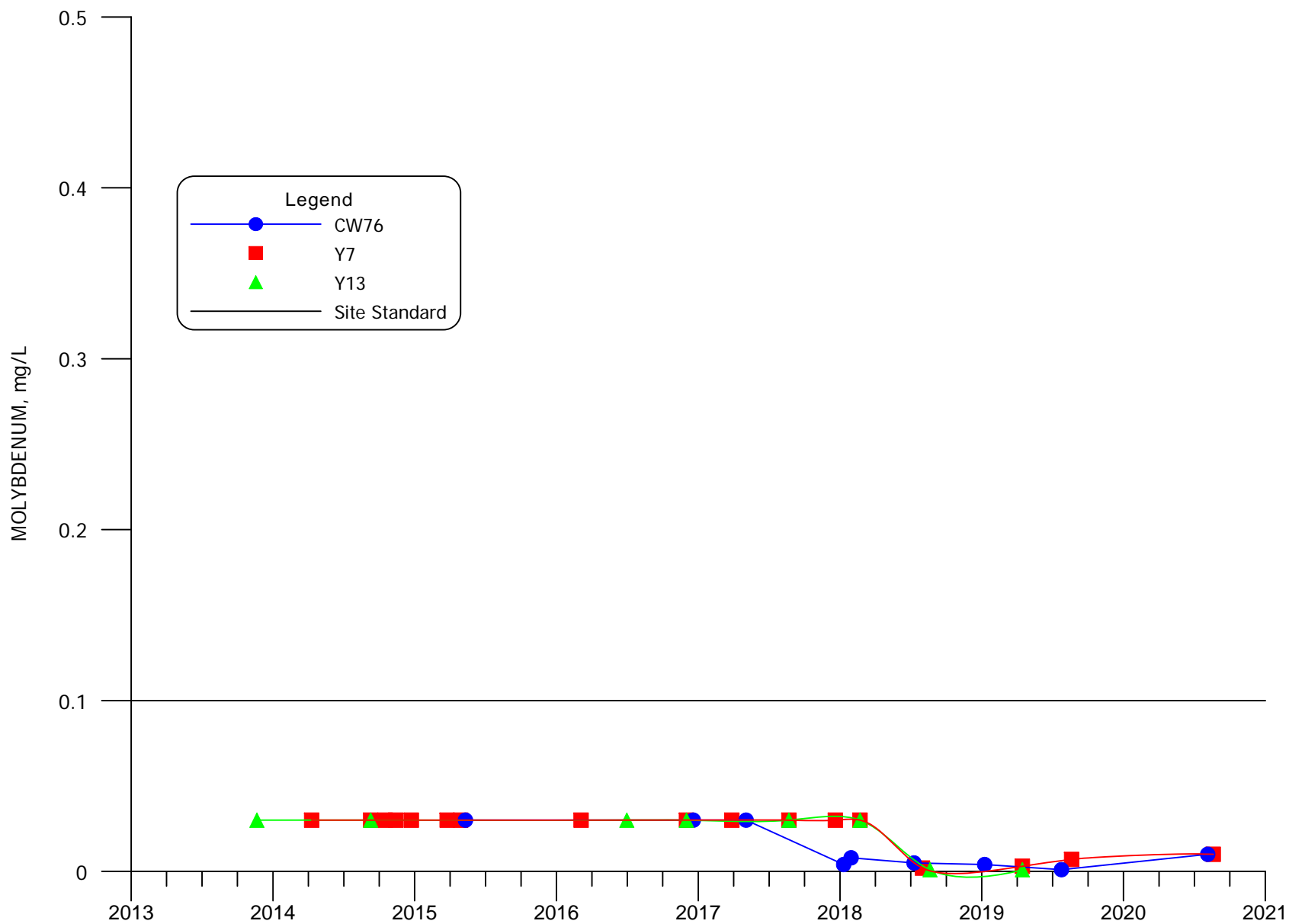


FIGURE 6.3-17A. MOLYBDENUM OF THE MIDDLE CHINLE AQUIFER, SOS, 2020, mg/L



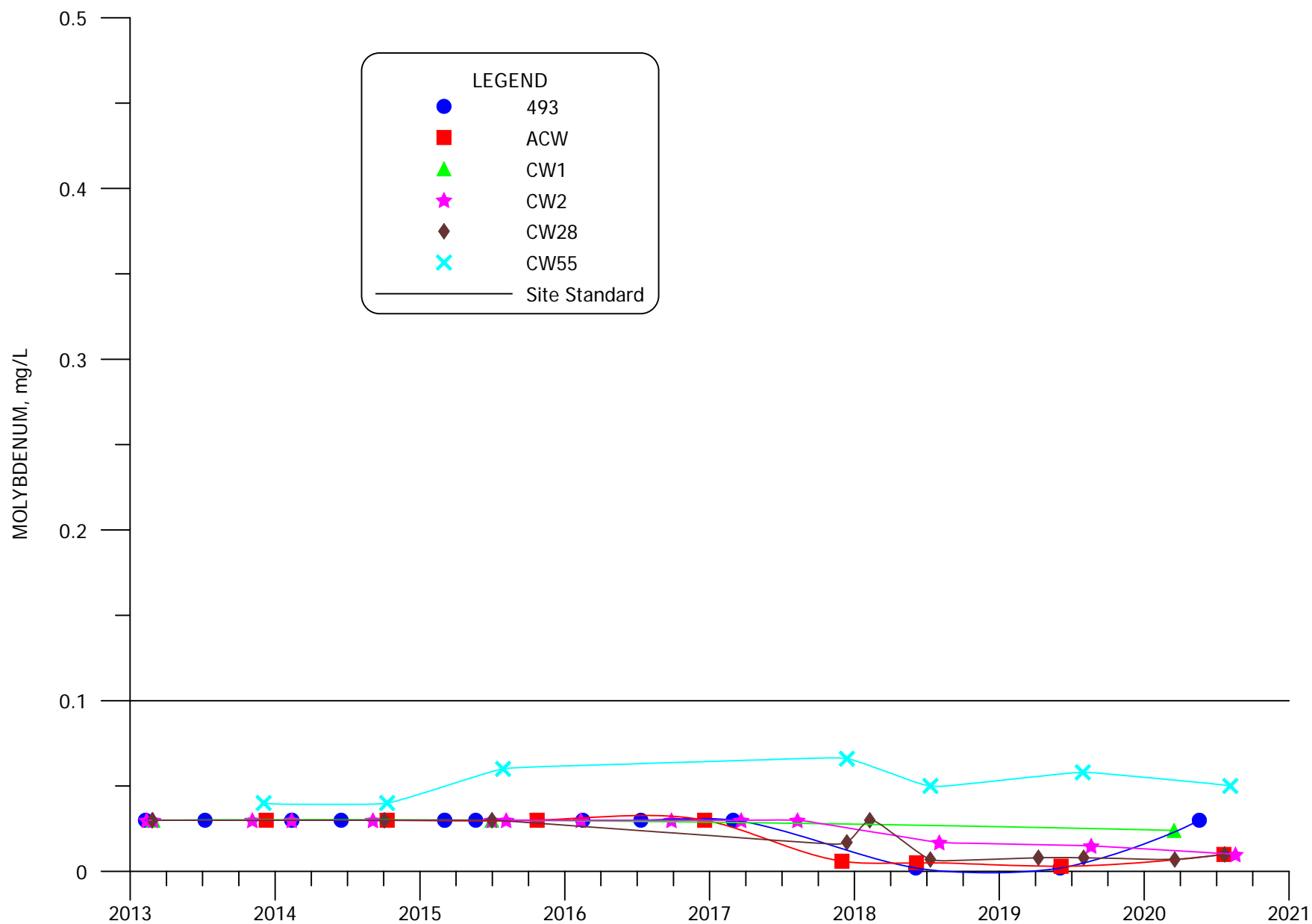
**FIGURE 6.3-18. MOLYBDENUM CONCENTRATIONS FOR MIXING ZONE WELLS  
CW17, CW35, CW45 AND CW62**

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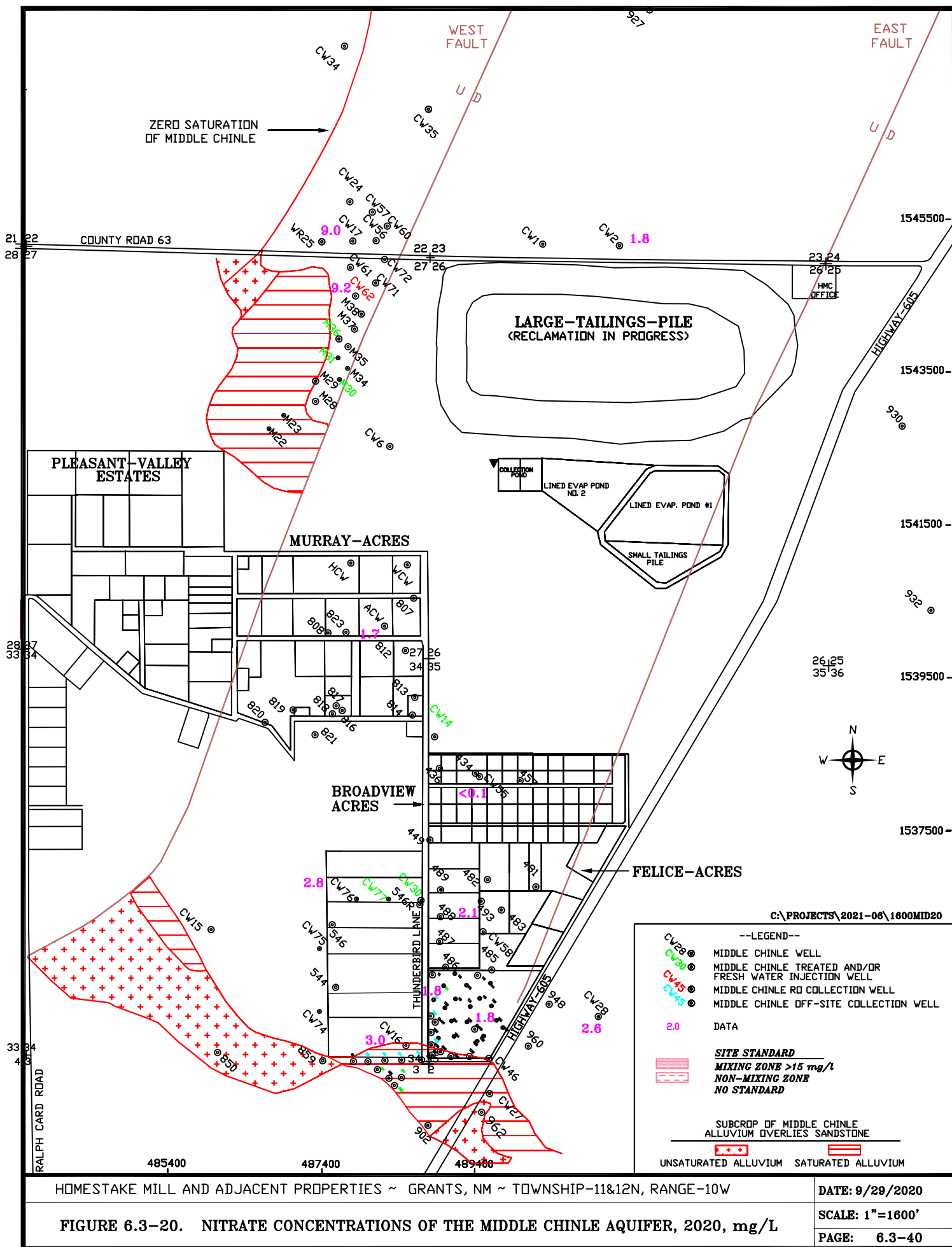
**FIGURE 6.3-18A. MOLYBDENUM CONCENTRATIONS FOR MIXING ZONE WELLS  
CW76, Y7 AND Y13**

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**FIGURE 6.3-19. MOLYBDENUM CONCENTRATIONS FOR NON-MIXING ZONE WELLS  
493, ACW, CW1, CW2, CW28 AND CW55**





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FIGURE 6.3-20. NITRATE CONCENTRATIONS OF THE MIDDLE CHINLE AQUIFER, 2020, mg/L

SCALE: 1"=1600'

PAGE: 6.3-40

**TABLE 6.3-1. MIDDLE CHINLE SITE STANDARDS AND 2020 BACKGROUND MIDDLE CHINLE DATA**

	CONSTITUENT, concentrations in mg/L							
Aquifer Zone	Selenium	Uranium	Molybdenum	TDS	Sulfate	Chloride	Nitrate	Vanadium
<b>CHINLE SITE STANDARDS</b>								
Chinle Mixing	0.14	0.18	0.10	3140	1750	250	15	0.01
Middle Chinle Non-Mixing	0.07	0.07	0.10	1560	857	250	*	*
<b>CHINLE MIXING ZONE WELLS</b>								
CW9	-	-	-	-	-	-	-	-
CW50	<0.001	0.02	0.002	1710	881	56	0.6	<0.01
CW52	-	-	-	-	-	-	-	-
CW15	-	-	-	-	-	-	-	-
CW24	-	-	-	-	-	-	-	-
CW35	0.06	0.17	0.001	2360	1280	66	3.0	<0.01
CW36	-	-	-	-	-	-	-	-
CW37	-	-	-	-	-	-	-	-
CW39	-	-	-	-	-	-	-	-
CW43	0.04	0.048	<0.01	2640	1260	222	7.0	<0.2
<b>MIDDLE CHINLE NON-MIXING ZONE WELLS</b>								
ACW	0.04	0.03	<0.01	1660	604	135	1.7	<0.02
CW1	0.06	0.06	0.02	1630	748	89	-	-
CW2	0.05	0.04	0.01	1430	567	102	1.8	<0.01
CW28	0.12	0.01	<0.01	1370	480	156	2.6	<0.02
WCW	-	-	-	-	-	-	-	-

\* Background water quality analyses for constituent determined that site standard is not necessary.

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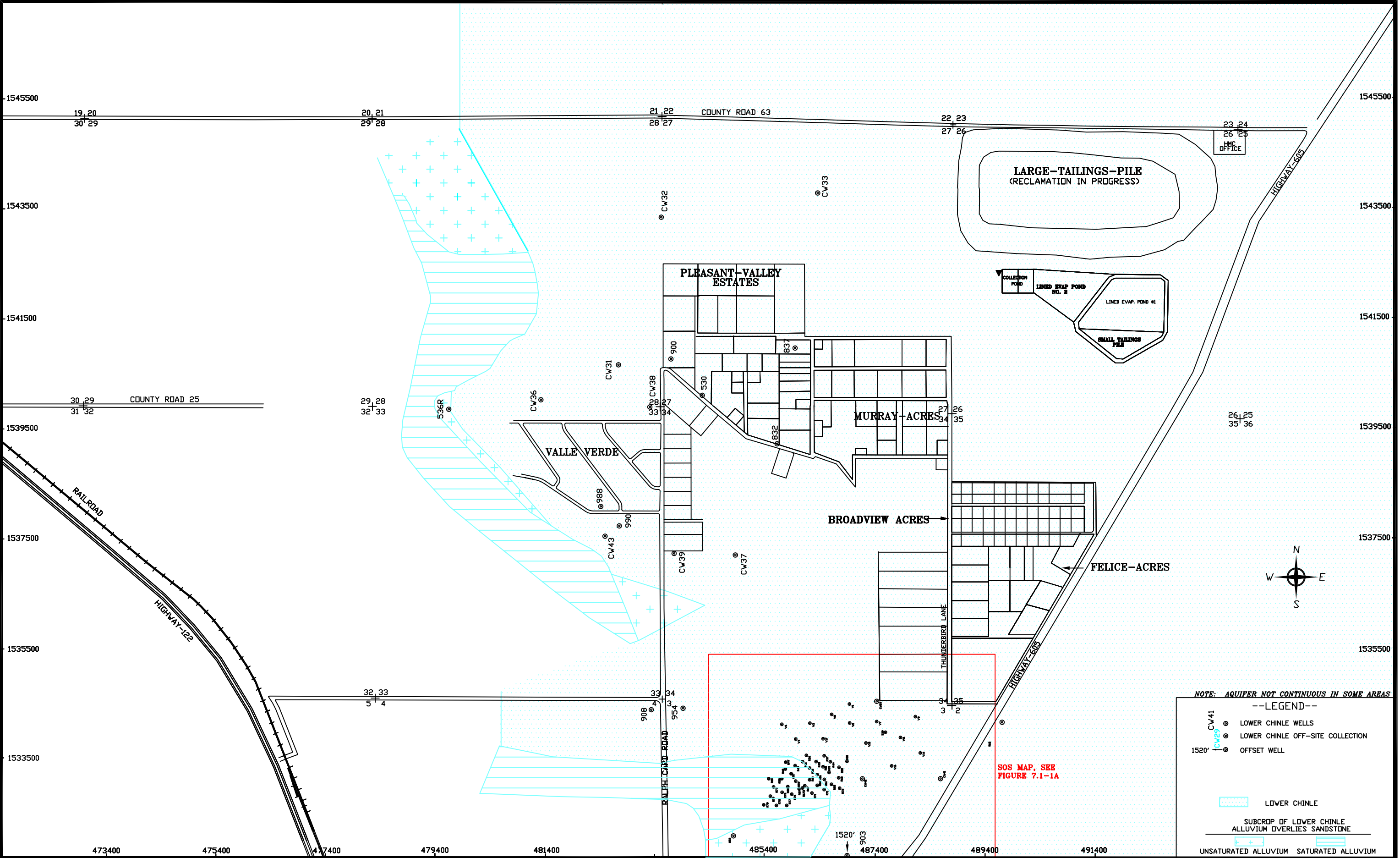
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## **7.0 LOWER CHINLE AQUIFER MONITORING**

### **7.1 LOWER CHINLE WELL COMPLETION**

The Lower Chinle aquifer is a permeable zone in the Chinle shale which exists below the Middle Chinle sandstone and above the San Andres aquifer. The Lower Chinle aquifer becomes important west and southwest of the Homestake Grants Project area where this unit is present at shallower depths. The general permeability of the Lower Chinle aquifer can vary dramatically, because the transmitting ability of this aquifer depends on the presence of fractured or altered shale that provides secondary permeability. [Tables 5.1-1](#) through [5.1-4](#) present the Lower Chinle basic well data along with the other Chinle aquifer wells.

Wells that are completed in the Lower Chinle aquifer are shown on [Figures 7.1-1](#) and [7.1-1A](#). Chinle shale exists above the top of the Lower Chinle aquifer in the area with the dot pattern. This figure also shows the location of the Lower Chinle aquifer subcrop underlying the alluvium. The cyan horizontal hatched pattern shows where the alluvium is saturated in the subcrop area, while the plus-sign pattern shows where the alluvium is not saturated in the subcrop area. No new Lower Chinle wells were drilled in 2020 and no Lower Chinle wells were used for south collection in 2020.



SCALE: 1" = 1600'  
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DATE: 3/10/2021

FIGURE 7.1-1. LIMITS OF LOWER CHINLE AQUIFER AND WELL LOCATIONS, 2020

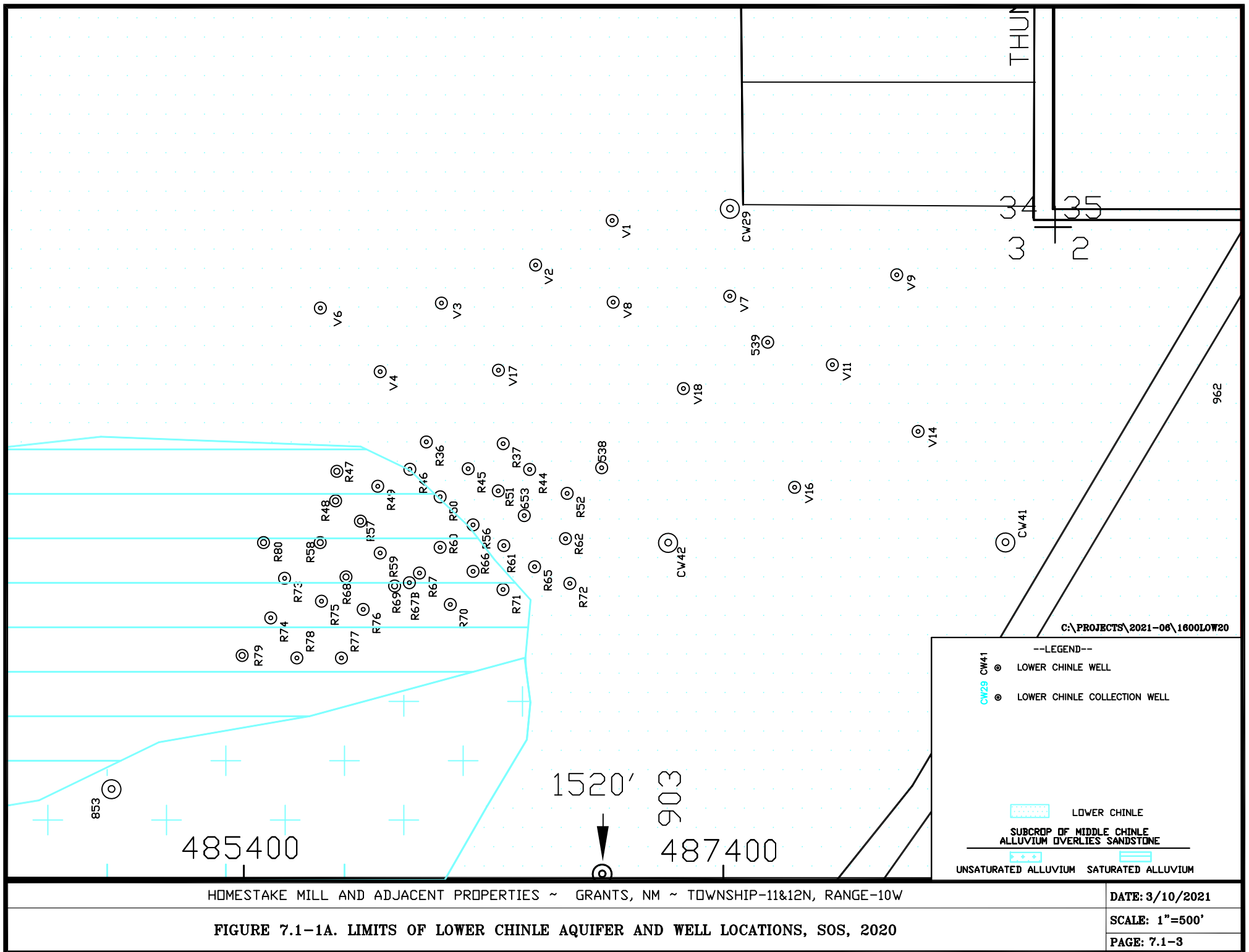


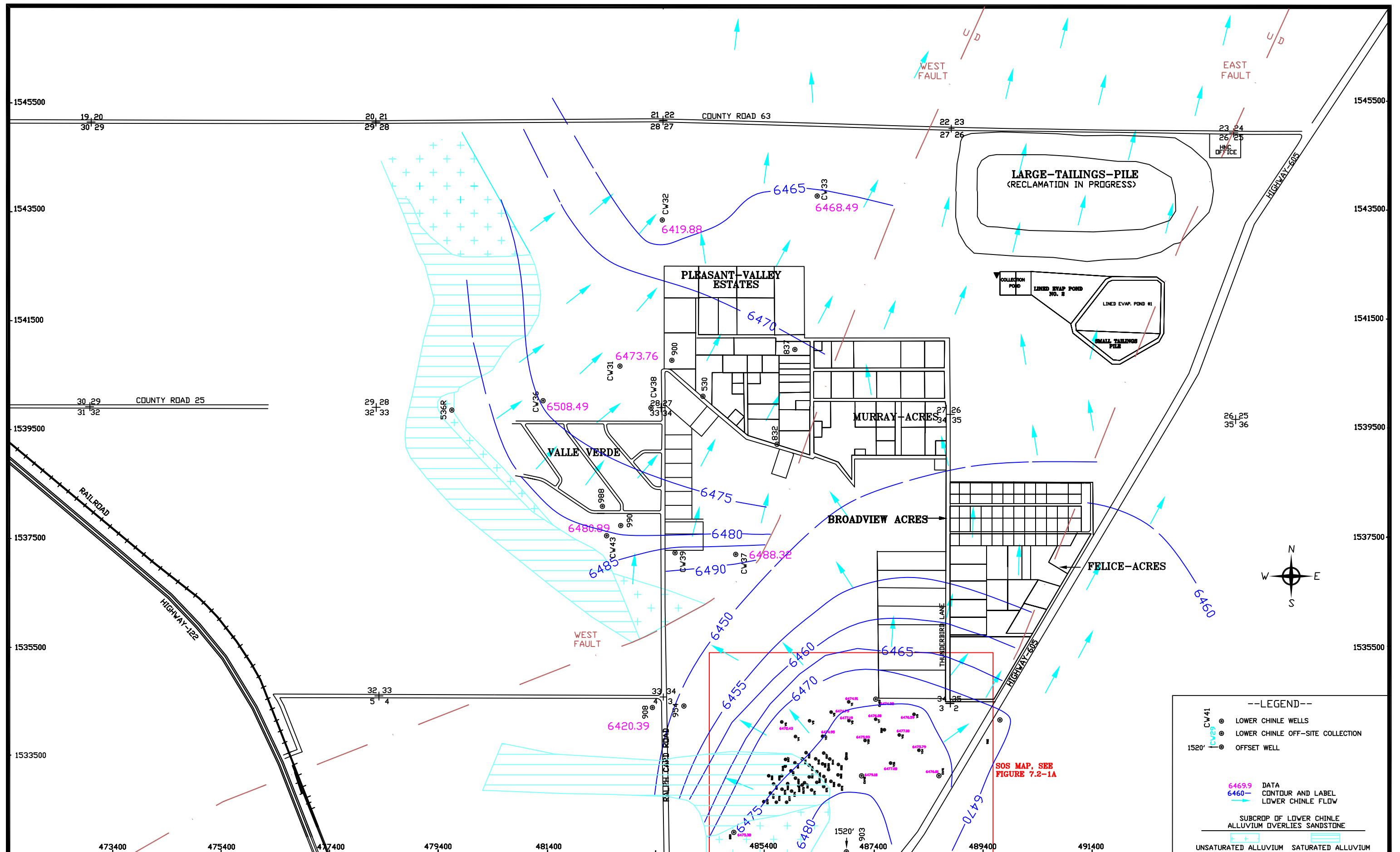
FIGURE 7.1-1A. LIMITS OF LOWER CHINLE AQUIFER AND WELL LOCATIONS, SOS, 2020



## 7.2 LOWER CHINLE WATER LEVELS

Water-level elevations in the Lower Chinle wells are presented along with the data for the Upper and Middle Chinle wells in [Appendix A](#). [Figures 7.2-1 and 7.2-1A](#) present water-level elevations in the Lower Chinle wells and the fall of 2020 water-level elevation contours. The West and East Faults are also shown on [Figure 7.2-1](#). The approximate Lower Chinle subcrop areas beneath the alluvium are also shown on this figure. Groundwater flow west of the West Fault in the Lower Chinle is mainly to the northeast. Groundwater flow between the two faults is to the northeast in the area of the tailings. The flow is to the northwest in the southern portion of the Lower Chinle aquifer between the faults. The northwesterly flow direction in this area indicates that the Lower Chinle water moves across the West Fault in the area west of Broadview Acres. The highest water-level elevations in Section 3 are in or near the subcrop area of the Lower Chinle indicating that the alluvial aquifer is recharging the Lower Chinle aquifer in this area. The water-level elevation in well CW36 was not honored in the contouring in [Figure 7.2-1](#) because the 2020 measurement was not consistent with previous measurements (see [Figure 7.2-4](#)).

The Lower Chinle wells for which water-level time plots were prepared are shown on [Figure 7.2-2](#). Water levels are presented for Lower Chinle wells 853, CW29, CW41, CW42, V6 and V9 on [Figure 7.2-3](#). The water levels in the wells located in Section 3 showed recovery from 2013 through 2016 that was likely a result of cessation of pumping for the irrigation supply in 2012. After 2016, there is a mild declining water-level trend resulting from collection from alluvial wells in the northeast Section 3 area. [Figure 7.2-4](#) presents water-level elevations versus time for Lower Chinle wells CW31, CW32, CW33, CW36, CW37 and CW43 (see [Figure 7.2-2](#) for location of these wells). This figure shows fairly steady water-level elevations in the Lower Chinle aquifer for the last few years with the exception of an anomalous water-level elevation in well CW36 in 2020.



SCALE: 1" = 1600'  
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 DATE: 3/10/2021

FIGURE 7.2-1 WATER LEVEL ELEVATIONS  
 OF THE LOWER CHINLE AQUIFER,  
 2020, FT-MSL

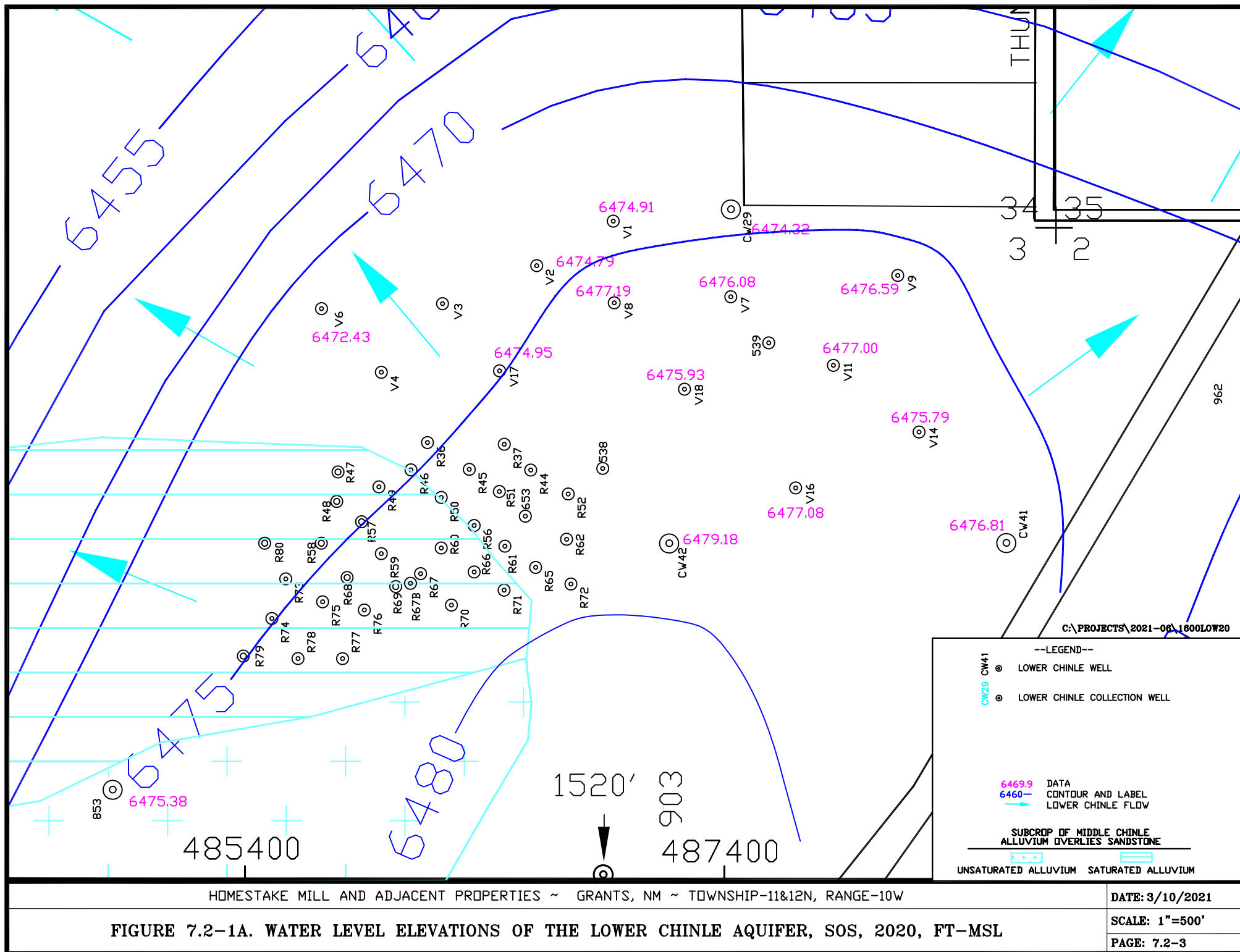
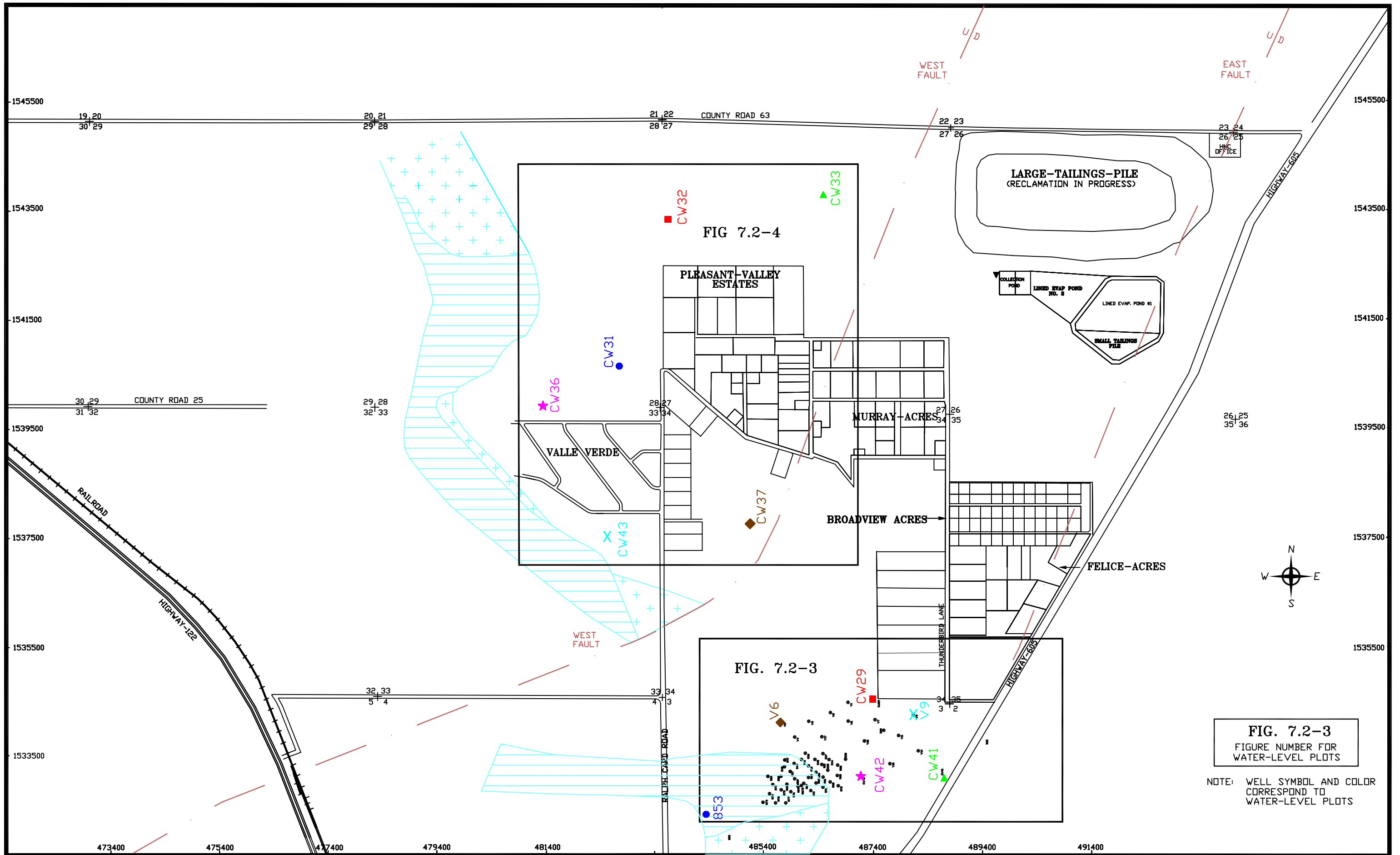
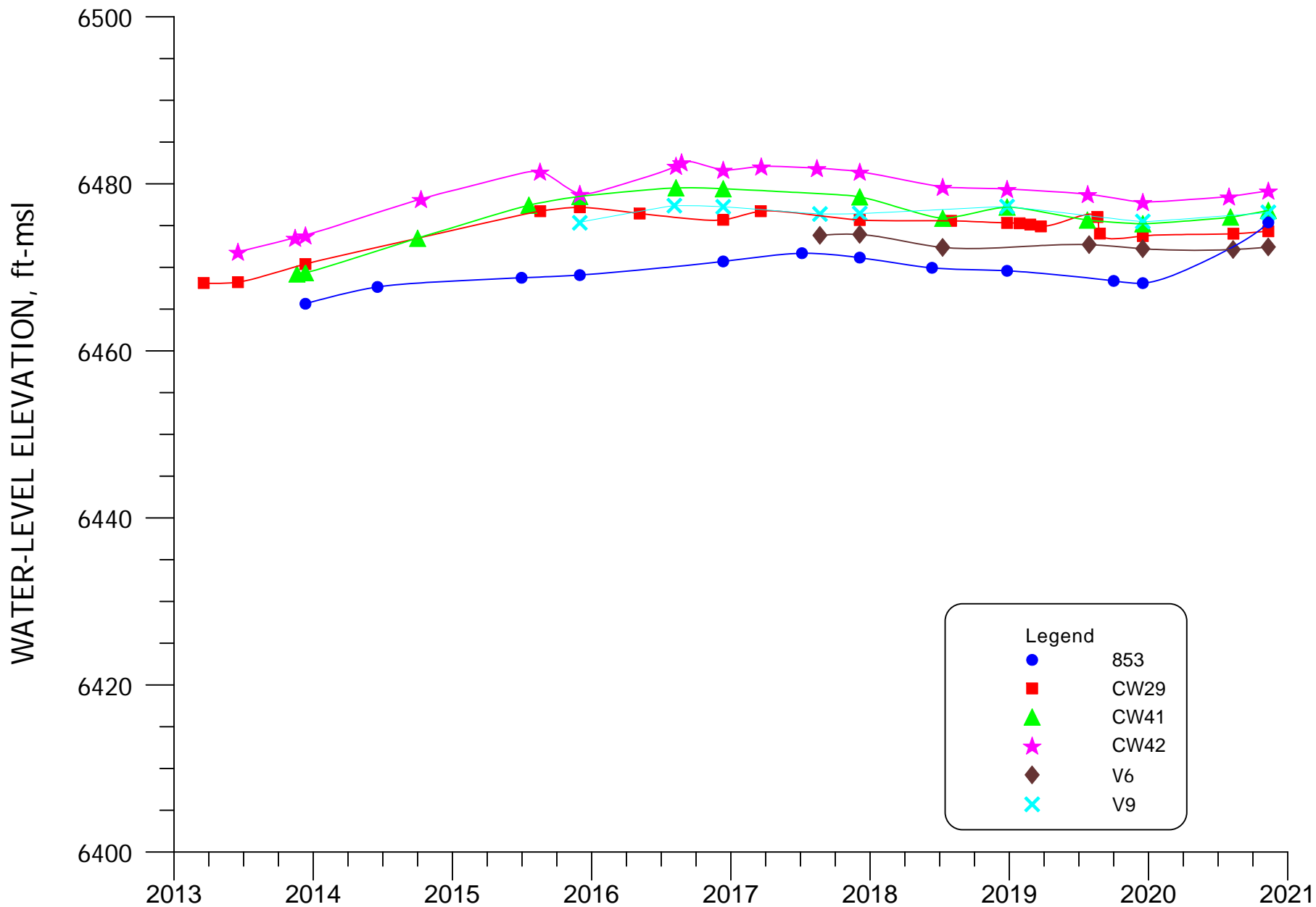


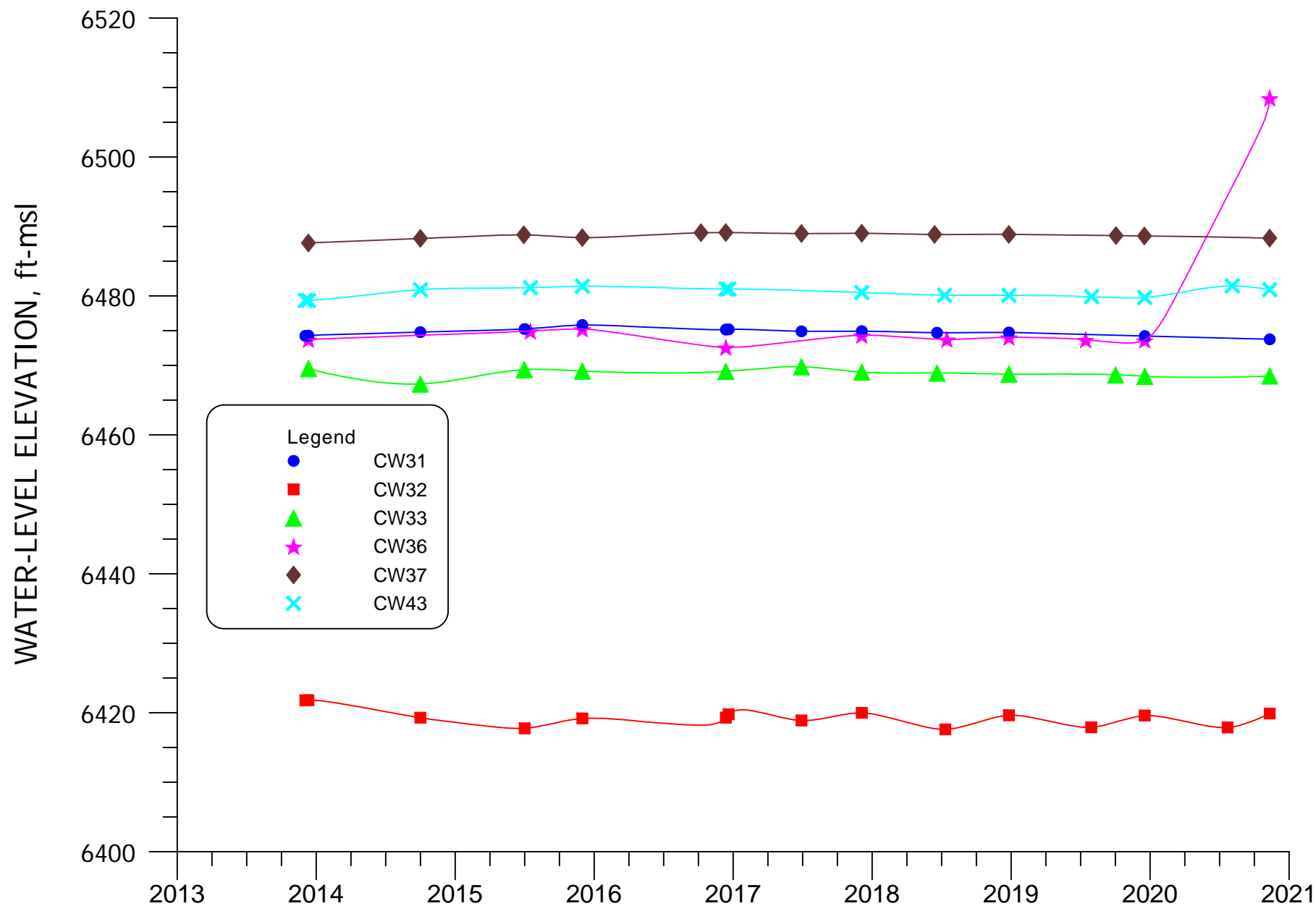
FIGURE 7.2-1A. WATER LEVEL ELEVATIONS OF THE LOWER CHINLE AQUIFER, SOS, 2020, FT-MSL

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SCALE: 1"=500'  
PAGE: 7.2-3





**FIGURE 7.2-3. WATER-LEVEL ELEVATION FOR WELLS 853, CW29, CW41, CW42, V6 AND V9.**



**FIGURE 7.2-4. WATER-LEVEL ELEVATION FOR WELLS CW31, CW32, CW33, CW36, CW37 AND CW43.**

### 7.3 LOWER CHINLE WATER QUALITY

Water-quality data for 2020 for the Lower Chinle aquifer are presented in [Tables B.5-1](#) and [B.5-2](#) of [Appendix B](#) along with water-quality data for the other Chinle aquifer wells. The basic well data is presented in [Tables 5.1-1](#) through [5.1-4](#), and the orientation of the well name on [Figures 5.1-1](#), [5.1-1A](#) and [5.1-1B](#) indicates which of the Chinle wells are completed in the Lower Chinle aquifer.

The Lower Chinle wells used in establishing the Chinle site standards are shown on [Figure 7.3-1](#) with a blue box around the well name showing which Lower Chinle wells were used to define the non-mixing zone site standard. The yellow pattern on this figure shows the mixing zone for the Lower Chinle aquifer. The Lower Chinle wells used in conjunction with the Upper and Middle Chinle wells (see [Figures 5.3-1](#) and [6.3-1](#) for the Upper and Middle Chinle wells used, respectively) in establishing the mixing zone site standards are shown with a red box around their well names. The wells with a blue box around their well names were used in establishing the non-mixing zone site standards for the Lower Chinle aquifer. [Table 7.3-1](#) presents Chinle mixing zone site standards and the non-mixing zone Lower Chinle site standards. This table also presents the 2020 data for the Chinle mixing zone wells and the Lower Chinle non-mixing zone wells.

Constituent concentrations in the Lower Chinle aquifer exceed site standards only in Section 3 and the very southern portion of Section 34, except for some natural exceedances in the far down-gradient wells. Sulfate concentrations in the Lower Chinle aquifer are not above the NRC site standards except in far down-gradient wells where naturally occurring concentrations exceed the relevant non-mixing zone site standard. Uranium concentrations exceed the NRC site standards only in the northeastern and central portions of Section 3 and the southern portion of Section 34. Molybdenum concentrations in the Lower Chinle aquifer are much less than 0.1 mg/L.

#### 7.3.1 SULFATE – LOWER CHINLE

[Figures 7.3-1A](#) and [7.3-1B](#) present contours of sulfate concentrations in the Lower Chinle aquifer during 2020. Lower Chinle standards based on background data are presented for sulfate in the legend of [Figures 7.3-1A](#) and [7.3-1B](#). None of the Lower Chinle concentrations in

the mixing zone (see Figure 7.3-1 for the Lower Chinle mixing zone area) exceeded the mixing-zone sulfate site standard of 1750 mg/L. The pattern at well CW33 shows that its past sulfate concentration has been slightly greater than the non-mixing zone standard of 2000 mg/L. This natural exceedance is due to the limited non-mixing zone data set that was used to set the standard, and the natural groundwater quality deterioration with down-gradient movement in the shale.

The locations of wells used in the plots of water quality for the Lower Chinle are presented on Figure 7.3-2 and shows that data for mixing zone Lower Chinle wells 538, CW42, CW43 and V6 are grouped together on the water-quality time plots, and data for non-mixing zone wells CW29, CW32 and CW41 are presented on a second plot. Figure 7.3-3 presents sulfate concentrations plotted versus time for the Lower Chinle mixing-zone wells and shows that all of these concentrations are below the mixing zone standard. Plots of sulfate concentration versus time for Lower Chinle wells CW29, CW32 and CW41 are presented on Figure 7.3-4 (see Figure 7.3-2 for location of these wells) with the non-mixing zone standard. This plot shows that the 2020 sulfate concentrations for these wells are below the site standard.

### **7.3.2 TOTAL DISSOLVED SOLIDS – LOWER CHINLE**

Figures 7.3-5 and 7.3-5A present the total dissolved solids (TDS) concentrations in the Lower Chinle aquifer during 2020. All TDS concentrations for 2020 were less than the non-mixing zone site standard value of 4140 mg/L. Concentrations are thought to naturally exceed this level farther down-gradient as shown by the cyan pattern. The TDS concentration naturally increases down-gradient due to the low permeability and correspondingly slow movement of water through this shale aquifer. All TDS concentrations on Figure 7.3-5A are less than the mixing zone standard of 3140 mg/L. Figures 7.3-6 and 7.3-7 present TDS concentrations for the mixing zone and non-mixing zone Lower Chinle wells, respectively, and shows that all of the 2020 TDS concentrations in these wells are below the site standards.



### **7.3.3 CHLORIDE – LOWER CHINLE**

Chloride concentration data in the Lower Chinle aquifer were reviewed during 2003 to confirm that restoration for this constituent is not necessary in the Lower Chinle aquifer. The chloride concentrations measured during 2020 continue to support this conclusion and are all less than the NRC standard except in the down-gradient area where values naturally exceed the standard. Therefore, chloride concentration maps and time plots are not presented for the Lower Chinle aquifer.

### **7.3.4 URANIUM – LOWER CHINLE**

Figures 7.3-8 and 7.3-8A present the uranium concentrations in the Lower Chinle aquifer for 2020. Uranium concentrations in the Lower Chinle exceeded the mixing-zone site standard concentration in the central portion of Section 3, while concentrations in two wells exceeded the non-mixing zone site standard. Uranium concentrations plotted versus time for Lower Chinle wells 538, CW42, CW43 and V6 are presented on Figure 7.3-9. A gradual decline in the uranium concentration in well 538 has been observed, and some restoration is needed at wells CW42 and V6. The uranium concentrations in the Lower Chinle non-mixing zone wells with data presented on Figure 7.3-10 have remained at low levels with the exception of higher concentrations in well CW29. There is a slight declining trend in uranium concentration in well CW29.

### **7.3.5 SELENIUM – LOWER CHINLE**

Selenium concentrations in the Lower Chinle aquifer for 2020 are presented on Figures 7.3-11 and 7.3-11A. None of the selenium concentrations in water from the Lower Chinle wells exceeded the site standards. The mixing and non-mixing zone site standards are 0.14 and 0.32 mg/L, respectively, for the Lower Chinle aquifer.

Figure 7.3-12 presents selenium concentration versus time plots for wells 538, CW42, CW43 and V6. Figure 7.3-13 presents selenium concentrations plotted versus time for Lower Chinle wells CW29, CW32 and CW41. All of these selenium concentrations in these two plots are less than their corresponding standards.

### **7.3.6 MOLYBDENUM – LOWER CHINLE**

Molybdenum concentrations in water samples collected from the Lower Chinle wells in 2020 were generally very small with all values less than or equal to 0.03 mg/L and, therefore, no areal molybdenum concentration figures or time plots were prepared. The 2020 results are consistent with historical measurements of molybdenum in the Lower Chinle aquifer. Molybdenum is not a constituent of concern in the Lower Chinle aquifer.

### **7.3.7 NITRATE – LOWER CHINLE**

Monitoring of nitrate concentration in the Lower Chinle aquifer in 2020 confirms that concentrations remain significantly below the site standard of 15 mg/L for the mixing zone. Therefore, a map of the nitrate values for the Lower Chinle was not developed.

Plots of nitrate concentrations versus time were not prepared, because historically, samples from Lower Chinle wells contained very low nitrate concentrations that are similar to those measured in 2020. Nitrate concentration in the tailings seepage and the majority of the alluvial aquifer is low and therefore there is very little potential for elevated nitrate concentration in the Lower Chinle aquifer resulting from seepage impacts.

### **7.3.8 RADIUM-226 AND RADIUM-228 – LOWER CHINLE**

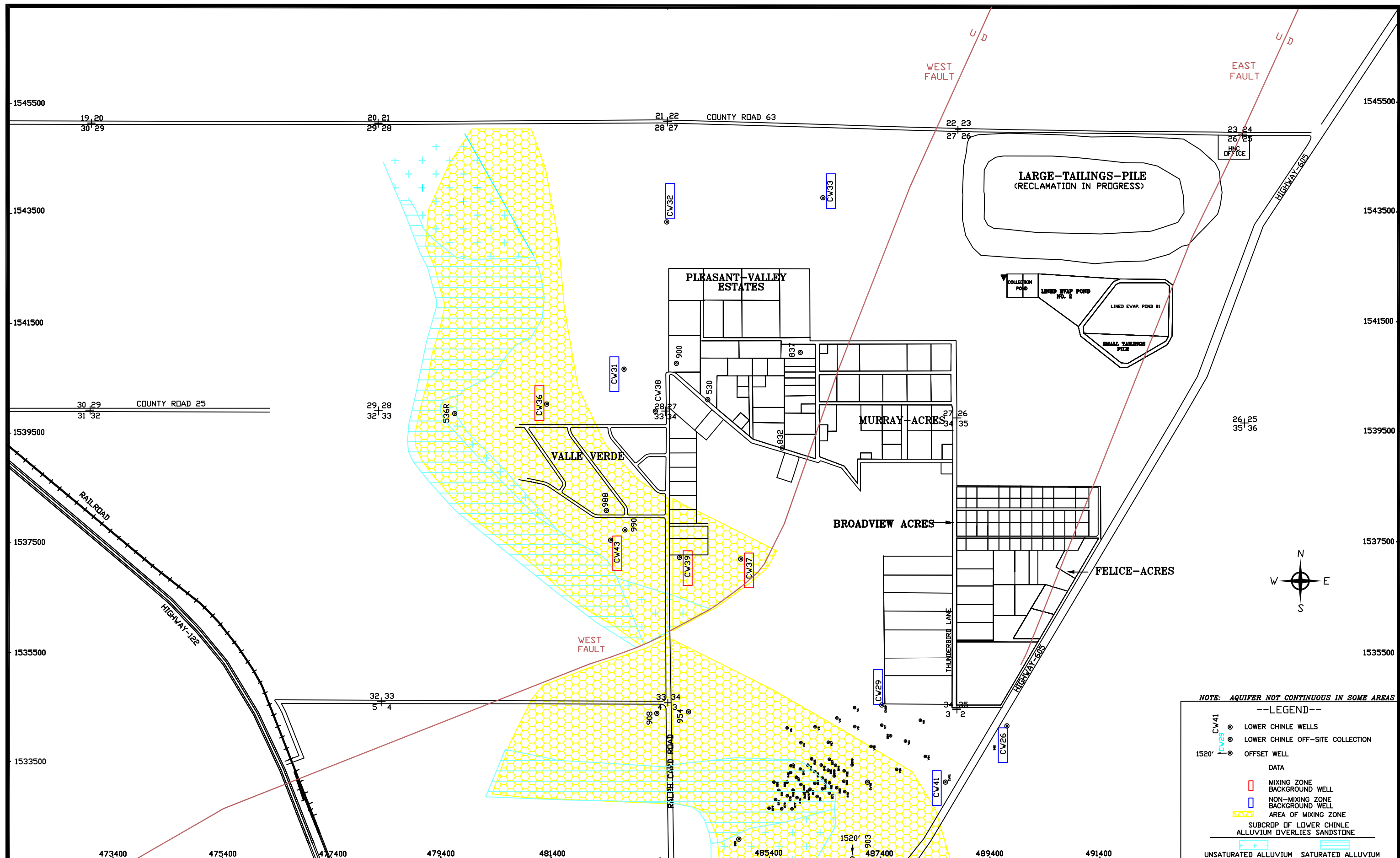
All radium concentrations for 2020 were low in the Lower Chinle aquifer. Because of the typically low concentrations, radium-226 and radium-228 are not important parameters relative to the Lower Chinle aquifer; therefore, a site standard for the Lower Chinle has not been set. These low levels of radium do not warrant the development of a figure presenting areal distribution of radium concentration. A radium-228 concentration of 5.4 pCi/L in a 2020 sample from well CW29 is thought to be a laboratory outlier and is not consistent with past measurements in the well. Radium-228 analysis is typically more erratic than other constituents but the available data shows that radium-226 and radium-228 concentrations are below levels of concern in the Lower Chinle aquifer at the HMC site.

### **7.3.9 VANADIUM - LOWER CHINLE**

Vanadium concentrations have historically been low in the Lower Chinle aquifer. Significant vanadium concentrations in the Lower Chinle aquifer would not be expected because concentrations of this constituent have only been slightly elevated in the alluvial aquifer near the tailings. Vanadium concentrations in the Lower Chinle aquifer have never been large enough to support consideration of this constituent as warranting establishment of a site standard. All 2020 vanadium concentrations in the Lower Chinle aquifer were 0.01 mg/L or less.

### **7.3.10 THORIUM-230 – LOWER CHINLE**

Thorium-230 concentrations have never been significant in the Lower Chinle aquifer and, therefore, should be dropped from the Lower Chinle monitoring list and eliminated from consideration as a Lower Chinle standard. No plots of thorium-230 concentrations with time were prepared because concentrations have historically been low. All 2020 thorium-230 levels were less than 0.3 pCi/L.

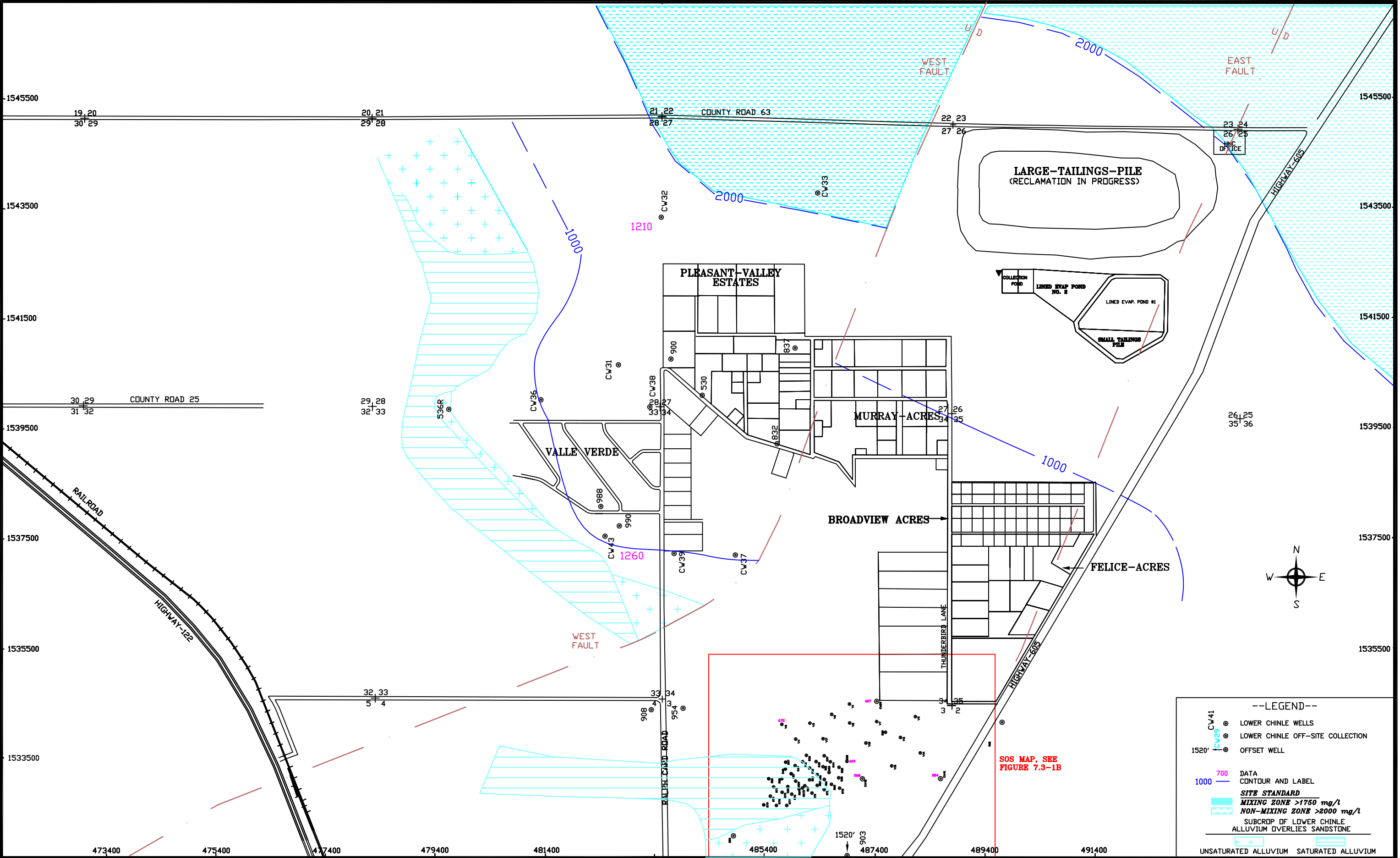


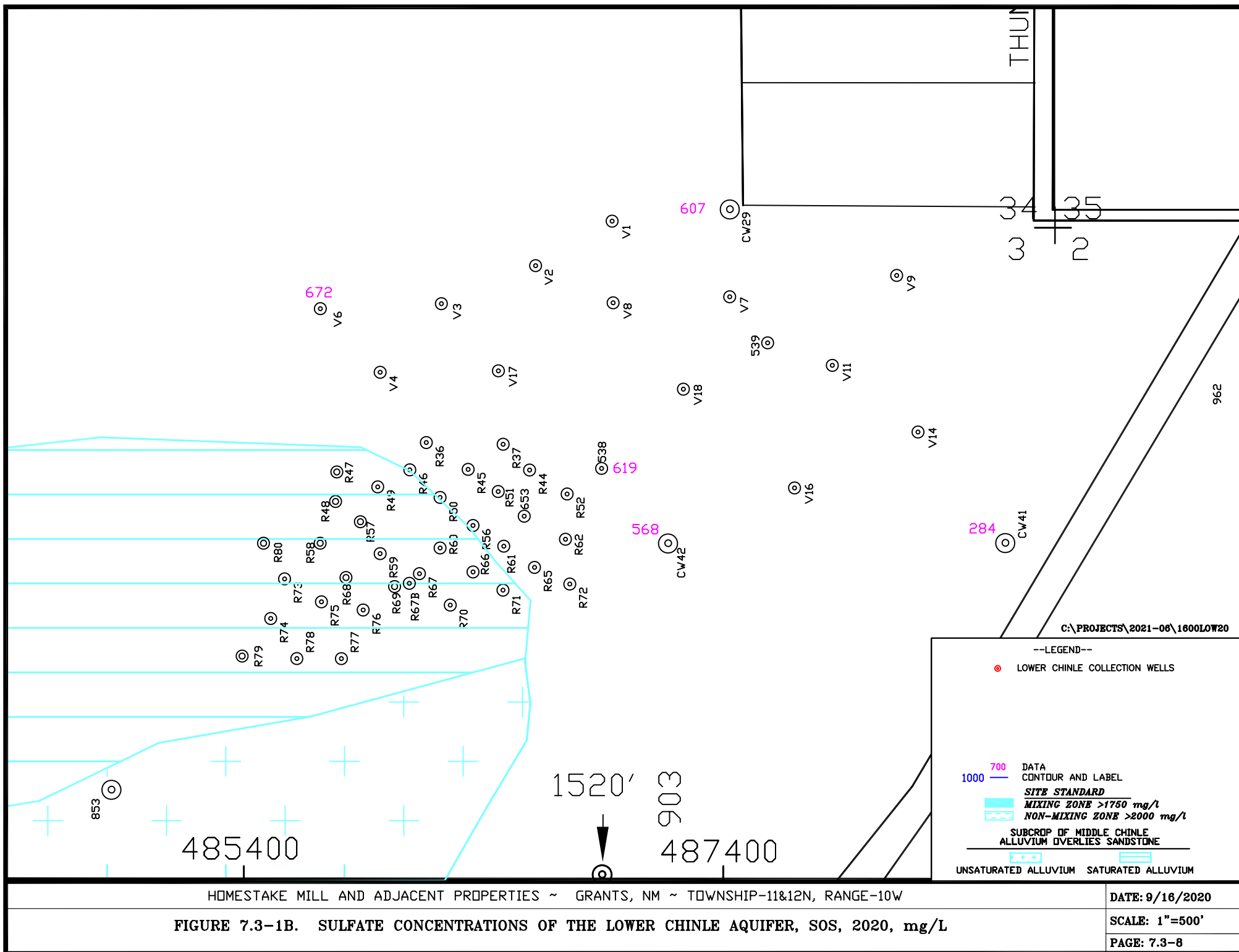
SCALE: 1" = 1600'

C:\PROJECTS\2021-06\1600LOW20

DATE: 9/16/2020

FIGURE 7.3-1. LOCATION OF LOWER CHINLE WELLS USED FOR SITE STANDARDS AND LOWER CHINLE MIXING ZONE





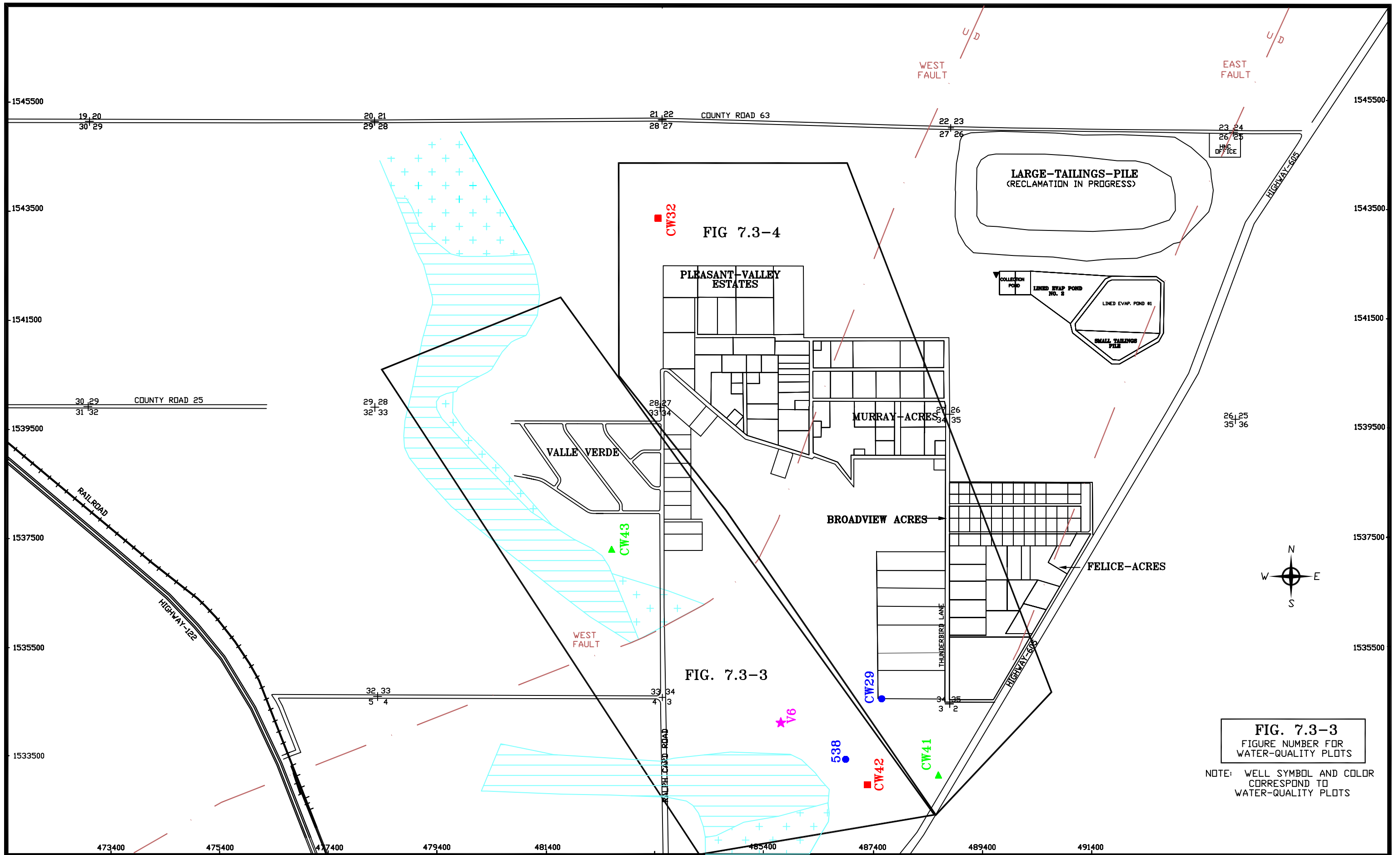
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

FIGURE 7.3-1B. SULFATE CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, SOS, 2020, mg/L

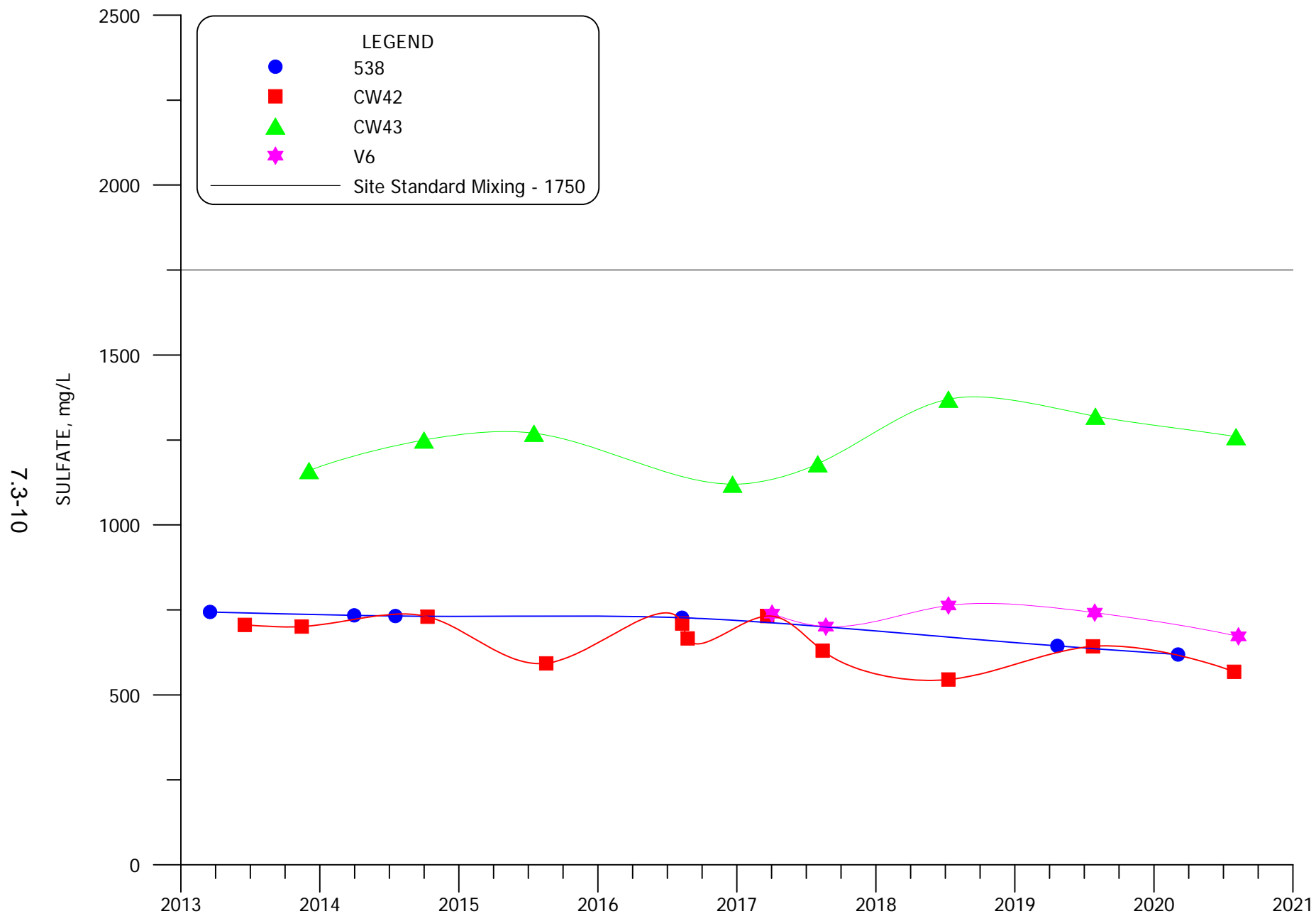
DATE: 9/16/2020

SCALE: 1"=500'

PAGE: 7.3-8

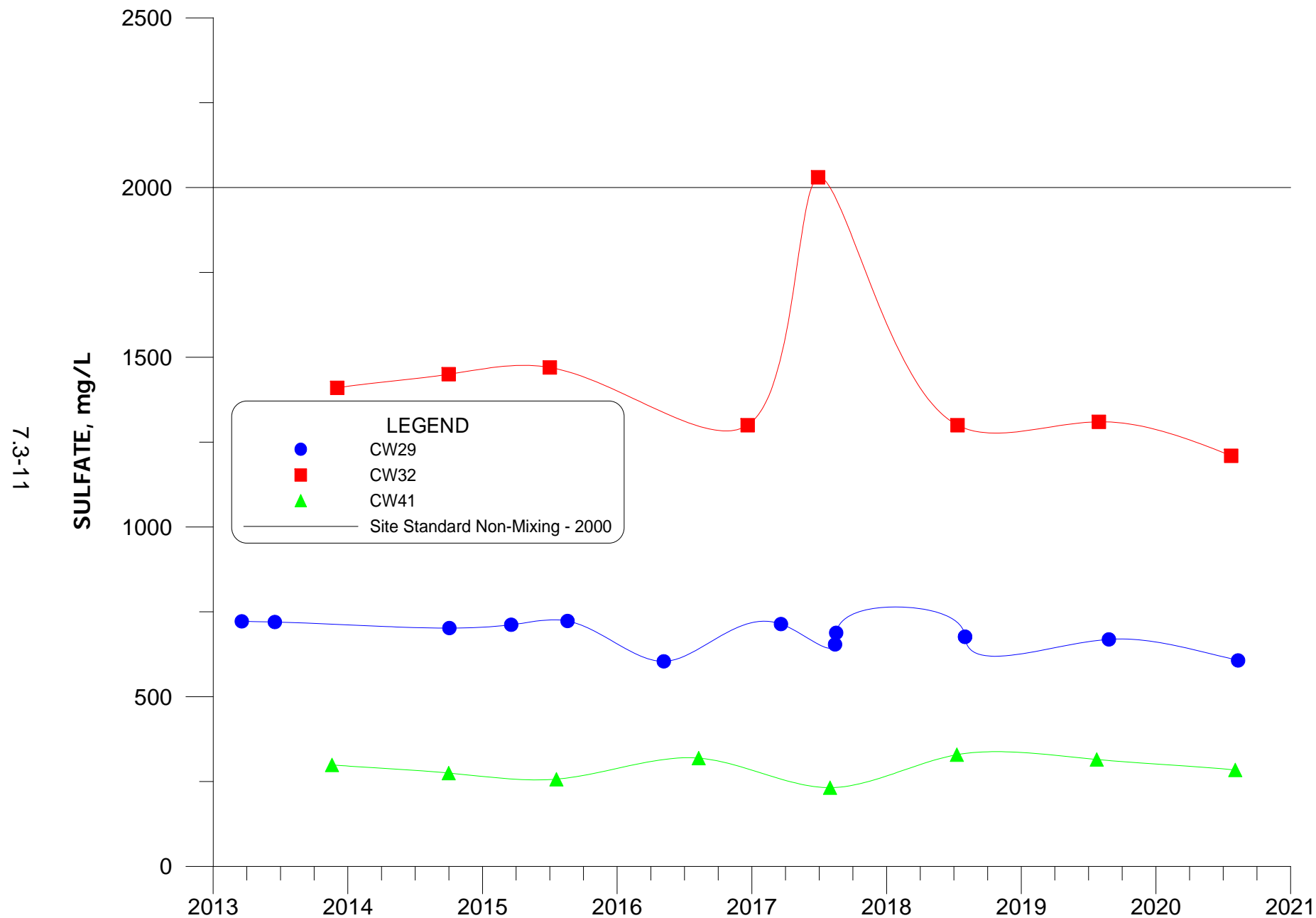


**FIG. 7.3-3**  
 FIGURE NUMBER FOR  
 WATER-QUALITY PLOTS  
 NOTE: WELL SYMBOL AND COLOR  
 CORRESPOND TO  
 WATER-QUALITY PLOTS

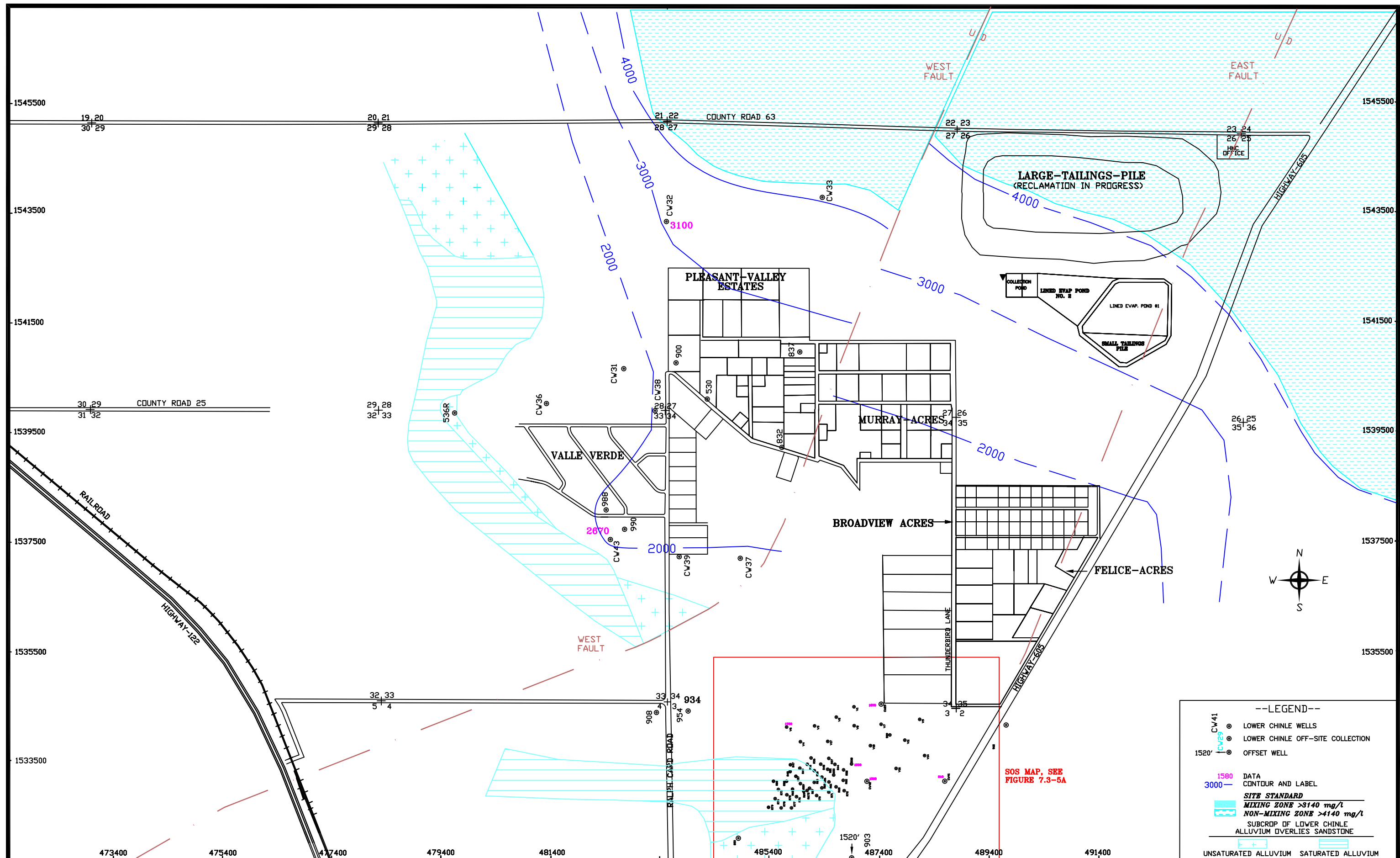


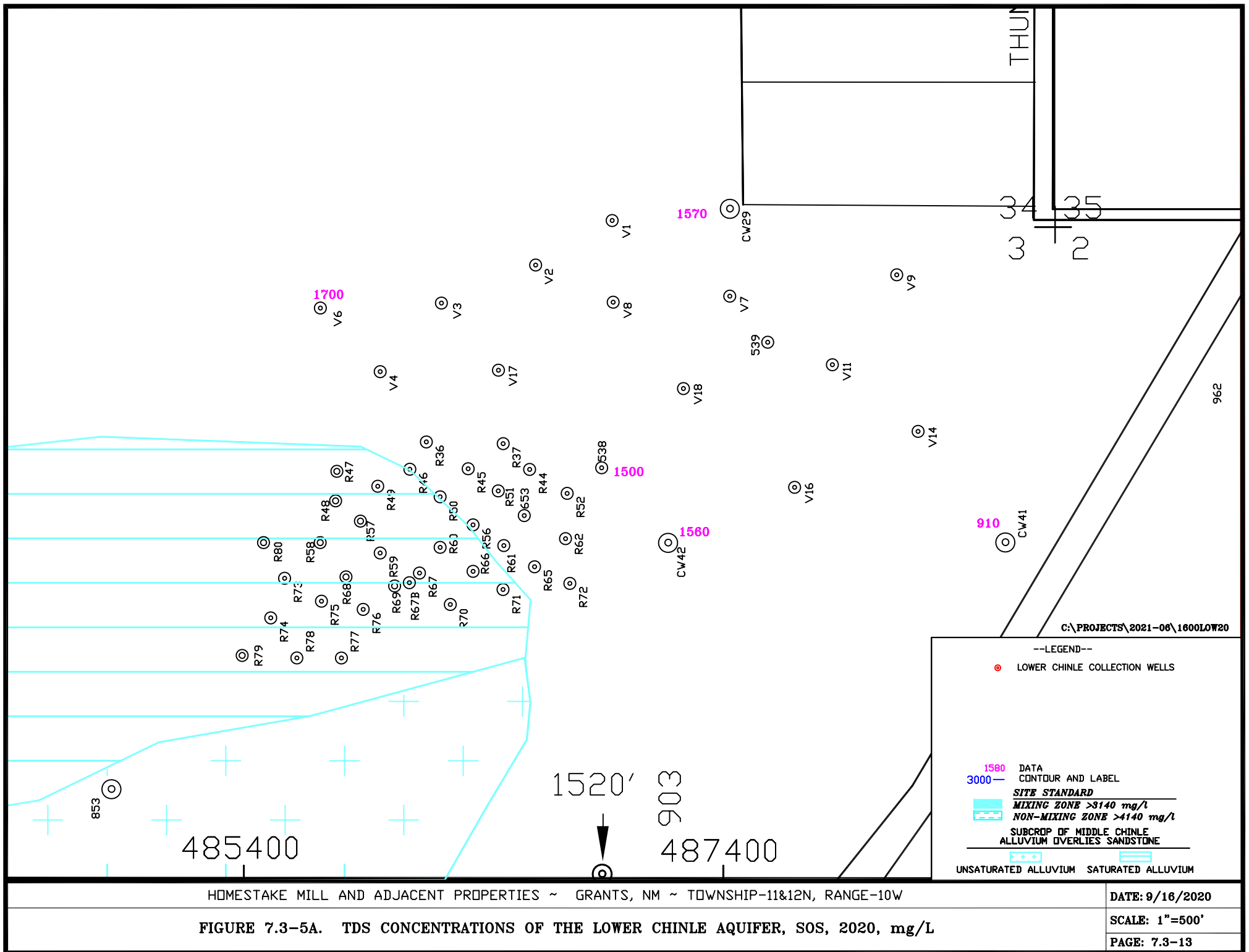
**FIGURE 7.3-3. SULFATE CONCENTRATIONS FOR MIXING ZONE WELLS  
538, CW42, CW43 AND V6**





**FIGURE 7.3-4. SULFATE CONCENTRATIONS FOR NON-MIXING WELLS  
CW29, CW32 AND CW41.**





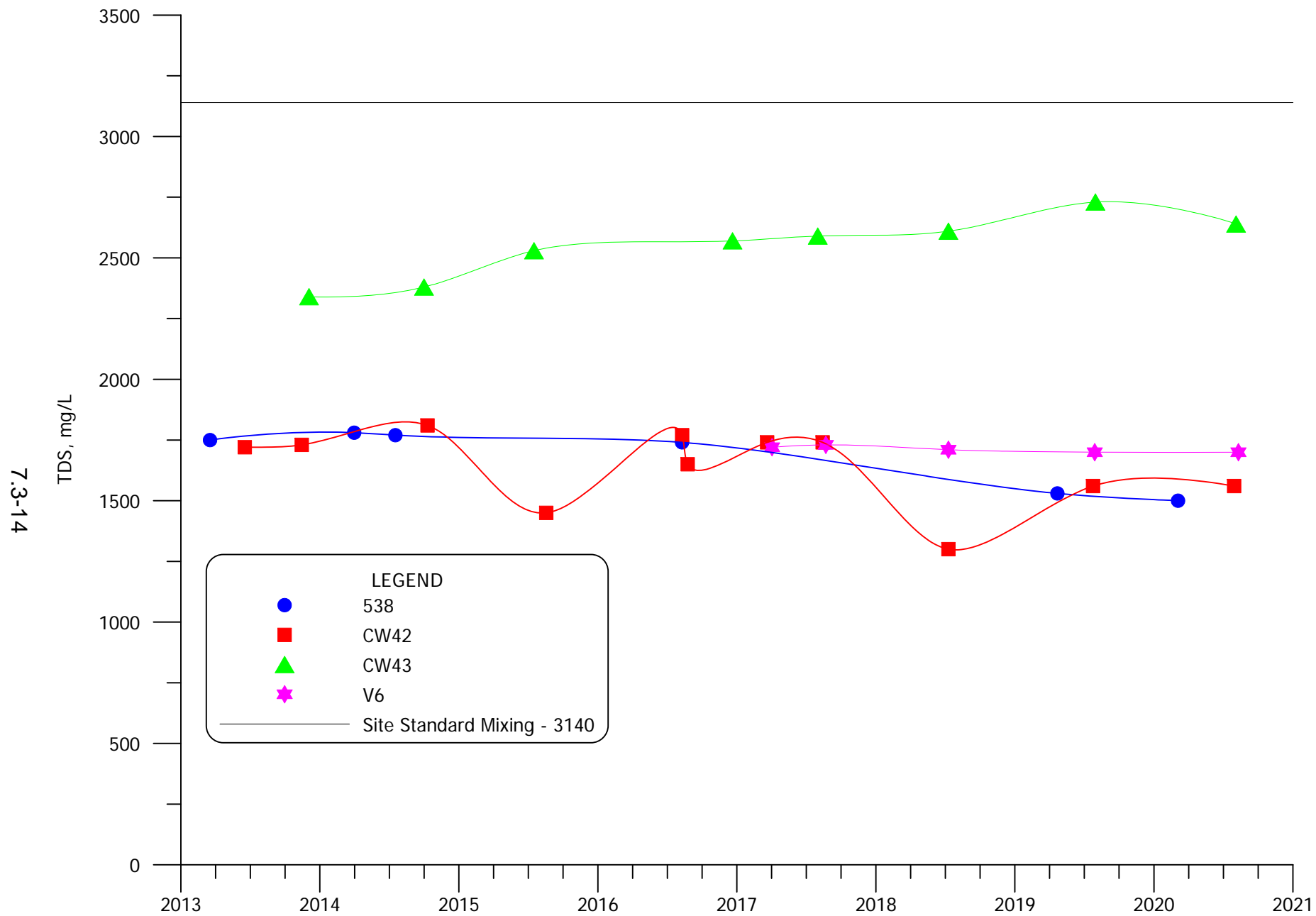
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

FIGURE 7.3-5A. TDS CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, SOS, 2020, mg/L

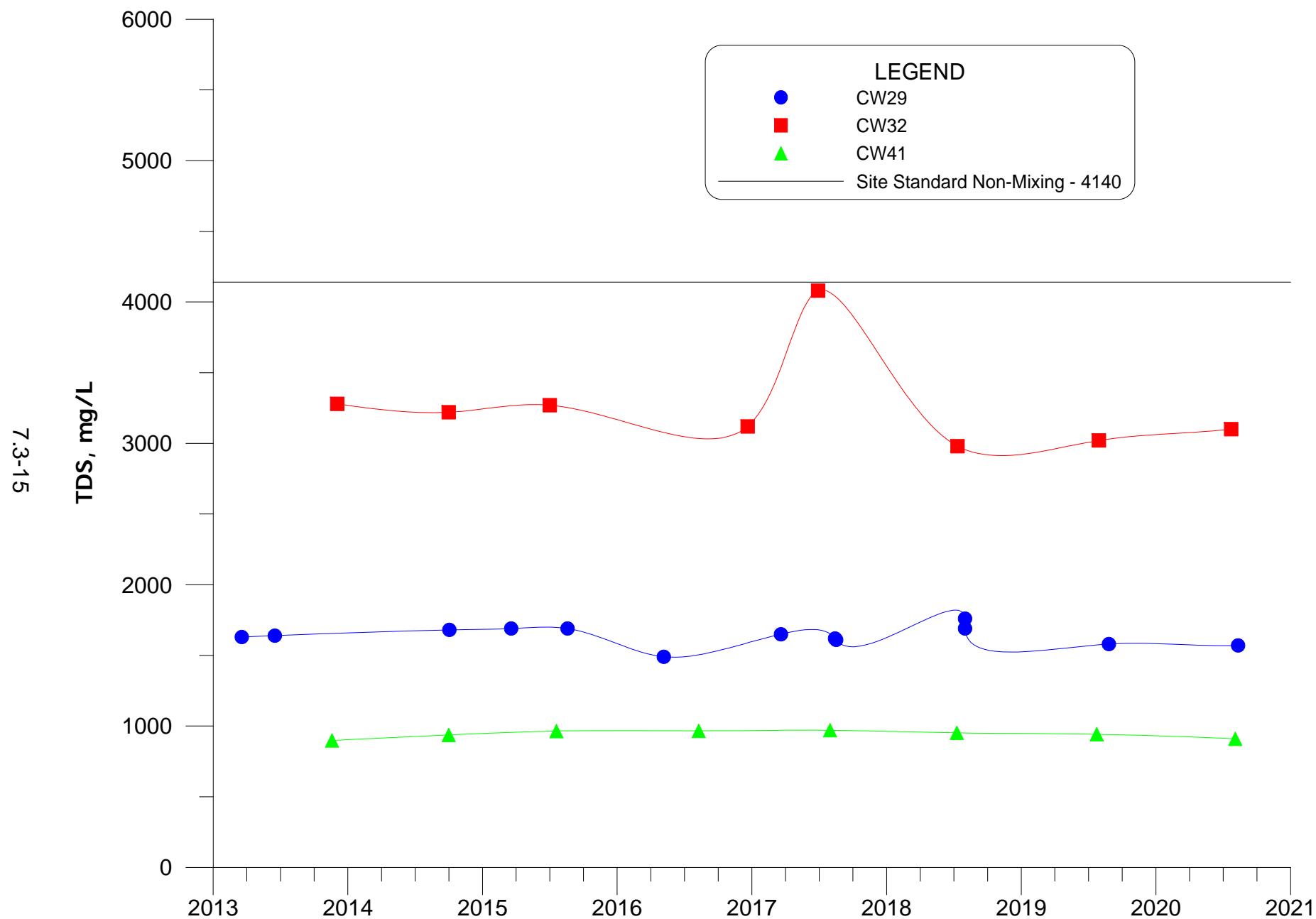
DATE: 9/16/2020

SCALE: 1"=500'

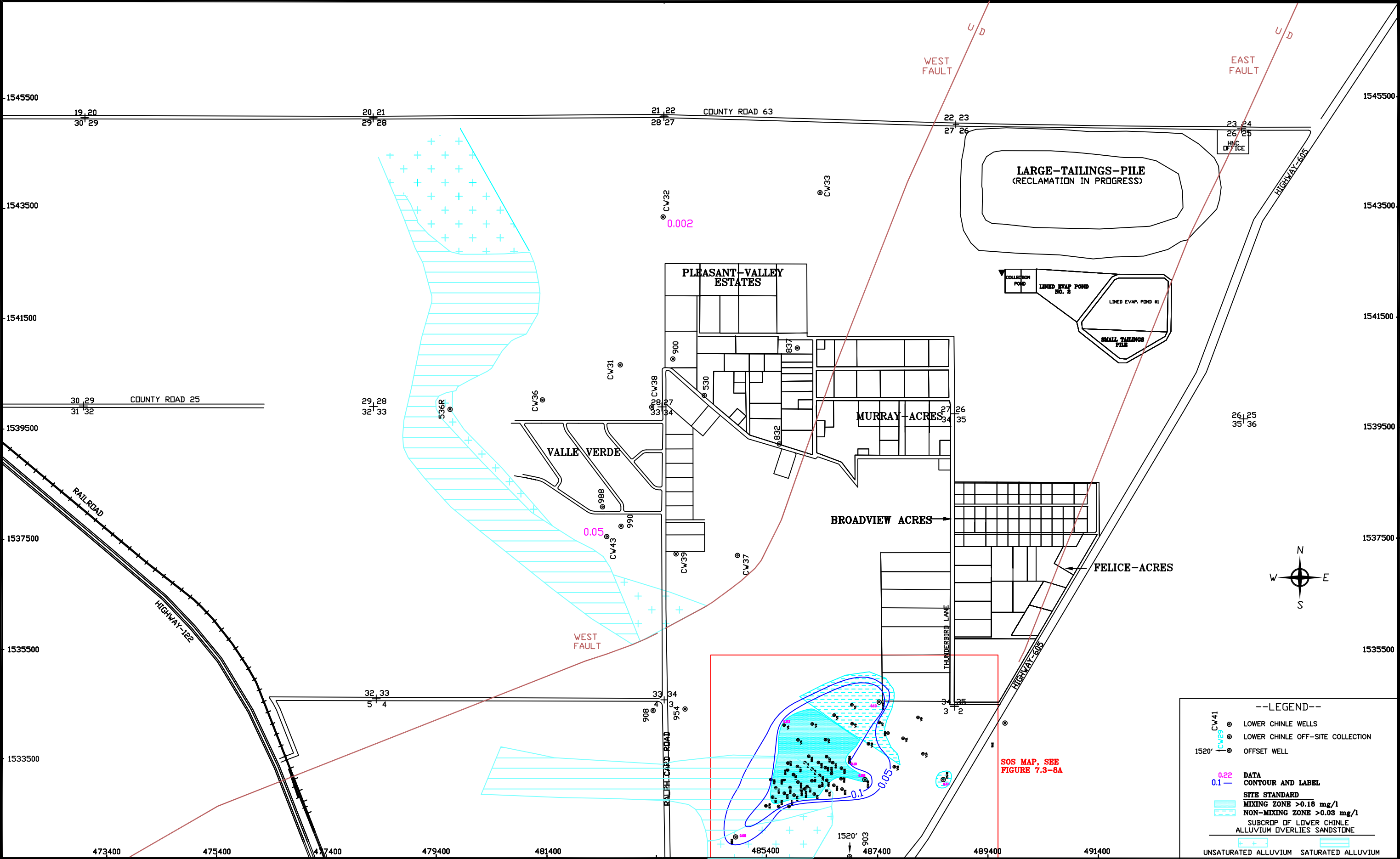
PAGE: 7.3-13



**FIGURE 7.3-6. TDS CONCENTRATIONS FOR MIXING ZONE WELLS  
538, CW42, CW43 AND V6**

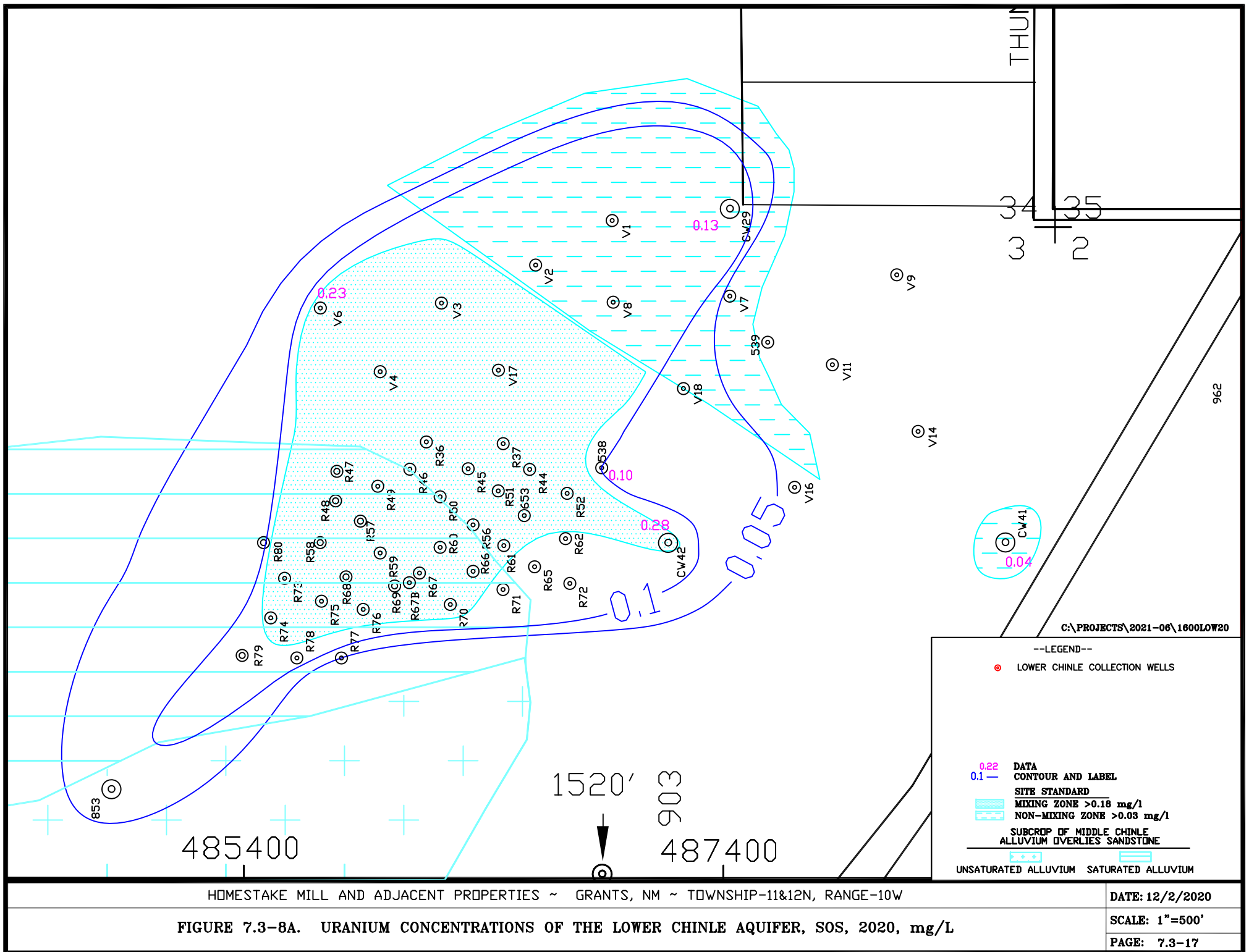


**FIGURE 7.3-7. TDS CONCENTRATIONS FOR NON-MIXING WELLS  
CW29, CW32 AND CW41.**



SCALE: 1" = 1600'  
C:\PROJECTS\2021-06\1600LOW20  
DATE: 9/16/2020

FIGURE 7.3-8. URANIUM CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, 2020, mg/L



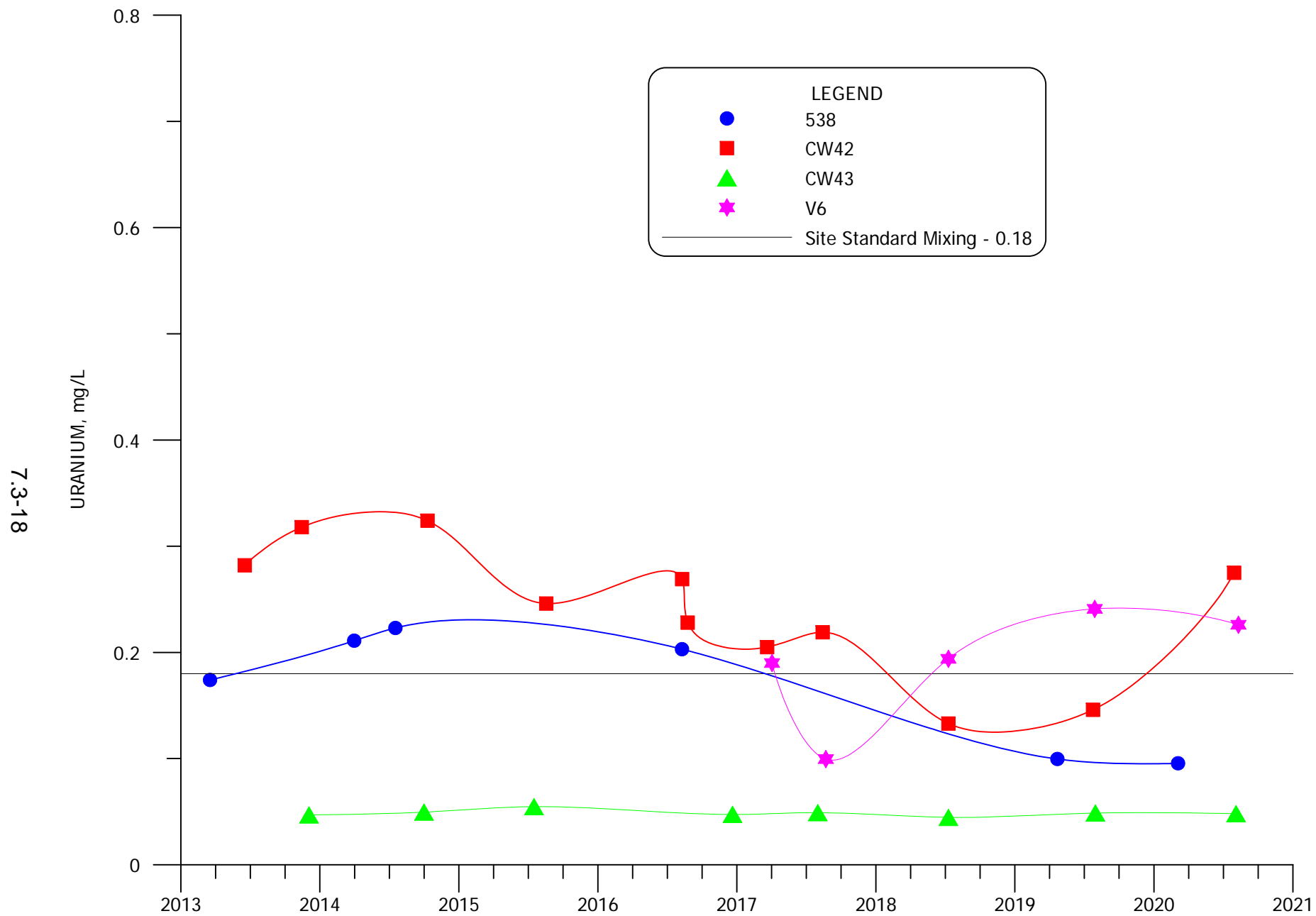
HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

FIGURE 7.3-8A. URANIUM CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, SOS, 2020, mg/L

DATE: 12/2/2020

SCALE: 1"=500'

PAGE: 7.3-17



**FIGURE 7.3-9. URANIUM CONCENTRATIONS FOR MIXING ZONE WELLS  
538, CW42, CW43 AND V6**



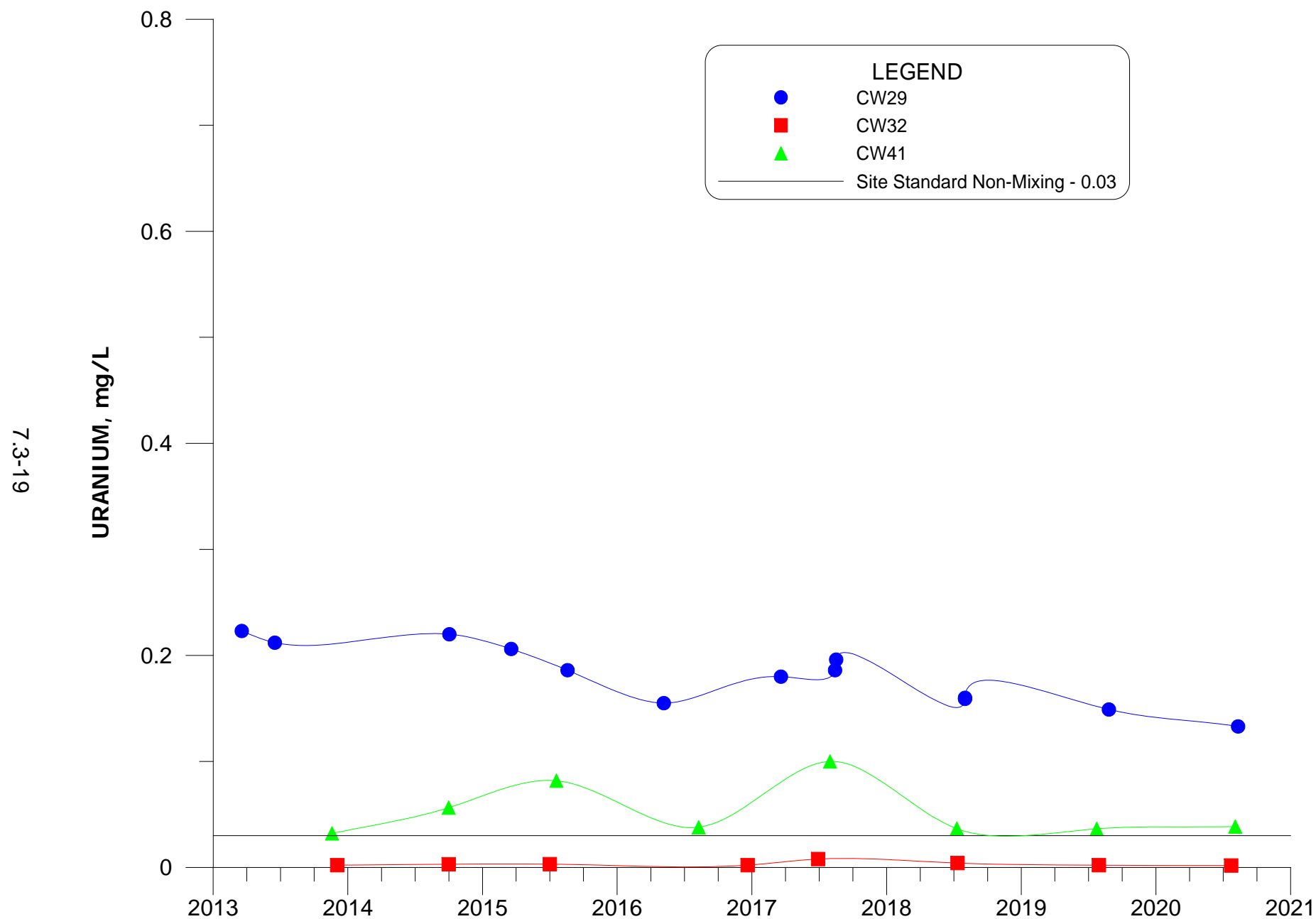
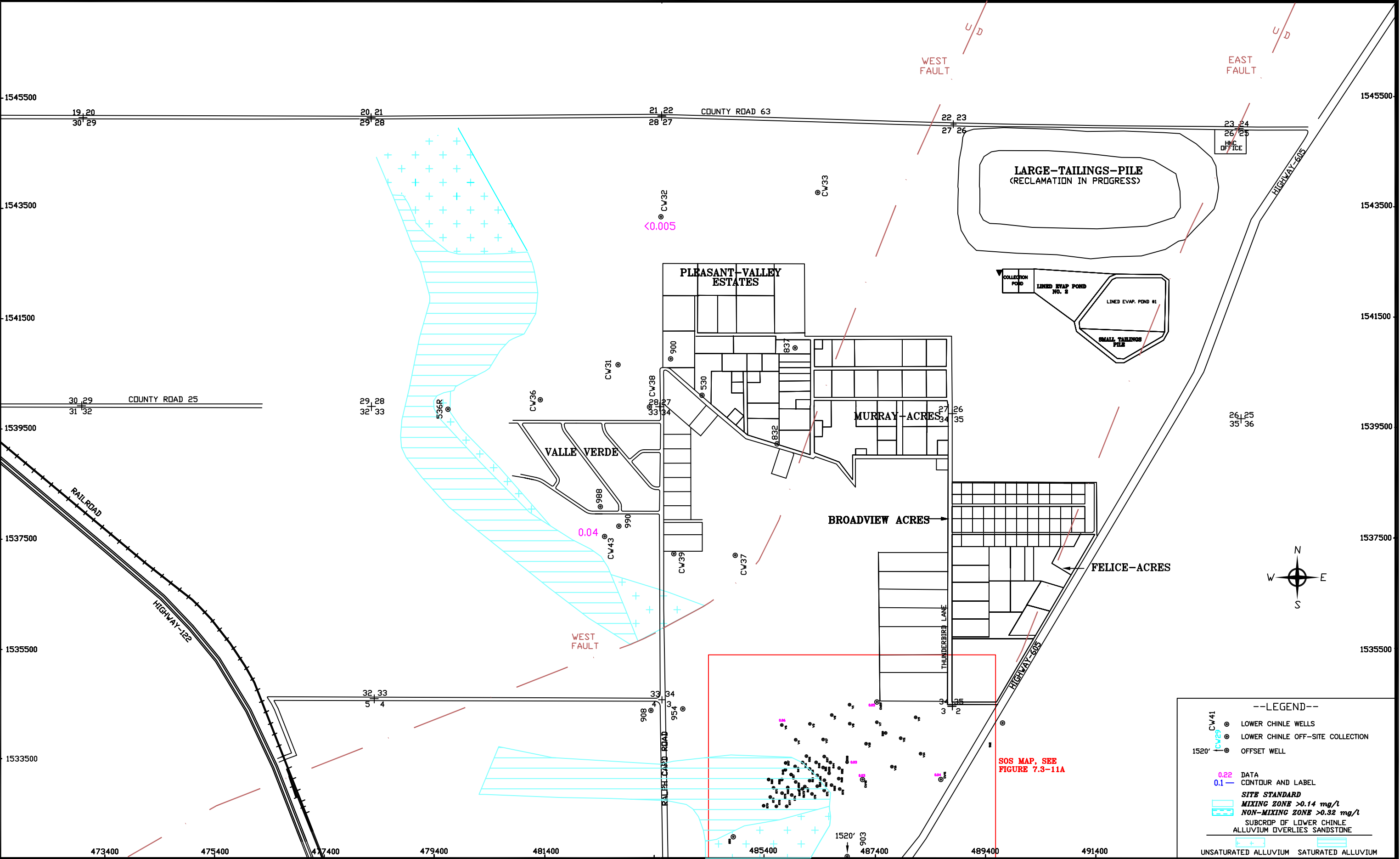
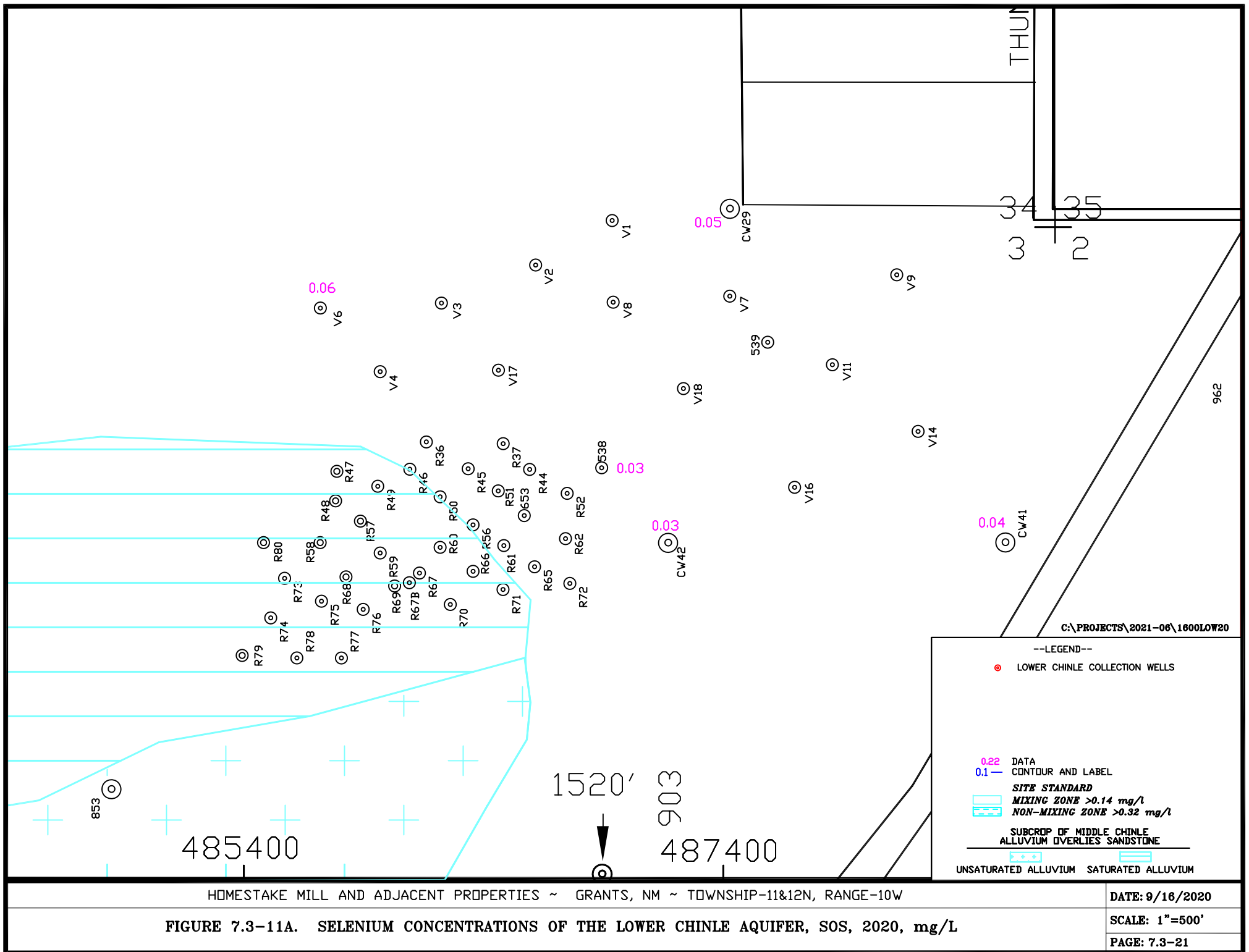
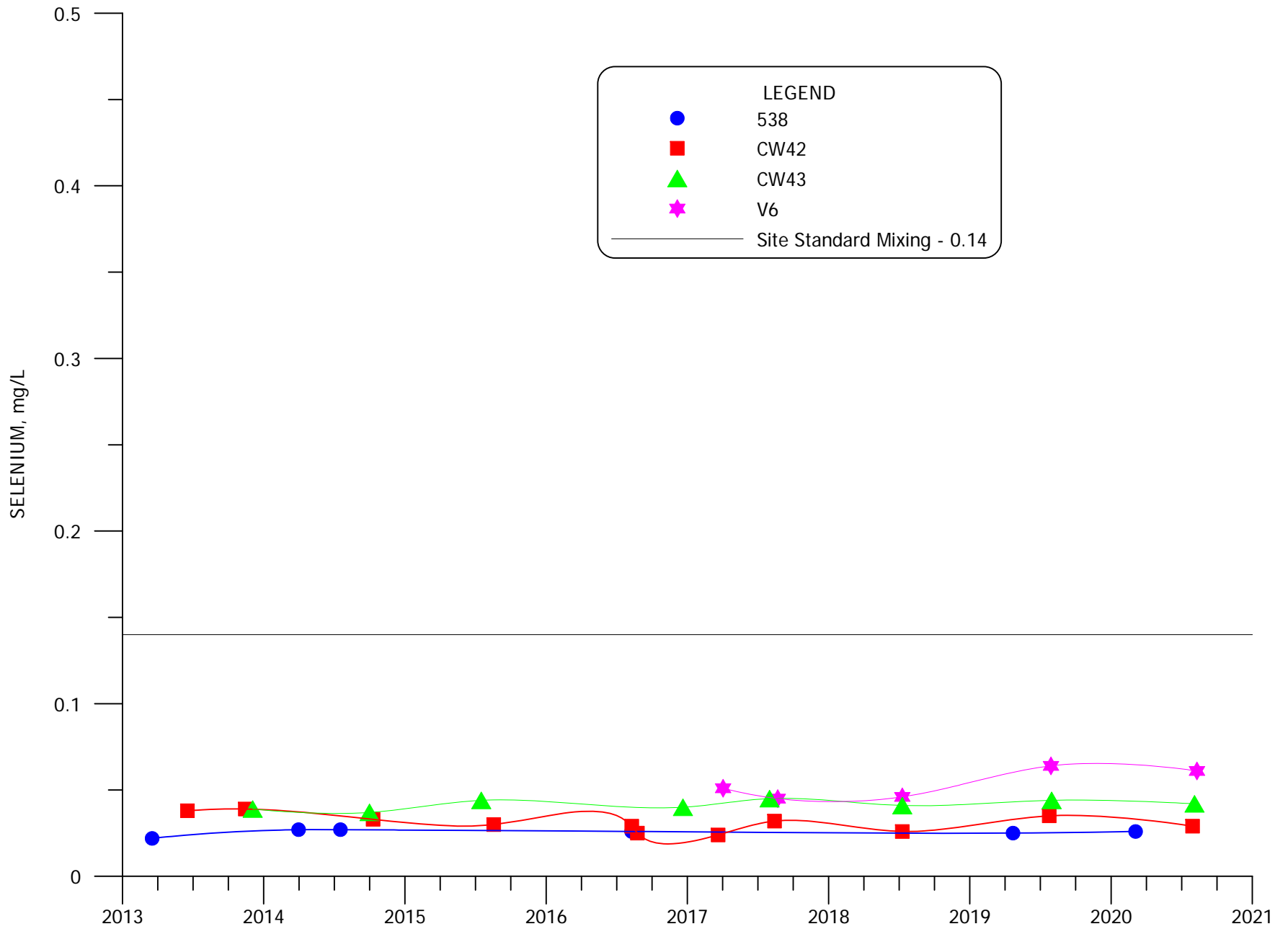


FIGURE 7.3-10. URANIUM CONCENTRATIONS FOR NON-MIXING WELLS  
CW29, CW32 AND CW41.





7.3-22



**FIGURE 7.3-12. SELENIUM CONCENTRATIONS FOR MIXING ZONE WELLS  
538, CW42, CW43 AND V6**

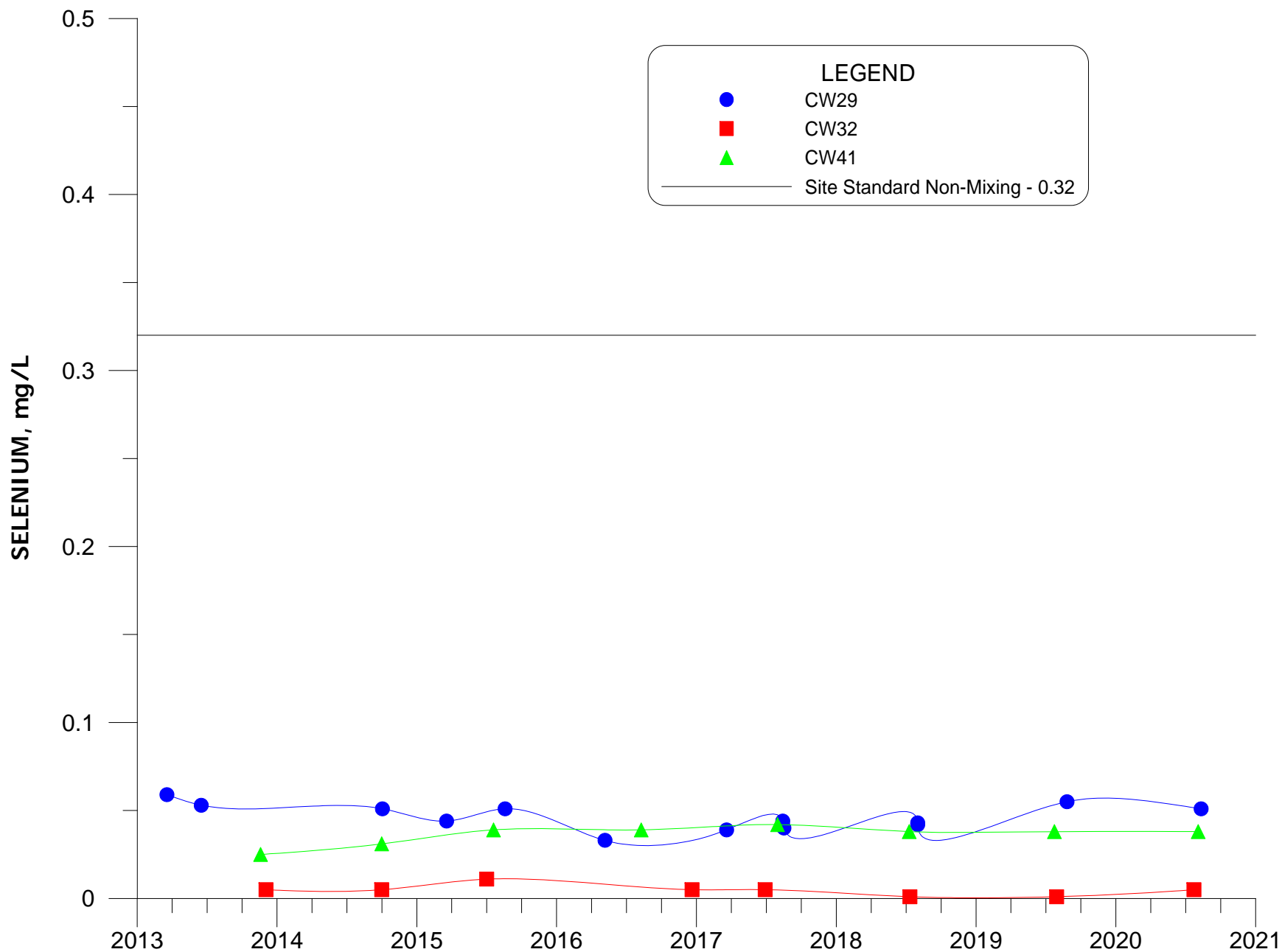


FIGURE 7.3-13. SELENIUM CONCENTRATIONS FOR NON-MIXING WELLS  
CW29, CW32 AND CW41.

**TABLE 7.3-1. LOWER CHINLE SITE STANDARDS AND 2020 BACKGROUND LOWER CHINLE DATA**

Aquifer Zone	CONSTITUENT, concentrations in mg/l							
	Selenium	Uranium	Molybdenum	TDS	Sulfate	Chloride	Nitrate	Vanadium
<b>CHINLE SITE STANDARDS</b>								
Chinle Mixing	0.14	0.18	0.10	3140	1750	250	15	0.01
Lower Chinle Non-Mixing	0.32	0.03	0.10	4140	2000	634	*	*
<b>CHINLE MIXING ZONE WELLS</b>								
CW9	-	-	-	-	-	-	-	-
CW50	<0.001	0.02	0.002	1710	881	56	0.6	<0.01
CW52	-	-	-	-	-	-	-	-
CW15	-	-	-	-	-	-	-	-
CW24	-	-	-	-	-	-	-	-
CW35	0.06	0.17	0.001	2360	1280	66	3.0	<0.01
CW36	-	-	-	-	-	-	-	-
CW37	-	-	-	-	-	-	-	-
CW39	-	-	-	-	-	-	-	-
CW43	0.04	0.048	<0.01	2640	1260	222	7.0	<0.2
<b>LOWER CHINLE NON-MIXING ZONE WELLS</b>								
CW26	-	-	-	-	-	-	-	-
CW29	0.05	0.13	<0.01	1570	607	140	2.6	<0.02
CW31	-	-	-	-	-	-	-	-
CW32	<0.005	0.002	<0.01	3100	1210	389	<0.1	<0.02
CW33	-	-	-	-	-	-	-	-
CW41	0.04	0.04	<0.01	910	284	90	3.1	<0.01

\* Background water quality analyses for constituent determined that site standard is not necessary.

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## **8.0 SAN ANDRES AQUIFER MONITORING**

### **8.1 SAN ANDRES WELL COMPLETIONS AND WATER LEVELS**

The San Andres aquifer is the most important regional aquifer in the Grants Project area and is typically referred to as the San Andres-Glorieta (SAG) aquifer due to the connection between the San Andres limestone and Glorieta sandstone. This report refers to only the San Andres aquifer because the monitoring and pumping for the GRP is only from the San Andres limestone and data for the aquifer in this area is mainly from wells completed in the upper portion of the San Andres limestone. The Chinle Formation, which exists between the alluvium and the San Andres, is approximately 800 feet thick at the Homestake tailings site and is primarily shale with a few sandstone lenses. Therefore, the alluvial aquifer and the San Andres aquifer are separated by a very thick aquitard. The difference in piezometric head between the alluvial and San Andres aquifers is in the range of 80 to 100 feet, which confirms that the flow between the two systems is restricted by the limited permeability of the Chinle Formation. The San Andres and alluvial aquifers are only in direct contact in the western portion of the area presented on [Figure 8.1-1](#) (see magenta pattern area). With no areas of direct communication within the area where the alluvial aquifer is impacted by seepage from the Homestake tailings, and only very limited hydraulic communication through the Chinle shale, the San Andres aquifer is not affected by the GRP tailings seepage. However, the monitoring of former San Andres supply well 943 indicated that there was leakage from a shallower aquifer occurring in the well annulus, and that the leakage had slightly impacted the San Andres aquifer in the area of the well prior to its abandonment in July of 2018. The San Andres aquifer has been used as the source for fresh-water injection into the alluvium and Chinle aquifers at the GRP, and as a result, a monitoring program was established for the San Andres aquifer. Additional monitoring has been implemented to address the past leakage in abandoned well 943.

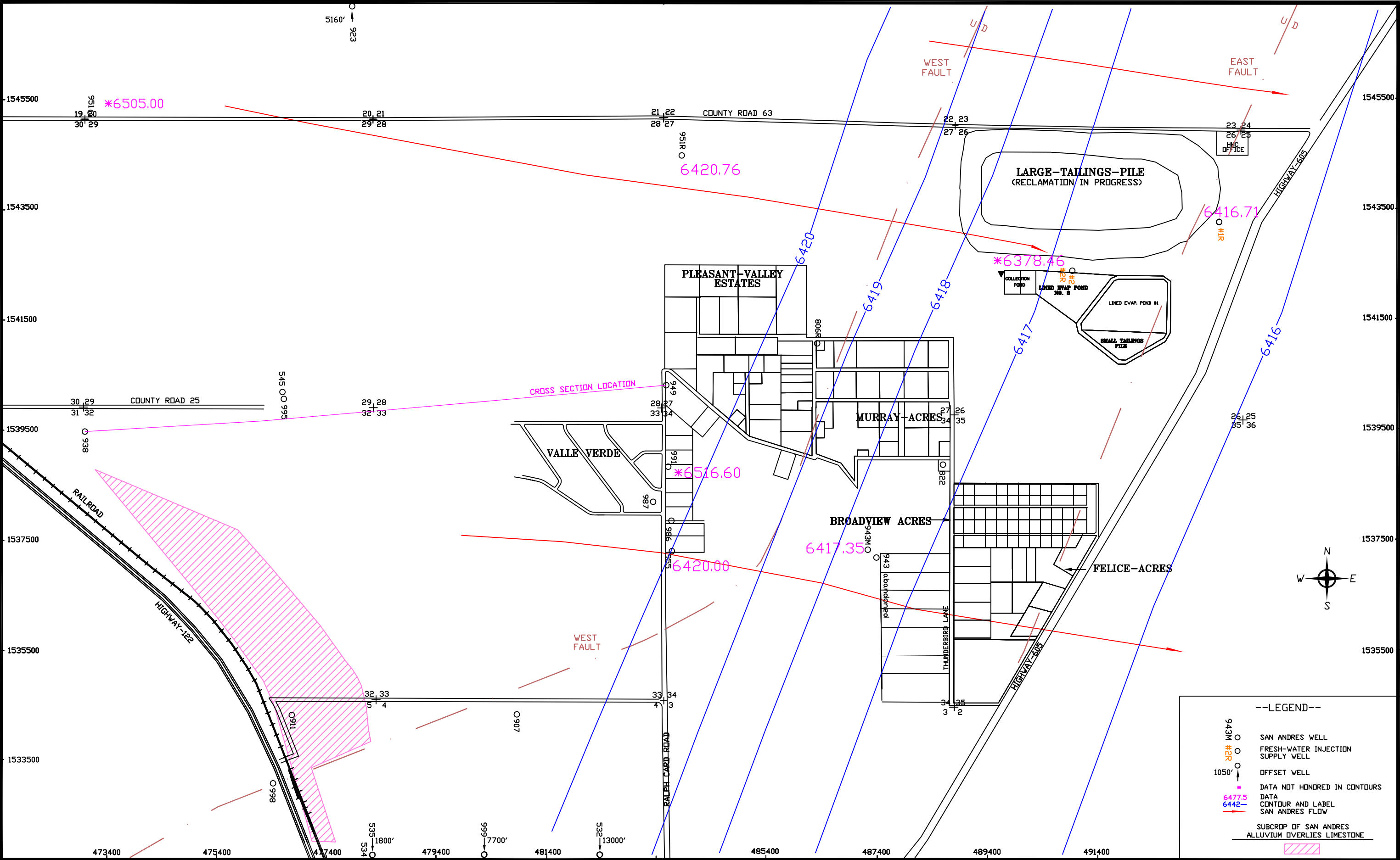
[Table 8.1-1](#) presents well completion information for the San Andres wells in this area. Homestake's two deep water supply wells within the project area were San Andres wells #1 Deep and #2 Deep prior to the abandonment of well #1 Deep in 2019. Well #1 Deep was not used in 2017 through 2019 and drilling of replacement well #1R Deep was started in late 2017 and completed in early 2018. Usage of wells #1R and #2R Deep for water supply is expected to start in 2021. These wells are used to supply the fresh-water to the PTT for the treated water

injection systems within the GRP. San Andres well 951 was used as the fresh-water injection supply for the injection system in Sections 28 and 29 through March of 2012. Replacement well 951R has been used starting in July of 2012 and continuing through early 2018 with a limited usage in late 2019. A small usage of water from well 951R during 2020 was for construction purposes in the relining of the West Collection Pond and was not for fresh-water injection supply. San Andres well 943 had been used as the fresh-water injection supply for the injection system in Sections 3 and 34 and in Felice Acres and its use as a fresh-water injection supply ended on May 18, 2017. San Andres monitoring well 943M was drilled in December 2017 and is located 217 feet northwest of former well 943. Abandonment of San Andres well 928 was initiated in late 2017 and completed in 2018 while well 943 was abandoned in July of 2018.

Figure 8.1-1 shows the locations of the San Andres wells within and near the GRP area. Recharge to the San Andres aquifer occurs mainly west of the area shown in the figure and in the far western portion of the figure. The structure of the San Andres aquifer dips to the east, and thus the ground water system becomes progressively deeper in the easterly direction. Figure 8.1-2 shows a cross section from the west at San Andres well 938 to the east at San Andres well 949 (see Figure 8.1-1 for location of cross section). This cross section shows the dip of the San Andres and the thickness of Chinle shale between the alluvium and the top of the San Andres limestone.

The water-level elevations measured during 2020 (Figure 8.1-1) show a very flat piezometric surface with the gradient being from the west-northwest to the east-southeast. The continuity of the gradient in this area indicates that the East and West faults do not significantly affect the groundwater flow in the San Andres aquifer. The displacement at the faults is not large enough to completely offset the entire thickness of this aquifer system. The displacement at the faults would cause the water in the upper portion of the San Andres aquifer to mix with some of the deeper aquifer water prior to continuing to flow to the east. The increase in gradient in the project area also indicates a decrease in transmissivity in the area of the steeper gradient. The faults may cause a decrease in the transmitting ability of the San Andres aquifer in this area. The flow direction from Figure 14 in Baldwin and Anderholm (1992) was taken into account in drawing the water-level elevation contours. An asterisk is added to the water-level elevation values that were not honored in drawing the contours on the map.

The water-level elevation change in the San Andres aquifer with time is shown in Figure 8.1-3 and shows overall fairly steady water levels for 2013 through 2020. Water levels in the San Andres had generally declined at a rate of 3 feet per year from 2000 to 2012, but have been fairly steady since 2012. The water-level elevation measured in 2020 for well 951 is believed to be erroneous.



SCALE: 1" = 1000'  
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DATE: 12/2/20

FIGURE 8.1-1. LOCATION OF SAN ANDRES WELLS AND WATER-LEVEL ELEVATION FOR SAN ANDRES AQUIFER, 2020, FT-MSL

8-1-5

ELEVATION, FT-MSL

ELEVATION, FT-MSL

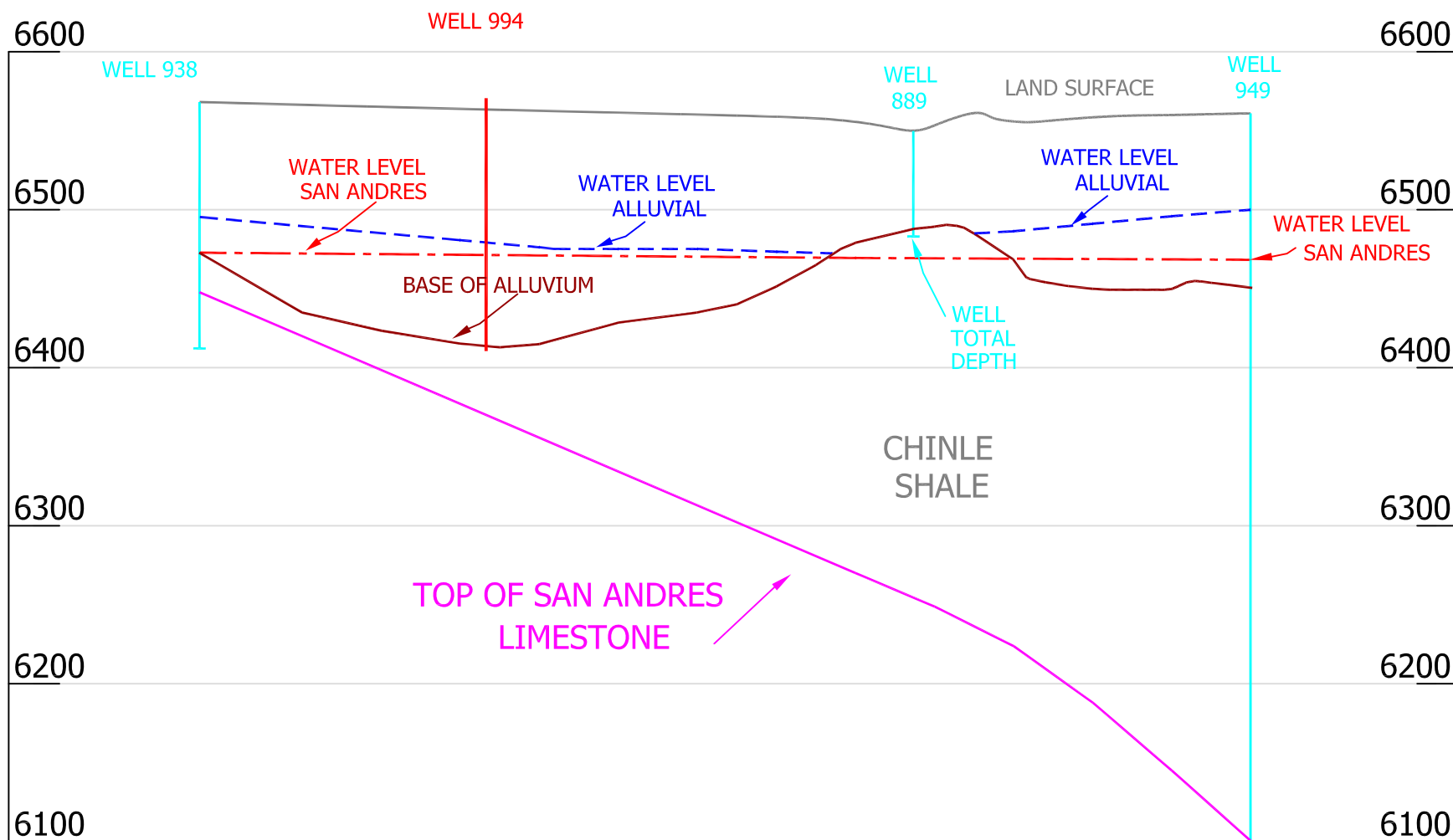


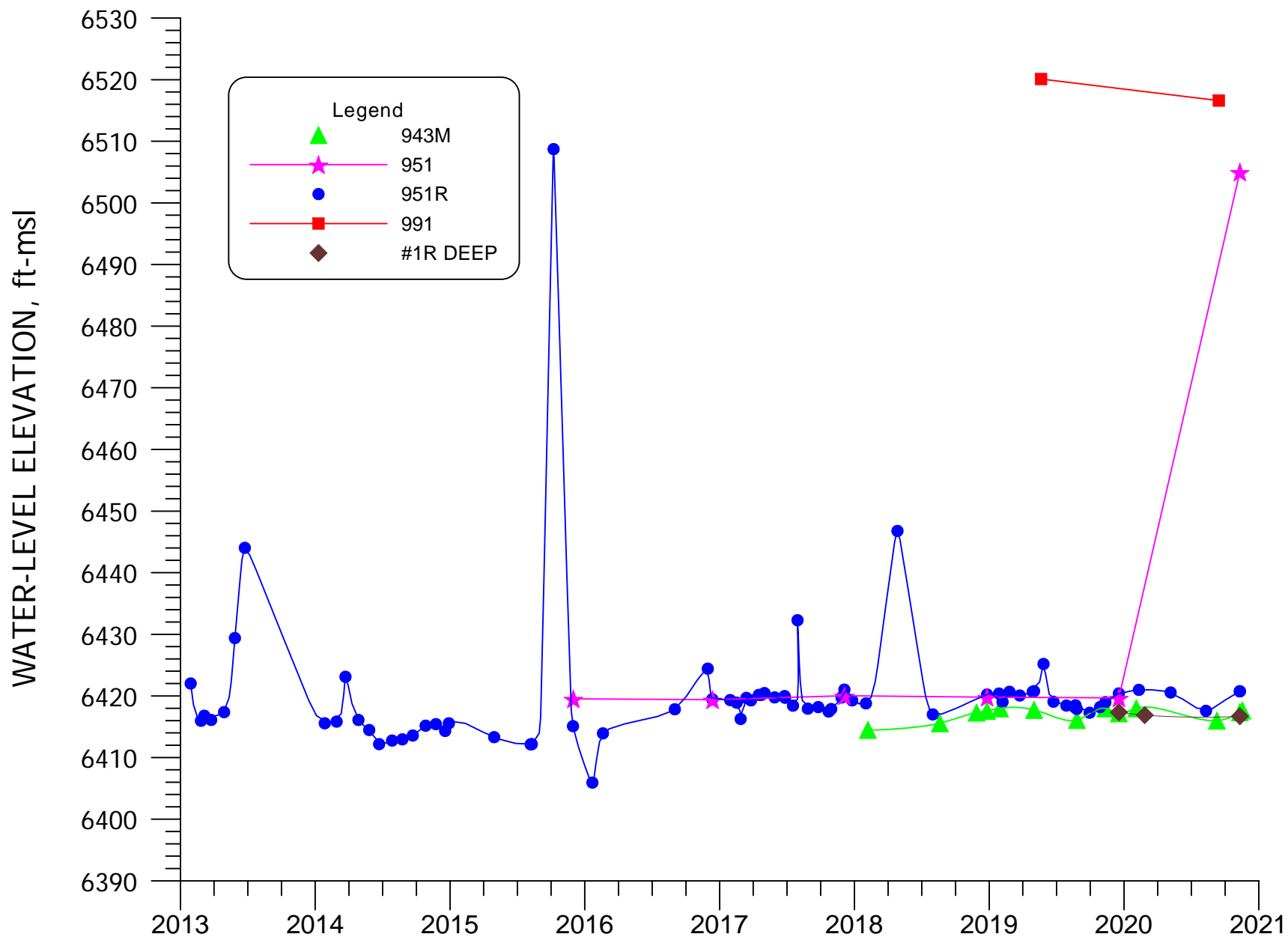
FIGURE 8.1-2. SAN ANDRES CROSS-SECTION ALONG THE NORTHERN BORDER OF SECTIONS 32 AND 33

DATE: 12/2/20

HORIZONTAL SCALE: 1" = 1600'

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8.1-6



**FIGURE 8.1-3. WATER-LEVEL ELEVATION FOR SAN ANDRES WELLS 943M, 951, 951R, 991 AND #1R DEEP.**

**TABLE 8.1-1. WELL DATA FOR THE SAN ANDRES WELLS.**

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO TOP OF SAN ANDRES (FT-LSD)	ELEV. TO TOP OF SAN ANDRES (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
* #1 Deepwell	1543307	493633	1000.0	10.0	12/5/2017	152.30	6431.46	0.0	6583.76	130	6454	A	---
										303	6281	U	---
										433	6151	M	---
										597	5987	L	---
										955	5629	S	919-999
#1R Deepwell	1543270	493560	1025.0	10.0	11/11/2020	172.68	6416.71	2.4	6589.39	955	5632	S	955-1025
#2 Deepwell	1542424	490972	870.0	---	10/7/2020	197.20	6378.46	0.0	6575.66	110	6466	A	---
										800	5776	S	-
#2R Deepwell	1542425	490934	870.0	10.0	12/18/2019	184.91	6394.28	1.5	6579.19	800	5778	S	800-870
0806R	1541177	486264	600.0	16.0	12/3/2018	149.99	6416.40	---	6566.39	510	---	S	510-580
0532	1518700	482400	214.0	14.0	---	---	---	0.0	6515.00	0	6515	S	-
0534	1531814	478300	1000.0	16.0	12/16/2010	120.01	6432.56	0.0	6552.57	---	---	S	-
0535	1530100	478450	198.0	12.0	12/17/2010	117.85	6422.15	0.0	6540.00	---	---	S	-
0545	1540200	476600	0.0	8.0	---	---	---	---	6560.00	---	---	S	-
* 0806	1541120	486320	584.0	16.0	---	---	---	0.0	6567.00	90	6477	A	---
										520	6047	S	-
0822	1538920	488630	980.0	7.0	2/13/2008	135.60	6421.40	0.0	6557.00	790	5767	S	790-875
0907	1534250	480800	360.0	16.0	12/3/2018	124.69	6420.91	0.0	6545.60	123	6423	A	---
										262	6284	S	295-360
0911	1534350	476800	188.0	---	---	---	---	0.0	6552.60	---	---	S	-
0918	---	---	725.0	4.0	---	---	---	0.0	6702.40	620	6082	S	635-655
0919	---	---	628.0	5.0	---	---	---	0.0	6684.00	35	6649	A	---
										356	6328	S	364-571
0923	1552400	477900	330.0	5.0	4/6/1994	6464.97	157.63	0.0	6622.60	60	6563	A	---
										229	6394	S	234-330
* 0928	1548250	491700	864.0	18.0	12/13/2016	132.21	6465.39	1.2	6597.60	138	6458	A	---
										801	5795	S	-
0938	1539500	473040	---	---	12/5/2017	157.70	6411.10	0.0	6568.80	95	6474	A	---
										120	6449	S	-
* 0943	1537222	487407	978.0	18.0	12/26/2017	134.00	6421.91	0.0	6555.91	704	5852	S	703-978
0943M	1537358	487238	800.0	6.0	11/17/2020	138.46	6417.64	2.3	6556.10	710	5844	S	740-800
0949	1540350	483600	551.0	6.0	2/13/2008	130.60	6431.70	0.0	6562.30	112	6450	A	---
										250	6312	L	---
										460	6102	S	400-493
										460	6102	S	505-551
0951	1545500	473200	275.0	10.0	11/11/2020	68.70	6505.00	0.9	6573.70	110	6463	A	---
										227	6346	S	241-275
0951R	1544500	484100	525.0	8.0	11/11/2020	156.02	6420.76	1.0	6576.78	65	6511	A	---
										420	6156	S	415-525

**TABLE 8.1-1. WELL DATA FOR THE SAN ANDRES WELLS.**

(cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	DATE	WATER LEVEL		MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO TOP OF SAN ANDRES (FT-LSD)	ELEV. TO TOP OF SAN ANDRES (FT-MSL)	CASING PERFOR- ATIONS (FT-LSD)	
						DEPTH (FT-MP)	ELEV. (FT-MSL)						
0955	1537338	483699	498.0	5.0	8/4/2020	130.00	6420.00	0.2	6550.00	40 420	6510 6130	A --- S 385-498	
0986	1537894	483690	467.0	5.0	8/23/2008	124.00	6526.00	0.8	6650.00	65 85 415	6584 6564 6234	A --- L --- S 420-467	
0987	1538226	483357	500.0	5.0	11/3/1995	54.48	6595.52	1.0	6650.00	70 385	6579 6264	A --- S 425-470	
0991	1538873	483630	500.0	6.0	9/14/2020	134.40	6516.60	1.4	6651.00	---	---	S -	
0995	1540115	476594	---	---	---	---	---	0.0	6474.00	---	---	S -	
0998	1533080	476450	145.0	16.0	3/15/2018	128.22	6521.78	0.0	6650.00	---	---	S -	
0999	1524230	480187	180.0	16.0	3/15/2018	111.39	6415.61	0.0	6527.00	0	6527	S -	

NOTE: A = Base of Alluvium  
L = Lower Chinle  
S = San Andres Aquifer  
r = Reported  
\* = Abandoned



## 8.2 SAN ANDRES WATER QUALITY

Figure 8.2-1 presents the most recent water-quality data for the San Andres aquifer. Tables B.6-1 and B.6-2 in Appendix B present the tabulation of the water-quality data for the San Andres aquifer. Additional San Andres monitoring is presented in Figure 8.2-1 and shows the 2020 data for sulfate, TDS, uranium and selenium concentrations in the San Andres aquifer. HMC committed to additional monitoring in the San Andres aquifer to address concerns for the past leakage in well 943 prior to its abandonment in July of 2018. The additional quarterly samples from wells 951R and #2 Deep were obtained in 2020 while one of the 943M quarterly samples and one of the semiannual samples from wells 806R, 955 and 991 were not obtained due to work force limitations resulting from the COVID-19 pandemic. The semiannual samples from well 949 were not collected because the land owner would not give permission to sample this well during 2020.

Sulfate concentrations are typically near 650 mg/L for the area of the Homestake #1R Deep well and the #2 Deep well. Sulfate concentration in the San Andres aquifer generally increases with residence time in the limestone with wells 532, 938, 998 and 999, which are located near the outcrop, typically having lower concentrations than wells located farther to the east. The sulfate concentrations in wells 955 and 991 are less than the sulfate concentrations in wells 806R and 943M because wells 955 and 991 are located closer to the recharge area for the San Andres aquifer. TDS concentrations in the San Andres aquifer have varied from 464 mg/L to approximately 2000 mg/L and generally increase in a down-gradient direction. The higher concentrations of sulfate and TDS to the east are natural and typical of a limestone aquifer where the extended contact time with the formation results in ongoing dissolution of major constituents. This increase in major constituent concentrations from the recharge area to the down dip area is expected. Uranium concentrations were generally small in all of the San Andres wells monitored during 2020 with the largest measured value of 0.028 mg/L in well 951R. Selenium concentrations in the San Andres aquifer vary from less than 0.005 to 0.010 mg/L. All measured molybdenum concentrations are less than 0.01 mg/L.

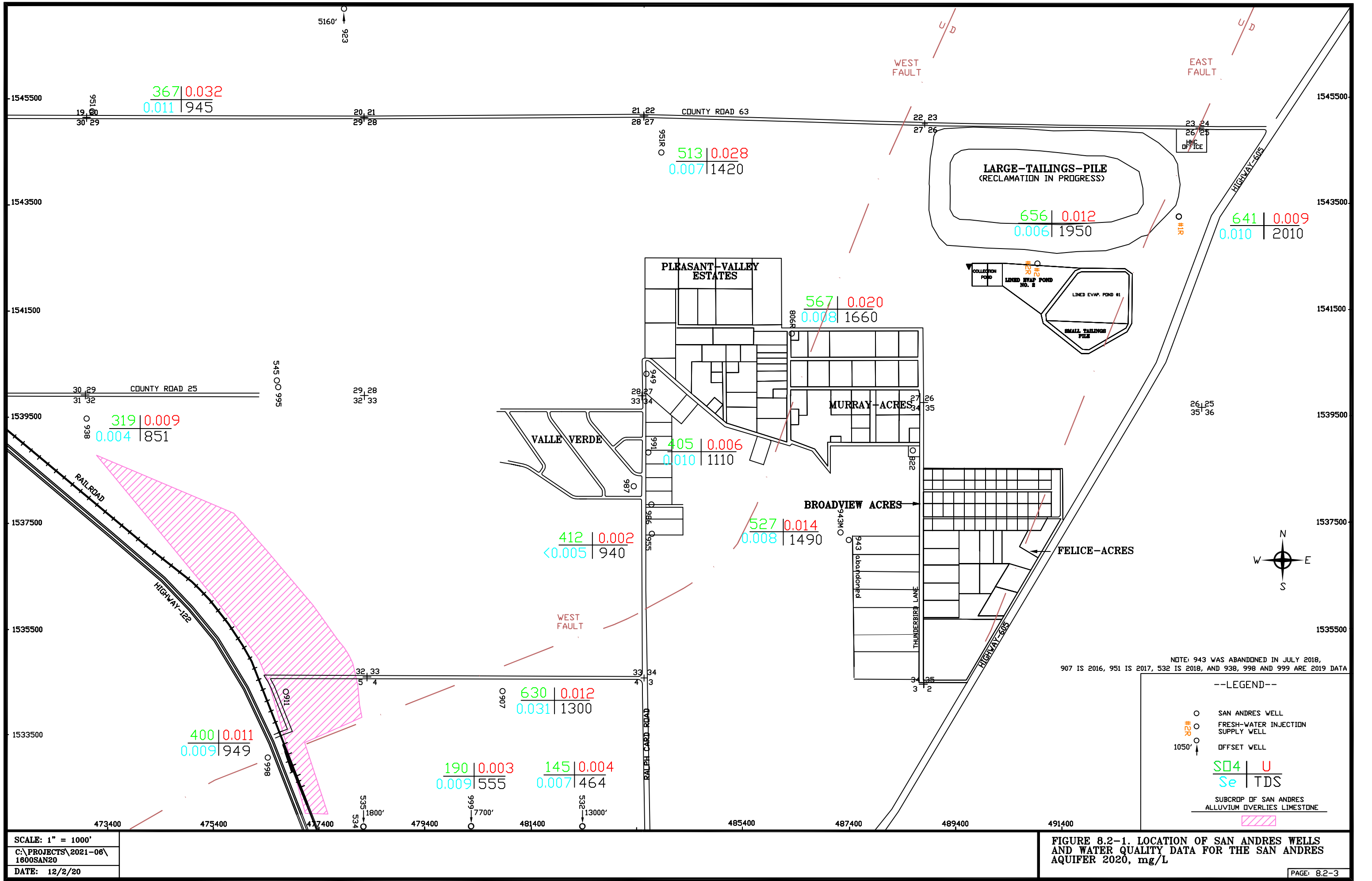
The additional monitoring of the San Andres aquifer in the GRP area relative to the past leakage from well 943 in 2020 does not show an increase in constituent concentrations that could be attributed to the past leakage into well 943 (see Figure 8.2-1 and Figure 8.2-8). The

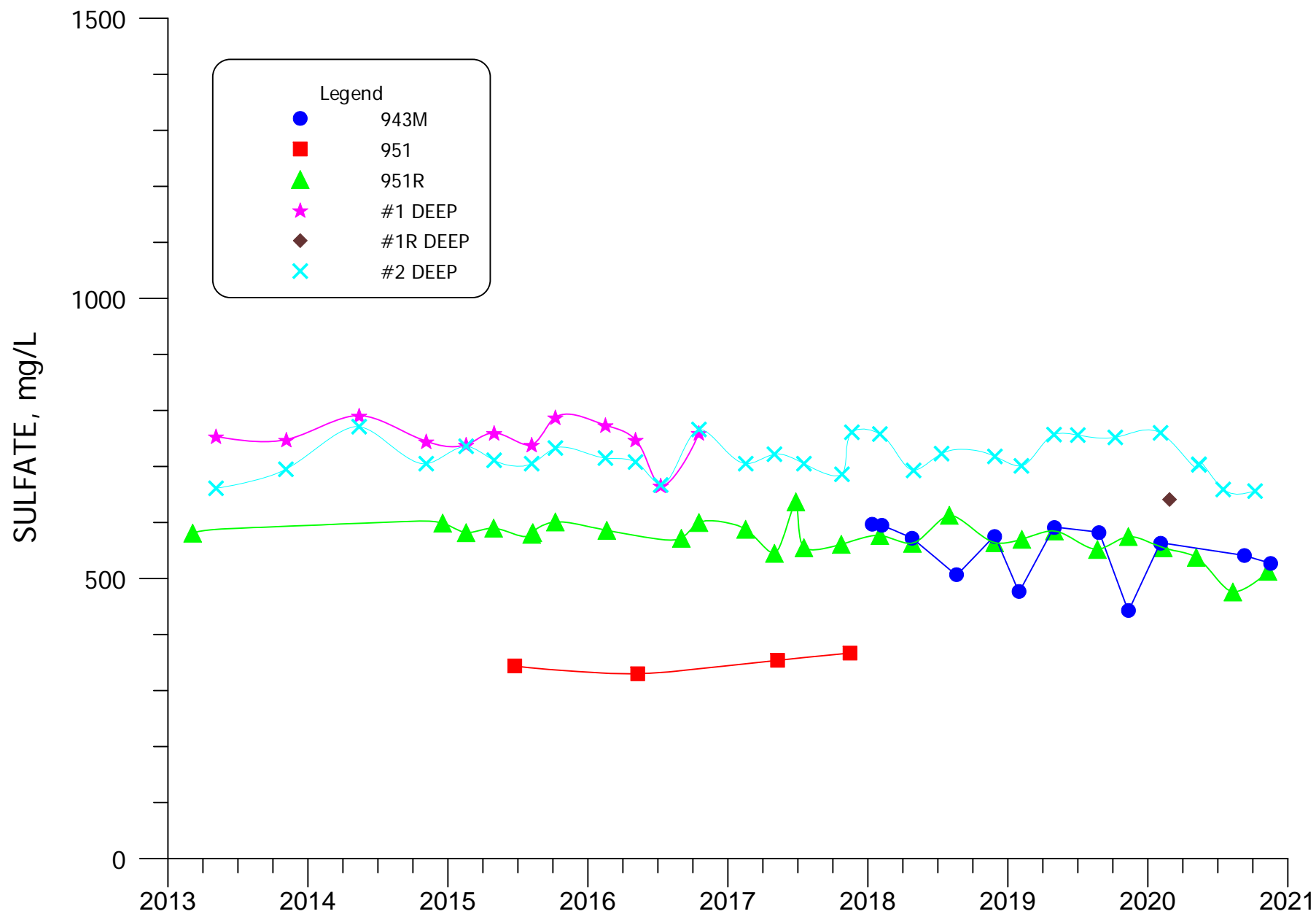
very small uranium concentration increase of 0.007 mg/L for the late 2020 sample from well 943M is potentially an anomalous point and future sampling will inform that interpretation. Additionally, minor impacts from seepage at the Bluewater site have been observed at other San Andres wells in the GRP area, and the slight uranium concentration increase in well 943M could potentially be a very minor impact from the Bluewater site.

[Figure 8.2-2](#) presents sulfate concentrations with time for Homestake's wells 943M, 951, 951R, #1 Deep, #1R Deep and #2 Deep wells. This data shows that sulfate concentrations in 2020 for these San Andres wells were similar to their historical average since injection water supply has occurred. [Figure 8.2-3](#) presents the sulfate concentrations with time for San Andres wells 532, 806R, 955, 991, 998 and 999. Updated sulfate concentrations for wells 991, 955, 951R, 806R and #2 Deep were obtained and are consistent with previous data.

[Figures 8.2-4](#) through [8.2-7](#) present TDS and chloride concentrations with time for HMC's and other San Andres wells for these two additional major constituents. The TDS data shows an increase with distance from the San Andres outcrop in the western portion of [Figure 8.2-1](#) with the highest values in the eastern wells.

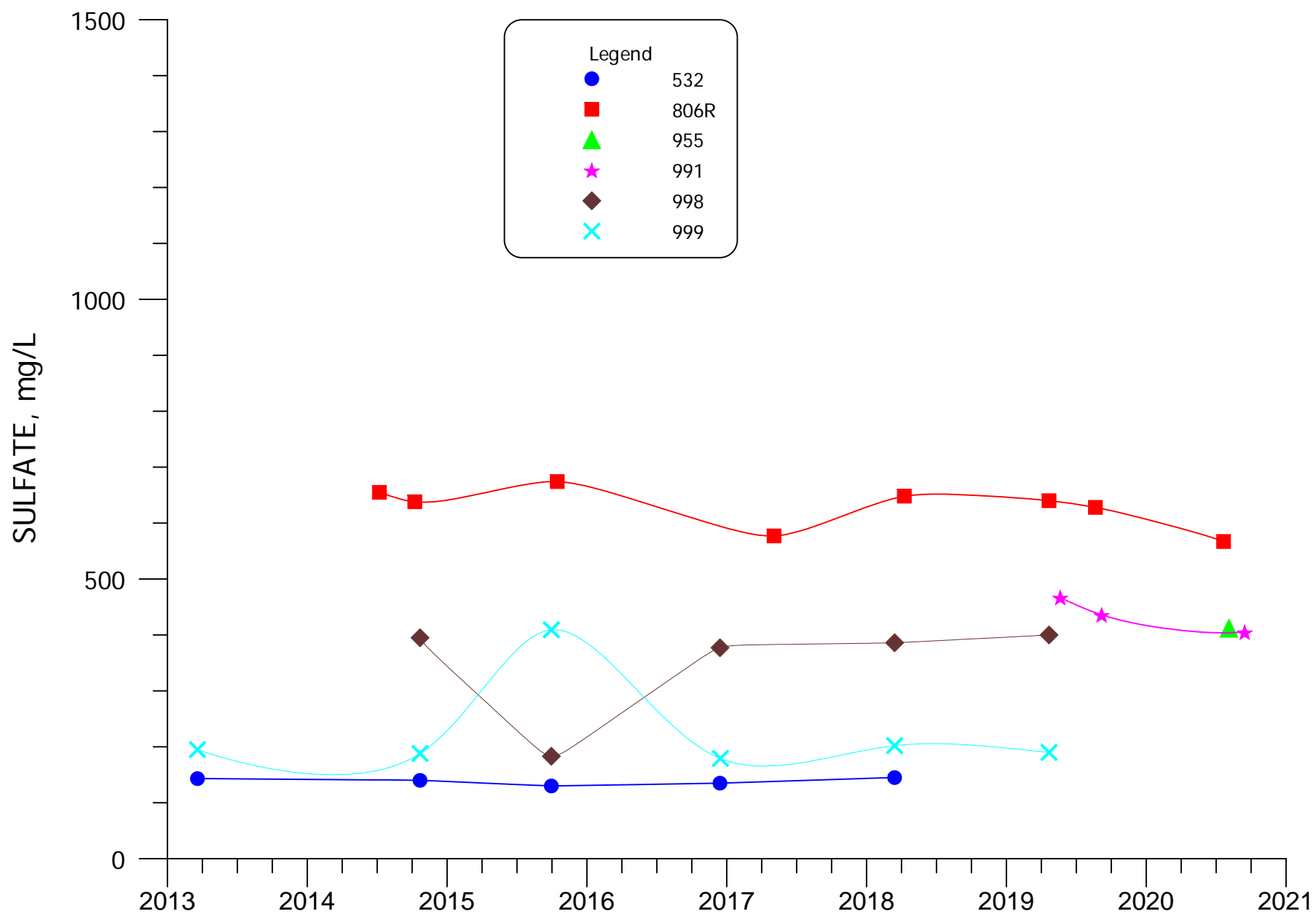
Uranium and selenium plots were also developed for these two groups of San Andres wells and are presented in [Figures 8.2-8](#) through [8.2-11](#). The increase in uranium concentration in well 806R in 2017 is not supported by other constituents and is indicated to be anomalous based on comparison with the 2018 through 2020 values. No trends in these constituent concentrations that would indicate impacts from the past well 943 leakage were noted in wells 806R, 943M, 955 or 991.



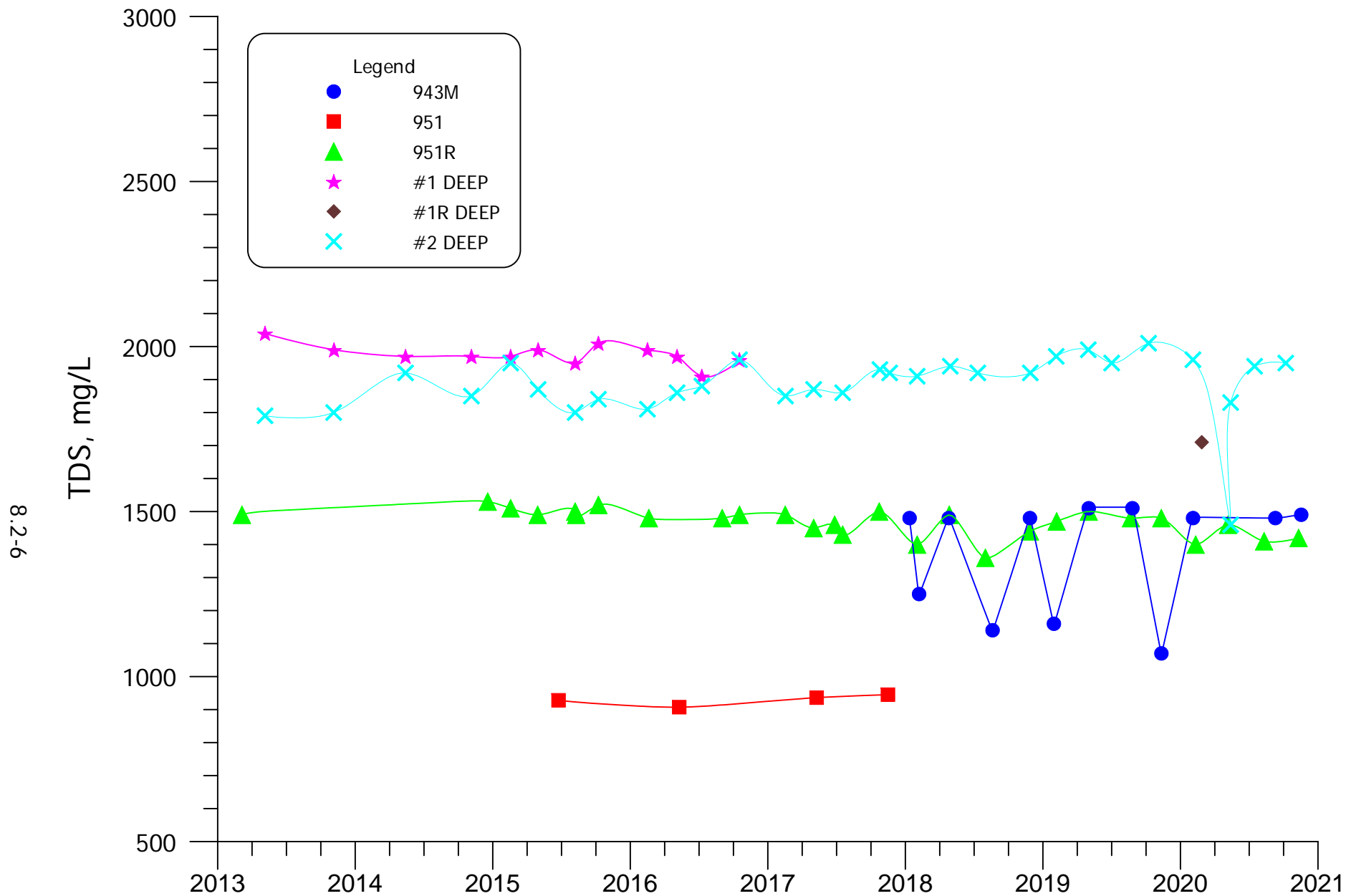


**FIGURE 8.2-2. SULFATE CONCENTRATIONS FOR WELLS 943M, 951, 951R, #1 DEEP, #1R DEEP AND #2 DEEP.**

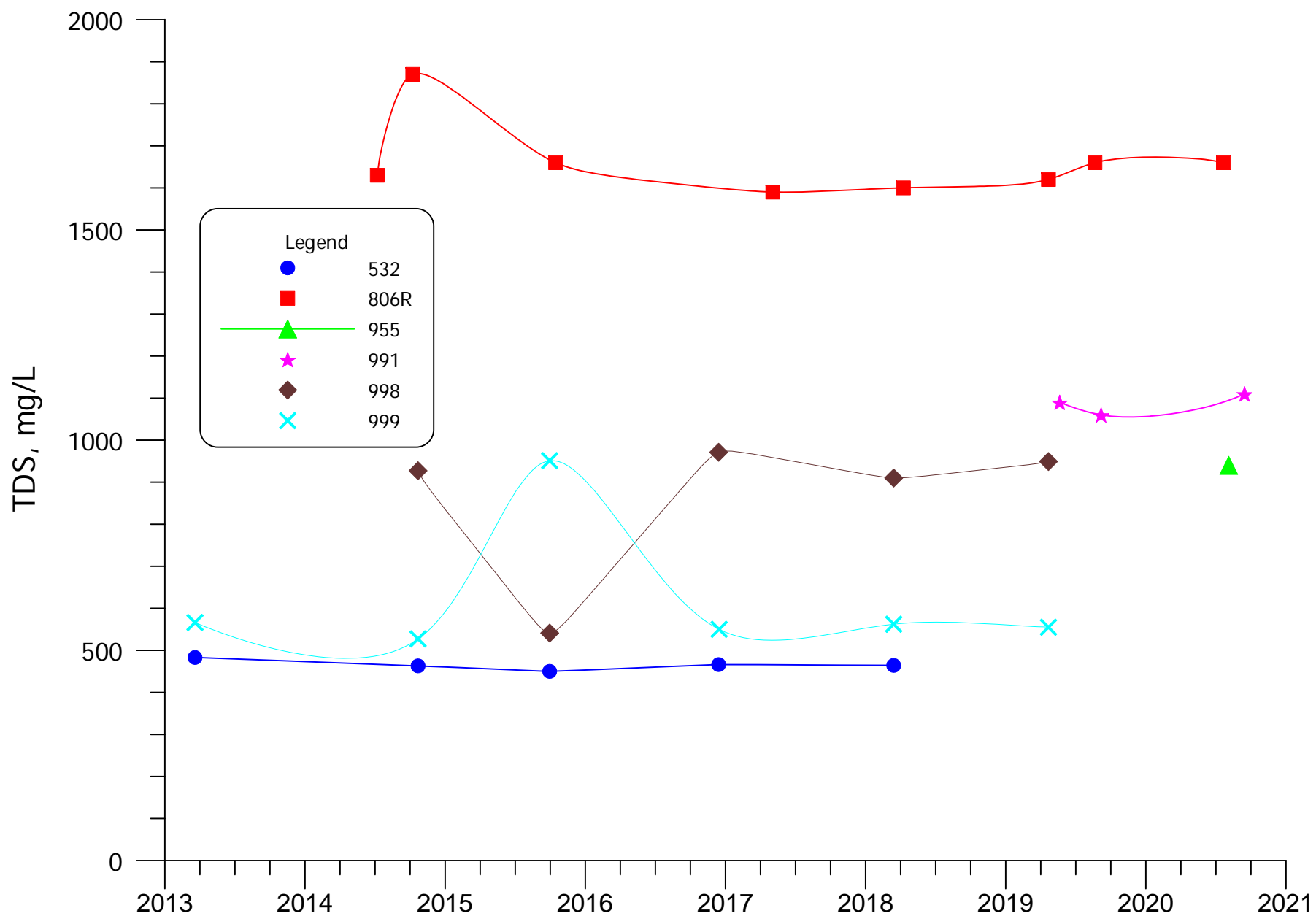
8.2-5



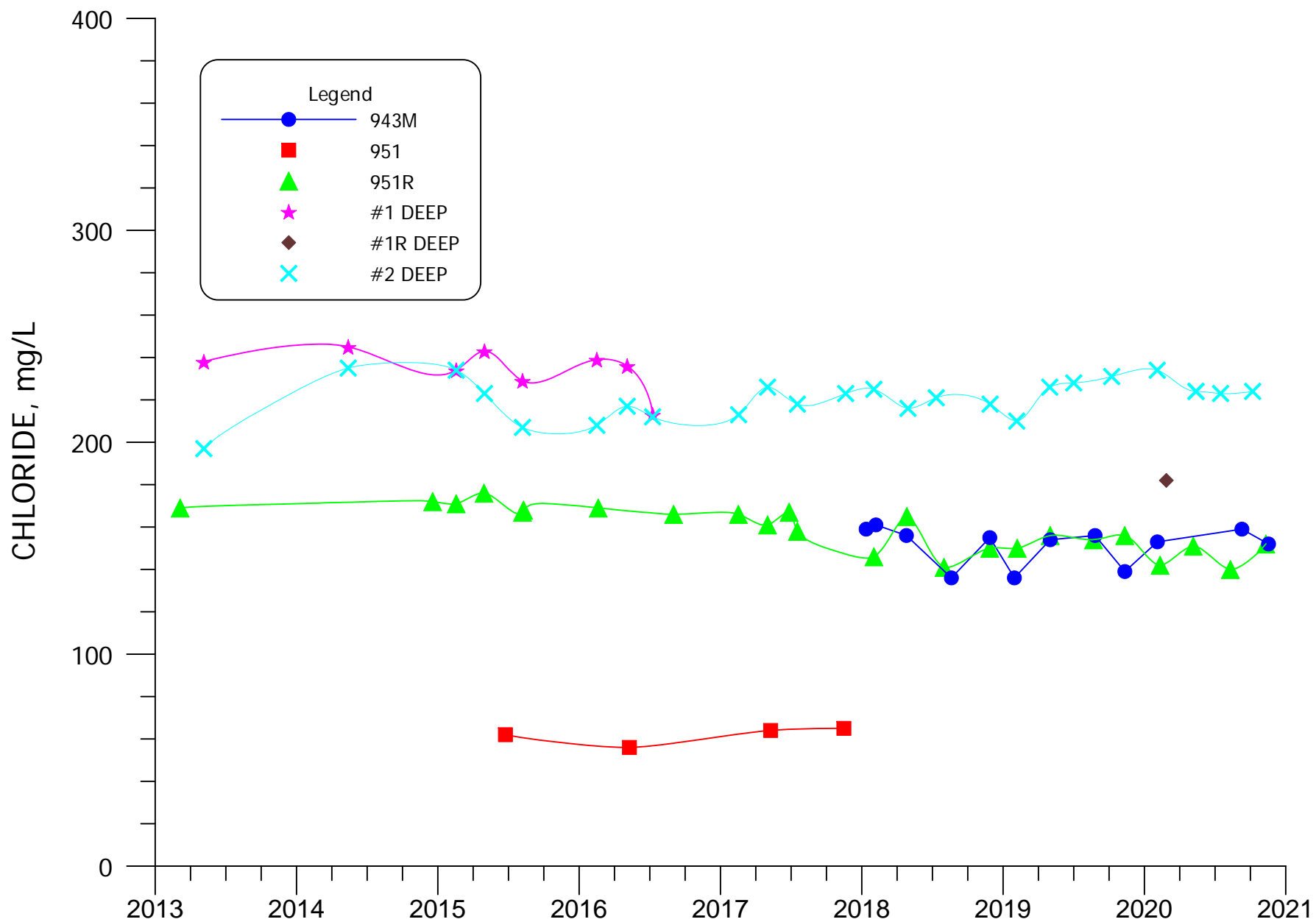
**FIGURE 8.2-3. SULFATE CONCENTRATIONS FOR WELLS 532, 806R, 955, 991, 998 AND 999.**



**FIGURE 8.2-4. TDS CONCENTRATIONS FOR WELLS 943M, 951, 951R, #1 DEEP, #1R DEEP AND #2 DEEP.**



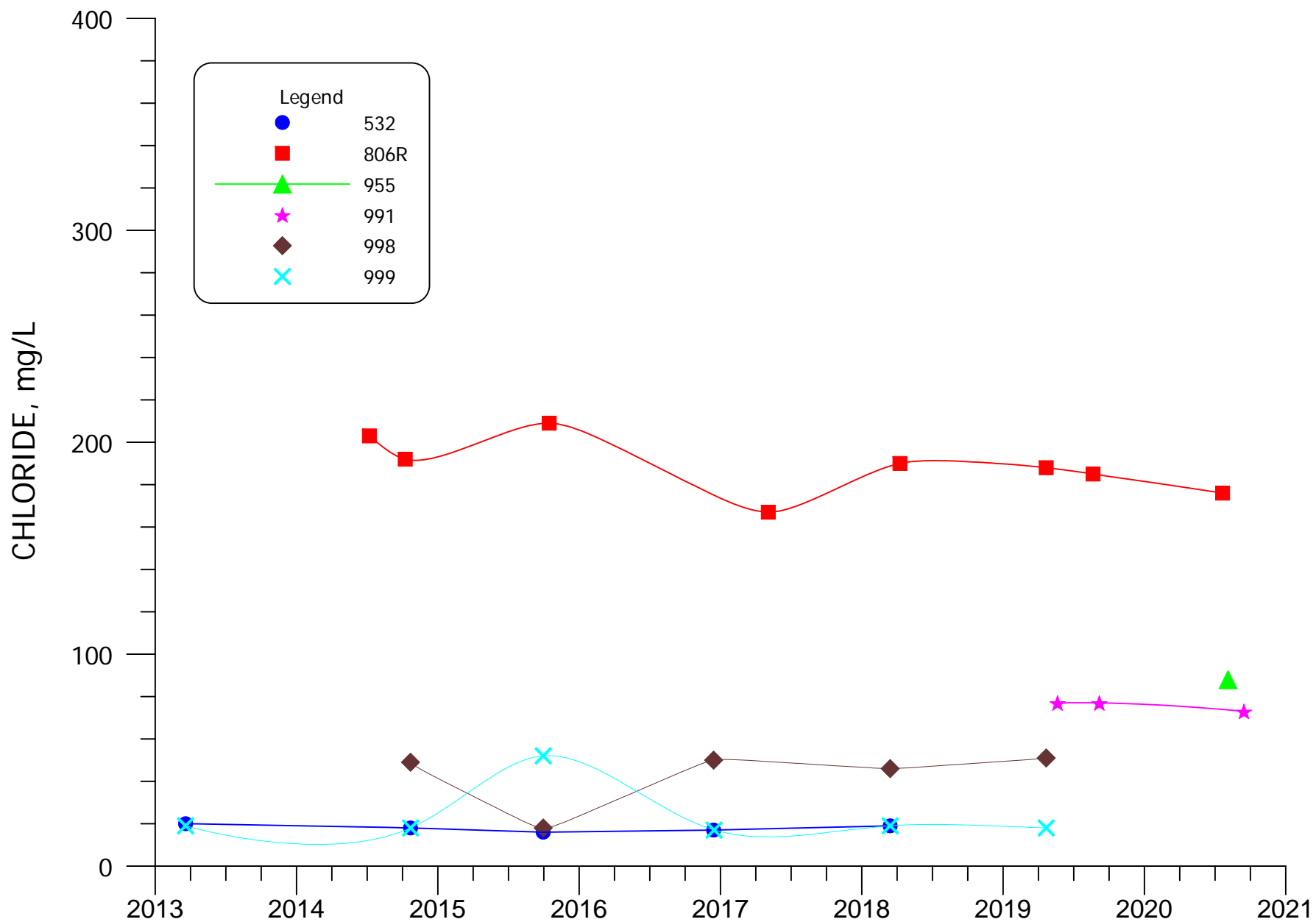
**FIGURE 8.2-5. TDS CONCENTRATIONS FOR WELLS  
532, 806R, 955, 991, 998 AND 999.**



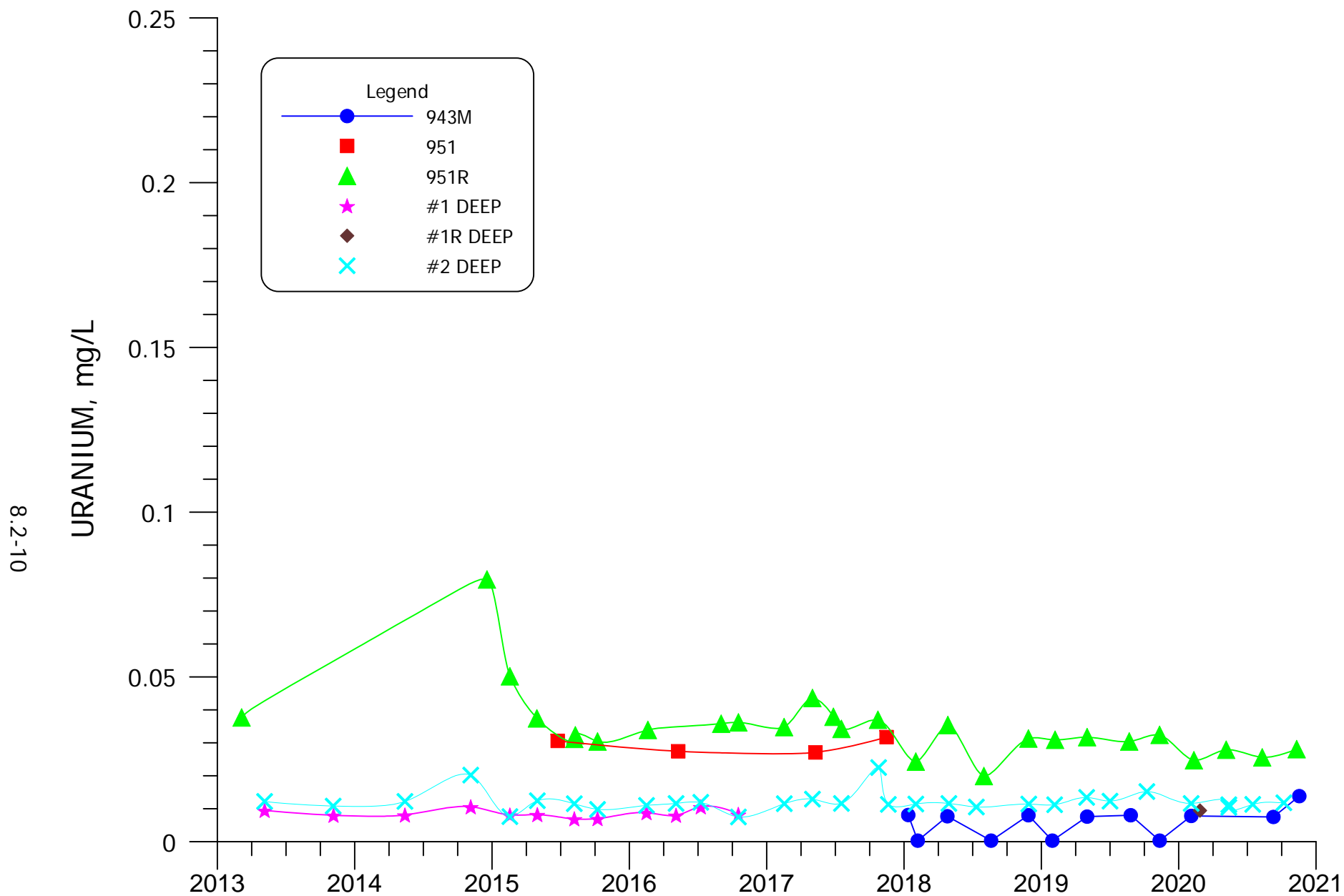
**FIGURE 8.2-6. CHLORIDE CONCENTRATIONS FOR WELLS 943M, 951, 951R, #1 DEEP, #1R DEEP AND #2 DEEP.**



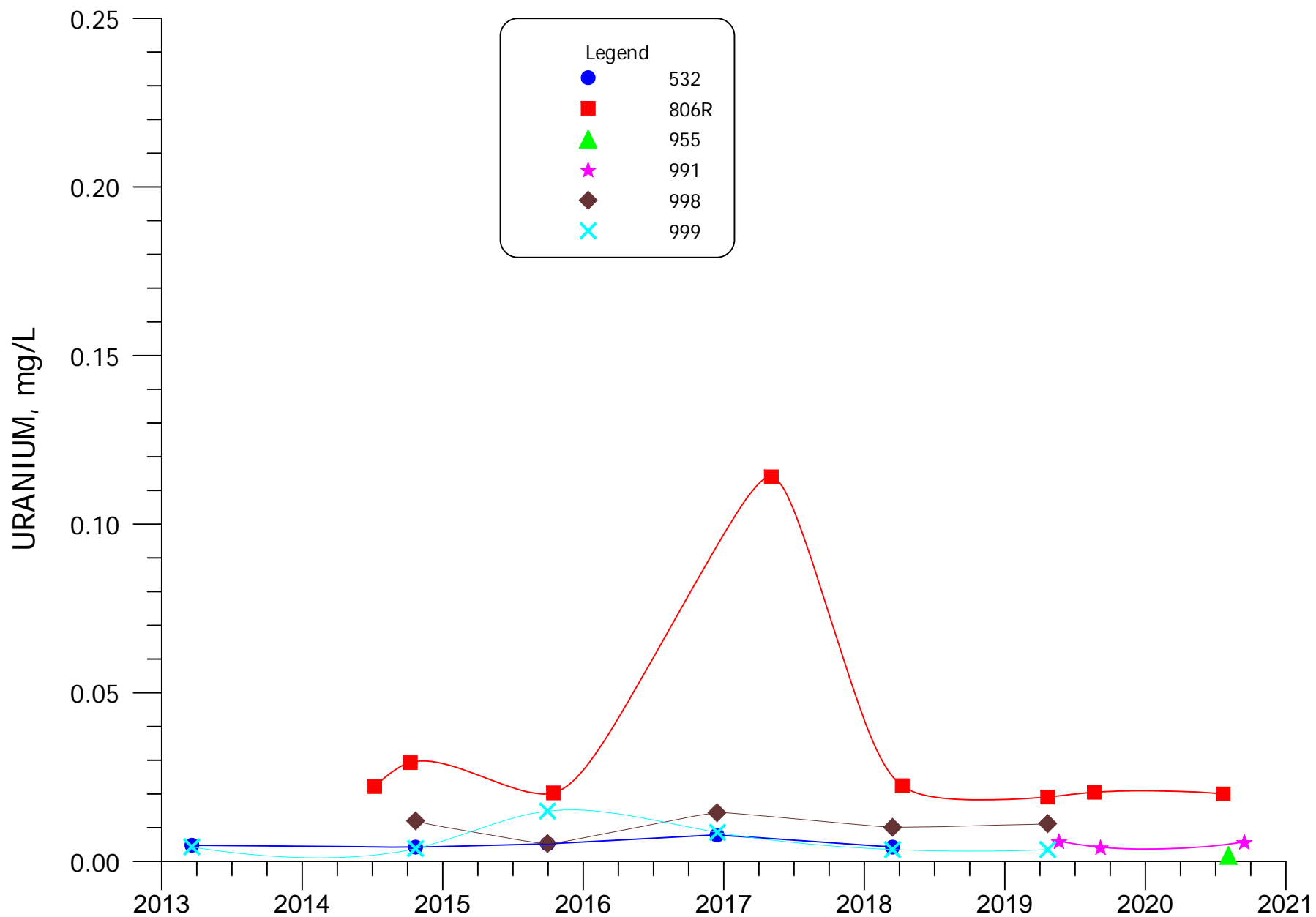
8.2-9



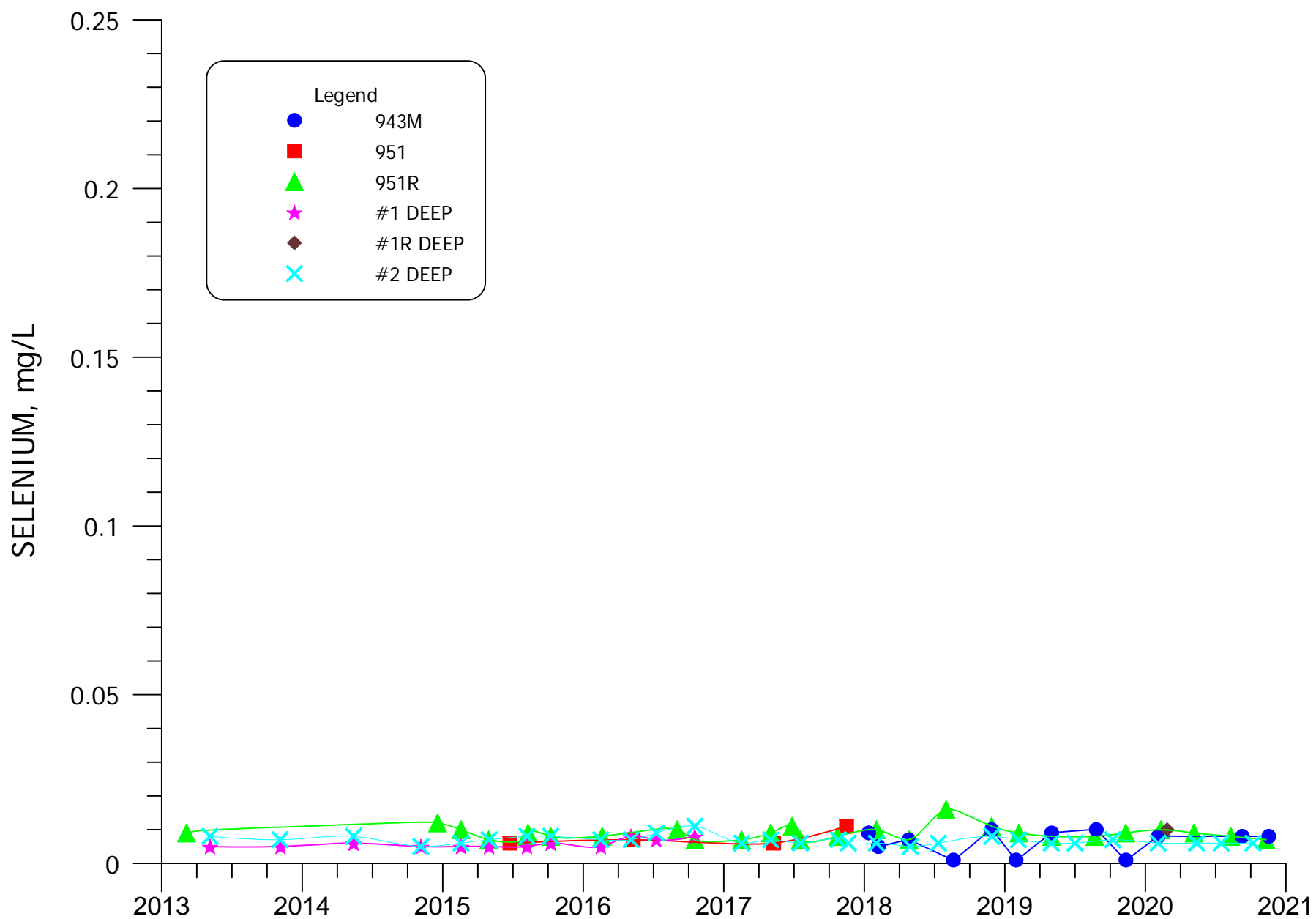
**FIGURE 8.2-7. CHLORIDE CONCENTRATIONS FOR WELLS 532, 806R, 955, 991, 998 AND 999.**



**FIGURE 8.2-8. URANIUM CONCENTRATIONS FOR WELLS 943M, 951, 951R, #1 DEEP, #1R DEEP AND #2 DEEP.**

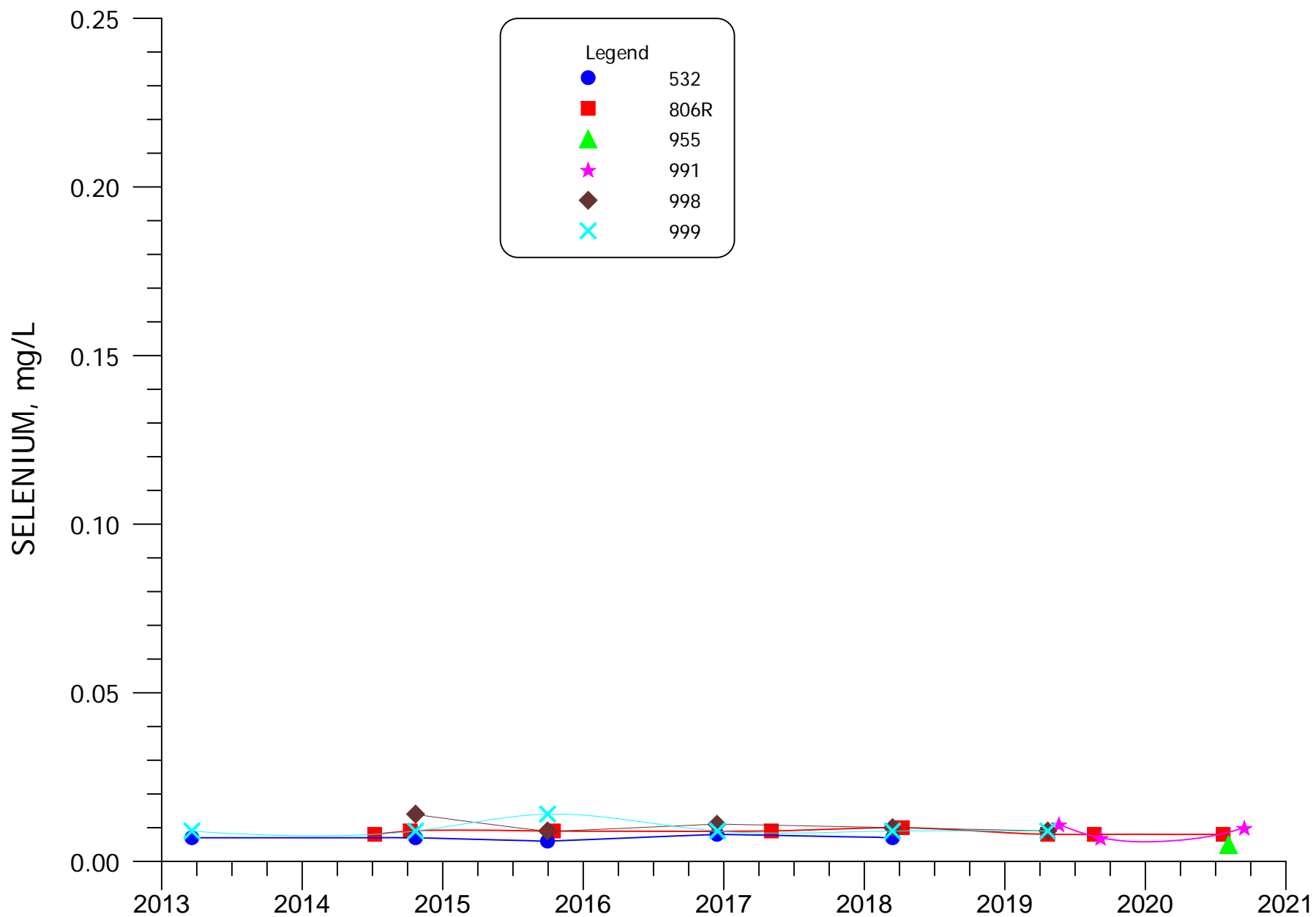


**FIGURE 8.2-9. URANIUM CONCENTRATIONS FOR WELLS 532, 806R, 955, 991, 998 AND 999.**



**FIGURE 8.2-10. SELENIUM CONCENTRATIONS FOR WELLS 943M, 951, 951R, #1 DEEP, #1R DEEP AND #2 DEEP.**

8.2-13



**FIGURE 8.2-11. SELENIUM CONCENTRATIONS FOR WELLS 532, 806R, 955, 991, 998 AND 999.**

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**FOR HOMESTAKE'S GRANTS PROJECT**

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**APPENDIX A**  
**WATER LEVELS**

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**FOR HOMESTAKE’S GRANTS PROJECT**

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# Table A.1-1. WATER LEVELS FOR THE TAILINGS WELLS

WATER LEVEL ELEVATION (FT-MSL)

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>CN1</b>			<b>CS7</b>			5/26/2020	53.70	6597.91	12/30/2020	> 76.00	< 6579.30
1/27/2020	18.70	6596.31	10/6/2020	71.50	6593.19	6/30/2020	53.95	6597.66	<b>ES4</b>		
2/24/2020	18.70	6596.31	<b>EC18</b>			7/27/2020	54.10	6597.51	10/6/2020	71.90	6593.90
3/30/2020	16.40	6598.61	10/6/2020	66.20	6601.08	8/31/2020	54.20	6597.41	10/15/2020	72.67	6593.13
4/27/2020	18.93	6596.08	<b>EE2</b>			9/29/2020	54.23	6597.38	<b>ES6</b>		
5/26/2020	19.04	6595.97	1/27/2020	65.20	6602.64	10/26/2020	54.53	6597.08	10/6/2020	> 97.50	< 6562.50
6/30/2020	19.30	6595.71	2/24/2020	65.35	6602.49	12/1/2020	54.56	6597.05	<b>ET19</b>		
7/27/2020	18.70	6596.31	3/30/2020	65.60	6602.24	12/30/2020	54.65	6596.96	7/13/2020	> 90.00	< 6576.00
8/31/2020	19.70	6595.31	4/27/2020	65.51	6602.33	<b>E014</b>			10/6/2020	> 90.00	< 6576.00
9/29/2020	19.65	6595.36	5/26/2020	65.63	6602.21	7/13/2020	58.00	6612.00	<b>ET20</b>		
10/26/2020	19.61	6595.40	6/30/2020	65.80	6602.04	10/6/2020	57.20	6612.80	7/13/2020	67.20	6596.80
12/1/2020	19.85	6595.16	7/27/2020	65.00	6602.84	<b>E022</b>			10/6/2020	67.60	6596.40
12/30/2020	19.92	6595.09	8/31/2020	66.00	6601.84	10/6/2020	41.30	6625.70	<b>NE1</b>		
<b>CN2</b>			9/29/2020	66.15	6601.69	<b>EP23</b>			1/27/2020	63.75	6585.07
1/27/2020	72.20	6585.97	10/26/2020	66.20	6601.64	10/6/2020	58.70	6609.30	2/24/2020	50.20	6598.62
2/24/2020	72.40	6585.77	12/1/2020	66.30	6601.54	<b>EP31</b>			4/27/2020	50.18	6598.64
3/30/2020	72.70	6585.47	12/30/2020	66.40	6601.44	10/6/2020	52.90	6614.10	5/26/2020	50.67	6598.15
4/27/2020	71.11	6587.06	<b>EI4</b>			<b>ES1</b>			6/30/2020	50.90	6597.92
5/26/2020	72.79	6585.38	10/6/2020	40.60	6627.40	1/27/2020	30.20	6584.98	7/27/2020	50.75	6598.07
6/30/2020	72.80	6585.37	<b>EI9</b>			2/24/2020	30.20	6584.98	8/31/2020	32.45	6616.37
7/27/2020	72.40	6585.77	10/6/2020	63.90	6604.10	3/30/2020	32.40	6582.78	9/29/2020	51.27	6597.55
8/31/2020	72.90	6585.27	<b>EN1</b>			4/27/2020	30.30	6584.88	10/26/2020	51.09	6597.73
9/29/2020	73.03	6585.14	1/27/2020	31.80	6587.06	5/26/2020	30.48	6584.70	12/1/2020	51.20	6597.62
10/26/2020	71.26	6586.91	2/24/2020	31.90	6586.96	6/30/2020	30.80	6584.38	12/30/2020	51.43	6597.39
12/1/2020	72.90	6585.27	3/30/2020	32.00	6586.86	7/27/2020	30.50	6584.68	<b>NE2</b>		
12/30/2020	73.00	6585.17	4/27/2020	31.98	6586.88	8/31/2020	31.20	6583.98	10/6/2020	64.95	6596.03
<b>CS1</b>			5/26/2020	22.98	6595.88	9/29/2020	30.55	6584.63	<b>NW3</b>		
10/6/2020	32.70	6575.60	6/30/2020	21.10	6597.76	12/30/2020	30.65	6584.53	10/6/2020	66.30	6588.71
<b>CS2</b>			7/27/2020	20.90	6597.96	<b>ES2</b>					
1/27/2020	60.60	6591.38	8/31/2020	32.10	6586.76	1/27/2020	> 76.00	< 6579.30			
2/24/2020	60.70	6591.28	9/29/2020	32.30	6586.56	2/24/2020	> 76.00	< 6579.30			
3/30/2020	60.90	6591.08	10/26/2020	23.04	6595.82	3/30/2020	> 76.00	< 6579.30			
4/27/2020	58.55	6593.43	12/1/2020	32.40	6586.46	4/27/2020	60.73	6594.57			
5/26/2020	60.88	6591.10	12/30/2020	32.30	6586.56	5/26/2020	> 76.00	< 6579.30			
6/30/2020	61.30	6590.68	<b>EN2</b>			6/30/2020	> 76.00	< 6579.30			
7/27/2020	61.80	6590.18	1/27/2020	53.10	6598.51	7/27/2020	> 76.00	< 6579.30			
8/31/2020	61.50	6590.48	2/24/2020	53.40	6598.21	8/31/2020	> 76.00	< 6579.30			
9/29/2020	61.46	6590.52	3/30/2020	16.80	6634.81	9/29/2020	> 76.00	< 6579.30			
10/26/2020	61.57	6590.41	4/27/2020	53.54	6598.07	10/26/2020	> 76.00	< 6579.30			
12/1/2020	61.80	6590.18				12/1/2020	> 76.00	< 6579.30			
12/30/2020	61.70	6590.28									

\* Drawdown Tube Pressure, # Transducer Reading

CN1 - NW3



**Table A.1-1. WATER LEVELS FOR THE TAILINGS WELLS (cont.)**

**WATER LEVEL ELEVATION (FT-MSL)**

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>NW4</b>			5/26/2020	44.70	6593.17	<b>WME-6</b>			<b>WO32</b>		
1/27/2020	> 33.70	< 6622.45	6/30/2020	45.20	6592.67	2/20/2020	56.90	6614.60	10/8/2020	65.10	6589.90
2/24/2020	> 33.70	< 6622.45	7/27/2020	45.60	6592.27	7/13/2020	55.00	6616.50	<b>WP10</b>		
3/30/2020	> 33.70	< 6622.45	8/31/2020	45.30	6592.57	10/6/2020	> 67.25	< 6604.25	10/9/2020	66.30	6591.70
4/27/2020	> 33.70	< 6622.45	9/29/2020	44.93	6592.94	<b>WN1</b>			<b>WS1</b>		
5/26/2020	> 33.70	< 6622.45	10/26/2020	44.98	6592.89	1/27/2020	20.20	6586.48	1/27/2020	10.15	6596.96
6/30/2020	> 33.70	< 6622.45	12/1/2020	45.40	6592.47	2/24/2020	20.25	6586.43	2/24/2020	10.30	6596.81
7/27/2020	> 33.70	< 6622.45	12/30/2020	45.10	6592.77	3/30/2020	20.45	6586.23	3/30/2020	10.55	6596.56
8/31/2020	> 33.70	< 6622.45	<b>WA4</b>			4/27/2020	20.44	6586.24	4/27/2020	10.63	6596.48
9/29/2020	> 33.70	< 6622.45	10/8/2020	62.20	6594.90	5/26/2020	20.51	6586.17	5/26/2020	10.68	6596.43
10/26/2020	> 33.70	< 6622.45	<b>WC15</b>			6/30/2020	20.70	6585.98	6/30/2020	10.75	6596.36
12/1/2020	> 33.70	< 6622.45	10/8/2020	47.40	6616.66	7/27/2020	20.50	6586.18	7/27/2020	10.95	6596.16
12/30/2020	> 33.70	< 6622.45	<b>WF9</b>			8/31/2020	20.80	6585.88	8/31/2020	10.60	6596.51
<b>SE2</b>			10/9/2020	68.50	6597.20	9/29/2020	20.90	6585.78	9/29/2020	10.55	6596.56
1/27/2020	71.10	6590.27	<b>WF13</b>			10/26/2020	20.86	6585.82	10/26/2020	10.60	6596.51
2/24/2020	70.30	6591.07	10/8/2020	72.10	6594.95	12/1/2020	20.95	6585.73	12/1/2020	10.75	6596.36
3/30/2020	71.60	6589.77	<b>WME-1</b>			12/30/2020	21.10	6585.58	12/30/2020	10.78	6596.33
4/27/2020	71.72	6589.65	2/20/2020	56.00	6603.23	<b>WN2</b>			<b>WS2</b>		
5/26/2020	71.73	6589.64	10/6/2020	> 57.30	< 6601.93	1/27/2020	54.75	6589.57	1/27/2020	58.80	6590.64
6/30/2020	72.20	6589.17	<b>WME-2</b>			2/24/2020	54.80	6589.52	2/24/2020	58.60	6590.84
7/27/2020	71.90	6589.47	2/20/2020	60.70	6600.35	3/30/2020	55.00	6589.32	3/30/2020	59.00	6590.44
8/31/2020	72.00	6589.37	10/6/2020	61.60	6599.45	4/27/2020	54.98	6589.34	4/27/2020	58.81	6590.63
9/29/2020	71.95	6589.42	<b>WME-3</b>			5/26/2020	56.75	6587.57	5/26/2020	60.84	6588.60
10/26/2020	71.97	6589.40	2/20/2020	64.30	6600.01	6/30/2020	55.25	6589.07	6/30/2020	59.30	6590.14
12/1/2020	71.60	6589.77	10/6/2020	64.40	6599.91	7/27/2020	55.40	6588.92	7/27/2020	59.65	6589.79
12/30/2020	71.85	6589.52	<b>WME-4</b>			8/31/2020	55.50	6588.82	8/31/2020	59.30	6590.14
<b>SW1</b>			2/20/2020	59.40	6602.91	9/29/2020	55.50	6588.82	9/29/2020	59.30	6590.14
1/27/2020	24.90	6574.93	10/6/2020	58.40	6603.91	10/26/2020	55.59	6588.73	10/26/2020	59.50	6589.94
2/24/2020	24.95	6574.88	<b>WME-5</b>			12/1/2020	55.70	6588.62	12/1/2020	59.65	6589.79
3/30/2020	25.10	6574.73	2/20/2020	71.70	6600.65	12/30/2020	55.80	6588.52	12/30/2020	59.60	6589.84
4/27/2020	24.95	6574.88	7/13/2020	66.20	6606.15	<b>WO5</b>			<b>WS7</b>		
5/26/2020	24.95	6574.88	10/6/2020	> 77.32	< 6595.03	10/8/2020	36.70	6623.30	10/9/2020	74.20	6584.92
6/30/2020	25.35	6574.48	<b>WME-6</b>			<b>WO10</b>			<b>WT6</b>		
7/27/2020	25.80	6574.03	2/20/2020	59.40	6602.91	10/9/2020	62.25	6594.75	10/8/2020	> 90.00	< 6567.00
8/31/2020	25.50	6574.33	10/6/2020	58.40	6603.91	<b>WO15</b>			<b>WT15</b>		
9/29/2020	25.27	6574.56	<b>WME-7</b>			10/9/2020	> 90.00	< 6564.00	10/8/2020	121.40	6538.60
10/26/2020	25.50	6574.33	2/20/2020	71.70	6600.65	<b>WO21</b>					
12/1/2020	25.70	6574.13	7/13/2020	66.20	6606.15	10/9/2020	61.80	6591.20			
12/30/2020	25.60	6574.23	10/6/2020	> 77.32	< 6595.03						
<b>SW2</b>											
1/27/2020	44.90	6592.97									
2/24/2020	44.95	6592.92									
3/30/2020	45.10	6592.77									
4/27/2020	44.66	6593.21									

\* Drawdown Tube Pressure, # Transducer Reading

**NW4 - WT15**

**Table A.1-1. WATER LEVELS FOR THE TAILINGS WELLS (cont.)****WATER LEVEL ELEVATION (FT-MSL)**

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>WT18</b>											
10/9/2020	50.20	6609.80									
<b>WW1</b>											
1/27/2020	24.70	6578.39									
2/24/2020	24.70	6578.39									
3/30/2020	24.90	6578.19									
4/27/2020	24.95	6578.14									
5/26/2020	24.98	6578.11									
6/30/2020	25.15	6577.94									
7/27/2020	25.35	6577.74									
8/31/2020	25.40	6577.69									
9/29/2020	25.42	6577.67									
10/26/2020	25.60	6577.49									
12/1/2020	25.65	6577.44									
12/30/2020	25.68	6577.41									
<b>WW2</b>											
1/27/2020	> 64.90	< 6578.74									
2/24/2020	> 64.90	< 6578.74									
3/30/2020	> 64.90	< 6578.74									
4/27/2020	> 64.90	< 6578.74									
5/26/2020	> 64.90	< 6578.74									
6/30/2020	> 64.90	< 6578.74									
7/27/2020	> 64.90	< 6578.74									
8/31/2020	> 64.90	< 6578.74									
9/29/2020	> 64.90	< 6578.74									
10/26/2020	> 64.90	< 6578.74									
12/1/2020	> 64.90	< 6578.74									
12/30/2020	> 64.90	< 6578.74									
<b>WW3</b>											
10/8/2020	51.70	6607.84									

\* Drawdown Tube Pressure, # Transducer Reading

**Table A.2-1 WATER LEVELS FOR HOMESTAKE'S ALLUVIAL WELLS**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>0690</b>			2/3/2020	40.14	6530.76	<b>B1</b>			8/31/2020	41.70	6529.88
11/11/2020	42.10	6539.96	2/10/2020	40.39	6530.51	11/20/2020	41.35	6530.47	9/8/2020	41.48	6530.10
<b>0691</b>			2/17/2020	40.43	6530.47	<b>B11</b>			9/14/2020	41.40	6530.18
11/11/2020	47.18	6541.63	2/24/2020	40.50	6530.40	3/2/2020	46.10	6531.29	9/21/2020	41.40	6530.18
<b>0892</b>			3/2/2020	40.38	6530.52	<b>B12</b>			9/28/2020	41.66	6529.92
11/11/2020	43.65	6543.56	3/9/2020	39.51	6531.39	3/8/2020	41.00	6532.02	10/5/2020	41.70	6529.88
<b>1A</b>			3/16/2020	40.60	6530.30	11/25/2020	41.47	6531.55	10/12/2020	41.60	6529.98
4/9/2020	37.91	6547.52	3/23/2020	40.47	6530.43	<b>B13</b>			10/19/2020	41.56	6530.02
<b>1C</b>			3/30/2020	40.47	6530.43	3/8/2020	36.50	6533.54	10/26/2020	41.44	6530.14
11/20/2020	37.32	6550.67	4/13/2020	39.89	6531.01	11/20/2020	37.70	6532.34	11/2/2020	41.72	6529.86
<b>1H</b>			4/20/2020	40.10	6530.80	<b>BA</b>			11/9/2020	41.54	6530.04
11/20/2020	> 55.40	< 6530.99	4/27/2020	40.24	6530.66	1/6/2020	42.20	6529.38	11/16/2020	41.68	6529.90
<b>1I</b>			5/4/2020	40.23	6530.67	1/13/2020	42.13	6529.45	11/23/2020	41.43	6530.15
11/20/2020	34.40	6563.95	5/11/2020	40.22	6530.68	1/20/2020	42.53	6529.05	11/30/2020	41.53	6530.05
<b>1K</b>			5/18/2020	40.27	6530.63	1/27/2020	42.30	6529.28	12/7/2020	41.68	6529.90
4/9/2020	43.38	6540.75	5/25/2020	40.33	6530.57	2/3/2020	41.92	6529.66	12/14/2020	41.43	6530.15
<b>1N</b>			5/31/2020	40.37	6530.53	2/10/2020	42.13	6529.45	12/21/2020	41.60	6529.98
11/11/2020	32.33	6558.52	6/8/2020	40.32	6530.58	2/17/2020	42.13	6529.45	12/28/2020	41.55	6530.03
<b>1O</b>			6/15/2020	40.28	6530.62	2/24/2020	42.20	6529.38	<b>BC</b>		
11/11/2020	> 43.95	< 6550.99	6/22/2020	40.28	6530.62	3/2/2020	42.01	6529.57	11/23/2020	39.89	6534.72
<b>1P</b>			6/29/2020	40.43	6530.47	3/9/2020	42.23	6529.35	<b>C1</b>		
11/11/2020	41.10	6544.14	7/6/2020	40.80	6530.10	3/16/2020	42.20	6529.38	3/26/2020	38.54	6533.32
<b>1U</b>			7/13/2020	38.80	6532.10	3/30/2020	41.21	6530.37	<b>C2</b>		
1/14/2020	41.65	6544.57	7/20/2020	38.40	6532.50	4/13/2020	40.48	6531.10	3/26/2020	35.11	6529.91
<b>B</b>			7/27/2020	40.69	6530.21	4/20/2020	51.68	6519.90	<b>C6</b>		
1/6/2020	40.15	6530.75	8/3/2020	40.80	6530.10	4/27/2020	41.33	6530.25	3/26/2020	78.36	6506.53
1/13/2020	40.10	6530.80	8/10/2020	40.85	6530.05	5/4/2020	41.40	6530.18	<b>C7</b>		
1/20/2020	40.23	6530.67	8/17/2020	41.60	6529.30	5/11/2020	41.39	6530.19	3/26/2020	53.85	6530.59
1/27/2020	40.30	6530.60	8/24/2020	40.80	6530.10	5/18/2020	41.46	6530.12	<b>C8</b>		
			8/31/2020	40.52	6530.38	5/25/2020	40.60	6530.98	3/26/2020	50.13	6534.36
			9/8/2020	40.23	6530.67	5/31/2020	41.68	6529.90	<b>C9</b>		
			9/14/2020	40.22	6530.68	6/8/2020	41.54	6530.04	3/26/2020	57.28	6527.27
			9/21/2020	40.40	6530.50	6/15/2020	41.06	6530.52	<b>C10</b>		
			9/28/2020	40.41	6530.49	6/22/2020	41.60	6529.98	3/26/2020	62.67	6522.59
			10/5/2020	40.50	6530.40	6/29/2020	41.96	6529.62			
			10/12/2020	40.50	6530.40	7/6/2020	42.15	6529.43			
			10/19/2020	40.37	6530.53	7/13/2020	42.30	6529.28			
			10/26/2020	40.20	6530.70	7/20/2020	41.50	6530.08			
			11/2/2020	40.50	6530.40	7/27/2020	42.16	6529.42			
			11/9/2020	40.32	6530.58	8/3/2020	42.40	6529.18			
			11/16/2020	40.45	6530.45	8/10/2020	42.20	6529.38			
			11/23/2020	40.26	6530.64	8/17/2020	42.40	6529.18			
			11/30/2020	40.34	6530.56	8/24/2020	42.27	6529.31			
			12/7/2020	40.44	6530.46						
			12/14/2020	40.24	6530.66						
			12/21/2020	40.40	6530.50						
			12/28/2020	40.36	6530.54						

\* Drawdown Tube Pressure, # Transducer Reading

**0690 - C10**

**Table A.2-1 WATER LEVELS FOR HOMESTAKE'S ALLUVIAL WELLS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>D1</b>			7/27/2020	56.43	6527.38	7/6/2020	54.60	6535.93	<b>GV</b>		
7/22/2020	46.20	6524.70	8/3/2020	50.60	6533.21	7/13/2020	54.50	6536.03	11/20/2020	52.79	6524.59
<b>DC</b>			8/10/2020	56.70	6527.11	7/20/2020	50.20	6540.33	<b>GW1</b>		
11/23/2020	42.43	6528.88	8/17/2020	56.90	6526.91	7/27/2020	45.16	6545.37	11/20/2020	38.49	6526.78
<b>DD</b>			8/24/2020	56.77	6527.04	8/3/2020	54.40	6536.13	<b>GW2</b>		
2/12/2020	48.65	6543.94	8/31/2020	56.61	6527.20	8/10/2020	54.40	6536.13	11/20/2020	38.95	6527.13
5/7/2020	48.91	6543.68	9/8/2020	56.10	6527.71	8/17/2020	50.70	6539.83	<b>I</b>		
8/18/2020	49.20	6543.39	9/14/2020	56.27	6527.54	8/24/2020	55.80	6534.73	11/20/2020	38.82	6528.38
10/12/2020	49.70	6542.89	9/21/2020	56.30	6527.51	8/31/2020	56.05	6534.48	<b>K4</b>		
<b>DD2</b>			9/28/2020	56.42	6527.39	9/8/2020	55.92	6534.61	3/9/2020	58.75	6543.27
2/12/2020	46.15	6547.13	10/5/2020	56.40	6527.41	9/14/2020	55.86	6534.67	<b>K5</b>		
5/7/2020	46.20	6547.08	10/12/2020	56.40	6527.41	9/21/2020	56.10	6534.43	3/5/2020	76.05	6525.68
8/19/2020	46.45	6546.83	10/19/2020	49.56	6534.25	9/28/2020	59.32	6531.21	<b>K7</b>		
10/7/2020	46.50	6546.78	10/26/2020	56.87	6526.94	10/5/2020	55.35	6535.18	3/10/2020	61.50	6540.03
<b>DT</b>			11/2/2020	56.40	6527.41	10/12/2020	56.10	6534.43	<b>K9</b>		
1/6/2020	49.85	6533.96	11/9/2020	56.29	6527.52	10/19/2020	55.28	6535.25	2/27/2020	64.45	6535.89
1/13/2020	56.54	6527.27	11/16/2020	56.42	6527.39	10/26/2020	54.98	6535.55	<b>K11</b>		
1/20/2020	56.97	6526.84	11/23/2020	56.13	6527.68	11/2/2020	55.40	6535.13	3/8/2020	65.85	6534.76
1/27/2020	57.15	6526.66	11/30/2020	49.51	6534.30	11/9/2020	54.96	6535.57	<b>KEB</b>		
2/3/2020	49.61	6534.20	12/7/2020	48.84	6534.97	11/16/2020	55.34	6535.19	3/8/2020	42.10	6527.63
2/10/2020	50.26	6533.55	12/14/2020	48.37	6535.44	11/23/2020	54.88	6535.65	<b>KF</b>		
2/17/2020	50.80	6533.01	12/21/2020	48.90	6534.91	11/30/2020	56.04	6534.49	3/10/2020	34.80	6535.41
2/24/2020	56.90	6526.91	12/28/2020	48.62	6535.19	12/7/2020	55.43	6535.10	<b>F</b>		
3/2/2020	57.46	6526.35	<b>DZ</b>			12/14/2020	54.96	6535.57	9/16/2020	36.90	6527.92
3/9/2020	57.07	6526.74	1/6/2020	55.50	6535.03	12/21/2020	55.25	6535.28	11/20/2020	37.21	6527.61
3/16/2020	52.30	6531.51	1/13/2020	55.22	6535.31	<b>FB</b>			<b>GA</b>		
3/23/2020	57.08	6526.73	1/20/2020	55.49	6535.04	9/23/2020	38.50	6527.16	11/20/2020	38.72	6524.07
3/30/2020	52.07	6531.74	1/27/2020	35.90	6554.63	<b>GF</b>			<b>GH</b>		
4/13/2020	51.36	6532.45	2/3/2020	54.78	6535.75	11/20/2020	40.13	6525.88	9/15/2020	37.70	6525.06
4/20/2020	56.48	6527.33	2/10/2020	55.12	6535.41	<b>GN</b>			<b>3/2/2020</b>		
4/27/2020	56.95	6526.86	2/17/2020	55.02	6535.51	3/2/2020	40.00	6527.97			
5/4/2020	57.10	6526.71	2/24/2020	51.20	6539.33						
5/11/2020	57.28	6526.53	3/2/2020	54.81	6535.72						
5/18/2020	54.57	6529.24	3/9/2020	54.93	6535.60						
5/25/2020	57.62	6526.19	3/16/2020	55.10	6535.43						
5/31/2020	56.94	6526.87	3/23/2020	54.95	6535.58						
6/8/2020	56.57	6527.24	3/30/2020	54.34	6536.19						
6/15/2020	51.96	6531.85	4/13/2020	51.73	6538.80						
6/22/2020	56.37	6527.44	4/20/2020	54.00	6536.53						
6/29/2020	56.54	6527.27	4/27/2020	53.98	6536.55						
7/6/2020	50.90	6532.91	5/4/2020	53.98	6536.55						
7/13/2020	56.70	6527.11	5/11/2020	54.03	6536.50						
7/20/2020	51.90	6531.91	5/18/2020	54.64	6535.89						
			5/25/2020	54.82	6535.71						
			5/31/2020	54.81	6535.72						
			6/8/2020	55.08	6535.45						
			6/15/2020	53.98	6536.55						
			6/22/2020	56.25	6534.28						
			6/29/2020	54.65	6535.88						

\* Drawdown Tube Pressure, # Transducer Reading

D1 - KF

**Table A.2-1 WATER LEVELS FOR HOMESTAKE'S ALLUVIAL WELLS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>KZ</b>			12/28/2020	35.60	6536.12	<b>MB</b>			<b>MZ</b>		
1/6/2020	36.15	6535.57	<b>L</b>			3/3/2020	45.15	6526.91	3/11/2020	65.10	6511.54
1/13/2020	36.18	6535.54	4/9/2020	45.37	6529.60	<b>MC</b>			11/23/2020	66.92	6509.72
1/20/2020	36.12	6535.60	<b>L5</b>			11/23/2020	46.45	6525.61	<b>NC</b>		
1/27/2020	55.20	6516.52	4/9/2020	41.64	6534.43	<b>MF</b>			4/9/2020	41.54	6544.29
2/3/2020	36.14	6535.58	<b>L6</b>			11/23/2020	49.11	6523.17	11/11/2020	41.97	6543.86
2/10/2020	36.30	6535.42	10/14/2020	33.64	6541.00	<b>MH</b>			<b>ND</b>		
2/17/2020	36.33	6535.39	<b>L7</b>			11/23/2020	53.40	6520.52	11/11/2020	40.40	6552.49
2/24/2020	36.40	6535.32	10/14/2020	41.41	6535.20	<b>MJ</b>			<b>P</b>		
3/2/2020	36.26	6535.46	<b>M3</b>			11/23/2020	54.30	6518.64	11/17/2020	40.33	6546.93
3/9/2020	36.29	6535.43	4/29/2020	59.96	6516.14	<b>ML</b>			<b>P1</b>		
3/16/2020	36.30	6535.42	<b>M5</b>			3/10/2020	54.70	6518.00	11/11/2020	40.32	6552.15
3/23/2020	36.30	6535.42	11/20/2020	44.12	6531.22	11/23/2020	55.11	6517.59	<b>P2</b>		
3/30/2020	36.34	6535.38	<b>M6</b>			<b>MN</b>			3/11/2020	42.45	6547.34
4/13/2020	36.26	6535.46	3/8/2020	61.65	6513.39	11/23/2020	63.92	6513.64	3/16/2020	42.40	6547.39
4/20/2020	36.15	6535.57	11/23/2020	62.93	6512.11	<b>MQ</b>			<b>P3</b>		
4/27/2020	36.10	6535.62	<b>M7</b>			3/3/2020	64.60	6509.70	3/11/2020	42.60	6547.35
5/4/2020	36.07	6535.65	3/9/2020	57.55	6515.30	<b>MU</b>			<b>P4</b>		
5/11/2020	36.07	6535.65	11/23/2020	58.43	6514.42	10/15/2020	45.62	6528.57	3/16/2020	39.10	6550.42
5/18/2020	36.04	6535.68	<b>M9</b>			11/23/2020	45.01	6529.18	<b>Q</b>		
5/25/2020	36.07	6535.65	3/8/2020	64.70	6512.11	<b>MW</b>			5/13/2020	41.78	6552.04
5/31/2020	36.09	6535.63	10/19/2020	65.81	6511.00	3/11/2020	56.40	6518.51	<b>R</b>		
6/8/2020	36.10	6535.62	11/23/2020	66.37	6510.44	11/23/2020	64.80	6510.11	3/17/2020	39.60	6564.43
6/15/2020	36.21	6535.51	<b>M10</b>			<b>MX</b>			<b>S</b>		
6/22/2020	36.05	6535.67	3/10/2020	62.60	6510.76	8/19/2020	52.25	6516.36	11/23/2020	46.10	6535.07
6/29/2020	36.00	6535.72	11/23/2020	64.10	6509.26	<b>MY</b>					
7/6/2020	36.05	6535.67	<b>MA</b>			10/14/2020	57.72	6515.84			
7/13/2020	36.10	6535.62	11/23/2020	44.90	6527.32						
7/20/2020	34.65	6537.07									
7/27/2020	36.04	6535.68									
8/3/2020	36.20	6535.52									
8/10/2020	36.10	6535.62									
8/17/2020	36.10	6535.62									
8/24/2020	36.09	6535.63									
8/31/2020	35.92	6535.80									
9/8/2020	35.73	6535.99									
9/14/2020	35.72	6536.00									
9/21/2020	35.80	6535.92									
9/28/2020	35.93	6535.79									
10/5/2020	36.00	6535.72									
10/12/2020	36.00	6535.72									
10/19/2020	36.06	6535.66									
11/2/2020	36.25	6535.47									
11/9/2020	49.36	6522.36									
11/16/2020	36.14	6535.58									
11/23/2020	36.11	6535.61									
11/30/2020	36.02	6535.70									
12/7/2020	35.87	6535.85									
12/14/2020	35.71	6536.01									
12/21/2020	35.50	6536.22									

\* Drawdown Tube Pressure, # Transducer Reading

KZ - S

**Table A.2-1 WATER LEVELS FOR HOMESTAKE'S ALLUVIAL WELLS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>S1</b>			12/21/2020	41.60	6533.59	<b>S3</b>			10/12/2020	46.70	6527.99
1/6/2020	41.30	6533.89	12/28/2020	41.53	6533.66	11/23/2020	40.93	6533.85	10/19/2020	46.58	6528.11
1/13/2020	41.25	6533.94	<b>S2</b>			<b>S4</b>			10/26/2020	46.46	6528.23
1/20/2020	41.33	6533.86	1/6/2020	43.80	6529.92	7/30/2020	42.95	6532.34	11/2/2020	46.63	6528.06
1/27/2020	41.40	6533.79	1/13/2020	41.23	6532.49	9/15/2020	42.70	6532.59	11/9/2020	46.42	6528.27
2/3/2020	41.28	6533.91	1/20/2020	41.29	6532.43	11/23/2020	42.45	6532.84	11/16/2020	46.56	6528.13
2/10/2020	41.44	6533.75	2/3/2020	41.26	6532.46	<b>S5</b>			11/23/2020	46.43	6528.26
2/17/2020	41.50	6533.69	2/10/2020	41.45	6532.27	1/6/2020	46.20	6528.49	12/7/2020	46.43	6528.26
2/24/2020	41.70	6533.49	2/17/2020	41.49	6532.23	1/13/2020	46.21	6528.48	12/14/2020	46.33	6528.36
3/2/2020	41.56	6533.63	2/24/2020	41.75	6531.97	1/20/2020	46.39	6528.30	12/21/2020	46.50	6528.19
3/9/2020	41.63	6533.56	3/2/2020	41.55	6532.17	1/27/2020	46.50	6528.19	12/28/2020	46.21	6528.48
3/16/2020	46.10	6529.09	3/9/2020	41.62	6532.10	2/3/2020	46.21	6528.48	<b>S11</b>		
3/23/2020	41.70	6533.49	3/23/2020	41.65	6532.07	2/10/2020	46.43	6528.26	1/29/2020	41.60	6536.79
3/30/2020	41.73	6533.46	3/30/2020	41.69	6532.03	2/17/2020	46.49	6528.20	11/23/2020	43.16	6535.23
4/13/2020	41.48	6533.71	4/13/2020	41.41	6532.31	2/24/2020	46.70	6527.99	<b>S12</b>		
4/20/2020	41.65	6533.54	4/20/2020	41.68	6532.04	3/2/2020	46.52	6528.17	1/29/2020	46.05	6532.80
4/27/2020	41.71	6533.48	4/27/2020	41.70	6532.02	3/9/2020	46.62	6528.07	<b>S19</b>		
5/4/2020	41.72	6533.47	5/4/2020	41.69	6532.03	3/16/2020	38.60	6536.09	11/23/2020	42.93	6535.04
5/11/2020	41.87	6533.32	5/11/2020	41.71	6532.01	3/23/2020	46.74	6527.95	<b>S21</b>		
5/18/2020	41.81	6533.38	5/18/2020	41.76	6531.96	3/30/2020	46.59	6528.10	11/23/2020	41.92	6538.36
5/25/2020	41.84	6533.35	5/25/2020	41.79	6531.93	4/13/2020	46.22	6528.47			
5/31/2020	41.84	6533.35	5/31/2020	41.77	6531.95	4/20/2020	46.34	6528.35			
6/8/2020	41.80	6533.39	6/8/2020	41.78	6531.94	4/27/2020	46.51	6528.18			
6/15/2020	41.82	6533.37	6/15/2020	41.83	6531.89	5/4/2020	46.61	6528.08			
6/22/2020	41.78	6533.41	6/22/2020	41.72	6532.00	5/11/2020	46.69	6528.00			
6/29/2020	41.79	6533.40	6/29/2020	41.73	6531.99	5/18/2020	46.77	6527.92			
7/6/2020	42.20	6532.99	7/27/2020	41.88	6531.84	5/25/2020	46.81	6527.88			
7/13/2020	41.90	6533.29	8/10/2020	41.80	6531.92	5/31/2020	46.75	6527.94			
7/20/2020	41.90	6533.29	8/17/2020	41.95	6531.77	6/8/2020	46.60	6528.09			
7/27/2020	41.90	6533.29	8/24/2020	41.85	6531.87	6/15/2020	46.47	6528.22			
8/3/2020	41.95	6533.24	8/31/2020	41.70	6532.02	6/22/2020	46.51	6528.18			
8/10/2020	42.00	6533.19	9/8/2020	41.52	6532.20	6/29/2020	46.60	6528.09			
8/17/2020	42.00	6533.19	9/14/2020	41.50	6532.22	7/6/2020	47.05	6527.64			
8/24/2020	41.93	6533.26	9/21/2020	41.50	6532.22	7/13/2020	46.80	6527.89			
8/31/2020	41.85	6533.34	9/28/2020	41.56	6532.16	7/20/2020	46.65	6528.04			
9/8/2020	41.69	6533.50	10/5/2020	40.85	6532.87	7/27/2020	46.71	6527.98			
9/14/2020	41.68	6533.51	10/12/2020	40.50	6533.22	8/3/2020	46.90	6527.79			
9/21/2020	41.65	6533.54	10/19/2020	41.66	6532.06	8/10/2020	46.95	6527.74			
9/28/2020	41.65	6533.54	10/26/2020	41.50	6532.22	8/17/2020	46.90	6527.79			
10/5/2020	41.75	6533.44	11/2/2020	41.65	6532.07	8/24/2020	46.75	6527.94			
10/12/2020	41.80	6533.39	11/9/2020	41.44	6532.28	8/31/2020	46.77	6527.92			
10/19/2020	41.74	6533.45	11/16/2020	41.42	6532.30	9/8/2020	46.45	6528.24			
10/26/2020	41.63	6533.56	11/23/2020	41.36	6532.36	9/14/2020	46.56	6528.13			
11/2/2020	41.77	6533.42	11/30/2020	41.39	6532.33	9/21/2020	46.70	6527.99			
11/9/2020	41.62	6533.57	12/7/2020	41.43	6532.29	9/28/2020	46.57	6528.12			
11/16/2020	41.62	6533.57	12/14/2020	41.37	6532.35	10/5/2020	39.75	6534.94			
11/23/2020	41.49	6533.70	12/21/2020	41.50	6532.22						
11/30/2020	41.54	6533.65	12/28/2020	41.44	6532.28						
12/7/2020	41.56	6533.63									
12/14/2020	41.56	6533.63									

\* Drawdown Tube Pressure, # Transducer Reading

S1 - S21

**Table A.2-1 WATER LEVELS FOR HOMESTAKE'S ALLUVIAL WELLS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>SA</b>			12/28/2020	47.77	6532.54	10/12/2020	45.10	6533.64	9/21/2020	44.7	6534.56
1/6/2020	47.70	6532.61	<b>SB</b>			10/19/2020	45.03	6533.71	9/28/2020	44.7	6534.56
1/13/2020	47.92	6532.39	3/17/2020 49.05 6532.04			10/26/2020	44.95	6533.79	10/5/2020	44.8	6534.46
1/20/2020	48.05	6532.26	<b>SE6</b>			11/2/2020	45.08	6533.66	10/12/2020	44.8	6534.46
2/3/2020	47.79	6532.52	1/29/2020 41.70 6537.21			11/9/2020	44.98	6533.76	10/19/2020	44.7	6534.56
2/10/2020	41.42	6538.89	<b>SM</b>			11/16/2020	45.01	6533.73	10/26/2020	44.63	6534.63
2/17/2020	48.19	6532.12	1/6/2020	44.35	6534.39	11/23/2020	44.85	6533.89	11/2/2020	44.8	6534.46
2/24/2020	48.30	6532.01	1/13/2020	44.29	6534.45	11/30/2020	44.92	6533.82	11/9/2020	44.66	6534.6
3/2/2020	48.23	6532.08	1/20/2020	44.37	6534.37	12/7/2020	44.96	6533.78	11/16/2020	44.72	6534.54
3/9/2020	48.33	6531.98	1/27/2020	44.40	6534.34	12/14/2020	44.86	6533.88	11/23/2020	44.63	6534.63
3/16/2020	48.40	6531.91	2/3/2020	44.29	6534.45	12/21/2020	45.00	6533.74	11/30/2020	44.61	6534.65
3/23/2020	48.36	6531.95	2/10/2020	44.51	6534.23	12/28/2020	44.93	6533.81	12/7/2020	44.66	6534.6
3/30/2020	48.18	6532.13	2/17/2020	44.59	6534.15	<b>SN</b>			12/14/2020	44.53	6534.73
4/13/2020	47.83	6532.48	2/24/2020	44.70	6534.04	1/6/2020	44.2	6535.06	12/21/2020	44.65	6534.61
4/20/2020	48.03	6532.28	3/2/2020	44.60	6534.14	1/13/2020	44.14	6535.12	12/28/2020	44.53	6534.73
4/27/2020	48.20	6532.11	3/9/2020	44.70	6534.04	1/20/2020	44.23	6535.03			
5/4/2020	48.22	6532.09	3/16/2020	44.80	6533.94	1/27/2020	44.3	6534.96			
5/11/2020	48.27	6532.04	3/23/2020	44.74	6534.00	2/3/2020	44.13	6535.13			
5/18/2020	48.56	6531.75	3/30/2020	44.78	6533.96	2/10/2020	44.34	6534.92			
5/25/2020	48.42	6531.89	4/13/2020	44.70	6534.04	2/17/2020	44.41	6534.85			
5/31/2020	48.26	6532.05	4/20/2020	44.74	6534.00	2/24/2020	44.5	6534.76			
6/8/2020	48.14	6532.17	4/27/2020	44.77	6533.97	3/2/2020	44.41	6534.85			
6/15/2020	48.12	6532.19	5/4/2020	44.78	6533.96	3/9/2020	44.49	6534.77			
6/22/2020	48.03	6532.28	5/11/2020	44.53	6534.21	3/16/2020	44.5	6534.76			
6/29/2020	48.15	6532.16	5/18/2020	44.89	6533.85	3/23/2020	44.48	6534.78			
7/6/2020	48.40	6531.91	5/25/2020	44.95	6533.79	3/30/2020	44.53	6534.73			
7/13/2020	48.25	6532.06	5/31/2020	44.96	6533.78	4/13/2020	44.39	6534.87			
7/20/2020	48.15	6532.16	6/8/2020	44.93	6533.81	4/20/2020	44.4	6534.86			
7/27/2020	48.30	6532.01	6/15/2020	44.99	6533.75	4/27/2020	44.76	6534.5			
8/3/2020	48.40	6531.91	6/22/2020	44.95	6533.79	5/4/2020	44.51	6534.75			
8/10/2020	48.40	6531.91	6/29/2020	44.95	6533.79	5/11/2020	44.55	6534.71			
8/17/2020	48.50	6531.81	7/6/2020	48.90	6529.84	5/18/2020	44.62	6534.64			
8/24/2020	48.28	6532.03	7/13/2020	45.20	6533.54	5/25/2020	44.66	6534.6			
8/31/2020	48.17	6532.14	7/20/2020	45.10	6533.64	5/31/2020	44.67	6534.59			
9/8/2020	47.91	6532.40	7/27/2020	45.06	6533.68	6/8/2020	44.64	6534.62			
9/14/2020	47.99	6532.32	8/3/2020	45.20	6533.54	6/15/2020	44.67	6534.59			
9/21/2020	48.10	6532.21	8/10/2020	45.20	6533.54	6/22/2020	44.63	6534.63			
9/28/2020	48.10	6532.21	8/17/2020	45.25	6533.49	6/29/2020	44.64	6534.62			
10/5/2020	48.20	6532.11	8/24/2020	45.19	6533.55	7/6/2020	45.05	6534.21			
10/12/2020	48.20	6532.11	8/31/2020	45.11	6533.63	7/13/2020	44.9	6534.36			
10/19/2020	48.08	6532.23	9/8/2020	44.97	6533.77	7/20/2020	44.85	6534.41			
10/26/2020	47.98	6532.33	9/14/2020	45.02	6533.72	7/27/2020	44.76	6534.5			
11/2/2020	48.12	6532.19	9/21/2020	45.00	6533.74	8/3/2020	44.85	6534.41			
11/9/2020	48.00	6532.31	9/28/2020	44.97	6533.77	8/10/2020	45	6534.26			
11/16/2020	48.04	6532.27	10/5/2020	45.00	6533.74	8/17/2020	44.9	6534.36			
11/23/2020	47.81	6532.50				8/24/2020	44.83	6534.43			
11/30/2020	47.87	6532.44				8/31/2020	44.8	6534.46			
12/7/2020	47.90	6532.41				9/8/2020	44.65	6534.61			
12/14/2020	47.69	6532.62				9/14/2020	44.72	6534.54			
12/21/2020	47.90	6532.41									

\* Drawdown Tube Pressure, # Transducer Reading

SA - SN

**Table A.2-1 WATER LEVELS FOR HOMESTAKE'S ALLUVIAL WELLS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>SO</b>			12/21/2020	45.60	6533.19	11/30/2020	45.32	6533.34	11/9/2020	42.52	6535.86
			12/28/2020	45.53	6533.26	12/7/2020	45.36	6533.30	11/16/2020	47.55	6530.83
1/6/2020	45.15	6533.64	<b>SP</b>			12/14/2020	45.27	6533.39	11/23/2020	47.39	6530.99
1/13/2020	45.06	6533.73				12/21/2020	45.30	6533.36	11/30/2020	47.42	6530.96
1/20/2020	45.16	6533.63				12/28/2020	45.27	6533.39	12/7/2020	47.47	6530.91
1/27/2020	45.20	6533.59				<b>SS</b>			12/14/2020	47.36	6531.02
2/3/2020	45.04	6533.75	1/6/2020	44.95	6533.71				12/21/2020	47.50	6530.88
2/10/2020	45.28	6533.51	1/13/2020	44.87	6533.79				12/28/2020	47.38	6531.00
2/17/2020	45.37	6533.42	1/20/2020	44.95	6533.71				<b>SSR</b>		
2/24/2020	45.50	6533.29	1/27/2020	45.00	6533.66	1/6/2020	47.20	6531.18			
3/2/2020	45.36	6533.43	2/3/2020	44.88	6533.78	1/13/2020	47.13	6531.25	1/29/2020	47.30	6531.67
3/9/2020	45.48	6533.31	2/10/2020	45.07	6533.59	1/20/2020	47.23	6531.15	3/17/2020	47.60	6531.37
3/16/2020	45.55	6533.24	2/17/2020	45.13	6533.53	1/27/2020	47.30	6531.08			
3/23/2020	45.50	6533.29	2/24/2020	45.25	6533.41	2/3/2020	47.12	6531.26			
3/30/2020	45.54	6533.25	3/2/2020	45.16	6533.50	2/10/2020	47.34	6531.04			
4/13/2020	45.46	6533.33	3/9/2020	45.24	6533.42	2/17/2020	47.41	6530.97			
4/20/2020	45.50	6533.29	3/16/2020	45.40	6533.26	2/24/2020	47.60	6530.78			
4/27/2020	45.02	6533.77	3/23/2020	45.27	6533.39	3/2/2020	47.44	6530.94			
5/4/2020	45.56	6533.23	3/30/2020	45.29	6533.37	3/9/2020	49.55	6528.83			
5/11/2020	45.58	6533.21	4/13/2020	45.21	6533.45	3/16/2020	47.65	6530.73			
5/18/2020	45.63	6533.16	4/20/2020	45.22	6533.44	3/23/2020	47.60	6530.78			
5/25/2020	45.69	6533.10	4/27/2020	45.27	6533.39	3/30/2020	47.59	6530.79			
5/31/2020	45.70	6533.09	5/4/2020	45.23	6533.43	4/13/2020	47.37	6531.01			
6/8/2020	45.62	6533.17	5/11/2020	45.36	6533.30	4/20/2020	47.45	6530.93			
6/15/2020	45.74	6533.05	5/18/2020	45.42	6533.24	4/27/2020	47.54	6530.84			
6/22/2020	45.66	6533.13	5/25/2020	45.45	6533.21	5/4/2020	47.58	6530.80			
6/29/2020	45.64	6533.15	5/31/2020	45.47	6533.19	5/11/2020	47.63	6530.75			
7/6/2020	46.00	6532.79	6/8/2020	43.40	6535.26	5/18/2020	46.67	6531.71			
7/13/2020	45.80	6532.99	6/15/2020	45.46	6533.20	5/25/2020	47.76	6530.62			
7/20/2020	45.75	6533.04	6/22/2020	45.40	6533.26	5/31/2020	47.71	6530.67			
7/27/2020	45.86	6532.93	6/29/2020	45.41	6533.25	6/8/2020	47.65	6530.73			
8/3/2020	45.85	6532.94	7/6/2020	45.55	6533.11	6/15/2020	47.66	6530.72			
8/10/2020	45.90	6532.89	7/13/2020	45.60	6533.06	6/22/2020	47.60	6530.78			
8/17/2020	45.90	6532.89	7/20/2020	45.50	6533.16	6/29/2020	47.62	6530.76			
8/24/2020	45.82	6532.97	7/27/2020	45.52	6533.14	7/6/2020	47.85	6530.53			
8/31/2020	45.71	6533.08	8/3/2020	45.60	6533.06	7/13/2020	47.80	6530.58			
9/8/2020	45.53	6533.26	8/10/2020	45.65	6533.01	7/20/2020	47.80	6530.58			
9/14/2020	45.60	6533.19	8/17/2020	45.70	6532.96	7/27/2020	47.75	6530.63			
9/21/2020	45.60	6533.19	8/24/2020	45.60	6533.06	8/3/2020	47.85	6530.53			
9/28/2020	45.65	6533.14	8/31/2020	45.53	6533.13	8/10/2020	47.90	6530.48			
10/5/2020	45.70	6533.09	9/8/2020	45.40	6533.26	8/17/2020	47.90	6530.48			
10/12/2020	45.70	6533.09	9/14/2020	45.42	6533.24	8/24/2020	47.80	6530.58			
10/19/2020	45.70	6533.09	9/21/2020	45.40	6533.26	8/31/2020	47.72	6530.66			
10/26/2020	45.57	6533.22	9/28/2020	45.40	6533.26	9/8/2020	47.54	6530.84			
11/2/2020	45.72	6533.07	10/5/2020	45.45	6533.21	9/14/2020	47.55	6530.83			
11/9/2020	45.54	6533.25	10/12/2020	45.50	6533.16	9/21/2020	47.60	6530.78			
11/16/2020	45.63	6533.16	10/19/2020	45.44	6533.22	9/28/2020	47.87	6530.51			
11/23/2020	45.43	6533.36	10/26/2020	45.37	6533.29	10/5/2020	47.65	6530.73			
11/30/2020	45.52	6533.27	11/2/2020	45.50	6533.16	10/12/2020	47.70	6530.68			
12/7/2020	45.58	6533.21	11/9/2020	45.35	6533.31	10/19/2020	47.60	6530.78			
12/14/2020	45.50	6533.29	11/16/2020	45.41	6533.25	10/26/2020	47.53	6530.85			
			11/23/2020	45.24	6533.42	11/2/2020	47.68	6530.70			

\* Drawdown Tube Pressure, # Transducer Reading

SO - SSR



**Table A.2-1 WATER LEVELS FOR HOMESTAKE'S ALLUVIAL WELLS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>ST</b>			12/7/2020	47.24	6532.07	<b>T23</b>			<b>T47</b>		
1/6/2020	46.40	6532.91	12/14/2020	47.12	6532.19	6/25/2020	113.00	6548.11	1/29/2020	118.75	6538.46
1/13/2020	47.02	6532.29	12/21/2020	47.20	6532.11	<b>T24</b>			<b>T48</b>		
1/20/2020	47.11	6532.20	12/28/2020	47.12	6532.19	1/14/2020	122.60	6534.43	1/28/2020	119.50	6538.06
1/27/2020	42.15	6537.16	<b>SV</b>			<b>T25</b>			<b>T53</b>		
2/3/2020	46.99	6532.32	3/17/2020	46.70	6532.55	1/14/2020	122.80	6534.54	1/28/2020	121.50	6535.48
2/10/2020	47.22	6532.09	<b>SZ</b>			<b>T26</b>			<b>T54</b>		
2/17/2020	47.32	6531.99	2/27/2020	48.15	6533.32	1/15/2020	121.90	6534.76	1/28/2020	118.60	6538.50
2/24/2020	47.45	6531.86	11/23/2020	43.91	6537.56	<b>T27</b>			2/13/2020	138.70	6518.40
2/27/2020	47.00	6532.31	<b>T2</b>			1/15/2020	121.80	6535.34	6/24/2020	123.80	6533.30
3/2/2020	47.35	6531.96	6/24/2020	98.00	6566.82	<b>T28</b>			<b>WR12</b>		
3/9/2020	47.42	6531.89	<b>T7</b>			1/15/2020	121.75	6536.96	11/23/2020	29.45	6538.74
3/16/2020	46.15	6533.16	3/25/2020	121.10	6538.57	<b>T29</b>			<b>X</b>		
3/18/2020	47.50	6531.81	<b>T8</b>			1/15/2020	119.20	6537.51	2/18/2020	33.40	6538.21
3/23/2020	47.47	6531.84	3/25/2020	122.12	6539.49	<b>T30</b>			4/9/2020	33.79	6537.82
3/30/2020	47.42	6531.89	<b>T9</b>			1/16/2020	123.00	6536.62	7/20/2020	34.10	6537.51
4/13/2020	47.19	6532.12	3/26/2020	121.07	6542.88	<b>T31</b>			10/12/2020	33.10	6538.51
4/20/2020	47.26	6532.05	<b>T10</b>			1/15/2020	122.10	6536.93			
4/27/2020	47.40	6531.91	3/25/2020	104.61	6555.35	<b>T33</b>					
5/4/2020	47.45	6531.86	<b>T12</b>			1/28/2020	79.45	6576.34			
5/11/2020	47.50	6531.81	3/25/2020	106.14	6551.09	<b>T36</b>					
5/18/2020	47.56	6531.75	<b>T15</b>			1/28/2020	119.30	6536.14			
5/25/2020	47.63	6531.68	3/25/2020	120.91	6544.38	<b>T41</b>					
5/31/2020	47.56	6531.75	<b>T19</b>			6/24/2020	102.95	6557.01			
6/8/2020	47.48	6531.83	6/24/2020	128.20	6539.56	<b>T43</b>					
6/15/2020	47.48	6531.83	<b>T22</b>			1/28/2020	119.85	6537.67			
6/22/2020	47.56	6531.75	3/17/2020	124.10	6543.09						
6/29/2020	47.45	6531.86									
7/6/2020	47.60	6531.71									
7/13/2020	47.65	6531.66									
7/20/2020	47.50	6531.81									
7/27/2020	51.39	6527.92									
8/3/2020	47.70	6531.61									
8/10/2020	45.60	6533.71									
8/17/2020	47.75	6531.56									
8/24/2020	47.63	6531.68									
8/31/2020	47.35	6531.96									
9/8/2020	47.33	6531.98									
9/14/2020	47.36	6531.95									
9/21/2020	47.45	6531.86									
9/28/2020	47.38	6531.93									
10/5/2020	47.45	6531.86									
10/12/2020	47.50	6531.81									
10/19/2020	47.41	6531.90									
10/26/2020	47.32	6531.99									
11/2/2020	47.30	6532.01									
11/9/2020	47.20	6532.11									
11/16/2020	47.36	6531.95									
11/23/2020	47.16	6532.15									
11/30/2020	47.24	6532.07									

\* Drawdown Tube Pressure, # Transducer Reading

ST - X

**TABLE A.2-2 WATER LEVELS FOR THE SUBDIVISION ALLUVIAL WELLS**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>0497</b>			<b>Q29</b>								
5/19/2020	49.78	6512.84	11/25/2020	51.70	6514.76						
11/25/2020	49.80	6512.82									
<b>0688</b>			<b>Q44</b>								
8/11/2020	60.50	6502.12	11/25/2020	51.53	6509.80						
11/20/2020	60.88	6501.74									
<b>0802</b>			<b>Q48</b>								
8/18/2020	41.40	6521.32	11/25/2020	51.22	6516.62						
<b>0844</b>			<b>SUB2</b>								
2/12/2020	38.45	6517.68	7/20/2020	42.90	6524.67						
11/20/2020	39.04	6517.09	<b>SUB3</b>								
<b>0845</b>			5/12/2020	40.03	6517.04						
2/12/2020	38.25	6518.80									
2/25/2020	36.90	6520.15									
11/20/2020	37.43	6519.62									
<b>AW</b>											
11/11/2020	38.40	6525.03									
<b>Q2</b>											
9/21/2020	73.20	6488.48									
10/29/2020	72.10	6489.58									
<b>Q5</b>											
5/6/2020	51.91	6509.57									
<b>Q8</b>											
11/25/2020	50.08	6510.72									
<b>Q11</b>											
9/21/2020	71.30	6489.72									
10/29/2020	53.55	6507.47									
<b>Q23</b>											
11/25/2020	62.45	6501.81									

\* Drawdown Tube Pressure, # Transducer Reading

**TABLE A.2-3 WATER LEVELS FOR REGIONAL ALLUVIAL WELLS**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>0520</b>			<b>0557</b>			<b>0649</b>			<b>0846</b>		
3/18/2020	54.70	6531.32	2/5/2020	43.00	6510.77	1/8/2020	84.25	6459.04	8/17/2020	44.20	6504.72
11/11/2020	55.38	6530.64				11/20/2020	103.11	6440.18	11/20/2020	44.23	6504.69
<b>0521</b>			<b>0631</b>			<b>0650</b>			<b>0851</b>		
3/18/2020	54.25	6530.19	11/20/2020	84.39	6456.71	11/11/2020	82.15	6464.96	11/11/2020	82.50	6463.94
<b>0522</b>			<b>0632</b>			<b>0652</b>			<b>0852</b>		
3/18/2020	52.60	6527.93	3/4/2020	85.30	6456.00	11/20/2020	84.60	6453.55	11/11/2020	69.95	6520.19
			11/20/2020	83.20	6458.10						
<b>0538</b>			<b>0634</b>			<b>0653</b>			<b>0855</b>		
3/4/2020	67.80	6481.14	11/25/2020	70.48	6489.59	11/20/2020	65.93	6479.04	11/20/2020	82.99	6458.12
<b>0539</b>			<b>0638</b>			<b>0654</b>			<b>0862</b>		
11/20/2020	> 210.00	< 6345.32	3/18/2020	50.10	6535.46	1/9/2020	74.20	6476.30	11/20/2020	52.63	6503.55
			11/11/2020	52.10	6533.46	11/25/2020	74.64	6475.86			
<b>0540</b>			<b>0639</b>			<b>0657</b>			<b>0864</b>		
5/6/2020	58.16	6497.75	2/27/2020	58.10	6529.78	11/20/2020	100.52	6451.29	4/30/2020	67.60	6479.12
11/20/2020	57.08	6498.83	3/8/2020	56.20	6531.68						
<b>0541</b>			5/12/2020	56.16	6531.72	<b>0658</b>			<b>0867</b>		
1/7/2020	91.00	6464.62	7/15/2020	57.20	6530.68	11/20/2020	107.61	6442.57	11/20/2020	58.98	6496.92
1/13/2020	91.00	6464.62									
11/25/2020	91.80	6463.82	<b>0640</b>			<b>0659</b>			<b>0869</b>		
			11/11/2020	> 47.70	< 6532.27	3/2/2020	70.00	6490.17	4/30/2020	68.97	6475.52
<b>0551</b>						11/25/2020	70.35	6489.82	11/20/2020	68.50	6475.99
1/8/2020	99.15	6448.15	<b>0644</b>			<b>0680</b>			<b>0876</b>		
11/20/2020	99.48	6447.82	5/5/2020	71.11	6472.79	11/25/2020	73.10	6485.77	11/20/2020	> 95.00	< 6449.26
<b>0553</b>			11/20/2020	70.85	6473.05						
11/20/2020	104.44	6443.04	<b>0646</b>			<b>0681</b>			<b>0877</b>		
<b>0554</b>			3/12/2020	74.30	6469.05	11/11/2020	64.80	6495.72	11/20/2020	62.56	6490.52
11/20/2020	> 140.00	< 6407.17	11/20/2020	74.15	6469.20						
<b>0555</b>			<b>0647</b>			<b>0685</b>			<b>0879</b>		
2/4/2020	42.40	6514.74	1/8/2020	104.25	6447.66	11/25/2020	97.50	6459.07	11/20/2020	67.64	6476.91
			11/20/2020	105.33	6446.58						
<b>0556</b>			<b>0648</b>			<b>0687</b>			<b>0881</b>		
2/4/2020	42.90	6513.12	11/20/2020	> 120.00	< 6427.79	11/25/2020	> 102.00	< 6453.96	2/25/2020	73.00	6492.04
									11/25/2020	73.73	6491.31

\* Drawdown Tube Pressure, # Transducer Reading

**0520 - 0881**

**TABLE A.2-3 WATER LEVELS FOR REGIONAL ALLUVIAL WELLS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

1/7/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>0882</b>			<b>0994</b>			<b>MP</b>			<b>R74</b>		
2/5/2020	64.90	6496.26	10/6/2020	92.10	6462.90	11/25/2020	64.85	6509.63	11/20/2020	71.33	6472.70
<b>0883</b>			<b>0996</b>			<b>MR</b>					
2/5/2020	59.85	6497.28	1/9/2020	80.20	6472.32	2/13/2020	68.30	6497.96			
						11/25/2020	69.35	6496.91			
<b>0884</b>			<b>H2A</b>			<b>MT</b>					
2/6/2020	72.35	6493.75	3/2/2020	52.45	6507.42						
						11/25/2020	> 60.50	< 6506.93			
<b>0885</b>			<b>H7</b>			<b>MV</b>					
11/25/2020	66.50	6498.14	10/20/2020	72.21	6487.33						
<b>0886</b>			<b>H7A</b>			3/11/2020	62.40	6507.38			
2/25/2020	71.30	6493.25	11/25/2020	71.83	6487.26	11/25/2020	67.94	6501.84			
11/25/2020	69.93	6494.62	<b>H7B</b>			<b>R1</b>					
<b>0887</b>						10/28/2020	51.66	6503.46			
11/25/2020	61.80	6505.93	10/20/2020	70.78	6488.60	11/20/2020	50.78	6504.34			
<b>0888</b>			<b>H16</b>			<b>R2</b>					
2/6/2020	77.20	6480.13	10/20/2020	66.20	6491.78	10/28/2020	67.39	6486.77			
11/25/2020	77.90	6479.43	<b>H17</b>			<b>R3</b>					
<b>0890</b>			10/20/2020	71.81	6491.55	5/12/2020	51.29	6504.44			
10/20/2020	74.81	6483.62	<b>H24</b>			10/28/2020	62.64	6493.09			
<b>0893</b>			10/20/2020	73.53	6492.34	<b>R4</b>					
2/10/2020	68.85	6495.12	<b>H55</b>			10/28/2020	54.04	6504.74			
11/25/2020	70.02	6493.95	3/3/2020	63.50	6505.75	<b>R5</b>					
<b>0897</b>			<b>H95</b>			10/12/2020	97.90	6459.85			
11/25/2020	79.25	6483.00	11/25/2020	65.92	6502.99	10/29/2020	54.43	6503.32			
<b>0899</b>			<b>M16</b>			<b>R18</b>					
1/9/2020	101.60	6469.24	11/25/2020	63.40	6507.19	3/12/2020	61.10	6494.90			
<b>0921</b>			<b>MO</b>			<b>R20</b>					
2/10/2020	41.70	6582.30	3/4/2020	62.60	6510.29	3/12/2020	59.90	6496.44			
			11/25/2020	64.40	6508.49	<b>R22</b>					
						3/12/2020	61.70	6495.44			

\* Drawdown Tube Pressure, # Transducer Reading

**0882 - R74**

# TABLE A.3-1 WATER LEVELS FOR CHINLE AQUIFERS

WATER LEVEL ELEVATION (FT-MSL)

3/1/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>0493</b>			<b>0931</b>			<b>CE13</b>			<b>CW2</b>		
5/19/2020	59.34	6500.94	11/11/2020	92.97	6517.59	11/11/2020	44.26	6530.38	8/18/2020	84.10	6501.38
11/11/2020	60.34	6499.94							11/11/2020	86.05	6499.43
<b>0494</b>			<b>ACW</b>			<b>CE14</b>			<b>CW2-1</b>		
5/19/2020	13.00	6547.14	7/20/2020	64.00	6499.80	11/11/2020	40.03	6529.42	11/11/2020	46.75	6538.73
11/11/2020	38.78	6521.36	11/11/2020	64.85	6498.95						
<b>0538</b>			<b>AW</b>			<b>CE15</b>			<b>CW3</b>		
3/4/2020	67.80	6481.14	11/11/2020	38.40	6525.03	6/17/2020	44.02	6522.06	3/17/2020	56.00	6531.18
						11/11/2020	47.96	6518.12	6/17/2020	56.13	6531.05
<b>0539</b>			<b>B32</b>			<b>CE15A</b>			11/11/2020	57.80	6529.38
11/20/2020	> 210.00	< 6345.32	12/22/2020	56.52	6518.87	8/20/2020	43.00	6521.81	<b>CW6</b>		
						11/11/2020	42.27	6522.54	11/11/2020	71.69	6503.95
<b>0653</b>			<b>CE1</b>			<b>CE19</b>			<b>CW9</b>		
11/20/2020	65.93	6479.04	11/11/2020	14.03	6556.16	8/20/2020	66.70	6502.13	11/11/2020	62.01	6529.82
<b>0850</b>			<b>CE2</b>			<b>CF3</b>			<b>CW15</b>		
11/11/2020	54.60	6494.55	5/13/2020	41.16	6535.19	11/11/2020	51.76	6535.03	11/11/2020	52.30	6499.02
			5/28/2020	41.34	6535.01						
<b>0853</b>			<b>CE6</b>			<b>CF4</b>			<b>CW17</b>		
11/11/2020	66.00	6475.38	12/22/2020	95.72	6469.47	2/27/2020	63.00	6600.69	7/22/2020	60.80	6528.52
						7/15/2020	75.50	6588.19	11/11/2020	66.55	6522.77
<b>0859</b>			<b>CE7</b>			8/14/2020	75.31	6588.38			
11/11/2020	58.00	6494.76	11/11/2020	44.19	6531.80	11/11/2020	75.11	6588.58	<b>CW18</b>		
									7/14/2020	53.55	6519.10
<b>0908</b>			<b>CE8</b>			<b>CF5</b>			11/11/2020	55.27	6517.38
11/11/2020	123.98	6420.39	6/25/2020	45.85	6523.85	11/29/2020	138.20	6533.26	<b>CW24</b>		
			11/11/2020	47.64	6522.06				11/11/2020	51.90	6536.77
<b>0927</b>			<b>CE9</b>			<b>CF6</b>			<b>CW28</b>		
11/11/2020	99.10	6495.90	6/18/2020	35.57	6527.55	11/29/2020	107.00	6560.43	3/18/2020	69.50	6502.18
11/11/2020	99.10	6495.90	7/14/2020	38.05	6525.07				7/22/2020	69.90	6501.78
<b>0929</b>			8/19/2020	39.80	6523.32	<b>CF7A</b>			11/11/2020	70.27	6501.41
11/11/2020	74.10	6518.47	11/11/2020	39.86	6523.26	11/11/2020	136.26	6531.85	<b>CW29</b>		
									8/11/2020	78.20	6474.02
<b>0930</b>			<b>CE10</b>			<b>CW1</b>			11/11/2020	77.90	6474.32
11/11/2020	103.40	6495.14	11/11/2020	51.75	6519.11	3/11/2020	83.60	6501.62			
						3/16/2020	125.60	6459.62			
						11/11/2020	85.85	6499.37			

\* Drawdown Tube Pressure, # Transducer Reading

0493 - CW29

**TABLE A.3-1 WATER LEVELS FOR CHINLE AQUIFERS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

3/1/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>CW31</b>			<b>CW50</b>			<b>CW74</b>			<b>R74</b>		
11/11/2020	86.50	6473.76	3/11/2020	48.55	6540.01	11/11/2020	55.00	6498.41	11/20/2020	71.33	6472.70
<b>CW32</b>			11/11/2020	49.15	6539.41	<b>CW75</b>			<b>T25</b>		
7/23/2020	149.40	6417.88	<b>CW52</b>			11/11/2020	55.40	6498.18	1/14/2020	122.80	6534.54
11/11/2020	147.40	6419.88	11/11/2020	38.60	6553.80	<b>CW76</b>			<b>T27</b>		
<b>CW33</b>			<b>CW53</b>			8/5/2020	56.35	6500.26	1/15/2020	121.80	6535.34
11/11/2020	106.40	6468.49	11/11/2020	48.96	6515.98	11/11/2020	56.20	6500.41	<b>T28</b>		
<b>CW34</b>			<b>CW54</b>			<b>CW78</b>			1/15/2020	121.75	6536.96
11/11/2020	53.55	6540.85	11/11/2020	33.70	6524.85	11/11/2020	48.82	6518.33	<b>T30</b>		
<b>CW35</b>			<b>CW55</b>			<b>Q48</b>			1/16/2020	123.00	6536.62
3/17/2020	52.20	6538.97	8/5/2020	53.55	6510.61	11/25/2020	51.22	6516.62	<b>V1</b>		
11/11/2020	52.80	6538.37	11/11/2020	52.83	6511.33	<b>R1</b>			11/11/2020	77.20	6474.91
<b>CW36</b>			<b>CW57</b>			10/28/2020	51.66	6503.46	<b>V2</b>		
11/11/2020	42.60	6508.49	11/11/2020	50.30	6534.60	11/20/2020	50.78	6504.34	11/11/2020	75.30	6474.79
<b>CW37</b>			<b>CW58</b>			<b>R2</b>			<b>V6</b>		
11/11/2020	62.85	6488.32	11/11/2020	61.72	6499.08	10/28/2020	67.39	6486.77	8/10/2020	75.30	6472.13
<b>CW40</b>			<b>CW60</b>			<b>R3</b>			11/11/2020	75.00	6472.43
11/11/2020	61.60	6517.34	11/11/2020	47.95	6536.25	5/12/2020	51.29	6504.44	<b>V7</b>		
<b>CW41</b>			<b>CW61</b>			10/28/2020	62.64	6493.09	11/11/2020	79.15	6476.08
8/3/2020	79.40	6476.01	11/11/2020	62.23	6520.60	<b>R4</b>			<b>V8</b>		
11/11/2020	78.60	6476.81	<b>CW62</b>			10/28/2020	54.04	6504.74	11/11/2020	74.30	6477.19
<b>CW42</b>			7/16/2020	54.50	6525.36	<b>R5</b>			<b>V9</b>		
7/30/2020	70.30	6478.48	<b>CW72</b>			10/12/2020	97.90	6459.85	11/11/2020	79.10	6476.59
11/11/2020	69.60	6479.18	11/11/2020	83.76	6496.37	10/29/2020	54.43	6503.32	<b>V11</b>		
<b>CW43</b>			<b>CW73</b>			<b>R49</b>			11/11/2020	78.90	6477.00
8/4/2020	67.35	6481.44	11/11/2020	51.05	6512.40	11/20/2020	71.33	6474.66	<b>V14</b>		
11/11/2020	67.90	6480.89	<b>CW74</b>			11/20/2020	69.74	6475.79	11/11/2020	79.90	6475.79
<b>CW45</b>			<b>CW75</b>			<b>R67</b>					
3/3/2020	52.70	6508.61	<b>CW76</b>								
11/11/2020	53.36	6507.95	<b>CW77</b>								

\* Drawdown Tube Pressure, # Transducer Reading

**CW31 - V14**

**TABLE A.3-1 WATER LEVELS FOR CHINLE AQUIFERS (cont.)**

WATER LEVEL ELEVATION (FT-MSL)

3/1/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>V16</b>			<b>Y17</b>								
11/11/2020	74.90	6477.08	11/11/2020	59.95	6504.68						
<b>V17</b>			<b>Y25</b>								
11/11/2020	75.20	6474.95	11/11/2020	59.92	6502.75						
<b>V18</b>			<b>Y30</b>								
11/11/2020	75.45	6475.93	11/11/2020	58.39	6501.66						
<b>WCW</b>											
11/11/2020	46.20	6521.17									
<b>WR25</b>											
11/11/2020	55.82	6530.64									
<b>Y1</b>											
11/11/2020	59.21	6502.23									
<b>Y2</b>											
11/11/2020	59.80	6501.81									
<b>Y3</b>											
11/11/2020	62.46	6500.92									
11/11/2020	62.46	6500.92									
<b>Y7</b>											
8/19/2020	58.00	6502.43									
<b>Y8</b>											
11/11/2020	59.49	6501.98									
<b>Y10</b>											
11/11/2020	65.04	6501.14									
<b>Y13</b>											
11/11/2020	59.17	6501.67									
<b>Y14</b>											
11/11/2020	52.53	6508.49									

\* Drawdown Tube Pressure, # Transducer Reading

V16 - Y30

**TABLE A.4-1 WATER LEVELS FOR THE SAN ANDRES AQUIFER**

WATER LEVEL ELEVATION (FT-MSL)

3/1/2021

Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)	Date	Water Level (ft-MP)	Water Level Elevation (ft+MSL)
<b>#1R Deepwell</b>											
2/26/2020	172.50	6416.89									
11/11/2020	172.68	6416.71									
<b>#2 DEEPWELL</b>											
10/7/2020	197.20	6378.46									
<b>0943M</b>											
2/3/2020	138.10	6418.00									
9/9/2020	140.10	6416.00									
11/11/2020	138.75	6417.35									
11/17/2020	138.46	6417.64									
<b>0951</b>											
11/11/2020	68.70	6505.00									
<b>0951R</b>											
2/10/2020	155.80	6420.98									
5/6/2020	156.21	6420.57									
8/10/2020	159.20	6417.58									
11/10/2020	156.03	6420.75									
11/11/2020	156.02	6420.76									
<b>0955</b>											
8/4/2020	130.00	6420.00									
<b>0991</b>											
9/14/2020	134.40	6516.60									



**APPENDIX B**  
**WATER QUALITY**

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**MONITORING/PERFORMANCE REVIEW  
FOR HOMESTAKE’S GRANTS PROJECT**

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**TABLE B.1-1 WATER QUALITY ANALYSES FOR THE TAILINGS WELLS**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
ES4	10/15/2020	PACE	---	---	---	---	---	---	300	2180	5740	7926	---	9.76
WME-2	2/20/2020	ENER	---	---	---	---	---	---	---	---	---	4330	---	9.84
WME-3	2/20/2020	ENER	1	0.2	6.0	1350	646	474	154	1270	---	4277	1.03	10.63
WME-4	2/20/2020	ENER	5	0.5	32.0	10700	3870	5200	573	9850	---	27600	1.02	10.83
WME-5	2/20/2020	ENER	2	0.3	29.0	3360	849	1880	264	3060	---	10601	1.00	11.17
WME-6	2/20/2020	ENER	2	0.9	13.0	3060	1280	1470	355	2670	---	10940	0.99	10.84

**TABLE B.1-2 WATER QUALITY ANALYSES FOR THE TAILINGS WELLS**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
ES4	10/15/2020	PACE	7.370	---	18.600	0.070	---	---	---	---	---	---	---	---
WME-3	2/20/2020	ENER	1.960	---	3.690	0.023	0.2	---	---	---	---	0.05	---	---
WME-4	2/20/2020	ENER	41.300	---	146.000	0.240	0.4	---	---	---	---	< 0.01	---	---
WME-5	2/20/2020	ENER	14.200	---	51.700	0.073	1.7	---	---	---	---	0.08	---	---
WME-6	2/20/2020	ENER	6.660	---	19.900	0.044	0.1	---	---	---	---	0.01	---	---

**TABLE B.2-1 WATER QUALITY ANALYSES FOR THE TOE DRAIN SUMPS**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
East 1 Sump	2/19/2020	ENER	---	---	---	---	---	---	802	---	---	14809	---	10.30
East 2 Sump	2/19/2020	ENER	---	---	---	---	---	---	680	---	---	12769	---	10.26
North 1 Sump	2/18/2020	ENER	---	---	---	---	---	---	620	---	---	11682	---	10.12
North 3 Sump	2/19/2020	ENER	---	---	---	---	---	---	544	---	---	8146	---	9.13
South 1 Sump	2/19/2020	ENER	---	---	---	---	---	---	396	---	---	6044	---	8.91
West 1 Sump	2/19/2020	ENER	---	---	---	---	---	---	528	---	---	10465	---	10.33

**TABLE B.2-2 WATER QUALITY ANALYSES FOR THE TOE DRAIN SUMPS**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
East 1 Sump	2/19/2020	ENER	20.500	---	46.900	0.332	---	---	---	---	---	---	---	---
East 2 Sump	2/19/2020	ENER	14.100	---	36.500	0.596	---	---	---	---	---	---	---	---
North 1 Sump	2/18/2020	ENER	16.200	---	36.400	0.365	---	---	---	---	---	---	---	---
North 3 Sump	2/19/2020	ENER	6.660	---	18.300	0.058	---	---	---	---	---	---	---	---
South 1 Sump	2/19/2020	ENER	8.660	---	12.200	0.023	---	---	---	---	---	---	---	---
West 1 Sump	2/19/2020	ENER	14.300	---	32.000	0.275	---	---	---	---	---	---	---	---

**TABLE B.3-1 WATER QUALITY ANALYSES FOR THE LINED PONDS**

Ca THROUGH pH														
Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
E Coll Pond	2/12/2020	ENER	---	---	---	---	---	---	347	2940	5540	7465	---	8.37
	5/11/2020	PACE	---	---	---	---	---	---	383	3230	5450	7480	---	8.64
	7/29/2020	PACE	22	78.0	13.0	1710	312	32	381	2930	5760	7810	1.06	8.80
	10/7/2020	PACE	---	---	---	---	---	---	550	4160	8660	11150	---	9.39
Evap Pond 1	2/12/2020	ENER	---	---	---	---	---	---	2500	22200	39800	39210	---	9.25
	5/11/2020	PACE	---	---	---	---	---	---	4930	35600	55800	59230	---	9.36
	7/29/2020	PACE	39	627.0	117.0	19500	1340	626	3680	35500	48800	45860	1.02	9.24
	10/7/2020	PACE	---	---	---	---	---	---	5560	57600	88700	70980	---	9.40
Evap Pond 2	2/12/2020	ENER	---	---	---	---	---	---	1260	10400	18900	19880	---	9.36
	5/11/2020	PACE	---	---	---	---	---	---	1680	14100	22600	25620	---	9.28
	7/29/2020	PACE	65	391.0	57.0	10200	856	251	1830	15500	26400	28080	1.21	9.10
	7/29/2020	PACE	# 62	# 377.0	# 50.0	# 9760	# 982	# 265	# 1810	# 15400	# 26300	---	# 1.16	# 9.10
	10/7/2020	PACE	---	---	---	---	---	---	1490	12300	20400	22180	---	9.40
EVAP POND 3A	2/12/2020	ENER	---	---	---	---	---	---	14900	22700	68900	67510	---	9.52
	5/11/2020	PACE	---	---	---	---	---	---	18200	18300	66600	84330	---	9.39
	7/29/2020	PACE	9	815.0	615.0	48800	< 5	< 5	25100	38600	117000	102900	1.46	9.21
	10/7/2020	PACE	---	---	---	---	---	---	41300	26500	132000	121800	---	8.89
EVAP POND 3B	2/12/2020	ENER	---	---	---	---	---	---	15500	24100	69600	98290	---	9.56
	5/11/2020	PACE	---	---	---	---	---	---	17300	22400	76400	82530	---	9.40
	7/29/2020	PACE	9	818.0	564.0	49200	< 5	< 5	20300	57700	125000	97730	1.25	9.22
	10/7/2020	PACE	---	---	---	---	---	---	27200	25200	112000	114200	---	9.19
W Coll Pond	10/7/2020	PACE	---	---	---	---	---	---	313	2480	4780	6172	---	8.64

# Signifies Quality Control Sample

**TABLE B.3-2 WATER QUALITY ANALYSES FOR THE LINED PONDS**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
E Coll Pond	2/12/2020	ENER	6.630	---	15.500	0.480	---	---	---	---	---	---	---	---
	5/11/2020	PACE	5.780	---	15.300	0.459	---	---	---	---	---	---	---	---
	7/29/2020	PACE	6.240	---	18.900	0.489	4.9	0.9	0.100	< 1.00	---	< 0.01	< 0.30	---
	10/7/2020	PACE	12.200	---	24.000	0.645	---	---	---	---	---	---	---	---
Evap Pond 1	2/12/2020	ENER	44.300	---	57.300	0.593	---	---	---	---	---	---	---	---
	5/11/2020	PACE	76.700	---	114.000	0.488	---	---	---	---	---	---	---	---
	7/29/2020	PACE	54.300	---	109.000	0.768	< 0.1	3.9	0.500	< 1.00	---	< 0.01	1.60	0.90
	10/7/2020	PACE	93.200	---	106.000	< 0.025	---	---	---	---	---	---	---	---
Evap Pond 2	2/12/2020	ENER	20.500	---	43.200	0.717	---	---	---	---	---	---	---	---
	5/11/2020	PACE	24.400	---	51.300	0.657	---	---	---	---	---	---	---	---
	7/29/2020	PACE	26.700	---	76.300	0.633	< 0.1	2.7	0.300	< 1.00	---	< 0.01	1.20	0.70
	7/29/2020	PACE	# 26.400	---	# 70.800	# 0.619	# < 0.1	# 2.4	# 0.200	# 4.60	# 4.90	# 0.02	# 1.10	# 0.70
	10/7/2020	PACE	20.900	---	48.700	0.757	---	---	---	---	---	---	---	---
EVAP POND 3A	2/12/2020	ENER	184.000	---	286.000	0.680	---	---	---	---	---	---	---	---
	5/11/2020	PACE	210.000	---	464.000	0.743	---	---	---	---	---	---	---	---
	7/29/2020	PACE	269.000	---	471.000	1.120	< 0.1	2.3	0.200	< 1.00	---	0.09	40.30	9.60
	10/7/2020	PACE	489.000	---	850.000	1.110	---	---	---	---	---	---	---	---
EVAP POND 3B	2/12/2020	ENER	186.000	---	378.000	0.680	---	---	---	---	---	---	---	---
	5/11/2020	PACE	207.000	---	428.000	0.735	---	---	---	---	---	---	---	---
	7/29/2020	PACE	304.000	---	581.000	1.170	< 0.1	4.7	0.300	< 1.00	---	0.08	63.90	8.10
	10/7/2020	PACE	405.000	---	594.000	1.490	---	---	---	---	---	---	---	---
W Coll Pond	10/7/2020	PACE	4.900	---	10.900	0.506	---	---	---	---	---	---	---	---



**TABLE B.4-1 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS**

Ca THROUGH Ph(f)

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
1A	4/9/2020	ENER	138	41.7	6.0	573	480	< 5	276	1010	2410	3451	0.96	7.24
1K	4/9/2020	ENER	88	18.0	2.4	264	336	< 5	109	419	1160	1718	1.00	7.16
B11	3/2/2020	ENER	263	57.6	8.8	908	561	< 5	352	2000	4090	5531	0.95	7.19
B12	3/8/2020	ENER	---	---	---	---	---	---	225	880	2120	2875	---	7.07
B13	3/8/2020	ENER	---	---	---	---	---	---	100	364	1060	1576	---	7.28
B16	12/22/2020	PACE	---	---	---	---	---	---	380	2930	5990	7594	---	7.49
B32	12/22/2020	PACE	---	---	---	---	---	---	155	721	1850	2529	---	7.49
B42	12/22/2020	PACE	---	---	---	---	---	---	644	5310	10100	12000	---	7.31
C2	3/26/2020	ENER	---	---	---	---	---	---	113	444	1200	1807	---	7.41
C6	3/26/2020	ENER	---	---	---	---	---	---	136	876	1970	2733	---	7.35
C8	3/26/2020	ENER	---	---	---	---	---	---	190	778	1980	2823	---	7.55
C9	3/26/2020	ENER	---	---	---	---	---	---	180	713	1760	2661	---	7.57
D1	7/22/2020	PACE	202	46.0	6.0	354	450	< 5	144	773	1920	2531	1.06	7.06
DD	2/12/2020	ENER	---	---	---	---	---	---	74	2030	3530	3957	---	7.01
	5/7/2020	PACE	460	111.0	10.0	381	353	< 5	73	2010	3490	3914	0.98	6.99
	8/18/2020	PACE	---	---	---	---	---	---	71	1840	3480	3795	---	7.01
	10/12/2020	PACE	---	---	---	---	---	---	71	1850	3420	3794	---	7.00
DD2	2/12/2020	ENER	---	---	---	---	---	---	59	1520	2780	3183	---	6.90
	5/7/2020	PACE	334	85.0	8.0	303	356	< 5	60	1540	2660	3167	0.93	7.04
	8/19/2020	PACE	---	---	---	---	---	---	59	1570	2680	3123	---	6.90
	10/7/2020	PACE	---	---	---	---	---	---	56	1530	2700	3124	---	6.94
F	9/16/2020	PACE	219	56.0	6.0	283	475	< 5	185	683	1780	2520	1.02	7.06
FB	9/23/2020	PACE	235	60.0	7.0	289	415	< 5	196	685	1820	2481	1.10	6.97
GH	9/15/2020	PACE	194	50.0	5.0	273	489	< 5	162	631	1630	2319	1.00	6.95

**TABLE B.4-1 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Ca THROUGH Ph(f)

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
GN	3/2/2020	ENER	165	52.5	8.5	237	375	< 5	159	577	1460	2113	1.01	7.04
K4	3/9/2020	ENER	---	---	---	---	---	---	68	336	997	1477	---	7.55
K5	3/5/2020	ENER	---	---	---	---	---	---	115	634	1610	4273	---	7.14
K7	3/10/2020	ENER	---	---	---	---	---	---	104	450	1230	1783	---	7.27
K9	2/27/2020	ENER	123	31.3	3.6	396	475	< 5	116	611	1610	2352	1.09	7.27
K11	3/8/2020	ENER	---	---	---	---	---	---	114	515	1390	2073	---	7.13
KEB	3/8/2020	ENER	---	---	---	---	---	---	59	244	714	1101	---	7.42
KF	3/10/2020	ENER	---	---	---	---	---	---	52	225	647	1010	---	7.52
L	4/9/2020	ENER	142	34.1	4.1	248	379	< 5	147	496	1370	1971	1.00	7.11
L5	4/9/2020	ENER	81	18.6	3.5	258	368	< 5	128	352	1080	1690	0.98	7.26
	4/9/2020	ENER	# 81	# 19.4	# 3.3	# 256	# 370	# < 5	# 128	# 353	# 1090	---	# 0.98	---
L6	10/14/2020	PACE	---	---	---	---	---	---	192	440	1330	1978	---	7.40
L7	10/14/2020	PACE	---	---	---	---	---	---	110	308	990	1487	---	7.44
M3	4/29/2020	PACE	385	112.0	11.0	2110	1610	< 5	415	3800	8420	9526	1.03	7.03
M6	3/8/2020	ENER	---	---	---	---	---	---	183	1030	2240	3018	---	7.01
M9	3/8/2020	ENER	---	---	---	---	---	---	168	1110	2350	3123	---	7.01
	10/19/2020	PACE	---	---	---	---	---	---	162	1050	2290	3022	---	7.24
M10	3/10/2020	ENER	---	---	---	---	---	---	224	1470	2920	3545	---	7.02
MB	3/3/2020	ENER	229	60.4	8.2	256	524	< 5	180	678	1770	2487	0.99	6.91
ML	3/10/2020	ENER	---	---	---	---	---	---	231	1930	3710	4298	---	6.99
MQ	3/3/2020	ENER	306	68.1	6.4	307	449	< 5	189	1110	2350	3040	0.96	7.18
MU	10/15/2020	PACE	---	---	---	---	---	---	217	1610	3150	3714	---	7.13
MX	8/19/2020	PACE	189	51.0	10.0	254	500	< 5	158	559	1540	2183	1.02	6.95

# Signifies Quality Control Sample

**TABLE B.4-1 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Ca THROUGH Ph(f)

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
MY	10/14/2020	PACE	---	---	---	---	---	---	141	496	1350	2008	---	7.21
MZ	3/11/2020	ENER	---	---	---	---	---	---	247	1480	2920	3537	---	6.96
NC	4/9/2020	ENER	173	30.3	3.2	228	181	< 5	52	794	1480	1973	1.00	7.38
P	11/17/2020	PACE	234	46.0	7.0	274	251	< 5	47	1010	1860	2335	1.03	7.61
P2	3/16/2020	ENER	---	---	---	---	---	---	63	1330	2340	2796	---	7.30
P3	3/11/2020	ENER	---	---	---	---	---	---	72	1380	2420	2885	---	7.40
P4	3/16/2020	ENER	---	---	---	---	---	---	45	881	1620	2098	---	7.52
Q	5/13/2020	PACE	429	78.0	12.0	321	230	< 5	66	1630	2670	3167	1.06	7.31
R	3/17/2020	ENER	---	---	---	---	---	---	57	1410	2370	2873	---	7.50
S4	9/15/2020	PACE	344	86.0	6.0	347	404	< 5	252	1250	2630	3321	0.99	6.89
S11	1/29/2020	ENER	---	---	---	---	---	---	150	546	1430	2066	---	7.15
SE6	1/29/2020	ENER	---	---	---	---	---	---	156	684	1800	2473	---	6.95
SSR	1/29/2020	ENER	---	---	---	---	---	---	939	7070	13900	16240	---	7.68
	3/17/2020	ENER	---	---	---	---	---	---	959	7240	14600	16840	---	7.60
ST	2/27/2020	ENER	---	---	---	---	---	---	607	4430	8900	11000	---	7.53
	3/18/2020	ENER	---	---	---	---	---	---	621	4280	9140	11130	---	7.56
SZ	2/27/2020	ENER	---	---	---	---	---	---	1430	11600	24600	26440	---	8.30
T2	6/24/2020	PACE	75	64.0	5.0	3110	1880	11	503	3720	8700	11160	1.18	8.00
T7	3/25/2020	ENER	---	---	---	---	---	---	548	5200	10300	12720	---	7.17
T8	3/25/2020	ENER	---	---	---	---	---	---	786	6360	14400	17370	---	9.37
T9	3/26/2020	ENER	---	---	---	---	---	---	446	3960	11400	14610	---	9.93
T10	3/25/2020	ENER	---	---	---	---	---	---	1200	8740	25400	28220	---	9.80
T12	3/25/2020	ENER	---	---	---	---	---	---	427	2880	7060	9472	---	8.99

**TABLE B.4-1 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Ca THROUGH Ph(f)

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
T15	3/25/2020	ENER	---	---	---	---	---	---	649	5270	11200	13320	---	7.29
T19	6/24/2020	PACE	246	100.0	6.0	3300	2160	< 5	561	4110	9440	11320	1.20	7.31
T22	3/17/2020	ENER	---	---	---	---	---	---	591	5640	10900	13080	---	7.23
T23	6/25/2020	PACE	102	175.0	14.0	6970	3670	< 5	1470	10800	18600	24850	0.99	7.37
T24	1/14/2020	ENER	---	---	---	---	---	---	445	3890	7630	9189	---	7.06
T25	1/14/2020	ENER	---	---	---	---	---	---	304	2460	4660	6120	---	7.06
T26	1/15/2020	ENER	---	---	---	---	---	---	469	4340	8320	10130	---	7.01
T27	1/15/2020	ENER	---	---	---	---	---	---	470	3890	7080	8593	---	6.91
T28	1/15/2020	ENER	---	---	---	---	---	---	517	4290	8220	9836	---	6.81
T29	1/15/2020	ENER	---	---	---	---	---	---	858	6570	13800	16890	---	8.77
	1/15/2020	ENER	---	---	---	---	---	---	# 830	# 6460	# 13700	---	---	---
T30	1/16/2020	ENER	---	---	---	---	---	---	492	3540	6690	8157	---	6.85
T31	1/15/2020	ENER	---	---	---	---	---	---	544	4510	8670	9872	---	7.06
T33	1/28/2020	ENER	---	---	---	---	---	---	624	4980	11200	13930	---	8.81
T36	1/28/2020	ENER	---	---	---	---	---	---	300	2490	5020	6452	---	7.41
T41	6/24/2020	PACE	< 2	< 2.0	11.0	3100	840	1180	356	2510	7680	10350	1.17	10.05
T43	1/28/2020	ENER	---	---	---	---	---	---	535	4730	9970	12460	---	9.01
T47	1/29/2020	ENER	---	---	---	---	---	---	487	3870	8940	11550	---	9.40
T48	1/28/2020	ENER	---	---	---	---	---	---	492	3830	8380	10960	---	9.03
T53	1/28/2020	ENER	---	---	---	---	---	---	167	1890	3820	4710	---	8.09
T54	1/28/2020	ENER	---	---	---	---	---	---	289	2740	6010	8196	---	9.42
	2/13/2020	ENER	10	10.0	5.3	2030	924	338	284	2690	6130	8273	0.99	9.48
	6/24/2020	PACE	7	9.0	4.0	2240	926	338	280	2440	5840	8138	1.16	9.51

# Signifies Quality Control Sample

**TABLE B.4-1 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Ca THROUGH Ph(f)

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
X	2/18/2020	ENER	---	---	---	---	---	---	76	331	907	1350	---	7.40
	4/9/2020	ENER	---	---	---	---	---	---	63	283	815	1231	---	7.11
	7/20/2020	PACE	106	22.0	5.0	126	311	< 5	83	246	780	1196	1.00	7.27
	7/20/2020	PACE	# 105	# 22.0	# 5.0	# 126	# 289	# < 5	# 82	# 242	# 780	---	# 1.03	# 7.27
	10/12/2020	PACE	---	---	---	---	---	---	108	317	960	1473	---	7.13

# Signifies Quality Control Sample

**TABLE B.4-2 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
1A	4/9/2020	ENER	3.500	---	1.640	0.556	6.2	0.3	0.100	0.90	0.90	< 0.01	0.20	0.10
1K	4/9/2020	ENER	0.604	---	0.386	0.026	2.5	0.2	0.100	0.40	0.90	< 0.01	0.05	0.07
B11	3/2/2020	ENER	5.400	---	4.930	2.900	22.4	0.5	0.200	0.40	0.80	< 0.01	0.20	0.40
B12	3/8/2020	ENER	0.697	---	0.209	0.070	---	---	---	---	---	---	---	---
B13	3/8/2020	ENER	0.529	---	0.276	0.012	---	---	---	---	---	---	---	---
B16	12/22/2020	PACE	9.270	---	14.800	0.335	---	---	---	---	---	---	---	---
B32	12/22/2020	PACE	1.130	---	1.220	0.064	---	---	---	---	---	---	---	---
B42	12/22/2020	PACE	24.700	---	38.300	0.953	---	---	---	---	---	---	---	---
C2	3/26/2020	ENER	0.359	---	0.192	0.022	---	---	---	---	---	---	---	---
C6	3/26/2020	ENER	2.680	---	6.540	0.769	---	---	---	---	---	---	---	---
C8	3/26/2020	ENER	4.360	---	5.970	0.811	---	---	---	---	---	---	---	---
C9	3/26/2020	ENER	3.660	---	5.530	0.386	---	---	---	---	---	---	---	---
D1	7/22/2020	PACE	1.500	---	1.760	0.064	1.5	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
DD	2/12/2020	ENER	0.116	---	0.002	0.066	---	---	---	---	---	---	---	---
	5/7/2020	PACE	0.101	---	< 0.030	0.050	8.7	< 3.0	---	3.80	2.60	< 0.02	< 3.00	---
	8/18/2020	PACE	0.106	---	< 0.010	0.060	---	---	---	---	---	---	---	---
	10/12/2020	PACE	0.111	---	< 0.010	0.064	---	---	---	---	---	---	---	---
DD2	2/12/2020	ENER	0.237	---	< 0.001	< 0.001	---	---	---	---	---	---	---	---
	5/7/2020	PACE	0.189	---	< 0.030	< 0.005	< 0.1	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
	8/19/2020	PACE	0.213	---	< 0.010	< 0.005	---	---	---	---	---	---	---	---
	10/7/2020	PACE	0.233	---	< 0.010	< 0.005	---	---	---	---	---	---	---	---
F	9/16/2020	PACE	0.041	---	< 0.010	0.031	2.6	< 0.2	---	1.30	1.70	< 0.01	< 0.30	---
FB	9/23/2020	PACE	0.060	---	< 0.010	0.042	2.0	0.2	0.100	1.30	1.90	< 0.01	< 0.30	---
GH	9/15/2020	PACE	0.057	---	< 0.010	0.019	4.4	< 0.2	---	1.50	1.80	< 0.01	< 0.30	---

**TABLE B.4-2 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
GN	3/2/2020	ENER	0.040	---	0.001	0.035	2.0	0.6	0.300	0.40	0.80	< 0.01	0.06	0.05
K4	3/9/2020	ENER	0.832	---	1.980	0.426	---	---	---	---	---	---	---	---
K5	3/5/2020	ENER	1.770	---	4.910	0.809	---	---	---	---	---	---	---	---
K7	3/10/2020	ENER	0.224	---	0.377	0.327	---	---	---	---	---	---	---	---
K9	2/27/2020	ENER	1.850	---	4.650	0.746	1.6	0.1	0.100	0.70	1.10	0.04	0.05	0.05
K11	3/8/2020	ENER	0.947	---	2.250	0.414	---	---	---	---	---	---	---	---
KEB	3/8/2020	ENER	0.054	---	0.206	0.010	---	---	---	---	---	---	---	---
KF	3/10/2020	ENER	0.035	---	0.193	0.006	---	---	---	---	---	---	---	---
L	4/9/2020	ENER	0.332	---	0.420	0.109	1.7	0.2	0.100	1.20	0.70	< 0.01	0.08	0.07
L5	4/9/2020	ENER	0.435	---	0.729	0.132	1.4	0.1	0.100	1.10	0.80	< 0.01	0.30	0.08
	4/9/2020	ENER	# 0.435	---	# 0.698	# 0.131	# 1.4	# 0.2	# 0.100	# 1.50	# 0.80	# < 0.01	# 0.10	# 0.06
L6	10/14/2020	PACE	0.258	---	0.400	0.194	---	---	---	---	---	---	---	---
L7	10/14/2020	PACE	0.145	---	0.150	0.073	---	---	---	---	---	---	---	---
M3	4/29/2020	PACE	15.100	---	22.200	0.556	2.4	< 3.0	---	< 3.00	---	< 0.01	< 3.00	---
M6	3/8/2020	ENER	2.120	---	2.370	0.149	---	---	---	---	---	---	---	---
M9	3/8/2020	ENER	2.470	---	2.400	0.140	---	---	---	---	---	---	---	---
	10/19/2020	PACE	2.290	---	2.380	0.117	---	---	---	---	---	---	---	---
M10	3/10/2020	ENER	0.149	---	0.013	0.039	---	---	---	---	---	---	---	---
MB	3/3/2020	ENER	0.034	---	< 0.001	0.014	2.0	0.3	0.100	0.50	0.90	< 0.01	0.60	0.20
ML	3/10/2020	ENER	0.104	---	0.002	0.024	---	---	---	---	---	---	---	---
MQ	3/3/2020	ENER	0.814	---	0.565	0.087	3.7	0.4	0.200	0.60	0.90	< 0.01	0.10	0.10
MU	10/15/2020	PACE	0.110	---	< 0.010	0.006	---	---	---	---	---	---	---	---
MX	8/19/2020	PACE	0.030	---	< 0.010	0.012	1.2	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---

**TABLE B.4-2 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
MY	10/14/2020	PACE	0.030	---	< 0.010	0.008	---	---	---	---	---	---	---	---
MZ	3/11/2020	ENER	0.110	---	0.008	0.046	---	---	---	---	---	---	---	---
NC	4/9/2020	ENER	0.019	---	0.005	0.137	5.4	0.2	0.100	1.30	0.80	< 0.01	0.07	0.05
P	11/17/2020	PACE	0.032	---	< 0.010	0.137	5.2	0.5	0.100	1.30	1.70	< 0.01	< 0.30	---
P2	3/16/2020	ENER	0.028	---	0.001	0.348	---	---	---	---	---	---	---	---
P3	3/11/2020	ENER	0.024	---	0.001	0.444	---	---	---	---	---	---	---	---
P4	3/16/2020	ENER	0.019	---	0.002	0.177	---	---	---	---	---	---	---	---
Q	5/13/2020	PACE	0.046	---	< 0.030	0.367	12.4	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
R	3/17/2020	ENER	0.022	---	0.002	0.665	---	---	---	---	---	---	---	---
S4	9/15/2020	PACE	0.331	---	0.410	< 0.005	< 0.1	0.2	0.100	2.00	2.00	< 0.01	< 0.30	---
S11	1/29/2020	ENER	0.113	---	0.154	0.013	---	---	---	---	---	---	---	---
SE6	1/29/2020	ENER	0.775	---	1.250	0.083	---	---	---	---	---	---	---	---
SSR	1/29/2020	ENER	23.500	---	37.900	1.830	---	---	---	---	---	---	---	---
	3/17/2020	ENER	23.500	---	35.400	1.480	---	---	---	---	---	---	---	---
ST	2/27/2020	ENER	15.300	---	27.800	0.918	---	---	---	---	---	---	---	---
	3/18/2020	ENER	15.400	---	27.600	0.982	---	---	---	---	---	---	---	---
SZ	2/27/2020	ENER	49.700	---	79.000	4.240	---	---	---	---	---	---	---	---
T2	6/24/2020	PACE	12.300	---	27.700	0.260	1.4	0.7	0.100	1.80	3.30	0.02	< 0.30	---
T7	3/25/2020	ENER	22.600	---	35.800	0.926	---	---	---	---	---	---	---	---
T8	3/25/2020	ENER	32.800	---	43.700	4.040	---	---	---	---	---	---	---	---
T9	3/26/2020	ENER	22.600	---	45.200	0.047	---	---	---	---	---	---	---	---
T10	3/25/2020	ENER	41.000	---	79.600	0.070	---	---	---	---	---	---	---	---
T12	3/25/2020	ENER	5.460	---	13.000	0.113	---	---	---	---	---	---	---	---



**TABLE B.4-2 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
T15	3/25/2020	ENER	25.800	---	30.200	0.726	---	---	---	---	---	---	---	---
T19	6/24/2020	PACE	19.500	---	33.100	0.078	1.2	5.5	0.300	< 1.00	---	0.02	3.60	3.20
T22	3/17/2020	ENER	18.500	---	33.900	0.530	---	---	---	---	---	---	---	---
T23	6/25/2020	PACE	56.400	---	71.000	0.618	90.5	1.0	0.100	< 1.00	---	0.06	0.40	0.50
T24	1/14/2020	ENER	13.600	---	22.600	0.070	---	---	---	---	---	---	---	---
T25	1/14/2020	ENER	4.660	---	9.060	0.271	---	---	---	---	---	---	---	---
T26	1/15/2020	ENER	16.700	---	32.700	0.047	---	---	---	---	---	---	---	---
T27	1/15/2020	ENER	11.300	---	7.220	0.113	---	---	---	---	---	---	---	---
T28	1/15/2020	ENER	17.300	---	16.100	0.351	---	---	---	---	---	---	---	---
T29	1/15/2020	ENER	20.300	---	39.500	0.518	---	---	---	---	---	---	---	---
	1/15/2020	ENER	22.000	---	# 44.100	# 0.571	---	---	---	---	---	---	---	---
T30	1/16/2020	ENER	13.500	---	5.880	0.118	---	---	---	---	---	---	---	---
T31	1/15/2020	ENER	15.900	---	17.900	0.129	---	---	---	---	---	---	---	---
T33	1/28/2020	ENER	15.000	---	41.300	0.115	---	---	---	---	---	---	---	---
T36	1/28/2020	ENER	5.860	---	14.500	0.160	---	---	---	---	---	---	---	---
T41	6/24/2020	PACE	5.080	---	29.800	0.024	< 0.1	123.0	1.200	< 1.00	---	0.44	15.00	3.60
T43	1/28/2020	ENER	14.100	---	25.500	0.934	---	---	---	---	---	---	---	---
T47	1/29/2020	ENER	10.400	---	22.100	0.779	---	---	---	---	---	---	---	---
T48	1/28/2020	ENER	11.800	---	25.400	0.294	---	---	---	---	---	---	---	---
T53	1/28/2020	ENER	2.750	---	5.480	0.305	---	---	---	---	---	---	---	---
T54	1/28/2020	ENER	6.630	---	11.700	0.306	---	---	---	---	---	---	---	---
	2/13/2020	ENER	6.220	---	11.400	0.309	6.4	1.6	0.400	2.00	0.70	0.05	0.03	0.06
	6/24/2020	PACE	6.020	---	11.700	0.356	5.6	1.8	0.200	1.80	3.30	0.06	16.50	19.00

**TABLE B.4-2 WATER QUALITY ANALYSES FOR HOMESTAKE'S ALLUVIAL WELLS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
X	2/18/2020	ENER	0.044	---	0.112	0.015	---	---	---	---	---	---	---	---
	4/9/2020	ENER	0.045	---	0.128	0.017	---	---	---	---	---	---	---	---
	7/20/2020	PACE	0.034	---	0.120	0.011	0.9	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
	7/20/2020	PACE	# 0.034	---	# 0.130	# 0.010	# 1.0	# < 0.2	---	# < 1.00	---	# < 0.02	# < 0.30	---
	10/12/2020	PACE	0.046	---	0.120	0.013	---	---	---	---	---	---	---	---

**TABLE B.4-3 WATER QUALITY ANALYSES FOR THE SUBDIVISION ALLUVIAL WELLS**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
0423	8/3/2020	PACE	182	51.0	20.0	265	486	< 5	155	497	1450	3262	1.11	7.04
0490	11/17/2020	PACE	202	51.0	7.0	323	430	< 5	169	755	1850	2500	1.03	7.45
0497	5/19/2020	PACE	238	65.0	10.0	360	475	< 5	175	847	1960	2779	1.09	7.09
	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2707	---	---
0688	8/11/2020	PACE	256	55.0	8.0	309	540	< 5	179	610	1780	2453	1.16	7.00
0802	8/18/2020	PACE	167	44.0	6.0	234	390	< 5	118	470	1310	1874	1.13	7.12
0844	2/12/2020	ENER	287	101.0	4.1	523	457	< 5	314	1360	2980	3854	1.01	7.32
0845	2/25/2020	ENER	239	67.5	5.3	375	482	< 5	239	1010	2290	3082	0.95	7.06
Q2	9/21/2020	PACE	---	---	---	---	---	---	144	642	1620	2291	---	7.12
	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2193	---	---
	10/29/2020	PACE	---	---	---	---	---	---	---	---	---	2058	---	7.45
Q5	5/6/2020	PACE	198	52.0	9.0	334	468	< 5	154	711	1780	2503	1.07	7.24
	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2359	---	---
Q9	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2045	---	---
Q11	9/21/2020	PACE	---	---	---	---	---	---	158	721	1800	2491	---	7.11
	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2473	---	---
	10/29/2020	PACE	---	---	---	---	---	---	---	---	---	2468	---	7.32
Q19	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2749	---	---
Q27	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2070	---	---
Q28	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2090	---	---
Q30	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2212	---	---
SUB2	7/20/2020	PACE	175	47.0	6.0	254	429	< 5	156	496	1460	2049	1.09	7.01
SUB3	5/12/2020	PACE	128	56.0	10.0	437	131	< 5	183	999	1780	2563	1.07	7.06

**TABLE B.4-4 WATER QUALITY ANALYSES FOR THE SUBDIVISION ALLUVIAL WELLS**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
0423	8/3/2020	PACE	0.176	---	< 0.010	0.023	1.7	< 0.2	---	2.60	4.00	< 0.02	< 0.30	---
0490	11/17/2020	PACE	0.282	---	0.040	0.043	2.7	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
0497	5/19/2020	PACE	0.581	---	< 0.030	0.050	2.8	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
	10/8/2020	HMC	---	0.51	---	---	---	---	---	---	---	---	---	---
0688	8/11/2020	PACE	0.047	---	< 0.010	0.008	1.1	0.2	0.100	4.80	4.10	< 0.02	< 0.30	---
0802	8/18/2020	PACE	0.101	---	0.020	0.011	1.2	0.2	0.100	< 1.00	---	< 0.01	< 0.30	---
0844	2/12/2020	ENER	0.097	---	< 0.001	0.057	7.6	0.4	0.200	0.10	0.70	< 0.01	0.07	0.09
0845	2/25/2020	ENER	0.069	---	< 0.001	0.034	3.9	0.3	0.200	0.20	1.20	< 0.01	0.05	0.04
Q2	9/21/2020	PACE	0.346	---	< 0.010	0.033	---	---	---	---	---	---	---	---
	10/8/2020	HMC	---	0.26	---	---	---	---	---	---	---	---	---	---
Q5	5/6/2020	PACE	0.403	---	< 0.030	0.036	3.2	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
	10/8/2020	HMC	---	0.38	---	---	---	---	---	---	---	---	---	---
Q9	10/8/2020	HMC	---	0.16	---	---	---	---	---	---	---	---	---	---
Q11	9/21/2020	PACE	0.498	---	< 0.010	0.043	---	---	---	---	---	---	---	---
	10/8/2020	HMC	---	0.47	---	---	---	---	---	---	---	---	---	---
Q19	10/8/2020	HMC	---	0.44	---	---	---	---	---	---	---	---	---	---
Q27	10/8/2020	HMC	---	0.29	---	---	---	---	---	---	---	---	---	---
Q28	10/8/2020	HMC	---	0.50	---	---	---	---	---	---	---	---	---	---
Q29	10/8/2020	HMC	---	0.46	---	---	---	---	---	---	---	---	---	---
Q30	10/8/2020	HMC	---	0.42	---	---	---	---	---	---	---	---	---	---
SUB2	7/20/2020	PACE	0.024	---	< 0.010	0.019	3.9	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
SUB3	5/12/2020	PACE	0.003	---	< 0.030	< 0.005	0.2	< 3.0	---	4.50	2.90	< 0.02	< 3.00	---

**TABLE B.4-5 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
0520	3/18/2020	ENER	---	---	---	---	---	---	235	738	1880	2598	---	7.11
0521	3/18/2020	ENER	---	---	---	---	---	---	249	802	1840	2651	---	7.36
0522	3/18/2020	ENER	---	---	---	---	---	---	235	751	1890	2671	---	7.18
0538	3/4/2020	ENER	---	---	---	---	---	---	139	619	1500	2107	---	7.08
0540	5/6/2020	PACE	132	36.0	8.0	206	326	< 5	110	429	1140	1683	1.07	7.30
0541	1/13/2020	ENER	201	55.4	7.9	213	367	< 5	158	728	1670	2295	0.93	7.26
0551	1/8/2020	ENER	281	63.1	5.8	287	388	< 5	211	1020	2160	8220	0.94	7.23
0555	2/4/2020	ENER	329	82.6	5.7	579	416	< 5	344	1560	3290	4337	0.99	7.18
0556	2/4/2020	ENER	294	76.5	5.3	514	390	< 5	294	1450	3010	3979	0.96	7.11
0557	2/5/2020	ENER	230	60.8	4.4	468	416	< 5	213	1160	2490	3717	0.99	7.47
0631	5/6/2020	PACE	157	39.0	9.0	353	366	< 5	155	646	1600	2357	1.11	7.59
0632	3/4/2020	ENER	---	---	---	---	---	---	146	641	1560	2214	---	7.56
0638	3/18/2020	ENER	---	---	---	---	---	---	229	703	1790	2566	---	7.43
0639	3/8/2020	ENER	185	37.9	7.6	255	272	< 5	202	672	1650	2324	0.97	7.27
	7/15/2020	PACE	172	39.0	9.0	279	270	< 5	213	647	1610	2230	1.00	7.29
0644	5/5/2020	PACE	177	44.0	10.0	343	397	< 5	177	681	1740	2441	1.07	7.37
0646	3/12/2020	ENER	---	---	---	---	---	---	172	741	1760	2414	---	7.35
0647	1/8/2020	ENER	212	58.9	6.6	213	398	< 5	162	689	1630	2250	0.97	7.22
0649	1/8/2020	ENER	234	55.3	5.2	229	356	< 5	178	791	1790	2427	0.96	7.17
0654	1/9/2020	ENER	216	60.1	8.2	251	383	< 5	169	804	1780	2459	0.96	7.02
0659	3/2/2020	ENER	242	63.0	8.2	284	478	< 5	185	778	1870	2563	1.01	7.03
	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2483	---	---
0846	8/17/2020	PACE	303	82.0	9.0	674	379	< 5	212	1770	3540	4333	1.04	7.33

**TABLE B.4-5 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS (cont'd.)**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
0864	4/30/2020	PACE	147	41.0	9.0	285	329	< 5	135	591	1470	2095	1.08	7.43
0869	4/30/2020	PACE	158	41.0	9.0	336	366	< 5	143	623	1530	2234	1.13	7.48
0881	2/25/2020	ENER	248	60.5	8.6	261	475	< 5	192	811	1910	2632	0.96	7.12
0882	2/5/2020	ENER	221	54.2	6.6	270	482	< 5	178	730	1800	2475	0.97	7.27
0883	2/5/2020	ENER	256	51.0	5.6	309	523	< 5	203	735	1880	2628	1.03	7.09
0884	2/6/2020	ENER	100	28.5	5.2	299	304	< 5	106	613	1390	2052	0.98	7.46
0886	2/25/2020	ENER	291	71.0	8.3	289	448	< 5	185	1030	2220	2917	0.97	7.14
0888	2/6/2020	ENER	211	57.4	7.8	238	336	< 5	151	780	1740	2387	0.99	7.16
0890	10/20/2020	PACE	---	---	---	---	---	---	174	744	1840	2458	---	7.46
0893	2/10/2020	ENER	227	53.6	7.8	247	490	< 5	183	670	1730	2449	0.98	7.10
0899	1/9/2020	ENER	174	56.7	6.3	173	312	< 5	143	583	1370	1931	0.98	7.33
0921	2/10/2020	ENER	400	66.0	9.0	323	228	< 5	65	1670	2800	3312	0.98	7.16
	2/10/2020	ENER	# 393	# 66.8	# 8.6	# 356	# 230	# < 5	# 64	# 1660	# 2790	---	# 1.01	---
0994	10/6/2020	PACE	245	57.0	8.0	179	312	< 5	149	611	1500	2125	1.12	7.19
	10/6/2020	PACE	# 243	# 57.0	# 8.0	# 179	# 337	# < 5	# 150	# 612	# 1440	---	# 1.09	# 7.19
0996	1/9/2020	ENER	195	55.1	6.5	199	364	< 5	153	643	1550	2160	0.97	7.40
H2A	3/2/2020	ENER	231	61.1	7.9	246	447	< 5	177	770	1840	2517	0.96	7.20
H7	10/20/2020	PACE	---	---	---	---	---	---	160	861	1860	2510	---	7.38
H7B	10/20/2020	PACE	---	---	---	---	---	---	153	740	1710	2317	---	7.30
H16	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2768	---	---
	10/20/2020	PACE	---	---	---	---	---	---	171	944	2140	2771	---	7.63
H17	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2414	---	---
	10/20/2020	PACE	---	---	---	---	---	---	175	699	1790	2430	---	7.26
H24	1/28/2020	ENER	270	72.0	8.0	305	---	---	190	972	---	---	---	---

# Signifies Quality Control Sample

**TABLE B.4-5 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS (cont'd.)**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
H24	9/24/2020	PACE	---	---	---	---	---	---	172	928	2080	2815	---	7.26
	10/8/2020	PACE	---	---	---	---	---	---	---	---	---	2738	---	---
	10/20/2020	PACE	---	---	---	---	---	---	178	906	2130	2739	---	7.38
H55	3/3/2020	ENER	265	69.9	8.0	301	478	< 5	187	896	2040	2700	1.01	7.04
MO	3/4/2020	ENER	353	87.4	8.4	354	377	< 5	200	1330	2650	3316	1.02	7.03
	3/4/2020	ENER	# 357	# 87.4	# 8.5	# 361	# 378	# < 5	# 201	# 1340	# 2660	---	# 1.02	---
MR	2/13/2020	ENER	289	70.1	8.6	295	464	< 5	190	968	2200	2891	1.00	7.06
MV	3/11/2020	ENER	---	---	---	---	---	---	158	612	1610	2261	---	7.11
R1	10/28/2020	PACE	---	---	---	---	---	---	206	1110	2490	3180	---	7.22
	10/28/2020	PACE	---	---	---	---	---	---	# 207	# 1120	# 2490	---	---	# 7.22
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	3211	---	7.44
R2	10/28/2020	PACE	---	---	---	---	---	---	179	849	2020	2667	---	7.35
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2645	---	7.62
R3	5/12/2020	PACE	196	54.0	8.0	325	386	< 5	150	751	1610	2399	1.08	7.22
	10/28/2020	PACE	---	---	---	---	---	---	142	635	1620	2140	---	7.45
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2269	---	7.83
R4	10/28/2020	PACE	---	---	---	---	---	---	143	622	1600	2177	---	7.48
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2230	---	7.46
R5	10/12/2020	PACE	---	---	---	---	---	---	141	556	1500	2102	---	7.28
	10/29/2020	PACE	---	---	---	---	---	---	---	---	---	2121	---	7.37
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2316	---	7.46
R11	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2153	---	7.70
R18	3/12/2020	ENER	---	---	---	---	---	---	114	464	1190	1725	---	7.25
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	1813	---	7.56
R20	3/12/2020	ENER	---	---	---	---	---	---	130	598	1470	2072	---	7.25

# Signifies Quality Control Sample

**TABLE B.4-5 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS (cont'd.)**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
R20	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	1968	---	7.68
R22	3/12/2020	ENER	---	---	---	---	---	---	135	592	1470	2073	---	7.21
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2038	---	7.78



**TABLE B.4-6 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
0520	3/18/2020	ENER	0.032	---	0.008	0.008	---	---	---	---	---	---	---	---
0521	3/18/2020	ENER	0.530	---	1.090	0.240	---	---	---	---	---	---	---	---
0522	3/18/2020	ENER	0.340	---	0.604	0.062	---	---	---	---	---	---	---	---
0538	3/4/2020	ENER	0.096	---	< 0.001	0.026	---	---	---	---	---	---	---	---
0540	5/6/2020	PACE	0.070	---	< 0.030	0.011	1.5	< 3.0	---	4.80	---	< 0.02	< 3.00	---
0541	1/13/2020	ENER	0.118	---	0.008	0.029	2.7	0.3	0.200	1.70	0.90	< 0.01	0.06	0.06
0551	1/8/2020	ENER	0.036	---	0.003	0.041	3.6	0.4	0.200	0.90	0.60	< 0.01	0.01	0.08
0555	2/4/2020	ENER	0.066	---	0.001	0.061	10.9	0.2	0.200	0.70	1.00	< 0.01	0.08	0.20
0556	2/4/2020	ENER	0.071	---	0.001	0.063	8.4	0.2	0.100	0.30	0.90	< 0.01	0.01	0.06
0557	2/5/2020	ENER	0.052	---	< 0.001	0.062	6.7	0.4	0.100	0.50	0.60	< 0.01	0.04	0.10
0631	5/6/2020	PACE	0.091	---	< 0.030	0.038	2.9	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
0632	3/4/2020	ENER	0.091	---	0.003	0.058	---	---	---	---	---	---	---	---
0638	3/18/2020	ENER	0.031	---	0.016	0.100	---	---	---	---	---	---	---	---
0639	3/8/2020	ENER	0.057	---	0.672	0.135	2.2	0.3	0.200	-0.01	0.90	< 0.01	0.10	0.10
	7/15/2020	PACE	0.025	---	0.320	0.154	1.1	0.3	0.100	1.30	1.90	< 0.02	< 0.30	---
0644	5/5/2020	PACE	0.117	---	< 0.030	0.025	3.4	< 3.0	---	4.60	3.10	< 0.02	< 3.00	---
0646	3/12/2020	ENER	0.061	---	0.001	0.036	---	---	---	---	---	---	---	---
0647	1/8/2020	ENER	0.067	---	< 0.001	0.025	3.0	0.2	0.200	1.00	0.60	< 0.01	0.30	0.20
0649	1/8/2020	ENER	0.026	---	0.004	0.023	2.0	0.2	0.200	0.80	0.60	< 0.01	0.04	0.09
0654	1/9/2020	ENER	0.146	---	0.017	0.032	3.4	0.1	0.100	1.00	0.60	< 0.01	0.08	0.10
0659	3/2/2020	ENER	0.178	---	0.021	0.035	2.9	0.3	0.200	-0.20	0.80	< 0.01	0.10	0.06
	10/8/2020	HMC	---	0.15	---	---	---	---	---	---	---	---	---	---
0846	8/17/2020	PACE	0.027	---	< 0.010	0.041	13.1	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---

**TABLE B.4-6 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
0864	4/30/2020	PACE	0.083	---	< 0.030	0.020	2.8	< 3.0	---	< 3.00	---	< 0.01	< 3.00	---
0869	4/30/2020	PACE	0.166	---	< 0.030	0.022	2.5	< 3.0	---	4.00	3.80	< 0.02	< 0.30	---
0881	2/25/2020	ENER	0.203	---	0.025	0.035	2.1	0.3	0.200	1.10	1.10	< 0.01	0.03	0.04
0882	2/5/2020	ENER	0.063	---	0.002	< 0.001	0.7	0.5	0.100	0.90	0.60	< 0.01	0.04	0.09
0883	2/5/2020	ENER	0.049	---	< 0.001	0.017	2.5	0.4	0.100	1.00	0.60	< 0.01	0.02	0.07
0884	2/6/2020	ENER	0.023	---	0.001	0.035	5.0	0.2	0.100	0.70	0.60	< 0.01	0.50	0.20
0886	2/25/2020	ENER	0.308	---	0.045	0.052	4.9	0.5	0.200	0.20	1.20	< 0.01	0.07	0.05
0888	2/6/2020	ENER	0.101	---	0.008	0.037	3.0	0.4	0.100	0.90	0.60	< 0.01	0.30	0.20
0890	10/20/2020	PACE	0.155	---	0.020	0.030	---	---	---	---	---	---	---	---
0893	2/10/2020	ENER	0.071	---	0.003	0.023	1.6	0.2	0.100	0.60	0.50	< 0.01	0.04	0.07
0899	1/9/2020	ENER	0.058	---	< 0.001	0.016	3.2	0.2	0.100	1.20	0.70	< 0.01	0.02	0.10
0921	2/10/2020	ENER	0.204	---	0.003	0.541	15.6	0.2	0.100	0.50	0.50	< 0.01	0.03	0.07
	2/10/2020	ENER	# 0.190	---	# 0.003	# 0.512	# 15.0	# 0.4	# 0.100	# -0.06	# 0.40	# < 0.01	# 0.02	# 0.06
0994	10/6/2020	PACE	0.006	---	< 0.010	0.029	3.9	0.2	0.100	< 1.00	---	< 0.01	< 0.30	---
	10/6/2020	PACE	# 0.006	---	# < 0.010	# 0.030	# 3.9	# < 0.2	---	# 1.20	# 1.80	# < 0.01	# < 0.30	---
0996	1/9/2020	ENER	0.065	---	0.007	0.025	2.8	0.3	0.200	0.80	0.60	< 0.01	0.09	0.10
H2A	3/2/2020	ENER	0.170	---	0.020	0.033	2.2	0.4	0.200	0.10	0.90	< 0.01	-0.02	0.09
H7	10/20/2020	PACE	0.199	---	0.030	0.039	---	---	---	---	---	---	---	---
H7B	10/20/2020	PACE	0.168	---	0.020	0.030	---	---	---	---	---	---	---	---
H16	10/8/2020	HMC	---	0.22	---	---	---	---	---	---	---	---	---	---
	10/20/2020	PACE	0.281	---	0.040	0.052	---	---	---	---	---	---	---	---
H17	10/8/2020	HMC	---	0.09	---	---	---	---	---	---	---	---	---	---
	10/20/2020	PACE	0.123	---	0.010	0.028	---	---	---	---	---	---	---	---
H24	1/28/2020	ENER	0.294	---	---	---	---	---	---	---	---	---	---	---

**TABLE B.4-6 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
H24	9/24/2020	PACE	0.295	---	0.050	0.047	---	---	---	---	---	---	---	---
	10/8/2020	HMC	---	0.24	---	---	---	---	---	---	---	---	---	---
	10/20/2020	PACE	0.291	---	0.050	0.043	---	---	---	---	---	---	---	---
H55	3/3/2020	ENER	0.461	---	0.095	0.055	2.5	0.5	0.200	1.70	1.00	< 0.01	0.06	0.10
MO	3/4/2020	ENER	0.185	---	0.015	0.064	7.6	0.4	0.200	1.60	1.00	< 0.01	0.08	0.10
	3/4/2020	ENER	# 0.178	---	# 0.014	# 0.062	# 7.5	# 0.3	# 0.200	# -0.50	# 1.00	# < 0.01	# 0.07	# 0.10
MR	2/13/2020	ENER	0.426	---	0.052	0.059	3.1	0.2	0.200	0.50	0.60	< 0.01	0.04	0.05
MV	3/11/2020	ENER	0.168	---	0.015	0.028	---	---	---	---	---	---	---	---
R1	10/28/2020	PACE	0.218	---	< 0.010	0.063	---	---	---	---	---	---	---	---
	10/28/2020	PACE	# 0.212	---	# < 0.010	# 0.063	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.19	---	---	---	---	---	---	---	---	---	---
R2	10/28/2020	PACE	0.248	---	< 0.010	0.040	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.20	---	---	---	---	---	---	---	---	---	---
R3	5/12/2020	PACE	0.143	---	< 0.030	0.024	3.0	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
	10/28/2020	PACE	0.152	---	< 0.010	0.022	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.17	---	---	---	---	---	---	---	---	---	---
R4	10/28/2020	PACE	0.286	---	< 0.010	0.035	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.25	---	---	---	---	---	---	---	---	---	---
R5	10/12/2020	PACE	0.188	---	< 0.010	0.032	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.22	---	---	---	---	---	---	---	---	---	---
R11	11/29/2020	HMC	---	0.20	---	---	---	---	---	---	---	---	---	---
R18	3/12/2020	ENER	0.063	---	0.004	0.014	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.06	---	---	---	---	---	---	---	---	---	---
R20	3/12/2020	ENER	0.162	---	0.007	0.026	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.12	---	---	---	---	---	---	---	---	---	---

**TABLE B.4-6 WATER QUALITY ANALYSES FOR THE REGIONAL ALLUVIAL WELLS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
R22	3/12/2020	ENER	0.131	---	0.003	0.024	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.13	---	---	---	---	---	---	---	---	---	---

**TABLE B.5-1 WATER QUALITY ANALYSES FOR THE CHINLE AQUIFERS**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
0493	5/19/2020	PACE	12	2.0	3.0	581	347	10	137	640	1840	2410	1.13	8.40
0494	5/19/2020	PACE	207	58.0	9.0	290	476	< 5	169	620	1680	2372	1.09	7.03
0538	3/4/2020	ENER	---	---	---	---	---	---	139	619	1500	2107	---	7.08
ACW	7/20/2020	PACE	6	< 2.0	2.0	603	435	20	135	604	1660	2572	1.11	8.77
B16	12/22/2020	PACE	---	---	---	---	---	---	380	2930	5990	7594	---	7.49
B32	12/22/2020	PACE	---	---	---	---	---	---	155	721	1850	2529	---	7.49
CE2	5/28/2020	PACE	125	33.0	5.0	227	359	< 5	114	391	1140	1671	1.09	7.72
CE6	12/22/2020	PACE	---	---	---	---	---	---	182	924	2240	3000	---	7.40
CE8	6/25/2020	PACE	10	< 2.0	< 2.0	633	383	8	59	747	1630	2434	1.19	8.32
CE9	6/18/2020	PACE	200	53.0	8.0	304	581	< 5	174	640	1780	2412	0.99	7.31
	6/18/2020	PACE #	# 202	# 53.0	# 8.0	# 304	# 555	# < 5	# 174	# 636	# 1750	---	# 1.02	# 7.31
	7/14/2020	PACE	181	52.0	8.0	278	510	< 5	173	601	1650	2336	0.99	6.94
	8/19/2020	PACE	204	61.0	10.0	300	506	< 5	176	670	1760	2385	1.04	6.90
CE15	6/17/2020	PACE	181	44.0	6.0	290	470	< 5	152	623	1680	2246	1.01	6.74
CE15A	8/20/2020	PACE	---	---	---	---	---	---	164	645	1690	2373	---	7.15
CE19	8/20/2020	PACE	---	---	---	---	---	---	126	563	1400	2016	---	7.30
	8/20/2020	PACE	---	---	---	---	---	---	# 124	# 552	# 1400	---	---	# 7.30
CF4	8/14/2020	PACE	< 2	< 2.0	16.0	3430	1450	1300	357	3010	9280	11880	1.07	10.19
CW1	3/16/2020	ENER	---	---	---	---	---	---	89	748	1630	2481	---	8.54
CW2	8/18/2020	PACE	7	< 2.0	2.0	537	307	10	102	567	1430	2193	1.19	8.59
CW3	3/17/2020	ENER	---	---	---	---	---	---	62	821	1660	2481	---	7.84
	6/17/2020	PACE	35	8.0	2.0	562	375	< 5	58	798	1670	2424	1.10	8.03
CW17	7/22/2020	PACE	365	94.0	10.0	373	364	< 5	115	1450	2810	3310	1.07	7.03
CW18	7/14/2020	PACE	39	7.0	4.0	709	650	6	212	645	1980	2980	1.11	7.38

# Signifies Quality Control Sample

**TABLE B.5-1 WATER QUALITY ANALYSES FOR THE CHINLE AQUIFERS (cont'd.)**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
CW28	3/18/2020	ENER	---	---	---	---	---	---	153	514	1320	2115	---	8.48
	7/22/2020	PACE	8	< 2.0	2.0	477	251	< 5	156	480	1370	2083	1.14	8.43
CW29	8/11/2020	PACE	144	39.0	8.0	369	344	< 5	140	607	1570	2181	1.19	7.28
CW32	7/23/2020	PACE	137	48.0	12.0	789	532	< 5	389	1210	3100	4221	1.01	7.06
CW35	3/17/2020	ENER	285	73.6	5.6	347	419	< 5	66	1280	2360	2961	1.00	7.03
CW41	8/3/2020	PACE	14	4.0	4.0	334	328	< 5	90	284	910	1467	1.12	8.08
CW42	7/30/2020	PACE	146	35.0	10.0	319	360	< 5	133	568	1560	2071	1.12	7.58
CW43	8/4/2020	PACE	337	83.0	8.0	416	371	< 5	222	1260	2640	3295	1.08	7.09
CW45	3/3/2020	ENER	164	40.6	5.0	294	517	< 5	152	585	1590	2335	0.97	7.22
CW50	3/11/2020	ENER	194	46.7	3.6	265	317	< 5	56	881	1710	2194	0.99	7.62
CW55	8/5/2020	PACE	43	9.0	6.0	604	502	< 5	164	631	1680	2625	1.12	7.71
CW62	7/16/2020	PACE	302	75.0	7.0	367	391	< 5	182	1390	2770	3412	0.92	7.17
CW76	8/5/2020	PACE	9	< 2.0	3.0	572	377	8	133	618	1500	2375	1.11	8.30
R1	10/28/2020	PACE	---	---	---	---	---	---	206	1110	2490	3180	---	7.22
	10/28/2020	PACE	---	---	---	---	---	---	# 207	# 1120	# 2490	---	---	# 7.22
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	3211	---	7.44
R2	10/28/2020	PACE	---	---	---	---	---	---	179	849	2020	2667	---	7.35
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2645	---	7.62
R3	5/12/2020	PACE	196	54.0	8.0	325	386	< 5	150	751	1610	2399	1.08	7.22
	10/28/2020	PACE	---	---	---	---	---	---	142	635	1620	2140	---	7.45
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2269	---	7.83
R4	10/28/2020	PACE	---	---	---	---	---	---	143	622	1600	2177	---	7.48
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2230	---	7.46
R5	10/12/2020	PACE	---	---	---	---	---	---	141	556	1500	2102	---	7.28

# Signifies Quality Control Sample

**TABLE B.5-1 WATER QUALITY ANALYSES FOR THE CHINLE AQUIFERS (cont'd.)**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
R5	10/29/2020	PACE	---	---	---	---	---	---	---	---	---	2121	---	7.37
	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2316	---	7.46
R11	11/29/2020	PACE	---	---	---	---	---	---	---	---	---	2153	---	7.70
T25	1/14/2020	ENER	---	---	---	---	---	---	304	2460	4660	6120	---	7.06
T27	1/15/2020	ENER	---	---	---	---	---	---	470	3890	7080	8593	---	6.91
T28	1/15/2020	ENER	---	---	---	---	---	---	517	4290	8220	9836	---	6.81
T30	1/16/2020	ENER	---	---	---	---	---	---	492	3540	6690	8157	---	6.85
V6	8/10/2020	PACE	175	40.0	10.0	396	368	< 5	154	672	1700	2345	1.20	7.43
Y7	8/19/2020	PACE	84	22.0	7.0	410	319	< 5	139	585	1470	2113	1.12	7.30
Y13	9/21/2020	PACE	---	---	---	---	---	---	148	631	1600	2675	---	7.44

**TABLE B.5-2 WATER QUALITY ANALYSES FOR THE CHINLE AQUIFERS**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
0493	5/19/2020	PACE	0.100	---	< 0.030	0.086	2.1	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
0494	5/19/2020	PACE	0.120	---	0.050	0.023	2.0	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
0538	3/4/2020	ENER	0.096	---	< 0.001	0.026	---	---	---	---	---	---	---	---
ACW	7/20/2020	PACE	0.035	---	< 0.010	0.042	1.7	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
B16	12/22/2020	PACE	9.270	---	14.800	0.335	---	---	---	---	---	---	---	---
B32	12/22/2020	PACE	1.130	---	1.220	0.064	---	---	---	---	---	---	---	---
CE2	5/28/2020	PACE	0.567	---	0.580	0.019	1.2	< 0.2	---	1.40	2.30	< 0.01	< 0.30	---
CE6	12/22/2020	PACE	1.820	---	1.960	0.065	---	---	---	---	---	---	---	---
CE8	6/25/2020	PACE	0.032	---	0.040	< 0.005	< 0.1	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
CE9	6/18/2020	PACE	0.191	---	0.070	0.021	1.0	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
	6/18/2020	PACE	# 0.205	---	# 0.070	# 0.022	# 1.3	# < 0.2	---	# < 1.00	---	# < 0.01	# < 0.30	---
	7/14/2020	PACE	0.100	---	0.050	0.018	1.9	1.1	0.100	< 1.00	---	< 0.02	< 0.30	---
	8/19/2020	PACE	0.091	---	0.030	0.017	2.1	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
CE15	6/17/2020	PACE	0.296	---	0.230	0.062	2.2	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
CE15A	8/20/2020	PACE	0.142	---	0.080	0.029	---	---	---	---	---	---	---	---
CE19	8/20/2020	PACE	0.570	---	0.620	0.059	---	---	---	---	---	---	---	---
	8/20/2020	PACE	# 0.584	---	# 0.620	# 0.057	---	---	---	---	---	---	---	---
CF4	8/14/2020	PACE	19.900	---	< 0.010	< 0.005	1.2	99.6	1.100	7.60	4.20	< 0.01	363.00	72.70
CW1	3/16/2020	ENER	0.064	---	0.024	0.060	---	---	---	---	---	---	---	---
CW2	8/18/2020	PACE	0.036	---	0.010	0.049	1.8	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
CW3	3/17/2020	ENER	0.238	---	0.215	0.002	---	---	---	---	---	---	---	---
	6/17/2020	PACE	0.211	---	0.210	< 0.005	< 0.1	< 0.2	---	< 1.00	---	0.02	< 0.30	---
CW17	7/22/2020	PACE	0.134	---	0.020	0.069	9.0	0.2	0.200	< 1.00	---	< 0.02	< 0.30	---
CW18	7/14/2020	PACE	0.029	---	< 0.010	0.014	1.6	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---



**TABLE B.5-2 WATER QUALITY ANALYSES FOR THE CHINLE AQUIFERS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
CW28	3/18/2020	ENER	0.018	---	0.007	0.112	---	---	---	---	---	---	---	---
	7/22/2020	PACE	0.015	---	< 0.010	0.123	2.6	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
CW29	8/11/2020	PACE	0.133	---	< 0.010	0.051	2.6	< 0.2	---	5.40	4.80	< 0.02	< 0.30	---
CW32	7/23/2020	PACE	0.002	---	< 0.010	< 0.005	< 0.1	0.8	0.300	< 1.00	---	< 0.02	< 0.30	---
CW35	3/17/2020	ENER	0.172	---	0.001	0.058	3.0	0.8	0.200	1.20	0.80	< 0.01	0.10	0.06
CW41	8/3/2020	PACE	0.039	---	< 0.010	0.038	3.1	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
CW42	7/30/2020	PACE	0.275	---	< 0.005	0.029	2.0	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
CW43	8/4/2020	PACE	0.048	---	< 0.010	0.042	7.0	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
CW45	3/3/2020	ENER	0.351	---	0.001	0.037	1.8	0.3	0.100	0.01	0.90	< 0.01	0.10	0.10
CW50	3/11/2020	ENER	0.022	---	0.002	< 0.001	0.6	0.6	0.200	1.30	0.70	< 0.01	-0.02	0.09
CW55	8/5/2020	PACE	0.059	---	0.050	< 0.005	< 0.1	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
CW62	7/16/2020	PACE	1.270	---	1.090	0.171	9.2	0.2	0.100	< 1.00	---	< 0.02	< 0.30	---
CW76	8/5/2020	PACE	0.073	---	< 0.010	0.045	2.8	< 0.2	---	< 1.00	---	< 0.02	< 0.30	---
R1	10/28/2020	PACE	0.218	---	< 0.010	0.063	---	---	---	---	---	---	---	---
	10/28/2020	PACE	# 0.212	---	# < 0.010	# 0.063	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.19	---	---	---	---	---	---	---	---	---	---
R2	10/28/2020	PACE	0.248	---	< 0.010	0.040	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.20	---	---	---	---	---	---	---	---	---	---
R3	5/12/2020	PACE	0.143	---	< 0.030	0.024	3.0	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
	10/28/2020	PACE	0.152	---	< 0.010	0.022	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.17	---	---	---	---	---	---	---	---	---	---
R4	10/28/2020	PACE	0.286	---	< 0.010	0.035	---	---	---	---	---	---	---	---
	11/29/2020	HMC	---	0.25	---	---	---	---	---	---	---	---	---	---
R5	10/12/2020	PACE	0.188	---	< 0.010	0.032	---	---	---	---	---	---	---	---

**TABLE B.5-2 WATER QUALITY ANALYSES FOR THE CHINLE AQUIFERS (cont'd.)**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
R5	11/29/2020	HMC	---	0.22	---	---	---	---	---	---	---	---	---	---
R11	11/29/2020	HMC	---	0.20	---	---	---	---	---	---	---	---	---	---
T25	1/14/2020	ENER	4.660	---	9.060	0.271	---	---	---	---	---	---	---	---
T27	1/15/2020	ENER	11.300	---	7.220	0.113	---	---	---	---	---	---	---	---
T28	1/15/2020	ENER	17.300	---	16.100	0.351	---	---	---	---	---	---	---	---
T30	1/16/2020	ENER	13.500	---	5.880	0.118	---	---	---	---	---	---	---	---
V6	8/10/2020	PACE	0.226	---	< 0.010	0.061	2.8	0.2	0.100	< 1.00	---	< 0.02	< 0.30	---
Y7	8/19/2020	PACE	0.168	---	< 0.010	0.030	1.8	< 0.2	---	< 1.00	---	< 0.01	< 0.30	---
Y13	9/21/2020	PACE	0.249	---	< 0.010	0.037	---	---	---	---	---	---	---	---

**TABLE B.6-1 WATER QUALITY ANALYSES FOR THE SAN ANDRES AQUIFER**

Ca THROUGH pH

Sample Point Name	Date	Lab	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	TDS (mg/L)	Cond(f) (µmhos/cm)	Ion_B (ratio)	pH(f) (std. units)
#1R Deepwell	2/26/2020	ENER	---	---	---	---	---	---	182	641	1710	2432	---	6.89
#2 DEEPWELL	2/3/2020	ENER	---	---	---	---	---	---	234	760	1960	2794	---	6.66
	5/13/2020	PACE	241	81.0	18.0	301	574	< 5	224	703	1460	2684	1.06	6.89
	5/13/2020	PACE	# 244	# 82.0	# 18.0	# 300	# 560	# < 5	# 224	# 704	# 1830	---	# 1.07	---
	7/16/2020	PACE	---	---	---	---	---	---	223	659	1940	2670	---	6.70
	10/7/2020	PACE	---	---	---	---	---	---	224	656	1950	2708	---	6.75
0806R	7/21/2020	PACE	210	72.0	14.0	228	445	< 5	176	567	1660	2319	1.10	6.89
0943M	2/3/2020	ENER	---	---	---	---	---	---	153	563	1480	2125	---	7.20
	9/9/2020	PACE	200	61.0	11.0	185	417	< 5	159	541	1480	2113	1.03	7.05
	11/17/2020	PACE	---	---	---	---	---	---	152	527	1490	2055	---	7.21
0951R	2/10/2020	ENER	---	---	---	---	---	---	142	555	1400	2008	---	6.95
	5/6/2020	PACE	184	62.0	11.0	187	394	< 5	151	538	1460	2020	1.03	7.08
	8/10/2020	PACE	---	---	---	---	---	---	140	476	1410	1932	---	6.91
	11/10/2020	PACE	---	---	---	---	---	---	152	513	1420	1931	---	7.25
0955	8/4/2020	PACE	98	41.0	8.0	166	234	< 5	88	412	940	1453	1.04	7.64
0991	9/14/2020	PACE	152	49.0	8.0	108	338	< 5	73	405	1110	1548	1.02	7.38

# Signifies Quality Control Sample

**TABLE B.6-2 WATER QUALITY ANALYSES FOR THE SAN ANDRES AQUIFER**

Unat Through Th-230

Sample Point Name	Date	Lab	Unat (mg/L)	KPA U (mg/L)	Mo (mg/L)	Se (mg/L)	NO3 (mg/L)	Ra226 (pCi/L)	Ra226(e) (pCi/L)	Ra228 (pCi/L)	Ra228(e) (pCi/L)	V (mg/L)	Th230 (pCi/L)	Th230(e) (mg/L)
#1R Deepwell	2/26/2020	ENER	0.009	---	< 0.001	0.010	---	---	---	---	---	---	---	---
#2 DEEPWELL	2/3/2020	ENER	0.012	---	0.002	0.006	---	---	---	---	---	---	---	---
	5/13/2020	PACE	0.011	---	< 0.030	0.006	1.6	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
	5/13/2020	PACE	# 0.010	---	# < 0.030	# 0.006	# 1.6	# < 3.0	---	# < 3.00	---	# < 0.02	# < 3.00	---
	7/16/2020	PACE	0.011	---	< 0.050	0.006	---	---	---	---	---	---	---	---
	10/7/2020	PACE	0.012	---	< 0.010	0.006	---	---	---	---	---	---	---	---
0806R	7/21/2020	PACE	0.020	---	< 0.010	0.008	4.0	0.5	0.200	< 1.00	---	< 0.02	< 0.30	---
0943M	2/3/2020	ENER	0.008	---	< 0.001	0.008	---	---	---	---	---	---	---	---
	9/9/2020	PACE	0.008	---	< 0.010	0.008	3.5	0.8	0.100	1.90	2.00	< 0.01	< 0.30	---
	11/17/2020	PACE	0.014	---	< 0.010	0.008	---	---	---	---	---	---	---	---
0951R	2/10/2020	ENER	0.025	---	0.003	0.010	---	---	---	---	---	---	---	---
	5/6/2020	PACE	0.028	---	< 0.030	0.009	3.4	< 3.0	---	< 3.00	---	< 0.02	< 3.00	---
	8/10/2020	PACE	0.026	---	< 0.010	0.008	---	---	---	---	---	---	---	---
	11/10/2020	PACE	0.028	---	< 0.010	0.007	---	---	---	---	---	---	---	---
0955	8/4/2020	PACE	0.002	---	< 0.010	< 0.005	< 0.1	0.8	0.100	< 1.00	---	< 0.02	< 0.30	---
0991	9/14/2020	PACE	0.006	---	< 0.010	0.010	3.3	0.9	0.100	< 1.00	---	< 0.01	< 0.30	---

**APPENDIX C**  
**ANNUAL ALARA AUDIT**



Sopris Environmental, LLC

Date: March 17, 2021

To: Mr. Brad Bingham  
Closure Manager  
Homestake Mining Company, Grants Operations  
PO Box 98  
Grants, New Mexico 87020

CC Mr. Randy Whicker  
Radiation Safety Officer

From: Janet A. Johnson, PhD, CHP (Emeritus)

RE: ALARA Audit Report for 2020

I have attached the ALARA Audit Report for 2020. It was a bit of a challenge this year due to the COVID-19 restrictions on travel. Thanks to your patience and the co-operation of your staff and consultants, I received all of the information I believe was necessary to complete the audit. Unfortunately, a site visit was not possible this year due to the pandemic. However, I believe this report is an accurate reflection of the status of the Homestake Mining Company, Grants Operations, radiation safety program. Radiation doses to Homestake employees and contractors are very low, and in most cases, indistinguishable from background. Estimated radiation doses to members of the public attributable to the site activities are below all regulatory requirements. The records I examined were clear and available remotely.

Thank you for the opportunity to perform this audit. I appreciate the help I received from your radiation safety staff as well as your consultants. I wish you all well as we emerge from this very stressful year.

# **ANNUAL ALARA AUDIT REPORT FOR 2020**

**Grants Operations  
Homestake Mining Company  
P. O. Box 98  
Grants, New Mexico 87020**

Prepared by:

Janet A. Johnson, PhD, CHP  
Sopris Environmental  
1001 Painted Lady Lane  
Carbondale, Colorado 81623

**March 17, 2021**

## ABSTRACT

The Annual ALARA Audit for 2020 was conducted remotely by Janet Johnson, PhD, CHP (emeritus) during January and February, 2021. A virtual opening meeting was held using Microsoft Teams on January 19, 2021. Documents were provided in an FTP share file transmitted to Dr. Johnson on January 19, 2021 by the Assistant Radiation Safety Officer (ARSO). Additional materials, including the Monthly ALARA Reports (HMC, 2020a), were sent by email by the Radiation Safety Officer (RSO), ARSO, and the Radiation Safety Technician (RST). Updated reports were posted on the FTP site as they became available and in preparation for the February 2021 Nuclear Regulatory Commission virtual inspection. The audit was conducted in accordance with Section 2.3.3 of U. S. Nuclear Regulatory Guide 8.31 (RG 8.31) (USNRC, 2002a) and License Condition 42 of Radioactive Materials License SUA-1471, Amendments 54, 55, and 56. Amendment 56 was signed on June 24, 2020, thus was the applicable document for most of the year.

The areas reviewed included personal monitoring data, bioassay data, worker dose reports, training records, inspection records, monthly ALARA reports, environmental data, Radiation Work Permits (RWPs) and instrument calibrations. The maximum radiation dose to a worker in 2020 was 22 mrem, including internal doses calculated for workers monitored using lapel samplers as required under specific Radiation Work Permits (RWPs). Radiation doses to members of the public during 2020 are included in the Semi-Annual monitoring report for July through December, 2020 (HMC, 2021). The estimated maximum annual dose to a member of the public, attributable to Homestake operations, was 46 mrem, consistent with doses calculated for previous years. Measured particulate and radon air concentrations for 2020 were also consistent with data from previous years. All records reviewed were found to be in substantial compliance with the RG 8.31 guidance. The records were easily available from the FTP site, and were clear and transparent. The restrictions placed on the audit procedure due to COVID-19 precluded a site visit and tour. Therefore, the auditor did not evaluate the physical conditions at the site. However, based on the virtual meeting and the records review, the Radiation Safety Program at the Homestake facility is well-organized and implemented. There were no findings resulting from this ALARA audit.



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## 1.0 INTRODUCTION

The Annual ALARA Audit (the Audit) for 2020, required by License Condition 42 (LC 42) of Homestake Mining Company of California's (HMC) Grants Uranium Mill facility (NRC Materials License Number SUA-1471, Amendments 54, 55, and 56), was conducted remotely during January and February 2021 by Janet A. Johnson, PhD, Certified Health Physicist (CHP) emeritus in accordance with the provisions of the U. S. Nuclear Regulatory Commission's Regulatory Guide 8.31 (NRC, 2002a). The following individuals were present at the virtual audit opening meeting on January 19, 2021: Homestake employees Mr. Brad Bingham, site Closure Manager (CM), Ms. Jennifer Ortega, Health, Safety and Environment Supervisor (HSE) and Mr. Kyle Martinez, Radiation Safety Technician (RST) as well as Mr. Randy Whicker, Radiation Safety Officer (RSO) and Mr. Chuck Farr, Alternate Radiation Safety Officer (ARSO) contracted through Environmental Restoration Group (ERG).

Mr. Brad Bingham, formerly Safety, Health and Environmental Compliance Officer, has been the CM since the fourth quarter of 2020, replacing Mr. David Pierce. Mr. Randy Whicker, CHP, assumed the position of RSO in March 2017 through the Safety and Environmental Review Panel (SERP) process documented in March 2017. The Homestake facility has undergone a self-assessment as required by the Confirmatory Order modifying NRC License Number SUA-1471 issued by the NRC on March 28, 2017. License Amendment 54 was issued in April, 2019. License Amendment 55 signed on February 2, 2020, added the zeolite water treatment system to License Condition No. 35. License Amendment 56, issued on June 24, 2020, approved the training and use of a qualified designee to conduct the daily site inspections in the absence of the RSO, ARSO, and RST.

Homestake submitted an application for an updated license amendment in November 2018. The changes that were requested in that amendment application include (but are not limited to) deleting or amending conditions that are out of date such as revising the title of the Radiation Protection Administrator in the license to Radiation Safety Officer consistent with current usage and Regulatory Guide 8.31. The license amendment application noted that the Regulatory Guides referenced in the current license are designed to be applicable to operating uranium recovery facilities whereas the Homestake facility is no longer an operating milling facility. The Radiation Protection Program (RPP) should be commensurate with current radiological conditions at the site. The amendment request was not accepted for review by NRC and HMC has not attempted to resubmit the application. Revision 3 of the Radiation Protection Program Manual (RPPM) (HMC, 2019) included minor updates to the RPP in 2019, but the basic requirements for occupational monitoring and contamination surveys have not changed since License Amendment 21 in 1995 (NRC, 1995), based on completion of mill facilities demolition and decommissioning and completion of windblown soil cleanup in off-pile areas. Amendment 21 reduced license requirements for the occupational RPP, including removal of the requirement for routine personal contamination surveys when leaving Controlled Areas of the facility, limiting equipment release surveys to items subject to contact with mill tailings, and modification or elimination of other occupational RPP elements related to removal of the mill.

As of the end of 2020, Homestake employed a total of 11 permanent staff members with two positions vacant<sup>1</sup>. Contractors periodically perform temporary work on site to support and

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<sup>1</sup> One of the positions had been filled as of the date of this report. The second open position is pending.

maintain facility operations. Contractors are responsible for abiding by Homestake radiation protection policies and procedures.

## 1.1 Site History

The HMC Grants Uranium Mill facility is located in the Grants Mining District, 5.5 miles northeast of Milan in Cibola County, New Mexico. Milling operations were conducted at the site from 1958 to 1990. The environmental restoration program began in 1977.

The facility consists of the decommissioned mill site, two tailings impoundments, three evaporation ponds a reverse osmosis plant and a zeolite groundwater treatment facility. The mill buildings were demolished and disposed to backfilled trenches on site in 1995. Soil cleanup has been mostly completed except for areas near the evaporation impoundments. A radon barrier has been installed on the large tailings pile (LTP) embankments and an interim cover installed on top of the impoundment. A pilot zeolite treatment facility for impacted groundwater was constructed on top of the LTP in 2014 and augmented with additional units in 2015 and 2016. The zeolite treatment facility was added to License Condition No. 35 with License Amendment No. 55 in February 2020. A reverse osmosis (RO) facility was also constructed at the site to treat groundwater. Additional capacity was constructed in the RO facility in 2015 and 2016.

Homestake property in the vicinity of the facility covers approximately 14,000 acres. The "Controlled Area" boundary, as defined in the RPPM (HMC, 2019), covers 1,556 acres and includes the LTP, Small Tailings Pile (STP), three Evaporation Ponds (EP-1, EP-2, and EP-3), two collection ponds (East and West), the RO facility, and two Zeolite systems as well as maintenance, warehouse and office areas. Appropriate signage is posted at major access points to the Controlled Area (e.g. radioactive materials caution signs and no trespassing warnings). Additional security to limit access to the site has been implemented in response to the COVID-19 pandemic. The "Restricted Area" is not defined in previously existing Site documentation; however, the RPPM (HMC, 2019) defines "restricted areas" in association with Radiation Work Permits (RWP) as areas that require temporary restricted access for specific projects as warranted at the discretion of the RSO.

## 1.2 ALARA Audit Requirements

NRC Regulatory Guide 8.31 (NRC, 2002a) and License Condition 42 require an annual review of the radiation protection program (ALARA Audit) including following data:

- Employee exposure records
- Bioassay results
- Inspection log entries
- Training program activities
- Radiation safety meeting reports
- Radiological survey and sampling data
- Reports on overexposure of workers
- Operating procedures reviewed during the period covered by the audit.

In addition, the ALARA audit includes reviews of the following:

- Trends in personnel exposures, for identifiable categories of workers and types of operation activities

- Use, maintenance, and inspection of equipment for exposure control
- Recommendations to further reduce personnel exposures.

The qualifications and training of the health physics staff were also reviewed during the audit.

### 1.3 2020 Activities

Activities conducted in 2020 included continued groundwater collection and treatment, operation of the RO system and operation of zeolite treatment units as well as general site maintenance and environmental and radiological monitoring. Additional non-routine activities were conducted under specific RWPs (See Section 2.5).

Groundwater remediation is a three-pronged process. The evaporation ponds receive liquid waste streams from groundwater treatment processes at the site. Water from groundwater extraction wells is pumped to either the reverse osmosis (RO) treatment plant or to the zeolite treatment facility. The RO facility treats impacted on-site groundwater for a number of constituents of potential concern. The zeolite units remove uranium from impacted off-site groundwater. The RO plant has a nominal treatment capacity of 1,200 gallons per minute. The clarifier was rebuilt in 2019 and 2020 under RWP 12-2019. Clarifier #2 was out of service at the time of the audit awaiting additional maintenance. The RO plant treats impacted groundwater for compliance with Site groundwater protection standards as indicated in RML Condition 35(B).

An initial pilot zeolite water treatment facility operating at a rate of 50 gallons per minute was upgraded with a 300 gallon per minute facility but is not currently in use. A new zeolite treatment unit with four additional treatment trains was added in 2016, theoretically increasing the total capacity by 1,200 gallons per minute; however, in practice, if all zeolite units are in normal operation, approximately 600 gallons of water per minute are treated. One of the zeolite treatment trains is normally undergoing regeneration at any given time. The Zeolite Facility removes uranium only.

A Final Status Survey (FSS) of former offsite land application irrigation areas was conducted by ERG in July 2018 on behalf of HMC (ERG, 2018). Results indicate compliance with release criteria for Ra-226 as defined in the approved Decommissioning Plan (AKG and Jenkins, 1993a and 1993b) under 10 CFR 40, Appendix A, Criterion 6(6). Criteria for other constituents of potential concern (uranium and selenium) were proposed in the Land Application Impact Assessment under the Confirmatory Order (HMC, 2017) as well as in the FSS Plan for the land application areas (ERG, 2017). Oak Ridge Institute for Science and Education (ORISE) performed an independent confirmatory survey on behalf of the NRC. Results appear to confirm HMC's FSS results. The FSS and Confirmatory Survey reports are currently under NRC review.

Other non-routine activities conducted on site in 2020 are covered under specific Radiation Work Permits (RWPs), listed in Section 2.5, and are described in the monthly ALARA reports.

### 1.4 Occupational Dose Summary

The personal monitoring protocol was modified in 2016, partially in response to a recommendation from the 2015 ALARA Audit. The protocol, defined in the RPPM, requires badging of all Homestake employees with the exception of administrative staff. Contractors spending more than five consecutive days on site inside Controlled Areas, are badged. Internal doses are calculated for workers who were monitored using lapel samplers worn by representative workers under RWPs. Internal committed effective doses from intake of

radionuclides had not been calculated in previous years because there has been limited potential for airborne radionuclide sources remaining on the site as demonstrated by investigations conducted in 2017 and 2018 and described in the Annual ALARA Audit Report for 2018 (Sopris, 2019). The maximum annual internal dose calculated for a worker in 2020 was 17 mrem.

Nearly all badges show doses below the reporting limit of 1 mrem in a quarter. Doses reported as M (less than the reporting limit) were assigned a value of 1 mrem for the purpose of calculating the annual dose. The measured deep dose has, in the past, been considered equivalent to the total effective dose equivalent (TEDE) for the year. In 2018, 2019, and 2020 internal doses incurred during activities conducted under specific RWPs (based on breathing zone air monitoring) were included in calculated TEDE values for the year where applicable (i.e. for workers involved with RWPs where air monitoring was required by the RSO). Reported shallow and eye doses were generally the same as deep doses. A review of the data showed no anomalies. The maximum TEDE for a worker in 2020 was 22 mrem.

## 1.5 Public Dose Summary

Radon concentrations, direct gamma radiation doses, and air particulate concentrations are measured at the site boundary and at locations representative of the nearest resident (HMC-4 and HMC-5). Net differences between measured annual average values at background monitoring stations (HMC-6 for gamma and air particulates and HMC-16 for radon) and the nearest resident (HMC-4 and HMC-5, whichever is higher) are assumed representative of radiological effluent emissions from Site facilities/operations. The net differences are used to calculate public dose to the nearest resident. The maximum annual effective dose equivalent to a member of the public is reported in the Semi-Annual Environmental Monitoring Report for the second half of each year.

The dose is calculated assuming a residential scenario at 75 percent total occupancy, 200 equivalent days per year indoors and 71 days per year outdoors (based on default values cited in NUREG/CR-5512). The dose from 0.1 pCi/L radon gas continuous occupancy at an equilibrium fraction of 100% is assumed to be equal to 50 mrem/year (10CFR20, Appendix B, Table 2 effluent concentration limits). Based on the results provided in the 2020 2<sup>nd</sup> half Semi-Annual Environmental Report, the calculated total effective dose equivalents (TEDEs) at HMC4 and HMC5, assumed to be representative of the nearest residents, were 46 mrem/y and 43 mrem/y, respectively (HMC, 2021). The 2019 calculated total effective dose equivalents (TEDEs) at HMC4 and HMC5 were 50 mrem/y and 31 mrem/y, respectively; the 2018 calculated doses were 52 mrem/y and 50 mrem/y respectively. The 2020 calculated doses are consistent with previous calculated doses. There is no discernable trend.

The TEDE is calculated by summing the committed effective dose equivalents (CEDEs) from inhalation of radionuclides in airborne particulates and inhalation of radon decay products with the direct gamma radiation dose. The concentration of radon decay products at each location is estimated based on the incremental annual average radon gas concentration (background subtracted) assuming an equilibrium factor of 0.2 for site-derived radon. The dose from direct gamma radiation is calculated by subtracting the measured annual background dose from the measured annual dose at each of the nearest resident location. The net dose is adjusted for occupancy but not for shielding indoors. The doses from inhalation of radionuclides in airborne particulate material are negligible at the nearest resident locations. The calculated total doses are well within the 10 CFR 20.1301(a)(1) public dose limit of 100 mrem per year and the doses

from airborne radionuclides, excluding radon, meet the ALARA constraint limit of 10 mrem per year (10 CFR 20.1101(d)). The calculated total annual effective dose, excluding radon, was less than 25 mrem per year.

The 2020 dose calculations, reported in the 2020 Semi-Annual Report for July through December (HMC, 2021), were reviewed and found to be accurate. Approximately 59% of the dose at HMC4 and 79% of the dose at HMC5 are attributable to radon with direct gamma radiation accounting for the remainder. The air particulates contribute a negligible amount to the annual dose, less than 1 mrem/yr. There are no apparent trends in public doses.

## 2.0 AUDIT RESULTS

The following sections describe the results of the on-site ALARA audit and review of documents, including the monthly ALARA reports (HMC, 2020a).

### 2.1 Routine Operations

Routine operations at the HMC mill site in 2020 involved water treatment and maintenance of treatment systems and environmental monitoring. Bioassay and direct radiation monitoring programs for workers are conducted in accordance with the Homestake RPPM, Version 3 (HMC, 2019 and associated SOPs) and, where applicable, with the requirements of specific RWPs issued by the RSO (Section 2.5).

#### 2.1.1 Bioassay Data

Homestake Mining Company collects routine urine bioassay samples semi-annually from Homestake employees and as needed from contractors who spend more than five consecutive days working inside the Controlled Area as defined in the RPPM. In addition, bioassay samples mandated by RWPs are collected at the start of the activity and at termination. The samples collected during the first quarter of 2020 were sent to Energy Laboratories, Inc. (ELI) and to Pace Analytical (formerly Inter-Mountain Laboratories) thereafter. Urine bioassay samples were analyzed only for uranium. The reporting limit for both contract laboratories is 5.0 micrograms per liter ( $\mu\text{g/L}$ ).

A total of 43 bioassay samples from employees and contractors were submitted to ELI from January through March 2020 and 51 submitted to Pace Analytical from July through December. Homestake discontinued the previous practice of submitting a blank and a spiked sample with each batch of samples in 2019 in accordance with Revision 2 of Regulatory Guide 8.22 (NRC, 2014) which no longer requires this practice. The samples were accompanied by appropriate Chain of Custody forms. None of the bioassay samples submitted in 2020 exceeded the laboratory reporting limit of 5.0  $\mu\text{g/L}$ . Workers are notified of their results if their bioassay exceeds the laboratory reporting limit.

#### 2.1.2 Internal Doses

Aside from individuals working under RWPs that require air monitoring, internal doses are not assessed because there is little potential for inhalation or ingestion of radioactive materials for routine operations. Essentially, all potential sources of airborne particulate releases have been covered with radon barrier materials on tailings or water in the evaporation ponds. Radon concentrations in the RO Building and the Mill Office Building are within the range of normal indoor values and less than the 4 pCi/L EPA guidance level for residences (See Section 2.6, Table 4b). Radon decay product concentrations are not routinely measured in these areas.



Studies conducted by the RSO in 2017 on the Large Tailings Pile (LTP), zeolite facilities and the surface ponds to assess potential worker exposures showed that radon and particulate concentrations are well below the 10 CFR 20 derived air concentrations (DACs). The RSO conducted a long-term study from December 2017 through May 2018 demonstrating that the maximum potential dose to a worker would be 53 mrem in a year, approximately 10% of the annual dose that would require monitoring (Whicker, 2018). However, breathing zone sampling is conducted and internal doses calculated based on the requirements of individual RWPs. The spreadsheet for calculating concentrations based on BZ samples was reviewed and found to be accurate.

### 2.1.3 External Doses

All HMC employees (other than administrative staff) are badged using OSL dosimeters obtained from Landauer, Inc. Badges are exchanged quarterly. The protocol requires badging of HMC employees and contractors who are on site in the Controlled Area for more than five consecutive days. Thirteen quarterly badges were issued to Homestake employees in 2020. Badges were issued to contractors as necessary. The number of badges used in 2020 varied by quarter according to how many contractors were on site for more than five days. Most contractor badges are stored on a badge board in the main office. Contractors sign their badges out each day and log them back in at the end of the work shift. (Because this audit was performed remotely it was not possible to review the badge log forms.)

Contractors are often only on site for short periods of time, or only one quarter. Contractor personnel from Environmental Radiation Group (ERG) track the OSL results and badge assignment forms in a database that “allows them to relate and query the results of all personnel based on the badges they use” (Alecksen, 2020).

Previously, the TEDE assigned to workers was limited to contributions from external deep dose equivalent as measured with OSL dosimeters. The CEDE has, in the past, been reported as zero since airborne radionuclide concentrations to which workers may be exposed are not expected to be elevated. The occupational exposures study conducted in 2018, described in Whicker (2018) and the 2018 ALARA Audit Report (Sopris, 2019), verified this expectation. However, doses to workers monitored using lapel or area air samplers under specific RWPs are included in the 2018, 2019 and 2020 annual TEDEs.

The maximum quarterly deep doses reported by the OSL vendor for the years 2012 through 2020 was 23 mrem (in 2014) and 11 (in 2015). In all other years the maximum was 8 mrem or less. The 2020 deep doses for most OSL badges have been reported as non-detect, i.e., less than 1 mrem.

Since 2018 annual worker doses have been calculated using the detection limit as the quarterly dose rather than zero for reported non-detect doses. Therefore, a worker badged for any quarter would have a calculated annual deep dose of at least 1 mrem, with workers badged for all four quarters having a calculated annual dose of at least 4 mrem. In addition, the 2018, 2019 and 2020 worker TEDEs include calculated internal dose based on air monitoring data. The 2018, 2019 and 2020 worker doses are shown in Table 1.



Table 1: Annual Worker Deep Doses

Year	Number of badged workers	Maximum Annual Deep Dose	Maximum CEDE	Maximum TEDE	Percent of reported doses <4 mrem
2018	108	6	13	19	89
2019	105	8	39	40	72
2020	87	9	17	22	75

The individual worker doses are recorded and filed annually on a form comparable to the NRC Form 5. Results are provided to workers upon request. Shallow and lens doses are also reported on the form but are not included in the assigned TEDE value. Individual Dose Reports are not required under 10CFR19.13(b)(1) since no worker doses exceeded 100 mrem per year; however, such notification of monitored workers is a good practice.

Due to the very low reported doses and the change in the method of calculating annual dose, it is not practical to determine any significant trends. However, given that the maximum annual TEDE for any individual worker in 2020 was less than 25 mrem, or 25% of the maximum allowable dose to a member of the public, and less than 5% of the annual dose that would require monitoring for workers, an analysis of trends, either as a whole or by occupation, would not be meaningful.

## 2.2 Safety Meetings and Training Programs

The training records for the radiation safety staff were reviewed. The contract RSO, Mr. Randy Whicker, CHP, attended 40-hour RSO refresher training for uranium recovery facilities in June 2017 and in May 2019 to fulfill the biennial refresher training specified in NRC Regulatory Guide 8.31 (NRC, 2002a). The RST, Kyle Martinez, along with all HMC employees, attended annual Radiation Worker Refresher Training on December 9, 2020 at the Grants site. The training was presented by the RSO. (The auditor attended the training remotely.) In addition, between May 2017 and July 2020 Mr. Martinez received 120.5 hours of individualized formal training presented by the RSO and ARSO to address the qualifications recommended in Reg Guide 8.31 for Radiation Safety Technicians. The individualized training included but was not limited to: site walkover, general radiation worker training, review of past site activities, hands on instrument training, discussion of dose calculations, etc. Training conducted in 2020 included discussion of 11.e(2) by-product material and specific characteristics of the Ludlum Model 43-93 detector. Mr. Martinez, along with Mr. Farr (ARSO), ERG contractor, attended a 40-hour Refresher Training Course conducted by RSCS in December 2019. Therefore, the radiation safety staff meets the training and biennial refresher training requirement.

Qualified designees who will perform daily site inspections in accordance with License Amendment 56 received training starting in April 2020. The training program was approved by the NRC in June 2020 as documented in a cover letter the accompanied License Amendment 56.

Contractors receive annual radiation safety orientation through a video with additional information provided by ERG or Homestake radiation safety personnel. A total of 66 contractors were trained by video in 2020. Contractors and new employees complete a test prior to receiving a dosimeter. A sample of the tests was reviewed. The test questions are appropriate

for the potential hazard present at the site. The trainer grades the test and initials the grade. **Based on the number of lost badges among contractors it is recommended that additional emphasis be placed on badge security during training.**

The ARSO completed documented hazardous materials transportation training in May 2019. Kyle Martinez, RST, received transportation training on 7/19/19. Billy Archuleta, Senior Shift Supervisor, received transportation training on 7/24/19. Homestake occasionally ships samples to laboratories under the “excepted package” (UN 2910) designation which does require following most of the Class 7 radioactive materials requirements except for triennial training and contamination limits. Five coolers with environmental samples were shipped to either ELI or Pace Analytical in 2020. The coolers were surveyed to document that they met the contamination requirements. The ARSO or RST performed the surveys. All contaminated media samples originating from the site are considered 11.e(2) material.

Safety meetings are held weekly and are attended by all available Homestake staff. Meeting subjects are not limited to radiation safety but may cover any aspect of occupational or environmental safety. A sample of safety meeting logs was reviewed. The subjects were appropriate, and attendees signed the log sheet. The Safety Meeting on 9/25/20 included a fire drill. The ARSO meets with the RST and other staff on a weekly basis to tour the site and review operations. The site tours are documented in the monthly ALARA Reports (HMC, 2020a). The RSO tours the site on a monthly basis, though in 2020 COVID-19 circumstances curtailed these site visits to some extent.

### 2.3 Inspection Reports

Daily site inspections are conducted primarily by the RST and by his designee in the absence of the RST or the ARSO. License Amendment 56 (6/24/20) approved the use of a designee to conduct daily inspections. A view of the records showed a few gaps in the daily inspection reports in the first half of the year due to lack of personnel on some holidays and weekends. There were no gaps in daily inspections from mid-July, after qualified designees had been trained, through the end of 2020. The designee training was reviewed and found to be appropriate. A sample of the daily inspection reports was reviewed. The inspection reports were helpful in documenting work on site, identifying problems and follow up. **The detail in the daily site inspection reports is a best practice.**

Weekly site inspections are conducted by the RSO and/or the ARSO. The observations are documented in the monthly ALARA Reports submitted by the ARSO. The narrative in the reports is complete and very useful. (There was no documented weekly inspection on April 1, 2020 due to COVID-19 restrictions.) **This is a best practice.**

The NRC conducted a remote routine on-site inspection from July 22-30, 2020. There were no violations identified. Two violations from the previous inspection were reviewed by the NRC and closed. One previous violation related to the procedures for the reverse osmosis system remained open pending a walkdown of the procedure during a subsequent inspection. A supplemental on-site inspection was conducted on September 16, 2020 at which time the inspector walked down the reverse osmosis procedure and closed out the previous violation. No violations were identified.

## 2.4 Contamination Surveys

Personal contamination surveys are conducted by contractors trained by the radiation safety staff to perform the surveys in accordance with the requirements of specific RWPs. When personnel exit surveys are required under an RWP, workers are required to scan out at the boundary of the corresponding temporary restricted area. Previously, workers scanned out at the radiation safety office. Contractors working on the LTP project (RWP 10-2020) scanned out in a shed in that area. The scan station located by the RO plant is still present but not used unless there is a project at that facility or nearby ponds. The alpha count rate is recorded by hand on Form EDF-15, Personal Contamination Survey Log. According to Procedure SOP 12, the release limit for personal contamination is background. The scan records are included with specific RWPs.

The HMC Personnel Contamination Survey Form (EDF-15) is somewhat ambiguous in that it lists the instrument used (Ludlum Model 2360/43-93 probe) and the calibration date but does not specifically state that the counts recorded are alpha counts. The ARSO corrected this issue during the audit. The forms will now state that the measurement is alpha activity. The daily background measurement is recorded on each form. On many of the forms, the recorded background was unusually high, in the range of 10 to more than 40 counts per minute while the survey measurements were generally less than 10 c/m. This is not reasonable. The issue was discussed, by email, with the ARSO. Background measurements taken in the morning prior to work tend to be unusually high. Moving forward, background measurements will be taken twice a day to obtain a more reasonable value to compare with the survey measurements. The calibration dates listed on a portion of the personnel contamination survey forms (EDF-15) and found to be consistent with the instrument calibration data.

Equipment release surveys are generally conducted by the RST using a Ludlum Model 43-93 alpha/beta probe coupled to a Model 2360 meter as part of specific RWPs. In some instances, as deemed advisable, the RSO or ARSO may require equipment release surveys for activities that didn't warrant an RWP (as a conservative ALARA protocol). Wipe tests are not necessary unless the measured surface activity exceeds the removable activity limit. The administrative limit is 200 disintegrations per minute (d/m) alpha or beta per 100 square centimeters (d/m-100 cm<sup>2</sup>). Monitoring data are recorded on Form EDF-5 and are included in the documentation for the RWP, or in a "miscellaneous surveys" folder. The method for determining the counting efficiency for alphas was clarified in that the count per  $2\pi$  disintegration, i.e., efficiency, is multiplied by a factor of 0.25 to account for geometry and actual scan efficiency in the field, as per ISO 7503-1 Annex. The equipment scan records are generally included with the RWPs.

Contamination surveys in clean areas have been conducted weekly since late 2018. A total of 52 clean area surveys were documented in 2020. All areas met the required contamination limit. Results of clean area surveys are recorded on EDF-4 or EDF-5, Radiological Contamination Survey Form.

## 2.5 Radiation Work Permits

Work areas under RWPs are designated as restricted areas with requirements for personal contamination and equipment release surveys unless otherwise specified. Eleven RWPs were issued in 2020. Two additional work permits were carried over from previous years. RWPs include a field level risk assessment (FLRA) to cover general safety issues. The 2020 and open 2019 RWPs remaining open in 2020 are listed in Table 2, below:

Table 2. Radiation Work Permits Issued in 2020 and Carried Over From 2019

ID	Issue Date	Subject	Bioassay	Other Monitoring	Workers trained	Date Closed Out
1-2020	1/13/20	Collection Pond sludge and liner removal	yes	Breathing zone monitoring	8	3/18/20
2-2020	4/1/20	Sludge cleanup from leaking blowdown pump seal	No	personal and equipment surveys	3	4/16/20
3-2020	5/4/20	Earthwork and relining collection pond	No	contamination surveys	16	6/11/20
4-2020	6/8/20	Placement of soil liner over exposed EP-1 liner damage	No	Contamination surveys	1	6/25/20
5-2020	7/8/20	Annual RO maintenance	yes	BZ sampling	6	7/22/20
6-2020	7/16/20	Prepare clean fill for EP-1 south berm	No	contamination surveys	6	8/12/20
7-2020	7/15/20	Clean out weeds inn 1200 GPM zeolite trains	no	Contamination surveys	4	8/12/20
8-2020	8/14/20	Inspection of clarifier 2	yes	Contamination surveys	5	9/10/20
9-2020	8/19/20	Removal of columns in LTP shed	no	Contamination surveys	3	8/26/20
10-2020	8/25/20	Well abandonment in LTP	yes	Scanning – issue of improper scanning by crew addressed and documented	12	still active in 2021
11-2020	12/04/20	Pipe removal on LTP	Yes	BZ monitoring for worker cutting pipe Contamination surveys	6	1/13/21
10-2019	8/8/18	Annual RO Maintenance	Yes	Contamination surveys	4	8/27/19
11-2019	9/20/19	Collection pond and liner removal	Yes	Contamination surveys	5	terminated 10/10/19 for re-evaluation
12-2019	10/13/18 extended to 1/31/21	RO Plant Clarifier rebuild	yes	self-frisking exceedance covered in 2019 ALARA audit	10	1/27/20

## 2.6 Radiological Effluent and Environmental Monitoring Data

Applicable sections of the Semi-Annual Environmental Monitoring Report for January through June (HMC,2020b), as well as the Semi-Annual Environmental Monitoring Report for July through December 2020 (HMC, 2021) were reviewed. The public dose calculations were

reviewed and found to be accurate. Calculated effective doses from all three pathways, radon, direct gamma, and air particulates, were less than half of the 100 mrem annual dose limit. The doses from direct gamma radiation and air particulates were less than 25 mrem/y.

Air monitoring data, radionuclide concentrations in airborne particulates and radon gas, as well as environmental gamma radiation dose rates are provided in the monthly ALARA Reports (HMC, 2020a). The laboratory reports were reviewed as well. Radionuclide concentrations in airborne particulate matter are monitored at seven locations around the site, including four locations at the property boundary in the predominant downwind directions, two locations at the boundary representing the nearest occupied residences, and one background location. Filters are exchanged weekly and composited quarterly for analysis by a contract laboratory for U-nat, Th-230, and Ra-226. ELI was used for the first quarter of the year with Pace Analytical for the remaining quarters. The radionuclide data for 2020 were reviewed. No trends or anomalous results were observed. With the exception of uranium in the third quarter and fourth quarter, all concentrations were less than 1 % of the 10CFR20, Appendix B effluent limits. Uranium concentrations in the third and fourth quarter were 3% and 1.4% of the applicable effluent limit, respectively. The required flow rate was not attained in the third quarter of 2020 for air monitoring stations HMC1 and HMC1A due to air sampler power issues and calibration down time (as per December ALARA Report).

The environmental gamma dose rates for 2017 through 2020 are shown in Table 3. There are no obvious trends in the data. (Measurements have been taken at HMC 1OFF routinely in the past but not reported.)

Table 3: Environmental Gamma Monitoring Results

Location	2017 Total	2018 Total	Q1-Q2 2019	Q3-Q4 2019	2019 Total	Q1-Q2 2020	Q3-Q4 2020	2020 Total
	mrem	mrem	Mrem	mrem	Mrem	mrem	mrem	Mrem
HMC 1	112	115.5	57.5	58.0	124	65.3	62.9	128.2
HMC 1A	112	118.7	56.8	59.9	117	61.2	63.5	124.7
HMC 1 OFF						66.2		
HMC 2	121	133.8	70.3	63.5	132	64.1	70.3	134.1
HMC 3	110	123.6	58.0	65.6	130	59.8	65.2	125.0
HMC 4	128	129.9	61.1	68.8	150	66.4	74.6	141.0
HMC 5	125	130.7	65.6	65.1	136	65.5	62.9	128.4
HMC 6	120	129.6	67.3	62.3	129	65.3	67.6	132.9
HMC 16 Bkgd	108*	116.8	59.5	57.3	124	Lost badge	58.0	116.0*

\*The 2017 Q1-Q2 dose was pro-rated for the entire year due to the loss of the Q1 environmental dosimeter; the 2020 dose was also pro-rated for the entire year due to loss of the Q1 environmental dosimeter.

Environmental radon gas concentrations have been monitored at ten locations on the site or at the site perimeter as well as in the RO Building and the Mill Office Building using alpha track detectors supplied by Radonova Laboratories (Rapidos) since 2017. Landauer alpha track detectors were deployed prior to 2017. Two detectors are currently co-located at each outdoor monitoring station with the measured concentrations averaged. Single detectors are deployed in the RO Building and the Mill Office Building.

The quarterly radon concentrations for 2019 and 2020 are shown Table 4a. Annual average concentrations for the years 2016 through 2020 are shown in Table 4b. As expected, the highest indoor radon concentrations in the office tend to occur during the first and fourth quarters (fall/winter months) most likely due to reduced ventilation during colder months. The annual average radon concentrations in the RO plant have decreased over the past four years. This may represent a trend or normal fluctuations due to differing weather conditions. The annual average concentrations in 2020 increased somewhat above the previous average concentrations almost entirely due to a general increase in radon concentrations in the fourth quarter of 2020 at all locations, including background indicating that this increase was due to atmospheric conditions rather than being site-related. The Environmental Monitoring Program is described in detail in the Semi-Annual Environmental Monitoring Reports (HMC, 2020b, 2021).

Table 4a: Quarterly Radon Gas Concentrations

Location	Quarterly and Annual Average Radon Concentrations (pCi/L)									
	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2019 Ave.	2020 Q1	2020 Q2	2020 Q3`	2020 Q4	2020 Ave.
HMC1	0.51	0.54	0.81	0.95	<b>0.70</b>	0.67	0.78*	0.65	1.2	<b>0.83</b>
HMC1A	0.56	0.45	0.77	0.75	<b>0.63</b>	0.58	0.60	0.62	1.1	<b>0.73</b>
HMC1OFF	0.61	0.49	0.77	0.88	<b>0.68</b>	0.68	0.46	0.61	1.15	<b>0.73</b>
HMC2	0.62	0.59	0.77	1.1	<b>0.77</b>	0.79	0.62	0.76	1.25	<b>0.86</b>
HMC3	0.49	0.43	0.56	0.81	<b>0.57</b>	0.56	0.44	0.54	0.99	<b>0.63</b>
HMC4	0.68	0.51	0.75	1.0	<b>0.73</b>	0.65	0.53	0.58	1.3	<b>0.77</b>
HMC5	0.59	0.42	0.64	0.87	<b>0.63</b>	0.64	0.91*	0.71	1.15	<b>0.76</b>
HMC6	0.47	0.38	0.75	0.71	<b>0.58</b>	0.57	0.49	0.58	0.96	<b>0.65</b>
HMC7	0.65	0.45	0.73	0.79	<b>0.65</b>	0.70	0.53	0.67	1.05	<b>0.74</b>
HMC16	0.28	0.22	0.42	0.42	<b>0.34</b>	0.37	0.30	0.34	0.61	<b>0.41</b>
HMC Office	2.2	1.80	1.5	1.6	<b>1.78</b>	2.4	1.4	1.4	2.7	<b>1.98</b>
R. O. Plant	0.68	0.57	0.95	1.0	<b>0.80</b>	0.68	0.97	1.0	1.5	<b>1.04</b>

\*Co-located detectors showed significant difference.

Table 4b: Annual Average Radon Gas Concentrations

Location	Annual Average Radon Gas Concentration (pCi L <sup>-1</sup> )				
	2016 Ave.	2017 Ave.	2018 Ave.	2019 Ave.	2020 Ave.
HMC1	0.91	0.73	0.80	0.70	0.83
HMC1A	0.94	0.62	0.73	0.63	0.73
HMC1OFF	0.95	0.68	0.79	0.68	0.73
HMC2	0.97	0.72	0.93	0.77	0.86
HMC3	0.72	0.57	0.71	0.57	0.63
HMC4	0.1.1	0.71	0.89	0.73	0.77
HMC5	0.91	0.68	0.84	0.63	0.76
HMC6	0.92	0.69	0.69	0.58	0.65
HMC7	0.85	0.69	0.81	0.65	0.74
HMC16	0.49	0.32	0.35	0.34	0.41
HMC Office	1.46	1.57	2.05	1.78	1.98
R. O. Plant	2.03	1.58	1.28	0.80	1.04

Radon flux from the LTP and STP were measured in May and June 2020. Canisters were placed on the STP on May 5-6, 2020 and on the LTP on June 8-9, 2020 as described in a report prepared by ERG for Homestake (ERG, 2020). The radon flux on the STP averaged over the entire area was  $4.62 \text{ pCi m}^{-2}\text{-s}^{-1}$ . The radon flux on the LTP was  $22.45 \text{ pCi m}^{-2} \text{ s}^{-1}$ . The average measured flux on the STP in 2019 was  $10.5 \text{ pCi m}^{-2} \text{ s}^{-1}$ . The average measured flux on the LTP was  $35.4 \text{ pCi m}^{-2} \text{ s}^{-1}$  in 2019. The measured flux for both tailings impoundments were significantly lower than for 2019.

## 2.7 Instrument Calibration Record

Instruments are calibrated semi-annually in accordance with license conditions and previous license commitments. NRC Regulatory Guide 8.30 guidelines require annual calibration (NRC, 2002b). Calibration records were reviewed.

The instruments are checked for reproducibility daily when in use in accordance with Regulatory Guide 8.30. The Model 19 microR meters are checked against a Cs-137 source; alpha meters against a Th-230 source; and beta meters, against a Tc-99 source. Two Cs-137 sources have been used in the past for the daily checks. The initial activities for the sources at the time of calibration were  $4.44 \text{ } \mu\text{Ci}$  and  $1.275 \text{ } \mu\text{Ci}$ . The sources are both more than 25 years old; however, the activities were corrected for decay in 2016. The current exposure rate from the lower activity source (initially  $1.275 \text{ } \mu\text{Ci}$ ) has decreased significantly due to decay to the point where it is no longer useful so the daily checks are performed with the higher activity source only. The exposure rate check is used only to demonstrate reproducibility from day to day so the actual activity is not a critical factor.

Table 5: Instrument Current Calibration Dates

Instrument Type	Meter - Ludlum Model # (Serial #)	Probe - Ludlum Model # (serial #)	Most recent Calibration Dates
Alpha/beta scaler	3030 (210768)	NA*	7/22/19 1/21/20 8/24/20
MicroR meter	Model 19 (310400)	NA	8/29/19 3/10/20 9/15/20
MicroR meter	Model 19 (82709)	NA	9/17/19 3/25/20 8/26/20
Alpha	12 (102859)	43-5 (082781)	9/17/19 3/25/20 No longer in use
Alpha	12 (87919)	43-5 (077534)	9/3/19 3/10/20 No longer in use
Alpha/Beta scaler	3030 (245268)	NA	8/30/19 2/28/20 9/8/20
Alpha/Beta survey meter	2360 (334038)	43-93 (372633)	8/29/19 3/10/20 9/15/20
Alpha/Beta survey meter	2360 (184920)	43-93 (199831)	Initial calibration 9/25/19 4/21/20 No longer in use
Alpha/Beta survey meter	2360(334005)	43-93 (372636)	9/17/19 3/25/20 8/26/20

\*NA = not applicable

## 2.8 Review of Standard Operating Procedures and SERPs

Standard Operating Procedures are contained in the RPPM (HMC, 2019) and the Homestake Manual of Standard Practices Policy Guidance Documents and Standard Operating



Procedures. A single controlled copy of these documents is maintained in the office of the CM. All procedures were reviewed as part of the self-assessment required under the 2017 NRC Confirmatory Order. The RPPM was last revised in 2019 (Revision 3).

There were no Safety and Environmental Review Panel (SERP) evaluations conducted in 2020. In 2019, a SERP document was prepared for liner replacement in EP1; however, the project was postponed and has not been implemented. HMC is not authorized to perform SERPS at this time..

## 2.9 Source Leak Tests

Three sources used for instrument calibrations (Th-230, Tc-99, and Cs-137) are leak tested annually. The most recent leak tests were conducted on June 11, 2020. All leak tests showed removable activity below the required 0.0005  $\mu\text{Ci}$  limit.

Sources that are not currently in use are stored in a locked source cabinet with “Caution, Radioactive Materials” signage. As noted in previous ALARA Audit reports, the exposure rates at the surface of the source cabinet, measured in January 2017, ranged from approximately 75  $\mu\text{R/hr}$  at the front to a maximum of 250  $\mu\text{R/hr}$  at the side. A wipe test performed on the source cabinet at that time showed alpha and beta counts in the range of background levels. Because of COVID-19 restrictions it was not possible to check the source cabinet during this audit.

A total of 59 sources are listed in the June 6, 2019 inventory. The source inventory was checked in August, 2018. All sources were accounted for. The four sources currently in use, (Th-230 [15,520 d/m], Tc-99 [12,670 d/m], Cs-137 [1.275  $\mu\text{Ci}$  as of 10/6/80] and Cs-137 [4.44  $\mu\text{Ci}$  as of 10/26/90]), are stored in the source cabinet. (Note: The lower activity Cs-137 source is no longer routinely in use.)

## 2.10 Review of Radiation Protection Data and Exposure Control

Radiation protection data, including personal dosimetry, bioassay results, and RWPs, indicate that the program is protective of worker radiation health. No deficiencies were found. The results of the bioassay and personal dosimetry monitoring are described in Sections 2.1.1 and 2.1.3, respectively.

Radon concentrations were measured in two occupied or potentially occupied locations on the site using alpha track detectors. The results are shown in Table 6. Radtrak detectors supplied by Landauer were used until third quarter 2016 when Landauer discontinued that line. Since that time, Rapidos detectors supplied by Radonova Laboratories have been used for both indoor and outdoor radon concentration measurements. The Rapidos detectors are more sensitive than the previously used Radtrak detectors and tend to be more consistent. As a result, rather than three detectors, as was the case previously, two radon detectors are deployed at the outdoor environmental monitoring locations and one each at indoor locations within the HMC office and RO plant. Measurements in the occupied indoor locations, are in the range of average indoor values for the United States, i.e. approximately 1 pCi/L to 3 pCi/L. All annual average radon concentrations were less than the EPA guideline for residences. Ventilation in the RO Building appears to be operating properly to control radon concentrations. The radon concentrations in the RO plant have decreased slightly over the past five years. It is not clear whether this is a trend or simply due to normal variation.



Table 6: Radon Concentrations for Monitored Indoor Locations

	HMC office (pCi/L)	RO Plant (pCi/L)
2015	2.0	2.5
2016	1.46	2.03
2017	1.57	1.58
2018	2.05	1.28
2019	1.77	0.88
2020	1.98	1.04

## 2.11 Unusual Events

There were no unusual events reported in 2020.

## 2.12 Review of 2019 Audit Findings and Recommendations

The 2019 ALARA Audit contained one recommendation as follows (Sopris, 2020):

Recommendation: All laboratory results should be reviewed for consistency with previous data and apparent discrepancies investigated as soon as practicable after receipt at HMC.

The recommendation was followed. For example: an error was discovered in the Q3 air particulate concentration report from Pace Analytical shortly after receipt. It was corrected and resolved within a few weeks after receipt of the initial report.

# 3.0 SUMMARY OF AUDIT

## 3.1 Findings

There were no Findings from this ALARA Audit. A few minor suggestions were addressed during the audit. The ALARA program at the Homestake facility complies with license conditions, regulatory requirements and the guidance provided by US NRC Regulatory Guide 8.31 (NRC, 2002a). Regulatory Guide 8.31 requires the ALARA Audit to review of trends in personnel exposure. Quarterly doses for badged workers are very low, generally below the reporting limit of 1 mrem, and have been consistent for the last seven years. The annual worker TEDEs for 2018, 2019 and 2020 were calculated assuming a value of 1 mrem for OSL deep doses reported as “M” or non-detect. The TEDE includes the calculated internal dose as well. Due to the current inclusion of estimated internal doses based on RWP air monitoring, it is not possible to compare the data from previous years to current worker dose estimates. However, the doses are so low (in most cases OSL deep doses reported as non-detect), there are no trends to report. The maximum worker annual TEDE for 2021 was 22 mrem, somewhat less than for 2019 and approximately the same as for 2018. There are no discernable trends in environmental radon, air particulates or direct radiation measurements except for indoor radon in the RO building where average annual concentrations appear to be decreasing. Calculated public doses have been generally consistent for the past few years.

## 3.2 Summary of Recommendations

Minor recommendations, addressed during the Audit, include: (1) clarification on the personal survey (form to specify that the measurement is alpha count and (2) ensure that background counts are representative of the conditions that exist at the time of the personnel surveys.

Based on the number of lost badges recorded in 2020, it is recommended that use and care of badges be stressed in training as long as such personal monitoring is required.

### 3.3 Significant Improvements in 2020

Documentation of daily and weekly site inspections continue to show improvement.

**Best practice: As with 2019, the Monthly ALARA reports include a helpful narrative of the weekly ARSO site inspection.**

**Best practice: The daily site walk-over inspections, now conducted by a qualified designee when the RSO, ARSO or RST is not present on site, include observations of potential radiological or safety issues as well as, in some cases, commentary on actions that had been taken to mitigate previously identified conditions.**

Based on the records review, the radiation protection program at the Homestake facility is well-designed and continues to operate at a high level of competence. The current COVID-19 pandemic did not allow for a site tour so the actual on-site conditions could not be evaluated. However, the narratives in the monthly ALARA Reports allowed the auditor to conclude that the site is operating in a way that protects workers and the environment.

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**APPENDIX D**  
**INSPECTION OF TAILINGS PILES AND PONDS**  
**AND**  
**ELEVATION SURVEY OF THE SETTLEMENT**  
**MONUMENTS ON TOP OF THE LARGE**  
**TAILINGS PILE SETTLE**



## **Grants Reclamation Project 2020 Annual EOR Inspection**

Annual Inspection of Tailings and  
Evaporation Ponds

March 24, 2021



Prepared for:

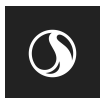
Homestake Mining Company of California

Prepared by:

Stantec Consulting Services Inc.

## Revision Record

Rev.	Description	Author		Quality Check		Independent Review	
0	Draft for HMC review	S. Downey	01/27/21	M. Davis	3/17/21	C. Strachan	3/17/21
1	Final for HMC			M. Davis	3/24/21		



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## Executive Summary

This report documents the 2020 site visit and annual Engineer of Record (EOR) inspection of the tailings impoundments and evaporation ponds at the Homestake Mining Company of California (HMC) Grants Reclamation Project (GRP) site, near Grants, New Mexico. Stantec Consulting Services Inc. (Stantec) serves as the EOR for the tailings impoundments and evaporation ponds. The site visit for this inspection was conducted by HMC and Stantec personnel on November 20, 2020.

Stantec visually inspected the crests, toes, slopes, and liners along the crests of the three evaporation ponds (Evaporation Pond-1, Evaporation Pond-2, Evaporation Pond-3) as well as the tops and outslopes of both tailings impoundments (Small Tailings Pile and Large Tailings Pile). The weather was sunny to partly cloudy with temperatures in the low-50s to mid-60s during the site visit. The ground surface was dry. The inspection observations are summarized below by facility.

### ***Large Tailings Pile***

Stantec personnel walked the Large Tailings Pile (LTP) toe and crest during the inspection and observed the side slopes from both the toe and crest. There was evidence of animal burrows or damage from wildlife along the slopes of the LTP. The downdrains installed around the LTP perimeter appeared in good working condition along the side slopes and toe of the LTP. The buried French drains and sumps in the slopes and at the toe of the LTP continue to collect interstitial water draining from the LTP tailings. The top surface and crest of the LTP appeared in stable condition. Rilling was present (up to 6 inches deep) in a few areas on north portions of the LTP top cover surface. Stantec observed the repairs made by HMC to the recurring sinkholes on the south crest of the LTP. The repairs included filling the sinkholes with grout and construction of a berm adjacent to the north side of the road. A low spot between downdrains 11 and 2, where sinkholes have been recurring, is still present.

Plugging and abandonment of injection, recovery, and monitoring wells on top of the LTP began in 2018 and is scheduled for completion in 2021. HMC plugged and abandoned 394 tailings wells on the top surface of the LTP in 2020. Six permitted wells will remain in place after well abandonment is complete, in addition to a few other existing well locations to be agreed upon with the regulatory agencies in 2021.

The water levels within the tailings are trending as expected. The majority of piezometers show a downward trend and overall decrease in water elevation. Stantec recommends continued monitoring of the piezometers that remain in place after the well abandonment program is complete.

The 2020 settlement monument survey indicates that, of the 46 settlement monuments found and surveyed, 45 showed either no change or minor settlement ranging from 0.01 to 0.20 feet, compared with the 2019 survey. The E5 monument showed a minor rise in elevation (0.01 feet) since 2019. Five settlement monuments were reported missing (B3, B10, C8, C11, and D8). These monuments have been missing or have no data reported since 2008 or earlier. B4 and B11 have been listed as damaged since 2018. Two instruments were reported as damaged (B7 and C7) in 2020.



### ***Small Tailings Pile***

Stantec personnel walked the Small Tailings Pile (STP) toe and crest during the inspection and observed the side slopes from both the toe and crest. HMC conducted annual maintenance in August on the STP side slopes by grading and compacting the side slopes. The rills on the north slope are becoming deeper under the erosion control blanket and Stantec recommends repairing the rills. HMC started a new trash pit on the south triangle area to the west of the previous location. Stantec also observed windblown salts on the west and north outslopes, as well as in some areas near the south toe of the STP.

Evaporation Pond 1 (EP-1) is on top of the STP. Stantec personnel walked portions of the toe and crest of EP-1 during the inspection. The evaporators were operating during the visit. The pond is operating at a reduced capacity due to damage on the liner on the south interior embankment slope from placing the West Collection Pond sludge. There are also five holes (less than 2-inch in diameter) that developed in the liner on the north interior embankment slope in 2020. Stantec recommends that HMC continue to operate EP-1 at reduced capacity. The operating water level should be kept at a minimum of 2 feet below the damaged liner area at the south embankment and below the holes in liner at north embankment.

### ***Evaporation Pond 2***

The toe and crest of Evaporation Pond 2 (EP-2) were walked during the inspection. The upstream embankment slopes are lined with a dual HDPE liner system. The upstream embankment slopes and liner were in stable condition during the inspection. The pond crest and crest road were also in good condition during the inspection. The downstream embankment slopes are covered with 2-inch sized basalt gravel and were stable, with no major rilling observed. Stantec reviewed the leak detection and removal system (LDRS) pumping records for EP-2.

### ***Evaporation Pond 3***

Stantec personnel walked portions of the toe of Evaporation Pond 3 (EP-3) and the crest during the inspection. The upstream embankment slopes are lined with a dual HDPE liner system. The upstream embankment slopes and liner were in good condition during the inspection. The pond crest and crest road were in good condition during the inspection. A metal bollard near on the pond crest near the northeast corner had been damaged during evaporator maintenance and was slated by HMC for repair. Rill management was performed on the outer slopes in August 2020 and the embankments were in good condition. Stantec reviewed the LDRS pumping records for EP-3.

### ***Recommended Action Items***

Stantec identified ten recommendations from the 2020 site inspection, primarily related to erosion control and drainage management. Four recommendations are carryover action items from 2018 and 2019, three recommendations are updated from 2018, and three recommendations are new. One action item is rated as “high” priority; to continue to operate EP-1 at reduced capacity. Seven action items are rated as “medium” priority and two action items are rated as “low” priority.

Stantec recommends that annual tailings inspections continue on the current schedule, with the next inspection in November 2021. HMC site personnel should continue regular facility inspection and should report changing



## 2020 ANNUAL EOR INSPECTION

conditions to the EOR. The action items in this report should be tracked throughout the year by HMC and the EOR for progress and reviewed during the 2021 inspection.



## Abbreviations

ACL	Alternate Concentration Limit
ALR	action leakage rate
COC	constituent of concern
DOE	Department of Energy
DP	discharge permit
EAP	Emergency Action Plan
EOR	Engineer of Record
EP-1	Evaporation Pond 1
EP-2	Evaporation Pond 2
EP-3	Evaporation Pond 3
EPA	Environmental Protection Agency
gpd	gallons per day
gpm	gallons per minute
GRP	Grants Reclamation Project
HDPE	high density polyethylene
HMC	Homestake Mining Company
LDRS	leak detection removal system
LTP	Large Tailings Pile
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
NMPM	New Mexico Principal Meridian
NPL	National Priority List
NRC	Nuclear Regulatory Commission



## 2020 ANNUAL EOR INSPECTION

O&M	operations and maintenance
PE	Professional Engineer
RO	reverse osmosis
SOP	standard operation procedure
STP	Small Tailings Pile
TDS	total dissolved solids
tpd	tons per day
UMTRCA	Uranium Mill Tailings Radiation Control Act
WCP	West Collection Pond



## 1.0 INTRODUCTION

This report documents the 2020 site visit and annual Engineer of Record (EOR) inspection of the tailings impoundments and evaporation ponds at the Homestake Mining Company of California (HMC) Grants Reclamation Project (GRP) site. As EOR for the Site, Stantec is required to annually inspect the stability and functionality of the tailings impoundments and evaporation ponds per Nuclear Regulatory Commission (NRC) Radioactive Materials License SUA-1471, Condition 12 and New Mexico Environment Department (NMED) Discharge Permit (DP) DP-200, Condition 52i. HMC and Stantec personnel conducted the site visit and inspection on November 20, 2020.

The GRP site is approximately 4.5 miles north of the Village of Milan, Cibola County, New Mexico, USA. New Mexico State Highway (NM) 605 is located east of the site and United States Route 66 is located south-southwest of the site. The main area of the site falls within Sections 22, 23, and 26 of Township 12 North, Range 10 West. HMC owns approximately 14,000 acres over 22 Township Sections (over 22 square miles), which includes the GRP site and surrounding areas.

This is the third annual inspection conducted by Stantec. Stantec has reviewed previous inspection documentation for inspections conducted by the previous EOR (Alan Kuhn) from 2002 to 2017.

For reference purposes, the site typically operates in a modified NAVGD29 elevation datum. References to elevation in this document are based on the HMC control network. NAVD88 elevations are 3.25 feet above the elevations presented in this report.

## 1.1 OPERATIONAL INFORMATION

Uranium milling operations occurred at the Homestake Facility from 1958 until 1990. Homestake's milling facilities were constructed and originally operated as two distinct partnerships, with Homestake Mining Company acting as the managing partner of both. The larger mill was organized as Homestake-Sapin Partners, with a nominal milling capacity of 1,750 tons per day (tpd). The smaller mill was organized as Homestake-New Mexico Partners with a nominal milling capacity of 1,650 tpd. Both mills were designed to be alkaline leach-caustic precipitation processes for concentrating uranium oxide from ores with average grades of 0.05 to 0.30 percent  $U_3O_8$ . The mills operated independently, each with its own tailings impoundment, until 1961, when the partnerships were merged. Homestake-Sapin Partners was the surviving organization. In 1968, United Nuclear Corporation acquired an interest in the partnership, which was bought out in 1981, leaving HMC as the sole owner. In 2001, Barrick Gold Corporation of North America purchased HMC.

The majority of the mill structures were decommissioned between 1993 and 1995, with some structures left in place to support the continuing groundwater restoration program that initiated in 1977. The current structures at the project site are related to the operation and maintenance (O&M) of the continuing groundwater restoration program and the tailings impoundments.

The groundwater restoration program utilizes two zeolite treatment systems and a reverse osmosis (RO) treatment plant. Treatment residuals are managed in three evaporation ponds, which remove water and leave behind constituents of concern (COCs) as salts in the bottom of the ponds. The site COCs are uranium, selenium, molybdenum, sulfate, chloride, total dissolved solids (TDS), nitrate, vanadium, thorium-230, radium-226, and radium-



228. The 2020 Groundwater Corrective Action Program (HMC, 2020) shows that long-term groundwater correction action to restore aquifers to groundwater protection standards is not practical. HMC is in the process of developing and submitting an application to the NRC for Alternate Concentration Limits (ACLs) for affected aquifers. Conclusion of groundwater restoration activities depends on regulatory approval of ACLs.

## 1.2 TAILINGS PILE AND EVAPORATION POND DESCRIPTIONS

Two tailings impoundments were constructed on the GRP site. The first and smaller of the two impoundments, the Small Tailings Pile (STP), contains 1.22 million tons of tailings from ore milled under contracts with the federal government. It is located in the SE ¼ and SW ¼ of Section 26, Township 12 North, Range 10 West, NMPM.

The second and larger of the two impoundments, the Large Tailings Pile (LTP), located in the N ½, Section 26, Township 12 North, Range 10 West, NMPM, contains comingled tailings from ore milled under both federal government (11.41 million tons) and commercial contracts (10.89 million tons). Until 1966, HMC deposited tailings into only one cell of the LTP. Subsequently, HMC added a cell adjacent to and west of the first cell. From 1966 until 1990, tailings disposal alternated between the two cells (east and west) as necessary to maintain optimal operating conditions. Figure 1 shows the locations of the tailings impoundments and the other site features.

Three evaporation ponds (EP-1, EP-2, and EP-3) were built on site between 1990 and 2010 to contain treated water from the groundwater restoration activities. The evaporation ponds were constructed to hold and evaporate water pumped from the collection wells of the groundwater restoration system. Water is transferred between the three ponds as part of the overall water and management system. Additional information on the design and construction of the tailings impoundments and evaporation ponds is included in Section 6.0.





## **2.0 DOCUMENT AND DATA REVIEW**

HMC provided Stantec with reports and data prepared for the site since the previous EOR inspection. Data and documents received in 2020 include:

- Piezometer readings
- LTP collection wells and drainage sumps data
- Historic LTP collection well and drainage sump data
- Leak detection sump discharge monitoring for EP-2 and EP-3 recorded weekly by HMC
- Pond levels recorded weekly by HMC
- Settlement monitoring survey of the LTP by Hammon Enterprises, Inc.

Stantec personnel reviewed these documents prior to and following the site visit.



## 3.0 SITE VISIT

Melanie Davis of Stantec and EOR for the tailings impoundments and evaporation ponds conducted the inspection. Reginald Shirley, HMC's Site Engineer, accompanied Melanie during the site visit.

Following the annual inspection, Melanie Davis discussed observations and action items with Reginald Shirley and Brad Bingham of HMC. Stantec and HMC agreed on the deficiencies found during the inspection and the necessary corrective actions. Section 9 summarizes these observations and recommended actions.



## 4.0 ANNUAL INSPECTIONS

Stantec personnel visually inspected the crests, toes, slopes, and liners along the crests of the three evaporation ponds (EP-1, EP-2, and EP-3) as well as the tops and outslopes of both tailings piles (STP and LTP). The weather during the site visit was sunny to partly cloudy with temperatures ranging from the low-50 to mid-60 degrees Fahrenheit. The ground surface was dry. Appendix A includes tailings pile and pond inspection safety checklist forms.

### 4.1 SAFETY INSPECTION FORMS AND PHOTO LOG

Stantec recorded observations and other findings during the inspection on a standard dam safety inspection form. The inspection categories and items in the form provide a comprehensive evaluation in accordance with internationally-accepted industry practice. A form was completed for each structure listed above (Appendix A). Select photographs taken during the site visit are included in a photo log (Appendix B).

### 4.2 LARGE TAILINGS PILE

#### 4.2.1 Inspection

Stantec personnel walked the LTP toe and crest during the inspection and observed the side slopes from both the toe and crest. The tailings side slopes are covered with riprap ( $D_{50} = 8$  inches) and natural vegetation, and were in stable condition during the inspection. Windblown sediments existed near the top of the outslopes of the LTP, likely from the top of the LTP. The windblown sediments cause the slopes to appear uneven or vary in grade from the top to the bottom of the slope. There was evidence of animal burrows or damage from wildlife along the slopes of the LTP.

The downdrains installed around the LTP perimeter appeared in good condition along the side slopes and toe of the LTP. Water injection into the LTP ceased in 2015 (AKA, 2016). The buried French drains and sumps in the slopes and at the toe of the LTP continue to collect interstitial water draining from the LTP tailings. At the time of the inspection, the ground surface at the toe around the LTP was dry. Salt precipitate was observed along the north toe and the southwest toe of the LTP (near the RO Plant).

The top surface and crest of the LTP was generally in stable condition. Rilling present during the 2019 inspection on the south and north side of the LTP top surface was repaired by HMC in August 2020. Rilling was present (up to 6 inches deep) in a few areas on north portions of the LTP top cover surface during the 2020 inspection. HMC repaired the sinkhole on the south side of the LTP near the crest by downdrain 11 that was present during the 2019 inspection, as well as three other sinkholes that appeared in September 2020. The area between downdrains 11 and 12 where the sinkholes have been recurring remains to be a low spot. Stantec recommends HMC add and compact material between these downdrains to mitigate pooling of water and recurring sinkholes in this area. HMC constructed a berm on the inside edge of the access road and Stantec suggested to make a cut in a few locations along the berm to allow the water to flow across the road and into the downdrains and not pond on the upgradient edge of the berm.

The zeolite plant facilities on the LTP appear stable with no apparent impact on the stability of the LTP. HMC installed new piping near the southwest corner of the 1200 gpm zeolite plant facilities in 2018 and partially repaired the berm at the toe and side slope above the installed piping (see Appendix B, Photo 13) where the berm material was partially



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removed. Stantec recommended in 2018 that HMC complete repairs to the berm so that slope stability is not compromised.

HMC's subcontractor was on site performing well abandonment on the LTP. Photos of well abandonment activities are included in Appendix B. HMC plugged and abandoned 156 tailings wells on the top surface of the LTP in 2020. Plugging and abandonment of injection, recovery, and monitoring wells on top of the LTP began in 2018 and is scheduled for completion in 2021. Six permitted wells will remain in place after well abandonment is complete, in addition to a few additional well locations to be agreed upon with the regulatory agencies in 2021.

### 4.2.2 Settlement Monitoring

The 2020 settlement monument survey was conducted by Hammon Enterprises, Inc. (Hammon) on November 16, 2020. Of the 46 settlement monuments found and surveyed, 45 showed either no change or minor settlement ranging from 0.01 to 0.20 feet, compared with the 2019 survey. The E5 monument showed minor increase in elevation (0.01 feet) since 2019. This increase is within the survey accuracy. Five settlement monuments were reported missing (B3, B10, C8, C11, and D8). These monuments have been missing or have no data reported since 2008 or earlier. B4 and B11 have been listed as damaged since 2018. Two instruments were reported as damaged (B7 and C7) in 2020. Monument B7 had a 4.14-foot-section of drill stem broken off from the monument and appeared to have been run over. The PVC casing was demolished leaving the monument 0.5 feet below grade. Monument B7 had a 2.22-foot-section of drill stem broken off from the monument. The monument appears to have been run over and the PVC casing demolished leaving the monument 0.5 feet below grade. Stantec understands that Hammon returned to site and installed new PVC casing at these two locations.

Stantec plotted settlement monitoring data from 1993 to present for the settlement monitoring locations on the LTP. The complete set of survey monument elevations is included in Appendix C, along with plots grouping the settlement points together by lines (A through E). Settlement contours on Figure 2 show the cumulative settlement (in feet) measured to date.

Stantec consolidated and analyzed the data by plotting the cumulative settlement versus log time. The monument location with the largest and most consistent cumulative settlement was selected within each quadrant of the LTP (NW-A4, SW-D3, NE-B9, and SE-D7), as well as three locations from the C-line monuments (C3, C7, and X1). The C-line monuments show the highest cumulative settlement and lie along the centerline dividing the LTP into north and south. One monument was selected from each the east and west quadrants along this line along with X1. Based on review of the settlement data and comparison with the water level elevation contours provided by HMC, the greatest amounts of settlement have occurred in or near areas with the largest remaining thickness of tailings saturation. The maximum cumulative settlements have been recorded near X1 and near C7. The trends in the dataset are inconsistent, potentially due to the past reinjection program. In general, the settlement data appears to indicate primary consolidation of the tailings is complete, but long-term secondary consolidation (creep) continues in multiple locations within the LTP.

A systematic survey error likely occurred in 2016 that carried through all the settlement measurements. This error resulted in the majority of the settlement monuments showing an increase in elevation (up to 0.53 feet), rather than settlement (AKA, 2018). There has been minimal additional settlement (approximately 0.1 feet per year or less) since 1999, excluding the 2016 data. Settlement monitoring data and plots are included in Appendix C.



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#### 4.2.3 Piezometer Monitoring

HMC measures water levels for the wells on top of the LTP monthly, biannually, or annually, depending on the location. Figure 1 shows the LTP monitoring well locations.

Stantec plotted the water level elevations from 2015, when water injection into the LTP ceased, through 2020 for 52 locations, although several locations do not have data starting until 2016 or later. The piezometer data and plots are provided in Appendix D. Piezometer water levels were compared from the first reading (ranging from January 2015 to late 2016) to the most current reading, typically December 2020. There is some scatter and abnormalities within the data; however, the majority of piezometers show a downward trend and overall decrease in water elevation. Of the 52 piezometers on LTP, one location (EG9) has only one reading and was not analyzed. Of the remaining 51 locations, 47 showed no change or a decrease in water level elevation, ranging in an overall change of 0.0 feet to -70.8 feet. The other four locations (EP31, ES1, NW3, and WT18) showed an increase in overall water level elevation, ranging from 1 to 6.2 feet. 2020 water levels were within the range of measured water levels for nearby wells. EP31 and WT18 are screened in tailings slimes and located on the top of the LTP, and NW3 is screened in tailings sands and located on the LTP crest. ES1 is screened in tailings sands and located on the south slope. ES1 increased from May 2018 to November 2018 but then decreased and has stayed at a fairly consistent water level with fluctuations of less than 1 foot. ES1 decreased by 0.5 feet since the 2019 water level.

The water levels within the tailings are trending as expected. Stantec recommends continued monitoring of the piezometers that remain in place after the well abandonment program is complete.

#### 4.2.4 French and Toe Drain Tailings Sumps

HMC provided Stantec with the flow rate data for the sumps from January 2011 to December 2020. The sumps are connected to the French and toe drains located at the base of the tailings, near the toe of the LTP. Figure 1 shows the sump locations, including E-1, E-2, East Reclaim, N-1, S-1, W-1, and West Reclaim. Seepage has been observed by Stantec at the north and northwest toe of the LTP during the 2018 and 2019 annual inspection, and evidence of seepage (i.e., precipitate) was observed during the 2020 inspection. This area has had observed seepage since 2006 and was mitigated by HMC in 2008 with the installation of additional sumps to collect the drainage. Wet soil in the area reappeared in 2016. Evidence of seepage (i.e., precipitate) has also been observed by HMC in 2019 and by Stantec in 2020 along the southwest toe of the LTP.

The average pumping rates from the sumps has ranged from approximately 45 gpm in early 2011 to 5 gpm in December 2020. Several pump locations (E-2, W-1, S-1, N-1 and West Reclaim) have pumped very little flow since early 2017. The decreasing trend in sump pumping rates is consistent with a decrease in water levels in the tailings. Collection from the French and drains is expected to continue until pumping rates are too small for continued sump pump operation.

### 4.3 SMALL TAILINGS PILE

#### 4.3.1 Inspection

HMC conducted annual maintenance in August 2020 on the STP side slopes by grading and compacting the side slopes. Rills existed underneath the erosion control blanket on the north embankment. The rills on the north slope are



becoming deeper under the erosion control blanket and Stantec recommends repairing the rills. HMC would need to cut out portions of the erosion mat, fill in the rilling and compact the material, then patch in new erosion mat. HMC started a new trash pit on the south triangle area to the west of the previous location. Stantec also observed windblown salts on the west and north outslopes, as well as in some areas near the south toe of the STP.

#### 4.3.2 Evaporation Pond 1

Stantec personnel walked portions of the toe and crest of EP-1 during the inspection. The evaporators were operating during the visit. EP-1 (on top of the STP) is in operational condition although it is operating at a reduced capacity due to the liner areas damaged in 2020. The West Collection Pond (WCP) relining project in 2020 transported spent lime sludge from the WCP to EP-1 with the material placed along the south interior slope and covered with 6 inches of clean fill. The liner was damaged in this area during placement of the WCP sludge. There are also five hole (less than 2-inches in diameter) that developed in the liner on the north slope in the spring of 2020 while transferring water from EP-2 to EP-1. Additionally, there are significant slumps and benching under the EP-1 liner along the upstream slope near the southeast corner. This appears to be a result of wave action over time. The slumps and benching continue from the southeast corner to the north (along the east embankment) and to the west (along the south embankment). Weathering cracks are present along most of the liner. The slumps, benching, and weathering cracks were observed in previous inspections (Stantec, 2019, 2020). Stantec completed a feasibility study to re-line EP-1, which was submitted to NMOSE and NMED on behalf of HMC for approval in December 2018 (Stantec, 2018). HMC is re-evaluating the EP-1 re-lining plan in 2021 due to the new strategy outlined in the Groundwater Corrective Action Program (HMC, 2020) that could result in decommissioning the evaporation ponds sooner than previously planned.

The pond depth in EP-1 from bottom to crest is assumed to be 15 feet, and the minimum freeboard requirement is 2 feet. Therefore, the maximum operational water depth is 13 feet. The freeboard measurements for 2020 ranged from 9.8 to 12.9 feet, well below the freeboard requirement of 2 feet.

Stantec recommends that HMC continue to operate EP-1 at reduced capacity and at an operating level a minimum of 2 feet below the damaged liner area at the south embankment and below the holes in liner at north embankment. Per HMC, the lowest depth of the liner damaged in 2020 is located on the south embankment at 8 feet in depth from the crest. Therefore, a minimum freeboard of 10 feet and corresponding maximum water level of 5 feet are recommended for EP-1 for current conditions.

### 4.4 EVAPORATION POND 2

#### 4.4.1 Inspection

Stantec personnel walked the crest and portions of the toe EP-2 during the inspection. The upstream embankment slopes are lined with a dual HDPE liner system. The upstream embankment slopes and liner were in good condition during the inspection. The pond was operating at a lower level as compared to previous inspections. The pond crest and crest road were in good condition during the inspection. The downstream embankment slopes are protected with a 2-inch size basalt gravel and were in good condition, with no major rilling observed. There were small shrubs and vegetation growing on the downstream slopes.



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#### 4.4.2 Data Review

In 2020, HMC recorded weekly leakage rates through the LDRS. The water may leak through the primary liner, which is then collected in sumps between the primary and secondary liners, and then pumped out from each sump. The water pumped out is discharged directly back into the pond. Water volume removed through the collection sumps are recorded weekly and records are maintained on site.

LDRS Zones 1 and 4 show zero water collected in 2020. The data from Zones 2, 3, and 5 show that most water was collected between January and June 2020. The Action Leakage Rate (ALR) of 775 gpd/acre was exceeded in both Zones 2 and 5. Zone 2 exceeded the ALR for several readings between February 10 and April 13, ranging from 813 to 1,423 gpd/acre. Zone 5 exceeded the ALR for several readings between January and April, ranging from 776 to 1,125 gpd/acre.

For freeboard calculations, the EP-2 pond depth from bottom to crest is assumed to be 25 feet, and the minimum freeboard requirement is 2 feet. Therefore, the maximum operational water depth is 23 feet. The freeboard measurements for 2020 ranged from 2.72 to 9.8 feet, below the freeboard requirement of 2 feet.

### 4.5 EVAPORATION POND 3

#### 4.5.1 Inspection

Stantec personnel walked the crest and portions of the toe of EP-3 during the inspection. The upstream embankment slopes are lined with a dual HDPE liner system. The upstream embankment slopes and liner were in good condition during the inspection. The pond crest and crest road were in good condition during the inspection. Rill management was performed on the outer slopes in August 2020 and the embankments were in good condition. Stantec was informed by HMC during the site visit that a metal pole on the pond crest near the northeast corner of the pond had been hit and damaged by HMC personnel while pulling an APEX evaporator unit out of EP-3 for maintenance. HMC plans to repair the pole and place it back in the same location. Stantec recommended that HMC use caution while performing repair so as not to get close to the liner.

#### 4.5.2 Data Review

HMC recorded weekly leakage rates through the LDRS. The pumps in each of the cells A-1, A-3, and A-4 were removed for general maintenance in 2018, and the casing pipe collapsed in these cells. The sump pumps were re-installed as deep as possible and are functional but could not be placed at the bottom of the pipes due to the collapsed casing. HMC does not plan to repair the collapsed pipes.

The EP-3A and EP-3B sub-cells showed no readings above the ALR of 775 gpd/acre in 2020. Sub-cells A-1, A-3, and A-4 showed zero pumping for the duration of 2020. HMC noted that the pump for sub-cell A-3 was connected and working, but is not at the bottom of the sump. Sub-cells A-2 and A-5 show pumping rates at the beginning of 2020 (January through March in A-5 and January through June in A-2), but show minimal or zero pumping for the remainder of the year. Sub-cells B-2, B-3, and B-5 showed minimal or zero pumping for the duration of 2020. Sub-cells B-1, and B-4 show pumping rates in 2020 with a maximum rate of 410 gpd/acre in B-4.



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For freeboard calculations, the EP-3 pond depth from bottom to crest is assumed to be 13.4 feet, and the minimum freeboard requirement is 2 feet. Therefore, the maximum operating water depth is 11.4 feet. The freeboard for EP-3 was below the requirement of 2 feet in 2020. Freeboard measurements ranged from 2.2 to 5.15 feet for EP-3A and from 2.5 to 5.15 feet for EP-3B.





## 5.0 REGULATORY REQUIREMENTS AND DESIGN CRITERIA

The GRP site is a Title II Uranium Mill Tailings Radiation Control Act (UMTRCA) site licensed by the NRC under NRC License SUA-1471. The site also has a Discharge Permit (DP-200) with the State of New Mexico Environment Department and is a Federal Superfund site on the National Priority List (NPL) with the Environmental Protection Agency (EPA). The EOR is responsible for the geotechnical stability of the tailings and evaporation ponds. The NMOSE changed the status of the evaporation ponds from Low to Significant hazard potential in 2018, requiring the completion of Emergency Action Plans (EAP), Operations & Maintenance (O&M) manuals, dam breach and flood routing analysis. General conditions and applicable design criteria are listed below.

### General Strategy

- Tailings are enclosed in covered impoundments.
- Water treatment process water is contained on site in a series of lined evaporation ponds.

### Dam Safety and Stability

- Meet current dam safety standards at time of design and construction per NRC, New Mexico Administrative Code (NMAC), and US Department of Energy (DOE).
- Barrick Tailings and Heap Leach Standards (Barrick, 2016) apply to the current configuration.
- Provide stability under unfavorable conditions caused by seepage, gravitational and earthquake stresses. Calculated Factors of Safety under these conditions to exceed the following NMAC, 2010; NRC, 2003; NRC, 2008; Barrick, 2016; and DOE, 1989 guidelines for the design of ponds or dams:
  - Long-term Static Stability = 1.5
  - End of Construction = 1.3
  - Post-Construction Liner Failure = 1.3
  - Pseudo-static Factor of Safety = 1.1
- NMOSE/NMED guidelines (NMAC, 2010) recommend design for a seismic event return period for water storage dams of approximately 2,500 years for dams classified as significant hazard potential and 5,000 years for dams classified as high hazard potential. From HMC requirements (Barrick, 2016) the seismic event return period for low and high consequence of failure is 2,500 and 5,000 years, respectively.

### Operations and Closure

- Construction of outer cover slopes is partially completed on the STP without erosion protection and completed with erosion protection for the LTP.
- Regular maintenance is conducted to repair erosional issues.
- Use of erosion protection on outside tailings pile slopes to protect against surface runoff, where required. Drainage ditches are also included to limit surface erosion.
- Integrity of pond liners inspected on a regular basis to prevent loss of containment.

Stantec understands that Barrick is in the process of updating their corporate standards and guidelines for tailings management to align with the Global Industry Standard on Tailings Management (GISTM) released in August 2020



## 2020 ANNUAL EOR INSPECTION

### Regulatory Requirements and Design Criteria

(GTR, 2020). Barrick, as member of the International Council on Mining and Metals, has committed that their tailings impoundments will comply with the GISTM within three years, for sites classified per the GISTM as “Very High” or “Extreme” and within five years for all other sites.



## 6.0 DESIGN AND CONSTRUCTION

### 6.1 SITE GEOLOGY

The site is located in the southeastern part of the Colorado Plateau physiographic province and is mostly on the south flank of the San Juan Basin. This region experienced a minor degree of structural deformation (regional folding and block uplift) associated with formation of the Zuni Uplift, which is characterized by a northwest-trending anticline composed of Precambrian crystalline basement rocks overlain by Permian to Jurassic sedimentary rocks. These sedimentary rocks were uplifted during the Laramide Orogeny near the end of the Late Cretaceous through the Eocene, approximately 80 to 40 million years before present (Arcadis, 2013). Bedrock units at the site consist of the Glorieta Sandstone (Early Permian), San Andres Limestone (Early Permian), and Chinle Formation (Late Triassic). As a result of Laramide deformation, these bedrock units have a shallow northeastern dip direction of approximately 3 to 10 degrees (Kelley, 1967).

The surficial soils underlying the site consist of clay underlain by silty sand to sand with silt to a depth of 7 feet. The clay is low in plasticity, whereas the silty sand was non-plastic (CH2M, 2018). Geologic logs from wells installed on site indicate the alluvium thickness underneath the main area of the site, where the LTP is located, is up to 100 feet thick (CH2M, 2018). The alluvial aquifer consists of discontinuous layers of clay, silt, and sand.

### 6.2 LARGE TAILINGS PILE

The LTP contains an estimated 21 million tons of tailings in two cells. Tailings were discharged into the LTP with cyclone separation. The coarse fraction (mostly sand) was deposited along the embankment crest, and the fine fraction (mostly silt and clay) was deposited within the cells. Process water was recovered by gravity through two decant towers and returned to the mill for re-use. From 1966 until 1990, tailings disposal alternated between the two cells as necessary to maintain optimal operating conditions.

The starter dike for the LTP was constructed with natural soils excavated from within the tailings impoundment area and compacted. The dike was constructed to a height of approximately 10 feet, a width of approximately 10-15 feet at the top, and 25-30 feet at the bottom. The impoundment's perimeter embankment was raised by the centerline method. The LTP includes a series of eight sumps around the perimeter of the pile, connected to a toe drain and French drain that collect tailings seepage.

Interim reclamation of the LTP was completed in 1995. This work consisted of regrading the side slopes to 5:1 (horizontal: vertical) and covering these slopes with 3 feet of compacted radon barrier material (sandy clay) and 8 inches of rock. The top surface of the impoundment was covered with a minimum of 0.5 feet of interim soil cover. Additional interim soil cover has been added over the years to reduce radon emanation in specific areas. Numerous groundwater collection and monitoring wells are installed in the top of the LTP for remediating the underlying alluvial aquifer. The LTP presently covers approximately 170 acres and is approximately 100 feet high.

### 6.3 SMALL TAILINGS PILE

The STP contains an estimated 1.22 million tons of tailings. Tailings deposited within this impoundment were contained entirely by an embankment composed of compacted natural soils. The embankment was compacted and



### Design and Construction

raised to a height of 20-25 feet. The embankment crest had a minimum 10-foot width and a width of approximately 40 feet at the base. The STP covers approximately 40 acres.

In 1987, HMC committed to contaminated soil cleanup of windblown tailings on site. From 1988 to 1994, the surficial six inches (15 centimeters) of approximately 1,200 acres were excavated, with a portion was placed on the southern sides and top of the STP. EP-1 was constructed on top of the STP in 1990 and all visible tailings slimes were excavated and placed in the south portion of the STP. The pentagon-shaped STP holds EP-1 on the northern two-thirds of the pile and a contaminated soil and debris disposal area on the southern portion of the pile. After the off-pile soil cleanup was completed, the STP was partially reclaimed between 1993 and 1995 per the NRC-approved closure plan (AK Geoconsult, 1991). An average 1-foot thickness of clean borrow material was placed as an interim cover on the southern portion of the STP, outside of EP-1.

## 6.4 EVAPORATION POND 1

EP-1 was built in 1990 on top of the STP to assist in the dewatering of the LTP and to hold and evaporate water pumped from the collection wells of the groundwater restoration plan. The pond design was prepared by AK Geoconsult and submitted to the NRC, NMED and NMOSE in June 1990, with approval granted thereafter (AK Geoconsult, 1990). NRC License Amendment No. 7 of SUA-1471 revised License Condition 35 and granted approval by the NRC for construction and operation of EP-1. Operation of the pond began in November 1990.

Construction and performance testing of the liner was completed in November 1990. AK GeoConsult, Inc., submitted a Certificate of Construction to the NMOSE on December 5, 1990 stating that the evaporation pond construction was complete. A Completion Report for the construction of EP-1 was transmitted to the NRC, NMED and NMOSE by letters dated April 5, 1991. Stantec has not reviewed as-built drawings of EP-1.

EP-1 is lined with a single liner composed of a Deery Oil Liner/fabric, a non-woven fabric impregnated and then overlain with a layer of No. 6 Deery Oil. No. 6 Deery Oil is a petroleum-based asphaltic blend that is applied after being heated to 370 to 400 °F, and is the same oil commonly used for sealing cracks in road asphalt. The total constructed area of EP-1, including bottom and side slopes, is 26.2 acres, with a capacity of approximately 285 acre-feet, allowing for 2 feet of freeboard. The maximum depth is 15 feet. Currently water can be transferred from EP-1 to EP-2 or EP-3, when necessary.

HMC has performed repairs on the EP-1 liner over time, where holes or tears were identified in sub-aerial portions of the liner. In 2017, significant wear and tear was identified on the liner due to the age of the pond (28 years) beyond its design life expectancy (20 years). Due to this, HMC contracted Stantec to complete a feasibility study to re-line EP-1, which was submitted to NMOSE and NMED for approval in December 2018 (Stantec, 2018). HMC is currently re-evaluating the EP-1 re-lining plan based on new strategy outlined in the Groundwater Corrective Action Program (HMC, 2020).

The pond is currently operating at a reduced capacity due to damage on the liner on the south slope from placing the West Collection Pond sludge in 2020. There is also a hole less than 1-foot in diameter that developed in the liner on the north slope in 2020.

EP-1 is the designated final disposal location for all classified 11.e(2) uranium impacted material on site during final decommissioning and reclamation activities.



## 6.5 EVAPORATION POND 2

EP-2 was designed in 1994 by Bateman Engineering and AK GeoConsult, Inc. and constructed in 1995 by Nielsons, Inc. to increase storage and treatment capacity for contaminated groundwater as part of HMC's ongoing groundwater restoration program. Additional surface storage and evaporation capacity was required to increase contaminated groundwater pumping rates to shorten the overall time required for groundwater restoration. The pond and liner designs were prepared and submitted for approval to the NRC, NMED, and NMOSE. The NRC authorized construction and operation of the evaporation pond per License Amendment 19 and the associated new License Condition 39.

EP-2 is located between the STP on the east and the RO collection ponds on the west. The total constructed area of the evaporation pond, including bottom and side slopes, is approximately 17.5 acres with a maximum storage capacity of approximately 317.4 acre-feet. The maximum depth is 25 feet, and the freeboard requirement is a minimum of 2 feet. The pond has compacted earthen embankments created from the alluvial soil excavated from the pond area. The earthen embankment along the southern side of the pond, at its highest, is 20 feet above native ground surface. Water is transferred from the East Collection Pond to EP-2 and from EP-2 to EP-1 as needed. Water can also be transferred back to EP-2 from EP-1.

A two-part HDPE lining system was installed in the pond with a leak detection/drainage layer between the two HDPE liners. There are five leak detection cells. The HDPE liner consisted of an upper primary liner of 60 mil (0.060 inch) thickness and a secondary liner of 40-mil thickness. All seams were wedge-welded (hot-shoe welded) except for the corner and west tie-in seams. After installation, performance testing identified leak points in the primary liner and repairs were made before the pond was put in service.

HMC notified the NRC and the NMED on November 14, 2017 of identified pumping rates in portions of EP-2 leak detection system were pumping higher than the ALR of 775 gallons per day per acre foot of storage. This ALR is per the NRC License Condition 35D. Also, as per Condition 35D, the pumps are required to be activated whenever water levels within the leak detection sumps rises above one foot of hydraulic head. HMC indicated that, with respect to the exceedances, the secondary liner had remained effective and there was no discharge to the environment. HMC completed an investigation of the leak detection cells in EP-2 which determined that some submersible pumps and/or the hydraulic sensors to control pumping had failed. Replacement pumps and sensors were installed and HMC modified the Standard Operating Procedure (SOP) for the evaporation ponds to include manual water level measurements of the leak detection cells to confirm water levels are remaining below one foot of hydraulic head as per License Condition 35D.

## 6.6 EVAPORATION POND 3

EP-3 was designed by Kleinfelder in October 2006 and approved by the NRC in August 2008 (Kleinfelder, 2006). Construction was completed for EP-3 in November 2010 and it was placed into operation January 2011. EP-3 consists of two cells (A and B) each with an approximate size of 13.3 acres (total of 26.6 acres). The maximum depth of EP-3 is 13.4 feet with a minimum freeboard requirement of 2 feet. The two cells provide a storage capacity of approximately 286 acre-feet for temporary retention and evaporation of contaminated groundwater. The pond is lined with a dual HDPE liner and a HDPE geonet interstitial leak detection system. There are five leak detection systems for Basin A and five systems for Basin B. The primary liner is 60 mils thick and the secondary liner is 40 mils thick.



## 2020 ANNUAL EOR INSPECTION

### Design and Construction

The NRC-licensed boundary was extended to include EP-3. EP-3 will be decommissioned once site restoration activities are completed and the pond liner and any salts/sediments will be disposed of in the final closure cell of EP-1.

HMC notified the NRC and the NMED on November 14, 2017 of identified pumping rates in portions of EP-3 leak detection system were pumping higher than the ALR of 775 gallons per day per acre-foot of storage. This ALR is per the NRC License Condition 35D. Also, as per Condition 35D, the pumps must be activated whenever water levels within the leak detection sumps rises above one foot of hydraulic head. HMC indicated that, with respect to the exceedances, the secondary liner remained effective and there was no discharge to the environment. HMC completed an investigation of the leak detection cells in EP-3 which determined that some submersible pumps and/or the hydraulic sensors to control pumping failed. Replacement pumps and sensors were installed and HMC modified the SOP for the evaporation ponds to include manual water level measurements of the leak detection cells to confirm water levels remain below 1 foot of hydraulic head as per License Condition 35D.



## 7.0 DAM HAZARD CLASSIFICATION REVIEW

The three evaporation ponds were re-classified by the NMOSE from low hazard to significant hazard in 2018. Due to this reclassification, NMOSE requires HMC to submit a dam breach analysis report, an Operation and Maintenance Manual, and Emergency Action Plan for each pond. HMC submitted these documents for EP-1 and are under review by NMOSE. The documents will be submitted for EP-2 and EP-3 after NMOSE completes review for EP-1. The significant hazard classification for the dams may change dependent upon final NMOSE approval of the dam breach analyses.

The NMOSE recommends that dams classified as significant or high hazard be inspected at least every 5 years by a professional engineer licensed in the state of New Mexico. NMOSE does not specify dam inspection requirements for dams classified as *low*. For dams classified as low or significant, NMOSE requires that the owner re-evaluate the hazard classification if a downstream development occurs. HMC has had dam safety inspections conducted annually by the EOR since 2002.

For the tailings impoundments, HMC requested that Stantec classify the structures in 2020 according to the GISTM (GTR, 2020). The STP and LTP dams were classified as significant hazard based on results of a failure modes and effects workshop Stantec facilitated with HMC and Stantec personnel in October 2020.



## 8.0 RECOMMENDED ACTION ITEMS

The tailings impoundments and three evaporation ponds are generally in stable condition, with the exceptions and recommendations described in the above sections. Table 1 shows recommendations from the 2020 site visit and inspection organized by priority. The timeframes for addressing items within each of the priority designations are:

- **Extreme** - 0 to 3 months
- **High** - 3 to 12 months
- **Medium** - 12 to 18 months
- **Low** - greater than 18 months, or when budgeted

**Table 1. Recommended Action Items**

Action Item No.	Recommendation	Priority	Status
1	Continue to operate EP-1 at reduced capacity. The operating water level should be kept at a minimum of 2 feet below the damaged liner area at the south embankment and below the holes in liner at north embankment (i.e., minimum freeboard of 10 feet).	High	2020 safety inspection recommendation.
2	Regrade LTP interim cover access road to drain to downdrains in all locations around perimeter to prevent ponding and erosion, specifically between Downdrains 11 and 12 where sinkholes have been recurring.	Medium	2018 safety inspection recommendation updated in 2019 to specify area between Downdrains 11 and 12.
3	Fill and compact additional soil over cover rilling on LTP to prevent tailings exposure. Follow existing reclamation plan specifications.	Medium	Recommendation renewed in 2020 for new areas requiring repair.
4	Continue site-wide rill management and grade control to minimize erosion.	Medium	2018 safety inspection recommendation updated for 2020. Currently done on an annual basis.
5	Protect existing settlement monuments on the LTP to prevent equipment damage. Repair monuments damaged in 2020 during LTP well abandonment.	Medium	2018 safety inspection recommendation updated for 2020 to include repairs to damaged equipment.
6	Add and compact material to match grade at concrete near inlets for LTP Downdrains to prevent clogging.	Medium	2019 safety inspection recommendation.
7	Repair damaged pole that was hit while pulling out APEX unit in EP-3. Stantec recommends HMC use caution during repairs so as not to damage the liner.	Medium	2020 safety inspection recommendation.
8	Repair rilling under erosion control blanket on STP north slope.	Medium	2020 safety inspection recommendation.
9	Maintain perimeter berms on STP and LTP to prevent concentrated runoff and provide safe vehicle access.	Low	2018 safety inspection recommendation.
10	Consider repairs to damaged LDRS piping for EP-2 and EP-3.	Low	2018 safety inspection recommendation.





## 9.0 REFERENCES

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US Nuclear Regulatory Commission (NRC), 2008. Regulatory Guide 3.11 Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills, Rev. 2, December.



## 2020 ANNUAL EOR INSPECTION

### References

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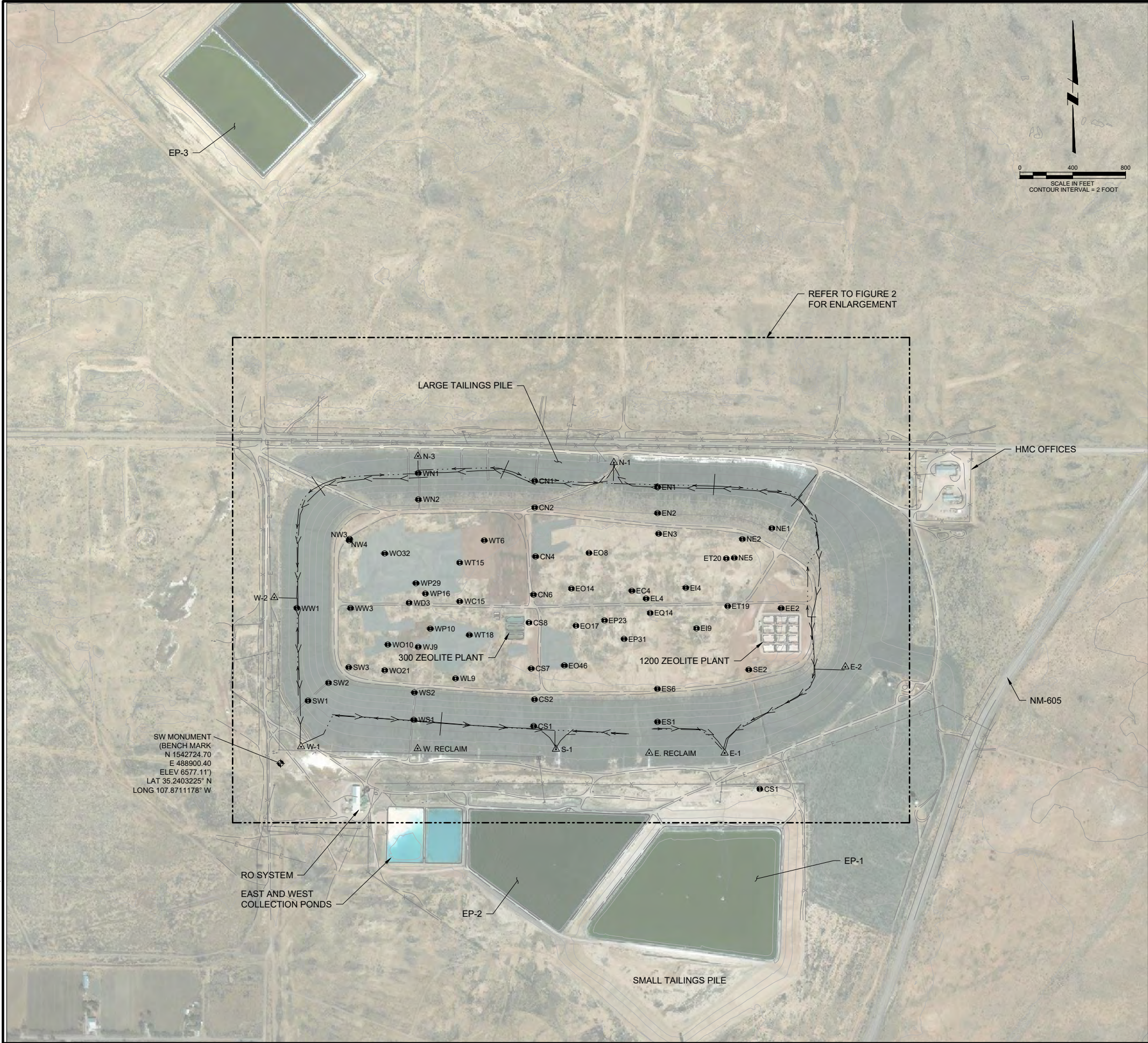
# FIGURES



BY: FOWLER, CAMILLE

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

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LEGEND

- EXISTING GROUND CONTOURS
- EXISTING PIPE
- TOE-DRAIN
- FRENCH DRAIN
- WN2 SAND AND SLIME WATER LEVEL WELL LOCATION AND IDENTIFICATION
- N-1 SUMP LOCATION AND IDENTIFICATION

NOTES

- EXISTING GROUND SURVEY FROM DECEMBER 12 & 13, 2017. CONTROL RE-ESTABLISHED MAY 23, 2018.
- COORDINATES ARE REFERENCED TO THE N.M. WEST ZONE STATE PLANE GRID NAD27 AND ADJUSTED TO THE HSMC CONTROL NETWORK.
- ELEVATIONS ARE REFERENCED TO NGVD29 AND ADJUSTED TO THE HSMC CONTROL NETWORK. ADD 3.25 TO REACH NAVD88.

REV	DATE	BY	DESCRIPTION
A	12/20	CF	ISSUED FOR CLIENT REVIEW

SCALE  
1" = 400'

WARNING  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED S. DOWNEY  
DRAWN C. FOWLER  
CHECKED J. CUMBERS



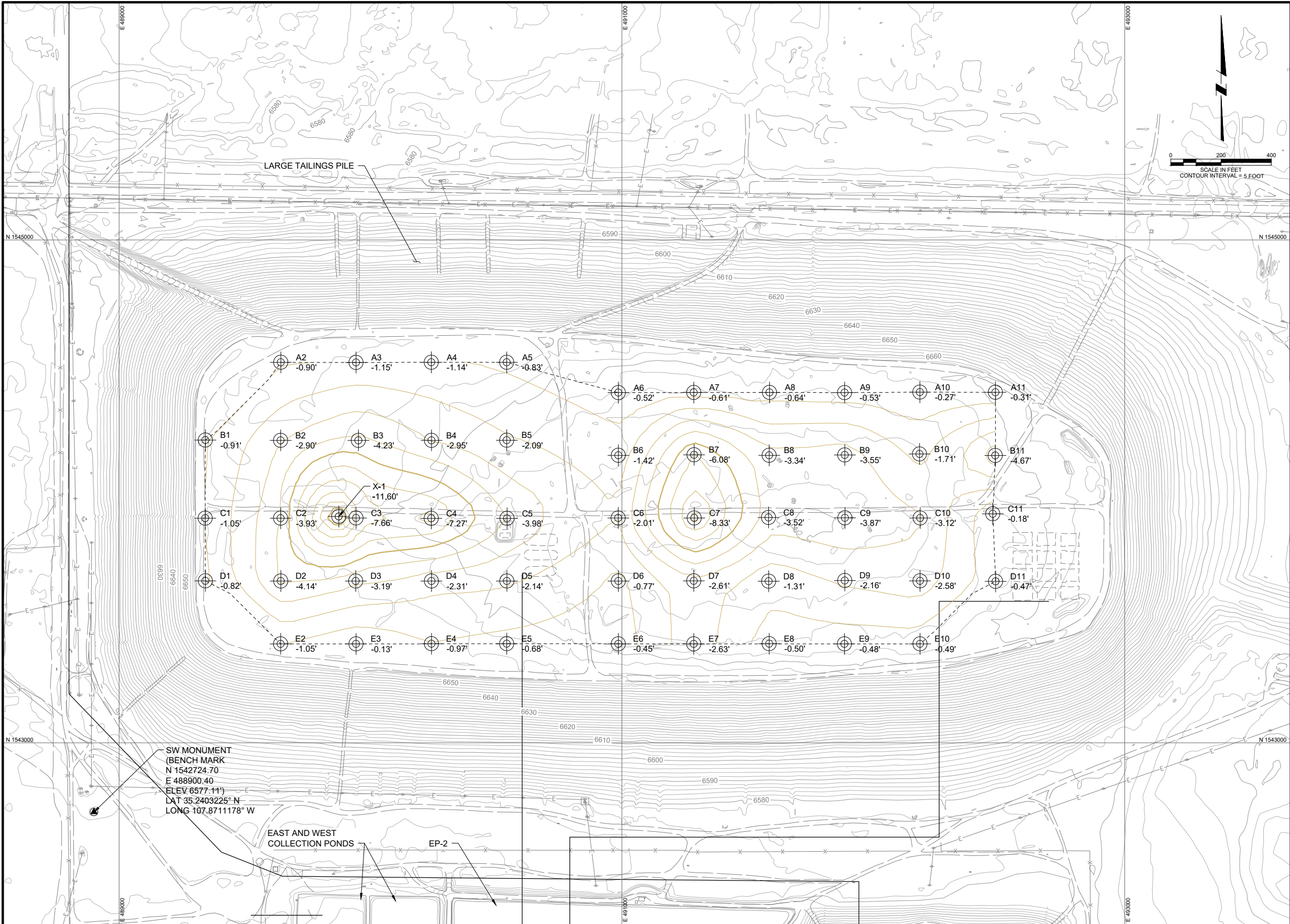
GRANTS RECLAMATION PROJECT  
2020 ANNUAL EOR INSPECTION  
SITE LAYOUT



BY: FOWLER, CAMILLE

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LEGEND

- 6630 EXISTING GROUND CONTOURS
- 1 CUMULATIVE SETTLEMENT CONTOURS
- EXISTING PIPE
- E EXISTING POWER LINES
- X EXISTING FENCE
- A1 SETTLEMENT MONUMENT
- 0.83' CUMULATIVE SETTLEMENT IN FEET, FROM 1993 TO 2020

NOTES

- EXISTING GROUND SURVEY FROM DECEMBER 12 & 13, 2017. CONTROL RE-ESTABLISHED MAY 23, 2018.
- COORDINATES ARE REFERENCED TO THE N.M. WEST ZONE STATE PLANE GRID NAD27 AND ADJUSTED TO THE HSMC CONTROL NETWORK.
- ELEVATIONS ARE REFERENCED TO NGVD29 AND ADJUSTED TO THE HSMC CONTROL NETWORK. ADD 3.25 TO REACH NAVD88.

CUMULATIVE TOTAL SETTLEMENT CONTOURS

REV	DATE	BY	DESCRIPTION
A	12/20	RW	ISSUED FOR CLIENT REVIEW

SCALE  
1" = 200'

WARNING  
0 1/2 1  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED S. DOWNEY  
DRAWN S. JONES  
CHECKED J. CUMBERS



GRANTS RECLAMATION PROJECT  
2020 ANNUAL EOR INSPECTION  
CUMULATIVE TOTAL SETTLEMENT CONTOURS

# **APPENDICES**

## Appendix A SAFETY INSPECTION FORMS



**Routine Visual Inspection Checklist for Tailings Storage Facility**

Facility: Grants Reclamation Project      Structure (circle one): STP ☒ LTP      Inspection Date: November 20, 2020  
 Inspector(s): M. Davis      Weather Conditions: Partly Cloudy, 50s°      Ground Conditions: Dry  
 Reason for Inspection: Annual EOR Inspection      Photos Taken: : ☐ NO ☒ YES  
 Additional Comments: \_\_\_\_\_

**1. Tailings Top Cover**

Is the general condition of cover inadequate? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Observed sinkholes, depressions, or unusual settlement? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Evidence of rills, gullies, or other surface erosion? ☐ N/A ☐ NO ☒ YES Rilling on north side of top of pile (see comment)  
 Evidence of animal burrows or damage from wildlife? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Evidence of debris accumulation along the slope? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Vegetation? ☐ N/A ☐ NO ☒ YES limited  
 Additional Comments: Rilling (up to 6 inches deep) was present in a few areas on north portions of the LTP top cover surface in the same area where rilling was present in 2020. The 2020 rills were repaired by grading and compaction in August 2020.

**2. Tailings Crest/Crest Road**

Is the general condition of crest surface/road inadequate? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Observed sinkholes, depressions, or unusual settlement? ☐ N/A ☐ NO ☒ YES Low spot along road (see comment)  
 Evidence of rills, gullies, or other surface erosion? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Evidence of animal burrows or damage from wildlife? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Evidence of surface cracks? Direction? Offset? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Evidence of lateral movement? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Vegetation? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Additional Comments: A low spot between downdrains #11 and #12 is still present, where sinkholes have been recurring. Area will need to be regraded to drain to the downdrains and mitigate recurrence of sinkholes.

**3. Tailings Side Slopes**

Slope protection material: Riprap D50=6 inches; natural vegetation      Uniform or benched slope: \_\_\_\_\_      Uniform: \_\_\_\_\_  
 Slope height: 80 vertical feet      Slope gradient: 5:1  
 Is the general condition of slope protection inadequate? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Observed sinkholes, depressions, or unusual settlement? ☐ N/A ☒ NO ☐ YES Sinkholes observed in 2020 were repaired.  
 Evidence of rills, gullies, or other surface erosion? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Evidence of animal burrows or damage from wildlife? ☐ N/A ☐ NO ☒ YES \_\_\_\_\_  
 Evidence of debris accumulation along the slope? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Evidence of seepage? ☐ N/A ☐ NO ☒ YES See comment  
 Location(s)? 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_  
 Measurable flow rate? 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_  
 Clarity of seepage? 1. ☐ Clear ☐ Muddy      2. ☐ Clear ☐ Muddy      3. ☐ Clear ☐ Muddy      4. ☐ Clear ☐ Muddy  
 Evidence of wet areas? Location(s)? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_  
 Additional Comments: Windblown sediment present along top of slope, near crest. Precipitate present at toe of north slope and toe of southwest slope. Evidence of seepage where repaired sinkholes had daylighted on the south slope.



**Routine Visual Inspection Checklist for Tailings Storage Facility**Facility: Grants Reclamation Project Structure (circle one): STP LTP Inspection Date: November 20, 2020**4. Downdrain Structures**Outlet type: HDPE pipe dissipated by large riprap Other water removal systems: N/AObserved wet areas adjacent to outlet structure? ☐ N/A ☒ NO ☐ YESEvidence of displacement or potential disruption of flow in downstream channel? ☐ N/A ☒ NO ☐ YESEvidence of debris accumulation or vegetation growth in downstream channel? ☐ N/A ☒ NO ☐ YES

Additional Comments: \_\_\_\_\_

**5. Instrumentation**Observed: Piezometers: ☒ NO ☐ YES Monitoring Wells: ☒ NO ☐ YES Inclometers: ☒ NO ☐ YESOther/Notes: Settlement monuments, wells, piping, zeolite treatment plants located on LTP top surface**6. General Observations and Recommendations**LTP in stable condition during inspection. Recommendation to fix surface water drainage issues near downdrains 11 and 12, where sinkholes have been recurring (2018 inspection recommendation).Fill and compact additional soil over cover rilling on LTP (2019 inspection recommendation renewed for new areas requiring repair)Recommend repairing berm at toe of 1200 zeolite facility near where new piping was installed (2018 inspection recommendation).Add and compact material to match grade at concrete near inlets for LTP downdrains to prevent clogging (2018 inspection recommendation)

**Routine Visual Inspection Checklist for Tailings Storage Facility**

Facility: Grants Reclamation Project      Structure (circle one): STP LTP      Inspection Date: November 20, 2020  
 Inspector(s): M. Davis      Weather Conditions: Partly cloudy, 60- 65°      Ground Conditions: Dry  
 Reason for Inspection: Annual EOR Inspection      Photos Taken:    : ☐ NO ☒ YES  
 Additional Comments: \_\_\_\_\_

**1. Tailings Top Cover**

Is the general condition of cover inadequate?      ☐ N/A    ☒ NO    ☐ YES    See comment  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of rills, gullies, or other surface erosion?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of animal burrows or damage from wildlife?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of debris accumulation along the slope?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Vegetation?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Additional Comments: Evaporation Pond 1 is located on the STP and covers the majority of the STP top surface (see EP-1 DSI Form)

**2. Tailings Crest/Crest Road**

Is the general condition of crest surface/road inadequate?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of rills, gullies, or other surface erosion?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of animal burrows or damage from wildlife?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of surface cracks? Direction? Offset?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of lateral movement?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Vegetation?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Additional Comments: \_\_\_\_\_

**3. Tailings Side Slopes**

Slope protection material: Sandy clay fill      Uniform or benched slope: \_\_\_\_\_      Uniform \_\_\_\_\_  
 Slope height: 20 to 25 feet      Slope gradient: 5H:1V  
 Is the general condition of slope protection inadequate?    ☐ N/A    ☒ NO    ☐ YES    No slope protection in place, except north slope  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of rills, gullies, or other surface erosion?      ☐ N/A    ☐ NO    ☒ YES    Rilling present along north side slopes (see comment)  
 Evidence of animal burrows or damage from wildlife?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of debris accumulation along the slope?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of seepage?      ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Location(s)?    1. \_\_\_\_\_    2. \_\_\_\_\_    3. \_\_\_\_\_    4. \_\_\_\_\_  
 Measurable flow rate?    1. \_\_\_\_\_    2. \_\_\_\_\_    3. \_\_\_\_\_    4. \_\_\_\_\_  
 Clarity of seepage?    1. ☐ Clear ☐ Muddy    2. ☐ Clear ☐ Muddy    3. ☐ Clear ☐ Muddy    4. ☐ Clear ☐ Muddy  
 Evidence of wet areas? Location(s)?    ☐ N/A ☒ NO ☐ YES    \_\_\_\_\_  
 Additional Comments: Rilling present under erosion mat on north embankment. Windblown salts observed on the west and north out slopes, as well as in some areas near the south toe of the STP.

**Routine Visual Inspection Checklist for Tailings Storage Facility**Facility: Grants Reclamation Project Structure (circle one): STP LTP Inspection Date: November 20, 2020**4. Downdrain Structures**Outlet type: HDPE pipe dissipated by large riprap Other water removal systems: \_\_\_\_\_Observed wet areas adjacent to outlet structure? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_Evidence of displacement or potential disruption of flow in downstream channel? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_Evidence of debris accumulation or vegetation growth in downstream channel? ☐ N/A ☒ NO ☐ YES \_\_\_\_\_

Additional Comments: \_\_\_\_\_

**5. Instrumentation**Observed: Piezometers: ☒ NO ☐ YES Monitoring Wells: ☒ NO ☐ YES Inclometers: ☒ NO ☐ YES

Other/Notes: \_\_\_\_\_

**6. General Observations and Recommendations**Rill maintenance was conducted in August 2020.HMC has started a new trash pit on the south triangle area to the west of the previous location.

**Routine Visual Inspection Checklist for Embankment Dam**

Facility: Grants Reclamation Project      Structure: EP-1      Inspection Date: November 20, 2020  
 Inspector(s): M. Davis      Weather Conditions: Partly cloudy, 60-65°      Ground Conditions: Dry  
 Reason for Inspection: Annual EOR Inspection      Photos Taken:    : ☐ NO ☒ YES  
 Additional Comments: Single-lined pond

**1. Upstream Slopes of Pond Embankments**

Slope protection material: Liner      Uniform or benched slope: Uniform  
 Slope height: 15-20 feet      Slope gradient: 4H:1V, 10H:1V (north embankment)  
 Is the general condition of slope protection inadequate?    ☐ N/A    ☐ NO    ☒ YES    Tears/holes in liner (see comments)  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☐ NO    ☒ YES    Sloughing and benching  
 Evidence of rills, gullies, or other surface erosion?    ☐ N/A    ☐ NO    ☒ YES    Sloughing under liner on NE and SE corners  
 Evidence of animal burrows or damage from wildlife?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of debris accumulation along the slope?    ☐ N/A    ☐ NO    ☒ YES    Salts at and above water elevation  
 Evidence of operational activity in upstream area?    ☐ N/A    ☐ NO    ☒ YES    Evaporators in operation  
 Vegetation?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Additional Comments: EP-1 currently operating at reduced capacity due to damage on liner on south embankment from placement of WCP sludge and from tear in liner on north embankment.

**2. Pond Crest/Crest Road**

Dam crest surface material: Road base, 1" minus gravel      Crest width: 10-25 feet      Safety berms: No  
 Dam constructed in stages?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Is the general condition of crest surface inadequate?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of rills, gullies, or other surface erosion?    ☐ N/A    ☐ NO    ☒ YES    Rilling on north crest  
 Evidence of animal burrows or damage from wildlife?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of surface cracks? Direction? Offset?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Evidence of lateral movement?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Vegetation?    ☐ N/A    ☒ NO    ☐ YES    \_\_\_\_\_  
 Additional Comments: Rilling at north crest and eroding through safety berm, continuing down slope

Facility: Grants Reclamation Project Structure: EP-1 Inspection Date: November 20, 2020
**3. Downstream Slopes of Pond Embankments**

Slope protection material: Sandy clean fill Uniform or benched slope: Uniform

Slope height: 20-25 feet Slope gradient: 5H:1V

Is the general condition of slope protection inadequate? ☐ N/A ☒ NO ☐ YES

Observed sinkholes, depressions, or unusual settlement? ☐ N/A ☒ NO ☐ YES

Evidence of rills, gullies, or other surface erosion? ☐ N/A ☐ NO ☒ YES Rilling present on north DS slope (see comment)

Evidence of animal burrows or damage from wildlife? ☐ N/A ☒ NO ☐ YES

Evidence of debris accumulation along the slope? ☐ N/A ☒ NO ☐ YES

Evidence of operational activity in downstream area? ☐ N/A ☒ NO ☐ YES

Evidence of seepage? ☐ N/A ☒ NO ☐ YES

Location(s)? 1. 2. 3. 4.

Measurable flow rate? 1. 2. 3. 4.

Clarity of seepage? 1. ☐ Clear ☐ Muddy 2. ☐ Clear ☐ Muddy 3. ☐ Clear ☐ Muddy 4. ☐ Clear ☐ Muddy

Evidence of wet areas? Location(s)? ☐ N/A ☒ NO ☐ YES

Additional Comments: Rilling present under erosion mat on downstream slope of north embankment
**4. Instrumentation**

Observed: LDRS Sump Pumps: ☒ NO ☐ YES Staff Gauge: ☒ NO ☐ YES

Other/Notes:

**5. General Observations and Recommendations**


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**Routine Visual Inspection Checklist for Embankment Dam**

Facility: Grants Reclamation Project      Structure: EP-2      Inspection Date: November 20, 2020  
 Inspector(s): M. Davis      Weather Conditions: Partly cloudy 60-65°      Ground Conditions: Dry  
 Reason for Inspection: Annual EOR Inspection      Photos Taken: : ☐ NO ☒ YES  
 Additional Comments: \_\_\_\_\_

**1. Upstream Slopes of Pond Embankments**

Slope protection material: HDPE Liner      Uniform or benched slope: Uniform  
 Slope height: 25 feet      Slope gradient: 3H:1V; 5H:1V (east embankment)  
 Is the general condition of slope protection inadequate?    ☐ N/A    ☒ NO    ☐ YES  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of rills, gullies, or other surface erosion?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of animal burrows or damage from wildlife?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of debris accumulation along the slope?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of operational activity in upstream area?    ☐ N/A    ☒ NO    ☐ YES  
 Vegetation?    ☐ N/A    ☒ NO    ☐ YES  
 Additional Comments: \_\_\_\_\_

**2. Pond Crest/Crest Road**

Dam crest surface material: Road base, 1" minus gravel      Crest width: 15-20 feet\*      Safety berms: No  
 Dam constructed in stages?    ☐ N/A    ☒ NO    ☐ YES  
 Is the general condition of crest surface inadequate?    ☐ N/A    ☒ NO    ☐ YES  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of rills, gullies, or other surface erosion?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of animal burrows or damage from wildlife?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of surface cracks? Direction? Offset?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of lateral movement?    ☐ N/A    ☒ NO    ☐ YES  
 Vegetation?    ☐ N/A    ☒ NO    ☐ YES  
 Additional Comments: \*Crest width is 20 feet on the east embankment (shared with EP-1) and 15 feet on the other embankments.

Facility: Grants Reclamation Project Structure: EP-2 Inspection Date: November 20, 2020**3. Downstream Slopes of Pond Embankments**Slope protection material: 2-inch gravel (basalt) Uniform or benched slope: UniformSlope height: Varies ~7 ft to 19 ft Slope gradient: 3H:1VIs the general condition of slope protection inadequate? ☐ N/A ☒ NO ☐ YESObserved sinkholes, depressions, or unusual settlement? ☐ N/A ☒ NO ☐ YESEvidence of rills, gullies, or other surface erosion? ☐ N/A ☒ NO ☐ YESEvidence of animal burrows or damage from wildlife? ☐ N/A ☒ NO ☐ YESEvidence of debris accumulation along the slope? ☐ N/A ☒ NO ☐ YESEvidence of operational activity in downstream area? ☐ N/A ☒ NO ☐ YESEvidence of seepage? ☐ N/A ☒ NO ☐ YES

Location(s)? 1. 2. 3. 4.

Measurable flow rate? 1. 2. 3. 4.

Clarity of seepage? 1. ☐ Clear ☐ Muddy 2. ☐ Clear ☐ Muddy 3. ☐ Clear ☐ Muddy 4. ☐ Clear ☐ MuddyEvidence of wet areas? Location(s)? ☐ N/A ☒ NO ☐ YES

Additional Comments: \_\_\_\_\_

**4. Instrumentation**Observed: LDRS Sump Pumps: ☐ NO ☒ YES Staff Gauge: ☐ NO ☒ YES

Other/Notes: \_\_\_\_\_

**5. General Observations and Recommendations**

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**Routine Visual Inspection Checklist for Embankment Dam**

Facility: Grants Reclamation Project      Structure: EP-3      Inspection Date: November 20, 2020  
 Inspector(s): M. Davis      Weather Conditions: Partly cloudy, 50s°      Ground Conditions: Dry  
 Reason for Inspection: Annual EOR Inspection      Photos Taken: : ☐ NO ☒ YES  
 Additional Comments: Double-lined HDPE pond

**1. Upstream Slopes of Pond Embankments**

Slope protection material: HDPE Liner      Uniform or benched slope: Uniform  
 Slope height: 14 feet      Slope gradient: 3H:1V  
 Is the general condition of slope protection inadequate?    ☐ N/A    ☒ NO    ☐ YES  
 Observed sinkholes, depressions, or unusual settlement?    ☐ N/A    ☒ NO    ☐ YES  
 Evidence of rills, gullies, or other surface erosion?          ☒ N/A    ☐ NO    ☐ YES  
 Evidence of animal burrows or damage from wildlife?          ☒ N/A    ☐ NO    ☐ YES  
 Evidence of debris accumulation along the slope?            ☒ N/A    ☐ NO    ☐ YES  
 Evidence of operational activity in upstream area?            ☐ N/A    ☐ NO    ☒ YES      Salt deposition, generally on East half  
 Vegetation?    ☒ N/A    ☐ NO    ☐ YES  
 Additional Comments: \_\_\_\_\_

**2. Pond Crest/Crest Road**

Dam crest surface material: Road base, 1" minus gravel      Crest width: 15 ft      Safety berms: No  
 Dam constructed in stages?    ☐ N/A    ☒ NO    ☐ YES  
 Is the general condition of crest surface inadequate?          ☐ N/A    ☒ NO    ☐ YES  
 Observed sinkholes, depressions, or unusual settlement?      ☐ N/A    ☒ NO    ☐ YES  
 Evidence of rills, gullies, or other surface erosion?            ☐ N/A    ☒ NO    ☐ YES  
 Evidence of animal burrows or damage from wildlife?          ☐ N/A    ☒ NO    ☐ YES  
 Evidence of surface cracks? Direction? Offset?                ☐ N/A    ☒ NO    ☐ YES  
 Evidence of lateral movement?                                        ☐ N/A    ☒ NO    ☐ YES  
 Vegetation?    ☐ N/A    ☒ NO    ☐ YES  
 Additional Comments: Crest width between two cells in pond is approximately 10 feet.



Facility: Grants Reclamation Project Structure: EP-3 Inspection Date: November 20, 2020

### 3. Downstream Slopes of Pond Embankments

Slope protection material: None Uniform or benched slope: Uniform

Slope height: ~10 feet Slope gradient: 5H:1V

Is the general condition of slope protection inadequate? ☒ N/A ☐ NO ☐ YES

Observed sinkholes, depressions, or unusual settlement? ☐ N/A ☒ NO ☐ YES

Evidence of rills, gullies, or other surface erosion? ☐ N/A ☒ NO ☐ YES See additional comments.

Evidence of animal burrows or damage from wildlife? ☐ N/A ☒ NO ☐ YES

Evidence of debris accumulation along the slope? ☐ N/A ☒ NO ☐ YES

Evidence of operational activity in downstream area? ☐ N/A ☒ NO ☐ YES

Evidence of seepage? ☐ N/A ☒ NO ☐ YES

Location(s)? 1. 2. 3. 4.

Measurable flow rate? 1. 2. 3. 4.

Clarity of seepage? 1. ☐ Clear ☐ Muddy 2. ☐ Clear ☐ Muddy 3. ☐ Clear ☐ Muddy 4. ☐ Clear ☐ Muddy

Evidence of wet areas? Location(s)? ☐ N/A ☒ NO ☐ YES

Additional Comments: Downstream slopes were graded for rill management in August 2020.

### 4. Instrumentation

Observed: LDRS Sump Pumps: ☐ NO ☒ YES Staff Gauge: ☐ NO ☒ YES

Other/Notes: \_\_\_\_\_

### 5. General Observations and Recommendations

Metal pole (bollard) near the northeast corner had been damaged while HMC was removing an evaporator unit from the pond for maintenance.

Stantec recommended that HMC use caution during repairs so as not to damage or get too close to the liner.

## Appendix B PHOTO LOG





**Photo 1: LTP, downstream toe along north side slope (looking west)**



**Photo 2: LTP, precipitate build up along downstream toe of north side slope**





**Photo 3: LTP, down drain outlet on north side slope**



**Photo 4: LTP, French drain/sump system at downstream toe of north side slope**





**Photo 5: LTP, east slope where diversion levee ties in to LTP**

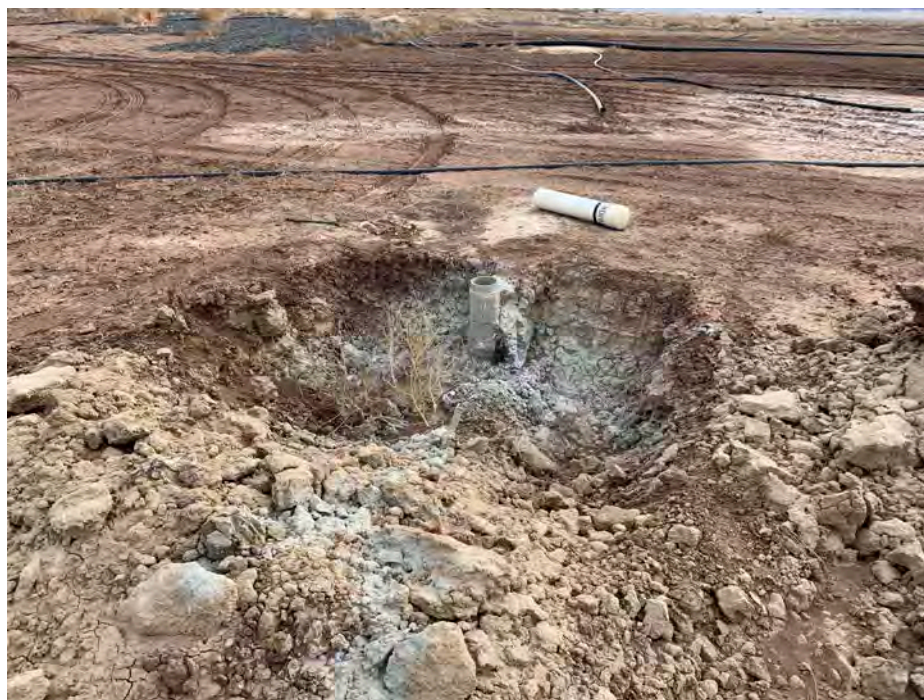


**Photo 6: LTP, precipitate on southwest slope of the LTP**





**Photo 7: LTP, precipitate buildup on southwest toe and road between LTP and RO plant**



**Photo 8: LTP, well abandonment on top surface**





**Photo 9: LTP, current dry conditions of downdrains 5 and 6**



**Photo 10: LTP, crest road of south side slope**





**Photo 11: LTP, berm constructed to help divert stormwater on LTP top surface at the north side of road**



**Photo 12: LTP, top surface of regraded area near south slope crest road**





**Photo 13: LTP, zeolite 1200 piping and berm**



**Photo 14: LTP, scour or damage to top surface interim cover**





**Photo 15: EP-1, precipitate buildup on slopes, operating at reduced capacity (looking north)**



**Photo 16: EP-1, precipitate buildup on southwest corner, looking northwest**





**Photo 17: EP-1, erosion mat on north embankment, rilling present under mat**



**Photo 18: EP-1, erosion mat on the north embankment downslope**





**Photo 19: EP-1, downstream slopes of STP/EP-1 after annual regrading**



**Photo 20: STP/EP-1, drainage feature on the southwest corner**





**Photo 21: STP/EP-1, toe of slope along the east embankment**



**Photo 22: STP/EP-1, south triangle area, looking east**





**Photo 23: EP-1, north crest of EP-1, looking east**



**Photo 24: EP-1, general conditions of downstream slope after annual regrading**





**Photo 25: EP-1/EP-2, crest road between EP-1 and EP-2**



**Photo 26: EP-2, general conditions of EP-2 liner and crest**





**Photo 27: EP-2, evaporators in operation, looking west towards RO plant**



**Photo 28: EP-2, general conditions, precipitate on northwest corner**





**Photo 29: EP-3, general conditions of downstream slope after annual regrading**



**Photo 30: EP-3, general conditions of downstream slope after annual regrading**



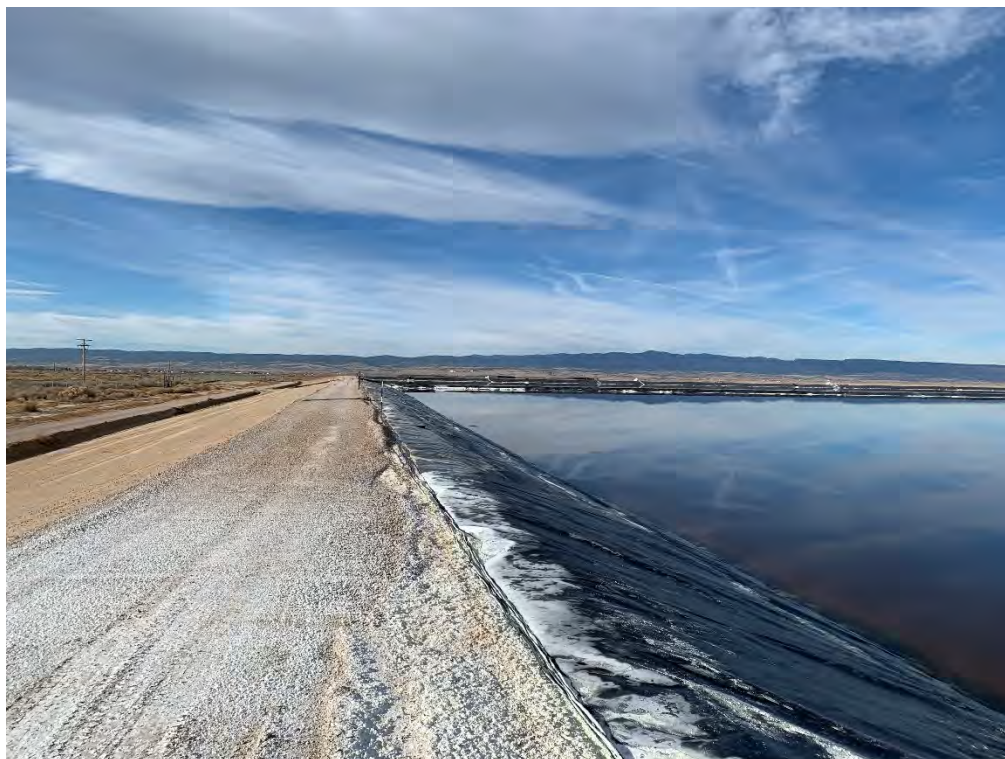


**Photo 31: EP-3, general conditions of pond and liner**

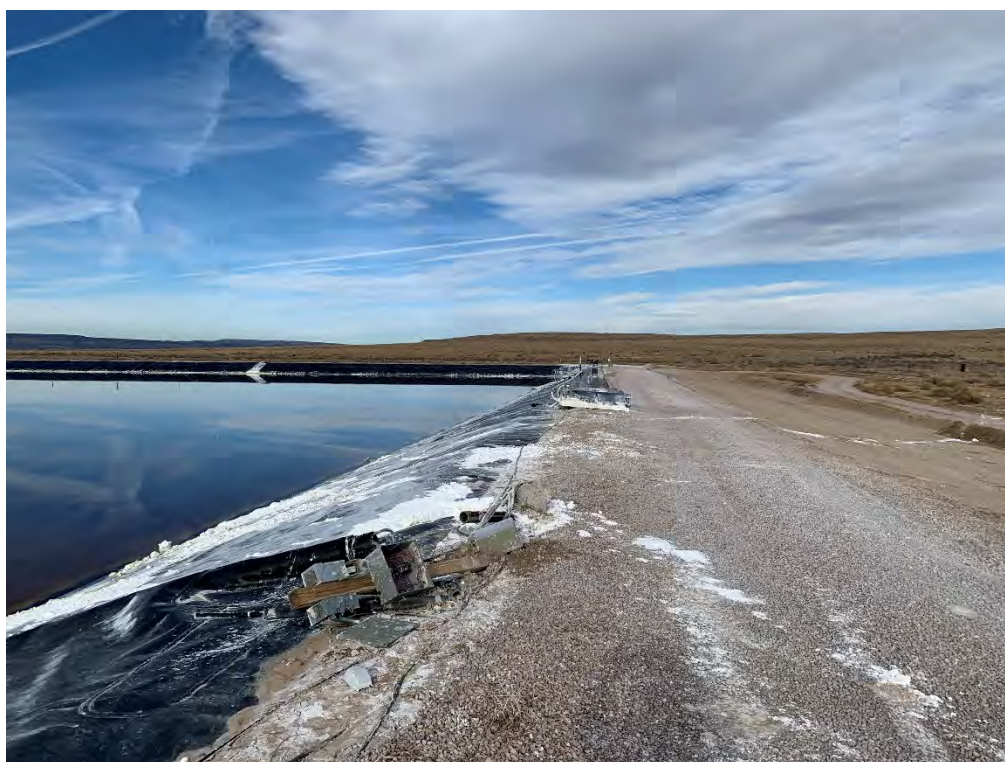


**Photo 32: EP-3, evaporator unit pulled out of EP-3 with precipitate buildup**





**Photo 33: EP-3, general conditions of crest road and liner**



**Photo 34: EP-3, damaged pole at northeast corner**

## Appendix C LTP SETTLEMENT DATA AND PLOTS



[illegible]

**GRP EOR Annual Inspection  
Settlement Monument Survey Data**

JANUARY 2021



Date	2/12/1994	2/21/1994	2/28/1994	3/8/1994	3/20/1994	4/8/1994	4/19/1994	5/3/1994	5/15/1994	6/7/1994	6/28/1994	7/11/1994	8/2/1994	8/16/1994	9/12/1994	10/1/1994	10/22/1994	11/12/1994	12/6/1994	12/26/1994
A2	6657.15	6657.09	6657.10	6657.09	6657.06	6657.05	6657.05	6657.03	6657.03	6656.93	6656.99	6657.03	6657.03	6657.03	6657.04	6657.03	6657.03	6657.02	6656.98	6657.00
A3	6657.80	6657.53	6657.54	6657.55	6657.53	6657.49	6657.48	6657.46	6657.45	6657.46	6657.40	6657.45	6657.44	6657.45	6657.45	6657.43	6657.43	6657.42	6657.37	6657.41
A4	6658.06	6657.89	6657.92	6657.89	6657.86	6657.87	6657.87	6657.85	6657.85	6657.85	6657.80	6657.83	6657.83	6657.84	6657.85	6657.84	6657.83	6657.83	6657.77	6657.80
A5	6659.67	6659.50	6659.52	6659.50	6659.49	6659.52	6659.51	6659.61	6659.50	6659.50	6659.46	6659.29	6659.30	6659.34	6659.34	6659.33	6659.33	6659.32	6659.31	6659.29
A6	6665.79	6665.70	6665.71	6665.71	6665.70	6665.73	6665.72	6665.83	6665.72	6665.72	6665.67	6665.71	6665.70	6665.69	6665.69	6665.70	6665.70	6665.70	6665.70	6665.67
A7	6666.18	6666.25	6666.26	6666.25	6666.23	6666.25	6666.24	6666.35	6666.24	6666.23	6666.20	6666.22	6666.18	6666.18	6666.19	6666.18	6666.18	6666.18	6666.20	6666.12
A8	6666.68	6666.68	6666.73	6666.71	6666.71	6666.78	6666.77	6666.87	6666.76	6666.75	6666.71	6666.74	6666.68	6666.69	6666.70	6666.69	6666.69	6666.68	6666.73	6666.62
A9	6666.41	6666.45	6666.49	6666.41	6666.50	6666.52	6666.55	6666.65	6666.53	6666.53	6666.50	6666.50	6666.50	6666.45	6666.46	6666.45	6666.44	6666.44	6666.48	6666.45
A10	6666.16	6666.39	6666.43	6666.40	6666.43	6666.49	6666.55	6666.64	6666.52	6666.52	6666.48	6666.50	6666.54	6666.47	6666.50	6666.49	6666.46	6666.46	6666.50	6666.48
A11	6663.97	6663.90	6663.95	6663.96	6663.96	6664.00	6663.99	6664.08	6663.97	6663.97	6663.94	6664.08	6664.10	6664.08	6664.11	6664.10	6664.07	6664.07	6664.07	6664.08
B1	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99
B2	6660.66	6659.95	6659.94	6659.91	6659.87	6659.78	6659.73	6659.67	6659.62	6659.59	6659.49	6659.49	6659.47	6659.47	6659.40	6659.38	6659.38	6659.32	6659.28	6659.28
B3	6663.21	6661.80	6661.75	6661.62	6661.49	6661.26	6661.16	6661.12	6660.85	6660.73	6660.57	6660.55	6660.48	6660.43	6660.37	6660.33	6660.26	6660.22	6660.12	6660.13
B4	6664.78	6663.66	6663.65	6663.57	6663.48	6663.40	6663.35	6663.29	6663.24	6663.19	6663.10	6663.10	6663.08	6663.05	6663.03	6663.02	6662.96	6662.91	6662.93	6662.93
B5	6666.77	6666.82	6666.81	6666.80	6666.77	6666.75	6666.72	6666.81	6666.67	6666.65	6666.57	6666.63	6666.63	6666.64	6666.61	6666.61	6666.59	6666.58	6666.59	6666.54
B6	6669.34	6669.25	6669.27	6669.23	6669.24	6669.57	6669.51	6669.65	6669.49	6669.47	6669.40	6669.47	6669.42	6669.39	6669.39	6669.36	6669.35	6669.34	6669.34	6669.32
B7	6673.15	6673.15	6673.15	6673.15	6673.15	6673.15	6673.15	6674.09	6673.88	6673.75	6673.62	6673.59	6673.51	6673.46	6673.39	6673.38	6673.28	6673.24	6673.23	6673.10
B8	6671.24	6671.20	6671.13	6671.06	6670.99	6670.89	6670.82	6670.86	6670.57	6670.35	6670.40	6670.40	6670.27	6670.23	6670.17	6670.14	6670.05	6669.99	6669.99	6669.85
B9	6671.79	6671.61	6671.55	6671.27	6671.33	6671.23	6671.23	6671.31	6671.11	6670.97	6670.84	6670.79	6670.72	6670.60	6670.51	6670.49	6670.37	6670.30	6670.29	6670.22
B10	6671.75	6671.72	6671.70	6671.67	6671.64	6671.62	6670.74	6672.16	6671.55	6671.42	6671.33	6671.29	6671.28	6671.16	6671.11	6671.10	6671.00	6670.95	6670.98	6670.93
B11	6666.00	6665.93	6665.98	6666.01	6666.00	6666.05	6666.04	6666.13	6666.03	6666.02	6665.99	6666.13	6666.15	6666.14	6666.16	6666.16	6666.12	6666.12	6666.12	6666.12
C1	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40
C2	6663.53	6662.34	6662.29	6662.26	6662.20	6662.10	6662.05	6661.98	6661.56	6661.50	6661.38	6661.37	6661.33	6661.28	6661.24	6661.19	6661.15	6661.11	6661.06	6661.06
C3	6671.82	6671.82	6670.43	6670.19	6670.17	6669.97	6669.86	6669.78	6669.56	6669.36	6669.13	6669.05	6668.92	6668.77	6668.59	6668.49	6668.31	6668.18	6668.03	6667.94
C4	6671.49	6670.19	6670.13	6669.97	6669.82	6673.39	6669.47	6669.41	6669.20	6669.03	6668.82	6668.79	6668.70	6668.62	6668.51	6668.47	6668.37	6668.31	6668.22	6668.21
C5	6674.67	6672.77	6672.74	6672.66	6672.58	6672.52	6672.45	6672.51	6672.34	6672.28	6672.18	6672.14	6672.14	6672.12	6672.08	6672.06	6672.03	6672.01	6672.01	6671.76
C6	6672.27	6672.49	6672.51	6672.46	6672.45	6672.42	6672.42	6672.52	6672.37	6672.35	6672.27	6672.24	6672.29	6672.24	6672.22	6672.20	6672.16	6672.15	6672.14	6672.11
C7	6676.13	6676.07	6676.02	6675.89	6675.76	6675.57	6675.46	6675.44	6675.21	6675.02	6674.84	6674.77	6674.57	6674.05	6674.36	6674.30	6674.16	6674.05	6673.93	6673.84
C8	6675.39	6675.28	6675.22	6675.36	6675.34	6674.74	6674.63	6674.61	6674.39	6674.23	6674.07	6674.08	6673.92	6673.87	6673.77	6673.73	6673.62	6673.54	6673.52	6673.38
C9	6674.67	6674.54	6674.50	6674.33	6674.20	6674.03	6673.90	6673.88	6673.66	6673.50	6673.36	6673.31	6673.27	6673.12	6673.04	6673.02	6672.90	6672.85	6672.76	6672.76
C10	6675.00	6674.84	6674.90	6674.71	6674.57	6674.39	6674.94	6674.90	6674.68	6674.51	6674.36	6674.33	6674.27	6674.14	6674.06	6674.02	6673.91	6673.83	6673.76	6673.75
C11	6666.81	6666.74	6666.80	6666.81	6666.80	6666.85	6666.81	6666.91	6666.81	6666.81	6666.78	6666.77	6666.80	6666.79	6666.81	6666.80	6666.77	6666.76	6666.64	6666.67
D1	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78
D2	6659.19	6658.65	6658.64	6658.63	6658.51	6658.45	6658.42	6658.39	6658.32	6658.31	6658.23	6658.23	6658.20	6658.17	6658.16	6658.13	6658.11	6658.09	6658.05	6658.06
D3	6661.70	6660.69	6660.67	6660.57	6660.50	6660.40	6660.36	6660.36	6660.23	6660.18	6660.07	6660.08	6660.05	6660.02	6659.98	6659.98	6659.91	6659.88	6659.82	6659.84
D4	6662.82	6662.27	6662.27	6662.18	6662.14	6662.06	6662.02	6662.04	6661.93	6661.89	6661.79	6661.80	6661.80	6661.77	6661.74	6661.75	6661.69	6661.68	6661.63	6661.64
D5	6665.53	6665.67	6665.73	6665.67	6665.64	6665.62	6665.57	6665.53	6665.50	6665.42	6665.39	6665.39	6665.37	6665.35	6665.36	6665.32	6665.31	6665.31	6665.29	6665.29
D6	6669.14	6669.08	6669.11	6669.06	6669.07	6669.10	6669.09	6669.20	6669.08	6669.08	6669.02	6669.13	6669.08	6669.05	6669.05	6669.06	6669.04	6669.04	6669.06	6669.05
D7	6670.18	6670.07	6670.04	6669.94	6669.86	6669.75	6669.66	6669.67	6669.48	6669.36	6669.27	6669.37	6669.27	6669.25	6669.21	6669.21	6669.12	6669.09	6669.06	6669.04
D8	6670.97	6670.84	6670.83	6670.72	6670.65	6670.56	6670.50	6670.55	6670.38	6670.30	6670.22	6670.38	6670.28	6670.26	6670.24	6670.24	6670.17	6670.14	6670.14	6670.12
D9	6670.62	6670.50	6670.53	6670.44	6670.41	6670.37	6670.31	6670.37	6670.21	6670.17	6670.11	6670.10	6670.04	6670.02	6669.99	6670.01	6669.93	6669.92	6669.89	6669.90
D10	6670.78	6670.86	6670.88	6670.86	6670.83	6670.81	6670.72	6670.73	6670.57	6670.46	6670.35	6670.33	6670.33	6670.22	6670.16	6670.14	6670.05	6670.01	6669.97	6669.98
D11	6665.66	6665.66	6665.66	6665.66	6665.66	6665.66	6665.66	6665.66	6665.78	6665.78	6665.76	6665.76	6665.71	6665.77	6665.79	6665.79	6665.74	6665.73	6665.74	6665.75
E2	6657.57	6657.47	6657.51	6657.46	6657.46	6657.48	6657.48	6657.52	6657.44	6657.44	6657.35	6657.38	6657.32	6657.33	6657.33	6657.37	6657.30	6657.29	6657.24	6657.28
E3	6657.82	6657.75	6657.80	6657.89	6657.97	6657.99	6658.00	6658.06	6657.98	6657.99	6657.93	6657.95	6657.96	6657.99	6658.05	6658.05	6657.98	6657.99	6657.96	6657.99
E4	6656.50	6656.37	6656.42	6656.37	6656.36	6656.38	6656.39	6656.45	6656.35	6656.36	6656.34	6656.39	6656.39	6656.33	6656.32	6656.36	6656.30	6656.30	6656.27	6656.29
E5	6661.16	6661.02	6661.05	6661.02	6661.00	6661.02	6661.01	6661.09	6660.99	6660.99	6660.97	6660.98	6661.02	6661.00	6661.02	6661.03	6660.99	6660.99	6661.01	6661.00
E6	6665.05	6665.01	6665.05	6665.01	6665.00	6665.03	6665.02	6665.12	6665.00	6665.01	6664.99	6665.05	6665.00	6664.99	6665.00	6665.01	6664.99	6664.99	6665.01	6664.99
E7																				



Date	1/21/1995	2/14/1995	3/6/1995	3/28/1995	4/29/1995	5/28/1995	6/6/1995	7/4/1995	7/22/1995	8/12/1995	9/2/1995	9/24/1995	10/11/1995	11/1/1995	11/28/1995	12/19/1995	1/8/1996	1/29/1996	2/27/1996	3/25/1996
A2	6657.02	6657.01	6657.00	6656.99	6656.99	6656.98	6656.96	6656.98	6656.96	6656.98	6656.97	6656.95	6656.97	6656.97	6656.97	6657.05	6656.98	6656.95	6657.00	6657.02
A3	6657.40	6657.40	6657.40	6657.40	6657.40	6657.37	6657.36	6657.38	6657.36	6657.37	6657.35	6657.33	6657.35	6657.35	6657.35	6657.41	6657.37	6657.31	6657.38	6657.38
A4	6657.80	6657.80	6657.81	6657.81	6657.81	6657.77	6657.77	6657.80	6657.78	6657.77	6657.78	6657.76	6657.79	6657.77	6657.76	6657.87	6657.78	6657.75	6657.82	6657.83
A5	6659.30	6659.31	6659.29	6659.30	6659.30	6659.26	6659.30	6659.29	6659.28	6659.29	6659.28	6659.23	6659.30	6659.28	6659.27	6659.34	6659.31	6659.26	6659.34	6659.33
A6	6665.68	6665.70	6665.67	6665.68	6665.73	6665.66	6665.71	6665.69	6665.65	6665.68	6665.68	6665.64	6665.71	6665.65	6665.68	6665.77	6665.70	6665.69	6665.75	6665.77
A7	6666.19	6666.18	6666.15	6666.15	6666.19	6666.15	6666.19	6666.16	6666.17	6666.11	6666.14	6666.11	6666.19	6666.15	6666.15	6666.21	6666.18	6666.15	6666.24	6666.21
A8	6666.70	6666.69	6666.65	6666.68	6666.71	6666.67	6666.70	6666.68	6666.67	6666.65	6666.64	6666.61	6666.71	6666.64	6666.70	6666.71	6666.67	6666.68	6666.73	6666.71
A9	6666.48	6666.45	6666.40	6666.43	6666.45	6666.42	6666.46	6666.44	6666.44	6666.41	6666.48	6666.36	6666.34	6666.43	6666.46	6666.49	6666.48	6666.45	6666.52	6666.51
A10	6666.50	6666.48	6666.44	6666.46	6666.46	6666.44	6666.48	6666.46	6666.46	6666.45	6666.51	6666.37	6666.51	6666.44	6666.48	6666.50	6666.47	6666.48	6666.51	6666.52
A11	6664.10	6664.08	6664.04	6664.07	6664.06	6664.06	6664.09	6664.07	6664.07	6664.11	6663.97	6664.14	6664.08	6664.09	6664.11	6664.09	6664.09	6664.09	6664.17	6664.15
B1	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99	6656.99
B2	6659.26	6659.23	6659.22	6659.19	6659.19	6659.16	6659.13	6659.13	6659.12	6659.14	6659.11	6658.98	6659.09	6659.05	6659.00	6659.15	6659.06	6659.04	6659.07	6659.11
B3	6660.10	6660.05	6660.02	6660.00	6659.98	6659.90	6659.90	6659.99	6659.87	6659.98	6659.86	6659.81	6659.83	6659.77	6659.66	6659.82	6659.78	6659.70	6659.79	6659.77
B4	6662.91	6662.90	6662.87	6662.86	6662.85	6662.80	6662.80	6662.91	6662.80	6662.79	6662.78	6662.74	6662.78	6662.73	6662.75	6662.84	6662.75	6662.72	6662.77	6662.79
B5	6665.55	6665.54	6665.52	6665.51	6665.53	6665.47	6665.51	6665.49	6665.48	6665.49	6665.46	6665.47	6665.52	6665.46	6665.43	6665.57	6665.46	6665.40	6665.49	6665.47
B6	6669.32	6669.30	6669.26	6669.27	6669.30	6669.21	6669.26	6669.24	6669.23	6669.18	6669.20	6669.13	6669.21	6669.15	6669.17	6669.25	6669.15	6669.15	6669.21	6669.18
B7	6673.13	6673.08	6673.02	6673.04	6673.04	6672.94	6672.98	6672.82	6672.89	6672.81	6672.85	6672.69	6672.82	6672.75	6672.70	6672.78	6672.61	6672.67	6672.70	6672.65
B8	6669.88	6669.83	6669.76	6669.78	6669.77	6669.67	6669.69	6669.52	6669.33	6669.54	6669.57	6669.36	6669.52	6669.39	6669.41	6669.39	6669.34	6669.33	6669.34	6669.31
B9	6670.17	6670.10	6670.03	6670.04	6670.02	6669.95	6669.97	6669.90	6669.89	6669.84	6669.87	6669.69	6669.85	6669.76	6669.72	6669.77	6669.72	6669.66	6669.73	6669.71
B10	6670.90	6670.86	6670.81	6670.83	6670.83	6670.77	6670.81	6670.76	6670.77	6670.73	6670.74	6670.56	6670.72	6670.62	6670.63	6670.58	6670.58	6670.61	6670.59	
B11	6666.10	6666.12	6666.08	6666.11	6666.10	6666.09	6666.13	6666.09	6666.11	6666.11	6666.16	6666.00	6666.18	6666.08	6666.09	6666.12	6666.11	6666.10	6666.17	6666.17
C1	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40	6657.40
C2	6660.92	6661.00	6660.97	6660.93	6660.93	6660.89	6660.89	6660.87	6660.96	6660.91	6660.90	6660.88	6660.85	6660.79	6660.77	6660.77	6660.76	6660.77	6660.81	6660.71
C3	6667.80	6667.68	6667.59	6667.48	6667.33	6667.18	6667.14	6667.15	6667.13	6667.14	6667.07	6666.85	6666.73	6666.60	6666.38	6666.22	6666.13	6666.18	6666.12	6665.95
C4	6668.15	6668.10	6668.06	6668.02	6668.02	6667.92	6668.00	6668.01	6668.03	6667.98	6667.93	6667.77	6667.71	6667.62	6667.45	6667.46	6667.38	6667.40	6667.38	6667.26
C5	6671.97	6671.95	6671.92	6671.90	6671.94	6671.85	6671.89	6671.88	6671.97	6671.85	6671.85	6671.76	6671.82	6671.83	6671.60	6671.64	6671.58	6671.62	6671.64	6671.55
C6	6672.10	6672.06	6672.03	6672.03	6672.06	6671.98	6672.03	6672.01	6672.10	6671.95	6671.80	6671.62	6671.64	6671.64	6671.44	6671.47	6671.38	6671.42	6671.42	6671.33
C7	6673.70	6673.60	6673.49	6673.42	6673.38	6673.33	6673.23	6673.14	6673.25	6673.10	6672.99	6672.76	6672.75	6672.48	6672.43	6672.36	6672.22	6672.21	6672.14	6671.99
C8	6673.40	6673.34	6673.26	6673.23	6673.25	6673.15	6673.17	6673.12	6673.12	6673.13	6673.09	6672.93	6672.98	6672.89	6672.82	6672.78	6672.67	6672.70	6672.69	6672.56
C9	6672.71	6672.66	6672.60	6672.57	6672.61	6672.51	6672.51	6672.49	6672.62	6672.50	6672.45	6672.29	6672.35	6672.24	6672.16	6672.15	6672.01	6672.05	6672.07	6671.93
C10	6673.70	6673.63	6673.56	6673.54	6673.57	6673.48	6673.49	6673.48	6673.62	6673.52	6673.53	6673.40	6673.48	6673.42	6673.34	6673.33	6673.20	6673.23	6673.25	6673.11
C11	6666.75	6666.77	6666.73	6666.74	6666.75	6666.74	6666.78	6666.79	6666.79	6666.74	6666.78	6666.70	6666.82	6666.73	6666.82	6666.65	6666.82	6666.76	6666.81	6666.80
D1	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.78	6658.57
D2	6658.04	6658.03	6658.01	6657.98	6658.00	6657.97	6657.96	6657.93	6657.93	6657.92	6657.92	6657.90	6657.88	6657.84	6657.83	6657.83	6657.83	6657.82	6657.80	6657.80
D3	6659.82	6659.80	6659.77	6659.75	6659.72	6659.67	6659.75	6659.77	6659.66	6659.80	6659.66	6659.62	6659.64	6659.58	6659.57	6659.57	6659.58	6659.56	6659.55	6659.53
D4	6661.63	6661.61	6661.59	6661.57	6661.59	6661.51	6661.60	6661.62	6661.50	6661.66	6661.52	6661.48	6661.50	6661.39	6661.42	6661.41	6661.42	6661.39	6661.38	6661.38
D5	6665.29	6665.27	6665.25	6665.23	6665.27	6665.19	6665.23	6665.21	6665.19	6665.19	6665.19	6665.13	6665.22	6665.09	6665.16	6665.11	6665.17	6665.14	6665.14	6665.12
D6	6669.05	6669.02	6669.00	6669.00	6669.05	6668.99	6669.04	6669.02	6669.02	6669.14	6669.19	6669.09	6669.18	6669.10	6669.15	6669.05	6669.18	6669.14	6669.16	6669.08
D7	6669.00	6668.95	6668.91	6668.89	6668.92	6668.85	6668.86	6668.87	6668.82	6668.79	6668.76	6668.70	6668.89	6668.67	6668.79	6668.66	6668.71	6668.66	6668.65	6668.64
D8	6670.09	6670.05	6670.01	6669.99	6670.05	6669.97	6670.00	6669.99	6669.96	6669.95	6669.90	6669.85	6670.01	6669.84	6669.90	6669.78	6669.89	6669.85	6669.86	6669.78
D9	6669.88	6669.85	6669.80	6669.79	6669.84	6669.77	6669.79	6669.81	6669.77	6669.76	6669.71	6669.66	6669.82	6669.63	6669.74	6669.62	6669.69	6669.63	6669.66	6669.61
D10	6669.92	6669.92	6669.87	6669.86	6669.89	6669.84	6669.87	6669.87	6669.85	6669.85	6669.78	6669.71	6669.80	6669.67	6669.75	6669.58	6669.72	6669.65	6669.69	6669.57
D11	6665.72	6665.74	6665.71	6665.70	6665.73	6665.72	6665.76	6665.77	6665.75	6665.74	6665.76	6665.68	6665.81	6665.71	6665.81	6665.65	6665.80	6665.73	6665.79	6665.79
E2	6657.29	6657.27	6657.27	6657.26	6657.21	6657.20	6657.26	6657.32	6657.24	6657.38	6657.23	6657.20	6657.22	6657.15	6657.17	6657.18	6657.18	6657.18	6657.16	6657.15
E3	6658.00	6658.00	6657.99	6657.98	6657.95	6657.94	6658.00	6658.07	6657.92	6658.12	6657.99	6657.96	6658.00	6657.92	6657.96	6657.99	6657.99	6657.99	6657.99	6657.96
E4	6656.30	6656.28	6656.25	6656.27	6656.24	6656.23	6656.30	6656.35	6656.24	6656.40	6656.27	6656.24	6656.28	6656.15	6656.22	6656.20	6656.22	6656.22	6656.22	6656.19
E5	6661.00	6660.98	6660.95	6660.98	6661.02	6660.94	6660.99	6660.97	6660.95	6660.96	6660.96	6660.91	6661.01	6660.89	6660.96	6660.95	6660.98	6661.36	6660.96	6660.93
E6	6665.00	6664.99	6664.96	6664.98	6665.02	6664.97	6665.01	6664.99	6665.00	6664.96	6664.93	6664.93	6665.04	6664.92	6665.00	6665.00	6664.91	6664.99	6665.01	6664.96
E7	6666.79</																			



Date	6/18/1996	7/31/1996	8/30/1996	9/30/1996	11/1/1996	12/2/1996	12/31/1996	4/30/1997	6/2/1997	6/30/1997	8/1/1997	1/9/1998	4/8/1998	12/4/1998	3/1/1999	4/1/1999	7/1/1999	10/3/2000	10/10/2001	11/4/2002
A2	6656.94	6656.85	6656.89	6656.84	6656.92	6656.90	6656.90	6656.92	6656.87	6656.92	6656.88	6656.81	6656.79	6656.77	6656.89	6656.83	6656.86	6656.84	6656.79	6656.72
A3	6657.30	6657.26	6657.25	6657.22	6657.28	6657.20	6657.22	6657.23	6657.24	6657.27	6657.23	6657.22	6657.14	6657.12	6657.25	6657.18	6657.22	6657.20	6657.14	6657.01
A4	6657.76	6657.70	6657.71	6657.64	6657.66	6657.69	6657.64	6657.68	6657.70	6657.68	6657.67	6657.66	6657.63	6657.54	6657.69	6657.62	6657.65	6657.65	6657.61	6657.47
A5	6659.27	6659.23	6659.19	6659.17	6659.19	6659.18	6659.16	6659.22	6659.18	6659.28	6659.22	6659.15	6659.16	6659.08	6659.24	6659.19	6659.20	6659.22	6659.19	6659.03
A6	6665.57	6665.68	6665.64	6665.59	6665.62	6665.58	6665.57	6665.71	6665.65	6665.67	6665.61	6665.63	6665.57	6665.59	6665.69	6665.62	6665.68	6665.68	6665.67	6665.53
A7	6666.12	6666.09	6666.06	6666.06	6666.07	6666.05	6666.06	6666.06	6666.10	6666.05	6666.04	6666.03	6666.00	6665.98	6666.09	6666.05	6666.13	6666.10	6666.08	6666.01
A8	6666.61	6666.53	6666.61	6666.55	6666.54	6666.51	6666.56	6666.51	6666.56	6666.59	6666.60	6666.55	6666.53	6666.50	6666.50	6666.63	6666.61	6666.56	6666.49	
A9	6666.38	6666.40	6666.34	6666.32	6666.31	6666.34	6666.35	6666.36	6666.33	6666.39	6666.28	6666.39	6666.26	6666.27	6666.27	6666.40	6666.36	6666.38	6666.25	
A10	6666.39	6666.40	6666.38	6666.34	6666.33	6666.36	6666.32	6666.37	6666.32	6666.44	6666.32	6666.30	6666.30	6666.28	6666.27	6666.42	6666.42	6666.30	6666.41	6666.30
A11	6664.03	6663.99	6663.98	6663.96	6663.99	6664.02	6663.87	6663.97	6664.06	6664.08	6663.96	6663.99	6663.93	6663.96	6663.94	6664.00	6664.09	6663.97	6664.07	6663.95
B1	6656.75	6656.75	6656.69	6656.66	6656.72	6656.75	6656.63	6656.68	6656.66	6656.75	6656.66	6656.60	6656.59	6656.60	6656.66	6656.66	6656.67	6656.65	6656.59	6656.50
B2	6658.98	6658.99	6658.94	6658.86	6658.94	6658.99	6658.84	6658.87	6658.82	6658.86	6658.76	6658.65	6658.66	6658.58	6658.68	6658.64	6658.66	6658.63	6658.53	6658.44
B3	6659.66	6659.60	6659.59	6659.64	6659.54	6659.57	6659.42	6659.51	6659.54	6659.44	6659.42	6659.38	6659.28	6659.24	6659.36	6659.33	6659.35	6659.29	6659.21	6659.09
B4	6662.67	6662.64	6662.65	6662.56	6662.64	6662.64	6662.51	6662.54	6662.63	6662.61	6662.57	6662.49	6662.45	6662.44	6662.56	6662.50	6662.53	6662.53	6662.49	6662.35
B5	6665.42	6665.32	6665.36	6665.28	6665.39	6665.30	6665.27	6665.32	6665.28	6665.42	6665.34	6665.30	6665.27	6665.20	6665.35	6665.32	6665.35	6665.38	6665.33	6665.22
B6	6669.13	6669.06	6669.03	6669.01	6668.97	6668.96	6668.98	6669.05	6668.95	6669.00	6668.90	6668.85	6668.81	6668.73	6668.88	6668.80	6668.84	6668.80	6668.75	6668.60
B7	6672.48	6672.42	6672.37	6672.32	6672.30	6672.36	6672.23	6672.21	6672.21	6672.23	6672.17	6672.10	6671.96	6671.88	6671.88	6671.91	6671.93	6671.87	6671.86	6671.77
B8	6669.13	6669.06	6669.02	6669.02	6668.98	6668.97	6668.94	6668.89	6668.91	6668.83	6668.84	6668.76	6668.67	6668.56	6668.58	6668.64	6668.60	6668.53	6668.49	
B9	6669.55	6669.51	6669.46	6669.41	6669.39	6669.38	6669.33	6669.31	6669.32	6669.23				6668.99	6668.94	6669.02	6669.05	6670.09	6668.94	6668.81
B10	6670.48	6670.44	6670.41	6670.33	6670.37	6670.36	6670.33	6670.29	6670.34	6670.06	6670.27	6670.26	6670.12	6670.10	6670.12	6670.17	6670.22	6670.08	6670.11	6670.02
B11	6666.05	6666.03	6666.01	6666.03	6665.97	6665.98	6665.96	6666.02	6666.03	6666.11	6665.96	6665.96	6665.97	6665.96	6665.96	6666.04	6666.11	6666.01	6666.11	6666.00
C1	6657.12	6657.07	6657.05	6657.04	6657.06	6657.00	6657.00	6656.99	6657.03	6657.06	6657.04	6656.97	6656.95	6656.93	6656.85	6657.01	6657.00	6656.93	6656.83	
C2	6660.69	6660.65	6660.66	6660.54	6660.61	6660.49	6660.50	6660.48	6660.48	6660.48	6660.48	6660.39	6660.35	6660.25	6660.21	6660.35	6660.34	6660.24	6660.17	6660.13
C3	6665.73	6665.73	6665.65	6665.56	6665.59	6665.43	6665.42	6665.30	6665.31	6665.23	6665.23	6665.12	6665.00	6664.95	6664.87	6665.03	6665.00	6664.94	6664.84	
C4	6667.22	6667.15	6667.15	6667.07	6667.05	6667.03	6667.00	6666.95	6666.93	6666.99	6666.90	6666.85	6666.83	6666.77	6666.73	6666.86	6667.46	6666.85	6666.68	
C5	6671.53	6671.52	6671.52	6671.49	6671.46	6671.46	6671.42	6671.47	6671.45	6671.46	6671.46	6671.36	6671.34	6671.27	6671.28	6671.38	6671.40	6671.44	6671.34	6671.25
C6	6671.29	6671.28	6671.25	6671.17	6671.18	6671.17	6671.16	6671.20	6671.13	6671.40	6671.06	6671.01	6670.97	6670.95	6670.97	6671.00	6671.05	6671.02	6670.96	6670.82
C7	6671.76	6671.68	6671.52	6671.53	6671.46	6671.39	6671.41	6671.35	6671.25	6671.24	6671.13	6670.91	6670.87	6670.78	6670.71	6670.78	6670.80	6670.72	6670.67	6670.58
C8	6672.47	6672.42	6672.38	6672.27	6672.26	6672.22	6672.21	6672.20	6672.16	6672.16	6672.17	6671.99	6671.96	6671.87	6671.89	6671.93	6671.97	6671.96	6671.92	6671.89
C9	6671.90	6671.86	6671.82	6671.72	6671.69	6671.64	6671.70	6671.62	6671.58	6671.56	6671.51	6671.49	6671.40	6671.41	6671.49	6671.49	6671.54	6671.48	6671.43	
C10	6673.01	6673.09	6673.05	6672.88	6672.92	6672.91	6672.89	6672.81	6672.86	6672.85	6672.83	6672.72	6672.69	6672.62	6672.61	6672.66	6672.71	6672.58	6672.58	6672.49
C11	6666.84	6666.67	6666.69	6666.58	6666.63	6666.59	6666.55	6666.65	6666.63	6666.50	6666.60	6666.56	6666.57	6666.56	6666.56	6666.70	6666.61	6666.70	6666.60	
D1	6658.56	6658.51	6658.54	6658.47	6658.47	6658.59	6658.46	6658.47	6658.46	6658.47	6658.51	6658.42	6658.44	6658.36	6658.31	6658.44	6658.44	6658.44	6658.29	
D2	6657.80	6657.77	6657.81	6657.69	6657.73	6657.72	6657.65	6657.64	6657.64	6657.68	6657.60	6657.59	6657.55	6657.52	6657.48	6657.62	6657.59	6657.52	6657.44	
D3	6659.53	6659.41	6659.49	6659.40	6659.45	6659.39	6659.32	6659.39	6659.36	6659.48	6659.38	6659.36	6659.29	6659.27	6659.22	6659.33	6659.30	6659.24	6659.11	
D4	6661.38	6661.33	6661.36	6661.25	6661.32	6661.29	6661.31	6661.26	6661.31	6661.33	6661.28	6661.22	6661.21	6661.17	6661.11	6661.24	6661.26	6661.22	6661.07	
D5	6665.08	6665.03	6665.12	6664.98	6664.99	6665.09	6665.00	6665.03	6665.04	6665.12	6665.01	6665.00	6665.00	6664.95	6664.95	6665.07	6665.11	6665.02	6664.94	
D6	6669.05	6669.02	6669.07	6668.97	6668.99	6669.03	6669.01	6669.04	6669.03	6669.07	6669.02	6668.97	6668.97	6668.96	6668.96	6669.05	6669.05	6669.02	6668.88	
D7	6668.55	6668.51	6668.54	6668.45	6668.50	6668.47	6668.40	6668.50	6668.36	6668.36	6668.38	6668.26	6668.24	6668.14	6668.14	6668.25	6668.16	6668.12	6668.06	
D8	6669.71	6669.68	6669.76	6669.60	6669.69	6669.65	6669.63	6669.60	6669.65	6669.66										
D9	6669.56	6669.51	6669.57	6669.42	6669.53	6669.50	6669.37	6669.48	6669.47	6669.39	6669.42	6669.29	6669.24	6669.24	6669.17	6669.29	6669.29	6669.20	6671.43	
D10	6669.50	6669.51	6669.52	6669.38	6669.47	6669.45	6669.31	6669.37	6669.44	6669.38	6669.32	6669.21	6669.15	6669.09	6669.08	6669.19	6669.03	6669.02	6668.95	
D11	6665.62	6665.60	6665.66	6665.58	6665.62	6665.70	6665.56	6665.59	6665.61	6665.69	6665.64	6665.60	6665.58	6665.61	6665.59	6665.72	6665.63	6665.72	6665.69	
E2	6657.07	6657.10	6657.11	6657.04	6657.07	6657.05	6657.14	6657.04	6657.04	6657.06	6657.05	6657.03	6657.04	6657.00	6656.94	6657.07	6657.06	6656.99	6656.92	
E3	6657.92	6657.90	6657.97	6657.83	6657.92	6657.83	6657.83	6657.92	6657.87	6657.97	6657.89	6657.91	6657.90	6657.90	6657.86	6658.00	6658.00	6657.99	6657.88	
E4	6656.13	6656.14	6656.14	6656.09	6656.13	6656.11	6656.17	6656.15	6656.12	6656.10	6656.12	6656.12	6656.18	6656.09	6656.02	6656.16	6656.18	6656.14	6655.96	
E5	6660.87	6660.87	6660.83	6660.78	6660.85	6660.84	6660.84	6660.87	6660.85	6660.93	6660.81	6660.88	6660.86	6660.82	6660.80	6660.92	6660.96	6660.89	6660.80	
E6	6664.92	6664.86	6664.92	6664.83	6664.87	6664.84	6664.87	6664.93	6664.90	6664.94	6664.94	6664.84	6664.86	6664.86	6664.85	6664.95	6664.98	6664.95	6664.85	
E7	6666.88	6666.67	6666.72	6666.63	6666.73	6666.61	6666.64	6666.65	6666.67	6666.70	6666.71	6666.61	6666.64	6666.65	6666.60	6666.75	6666.72	6666.70	6666.62	
E8	6666.08	6666.03	6666.10	6666.01																



Date	11/24/2003	11/29/2004	12/6/2005	10/5/2006	11/8/2007	12/4/2008	12/1/2009	10/12/2010	10/1/2011	12/1/2012	11/4/2013	11/6/2014	11/6/2015	11/29/2016	11/29/2017	9/27/2018	8/22/2019	11/16/2020
A2	6656.74	6656.70	6656.69	6656.83	6656.78	6656.62	6656.79	6656.60	6656.50	6656.45	6656.45	6656.44	6656.32	6656.40	6656.29	6656.32	6656.27	6656.25
A3	6657.07	6657.08	6657.03	6655.16	6655.10									6656.71	6656.68	6656.67	6656.65	
A4	6657.41	6657.39	6657.30	6657.57	6657.39	6657.29	6657.39	6657.21	6657.14	6657.09	6657.11	6657.11	6657.01	6657.09	6656.98	6657.00	6656.95	6656.92
A5	6659.03	6659.16	6659.12	6659.20	6659.16	6659.04	6659.18	6659.02	6658.96	6658.93	6658.95	6658.96	6658.87	6658.96	6658.87	6658.87	6658.85	6658.84
A6	6665.56	6665.66	6665.62	6665.68	6665.62	6665.53	6665.62	6665.48	6665.42	6665.40	6665.44	6665.43	6665.30	6665.42	6665.33	6665.33	6665.31	6665.27
A7	6665.99	6666.00	6666.05	6666.03	6666.04	6665.91	6666.05	6665.81	6665.84	6665.80	6665.83	6665.81	6665.67	6665.77	6665.67	6665.70	6665.63	6665.57
A8	6666.45	6666.44	6666.55	6666.54	6666.49	6666.33	6666.47	6666.31	6666.25	6666.21	6666.25	6666.21	6666.10	6666.21	6666.09	6666.10	6666.08	6666.04
A9	6666.25	6666.25	6666.38	6666.38	6666.31	6666.15	6666.28	6666.13	6666.07	6666.02	6666.07	6666.03	6665.94	6666.04	6665.92	6665.97	6665.90	6665.88
A10	6666.30	6666.29	6666.34	6666.33	6666.34	6666.15	6666.34	6666.18	6666.11	6666.06	6666.10	6666.06	6665.99	6666.07	6665.94	6665.99	6665.94	6665.89
A11	6663.94	6663.93	6663.95	6663.99	6664.00	6663.81	6664.00	6663.86	6663.78	6663.72	6663.78	6663.74	6663.68	6663.78	6663.65	6663.61	6663.67	6663.66
B1	6656.54	6656.52	6656.51	6656.45	6658.57	6656.44	6656.60	6656.43	6656.33	6656.31	6656.31	6656.26	6656.19	6656.26	6656.18	6656.14	6656.08	6656.08
B2	6658.48	6658.46	6658.45	6658.39	6658.41	6658.30	6658.44	6658.28	6658.16	6658.16	6658.16	6658.13	6657.99	6658.05	6657.92	6657.89	6657.81	6657.76
B3	6659.12	6659.12	6659.07	6658.98													#N/A	#N/A
B4	6662.36	6662.40	6662.33	6662.37	6662.38	6662.31	6662.42	6662.30	6662.16	6662.16	6662.16	6662.12	6662.01	6662.09	6661.97	6661.91	6661.91	6661.83
B5	6665.16	6665.32	6665.20	6665.08	6665.12	6665.02	6665.15	6664.99	6664.87	6664.87	6664.88	6664.84	6664.74	6664.85	6664.76	6664.74	6664.69	6664.68
B6	6668.64	6668.73	6668.69	6668.61	6668.64	6668.53	6668.63	6668.47	6668.40	6668.38	6668.36	6668.31	6668.16	6668.22	6668.10	6668.08	6668.04	6667.92
B7	6671.74	6671.71	6671.79	6671.69	6671.74	6671.60	6671.73	6671.50	6671.51	6671.51	6671.48	6671.44	6671.29	6671.37	6671.24	6671.24	6671.19	6667.07
B8	6668.45	6668.47	6668.56	6668.44	6668.44										6668.00	6667.99	6667.95	6667.90
B9	6668.83	6668.84	6668.98	6668.85	6668.87	6668.68	6668.83	6668.64	6668.59	6668.57	6668.58	6668.52	6668.41	6668.48	6668.37	6668.33	6668.28	6668.24
B10	6670.02	6670.03	6670.04														#N/A	#N/A
B11	6666.00	6666.00	6666.02	6665.94	6665.97	6665.81	6665.99	6665.83	6665.76	6665.73	6665.76	6665.68	6665.68	6665.68	6661.41	6661.40	6661.39	6661.33
C1	6656.88	6656.86	6656.83	6656.77	6656.86	6656.73	6656.89	6656.90	6656.63	6656.64	6656.61	6656.62	6656.39	6656.52	6656.39	6656.42	6656.38	6656.35
C2	6660.23	6660.17	6660.21	6660.16	6660.16	6660.00	6660.20	6660.23	6659.93	6659.97	6659.95	6659.91	6659.71	6659.83	6659.72	6659.68	6659.65	6659.60
C3	6664.87	6664.91	6664.71	6664.78	6664.78	6664.68	6664.82	6664.87	6664.54	6664.56	6664.55	6664.48	6664.48	6664.38	6664.27	6664.25	6664.17	6664.16
C4	6666.72	6666.85	6666.69	6666.76	6666.72										6664.33	6664.30	6664.28	6664.22
C5	6671.22	6671.24	6671.31	6671.14	6671.18	6671.11	6671.24	6671.08	6671.02	6671.01	6671.02	6670.94	6670.75	6670.89	6670.74	6670.75	6670.74	6670.69
C6	6670.90	6670.84	6670.96	6670.91	6670.86	6670.75	6670.86	6670.69	6670.62	6670.62	6670.62	6670.54	6670.38	6670.50	6670.38	6670.40	6670.34	6670.26
C7	6670.54	6670.59	6670.61	6670.51	6670.55	6670.39	6670.57	6670.36	6670.32	6670.30	6670.32	6670.26	6670.04	6670.17	6670.06	6670.06	6670.00	6667.80
C8	6671.86	6671.88	6671.95	6671.80	6671.87												#N/A	#N/A
C9	6671.37	6671.40	6671.57	6671.42	6671.39	6671.22	6671.39	6671.39	6671.39	6671.39	6671.39	6671.39	6671.39	6671.39	6671.39	6670.90	6670.91	6670.80
C10	6672.49	6672.50	6672.52	6672.39	6672.42	6672.24	6672.42	6672.24	6672.16	6672.17	6672.20	6672.12	6671.97	6672.11	6671.96	6671.97	6671.93	6671.88
C11	6666.61	6666.63	6666.65	6666.60	6666.63												#N/A	#N/A
D1	6658.34	6658.32	6658.29	6658.23	6658.39	6658.25	6658.41	6658.39	6658.13	6658.17	6658.17	6658.18	6657.95	6658.09	6658.01	6657.99	6657.98	6657.96
D2	6657.48	6657.43	6657.50	6657.43	6657.47											6655.12	6655.12	6655.05
D3	6659.16	6659.19	6659.13	6659.01	6659.06	6658.97	6659.04	6659.07	6658.85	6658.91	6658.87	6658.84	6658.66	6658.78	6658.65	6658.60	6658.59	6658.51
D4	6661.12	6661.25	6661.10	6661.12	6661.14	6661.03	6661.12	6661.11	6660.88	6660.93	6660.90	6660.89	6660.66	6660.76	6660.63	6660.61	6660.58	6660.51
D5	6664.93	6665.11	6664.99	6664.90	6664.95	6664.85	6664.93	6664.91	6664.68	6664.71	6664.66	6664.62	6664.44	6664.56	6664.46	6664.44	6664.40	6664.39
D6	6668.91	6668.87	6668.97	6668.88	6668.91	6668.79	6668.88	6668.85	6668.62	6668.68	6668.63	6668.59	6668.43	6668.55	6668.46	6668.45	6668.42	6668.37
D7	6668.00	6668.04	6668.07	6667.96	6668.04	6667.89	6668.02	6668.13	6667.89	6667.91	6667.86	6667.81	6667.64	6667.75	6667.66	6667.65	6667.61	6667.57
D8																	#N/A	#N/A
D9	6669.05	6669.03	6669.20	6669.07	6669.08	6668.90	6669.05	6668.99	6668.80	6668.83	6668.76	6668.72	6668.57	6668.68	6668.59	6668.59	6668.55	6668.46
D10	6668.94	6668.93	6668.94	6668.83	6668.88	6668.67	6668.82	6668.75	6668.58	6668.64	6668.56	6668.53	6668.39	6668.51	6668.40	6668.43	6668.40	6668.20
D11	6665.64	6665.65	6665.68	6665.63	6665.70	6665.53	6665.71	6665.63	6665.53	6665.54	6665.49	6665.49	6665.23	6665.35	6665.24	6665.28	6665.27	6665.19
E2	6656.95	6656.93	6656.90	6656.94	6656.99	6656.83	6657.00	6656.89	6656.73	6656.75	6656.76	6656.76	6656.53	6656.66	6656.58	6656.54	6656.56	6656.52
E3	6657.91	6657.93	6657.88	6657.94	6657.99	6657.88	6658.00	6657.93	6657.79	6657.81	6657.83	6657.83	6657.63	6657.79	6657.73	6657.70	6657.70	6657.69
E4	6655.98	6656.10	6655.91	6655.04	6655.97	6655.84	6655.96	6655.86	6655.72	6655.73	6655.73	6655.75	6655.53	6655.67	6655.58	6655.57	6655.59	6655.53
E5	6660.79	6660.82	6660.80	6660.93	6660.89	6660.76	6660.85	6660.75	6660.71	6660.63	6660.63	6660.63	6660.43	6660.60	6660.50	6660.49	6660.47	6660.48
E6	6664.86	6664.84	6664.91	6665.10	6664.93	6664.84	6664.93	6664.84	6664.72	6664.75	6664.77	6664.77	6664.55	6664.72	6664.68	6664.65	6664.66	6664.60
E7	6666.58	6666.61	6666.66	6666.73	6666.62	6666.56	6666.68	6666.59	6666.46	6666.37	6666.43	6666.40	6666.15	6666.68	6664.28	6664.27	6664.23	6664.21
E8	6666.02	6666.02	6666.12	6666.10	6666.07	6665.94	6666.07	6665.98	6665.85	6665.87	6665.87	6665.90	6665.66	6665.83	6665.78	6665.77	6665.76	6665.70
E9	6665.33	6665.32	6665.47	6665.51	6665.45	6665.27	6665.43	6665.34	6665.22	6665.24	6665.23	6665.25	6665.01	6665.19	6665.09	6665.13	6665.13	6665.05
E10	6665.79	6665.75	6665.80	6665.91	6665.85	6665.64	6665.83	6665.74	6665.61	6665.63	6665.62	6665.65	6665.42	6665.57	6665.48	6665.53	6665.49	6665.44
X-1	6662.21	6662.25	6662.04	6662.11	6662.14	6662.05	6662.21	6662.26	6661.93	6661.97	6661.96	6661.90	6661.90	6661.90	6661.74	6661.69	6661.61	6661.56

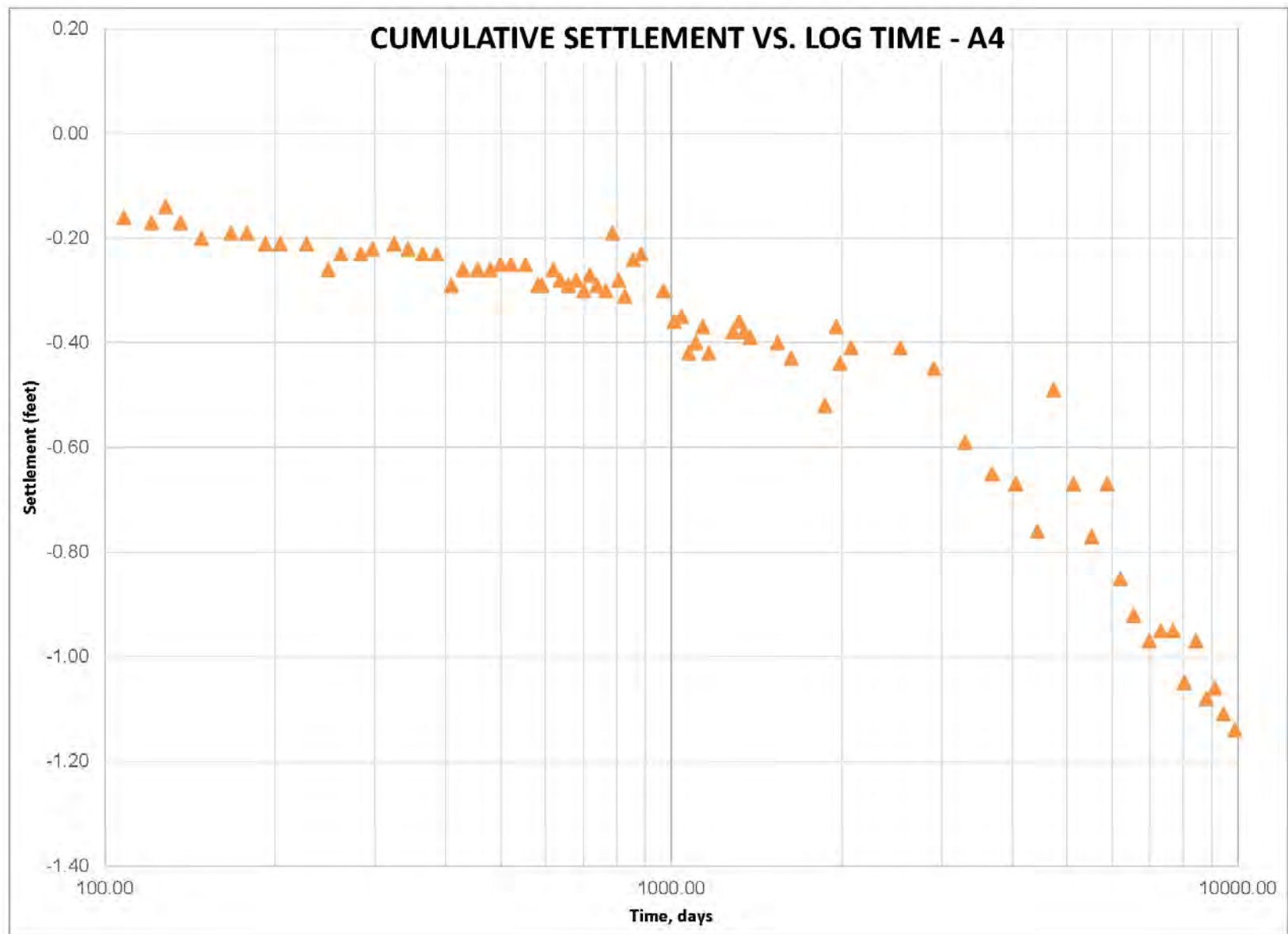
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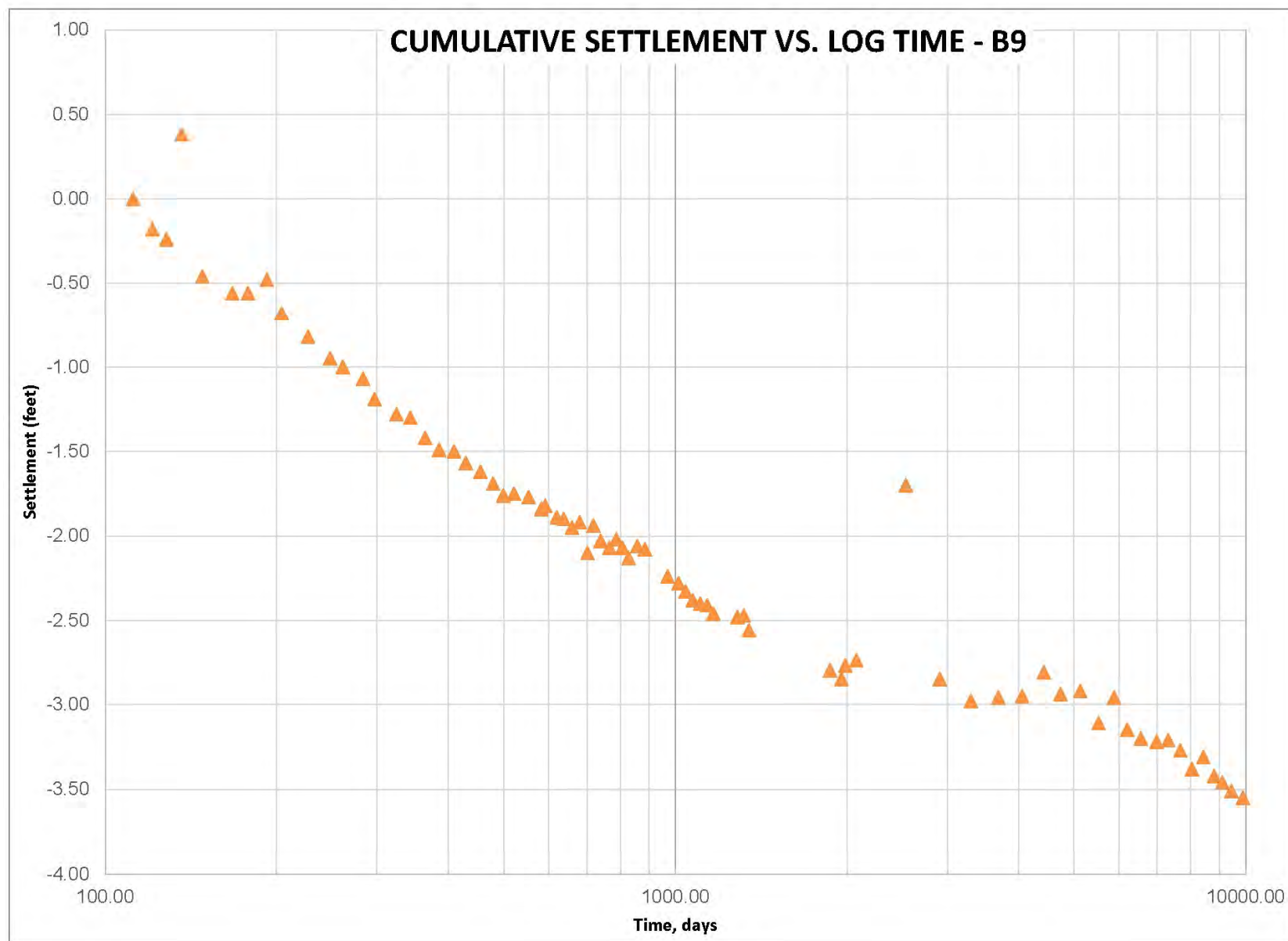
1. B7 survey notes for 2020: B7 found to have been disturbed. A 4.14 ft section of drill stem was found broken off from the monument. It appears to have been run over having it's PVC casing demolished leaving it 0.5' below grade. A new PVC casing will be installed.
2. B11 survey notes for 2018, 2019, and 2020: B11 found buried 1.3 ft deep.
3. C4 survey notes for 2018, 2019, and 2020: C4 found bent 15 degeres from 1.5ft. Monument would be 0.05 ft higher if straightened.
4. C7 survey notes for 2020: C7 found to have been disturbed. A 2.22 ft section of drill stem was found broken off from the monument. It appears to have been run over having it's PVC casing demolished leaving it 0.5' below grade. A new PVC casing will be installed.



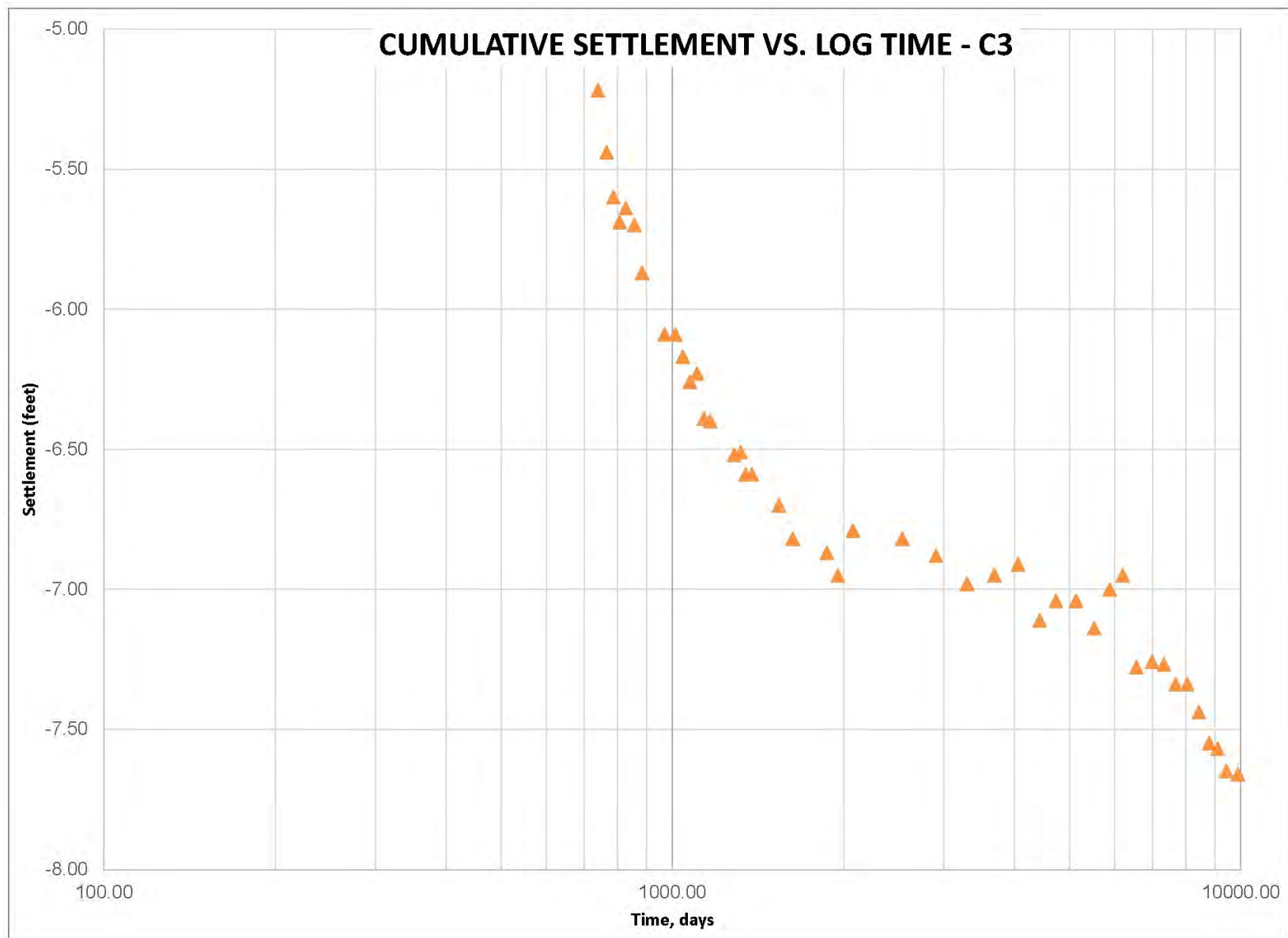
GRP EOR Annual Inspection  
Settlement Monument Survey Data

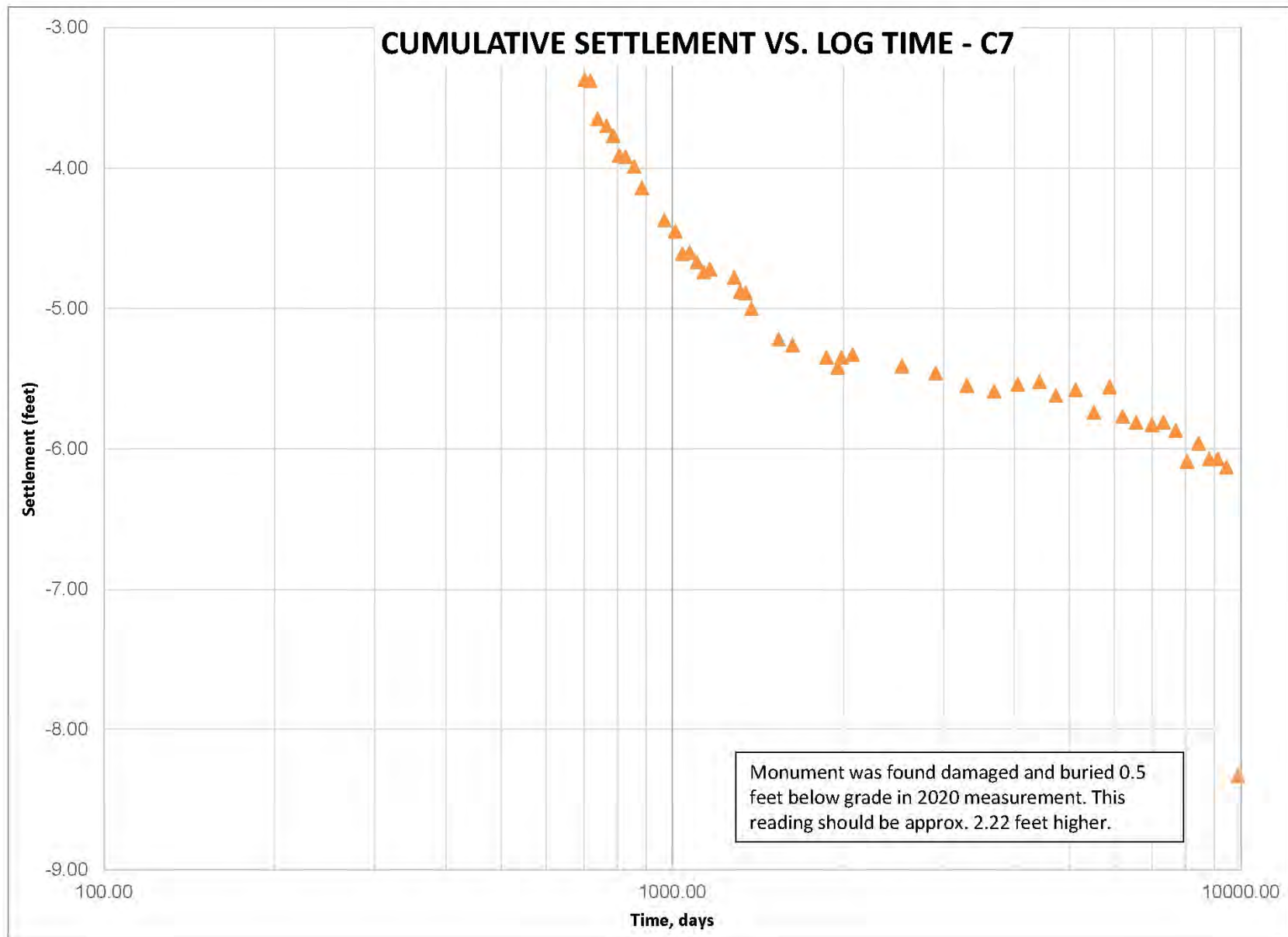


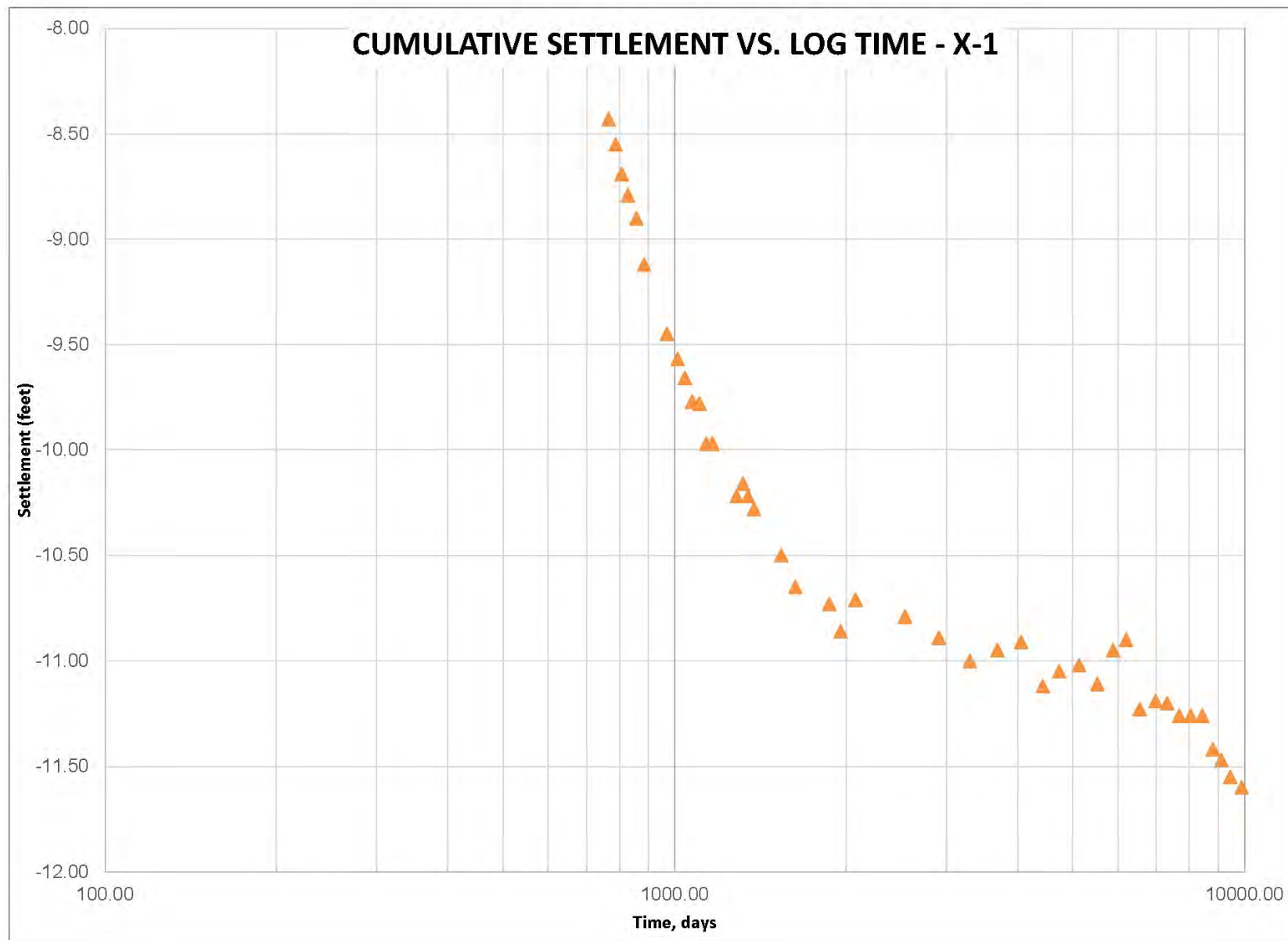


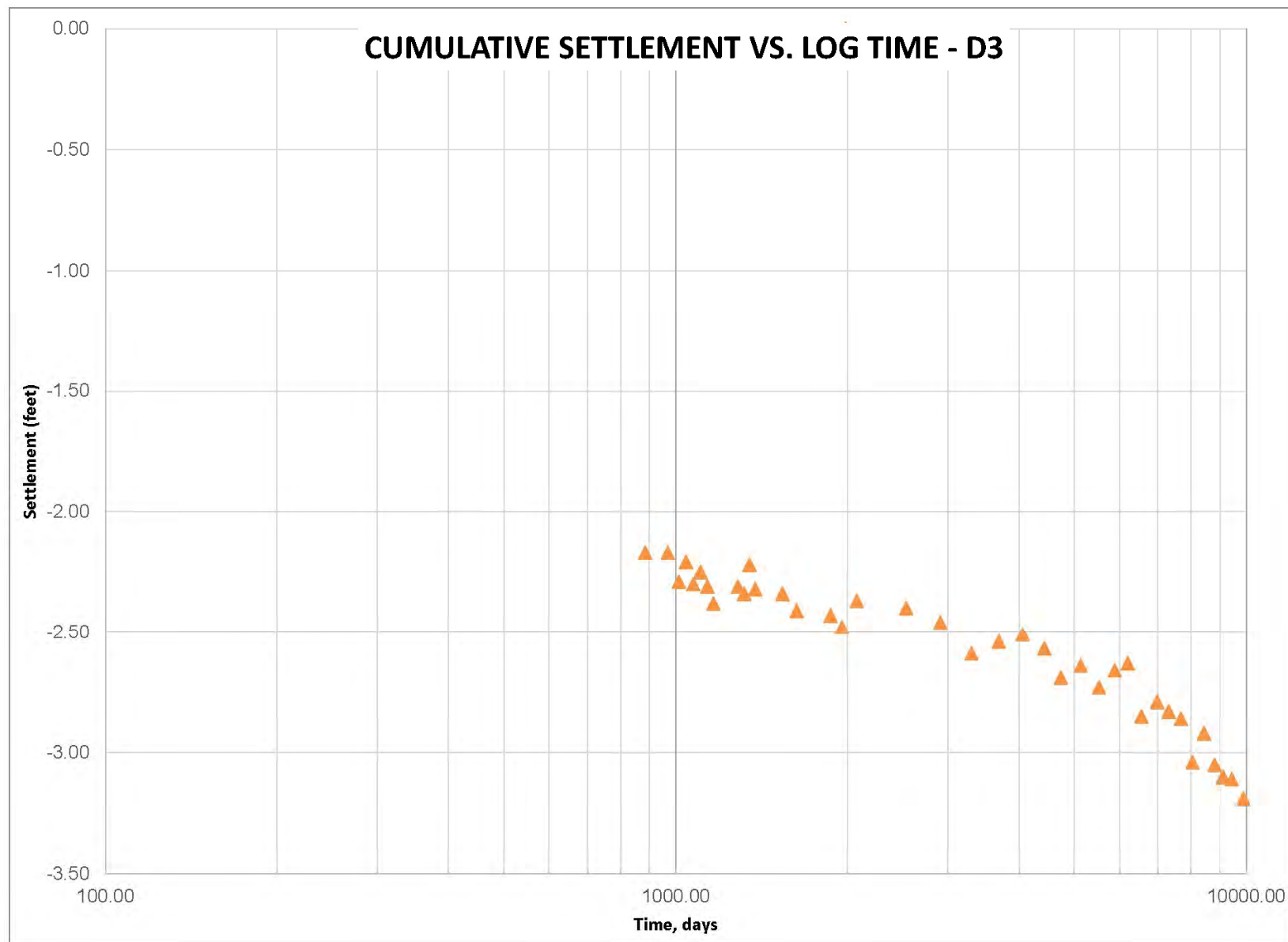




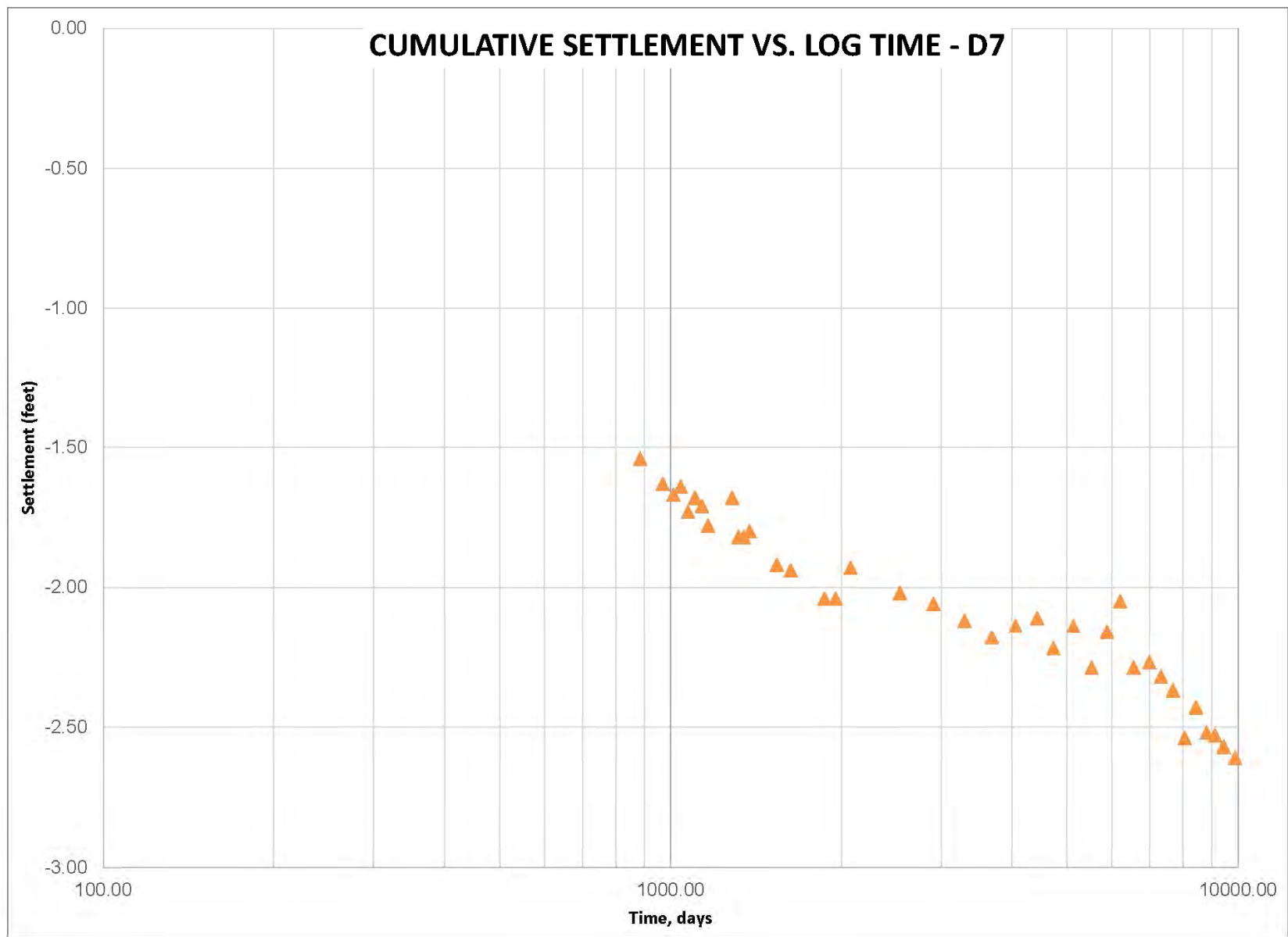


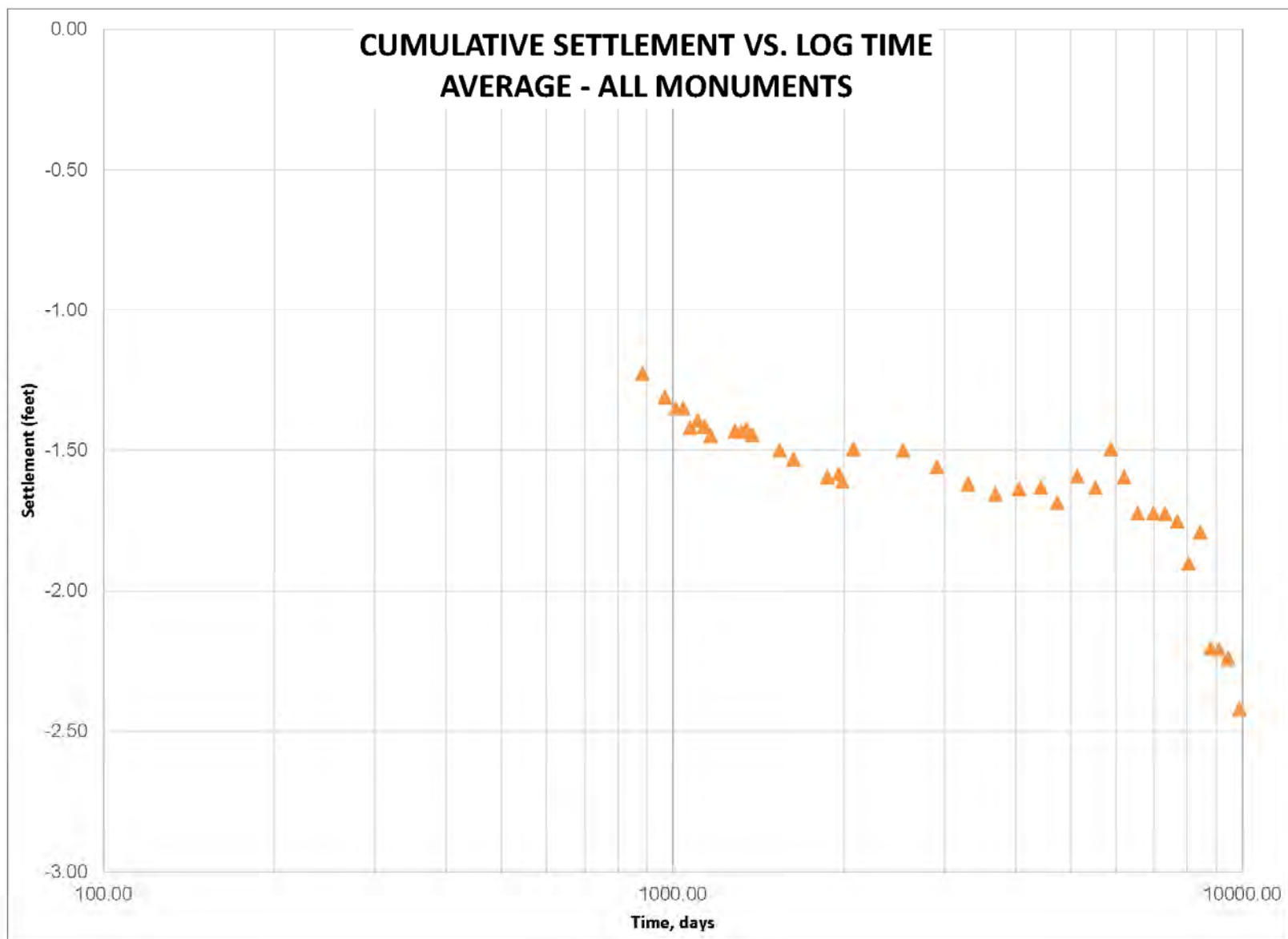


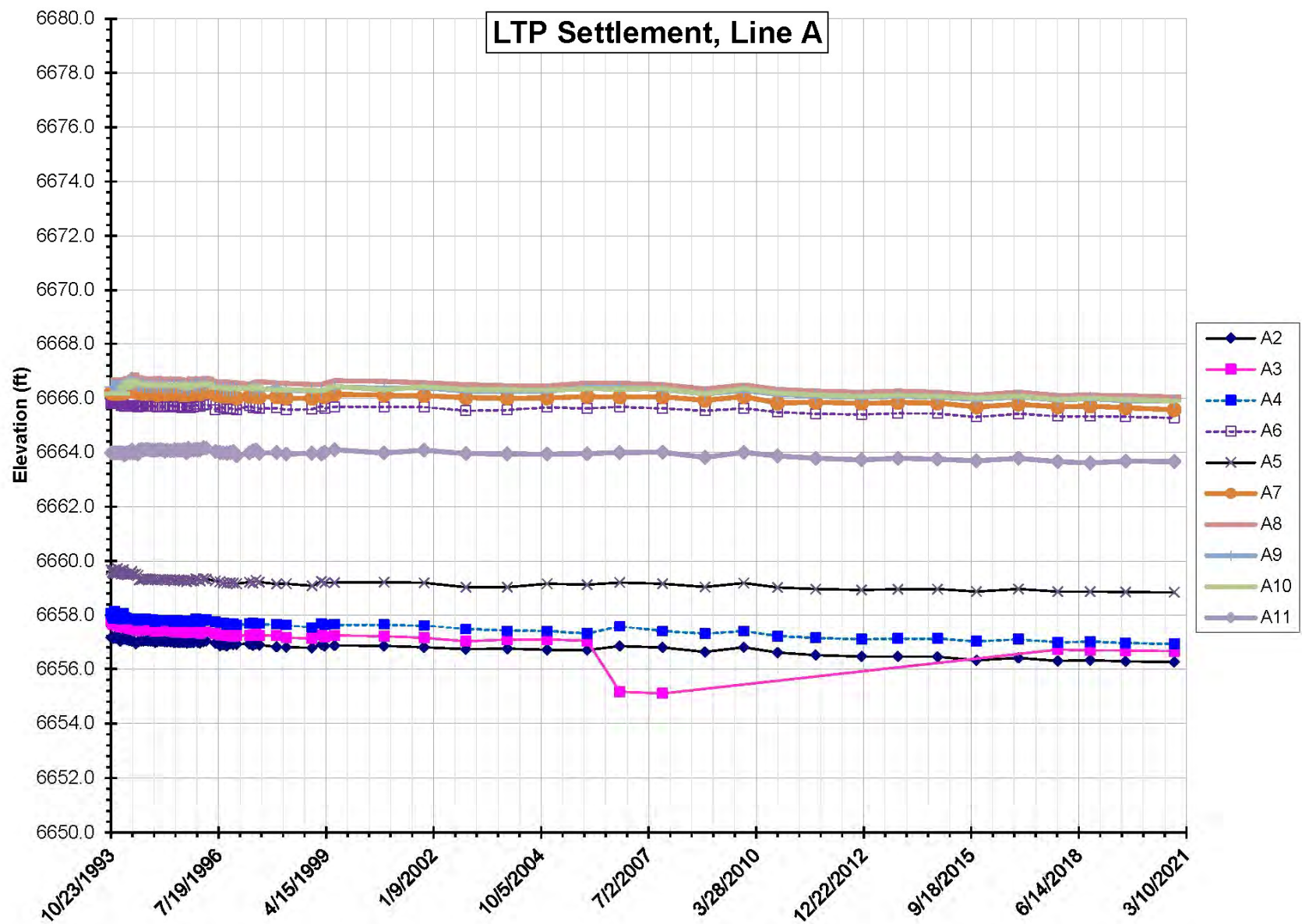


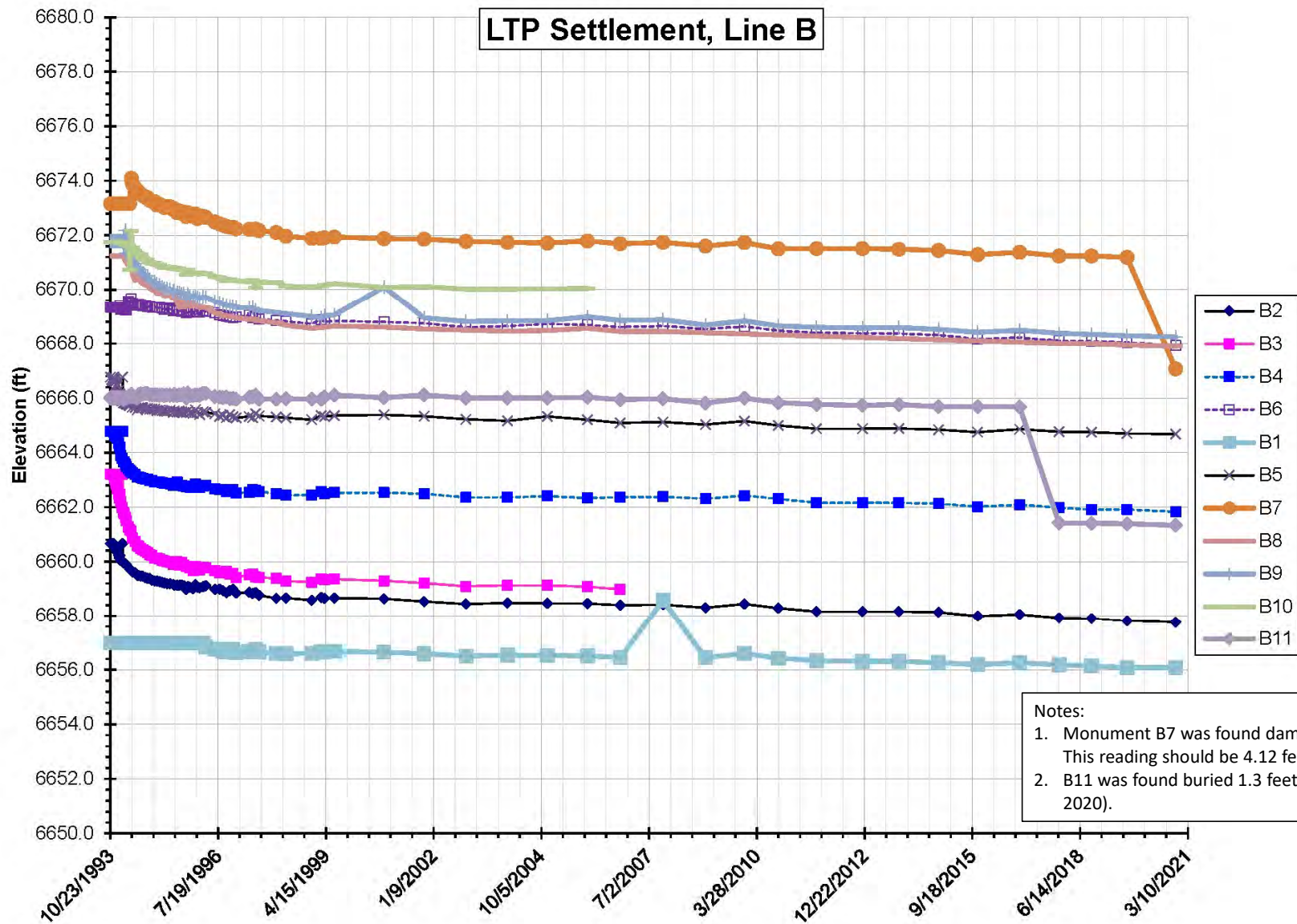




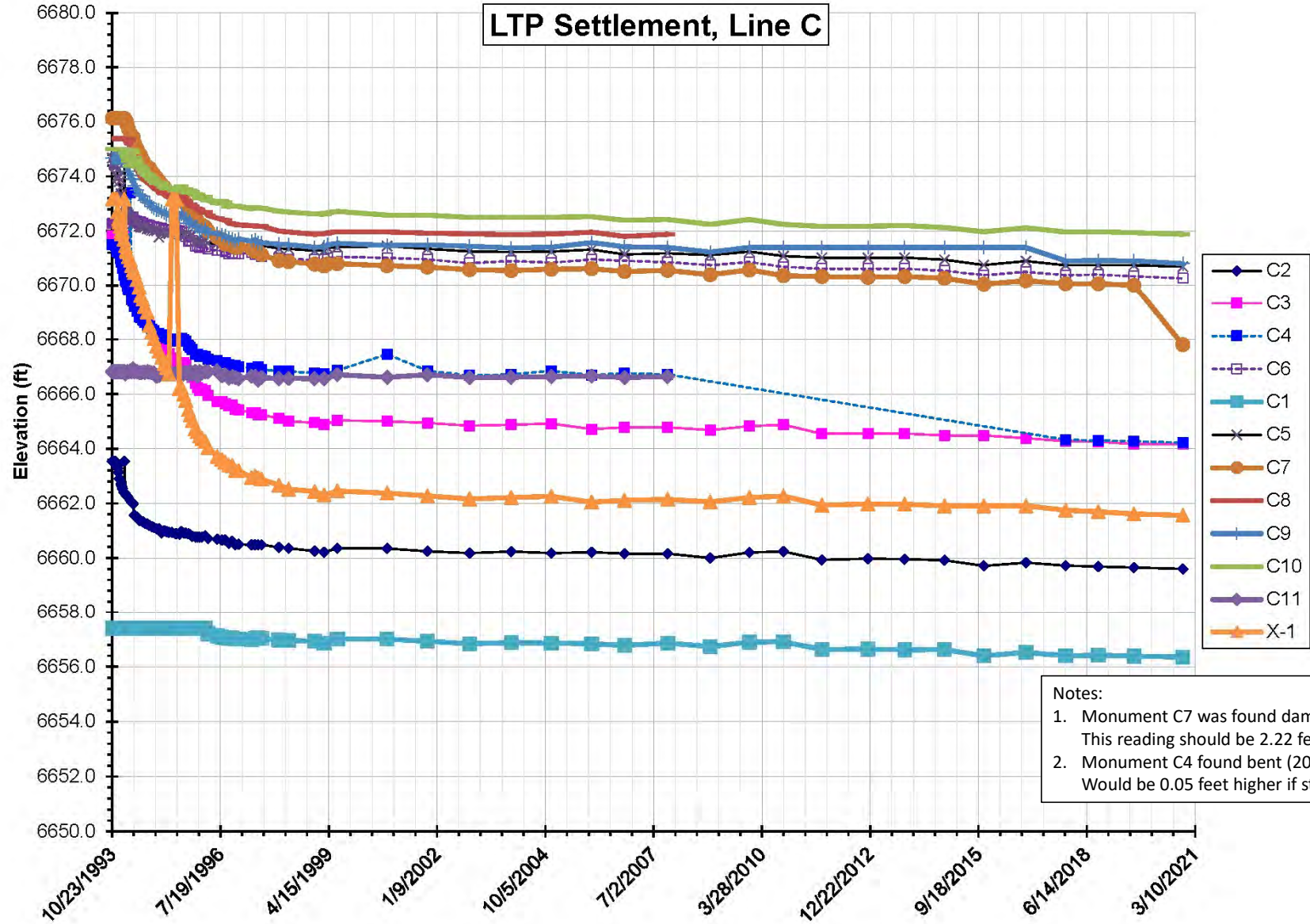


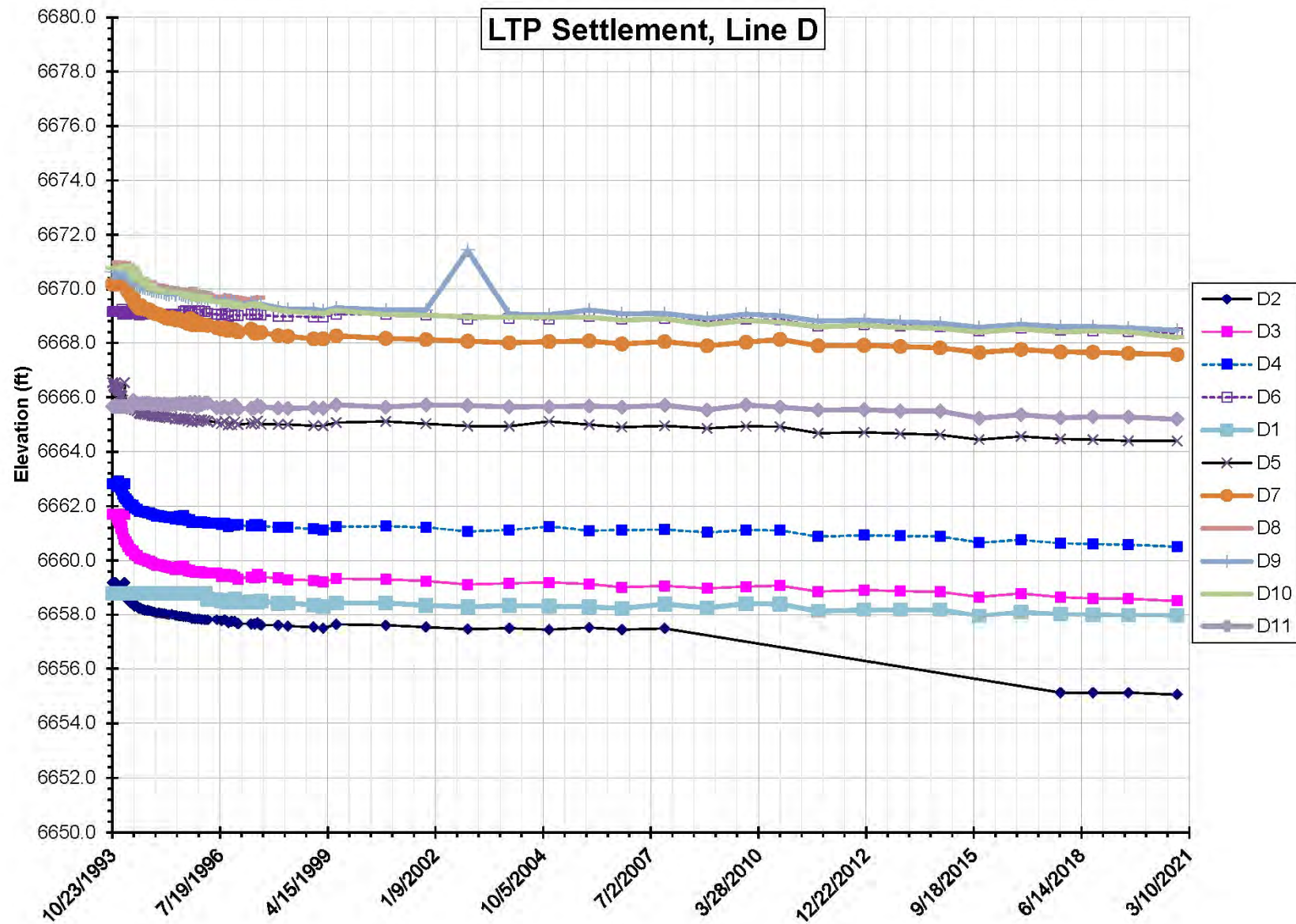


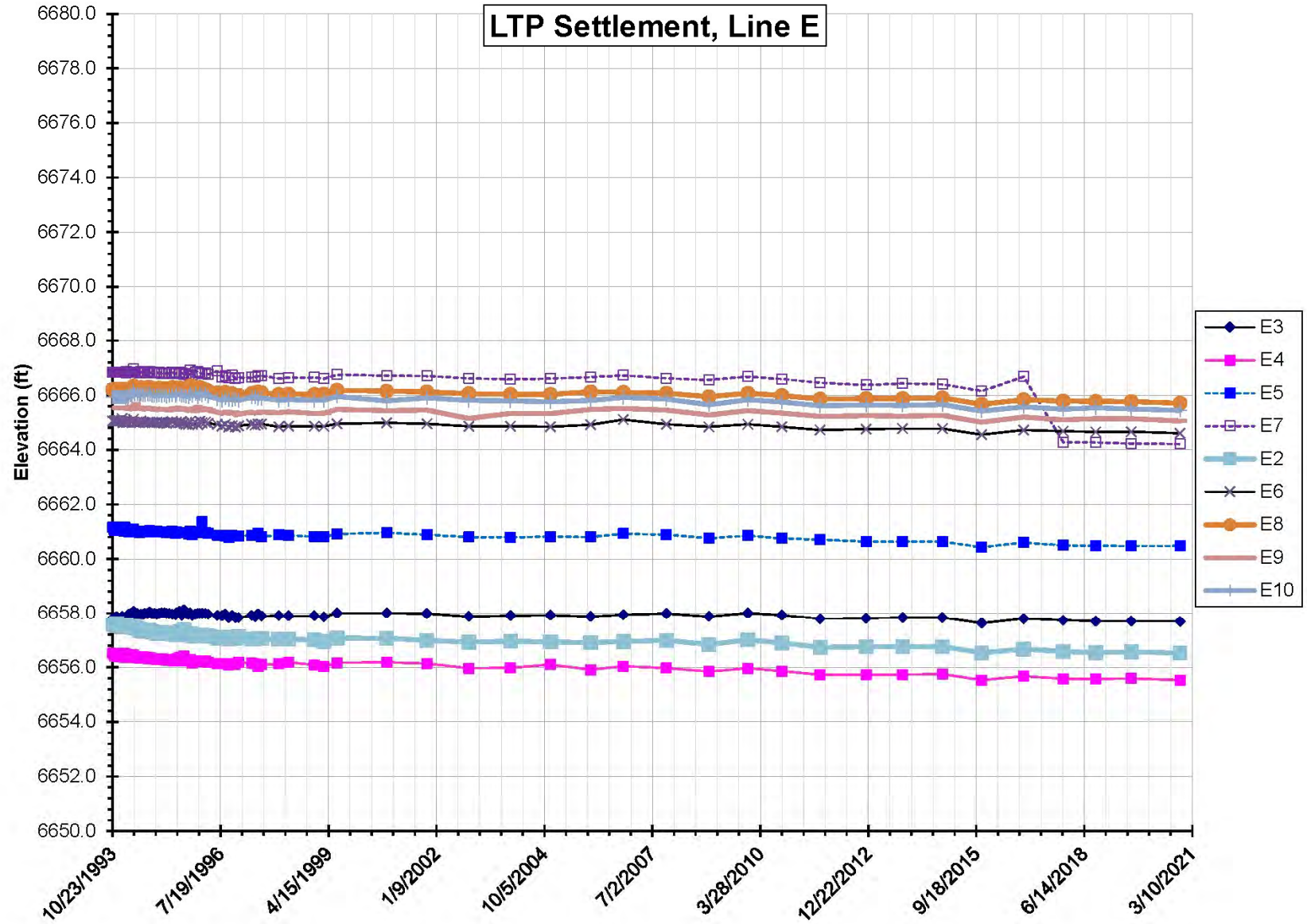










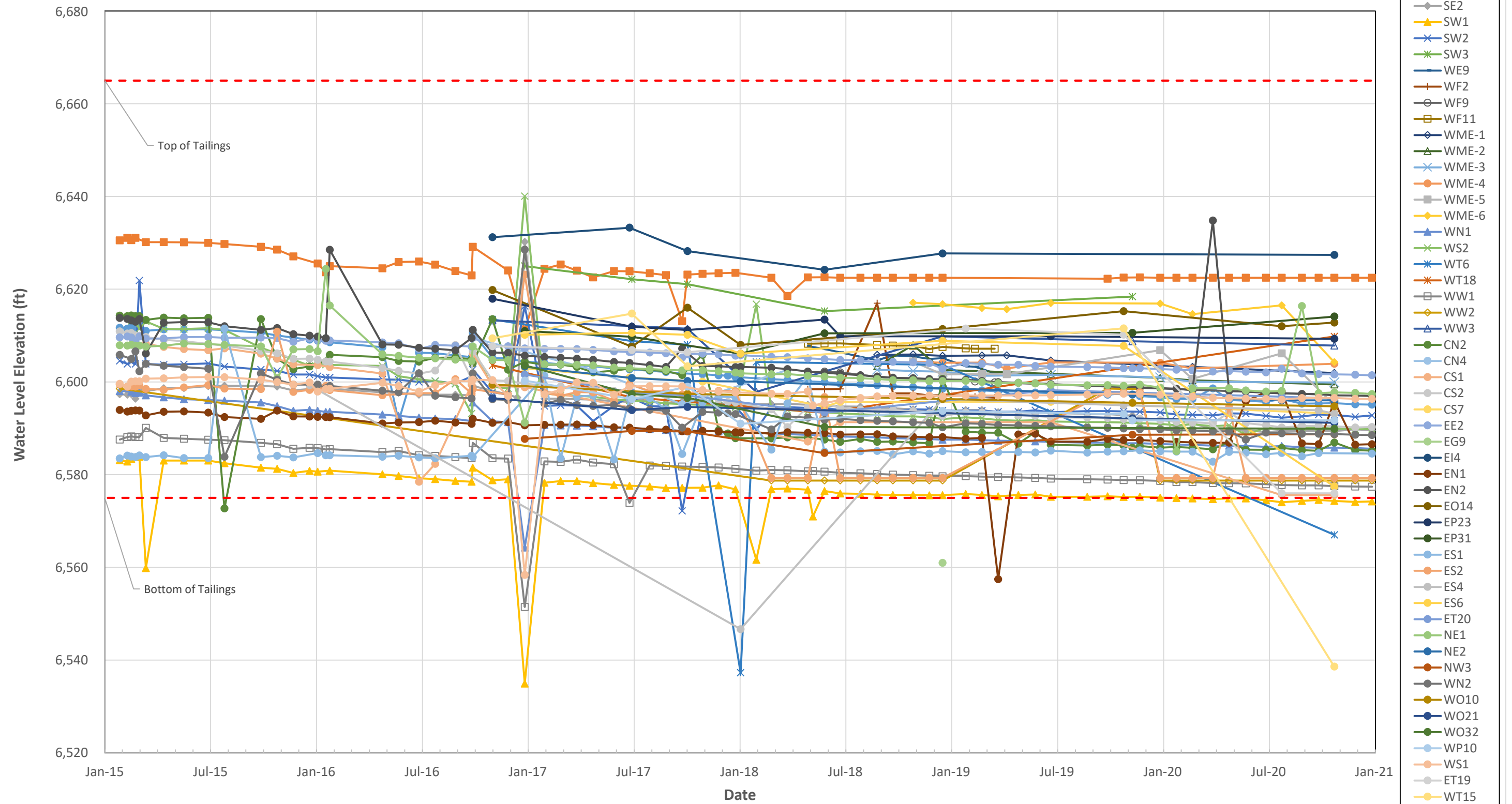


## Appendix D PIEZOMETER DATA AND PLOTS





Figure D.1 - LTP All Piezometers  
Water Level Elevations



**Figure D.2 - LTP Piezometers**  
**Water Level Elevations of Piezometers installed in 2015**

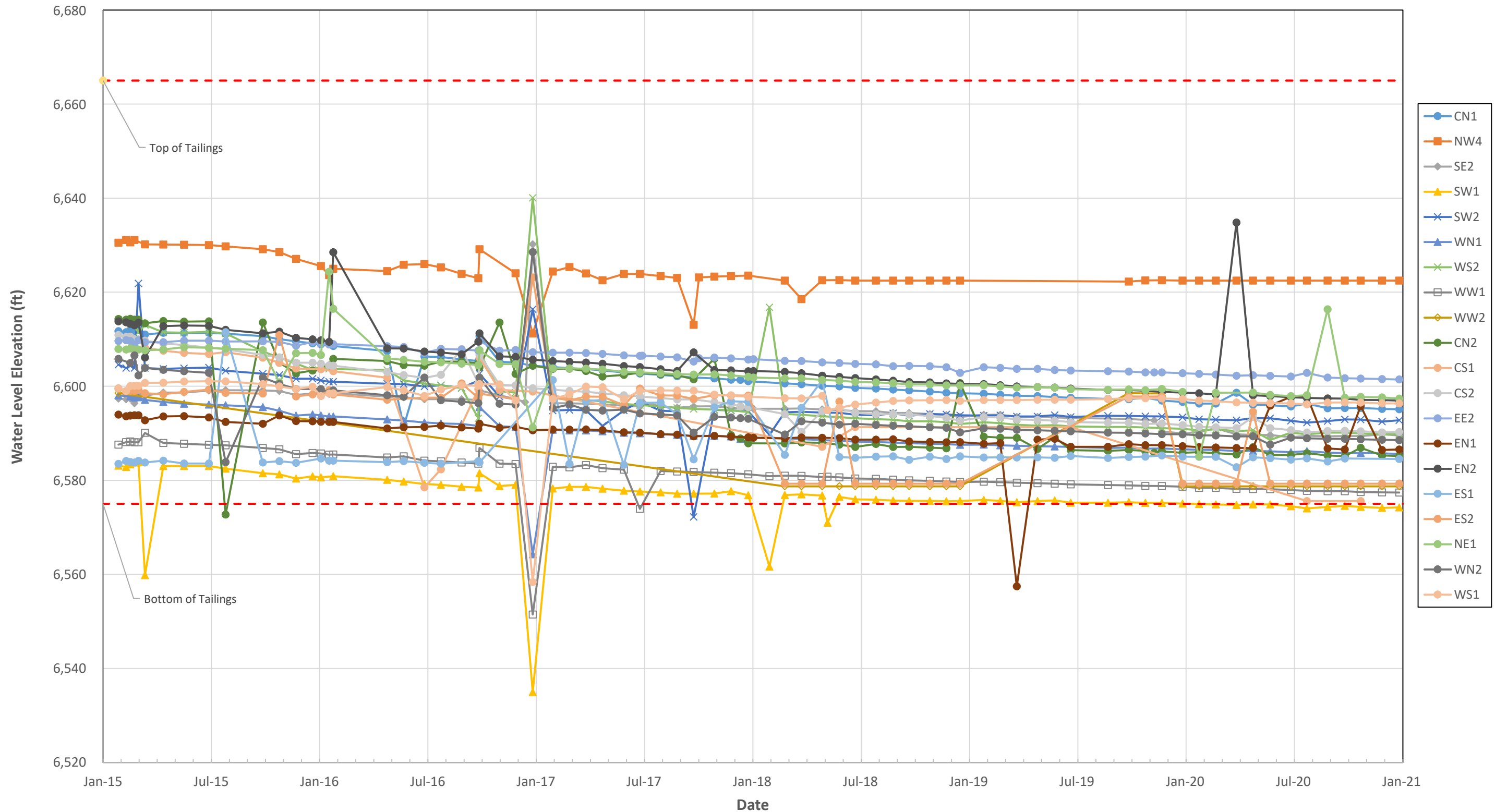


Figure D.3 - LTP Slope Piezometers - Sand Tailings Wells  
Water Level Elevations

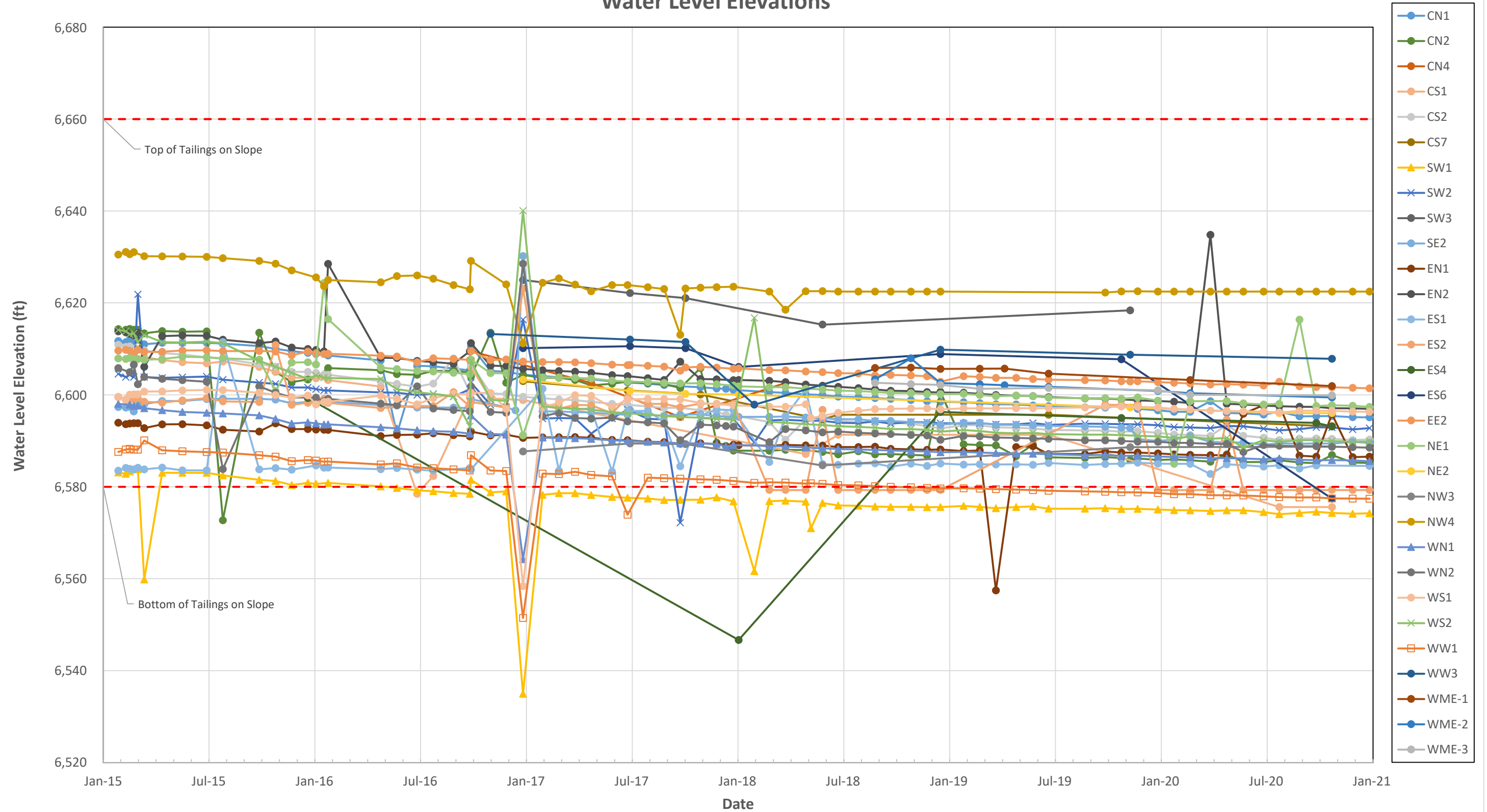


Figure D.4 - LTP Top of Pile Piezometers - Slime Tailings and Perched Wells  
Water Level Elevations

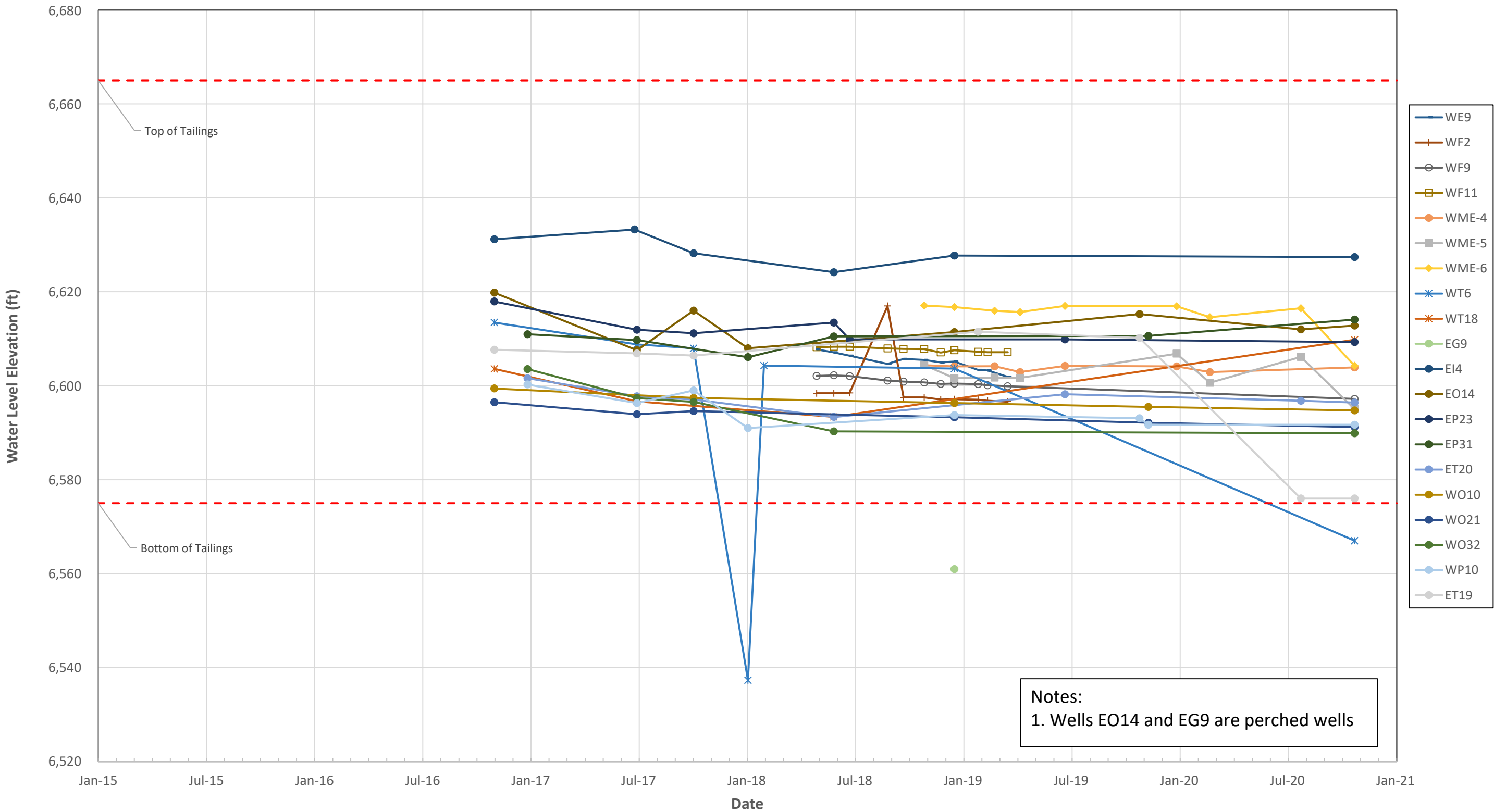


Figure D.5 - LTP Top of Pile Piezometers - NW Quadrant  
Water Level Elevations

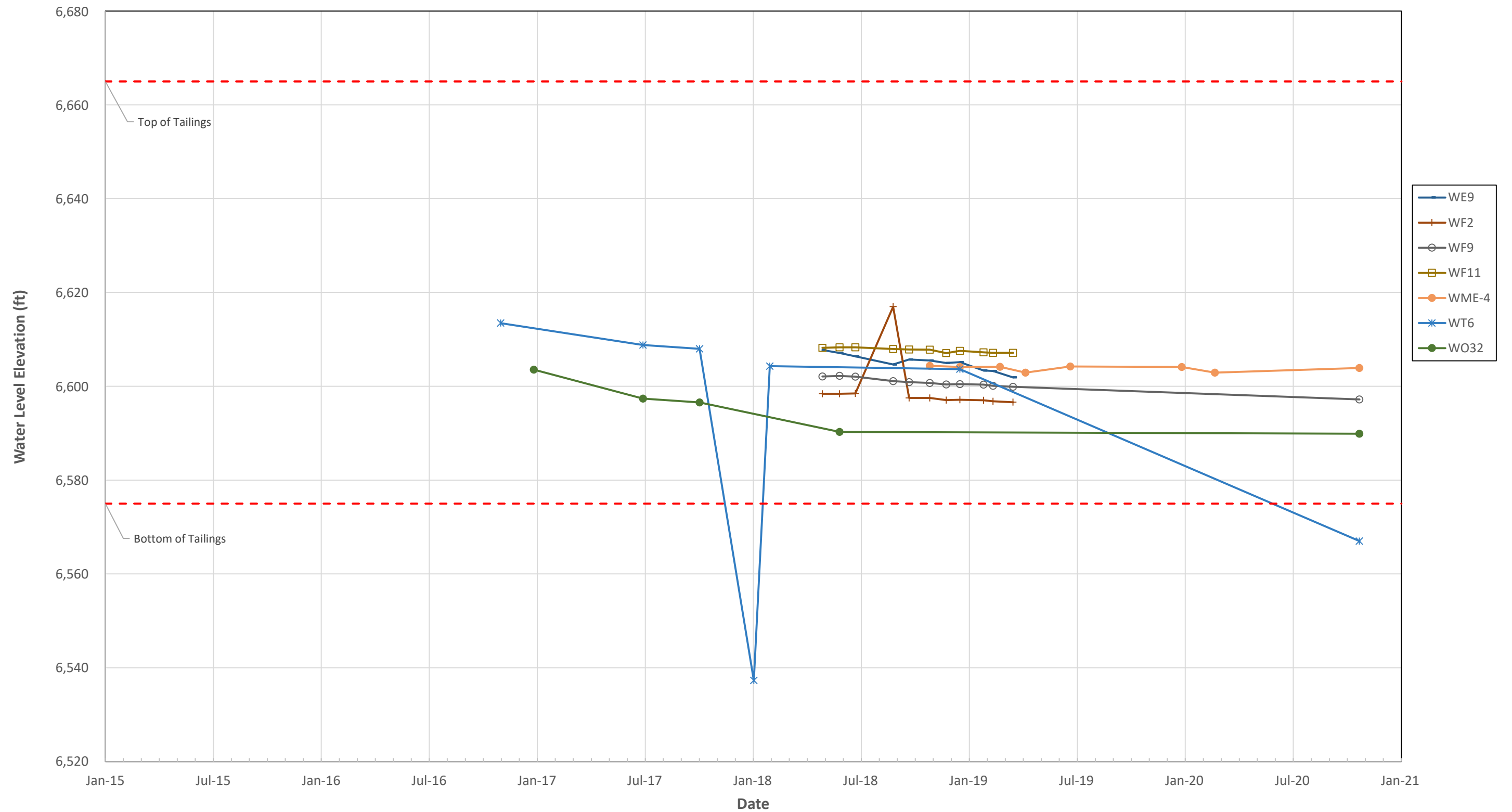


Figure D.6 - LTP Top of Pile Piezometers - SW Quadrant  
Water Level Elevations

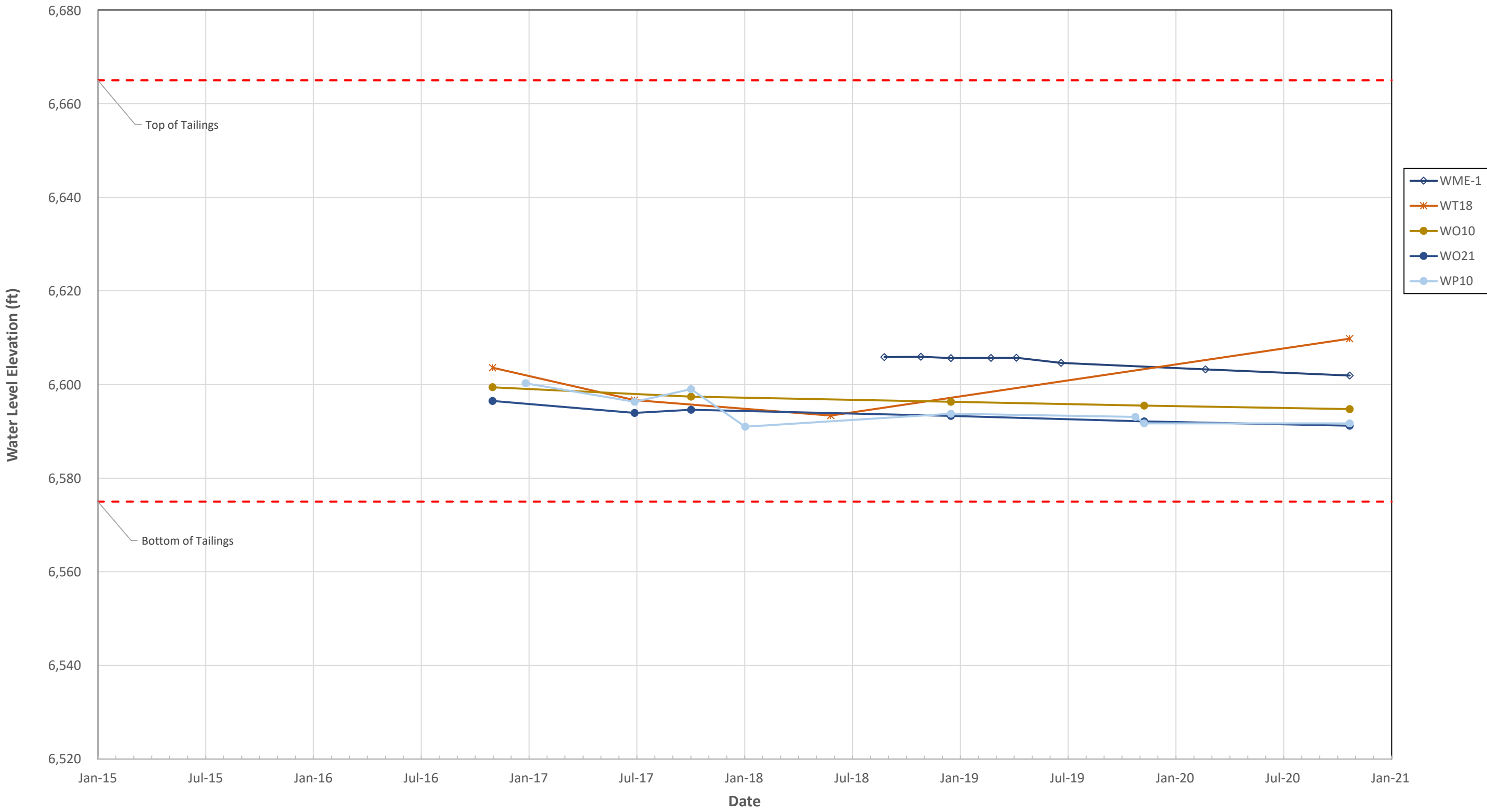


Figure D.7 - LTP Top of Pile Piezometers - NE Quadrant  
Water Level Elevations

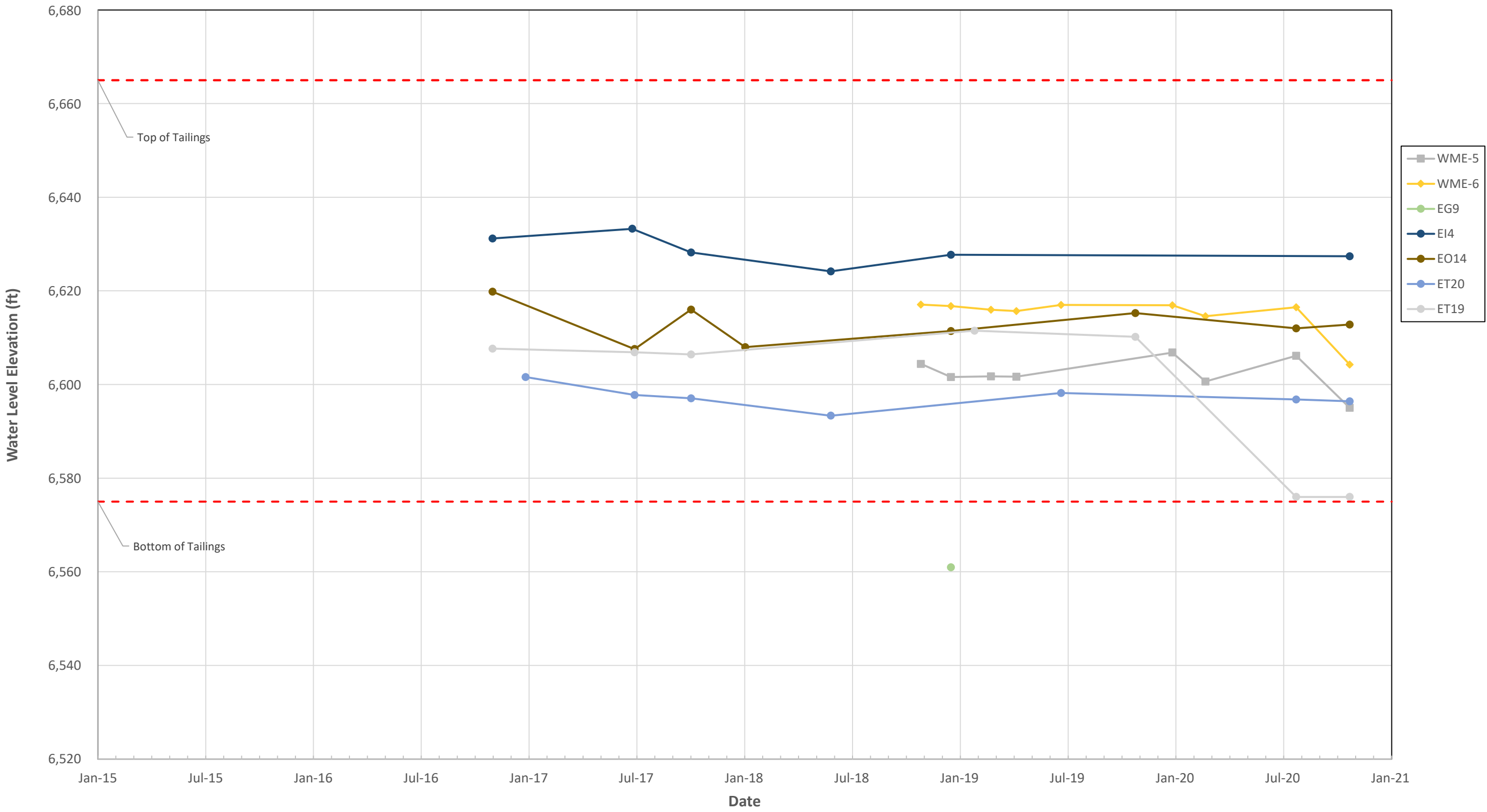
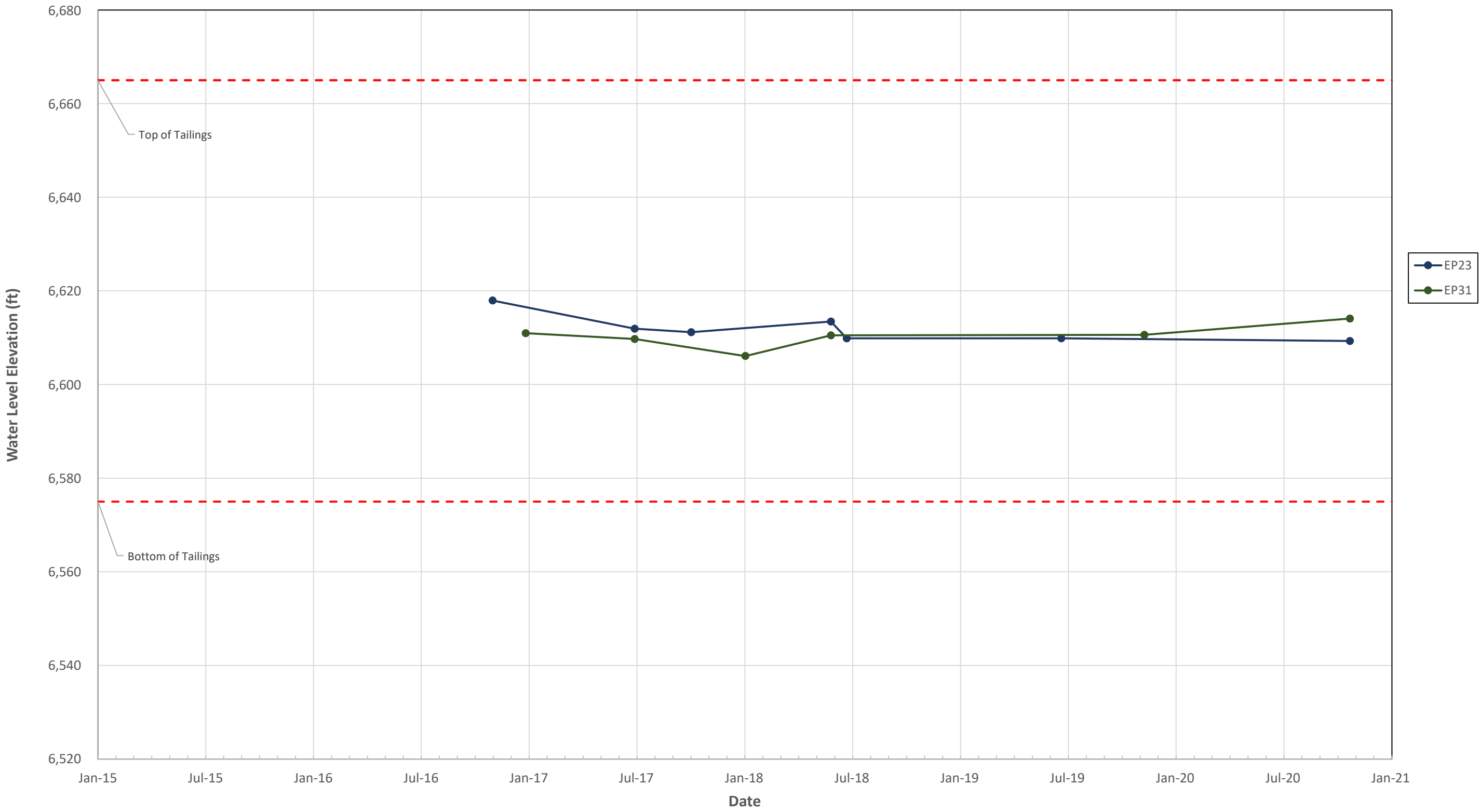


Figure D.8 - LTP Top of Pile Piezometers - SE Quadrant  
Water Level Elevations





**APPENDIX E**  
**GRANTS RECLAMATION PROJECT**  
**LAND USE REVIEW / SURVEY**

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**GRANTS RECLAMATION PROJECT**  
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# **Grants Reclamation Project**

## **Land Use Review / Survey** ***Annual Report No. 19 - CY2020***

### **1.0 Background**

As part of Amendment 34 to the Grants Reclamation Project Radioactive Materials License – SUA-1471-Docket 40-8903 (approved June 19, 2002), License Condition (LC) 42 was amended to require submittal of a land use survey with the License annual report to NRC. This report is the nineteenth annual land use review / survey pursuant to LC 42.

The general focus of the land use survey is to document and summarize the current land uses and any identified changes to land use in proximity to the Grants Reclamation Project. In particular, land use activities for those areas proximal to the tailings pile areas undergoing reclamation and closure and immediate surrounding areas where ongoing ground-water restoration continues to be reviewed.

### **2.0 2020 – Land Use – Homestake Properties**

Homestake Mining Company of California (HMC) owns and controls a sizeable land area in and around the Grants Reclamation project. Over the last number of years, additional lands have been acquired as opportunity has arisen and acquisition of such lands are deemed appropriate in relation to ongoing ground-water remediation and restoration activities and final reclamation / closure of the site.

Much of the HMC lands held in the area that are not in immediate proximity to the tailings pile complex have been, and are continuing to be, utilized for livestock grazing on a lessor/lessee tenant arrangement. Much of the current land area within the immediate Site Boundary area containing the evaporation ponds, RO plant and both tailings pile areas and office / shop compound have been excluded from livestock grazing and other land use except those directly related to the ongoing ground-water restoration activities. These areas have been livestock fenced to exclude grazing.

Several small lot / small acreage parcels [e.g. residential lot(s)] held by HMC in the general area of the reclamation site are idle and are essentially not in use except in certain instances where treated and/or fresh water injection and water collection is underway as part of the ongoing groundwater restoration program

or are under agricultural use on selected lot(s). For example, Block 1 Lot 5 and Block 2 Lot 2 in Murray Acres were planted and irrigated in 2008 through 2020 with the Murray Acres San Andres irrigation well.

### **3.0 2020 – Land Use – Pleasant Valley Estates, Murray Acres, Broadview Acres, Felice Acres and Valle Verde Residential Subdivisions**

Aside from the land uses on HMC land in the Grants Reclamation Project area described in the previous section above, the other major land use immediately proximal to the Site consists of residential development located in the Pleasant Valley Estates, Murray Acres, Broadview Acres and Felice Acres residential subdivisions. By way of background, HMC provided these subdivision areas with a potable water supply system as an extension of the Village of Milan water supply in the mid-1980's. The Village of Milan water supply extension to these areas was provided at that time to address a concern over the quality of groundwater used for domestic purposes in these adjacent subdivision areas. HMC paid for the water usage from the Village of Milan for the first ten years and re-started paying for the water usage in late 2018.

An assessment of current land use in these four subdivision areas was undertaken in December 2020 to provide an annual review of the present uses, occupancy and status for the various lots within these subdivisions. Over the years, permanent residential homes, modular homes and mobile homes have been established in the subdivision areas, and immediate adjacent areas, as would typify a rural residential neighborhood. A number of lots remain vacant, or are utilized for uses such as horse barns, corrals, equipment storage, etc. In some cases, dwellings are present on several lots throughout the subdivisions but are currently vacant or have been permanently abandoned and in various states of disrepair.

This year, the annual review also included an assessment of the residential areas adjacent to Felice Acres, Pleasant Valley Estates and the Valle Verde residential areas and adjacent lots as was done for 2006 through 2019 surveys.

The primary issue of concern in the subdivision areas is to determine whether current occupied dwellings are utilizing water service from the Village of Milan system for potable water consumption and not private wells, particularly private domestic wells that are completed into the underlying shallow alluvial aquifer.

The survey conducted in December 2020 consisted of first obtaining the records and customer database from the Village of Milan water district. This information was reviewed to prepare a separate residential customer database for the subdivisions that would reflect the lot number, customer, water meter customer

ID number and whether the customer utilized Milan water during 2020. See Tables E-1 through E-5 for 2020 database information.

A lot-by-lot reconnaissance was made in each of the subdivisions to determine whether each lot was occupied or vacant, contained a residence(s), and which residences are currently occupied. This information was then checked against the database to determine whether each occupied residence is supplied and metered through the Village of Milan water supply system. Results of this reconnaissance effort are summarized on the subdivision plat maps; see attached Figures E-1 through E-5.

Field review of the subdivisions areas, along with follow-up inquiries as required to confirm the status of water use at each property, indicates that occupied residential sites in, or immediately adjacent to the Felice Acres, Broadview Acres, Murray Acres, Pleasant Valley and Valle Verde subdivisions are on metered water service with the Village of Milan.

In the Valle Verde residential area and immediately adjacent to the subdivision, the one residence that was not on the Village of Milan water supply system in prior surveys was connected to the Milan water system in July, 2020.

#### **4.0 New Milan Water Hook-Ups**

Homestake (HMC) and the New Mexico Environment Department - Superfund Oversight Section entered into and executed a Memorandum of Agreement (MOA) in January 2009 regarding private well supplies utilized for domestic household use in the area. The MOA established an Area of Concern (AOC) wherein those residences within the area that are not on the Village of Milan water supply for domestic potable water use should be contacted and given the opportunity to be hooked up to that supply with HMC covering the cost of the hook-up. As of December 2020, no residences within the MOA Area of Concern (AOC) are pending with respect to a domestic water supply hook-up to the Village of Milan municipal water supply.

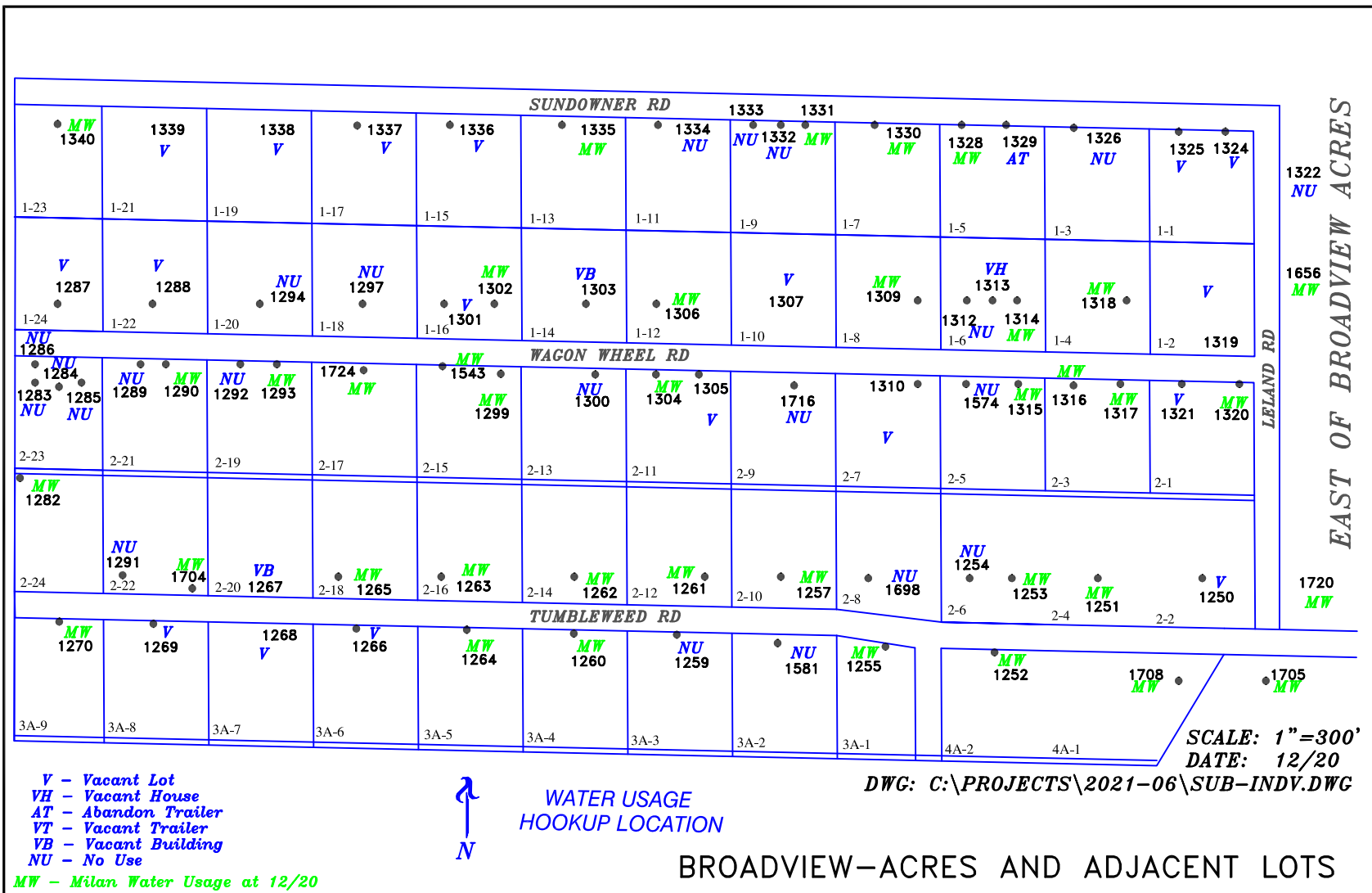
The last significant facet of the MOA addresses the concern with regard to an offer by HMC to residential property owners in the AOC to arrange for and pay for plugging and abandonment of private wells in the area. No private wells were abandoned as part of this MOA. Through public outreach to residents in the nearby neighborhoods, HMC is again offering to abandon private wells.

## **5.0 Conclusion**

The review of land use for HMC properties and the five residential subdivision areas to the south and west of the Grants Reclamation Project site indicates that present land uses in the area have not changed significantly. As a result of the annual survey of the residential areas within the Memorandum of Agreement (MOA) Area of Concern (AOC) during 2020, no residential properties remain to be addressed in terms of providing a domestic water supply hook-up. Survey results indicate that all other water users in the AOC area are supplied by the Village of Milan water supply.

This land use survey / review is completed on an annual basis to meet annual license condition reporting requirements under the NRC License. This will help in assuring that land use activities in the immediate area surrounding the Grants project are regularly reviewed and assist in determining that those uses do not present a new concern with local ground-water usage until project ground-water restoration activities are completed.

FIGURE E-1. BROADVIEW ACRES-LAND USE STATUS AND WATER USE  
E-5



BROADVIEW-ACRES AND ADJACENT LOTS

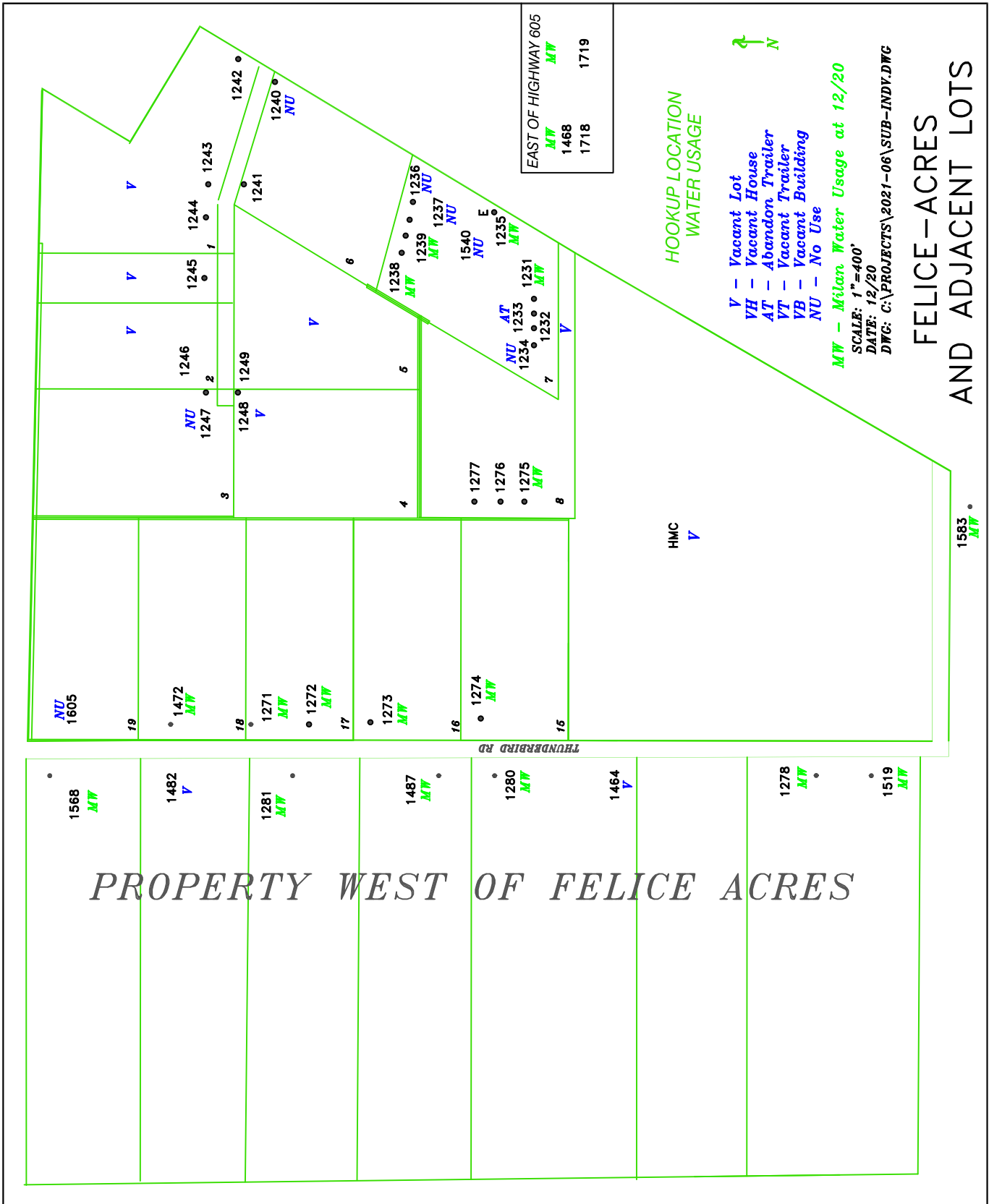


FIGURE E-2. FELICE ACRES – LAND USE STATUS AND WATER USE  
 E-6



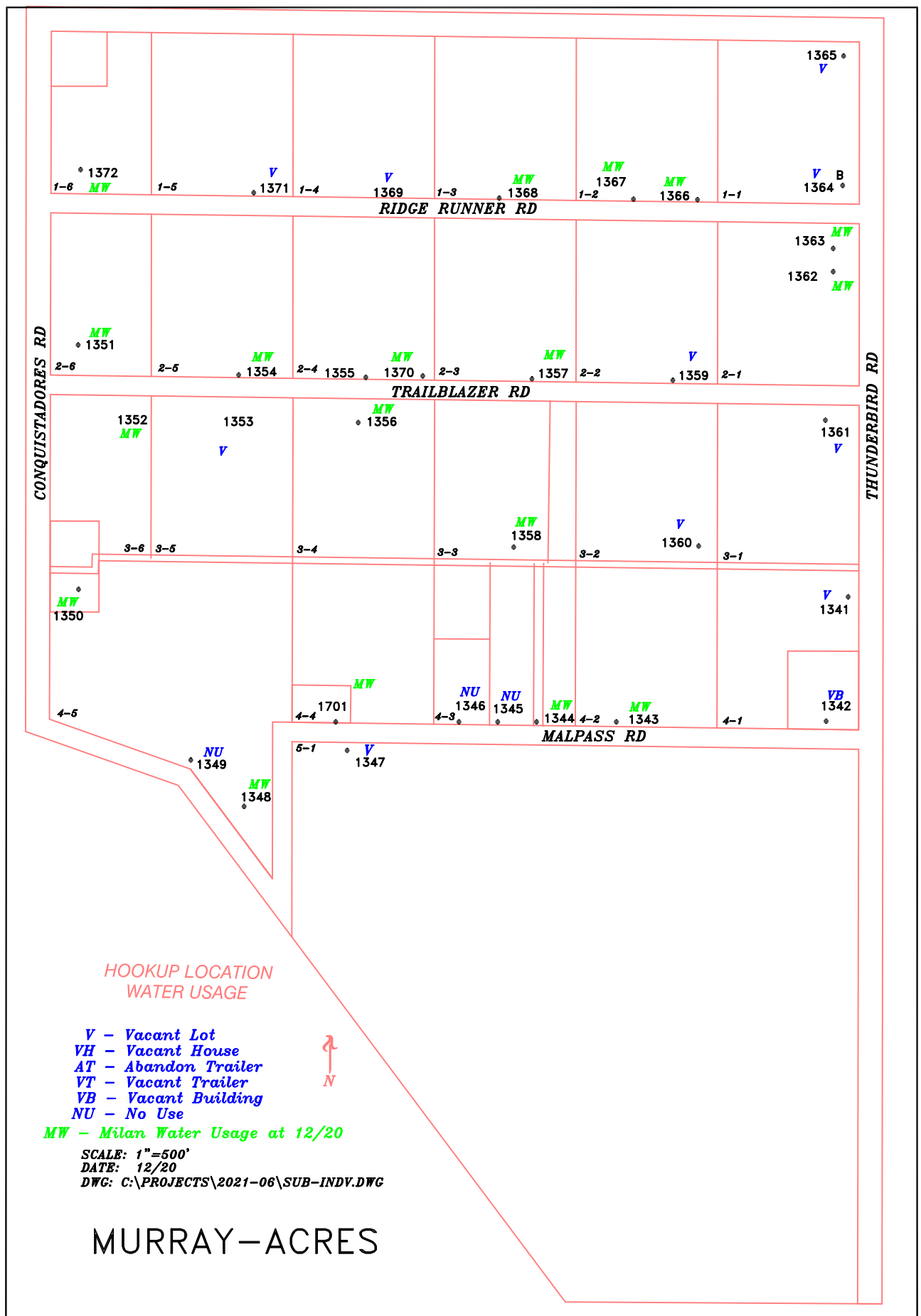


FIGURE E-3. MURRAY ACRES—LAND USE STATUS AND WATER USE  
E-7

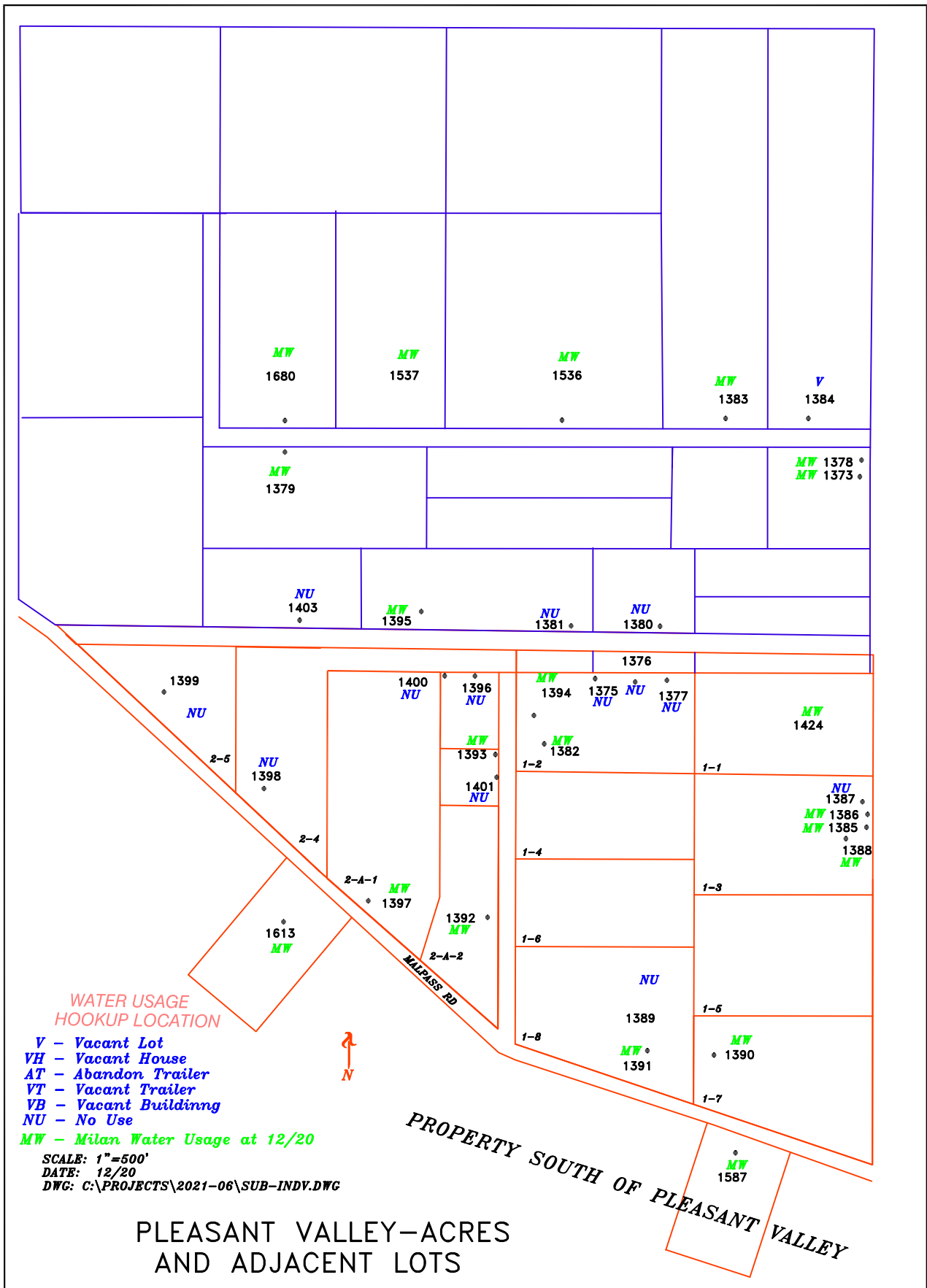


FIGURE E-4. PLEASANT VALLEY ESTATES-  
 LAND USE STATUS AND WATER USE



**TABLE E-1 WATER USE OF MILAN WATER IN BROADVIEW ACRES AND  
ADJACENT LOTS**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE
1 / 1	1324		
1 / 1	1325		
1 / 2	1319		
1 / 3	1326		
1 / 4	1318	X	X
1 / 5	1328	X	X
1 / 5	1329		
1 / 6	1312		
1 / 6	1313		
1 / 6	1314	X	X
1 / 7	1330	X	X
1 / 8	1309	X	X
1 / 9	1331	X	X
1 / 9	1332		
1 / 9	1333		
1 / 10	1307		
1 / 11	1334		
1 / 12	1306	X	X
1 / 13	1335	X	X
1 / 14	1303		
1 / 15	1336		
1 / 16	1301		
1 / 16	1302	X	X
1 / 17	1337		
1 / 18	1297		
1 / 19	1338		
1 / 20	1294		
1 / 21	1339		
1 / 22	1288		
1 / 23	1340	X	X
1 / 24	1287		
2 / 1	1320	X	X
2 / 1	1321		
2 / 2	1250		
2 / 3	1316	X	X
2 / 3	1317		X
2 / 4	1251	X	X

**TABLE E-1 WATER USE OF MILAN WATER IN BROADVIEW ACRES AND  
ADJACENT LOTS**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE
2 / 5	1315	X	X
2 / 5	1574		
2 / 6	1253	X	X
2 / 6	1254		
2 / 7	1310		
2 / 8	1698		
2 / 9	1308		
2 / 10	1257	X	X
2 / 11	1304	X	X
2 / 11	1305		
2 / 12	1261		X
2 / 13	1300		
2 / 14	1262	X	X
2 / 15	1299	X	X
2 / 15	1543	X	X
2 / 16	1263	X	X
2 / 17	1724	X	X
2 / 18	1265	X	X
2 / 19	1292		
2 / 19	1293	X	X
2 / 20	1267		
2 / 21	1289		
2 / 21	1290	X	X
2 / 22	1291		
2 / 22	1704	X	X
2 / 23	1283		
2 / 23	1284		
2 / 23	1285		
2 / 23	1286		
2 / 24	1282	X	X
3A / 1	1255	X	X
3A / 2	1581		
3A / 3	1259		
3A / 4	1260	X	X
3A / 5	1264	X	X

**TABLE E-1 WATER USE OF MILAN WATER IN BROADVIEW ACRES AND  
ADJACENT LOTS**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE
3A / 6	1266		
3A / 7	1268		
3A / 8	1269		
3A / 9	1270	X	X
4A / 1	1708	X	X
4A / 2	1252	X	X
	1705	X	X

EAST OF BROADVIEW ACRES			
	1322		
	1656	X	X
	1720	X	X

**TABLE E-2 WATER USE OF MILAN WATER IN FELICE ACRES AND  
ADJACENT LOTS**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE
1	1242		
1	1243		
1	1244		
2	1245		
2	1246		
3	1247		
4	1248		
5	1249		
6	1240		
6	1241		
7	1231	X	X
7	1232		
7	1233		
7	1234		
7	1235	X	X
7	1236	X	
7	1237		
7	1238	X	X
7	1239	X	X
7	1540		
8	1275	X	X
8	1276		
8	1277		
9			
10			
11			
12			
13			
14			
15	1274	X	X
16	1273	X	X
17	1271	X	X
17	1272	X	X
18	1472	X	X
19	1605		

**TABLE E-2 WATER USE OF MILAN WATER IN FELICE ACRES AND  
ADJACENT LOTS**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE
PROPERTY WEST OF FELICE ACRES			
	1519	X	X
	1278	X	X
	1279		
	1280	X	X
	1464		
	1487	X	X
	1281	X	X
	1482		
	1568	X	X
PROPERTY SOUTH OF FELICE ACRES			
	1583	X	X
PROPERTY EAST OF FELICE ACRES			
	1468	X	X
	1709		
	1718	X	X
	1719	X	X



**TABLE E-3 WATER USE OF MILAN WATER IN MURRAY ACRES**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE
1 / 1	1364		
1 / 1	1365		
1 / 2	1366	X	X
1 / 2	1367	X	X
1 / 3	1368	X	X
1 / 4	1369		
1 / 5	1371		
1 / 6	1372	X	X
2 / 1	1362	X	X
2 / 1	1363	X	X
2 / 2	1359		
2 / 3	1357	X	X
2 / 4	1355		
2 / 4	1370	X	X
2 / 5	1354	X	X
2 / 6	1351	X	X
3 / 1	1361		
3 / 2	1360		
3 / 3	1358	X	X
3 / 4	1356	X	X
3 / 5	1353		
3 / 6	1352	X	X
4 / 1	1341		
4 / 1	1342		
4 / 2	1343	X	X
4 / 3	1344	X	X
4 / 3	1345		
4 / 3	1346	X	
4 / 4	1701	X	X
4 / 5	1349		
4 / 5	1350	X	X
5 / 1	1347		
	1348	X	X

**TABLE E-4 WATER USE OF MILAN WATER IN PLEASANT VALLEY ESTATES  
AND ADJACENT LOTS**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE
1 / 1	1424	X	X
1 / 2	1375		
1 / 2	1376		
1 / 2	1377		
1 / 2	1382	X	X
1 / 2	1394	X	X
1/3	1385	X	X
1 / 3	1386	X	X
1 / 3	1387		
1 / 3	1388	X	X
1 / 7	1390	X	X
1 / 8	1389		
1 / 8	1391	X	X
2 / 4	1398		
2 / 5	1399		
2 / A1	1397	X	X
2 / A2	1392	X	X
2 / A2	1393	X	X
2 / A2	1396		
2 / A2	1400		
2 / A2	1401		
	1373	X	X
	1378	X	X
	1379	X	X
	1380		
	1381		
	1383	X	X
	1384		
	1395	X	X
	1403		
	1536	X	X
	1537	X	X
	1680	X	X
PROPERTY SOUTH OF PLEASANT VALLEY ESTATES			
17 - 2	1587	X	X
11 - 2	1613	X	X

**TABLE E-5 WATER USE IN VALLE VERDE AND  
ADJACENT LOTS**

SUBDIVISION BLOCK / LOT	CUSTOMER NUMBER SITE ID	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2019 WATER USAGE	PRIVATE RESIDENTIAL WELL WATER 2019	VILLAGE OF MILAN WATER SUPPLY SYSTEM 2020 WATER USAGE	PRIVATE RESIDENTIAL WELL WATER 2020
1 / 8	1696	X		X	
1 / 9	1700	X		X	
1 / 10	1617	X		X	
1 / 12	1475	X		X	
1 / 13	1479	X		X	
2 / 1	1474	X		X	
2/5	1702	X		X	
2 / 6	1713	X		X	
2 / 7	1473	X		X	
2 / 9					
2/10	1618	X		X	
3 / 1	1516	X		X	
3 / 2	1593	X		X	
3 / 3	1710	X		X	
3 / 4	1612	X		X	
4/11	1706	X		X	
4 / 8	1592	X		X	
4 / 14	1728		X	X	
4 / 18	1556	X		X	
5 / 12	1714	X		X	
7 / 13	1506	X		X	
7 / 16	1722	X		X	
7 / 15	1723	X		X	

PROPERTY NORTH OF VALLE VERDE					
	1513	X		X	
	1514	X		X	

PROPERTY EAST OF VALLE VERDE					
1/21	1712	X		X	
2 / 1	1711	X		X	
2 / 5	1493	X		X	
2 / 7	1502	X		X	
2 / 3	1566	X		X	

PROPERTY SOUTH OF VALLE VERDE					
	1557	X		X	

**APPENDIX F**  
**GRANTS RECLAMATION PROJECT**  
**METEOROLOGICAL DATA SUMMARY**

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3.0	PRECIPITATION.....	F-1
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# **Grants Reclamation Project**

## **Meteorological Data** *CY2020*

### **1.0 Introduction**

Homestake Mining Company of California (HMC) was issued discharge permit DP-200 in 2014. Specific permit condition 52 requires inclusion of available meteorological data in tabular format within the annual report. The following discussions, figures and tabulation present meteorological data for 2020.

### **2.0 Wind**

The annual wind rose developed from data taken at HMC's meteorological station is presented in Figure F-1. The maximum, minimum and mean monthly wind speeds are presented in Table F-1.

### **3.0 Precipitation**

The monthly precipitation depths are presented in Table F-1. The total measured precipitation depth at the Grant's was 7.55 inches in 2020.

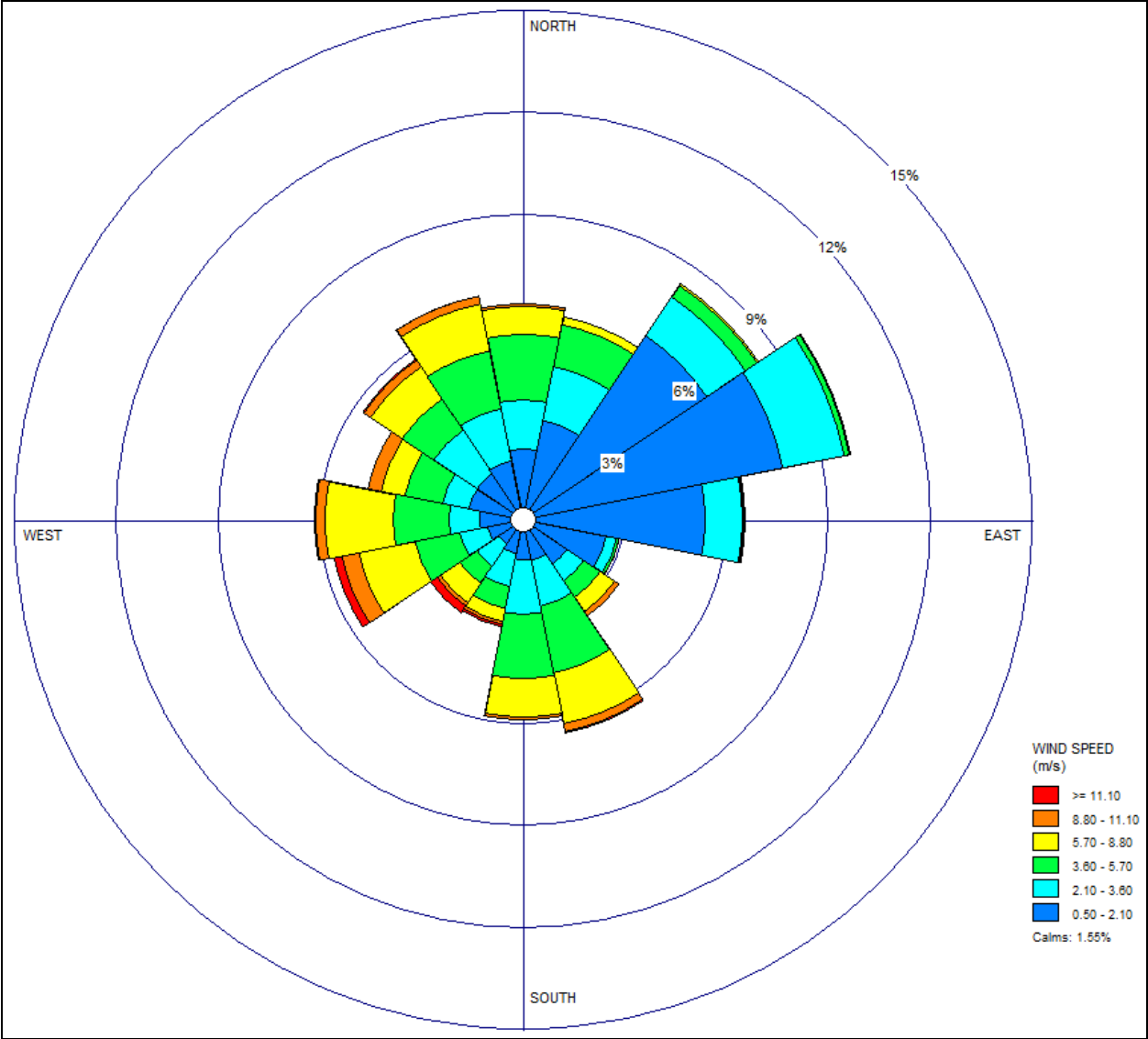
### **4.0 Temperature and Humidity**

The maximum, minimum and mean monthly temperatures are presented in Table F-1. The maximum, minimum and mean monthly relative humidity for 2020 is presented in Table F-1.

### **5.0 Solar Radiation and Evaporation**

The solar radiation measurements are presented in Table F-1. Table F-1 also presents an estimate of monthly potential evaporation based on available meteorological data.

Figure F-1. Grants Site 2020 Annual Wind Rose



**Table F-1. Grants Site 2020 Monthly Meteorological Data Summary**

Month	Simple Stats	Wind Speed (m/s)	Air Temperature (c)	Relative Humidity (%)	Monthly Precipitation (in)	Solar Radiation (W/m <sup>2</sup> )	Net Solar Radiation (W/m <sup>2</sup> )	Average Daily Temp (c)	Calculated Heat Index	Evaporation Potential (cc/month)
Jan-20	max	11.1	12.8	93.9	0.5	140.5	94.2	0.00	0.00	0.00
	min	0.2	-15.1	9.5						
	mean	3.0	-0.3	58.2						
Feb-20	max	15.9	17.0	94.6	0.81	174.0	116.6	1.45	0.15	0.29
	min	0.3	-15.9	10.2						
	mean	3.4	1.5	52.1						
Mar-20	max	15.8	18.2	93.0	0.86	213.7	143.2	6.49	1.49	2.40
	min	0.2	-7.8	7.8						
	mean	3.5	6.5	45.2						
Apr-20	max	12.5	26.5	88.2	0.29	297.4	199.3	10.69	3.16	4.82
	min	0.4	-7.8	6.8						
	mean	3.8	10.7	30.4						
May-20	max	12.3	29.0	70.2	0.02	324.3	217.3	16.76	6.24	9.52
	min	0.3	-0.4	4.1						
	mean	3.7	16.8	21.5						
Jun-20	max	14.8	31.7	80.6	0.16	327.0	219.1	21.16	8.88	12.83
	min	0.5	3.0	4.9						
	mean	3.9	21.2	20.7						
Jul-20	max	8.1	34.6	94.7	1.36	284.7	190.8	22.30	9.62	13.95
	min	0.2	10.1	7.7						
	mean	2.8	22.3	38.9						
Aug-20	max	10.7	33.3	90.4	1.19	264.6	177.3	23.12	10.16	13.77
	min	0.0	10.2	8.1						
	mean	2.7	23.1	30.8						
Sep-20	max	13.2	31.8	92.0	0.66	262.6	175.9	16.98	6.37	8.26
	min	0.1	0.0	5.2						
	mean	2.9	17.0	32.3						
Oct-20	max	13.0	27.0	95.2	0.92	220.4	147.7	11.08	3.33	4.49
	min	0.1	-7.9	5.2						
	mean	2.3	11.1	30.1						
Nov-20	max	11.8	22.0	93.8	0.34	158.1	105.9	5.19	1.06	1.50
	min	0.1	-9.6	10.4						
	mean	2.9	5.2	50.0						
Dec-20	max	12.5	15.8	90.2	0.44	139.8	93.7	0.00	0.00	0.00
	min	0.1	-13.9	9.3						
	mean	2.8	-2.1	51.5						

<b>Net solar radiation = (1-α) × SR</b>				
α = albedo (Earth average around 0.35. Typical desert sands average 0.4 and grasses average 0.25. Going with a 0.33.				
SR = solar radiation (From HMC met station data)				
<b>Evaporation Potential (PET) = 1.6 × (L/12) × (N/30) × (10 T<sub>a</sub>/I)<sup>3</sup></b>				
T <sub>a</sub> = Average daily temperature (degrees Celsius; if negative then value of 0) for month being calculated.				
L = Average day length (in hours) of month being calculated.				
N = number of days in month being calculated.				
α = (6.75E-7)× I <sup>5</sup> - (7.71E-5) × I <sup>2</sup> + (1.792E-2) × I + 0.49239				
α =	(a)	(b)	= a × b	
	6.75E-07	128456.5	8.67E-02	
	7.71E-05	2545.9	1.96E-01	
	1.79E-02	50.5	9.04E-01	
			0.49239	
	α =		1.29E+00	
I = Σ (for i = 1 to 12) (T <sub>a</sub> /I) <sup>1.514</sup> = Heat index which depends on the 12 monthly mean temperatures (T <sub>a</sub> ).				
	I =		50.46	