ARCADIS

Chevron Environmental Management Company

2024 Annual Groundwater Monitoring Report

Cooper-Jal Unit South Injection Station

Section 24, Township 24 South, Range 36 East

Lea County, New Mexico

OGRID No. 4323

Incident ID: nAUTOfAB000105



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2024 ANNUAL GROUNDWATER MONITORING REPORT

Cooper Jal

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1 Introduction

Arcadis U.S., Inc. (Arcadis) has prepared this report for Chevron Environmental Management Company (CEMC), which summarizes semi-annual groundwater monitoring activities conducted in 2024 at the Cooper-Jal Unit South Injection Station (Site). Data presented in this report was collected during semi-annual groundwater monitoring events conducted July 31st through August 1st, 2024, and November 12th through 13th, 2024.

The Site is located on Lea County Road J7, approximately five and a half miles northwest of Jal, New Mexico, in Section 24, Township 24 South, Range 36 East, Lea County, New Mexico in the Bureau of Land Management (BLM). The latitude and longitude coordinates of the Site are 32° 12' 7.13" N and 103° 13' 4.36" W.

Land in the vicinity of the Site is utilized primarily for livestock ranching and oil and gas production and has areas of undeveloped rangeland vegetated with indigenous grass. An injection well facility, operated by Resaca Resources, LLC (Resaca), is located adjacent to the Site. No active Chevron U.S.A. Inc. (Chevron) operations are present in the area. A Site Location Map is presented as **Figure 1**. Additional Site background information is in **Appendix A**.

2 Groundwater Monitoring Results

Groundwater at the Site is monitored semi-annually from a network of 18 monitoring wells and 2 recovery wells. A Site Details Map is presented as **Figure 2**. Arcadis performed semi-annual groundwater sampling events on July 31 through August 2, 2024, and November 12 through13, 2024. During each sampling event, all Site wells are gauged to determine depth to water and depth to non-aqueous phase liquid (LNAPL), if present. Additionally, conductivity readings are collected through the water column at two-foot intervals at each Site well annually, in conjunction with the first semi-annual sampling event. Per the Cooper Jal Reduced Sampling Work Plan submitted to the NMOCD on July 20, 2020, the July 2024 monitoring event consisted of water level measurements and samples collected from all twenty on-Site wells. Additionally, in accordance with the Cooper Jal Reduction Sampling Work Plan, water level measurements were collected at all twenty Site wells and samples were collected from eleven wells during the November 2024 monitoring event. Field monitoring methodologies are in **Appendix B**.

2.1 Groundwater Gauging Data

Groundwater and light non-aqueous phase liquid (LNAPL) measurements collected during the semi-annual monitoring events conducted in 2024 indicate:

- Groundwater elevations ranged from:
  - 3,181.59 feet above mean sea level (ft AMSL) (MW-11) to 3,190.65 ft AMSL (MW-12) during the July 2024 event, and
  - 3,181.71 ft AMSL (MW-11) to 3,190.74 ft AMSL (MW-12) during the November 2024 event.
- The groundwater elevations during both semi-annual sampling events in 2024 were consistent with historical levels, with groundwater flow generally to the southeast.
- Potentiometric elevation data for the sampling events are presented in **Table 1**. Groundwater potentiometric surface maps for July 2024 and November 2024 are presented on **Figure 3**.
- The calculated gradient was 0.0026 feet/foot (ft/ft) for both July and November 2024 gauging events.

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- LNAPL was not detected in any Site wells during either the July 2024 or the November 2024 monitoring events.

2.2 Groundwater Analytical Results

All 20 wells were sampled at the Site during the July-August 2024 sampling event. The November 2024 groundwater monitoring event was reduced to sampling 11 of 20 Site wells, as detailed in the Cooper Jal Sample Reduction Work Plan submitted to the NMOCD on July 20, 2020, presented in **Table 2**. On February 13, 2023, the proposed sampling reduction plan was approved with an additional request to collect samples for sulfate analysis from two Site wells (MW-4A and RW-2R). The sulfate sample collection is scheduled annually in conjunction with the first semi-annual sampling event. Samples were sent to Pace analytical to be analyzed for:

- Chloride by EPA method 300.0,
- Sulfate by EPA method 300.0 and,
- Total Dissolved Solids by EPA 2540C-2011.

Groundwater analytical results for chloride, total dissolved solids (TDS), and sulfate were compared to the New Mexico Water Quality Control Commission (NMWQCC) Groundwater Standards. A summary of the groundwater sample analytical results is presented in **Table 3**.

Cumulative summary tables of groundwater analytical results and potentiometric elevation data obtained for the Site from 1998 through 2024 are presented in **Appendices C** and **D**, respectively. Copies of the certified analytical reports and chain-of-custody documentation from Pace Laboratories are provided in **Appendix E**.

Isoconcentration maps for chloride for the July-August 2024 and November 2024 sampling events are presented on **Figure 4**. The isoconcentration maps for TDS for the July -August 2024 and November 2024 sampling events are presented on **Figure 5**. The isoconentration map for sulfate for the July-August 2024 sampling event is presented on **Figure 6**. The groundwater analytical results are further summarized below.

2.2.1 Chloride

- Chloride concentrations detected during the July-August 2024 groundwater sampling event exceeded the NMWQCC standard of 250 milligrams per liter (mg/L) in 12 of the 20 wells sampled (MW-1, MW-4, MW-4A, MW-5, MW-7, MW-9, MW-9A, MW-10, MW-12, RW-1, RW-2, and RW-2R).

  Chloride concentrations exceeding the NMWQCC standard of 250 mg/L ranged from 344 mg/L at monitoring well MW-10 to 10,800 mg/L at monitoring well MW-4.
- Chloride concentrations detected during the November 2024 groundwater sampling event exceeded the NMWQCC standard of 250 mg/L in 10 of the 11 wells sampled (MW-1, MW-4, MW-5, MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, and RW-2R).

  Chloride concentrations exceeding the NMWQCC standard of 250 mg/L ranged from 336 mg/L at monitoring well MW-10 to 13,400 mg/L at monitoring well MW-4.

2.2.2 TDS

- TDS concentrations detected during the July-August 2024 groundwater sampling event exceeded the NMWQCC standard of 1,000 mg/L in 12 of the 20 wells sampled (MW-1, MW-4, MW-4A, MW-5, MW-7, MW-9, MW-9A, MW-10, MW-12, RW-1, RW-2, and RW-2R).

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TDS concentrations exceeding the NMWQCC standard of 1,000 mg/L ranged from 1,030 mg/L (MW-9A) to 26,500 mg/L (MW-4).

- TDS concentrations detected during the November 2024 groundwater sampling event exceeded the NMWQCC standard of 1,000 mg/L in 10 of the 11 wells sampled (MW-1, MW-4, MW-5, MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, and RW-2R).

TDS concentrations exceeding the NMWQCC standard of 1,000 ranged from 1,090 mg/L (MW-10) to 22,900 mg/L (MW-4).

2.2.3 Sulfate

- Sulfate concentrations were analyzed in 2 wells (MW-4A and RW-2R) out of the 20 wells during the July-August 2024 groundwater sampling event. Sulfate concentrations detected during the July-August 2024 groundwater sampling event exceeded the NMWQCC standard of 600 mg/L in 1 of the 2 wells sampled (RW-2R).
- Due to historical data Sulfate concentrations at all the other site wells on Site are not being actively monitored per the NMOCD approved (dated February 13,2023) reduced Sampling Analysis Plan. ,

The sulfate concentration exceeding the NMWQCC standard of 600 mg/L was 845 mg/L for the recovery well RW-2R. Sulfate concentrations were not analyzed during the November 2024 groundwater sampling event in accordance with the approved Sampling Analysis Plan.

3 Summary

In summary, the semi-annual monitoring activities conducted at the Site in July-August 2024 and November 2024 indicate the following:

- All 20 Site wells were gauged during the July-August 2024 and November 2024 events;
- Groundwater elevations at the Site have remained consistent over the last 10 years;
- All 20 Site wells were sampled during the July-August 2024 event, and 11 Site wells were sampled during the November 2024 event;
- Potentiometric surface conditions were consistent with historical results showing groundwater flow to the southeast towards monitoring well MW-11.

Groundwater sample analytical results reported for the July-August 2024 and November 2024 sampling events indicate:

- Chloride exceeded the NMWQCC standard in 12 Site wells sampled during the July-August 2024 event (MW-1, MW-4, MW-4A, MW-5, MW-7, MW-9, MW-9A, MW-10, MW-12, RW-1, RW-2, and RW-2R), and 10 Site wells sampled during the November 2024 event (MW-1, MW-4, MW-5, MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, and RW-2R).
- The highest chloride concentrations were detected at wells MW-4 and RW-2R, located at the center of the site, during both July and November 2024 sampling events.
- TDS exceeded the NMWQCC standard of 1,000 mg/L in 12 Site wells sampled during the July 2024 event (MW-1, MW-4, MW-4A, MW-5, MW-7, MW-9, MW-9A, MW-10, MW-12, RW-1, RW-2, and RW-2R), and 10 Site wells sampled during the November 2024 event (MW-1, MW-4, MW-5, MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, and RW-2R).

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- The highest TDS concentrations were detected at wells MW-4 and RW-2R, located at the center of the site.
- Sulfate concentrations exceeded the NMWQCC standard at one of the two wells sampled during the July 2024 event (RW-2R).

Chloride Historical data suggest the following:

- Monitoring wells MW-1 and MW-5 have historical decreasing chloride concentration trends, with concentrations consistently above the chloride NMWQCC standard of 250 mg/L. However, since 2021, chloride concentrations at MW-1 have stabilized, ranging from 598 mg/L to 960 mg/L.
- Monitoring wells MW-2, MW-2A, MW-3, MW-6R, and MW-5A have consistent stable concentration trends below the chloride NMWQCC standard of 250 mg/L.
- MW-12 is the furthest upgradient well onsite, located to the northwest. Prior to 2018, chloride concentrations at MW-12 were generally below the chloride NMWQCC standard of 250 mg/L, with the exception of November 2007 and October 2016, when concentrations slightly exceeded the standard. Due to this historical trend and it's upgradient position to the site chloride plume, MW-12 has historically been considered a background well for chloride impact at the site. However, since October 2018, chloride concentrations have exceeded the NMWQCC standard and have consistently increased since, with only one instance of chloride concentrations decreasing below the chloride NMWQCC standard of 250 mg/L in April 2020. Since 2022, this increasing trend appears to have stabilized, with chloride concentrations ranging from 404 mg/L to 504 mg/L. MW-3, MW-2A, and MW-6R are downgradient from MW-12. These wells have consistently shown stable chloride concentrations below NMWQCC standard of 250 mg/L and act as the delineation wells along the northern edge of the impacted groundwater. As a result of this, the increasing chloride concentrations at MW-12 are believed to be a result of chloride impact from an upgradient source, not associated with the Site's release.
- MW-8, MW-14, and MW-11 are located in the southwest, east, and southeast portion of the site respectively, and have consistent stable concentration trends below the chloride standard of 250 mg/L, which support the southern delineation of the site chloride plume.
- Monitoring well MW-4 and recovery well RW-2R are centrally located and have the greatest concentration of chloride onsite. Chloride concentrations in these two wells have remained relatively stable since 2020. Monitoring well MW-4 has chloride concentrations ranging from 8,700 mg/L to 13,700 mg/L and recovery well RW-2 has chloride concentrations ranging from 7,250 mg/L to 8,300 mg/L.
- Downgradient monitoring wells MW-7 and MW-9 are located in the south central area of the site, down gradient from MW-4 and RW-2R. Chloride concentrations at MW-7 have been relatively stable since 2022 with concentrations ranging from 5,080 mg/L to 5,350 mg/L. Chloride concentrations at MW-9 have also been relatively stable since 2020 with concentrations ranging from 1,010 mg/L to 1,100 mg/L. Higher chloride concentrations at MW-7 compared to MW-9 could be explained to its upgradient/ closer proximity to RW-2R and MW-4.
- Anomalies detailed below were identified in some of the Site wells that are not representative of the historical trends on Site:
    - Chloride concentrations at wells MW-4, MW-5, and RW-2 during the August 2022 sampling event were reported below the NMWQCC groundwater standard of 250 mg/L. Historical data for MW-4, MW-5, and RW-2 have consistently exceeded the NMWQCC groundwater standard of 250 mg/L. However, analytical data collected from December 2022 through December 2024 at these wells

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align with the observed historical trends observed with chloride concentrations exceeding the NMWQCC standard of 250 mg/L.

- Well MW-5A has historically not exceeded NMWQCC groundwater standard of 250 mg/L, however during the August 2022 sampling event, analytical data indicated a chloride exceedance increase of 15,000 mg/L. Analytical data collected at MW-5A from July 2023 to August 2024 align with the observed historical trends being below the chloride NMWQCC standard of 250 mg/L.

Historical chloride analytical data from upgradient wells (MW-1, MW-2, MW-2A, MW-3, MW-4, MW-4A, MW-5, MW-5A, MW-6R, and RW-1) exhibit generally stable chloride concentration trends and do not indicate influence of increased concentrations over time. Historical chloride analytical data and the chloride concentration trend at MW-12 exhibit increasing chloride concentrations over time, surpassing the NMWQCC standard in recent years. MW-12 concentration trends combined with the consistent southeast groundwater flow at the site could be indicative of an existing off-site chloride plume upgradient of MW-12 that may be migrating towards the Site.

Historical TDS data suggest the following:

- Monitoring wells MW-1 and MW-5 have demonstrated historical decreasing TDS concentration trends. However, since 2021 analytical data has begun to stabilize, with TDS concentrations exceeding the TDS NMWQCC standard of 1,000 mg/L ranging from 1,240 mg/L to 2,290 mg/L at MW-1 and from 2,230 mg/L to 2,630 mg/L at MW-5.
- Upgradient wells MW-2, MW-2A, MW-3, MW-6R, MW-5 have consistently shown stable concentration trends below the TDS standard of 1,000 mg/L.
- Upgradient well MW-12 has a historically increasing TDS concentration trend. TDS concentrations at MW-12 have generally been below the NMWQCC TDS standard of 1,000 mg/L since 2002, with one exceedance occurring in November 2007. Due to this historical concentration trend and it's upgradient position to the onsite plume, MW-12 has historically been considered a background well at the site. However, on December 2021 TDS concentrations exceeded the NMWQCC TDS standard of 1,000 mg/L and have consistently increased since then, supporting the suggestion of potential influence from an upgradient off-site source. MW-3, MW-2A, and MW-6R are downgradient from MW-12. These wells have consistently shown stable TDS concentrations below the NMWQCC standard of 1,000 mg/L and act as the delineation wells along the northern edge of the Site's groundwater plume. As a result of this, the increasing TDS concentrations at MW-12 are believed to be a result of impact from an upgradient source, not associated with the Site's release.
- MW-8, MW-14, and MW-11 are located in the southwest, east, and southeast portion of the site respectively, and have consistent stable concentration trends below the TDS standard of 1,000 mg/L, which support the southern delineation of the site TDS plume.
- Downgradient monitoring wells MW-7, MW-9, and MW-9A are located in the south central area of the site, down gradient from MW-4 and RW-2R.These wells have a historically increasing TDS concentration trends above the TDS standard of 1,000 mg/L. Higher TDS concentrations at MW-7 compared to MW-9 and MW-9A could be explained by its upgradient closer proximity to RW-2R and MW-4.
- Monitoring well MW-4 and recovery well RW-2R are centrally located on site and have consistently had TDS concentrations greater than any other well at the site. Monitoring well MW-4 has TDS concentrations ranging from 16,400 mg/L to 28,900 mg/L and recovery well RW-2 has TDS concentrations ranging from 13,500 mg/L to 21,500 mg/L since 2020.

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Historical TDS analytical data from upgradient wells (MW-1, MW-2, MW-2A, MW-3, MW-4, MW-4A, MW-5, MW-5A, MW-6R, and RW-1) exhibit generally stable TDS concentration trends and do not indicate influence of increased concentrations over time. Historical TDS analytical data and the TDS concentration trends at MW-12 exhibits increasing TDS concentrations over time, surpassing the NMWQCC standard in recent years. MW-12 concentration trends combined with the consistent southeast groundwater flow at the site could be indicative of an existing off-site plume upgradient of MW-12 that may be migrating towards the Site. Additionally, the increasing TDS trends observed in the downgradient wells (MW-7, MW-9, and MW-9A) could also indicate the migration of TDS from upgradient wells (RW-1, MW-4A, RW-2, and RW-2R) on site towards MW-11.

Historical sulfate data suggest the following:

- Monitoring well MW-4A has a decreasing sulfate concentration trend with concentrations consistently below the NMWQCC standard of 600 mg/L. Analytical data from 2016 to 2024 indicate a stable concentration trend ranging from 91.7 mg/L to 101 mg/L.
- Monitoring well RW-2R has a relatively stable sulfate concentration trend with concentrations consistently above the NMWQCC standard of 600 mg/L.

Historical sulfate analytical data and concentration trends from monitoring wells MW-4A and RW-2R indicate a generally stable sulfate plume at the Site, concentrated at recovery well RW-2R.

4 Recommendations

Arcadis recommends the continuation of semi-annual groundwater monitoring and sampling on-Site in 2025, following the 2023 SAP that was approved by NMCOD in a letter dated February 13, 2023.

On March 25, 2024, Chevron submitted the *2023 Stage 1 & 2 Abatement Plan* to the NMOCD to document the on-going groundwater assessment activities and proposing a path to groundwater remediation and eventual site closure. On a letter dated September 27, 2024, the NMOCD approved the 2023 Stage 1 & 2 Abatement Plan under the condition of completion of public notification and to provide an update of the ancillary remediation system and construction designs within six months of the approval letter. On October 4, 2024, Arcadis completed the Public Notification requirements and submitted proof of public notice distribution to the NMOCD on a letter dated October 8, 2024. The proof of public notice for Cooper Jal Site was accepted by the NMOCD on October 15, 2024. As part of the 2024 Annual Groundwater Monitoring Report, Arcadis has included the Groundwater Recovery System 30 Percent Basis of Design (**Appendix F**) as requested by the NMOCD on the abatement plan approval letter dated September 27, 2024.

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Tables

Table 1
2024 Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID	TOC Elevation	Well Diameter (in)	Well Screen Interval (ft bgs[2])	Collection Date	Total Depth (ft below TOC)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft)
MW-1	*3321.94*	**2**	153-173	07/30/24	169.58	134.41	3187.53
				11/12/24	169.59	134.36	3187.58
MW-2	*3321.27*	**2**	163-173	07/30/24	168.98	134.12	3187.15
				11/12/24	168.97	134.05	3187.22
MW-2A	*3321.30*	**2**	130-145	07/30/24	142.19	134.18	3187.12
				11/12/24	142.18	134.13	3187.17
MW-3	*3320.08*	**2**	161-171	07/31/24	172.27	132.06	3188.02
				11/12/24	172.29	131.96	3188.12
MW-4	*3321.58*	**2**	161-171	07/30/24	171.77	135.15	3186.43
				11/12/24	171.79	135.03	3186.55
MW-4A	*3321.42*	**2**	128-143	07/30/24	145.98	134.97	3186.45
				11/12/24	145.97	134.93	3186.49
MW-5	*3322.98*	**2**	161-171	07/30/24	174.16	136.45	3186.53
				11/12/24	174.17	136.39	3186.59
MW-5A	*3321.07*	**2**	126-141	07/30/24	144.22	136.53	3184.54
				11/12/24	144.22	136.45	3184.62
MW-6R	*3323.04*	**4**	136-176	07/30/24	177.55	135.48	3187.56
				11/12/24	177.55	135.94	3187.10
MW-7	*3320.19*	**2**	151-166	07/30/24	163.88	135.39	3184.80
				11/12/24	163.92	135.33	3184.86
MW-8	*3319.06*	**2**	155-170	07/30/24	146.76	133.60	3185.46
				11/12/24	146.81	133.61	3185.45
MW-9	*3314.68*	**2**	149-164	07/31/24	161.71	131.83	3182.85
				11/12/24	161.74	131.71	3182.97
MW-9A	*3314.48*	**2**	127-142	07/31/24	142.41	131.58	3182.90
				11/12/24	142.45	131.50	3182.98
MW-10	*3321.12*	**2**	151-166	07/30/24	160.98	136.18	3184.94
				11/12/24	160.98	136.18	3184.94
MW-11	*3311.56*	**4**	125-140	07/31/24	165.48	129.97	3181.59
				11/12/24	165.50	129.85	3181.71
MW-12*	*3330.33*	**4**	157-172	07/31/24	171.34	139.68	3190.65
				11/12/24	171.35	139.59	3190.74
MW-14	*3318.36*	**4**	131-171	07/30/24	174.62	134.22	3184.14
				11/12/24	174.33	134.23	3184.13
RW-1	*3320.31*	**5**	130-174	07/30/24	163.88	133.61	3186.70
				11/12/24	163.90	133.58	3186.73
RW-2	*3320.42*	**5**	134-173	07/30/24	157.46	135.04	3185.38
				11/12/24	157.48	135.08	3185.34
RW-2R	*3320.68*	**6**	133-173	07/30/24	180.36	136.73	3183.95
				11/12/24	180.37	136.70	3183.98

Notes:
1. A - Indicates groundwater monitor well installed in shallow Uppermost Groundwater Bearing Unit.
2. ft bgs - feet below ground surface
3. in - inches
4. TOC - Top of Casing
5. * - Indicates groundwater monitor well installed off-site and upgradient of plume.
6. -- - Not Available/ Not Applicable

Table 2
2024 Groundwater Sampling and Analysis Plan
Cooper Jal Unit South Injection Station
Lea County, NM

First Semi-Annual Monitoring Event						Second Semi-Annual Monitoring Event					
Monitoring Well ID	Gauge Depth to Groundwater and Total Depth	Collect Conductivity Level every two (2) feet	Total Dissolved Solids by State Method 2540C	Inorganic Anions by USEPA Method 300		Gauge Depth to Groundwater and Total Depth	Collect Conductivity Level every two (2) feet	Total Dissolved Solids by State Method 2540C	Inorganic Anions by USEPA Method 300		Rationale for Reduction
				Chloride	Sulfate				Chloride	Sulfate	
MW-1	X	X	X	X	--	X	--	X	X	--	
MW-2	X	X	X	X	--	X	--	X	X	--	
MW-2A	X	X	X	X	--	X	--	--	--	--	Stable Trend
MW-3	X	X	X	X	--	X	--	--	--	--	Stable Trend
MW-4	X	X	X	X	--	X	--	X	X	--	
MW-4A	X	X	X	X	X	X	--	--	--	--	Stable Trend
MW-5	X	X	X	X	--	X	--	X	X	--	
MW-5A	X	X	X	X	--	X	--	--	--	--	Stable Trend
MW-6R	X	X	X	X	--	X	--	--	--	--	Stable Trend
MW-7	X	X	X	X	--	X	--	X	X	--	
MW-8	X	X	X	X	--	X	--	--	--	--	Stable Trend
MW-9	X	X	X	X	--	X	--	X	X	--	
MW-9A	X	X	X	X	--	X	--	--	--	--	Stable Trend
MW-10	X	X	X	X	--	X	--	X	X	--	
MW-11	X	X	X	X	--	X	--	--	--	--	Stable Trend
MW-12	X	X	X	X	--	X	--	X	X	--	
MW-14	X	X	X	X	--	X	--	--	--	--	Stable Trend
RW-1	X	X	X	X	--	X	--	X	X	--	
RW-2	X	X	X	X	--	X	--	X	X	--	
RW-2R	X	X	X	X	X	X	--	X	X	--	

Notes:
USEPA = United States Environmental Protection Agency
X = Data will be collected at monitoring well during respective event.
-- = Data will not be collected at monitoring well during semi-annual event

Table 3
2024 Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

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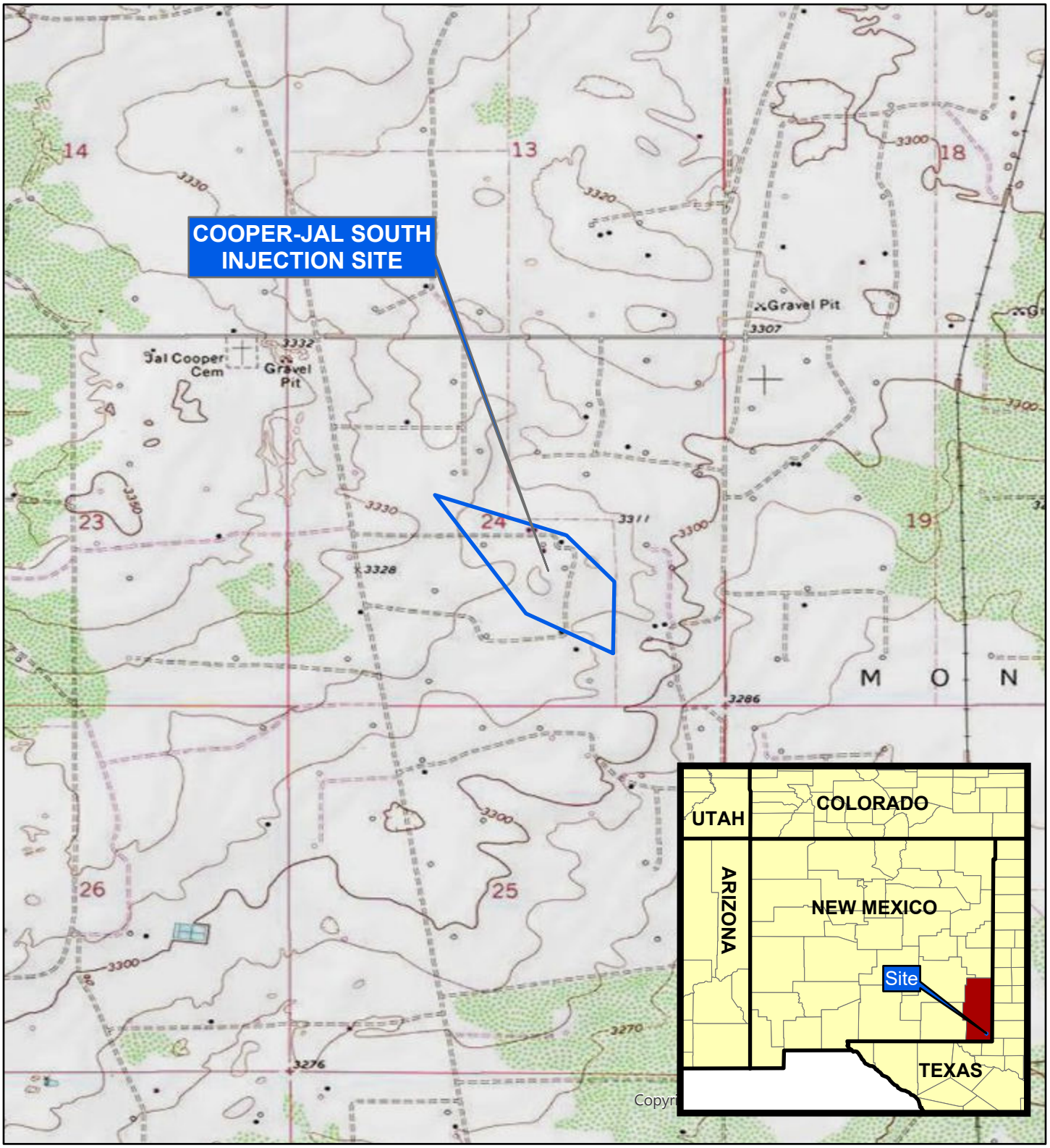
Sample ID	Sample Date	Chloride	TDS	Sulfate
NMWQCC Groundwater Standard (mg/L)		**250**	**1,000**	**600**
MW-1	8/1/2024	***598***	***1,640***	NA
	11/12/2024	***768***	***2,290***	NA
MW-2	8/1/2024	116 J6	672	NA
	11/12/2024	152	596	NA
MW-2A	8/1/2024	107 J6	522	NA
	11/12/2024	--	--	--
MW-3	8/2/2024	33.5	422	NA
	11/12/2024	--	--	--
MW-4	8/1/2024	***10,800***	***26,500***	NA
	11/12/2024	***13,400***	***22,900***	NA
MW-4A	7/31/2024	***422***	***1,200***	91.7
	11/12/2024	--	--	--
MW-5	8/1/2024	***941***	***2,260***	NA
	11/12/2024	***921***	***2,310***	NA
MW-5A	8/1/2024	161	609	NA
	11/12/2024	--	--	--
MW-6R	8/1/2024	76.9	480	NA
	11/12/2024	--	--	--
MW-7	8/1/2024	***5,080***	***14,800***	NA
	11/13/2024	***5,500***	***15,500***	NA
MW-8	8/2/2024	34.9	419	NA
	11/12/2024	--	--	--
MW-9	8/1/2024	***1,010***	***3,060***	NA
	11/13/2024	***1,040***	***3,300***	NA
MW-9A	8/1/2024	***737***	***1,030***	NA
	11/13/2024	--	--	--
MW-10	8/1/2024	***344***	***1,180***	NA
	11/13/2024	***336***	***1,090***	NA
MW-11	8/2/2024	35.1	417	NA
	11/12/2024	--	--	--
MW-12*	8/2/2024	***404***	***1,600***	NA
	11/12/2024	***504***	***1,560***	NA
MW-14	7/31/2024	61.4	473	NA
	11/12/2024	--	--	--
RW-1	7/31/2024	***1,540***	***13,900***	NA
	11/12/2024	***2,220***	***4,280***	NA
RW-1 Dup	7/31/2024	***1,680***	***9,820***	NA
	11/12/2024	***5,890***	***6,980***	NA
RW-2	7/31/2024	***533***	***3,510***	NA
	11/13/2024	***747***	***1,370***	NA
RW-2R	7/31/2024	***7,590***	***20,100***	***845***
	11/13/2024	***8,080***	***18,600***	NA
RW-2R Dup	7/31/2024	***8,010***	***18,400***	***881***

Notes:

1. Bold and italiced cells indicate New Mexico Water Quality Control Commission (NMWQCC) standard exceedance.
2. NA- Not Analysed
3. Results shown in milligrams/liter (mg/L).
4. * - Indicates groundwater monitor well installed off-site and upgradient of plume.
5. TDS - Total Dissolved Solids
6. J6- The sample matrix interfered with the ability to make any accurate determination; spike value is low.
7. -- Not Available
8. Monitoring wells MW-2A, MW-3, MW-4A, MW-5A, MW-6R, MW-8, MW-9A, MW-11, and MW-14 were excluded from sampling during the 2SA24 sampling event as they were not part of the 2024 SAP due to stable trends.

Figures



Legend

Site Boundary

Notes:
1. Datum: D_WGS_1984
2. Source: United States Geological Survey 7.5 Minute Quadrangle Map
3. Site Location: 32.19891, -103.21523

N

0 1,000 2,000 4,000 Feet

Chevron Environmental Management Company
Cooper-Jal Unit South Injection Site
Lea County, New Mexico

SITE LOCATION MAP

ARCADIS

FIGURE 1

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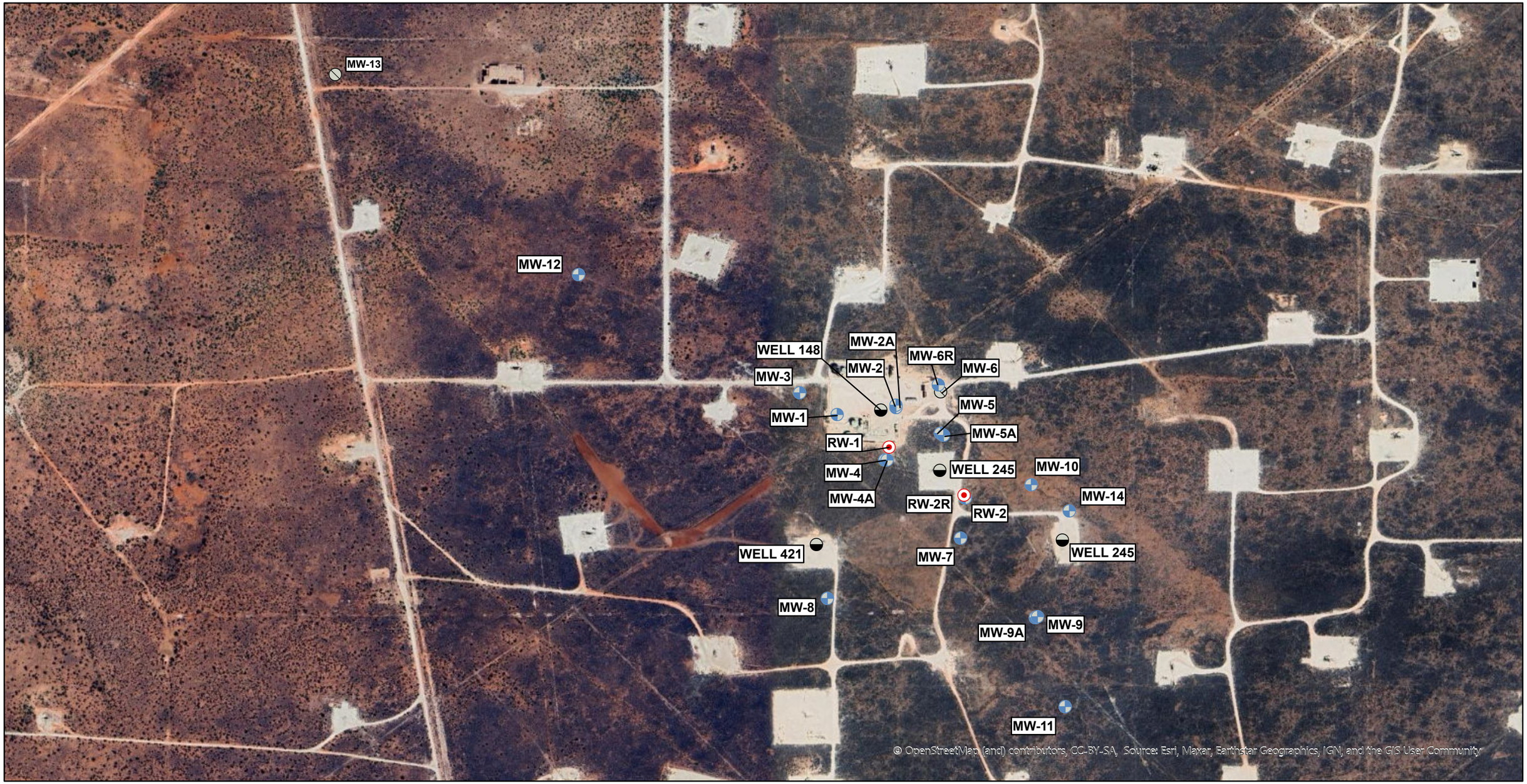


Legend

- Monitoring Well Location
- Recovery Well
- Cooper Jal Oil Well
- Plugged & Abandoned Monitoring Well

Notes:
1. Datum: D_WGS_1984
2. Cooper Jal Oil Wells were not gauged.
3. Site Location: 32.19891, -103.21523
4. MW-12 & MW-13 were installed off-site and upgradient of plume.

N

0 250 500 1,000 Feet

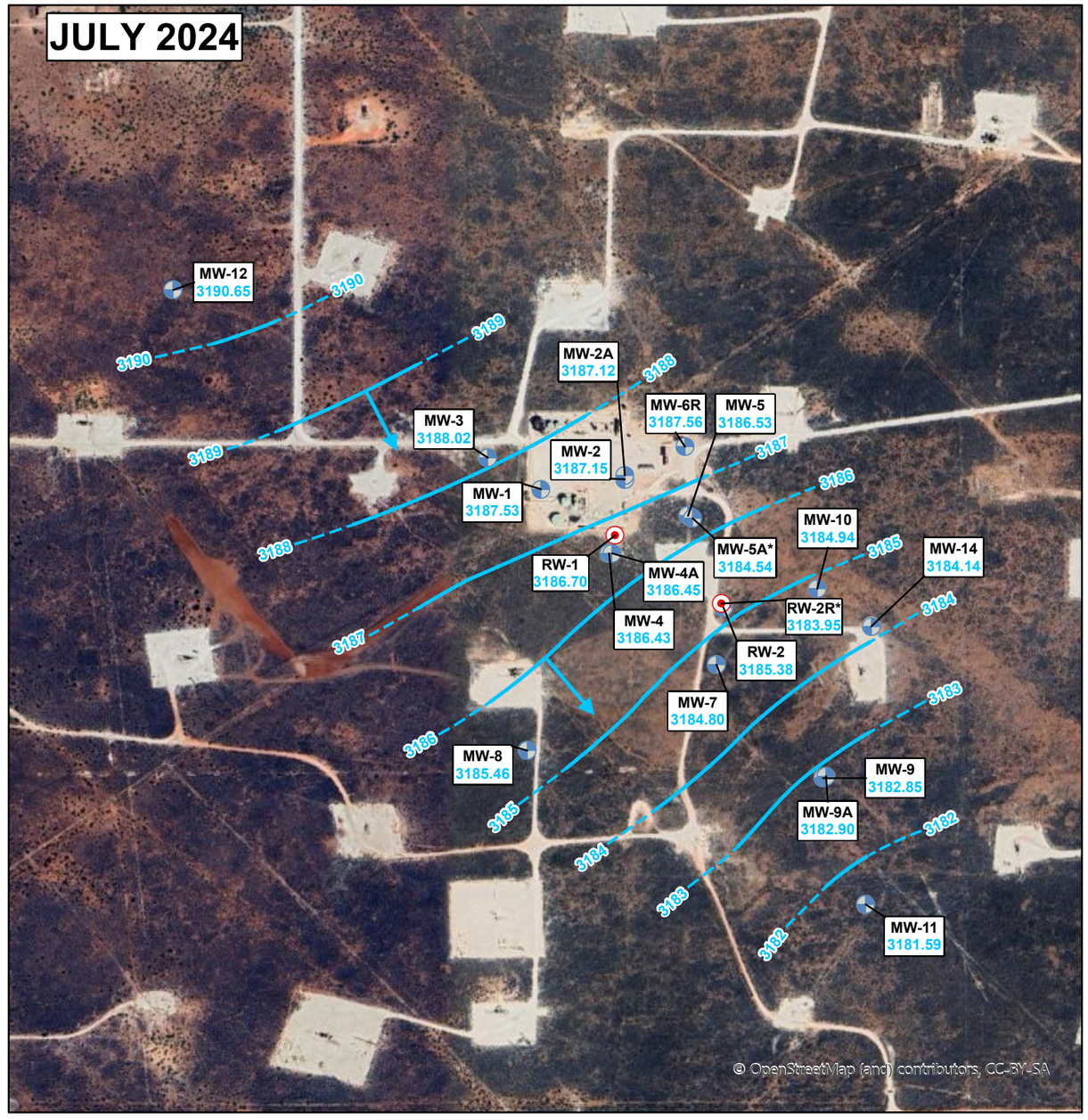
Chevron Environmental Management Company
Cooper-Jal Unit South Injection Site
Lea County, New Mexico

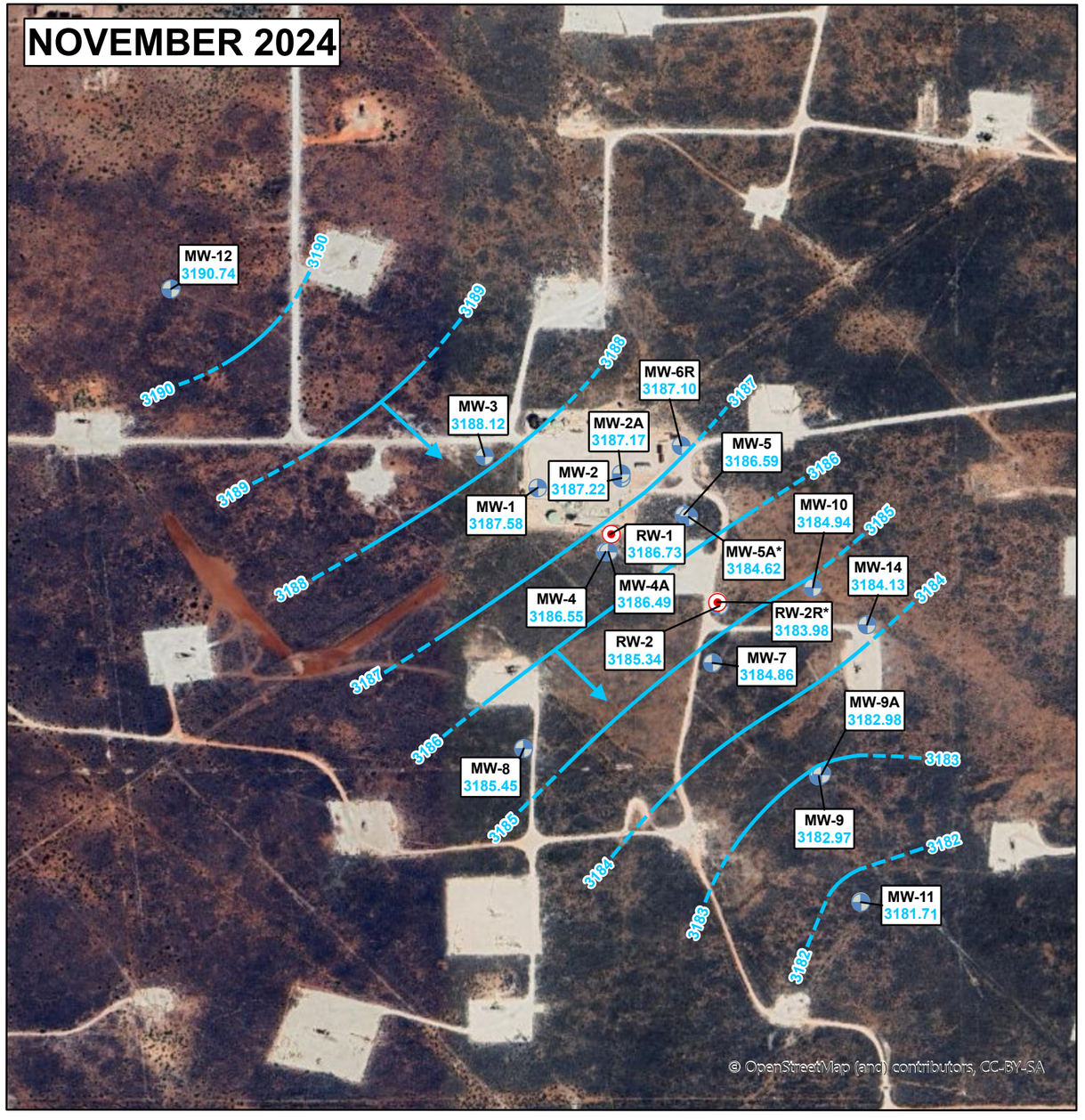
SITE DETAILS MAP

ARCADIS

FIGURE
2

Document Path: T:_ENV\Upstream\Cooper_Jal\PRO\Cooper Jal Annual Report.aprx, User Name: avi00976





Legend

- Monitoring Well Location
- Recovery Well
- Potentiometric Contour and Elevation (Dashed where Inferred)
- 3181.59 — Groundwater Elevation (ft above mean sea level)
- Approximate Groundwater Flow

Notes:
1. Datum: D_WGS_1984
2. Cooper-Jal Oil Wells were not gauged.
3. Site Location: 32.19891, -103.21523
4. MW-12 was installed off-site and upgradient of plume.
5. * - Groundwater elevation not used for contouring

N

0 250 500 1,000 Feet

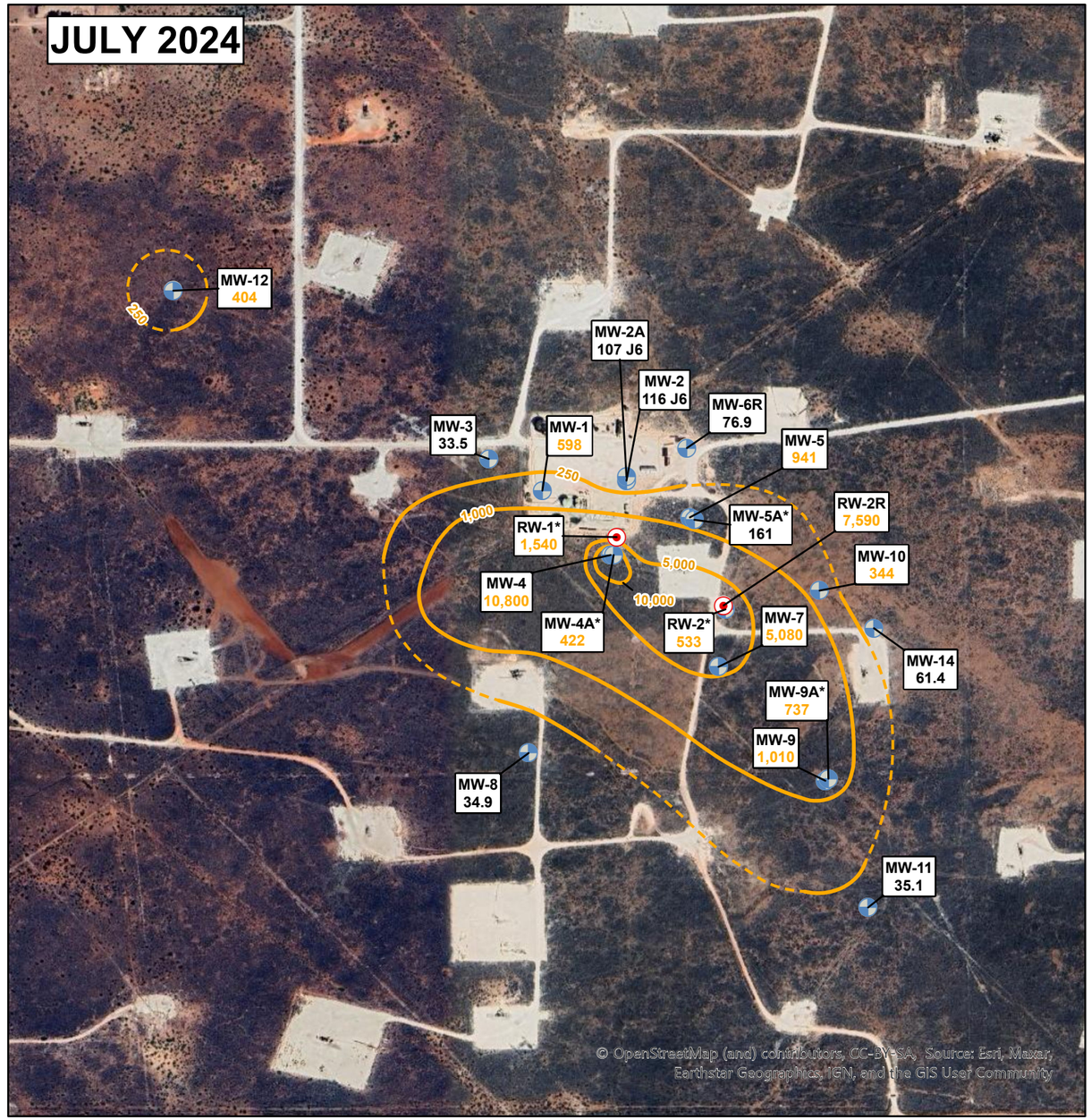
Chevron Environmental Management Company
Cooper-Jal Unit South Injection Site
Lea County, New Mexico

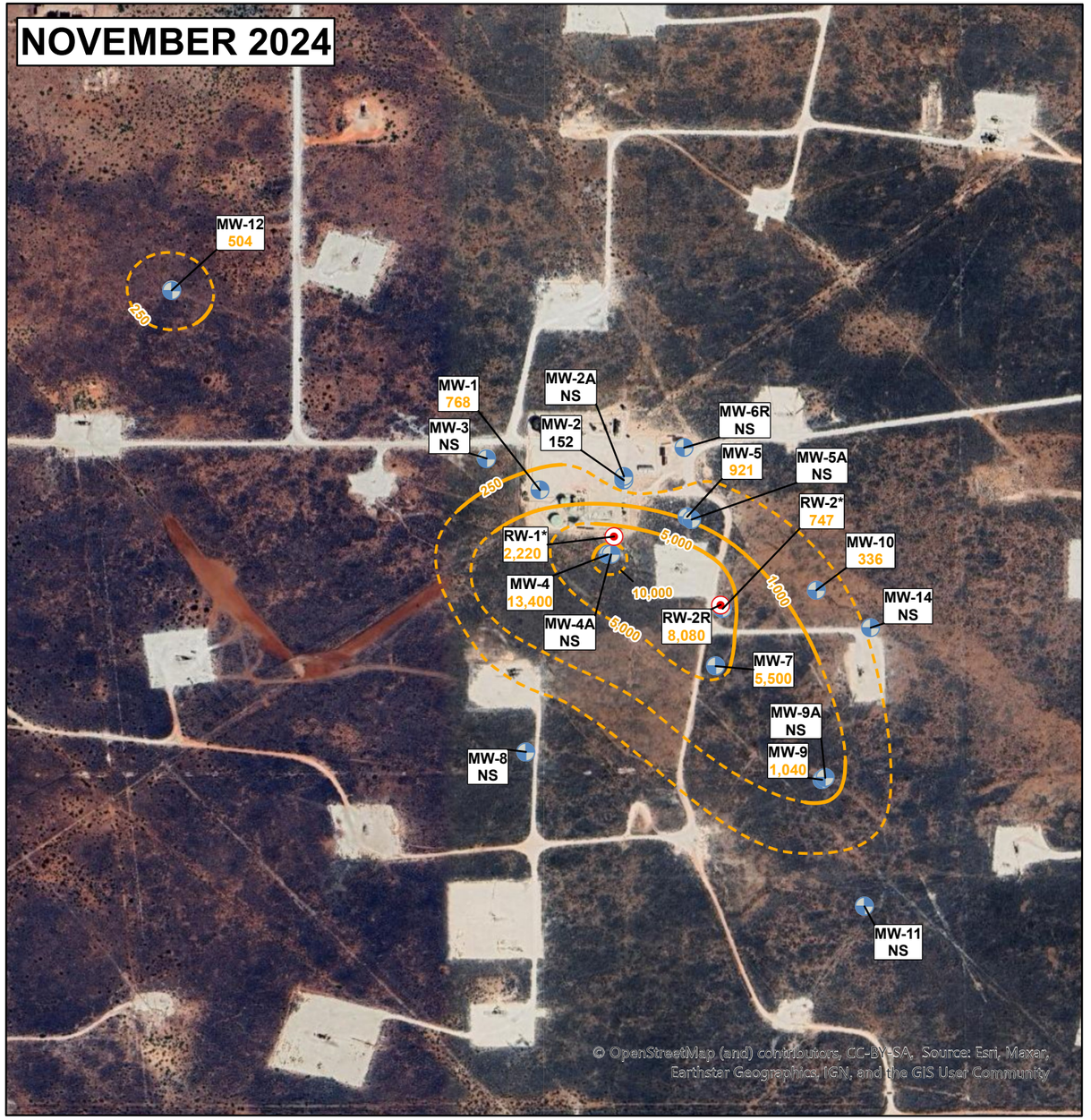
POTENTIOMETRIC SURFACE MAPS 2024

ARCADIS

FIGURE 3

Document Path: T:_ENV\Upstream\Cooper_Jal\PRO\Cooper Jal Annual Report.aprx, User Name: avi00976





Legend

- Monitoring Well Location
- Recovery Well
- 250 — Chloride Isoconcentration Contour (Dashed where Inferred)
- 161 — Chloride Concentration in milligrams per liter (mg/L)
- 422 — Chloride Concentration (mg/L) Exceeds New Mexico Water Quality Control Commission Other Standards for Domestic Water Supply

Notes:
1. Datum: D_WGS_1984
2. Cooper Jal Oil Wells were not gauged.
3. Site Location: 32.19891, -103.21523
4. MW-12 was installed off-site and upgradient of plume.
5. J6- The sample matrix interfered with the ability to make any accurate determination; spike value is low.
6. NMWQCC Groundwater Standard (mg/L)
7. * - Groundwater monitoring wells not used for contouring
8. NS - Not Sampled

N

0 250 500 1,000 Feet

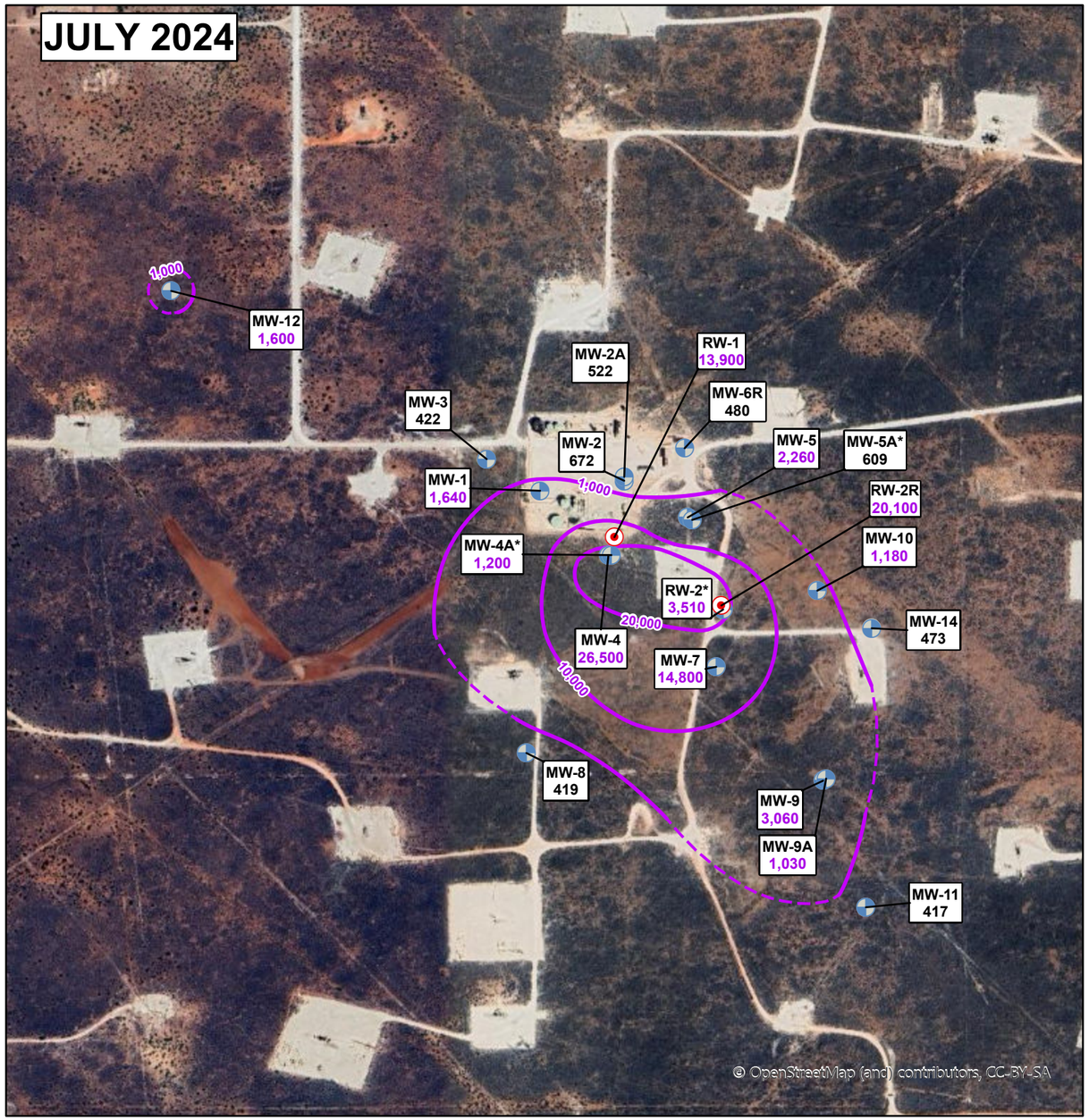
Chevron Environmental Management Company
Cooper-Jal Unit South Injection Site
Lea County, New Mexico

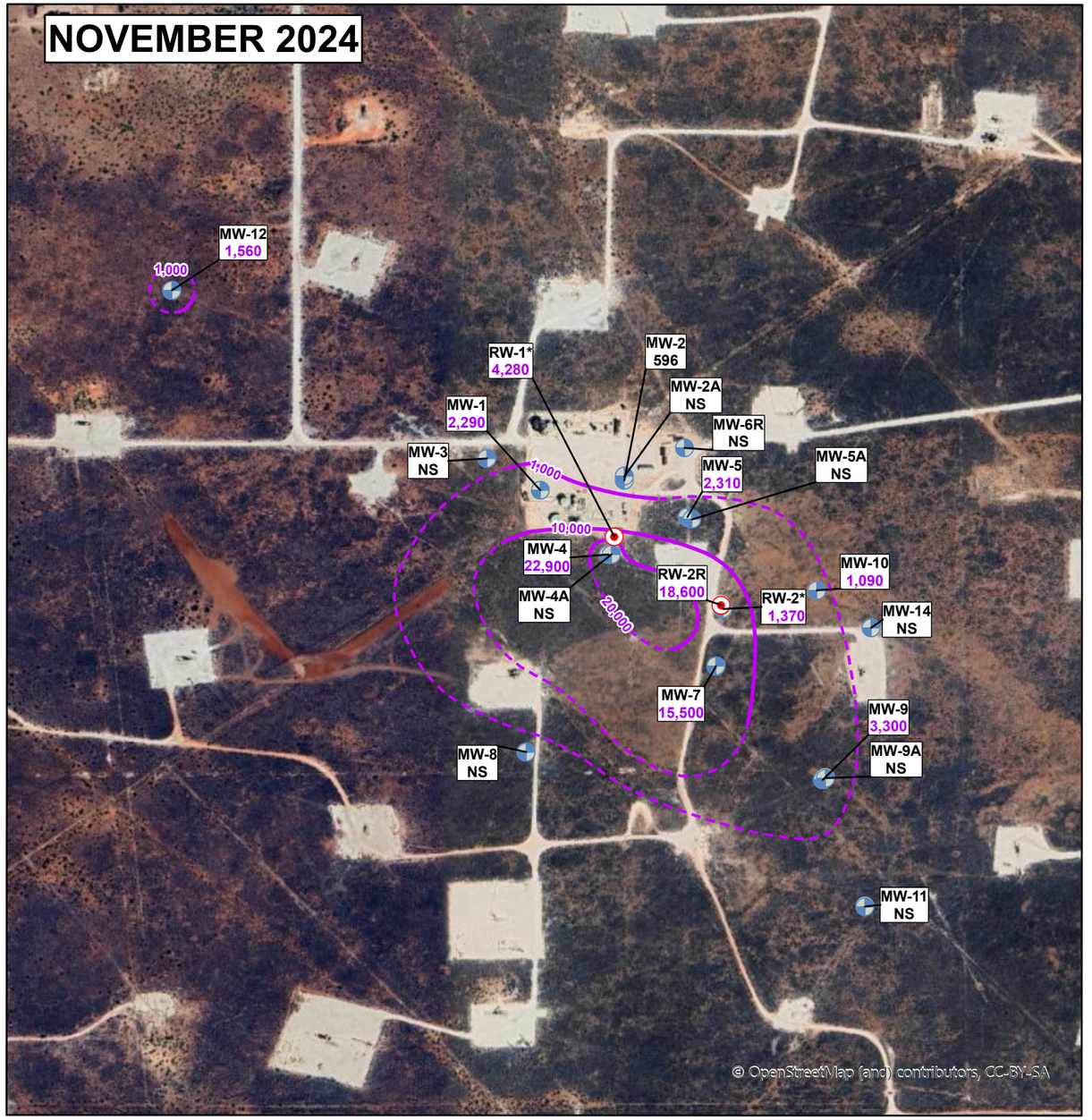
SEMI-ANNUAL CHLORIDE ISOCONCENTRATION MAPS 2024

ARCADIS

FIGURE 4

Document Path: T:_ENV\Upstream\Cooper_Jal\PRO\Cooper Jal Annual Report.aprx, User Name: joym8537





Legend

- Monitoring Well Location
- Recovery Well
- 1,000 — Total Dissolved Solids (TDS) Isoconcentration Contour (Dashed where Inferred)
- 419 — TDS Concentration in milligrams per liter (mg/L)
- 1,200 — TDS Concentration (mg/L) Exceeds New Mexico Water Quality Control Commission Other Standards for Domestic Water Supply

Notes:
1. Datum: D_WGS_1984
2. Cooper Jal Oil Wells were not gauged.
3. Site Location: 32.19891, -103.21523
4. MW-12 was installed off-site and upgrade of plume.
5. NMWQCC Groundwater Standard (mg/L)
6. * - Groundwater monitoring wells not used for contouring
7. NS - Not Sampled

N

0 250 500 1,000 Feet

Chevron Environmental Management Company
Cooper-Jal Unit South Injection Site
Lea County, New Mexico

SEMI-ANNUAL TDS ISOCONCENTRATION MAPS 2024

ARCADIS

FIGURE 5

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JULY 2024

MW-12 NA
MW-3 NA
MW-2 NA
MW-2A NA
MW-6R NA
MW-5 NA
MW-1 NA
RW-1 NA
MW-5A NA
MW-4 NA
MW-10 NA
600
MW-14 NA
MW-4A 91.7
RW-2R 845
RW-2 NA
MW-7 NA
MW-8 NA
MW-9A NA
MW-9 NA
MW-11 NA

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Legend

- Monitoring Well Location
- Recovery Well
- 100 — Sulfate Isoconcentration Contour (dashed where Inferred)
- 91.7 — Sulfate Concentration in milligrams per liter (mg/L)
- 845 — Sulfate Concentration (mg/L) Exceeds NMWQCC Other Standards for Domestic Water Supply

Notes:
1. Datum: D_WGS_1984
2. Cooper Jal Oil Wells were not gauged.
3. Site Location: 32.19891, -103.21523
4. NMWQCC Groundwater Standard (mg/L)
5. NA = Not Analyzed

N

0 200 400 800 Feet

Chevron Environmental Management Company
Cooper-Jal Unit South Injection Site
Lea County, New Mexico

ANNUAL SULFATE ISOCONCENTRATION MAP 2024

ARCADIS

FIGURE 6

Document Path: T:_ENV\Upstream\Cooper_Jal\PRO\Cooper Jal Annual Report.aprx, User Name: joym8537

Appendix A

Site Background

REGULATORY BACKGROUND

Site assessment activities were initiated in 1993 when Environmental Spill Control, Inc. (ESCI) of Hobbs, New Mexico, performed a subsurface assessment of an unlined earthen produced water overflow pit, reportedly located adjacent to the western edge of the Site. During the investigation, five boreholes were advanced to depths ranging from 15 feet below ground surface (ft bgs) to 100 ft bgs. The investigation revealed the presence of hydrocarbon-impacted soil. In 1996, Texaco Exploration and Production, Inc. (Texaco) filed a notice of intent to close the pit with the New Mexico Oil Conservation Division (NMOCD). Approximately 1,248 cubic yards (cy) of hydrocarbon-impacted soil were removed from the pit. During the closure activities, the excavation was lined with imported clay and backfilled with imported caliche. Texaco submitted a pit closure report to the NMOCD in December 1996.

In 1997, the NMOCD requested additional assessment activities to define the vertical extent of affected soil beneath the former pit. Assessment activities performed by Highlander Environmental Corporation revealed elevated chloride concentrations in the soil. In October 1997, monitor well MW-1 was installed near the former pit. Groundwater samples collected from the monitor well contained chloride concentrations above the New Mexico Water Quality Control Commission (NMWQCC) Human Health Standards for Groundwater (250 milligrams per liter [mg/L]). Assessment activities performed through May 1998 included the installation of 13 additional monitor wells. In 1998, electromagnetic (EM 34) terrain conductivity surveys were completed to identify areas of elevated chloride concentrations in soil.

REGULATORY FRAMEWORK

The NMOCD of the New Mexico Energy, Minerals, and Natural Resources Department has regulatory jurisdiction over corrective actions conducted at the Site. Corrective actions follow guidance given by the NMOCD in *Guidelines for Remediation of Leaks, Spills, and Releases (August 13, 1993).* These guidelines require remediation of four constituents of concern (COCs) in groundwater to the human health standards of the NMWQCC set forth in New Mexico Administrative Code 20.6.2.3103B as follows:

Analyte	NMWQCC Standard for Groundwater (mg/L)
Chloride	250
Total Dissolved Solids (TDS)	1,000
Fluoride	1.6
Sulfate (SO4)	600

Note: mg/L = milligrams per liter

The original analyte list included carbonate alkalinity, bicarbonate alkalinity, total alkalinity, nitrate-N, calcium, magnesium, potassium, sodium, chlorides, TDS, fluoride, and sulfate. In a letter to the NMOCD, dated December 15, 2014, GHD, on behalf of CEMC, requested a reduction in the list of analytical parameters and a reduction in the wells included in the monitoring program. In a subsequent email, dated May 19, 2015, the NMOCD approved the reduction of the list of analyses to chlorides, TDS, fluoride, and sulfate only. No wells were eliminated from the monitoring program. Arcadis, on behalf of CEMC, prepared and submitted the Proposal Groundwater Monitoring Reduction Workplan to the NMOCD in July 2020, which would reduce the number of wells that would be sampled during the second semiannual groundwater sampling event to 11 out of 20 wells (MW-1, MW-2, MW-4, MW-5,

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MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, and RW-2R). In an email from the NMOCD dated February 13, 2023, the proposed reduction plan was approved with an additional request to collect annual sulfate analysis from two site wells, one monitoring well, MW-4A, and one site recovery well, RW-2R.

Arcadis prepared the Cooper Jal 2021 Stage 2 & 2 Abatement Plan which was submitted to the NMOCD in July 2022. On February 1, 2023, Arcadis and CEMC met with NMOCD to review the 2021 Stage 1 & 2 abatement plan to discuss the additional information that will need to be included prior to the NMOCD's approval. In an email from the NMOCD dated February 20, 2023, the Cooper Jal 2021 Stage 1& 2 Abatement Plan was officially rejected requiring additional information for approval. Arcadis will update the Cooper Jal Stage 1 and Stage 2 Abatement plan and attempt to schedule a meeting with NMOCD to review the corrected sections to ensure that the required expectations of NMOCD are fully met.

GROUNDWATER SAMPLING AND ANALYSIS

In June 1998, Texaco prepared a groundwater corrective action plan to mitigate chloride concentrations and to provide plume containment by extracting groundwater from the affected groundwater-bearing unit (GWBU). Between 1999 and 2013, assessment activities included the installation of wells MW-6R, MW-11 to MW-14, RW-1, RW-2, and RW-2R. Monitor well MW-6 was plugged and abandoned in September 2013 due to a damaged well casing. Due to on-Site wells (MW-1, MW-2, MW-2A, MW-3, and MW-6) fully delineating the northern boundary of the chloride plume, monitor well MW-13, located approximately 1,000 feet up-gradient and off-Site, was plugged and abandoned on July 11, 2017. Semiannual groundwater monitoring activities and annual reporting to the NMOCD for this Site have been performed by GHD (formerly Conestoga-Rovers & Associates, Inc. [CRA]) since 2005 and continued until 2018. Arcadis has since then taken over the semiannual groundwater monitoring activities and annual reporting to the NMOCD from 2019 to 2023.

Groundwater at the Site is monitored semiannually via a network of 18 monitor wells and 2 recovery wells. Arcadis collected samples from 18 monitoring and recovery wells (MW-1, MW-2, MW-2A, MW-3, MW-4A, MW-5, MW-5A, MW-6R, MW-7, MW-8, MW-9, MW-9A, MW-11, MW-12, MW-14, RW-1, RW-2, and RW-2R) during the June 20, 2019 sampling event, and only collected 3 samples (MW-6R, MW-9, and MW-14) on November 23, 2019. During 2020 Arcadis developed a revised semi-annually sampling plan. On February 13, 2023 the proposed reduction plan was approved with an additional request to collect annual sulfate analysis from two site wells, one monitoring well, MW-4A, and one site recovery well, RW-2R. During each sampling event, all Site wells are gauged to determine depth to water and depth to non-aqueous phase liquid (LNAPL), if present. Additionally, Arcadis collects conductivity readings through the water column at two-foot intervals at each Site well annually in conjunction with the first semi-annual sampling event.

All 20 site monitoring and recovery wells were sampled during the first semiannual event conducted on April 20, 2020. Eleven of the monitoring and recovery wells (MW-1, MW-2, MW-4, MW-5, MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, and RW-2R) were sampled during the second semiannual monitoring event performed on October 12, 2020. All 20 site monitoring and recovery wells were sampled during the first semiannual monitoring event conducted on June 25, 2021. Eleven of the monitoring and recovery wells (MW-1, MW-2, MW-4, MW-5, MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, and RW-2R) were sampled during the second semiannual event performed on December 6, 2021. All 20 site monitoring and recovery wells were sampled during the first semiannual monitoring event conducted on July 20, 2023. Eleven of the monitoring and recovery wells (MW-1, MW-2, MW-4, MW-5, MW-7, MW-9, MW-10, MW-12, RW-1, RW-2, RW-2R) were sampled during the second semiannual monitoring event performed on November 13, 2023 as per the 2023 SAP. All 20 wells were sampled at the Site

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during the July-August 2024 sampling event. Eleven of 20 Site wells were sampled during the second semiannual monitoring event performed on November 13, 2024, as per the 2023 SAP.

Historically, chloride concentrations show decreasing trends in upgradient monitor wells MW-1, MW-2, and MW-5, as shown on concentration versus date graphs in Exhibit 1A, available in the *2018 Annual Groundwater Monitoring Report*. Increasing trends have been observed since 1997 in downgradient monitor wells MW-7, MW-9, MW-9A, and MW-10, as indicated in Exhibit 1B (available in the *2018 Annual Groundwater Monitoring Report*), although more recent data indicate that these concentrations are stabilizing with some variability, with the exception of monitor well MW-7. Similar trends are apparent in TDS and sulfate concentrations. There are no strong trends in the observed historical concentrations of fluoride. Based on current and historical concentration data, the groundwater plume at the Site is fully delineated.

Soil Boring and Monitor Well Installation

The New Mexico Office of the State Engineer (NMOSE) governs water usage in the State of New Mexico. Applications for Permits to Appropriate Groundwater were submitted by Texaco in October 1999 and were approved with specific conditions in June 2008. A total of 65 acre-feet (ac-ft) per annum from the two on-Site recovery wells (RW-1 and RW-2) was granted by the NMOSE for environmental remediation purposes. Usage of groundwater was granted by the NMOSE under well permits CP-884 (RW-2; 32.5 ac-ft per annum) and CP-885 (RW-1; 32.5 ac-ft per annum).

Due to apparent damage at RW-2 that would prevent the installation of a pump, RW-2R was installed under well permit CP-884-POD2 to replace RW-2 in 2013. An application to change the designation of RW-2 from a recovery well to a monitor well was submitted on December 16, 2016. This was done to allow the well to remain in the monitor well network instead of being plugged and abandoned. The change was conditionally approved, pending further assessment of the well integrity, by the NMOSE in a phone conversation on January 9, 2017. On February 10, 2017, GHD further assessed RW-2 and found the annular seal to be compliant with New Mexico Administrative Code (NMAC) 19.27.4.30 Regulations and the well casing and well pad to be in good condition. These findings were documented in a letter sent to the NMOSE on February 16, 2017. Based on GHD's understanding of the January 9, 2017, conversation, RW-2 is now designated as a monitor well.

To date, neither RW-1 nor RW-2R have been equipped for groundwater recovery and the Extension of Time was not requested after April 30th, 2020. A new application to NMOSE will be submitted if these wells are to become equipped in the future.

GEOLOGY/HYDROGEOLOGY ASSESSMENT

Site Setting

The Site is located on Lea County Road J7, approximately five and a half miles northwest of Jal, New Mexico, in Section 24, Township 24 South, Range 36 East, Lea County, New Mexico. The latitude and longitude coordinates of the Site are N 32° 12' 7.13" N and 103° 13' 4.36" W.

Land in the vicinity of the Site is utilized primarily for livestock ranching and oil and gas production, and production and has areas of undeveloped rangeland vegetated with indigenous grass. An injection well facility, operated by Resaca Resources, LLC (Resaca), is located adjacent to the Site. No active Chevron U.S.A. Inc. (Chevron) operations are present in the area.

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Regional Geologic Conditions

The region is characterized by a surface cover of up to 200 feet of unconsolidated to semi-lithified sediments of the Ogallala Formation consisting of sand, clay, and fluvial gravel. The upper portion of the Ogallala Formation has been heavily cemented by caliche. The Tertiary-aged sediments are underlain by the Triassic-aged Dockum Group shale ("red beds").

Site Geology

The Site boring logs used to interpret the Site geology included the October 2013 GHD field work and logs from previous groundwater assessments. The locations of the soil borings and monitor wells are shown on Figure 2. The subsurface stratigraphy typically included the following:

- A thick sand (0 to 163 feet) layer of unconsolidated fine sand containing trace caliche nodules. Sand grains gradually increasing to fine to medium grained at 140 feet,
- A fine sand layer typically ranging from 3 feet to 30 feet,
- A sandy clay layer typically ranging from 2 feet to 11 feet directly above the upper Dockum "redbeds",
- Red and gray weathered shale and mudstone "redbeds" of the Triassic Dockum Group that form the underlying confining layer.

Hydrogeologic Conditions

Regional groundwater flow in the Ogallala Aquifer is controlled by the slope of the land surface to the south with localized eastward flow into the valley of Monument Draw. The aquifer typically behaves as an unconfined aquifer. Monument Draw is an intermittent stream that contains water only after heavy rains (Texas Water Development Board [TWDB], 2008)1. The Dockum Group Shale is considered the underlying aquitard for the Ogallala Aquifer.

Site Hydrogeology

Groundwater beneath the Site is found within the lower Ogallala deposits. The depth to groundwater at the Site ranges from approximately 129.89 to 139.81 ft bgs, based on the groundwater monitoring event conducted in July/November 2023. The saturated thickness of the unconfined aquifer ranges from approximately 15 to 30 ft. The saturated thickness varies in conjunction with the elevation of the top of the Dockum shale. The thickest saturated portion of the Ogallala is to the southwest where the bedrock surface of the Dockum is the lowest. A dry borehole was encountered at BH-C, east of the property boundary of the Site.

At the Site, the local groundwater flow direction trends to the southeast with an average horizontal hydraulic gradient of approximately 0.0026 feet per foot (ft/ft), as presented in the attached figures. The southeast groundwater flow direction observed at the Site is consistent with the regional groundwater flow direction to the southeast in the Ogallala Aquifer. The deflection to the east at the eastern property boundary is likely related to the break of the slope of the land towards the Monument Draw to the east.

Appendix B

Field Methodology and Documentation

Page 28 of 287

Gauging Form
HES Transfer Site Name:Cooper Jal
Lea County, New Mexico

ARCADIS Design & Consultancy for natural and built assets

Monitoring Well ID	Date Gauged	DTW (ft btoc)	Total Depth (ft btoc)	Notes
MW-1	7-30-24	134.41	169.58	
MW-2	7-30-24	134.12	168.98	
MW-2A	7-30-24	134.18	142.19	
MW-3	7-30-24	132.06	172.27	
MW-4	7-30-24	135.15	171.77	
MW-4A	7-30-24	134.97	145.98	
MW-5	7-30-24	136.45	174.16	
MW-5A	7-30-24	136.53	144.22	
MW-6				P+A
MW-6R	7-30-24	139.48	177.55	
MW-7	7-30-24	135.39	163.88	
MW-8	7-30-24	133.60	146.76	
MW-9	7-31-24	131.83	161.71	
MW-9A	7-31-24	131.58	142.41	
MW-10	7-30-24	136.18	160.98	
MW-11	7-31-24	129.97	165.48	
MW-12	7-31-24	139.68	171.34	
MW-14	7-30-24	134.22	174.62	
RW-1	7-30-24	133.61	163.88	
RW-2	7-30-24	135.04	157.46	
RW-2R	7-30-24	136.73	180.36	

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Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	RW-1	**Date**	11/12/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	130 to 174	**Casing Diameter (in.)**	5	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	133.58	**Total Depth (ft-bmp)**	163.9	**Water Column (ft)**	30.32	**Gallons in Well**	30.79
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	14:25	**Well Volumes Purged**	N/A	**Sample ID**	RW-1-W-20241112	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	DUP-1-W-20241112	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	RW-1-W-20241112	Sample Time:	14:25	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	MW-12	**Date**	11/12/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	157 to 172	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	139.59	**Total Depth (ft-bmp)**	171.35	**Water Column (ft)**	31.76	**Gallons in Well**	5.16
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	12:30	**Well Volumes Purged**	N/A	**Sample ID**	MW-12-W-20241112	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW-12-W-20241112	Sample Time:	12:30	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

Project Number	30230083	**Well ID**	MW-1	**Date**	11/12/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	153 to 173	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	134.36	**Total Depth (ft-bmp)**	169.59	**Water Column (ft)**	35.23	**Gallons in Well**	5.72
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	12:50	**Well Volumes Purged**	N/A	**Sample ID**	MW-1-W-20241112	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW-1-W-20241112	Sample Time:	12:50	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute

mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride

mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	MW-2	**Date**	11/12/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	163 to 173	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	134.05	**Total Depth (ft-bmp)**	168.97	**Water Column (ft)**	34.92	**Gallons in Well**	5.67
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	13:15	**Well Volumes Purged**	N/A	**Sample ID**	MW-2-W-20241112	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW-2-W-20241112	Sample Time:	13:15	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

Project Number	30230083	**Well ID**	MW-5	**Date**	11/12/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	161 to 171	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	136.39	**Total Depth (ft-bmp)**	174.17	**Water Column (ft)**	37.78	**Gallons in Well**	6.14
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	13:45	**Well Volumes Purged**	N/A	**Sample ID**	MW-5-W-20241112	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW-5-W-20241112	Sample Time:	13:45	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	MW-4	**Date**	11/12/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	161 to 171	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	135.03	**Total Depth (ft-bmp)**	171.79	**Water Column (ft)**	36.76	**Gallons in Well**	5.97
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	14:00	**Well Volumes Purged**	N/A	**Sample ID**	MW-4-W-20241112	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW-4-W-20241112	Sample Time:	14:00	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	RW-2	**Date**	11/13/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	134 to 173	**Casing Diameter (in.)**	5	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	135.08	**Total Depth (ft-bmp)**	157.48	**Water Column (ft)**	22.4	**Gallons in Well**	22.75
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	10:00	**Well Volumes Purged**	N/A	**Sample ID**	RW-2-W-20241113	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	RW-2-W-20241113	Sample Time:	10:00	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	RW-2R	**Date**	11/13/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	133 to 173	**Casing Diameter (in.)**	6	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	136.7	**Total Depth (ft-bmp)**	180.37	**Water Column (ft)**	43.67	**Gallons in Well**	63.86
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	09:35	**Well Volumes Purged**	N/A	**Sample ID**	RW-2R-W-20241113	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	RW-2R-W-20241113	Sample Time:	09:35	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	MW-10	**Date**	11/13/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	151 to 166	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	136.18	**Total Depth (ft-bmp)**	160.98	**Water Column (ft)**	24.8	**Gallons in Well**	4.03
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	10:30	**Well Volumes Purged**	N/A	**Sample ID**	MW-10-W-20241113	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW-10-W-20241113	Sample Time:	10:30	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

Project Number	30230083	**Well ID**	MW-7	**Date**	11/13/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	151 to 166	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	135.33	**Total Depth (ft-bmp)**	163.92	**Water Column (ft)**	28.59	**Gallons in Well**	4.65
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	11:00	**Well Volumes Purged**	N/A	**Sample ID**	MW-7-W-20241113	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW-7-W-20241113	Sample Time:	11:00	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Chevron Groundwater Sampling Form

ARCADIS

Project Number	30230083	**Well ID**	MW-9	**Date**	11/13/2024		
Site Location	Lea County, New Mexico	**Site ID**	UEM4822	**Weather (°F)**	Clear	**Sampled by**	Daniel McGee
Measuring Point Description	Top of Casing	**Screen Depth Interval (ft-bmp)**	149 to 164	**Casing Diameter (in.)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	131.71	**Total Depth (ft-bmp)**	161.74	**Water Column (ft)**	30.03	**Gallons in Well**	4.88
Water Quality Meter Make/Model		**Purge Method**	No-Purge	**Collection Type**			Grab
Sample Time	11:30	**Well Volumes Purged**	N/A	**Sample ID**	MW9-W-20241113	**Purge Equipment**	Hydrasleeve
Purge Start	--	**Gallons Purged**		**Duplicate ID**	--	**Sample Equipment**	HydraSleeve
Purge End	--	**Total Purge Time (h:m)**	--				

Time	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
								Color	Odor
	--			--	--		--	--	--

Comments: None

Well Casing Volume Conversion

Well diameter (in.) = gallons per foot
1 = 0.04 1.5 = 0.09 2.5 = 0.26 3.5 = 0.50 6 = 1.47
1.25 = 0.06 2 = 0.16 3 = 0.37 4 = 0.65

Sample Information

Sample ID:	MW9-W-20241113	Sample Time:	11:30	Sample Depth (ft-bmp) (e.g. pump intake):	0
Analytes and Methods:	See Chain-of-Custody.			Depth to Water at Time of Sampling	0

ft-bmp = feet below measuring point
in. = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
PVC = Polyvinyl Chloride
mV = millivolts
°F = degrees Fahrenheit
°C = degrees Celsius
-- = Not Recorded

Appendix C

Cumulative Summary of Groundwater Analytical Results

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-1	09/16/97	--	--	280.00	**8,500.00**	--	--	**1,100.00**	520.00	630.00	50.00	4,300.00	**15,000.00**
	02/25/98	--	--	280.00	**5,600.00**	--	--	570.00	285.00	520.00	116.00	2,900.00	**9,300.00**
	02/14/01	<1.00	306.00	306.00	**11,000.00**	**4.40**	7.70	**1,000.00**	374.00	780.00	236.00	5,236.00	**20,000.00**
	05/17/02	<1.00	208.00	208.00	237.00	**5.83**	3.28	86.90	45.70	20.10	11.90	184.00	784.00
	10/23/02	--	--	--	168.00	--	--	96.80	--	--	--	--	696.00
	05/21/03	<1.00	290.00	290.00	**6,600.00**	<8.00	**10.90**	**875.00**	238.00	475.00	96.50	3,410.00	**13,200.00**
	11/25/03	<1.00	250.00	250.00	**402.00**	**7.03**	2.72	125.00	19.20	22.00	18.50	294.00	**1,158.00**
	05/12/04	<1.00	264.00	264.00	**504.00**	**7.31**	2.70	136.00	17.20	23.10	22.40	355.00	**1,328.00**
	11/16/04	<1.00	232.00	232.00	**384.00**	**4.94**	3.30	103.00	29.20	22.70	25.40	373.00	952.00
	11/16/05	<10.00	262.00	262.00	**1,210.00**	**3.00**	2.40	215 D1	85.40	92.60	23.00	847.00	**2,640.00**
	11/14/06	<10.00	200.00	200.00	96.00	**4.20**	2.00	76.00	13.20	6.49	15.60	172.00	624.00
	11/16/07	<10.00	255.00	255.00	**4,250.00**	**3.70**	3.90 D1	602 D1	154.00	187.00	54.00	2,100 D1	**10,900.00**
	11/04/08	<5.00	190.00	190.00	110.00	**6.30**	1.60	83.00	10.00	5.80	7.90	180.00	590.00
	11/03/09	<10.00	270.00	270.00	**4,100.00**	**4.10**	2.80	**640.00**	190.00	250.00	61.00	2,300.00	**8,000.00**
	11/10/10	<10.00	223.00	223.00	**2,670.00**	**1.92**	2.62	373.00	138.00	196.00	21.50	1,480.00	**5,020.00**
	11/10/11	<5.00	209.00	209.00	**3,220.00**	1.02	2.37	275.00	169.00	176.00	22.50	1,340.00	**5,250.00**
Dup	11/10/11	<5.00	213.00	213.00	**2,930.00**	1.05	2.35	240.00	183.00	197.00	22.60	1,480.00	**4,640.00**
	10/11/12	<5.00	190.00	190.00	**2,190.00**	**6.74**	4.52	301.00	132.00	145.00	17.90	1,140.00	**1,880.00**
	10/08/13	<6.00	211.00	211.00	**1,890.00**	1.46	2.39	247.00	131.00	114.00	15.30	914.00	**2,380.00**
	10/07/14	<4.00	205.00	205.00	**1,700.00**	0.46	2.37	277.00	118.00	126.00	14.90	860.00	**3,690.00**
	10/21/15	--	--	--	182.00	<4.00	--	78.10	--	--	--	--	559.00
	10/18/16	--	--	--	**1,320.00**	0.83	--	221.00	--	--	--	--	**2,700.00**
	10/24/17	--	--	--	148.00	**2.57**	--	79.40	--	--	--	--	594.00
	10/18/18	--	--	--	**1,290.00**	0.79	--	215.00	--	--	--	--	**2,360.00**
	06/20/19	--	--	--	**1,110.00**	--	--	--	--	--	--	--	**2,510.00**
	11/24/19				**1,110.00**			222.00					**2,190.00**
	4/20/20	--	--	--	**317.00**	--	--	--	--	--	--	--	826.00
	10/12/20	--	--	--	**285.00**	--	--	--	--	--	--	--	799.00
	06/25/21	--	--	--	**938.00**	--	--	--	--	--	--	--	**2,030.00**
	12/06/21	--	--	--	**656.00**	--	--	--	--	--	--	--	**1,800.00**
	08/23/22	--	--	--	**805**	--	--	--	--	--	--	--	**1,540**
	12/21/22	--	--	--	**960**	--	--	--	--	--	--	--	**1,240**
	07/20/23	--	--	--	**736**	--	--	--	--	--	--	--	**1,720**
	11/13/23	--	--	--	**857**	--	--	--	--	--	--	--	**1,840**
	08/01/24	--	--	--	**598**	--	--	--	--	--	--	--	**1,640**
	11/12/24	--	--	--	**768**	--	--	--	--	--	--	--	**2,290**
MW-2	02/25/98	--	--	210.00	**5,900.00**	--	--	**760.00**	840.00	380.00	30.00	2,650.00	**9,400.00**
	04/09/98	--	--	290.00	**8,200.00**	--	--	**990.00**	1,100.00	490.00	29.00	3,430.00	**15,000.00**
	02/14/01	<1.00	184.00	184.00	**7,400.00**	**2.30**	4.10	**870.00**	1,025.00	488.00	48.50	3,189.00	**15,000.00**
	05/17/02	<1.00	160.00	160.00	**3,200.00**	**1.72**	3.18	483.00	587.00	239.00	35.60	1,160.00	**6,040.00**
	10/23/02	--	--	--	**2,920.00**	--	--	451.00	--	--	--	--	**6,770.00**
	05/22/03	<1.00	158.00	158.00	**2,550.00**	**2.04**	3.87	386.00	448.00	176.00	20.00	1,020.00	**5,880.00**
	11/25/03	<1.00	160.00	160.00	**3,330.00**	<4.00	5.63	446.00	555.00	227.00	32.00	1,120.00	**6,760.00**
	05/12/04	<1.00	146.00	146.00	**1,750.00**	<2.00	2.78	246.00	308.00	112.00	29.70	549.00	**3,965.00**
	11/16/04	<1.00	120.00	120.00	**430.00**	<1.00	2.13	56.90	104.00	29.40	22.40	158.00	832.00
	11/16/05	<10.00	171.00	171.00	**4,720.00**	0.72	2.60	645 D1	594.00	209.00	20.80	3,290.00	**10,000.00**
	11/14/06	<10.00	160.00	160.00	**3,500.00**	0.78 N	2.10	470.00	535.00	212.00	21.00	15,400.00	**8,260.00**
	11/14/07	<10.00	178.00	178.00	**3,280.00**	0.76	1.93	462 D1	449.00	152.00	16.20	1310 D1	**9,110.00**
	11/04/08	<5.00	150.00	150.00	**2,900.00**	<1.0	1.10	430.00	380.00	160.00	26.00	1,200.00	**5,600.00**
	11/16/09	<10.00	150.00	150.00	**2,000.00**	1.10	1.60	340.00	290.00	120.00	20.00	750.00	**4,300.00**
	11/12/10	<10.00	186.00	186.00	**1,890.00**	0.73	1.86	327.00	326.00	120.00	9.80	795.00	**3,680.00**
	11/10/11	<5.00	175.00	175.00	**1,480.00**	0.81	1.31	150.00	227.00	83.20	9.75	668.00	**2,860.00**
	10/11/12	<5.00	149.00	149.00	**524.00**	0.55	1.92	231.00	119.00	31.70	8.78	286.00	**1,090.00**
	10/08/13	<6.00	269.00	269.00	**1,180.00**	1.20	<0.10	169.00	178.00	64.70	8.16	505.00	**2,520.00**
	10/07/14	<4.00	196.00	196.00	**695.00**	0.52	<0.023	147.00	143.00	47.50	7.30	343.00	**1,310.00**
	10/21/15	--	--	--	27.10	<2.00	--	58.60	--	--	--	--	388.00
	10/18/16	--	--	--	26.70	<0.50	--	34.40	--	--	--	--	352.00
	10/25/17	--	--	--	35.80	1.00	--	36.30	--	--	--	--	331.00
	10/18/18	--	--	--	65.90	0.66	--	48.50	--	--	--	--	384.00
	06/20/19	--	--	--	**283.00**	--	--	--	--	--	--	--	960.00
	11/23/19				27.70			42.00					274.00
	04/20/20	--	--	--	**263.00**	--	--	--	--	--	--	--	624.00
	10/12/20	--	--	--	221.00	--	--	--	--	--	--	--	675.00
	06/25/21	--	--	--	205.00	--	--	--	--	--	--	--	685.00
	12/06/21	--	--	--	183.00	--	--	--	--	--	--	--	675.00
	08/23/22	--	--	--	**1,190**	--	--	--	--	--	--	--	**2,250**
	12/21/22	--	--	--	239	--	--	--	--	--	--	--	494
	07/20/23	--	--	--	137	--	--	--	--	--	--	--	437
	11/13/23	--	--	--	194	--	--	--	--	--	--	--	546
	08/01/24	--	--	--	116 J6	--	--	--	--	--	--	--	672
	11/12/24	--	--	--	152	--	--	--	--	--	--	--	596

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-2A	02/26/98	--	--	190.00	**280.00**	--	--	330.00	144.00	36.00	5.70	215.00	**1,200.00**
	02/14/01	<1.00	162.00	162.00	44.00	1.30	2.30	76.00	64.40	16.70	7.02	45.50	390.00
	05/15/02	<1.00	176.00	176.00	36.60	<1.00	2.34	79.10	57.60	13.90	4.35	43.80	435.00
	10/23/02	--	--	--	44.30	--	--	97.00	--	--	--	--	425.00
	05/22/03	<1.00	168.00	168.00	40.50	<1.00	2.18	75.50	67.20	14.30	3.76	47.90	418.00
	11/25/03	<1.00	166.00	166.00	43.10	1.00	2.23	77.40	51.70	14.40	3.98	43.80	452.00
	05/12/04	<1.00	176.00	176.00	44.80	<1.00	2.24	76.50	62.90	15.00	3.66	43.60	440.00
	11/16/04	<1.00	164.00	164.00	52.50	1.22	2.78	75.40	68.80	15.30	3.98	49.10	428.00
	11/16/05	<10.00	151.00	151.00	56.80	0.60	2.30	75.1 D1	157.00	18.00	4.20	49.80	630 N
	11/14/06	<10.00	180.00	180.00	49.00	0.55	1.60	76.00	69.80	15.60	3.47	49.90	488.00
	11/14/07	<10.00	170.00	170.00	74.60	0.58	1.51	66.8 D1	666.00	15.30	<5.00	45.40	504.00
	11/04/08	<5.00	220.00	220.00	68.00	0.49	1.40	74.00	67.00	15.00	3.20	42.00	470.00
	11/03/09	<10.00	230.00	230.00	62.00	0.59	1.60	81.00	66.00	15.00	3.40	50.00	480.00
	11/11/10	<10.00	158.00	158.00	86.10	0.45	1.73	74.00	53.90	14.90	2.86	42.80	474.00
	11/10/11	<5.00	175.00	175.00	129.00	0.28	1.25	101.00	92.50	23.30	4.17	64.70	614.00
	10/11/12	<5.00	173.00	173.00	76.50	0.46	1.60	79.40	69.20	15.70	3.62	45.30	500.00
	10/08/13	<6.00	248.00	248.00	78.60	0.41	0.62	75.40	92.60	18.70	4.06	51.20	496.00
	10/07/14	<4.00	188.00	188.00	72.50	0.20	1.55	79.40	77.10	17.20	3.00	44.30	496.00
	10/21/15	--	--	--	76.70	<4.00	--	77.50	--	--	--	--	441.00
	10/18/16	--	--	--	84.60	<0.50	--	83.40	--	--	--	--	455.00
	10/25/17	--	--	--	83.10	1.23	--	77.30	--	--	--	--	512.00
	10/18/18	--	--	--	103.00	0.67	--	88.30	--	--	--	--	491.00
	06/20/19	--	--	--	86.50	--	--	--	--	--	--	--	554.00
	11/23/19				88.00			76.50					414.00
	04/20/20	--	--	--	126.00	--	--	--	--	--	--	--	526.00
	06/25/21	--	--	--	96.30	--	--	--	--	--	--	--	510.00
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--
	08/23/22	--	--	--	124.00	--	--	--	--	--	--	--	560.00
	12/21/22	--	--	--	--	--	--	--	--	--	--	--	--
	07/20/23	--	--	--	102	--	--	--	--	--	--	--	551
	11/13/23	--	--	--	--	--	--	--	--	--	--	--	--
	08/01/24	--	--	--	107 J6	--	--	--	--	--	--	--	522
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/27/98	--	--	190.00	**452.00**	--	--	406.00	200.00	50.00	11.00	237.00	**1,500.00**
	02/14/01	<1.00	158.00	158.00	34.00	**1.60**	2.40	100.00	54.50	19.00	7.61	48.60	440.00
	05/17/02	<1.00	158.00	158.00	30.60	1.56	2.35	102.00	55.60	18.40	5.04	50.00	433.00
	10/23/02	--	--	--	35.40	--	--	104.00	--	--	--	--	419.00
	05/22/03	<1.00	156.00	156.00	30.60	1.17	2.25	96.30	53.20	17.80	5.39	54.60	435.00
	11/25/03	<1.00	160.00	160.00	31.40	1.35	2.30	103.00	46.50	18.00	5.19	51.70	440.00
	05/12/04	<1.00	164.00	164.00	32.30	1.20	2.38	101.00	52.20	16.80	4.77	47.50	448.00
	11/16/04	<1.00	166.00	166.00	35.10	1.53	2.77	95.40	56.30	23.60	12.70	58.90	424.00
	11/17/05	<10.0	171.00	171.00	96.30	0.97	2.20	108 D1	89.20	22.10	8.87	93.40	840.00
	11/15/06	<10.00	170.00	170.00	30.00	0.92 N	1.70	96.00	51.30	17.30	4.30	57.20	505.00
	11/16/07	<10.00	170.00	170.00	39.70	0.93	1.58	88.2 D1	50.80	16.30	<5.00	50.60	570.00
	11/06/08	<5.00	150.00	150.00	36.00	1.10	1.40	97.00	50.00	17.00	4.00	48.00	430.00
	11/03/09	<10.00	160.00	160.00	35.00	1.10	1.60	110.00	49.00	17.00	4.20	56.00	410.00
	11/10/10	<10.00	164.00	164.00	35.40	0.84	1.77	99.90	48.80	15.20	3.42	45.10	380.00
	11/10/11	<5.00	165.00	165.00	36.40	0.83	1.35	87.90	57.90	18.00	3.79	53.00	404.00
	10/11/12	<5.00	162.00	162.00	36.60	1.01	1.74	100.00	51.20	16.90	4.11	51.00	438.00
	10/08/13	<6.00	194.00	194.00	38.40	1.02	1.17	98.70	56.50	18.30	4.08	54.90	450.00
	10/07/14	<4.00	187.00	187.00	19.50	0.37	1.39	62.80	44.30	9.82	22.40	38.80	332.00
	10/21/15	--	--	--	25.60	<2.00	--	74.80	--	--	--	--	307.00
	10/18/16	--	--	--	37.10	0.66	--	109.00	--	--	--	--	464.00
	10/24/17	--	--	--	35.90	1.50	--	98.70	--	--	--	--	442.00
	10/18/18	--	--	--	209.00	**5.35**	--	567.00	--	--	--	--	415.00
	06/20/19	--	--	--	40.00	--	--	--	--	--	--	--	448.00
	11/23/19				60.00			96.60					352.00
	04/20/20	--	--	--	68.5 F2 F1	--	--	--	--	--	--	--	435.00
Dup	04/20/20	--	--	--	69.60	--	--	--	--	--	--	--	502.00
	06/25/21	--	--	--	42.20	--	--	--	--	--	--	--	424.00
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--
	08/24/22	--	--	--	43.10	--	--	--	--	--	--	--	417.00
	12/21/22	--	--	--	--	--	--	--	--	--	--	--	--
	07/21/23	--	--	--	41.7	--	--	--	--	--	--	--	430 B
	11/13/23	--	--	--	--	--	--	--	--	--	--	--	--
	08/02/24	--	--	--	33.5	--	--	--	--	--	--	--	422
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	02/27/98	--	--	230.00	**12,000.00**	--	--	**1,300.00**	1,700.00	880.00	48.00	5,300.00	**22,000.00**
	04/09/98	--	--	240.00	**13,000.00**	--	--	**1,500.00**	1,740.00	840.00	42.00	5,400.00	**23,000.00**
	02/14/01	<1.00	232.00	232.00	**15,000.00**	**1.80**	6.80	**1,500.00**	--	--	--	--	**29,000.00**
	05/17/02	<1.00	232.00	232.00	**11,300.00**	**2.01**	6.09	**1,380.00**	1,610.00	814.00	60.90	4,310.00	**22,600.00**

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					*250*	*1.60*	*10*	*600.00*					*1,000*
MW-4	10/23/02	--	--	--	**11,300.00**	--	--	**1,320.00**	--	--	--	--	**23,200.00**
(Continued)	05/22/03	<1.00	220.00	220.00	**11,300.00**	<10.00	**12.30**	**1,370.00**	1,450.00	659.00	47.30	4,140.00	**62,500.00**
	11/26/03	<1.00	218.00	218.00	**12,100.00**	<8.00	**12.30**	**1,400.00**	1,830.00	889.00	62.00	4,620.00	**54,450.00**
	05/11/04	<1.00	214.00	214.00	**14,200.00**	<8.00	8.97	**1,560.00**	1,800.00	829.00	60.70	4,850.00	**65,450.00**
	11/17/04	<1.00	222.00	222.00	**13,600.00**	<20.00	**31.50**	**1,410.00**	2,020.00	972.00	73.60	5,900.00	**25,200.00**
	11/17/05	<10.00	181.00	181.00	**9,440.00**	0.82	0.20	45.8 D1	849.00	387.00	28.10	3,880.00	**24,300.00**
	11/15/06	<10.00	260.00	260.00	**14,000.00**	<5.00 C	5.20	**1,400.00**	1,760.00	897.00	58.80	6,150.00	**28,700.00**
	11/14/07	<10.00	255.00	255.00	**14,800.00**	0.54	7.15 D1	1,410 D1	1,170.00	382.00	48.00	4,760 D1	**36,300.00**
	11/12/08	<5.00	200.00	200.00	**12,000.00**	1.20	0.33	**1,300.00**	1,500.00	840.00	82.00	4,800.00	**22,000.00**
	11/04/09	<5.00	250.00	250.00	**15,000.00**	1.10	5.30	**1,600.00**	1,500.00	1,000.00	65.00	5,800.00	**30,000.00**
	11/11/10	<5.00	294.00	294.00	**15,500.00**	<1.00	**10.20**	**1,270.00**	1,380.00	904.00	40.40	5,450.00	**25,500.00**
	11/10/11	<5.00	277.00	277.00	**16,900.00**	0.11	6.16	**1,060.00**	1,680.00	1,110.00	40.00	6,490.00	**28,900.00**
	10/11/12	<5.00	256.00	256.00	**5,850.00**	**2.10**	4.58	**629.00**	434.00	334.00	21.20	2,620.00	**12,000.00**
	10/08/13	<6.00	294.00	294.00	**16,200.00**	0.72	6.79	**1,460.00**	1,690.00	1,180.00	40.80	7,370.00	**36,300.00**
	10/07/14	<4.00	291.00	291.00	**15,000.00**	<100.00	7.15	**1,740.00**	1,350.00	1,060.00	44.10	4,250.00	**32,400.00**
	10/20/15	--	--	--	**3,200.00**	<40.00	--	402.00	--	--	--	--	**7,070.00**
	10/18/16	--	--	--	**17,900.00**	<1.00	--	**1,890.00**	--	--	--	--	**35,300.00**
	10/25/17	--	--	--	**6,830.00**	<5.00	--	**754.00**	--	--	--	--	**12,300.00**
	10/18/18	--	--	--	**14,800.00**	<0.10	--	**1,510.00**	--	--	--	--	**24,700.00**
	06/20/19				**2,760.00**			NS					**7,830.00**
	11/24/19				**3,050.00**			420.00					**5,960.00**
	04/20/20	--	--	--	**14,600.00**	--	--	--	--	--	--	--	**28,900.00**
	10/12/20	--	--	--	**14,200.00**	--	--	--	--	--	--	--	**25,600.00**
	06/25/21	--	--	--	**13,600.00**	--	--	--	--	--	--	--	**28,400.00**
	12/06/21	--	--	--	**8,700.00**	--	--	--	--	--	--	--	**24,000.00**
	08/23/22	--	--	--	73.6	--	--	--	--	--	--	--	465.00
	12/21/22	--	--	--	**13,600**	--	--	--	--	--	--	--	**16,400**
	07/21/23	--	--	--	**13,300**	--	--	--	--	--	--	--	**19,800**
	11/13/23	--	--	--	**13,700**	--	--	--	--	--	--	--	**23,800**
	08/01/24	--	--	--	**10,800**	--	--	--	--	--	--	--	**26,500**
	11/12/24	--	--	--	**13,400**	--	--	--	--	--	--	--	**22,900**
MW-4A	02/27/98	--	--	180.00	**1,600.00**	--	--	410.00	470.00	130.00	11.00	620.00	**3,300.00**
	02/14/01	<1.00	154.00	154.00	**1,600.00**	1.40	2.80	210.00	--	--	--	--	**4,000.00**
	05/15/02	<1.00	156.00	156.00	**577.00**	<1.00	2.23	121.00	200.00	49.50	10.30	125.00	**1,610.00**
	10/23/02	--	--	--	**478.00**	--	--	114.00	--	--	--	--	**1,430.00**
	05/22/03	<1.00	154.00	154.00	**844.00**	<1.00	2.43	160.00	279.00	58.90	10.10	248.00	**2,200.00**
	11/26/03	<1.00	158.00	158.00	**1,060.00**	<4.00	5.82	182.00	337.00	79.30	15.20	329.00	**2,585.00**
	05/11/04	<1.00	156.00	156.00	**984.00**	<2.00	3.30	179.00	297.00	66.50	11.50	279.00	**2,300.00**
	11/17/04	<1.00	164.00	164.00	**1,110.00**	<2.00	4.62	186.00	369.00	75.40	14.90	413.00	**2,235.00**
	11/16/05	<10.0	181.00	181.00	**827 D1**	<0.50	2.20	160 D1	335.00	64.40	9.23	382.00	**2,340 N**
	11/15/06	<10.00	620.00	620.00	**960.00**	<0.50	2.60	170.00	227.00	53.50	8.10	406.00	**2,870.00**
	11/14/07	<10.00	311.00	311.00	**845 D1**	0.35	3.60 D1	167 D1	205.00	44.90	7.33	334.00	**2,650.00**
	11/12/08	<5.00	640.00	640.00	**650.00**	0.32	2.20	170.00	160.00	37.00	9.90	290.00	**1,700.00**
	11/04/09	<5.00	670.00	670.00	**670.00**	0.56	2.60	150.00	110.00	27.00	7.40	300.00	**1,600.00**
	11/11/10	<5.00	217.00	217.00	**663.00**	0.51	2.58	125.00	65.90	15.60	4.42	317.00	**1,760.00**
	11/10/11	<5.00	171.00	171.00	**621.00**	0.78	2.02	134.00	78.80	18.70	4.71	389.00	**1,400.00**
	10/11/12	<5.00	169.00	169.00	**516.00**	1.12	2.60	100.00	48.70	11.30	4.45	359.00	**1,200.00**
	10/08/13	<6.00	199.00	199.00	**512.00**	**2.63**	2.47	100.00	47.70	9.93	3.64	410.00	**1,170.00**
	10/07/14	<4.00	186.00	186.00	**387.00**	**1.69**	2.54	102.00	37.10	7.78	3.17	276.00	962.00
	10/20/15	--	--	--	**328.00**	<4.00	--	83.30	--	--	--	--	819.00
	10/18/16	--	--	--	**440.00**	1.49	--	97.60	--	--	--	--	**1,150.00**
	10/25/17	--	--	--	**341.00**	**2.83**	--	93.40	--	--	--	--	960.00
	10/18/18	--	--	--	**366.00**	1.29	--	99.60	--	--	--	--	901.00
	06/20/19	--	--	--	**336.00**	--	--	--	--	--	--	--	**1,040.00**
	11/24/19				**321.00**			94.50					**824.00**
	04/20/20	--	--	--	**311 F1**	--	--	--	--	--	--	--	808.00
	06/25/21	--	--	--	**409.00**	--	--	--	--	--	--	--	**1,030.00**
	12/06/21	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	08/23/22	--	--	--	**424**	--	--	--	--	--	--	--	988
	12/21/22	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	07/20/23	--	--	--	**424**	--	--	101	--	--	--	--	**1,260**
	11/13/23	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	07/31/24	--	--	--	**422**	--	--	91.7	--	--	--	--	**1,200**
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-5	02/26/98	--	--	180.00	**6,600.00**	--	--	**910.00**	1,400.00	470.00	31.00	2,400.00	**12,000.00**
	02/14/01	<1.00	166.00	166.00	**7,700.00**	**1.80**	4.10	**910.00**	--	--	--	--	**18,000.00**
	05/17/02	<1.00	156.00	156.00	**4,040.00**	1.53	4.56	586.00	757.00	319.00	60.90	1,260.00	**8,340.00**
	10/23/02	--	--	--	**3,900.00**	--	--	94.80	--	--	--	--	422.00
	05/22/03	<1.00	158.00	158.00	**3,170.00**	<4.00	6.52	550.00	644.00	215.00	49.90	1,240.00	**7,860.00**
	11/25/03	<1.00	168.00	168.00	**5,120.00**	<4.00	6.77	**739.00**	978.00	365.00	54.90	1,680.00	**11,940.00**

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-5	05/11/04	<1.00	160.00	160.00	**6,760.00**	<3.00	4.65	**1,030.00**	1,180.00	417.00	40.30	2,120.00	**20,380.00**
(Continued)	11/17/04	<1.00	172.00	172.00	**6,750.00**	<10.00	**16.60**	**786.00**	1,210.00	486.00	40.60	2,300.00	**11,980.00**
	11/17/05	<10.00	161.00	161.00	**2,140 D1**	0.79	0.16	334 D1	339.00	126.00	10.80	791.00	**7,120 N**
	11/14/06	<10.00	160.00	160.00	**2,000.00**	0.60	1.50	300.00	437.00	173.00	14.20	918.00	**4,420.00**
	11/14/07	<10.00	161.00	161.00	**5,790 D1**	0.37	4.01 D1	668 D1	812.00	240.00	23.30	1,850 D1	**16,300.00**
	11/06/08	<5.00	160.00	160.00	**4,900.00**	0.78	0.32	540.00	660.00	310.00	35.00	1,600.00	**9,700.00**
	11/03/09	<10.00	160.00	160.00	**5,100.00**	0.51	2.30	**710.00**	860.00	320.00	<13.00	1,800.00	**11,000.00**
	11/11/10	<5.00	176.00	176.00	**4,200.00**	0.16	2.37	554.00	687.00	250.00	17.30	1,400.00	**8,890.00**
	11/10/11	<5.00	172.00	172.00	**4,340.00**	0.24	0.55	411.00	944.00	326.00	19.70	1,780.00	**7,840.00**
	10/11/12	<5.00	164.00	164.00	**3,630.00**	0.38	2.26	474.00	671.00	239.00	17.00	1,360.00	**8,300.00**
	10/08/13	<6.00	176.00	176.00	**3,730.00**	0.37	1.56	425.00	659.00	253.00	15.40	1,440.00	**8,060.00**
	10/07/14	<4.00	172.00	172.00	**2,830.00**	<0.10	2.19	398.00	521.00	195.00	15.10	979.00	**5,280.00**
	10/21/15	--	--	--	**2,480.00**	<40.00	--	362.00	--	--	--	--	**5,510.00**
	10/18/16	--	--	--	**2,260.00**	<0.50	--	326.00	--	--	--	--	**5,380.00**
	10/25/17	--	--	--	**2,090.00**	<5.00	--	318.00	--	--	--	--	**3,780.00**
Dup	10/25/17	--	--	--	**2,010.00**	<5.00	--	300.00	--	--	--	--	**3,240.00**
	10/18/18	--	--	--	**1,890.00**	<0.10	--	323.00	--	--	--	--	**3,420.00**
	06/20/19	--	--	--	**1,700.00**	--	--	--	--	--	--	--	**4,280.00**
	11/23/19				**1,530.00**			250.00					**3,900.00**
	04/20/20	--	--	--	**1,870.00**	--	--	--	--	--	--	--	**4,150.00**
	10/12/20	--	--	--	**1,460.00**	--	--	--	--	--	--	--	**2,960.00**
	06/25/21	--	--	--	**1,330.00**	--	--	--	--	--	--	--	**2,590.00**
	12/06/21	--	--	--	**1,190.00**	--	--	--	--	--	--	--	**2,630.00**
	08/23/22	--	--	--	101	--	--	--	--	--	--	--	493
	12/21/22	--	--	--	**1,150**	--	--	--	--	--	--	--	**2,230**
	07/20/23	--	--	--	**1,050**	--	--	--	--	--	--	--	**2,440**
	11/13/23	--	--	--	**991**	--	--	--	--	--	--	--	**2,420**
	08/01/24	--	--	--	**941**	--	--	--	--	--	--	--	**2,260**
	11/12/24	--	--	--	**921**	--	--	--	--	--	--	--	**2,310**
MW-5A	02/26/98	--	--	170.00	190.00	--	--	180.00	107.00	23.00	3.50	117.00	740.00
	02/15/01	<1.00	164.00	164.00	140.00	1.20	2.10	130.00	90.20	27.90	8.70	74.60	670.00
	05/15/02	<1.00	182.00	182.00	53.50	<1.00	2.23	84.40	63.20	16.10	4.69	43.60	475.00
	10/23/02	--	--	--	50.00	--	--	**616.00**	--	--	--	--	**8,670.00**
	05/22/03	<1.00	158.00	158.00	32.50	<1.00	2.10	69.90	55.50	13.80	3.41	41.50	416.00
	11/25/03	<1.00	332.00	332.00	34.10	1.05	2.20	75.50	60.90	14.60	4.08	45.00	422.00
	05/11/04	<1.00	164.00	164.00	38.80	<1.00	2.25	75.80	60.90	15.00	3.40	43.20	484.00
	11/17/04	<1.00	152.00	152.00	39.60	1.37	2.66	74.30	58.10	13.60	3.83	48.50	430.00
	11/16/05	<10.00	191.00	191.00	40.20	0.82	2.10	75.2 D1	176.00	17.80	4.22	45.30	570 N
	11/14/06	<10.00	240.00	240.00	47.00	0.64	1.50	79.00	90.40	16.10	3.58	51.40	588.00
	11/14/07	<10.00	227.00	227.00	54.40	0.66	1.45	68.7 D1	73.70	14.00	<5.00	44.20	528.00
	11/06/08	<5.00	350.00	350.00	53.00	0.70	1.30	72.00	76.00	15.00	3.40	43.00	450.00
	11/03/09	<10.00	710.00	710.00	47.00	0.72	1.50	79.00	65.00	14.00	3.30	50.00	440.00
	11/11/10	<5.00	182.00	182.00	49.60	0.57	1.61	73.60	55.70	12.90	2.79	42.00	606.00
	11/10/11	<5.00	170.00	170.00	131.00	0.49	1.15	116.00	83.80	29.90	5.16	85.70	594.00
	10/11/12	<5.00	163.00	163.00	68.00	0.63	1.57	69.80	60.60	15.30	3.96	49.20	534.00
	10/08/13	<6.00	182.00	182.00	80.20	0.57	1.60	67.50	69.30	16.20	3.29	53.40	462.00
	10/07/14	<4.00	168.00	168.00	73.60	0.29	1.56	64.90	66.20	15.70	2.76	45.20	432.00
	10/21/15	--	--	--	84.90	<4.00	--	65.60	--	--	--	--	499.00
	10/18/16	--	--	--	101.00	<0.50	--	65.40	--	--	--	--	466.00
	10/25/17	--	--	--	99.60	1.14	--	59.30	--	--	--	--	537.00
	10/18/18	--	--	--	132.00	0.79	--	67.50	--	--	--	--	477.00
	06/20/19	--	--	--	118.00	--	--	--	--	--	--	--	650.00
	11/23/19				116.00			61.10					502.00
	04/20/20	--	--	--	120.00	--	--	--	--	--	--	--	571.00
	06/25/21	--	--	--	140.00	--	--	--	--	--	--	--	529.00
	12/06/21	--	--	--	**--**	**--**	--	**--**	--	--	--	--	**--**
	08/23/22	--	--	--	**15,000**	**--**	--	**--**	--	--	--	--	**18,500**
	12/21/22	--	--	--	**--**	**--**	--	**--**	--	--	--	--	**--**
	07/20/23	--	--	--	146	--	--	--	--	--	--	--	552
	11/13/23	--	--	--	--	--	--	--	--	--	--	--	--
	08/01/24	--	--	--	161	--	--	--	--	--	--	--	609
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	02/26/98	--	--	200.00	**260.00**	--	--	400.00	180.00	44.00	6.20	205.00	**1,200.00**
	02/14/01	<1.00	158.00	158.00	59.00	**1.70**	2.20	99.00	67.50	22.10	7.67	52.30	470.00
	05/17/02	<1.00	162.00	162.00	37.80	**1.62**	2.14	99.30	63.10	19.60	5.12	48.60	427.00
	10/23/02	--	--	--	46.10	--	--	109.00	--	--	--	--	331.00
	05/22/03	<1.00	162.00	162.00	40.30	1.24	2.13	94.40	61.70	17.40	4.23	51.90	464.00
	11/25/03	<1.00	154.00	154.00	53.60	1.40	2.18	98.00	53.60	18.70	4.97	51.70	482.00
	05/11/04	<1.00	156.00	156.00	54.40	1.23	2.19	97.00	59.00	18.10	4.22	47.80	506.00
	11/16/04	<1.00	162.00	162.00	57.90	**1.64**	2.68	99.80	66.60	19.60	5.16	57.00	464.00
	11/17/05	<10.00	201.00	201.00	101.00	0.97	0.35	97.8 D1	103.00	20.20	4.10	59.10	730.00

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-6	11/15/06	<10.00	750.00	750.00	68.00	0.99	1.50	93.00	64.60	20.40	4.23	57.10	507.00
(Continued)	11/15/07	<10.00	284.00	284.00	162.00	**51.00**	1.35	96.3 D1	84.10	25.20	<5.00	62.10	630.00
	11/06/08	<5.00	220.00	220.00	84.00	1.20	1.20	95.00	67.00	21.00	4.30	53.00	490.00
	11/03/09	<10.00	190.00	190.00	81.00	1.20	1.40	100.00	66.00	20.00	4.50	59.00	550.00
	11/08/10	NS - Well Damaged											
	11/10/11	NS - Well Damaged											
	10/11/12	NS - Well Damaged											
	09/30/13	Well Plugged and Abandoned											
MW-6R	10/08/13	<6.00	225.00	225.00	110.00	**1.91**	<0.10	102.00	69.90	24.40	5.17	85.60	600.00
	10/07/14	<4.00	182.00	182.00	39.70	0.55	0.68	93.00	59.20	18.20	3.10	48.20	402.00
	10/21/15	--	--	--	40.70	<2.00	--	98.60	--	--	--	--	390.00
	10/18/16	--	--	--	42.30	0.63	--	105 J	--	--	--	--	442.00
	10/25/17	--	--	--	49.30	1.46	--	93.80	--	--	--	--	465.00
	10/18/18	--	--	--	69.10	1.05	--	107.00	--	--	--	--	442.00
	06/20/19	--	--	--	59.10	--	--	--	--	--	--	--	482.00
Dup	06/20/19	--	--	--	64.40	--	--	--	--	--	--	--	592.00
	11/23/19	--	--	--	69.40	--	--	95.20	--	--	--	--	384.00
	04/20/20	--	--	--	77.40	--	--	--	--	--	--	--	506.00
	06/25/21	--	--	--	71.70	--	--	--	--	--	--	--	487.00
	12/06/21	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	08/23/22	--	--	--	145	--	--	--	--	--	--	--	514
	12/21/22	--	--	--	--	--	--	--	--	--	--	--	--
	07/20/23	--	--	--	71.5	--	--	--	--	--	--	--	479
	11/13/23	--	--	--	--	--	--	--	--	--	--	--	--
	08/01/24	--	--	--	76.9	--	--	--	--	--	--	--	480
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-7	05/14/98	--	--	230.00	**430.00**	--	--	340.00	214.00	66.00	13.00	165.00	**1,200.00**
	02/14/01	<1.00	150.00	150.00	**510.00**	**1.70**	2.40	150.00	--	--	--	--	**1,500.00**
	05/16/02	<1.00	150.00	150.00	75.70	1.59	2.27	97.40	68.60	23.20	6.63	54.30	501.00
	10/22/02	--	--	--	88.60	--	--	109.00	--	--	--	--	490.00
	05/22/03	<1.00	140.00	140.00	173.00	1.17	2.14	88.90	85.50	28.20	6.18	64.60	631.00
	11/26/03	<1.00	136.00	136.00	189.00	1.29	2.23	93.50	95.70	31.00	7.91	63.60	704.00
	05/13/04	<1.00	130.00	130.00	**267.00**	1.11	2.18	94.70	107.00	34.70	6.59	62.90	914.00
	11/16/04	<1.00	130.00	130.00	**367.00**	1.49	2.72	97.30	142.00	49.30	8.61	87.90	870.00
	11/17/05	<10.0	121.00	121.00	**456 D1**	0.53	0.28	106 D1	412.00	64.70	12.10	100.00	**1,440.00**
	11/15/06	<10.00	240.00	240.00	**550.00**	0.63	1.50	110.00	202.00	70.30	7.40	102.00	**2,100.00**
	11/15/07	<10.00	189.00	189.00	**458 D1**	1.20	1.39	176 D1	144.00	59.50	9.95	148.00	**1,880.00**
	11/12/08	<5.00	110.00	110.00	**650.00**	0.84	1.20	140.00	210.00	76.00	12.00	120.00	**1,600.00**
	11/04/09	<5.00	110.00	110.00	**1,100.00**	0.63	1.50	160.00	310.00	120.00	11.00	130.00	**2,800.00**
	11/10/10	<5.00	111.00	111.00	**1,310.00**	0.37	1.64	173.00	415.00	149.00	10.00	150.00	**3,130.00**
	11/10/11	<5.00	106.00	109.00	**1,710.00**	0.30	1.45	147.00	662.00	203.00	12.30	198.00	**3,660.00**
	10/11/12	<5.00	108.00	108.00	**2,020.00**	0.44	1.71	261.00	619.00	215.00	12.30	208.00	**5,580.00**
	10/08/13	<6.00	142.00	142.00	**2,840.00**	0.45	2.11	331.00	916.00	258.00	13.30	265.00	**7,530.00**
	10/07/14	<4.00	116.00	116.00	**2,190.00**	<0.10	2.03	317.00	682.00	238.00	12.20	227.00	**7,920.00**
	10/20/15	--	--	--	**1,420.00**	<20.00	--	231.00	--	--	--	--	**3,130.00**
	10/18/16	--	--	--	**2,920.00**	<0.50	--	385.00	--	--	--	--	**7,160.00**
	10/24/17	--	--	--	**1,670.00**	<2.00	--	249.00	--	--	--	--	**2,660.00**
	10/18/18	--	--	--	**4,000.00**	<0.10	--	482.00	--	--	--	--	**6,450.00**
	06/20/19	--	--	--	**4,210.00**	--	--	--	--	--	--	--	**15,500.00**
	11/24/19				**2,080.00**			272.00					**6,300.00**
	04/20/20	--	--	--	**4,570.00**	--	--	--	--	--	--	--	**14,100.00**
	10/12/20	--	--	--	**4,560.00**	--	--	--	--	--	--	--	**8,090.00**
	06/25/21	--	--	--	**4,140.00**	--	--	--	--	--	--	--	298.00
	12/07/21	--	--	--	**3,780.00**	--	--	--	--	--	--	--	**8,540.00**
	08/23/22	--	--	--	**5,170**	--	--	--	--	--	--	--	**10,800**
	12/21/22	--	--	--	**5,280**	--	--	--	--	--	--	--	**11,700**
	07/20/23	--	--	--	**5,150**	--	--	--	--	--	--	--	**14,500**
	11/14/23	--	--	--	**5,350**	--	--	--	--	--	--	--	**11,600**
	08/01/24	--	--	--	**5,080**	--	--	--	--	--	--	--	**14,800**
	11/13/24	--	--	--	**5,500**	--	--	--	--	--	--	--	**15,500**
MW-8	05/13/98	--	--	200.00	**270.00**	--	--	390.00	190.00	60.00	12.00	170.00	**1,200.00**
	02/14/01	<1.00	156.00	156.00	49.00	**1.80**	2.50	100.00	59.90	21.50	7.84	52.90	400.00
	05/16/02	<1.00	158.00	158.00	32.90	1.57	2.33	101.00	56.60	19.20	5.20	49.50	432.00
	10/22/02	--	--	--	40.80	--	--	104.00	--	--	--	--	392.00
	05/22/03	8.00	160.00	168.00	33.20	1.40	2.32	98.30	53.90	18.30	9.31	46.40	410.00
	11/26/03	<1.00	142.00	142.00	31.70	1.59	2.38	95.60	55.30	18.20	5.31	50.20	443.00
	05/12/04	<1.00	154.00	154.00	36.30	1.39	2.38	101.00	53.00	17.30	4.56	48.10	435.00
	11/16/04	<1.00	170.00	170.00	39.80	**1.94**	2.94	103.00	57.80	18.60	5.63	56.40	435.00
	05/17/05	4.00	152.00	156.00	41.00	**1.64**	2.94	105.00	61.00	18.60	5.78	47.30	434.00
	11/17/05	<10.00	171.00	171.00	113.00	1.10	<0.05	115 D1	83.40	21.70	5.74	102.00	750.00
	05/09/06	<10.00	160.00	160.00	210.00	0.89	1.40	200.00	72.70	33.30	7.12	125.00	896.00

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-8	11/14/06	<10.00	150.00	150.00	230.00	1.10	1.20	200.00	74.20	38.30	9.61	162.00	912.00
(Continued)	05/30/07	<10.00	141.00	141.00	62.00	1.20	1.74	120.00	54.10	19.10	<5.00	59.30	500.00
	11/15/07	<10.00	159.00	159.00	43.10	1.33	1.56	94.2 D1	52.10	17.20	<5.000	49.80	540.00
	05/15/08	<1.53	151.00	151.00	40.70	1.40	1.78	99.6 D1	51.70	16.80	4.10	54.8 D1	427.00
	11/12/08	<5.00	140.00	140.00	39.00	1.40	1.50	97.00	52.00	17.00	<2.6	46.00	350.00
	05/20/09	<5.00	140.00	140.00	39.00	1.30	1.60	110.00	50.00	17.00	4.30	49.00	430.00
	11/04/09	<5.00	150.00	150.00	41.00	1.40	1.70	110.00	46.00	16.00	3.30	47.00	450.00
	05/07/10	<5.00	<5.00	172.00	34.90	1.09	1.70	97.80	49.50	15.70	3.52	45.50	426.00
Dup	05/07/10	<5.00	<5.00	157.00	34.90	1.09	1.71	98.00	51.00	14.50	3.21	43.60	466.00
	11/12/10	<5.00	172.00	172.00	38.70	1.10	1.77	98.20	48.90	15.70	3.40	45.40	410.00
Dup	11/12/10	<5.00	160.00	160.00	38.70	1.10	1.76	98.30	50.50	15.30	3.44	44.80	398.00
	05/11/11	<5.00	170.00	170.00	185.00	1.20	1.60	93.00	73.00	28.40	5.68	165.00	692.00
	11/10/11	<5.00	161.00	161.00	36.90	1.06	1.41	87.40	57.10	17.00	3.46	48.60	406.00
	05/17/12	<5.00	173.00	173.00	37.90	1.09	1.59	92.90	53.30	16.40	3.83	56.70	440.00
	10/11/12	<5.00	158.00	158.00	39.90	1.29	1.83	103.00	49.00	16.60	4.30	49.00	444.00
	05/17/13	<5.00	167.00	167.00	38.30	1.37	1.70	106.00	55.30	17.50	3.67	45.90	416.00
	10/08/13	<6.00	182.00	182.00	39.50	1.17	1.78	96.20	57.40	19.70	4.35	57.60	446.00
	05/01/14	<10.00	165.00	165.00	40.60	1.12 J	1.81	106.00	55.10	19.90	3.82	52.90	436.00
	10/07/14	<4.00	176.00	176.00	8.14	0.16	1.07	30.50	40.00	4.98	7.81	35.10	259.00
	05/22/15	--	--	--	10.00	<2.00	--	30.10	--	--	--	--	252.00
	10/20/15	--	--	--	8.03	<2.00	--	32.50	--	--	--	--	146.00
	05/25/16	--	--	--	30.00	0.85	--	88.70	--	--	--	--	434.00
	10/18/16	--	--	--	4.28	<0.50	--	32.80	--	--	--	--	261.00
	05/11/17	--	--	--	9.10	<0.02	--	32.20	--	--	--	--	214.00
Dup	05/11/17	--	--	--	8.62	<0.02	--	32.20	--	--	--	--	182.00
	10/24/17	--	--	--	3.69	0.23	--	18.30	--	--	--	--	286.00
	05/22/18	--	--	--	5.22	0.32	--	21.90	--	--	--	--	282.00
	10/18/18	--	--	--	5.41	0.61	--	19.10	--	--	--	--	258.00
	06/20/19	--	--	--	NS	--	--	--	--	--	--	--	NS
	11/24/19				12.90			27.60					239.00
	04/20/20	--	--	--	49.00	--	--	--	--	--	--	--	305.00
	06/25/21	--	--	--	28.90	--	--	--	--	--	--	--	391.00
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--
	08/24/22	--	--	--	32.0	--	--	--	--	--	--	--	371
	12/21/22	--	--	--	--	--	--	--	--	--	--	--	--
	07/20/23	--	--	--	36.9	--	--	--	--	--	--	--	432
	11/13/23	--	--	--	--	--	--	--	--	--	--	--	--
	08/02/24	--	--	--	34.9	--	--	--	--	--	--	--	419
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-9	05/14/98	--	--	190.00	**350.00**	--	--	470.00	207.00	61.00	12.00	200.00	**1,300.00**
	02/15/01	<1.00	156.00	156.00	35.00	**2.60**	2.40	110.00	60.40	19.80	7.47	47.00	430.00
	05/16/02	<1.00	160.00	160.00	31.70	**2.22**	2.28	99.40	60.80	17.60	5.32	50.10	440.00
	10/23/02	--	--	--	39.00	--	--	102.00	--	--	--	--	436.00
	05/22/03	<1.00	160.00	160.00	31.00	**1.75**	2.19	93.30	52.20	15.80	4.75	50.20	455.00
	11/26/03	<1.00	150.00	150.00	31.80	**1.99**	2.34	99.80	57.70	16.60	4.69	46.30	452.00
	05/12/04	<1.00	164.00	164.00	33.60	**1.79**	2.29	99.20	54.80	16.00	4.27	43.50	467.00
	11/16/04	8.00	154.00	162.00	**367.00**	1.49	2.72	97.30	63.20	17.80	5.59	55.50	433.00
	05/17/05	4.00	154.00	154.00	44.20	**2.43**	3.05	117.00	58.80	16.70	5.94	44.10	434.00
	11/17/05	<10.00	161.00	161.00	83.50	1.30	0.14	111 D1	149.00	26.20	7.43	80.40	790 N
	05/09/06	<10.00	170.00	170.00	37.00	**1.80**	1.80	99.00	52.70	15.00	3.21	45.50	428.00
	11/15/06	<10.00	150.00	150.00	210.00	1.10	1.20	190.00	70.50	35.80	8.64	152.00	905.00
	05/30/07	<10.00	153.00	153.00	35.00	**2.10**	1.69	110.00	52.20	15.80	<5.00	44.70	464.00
	11/14/07	<10.00	151.00	151.00	186.00	1.49	1.48	156 D1	74.10	39.40	8.73	141.00	808.00
	05/15/08	<1.53	174.00	174.00	42.50	**2.38**	1.72	105 D1	55.60	17.00	3.99	54.1 D1	467.00
	11/04/08	<5.00	160.00	160.00	39.00	**2.10**	1.40	98.00	54.00	16.00	3.70	47.00	440.00
	05/20/09	<5.00	320.00	320.00	69.00	**2.10**	1.50	120.00	58.00	19.00	4.60	58.00	520.00
	11/04/09	<5.00	160.00	160.00	42.00	**2.20**	1.60	110.00	50.00	15.00	3.00	43.00	460.00
	05/07/10	<5.00	<5.00	162.00	50.20	**2.02**	1.66	97.50	53.60	15.70	3.32	43.50	442.00
	11/09/10	<5.00	186.00	186.00	60.70	**1.97**	1.74	98.00	59.20	18.10	3.64	50.00	446.00
	05/11/11	<5.00	160.00	160.00	80.30	**1.71**	1.72	75.70	73.90	25.80	4.61	67.90	518.00
	11/10/11	<5.00	151.00	151.00	138.00	**1.66**	1.38	107.00	82.70	26.90	4.34	65.40	582.00
	05/16/12	<5.00	162.00	162.00	137.00	**1.75**	1.61	93.50	83.80	23.20	4.39	60.30	584.00
	10/11/12	<5.00	147.00	147.00	148.00	**1.90**	1.71	98.70	80.50	25.80	4.94	59.80	644.00
	05/17/13	<5.00	144.00	144.00	246.00	**1.86**	1.61	99.30	107.00	30.20	4.43	60.20	**1,010.00**
	10/08/13	<6.00	164.00	164.00	150.00	**1.88**	1.81	99.80	90.00	25.20	4.62	60.80	620.00
	05/02/14	<10.00	143.00	143.00	**382.00**	1.56	1.77	103.00	132.00	35.70	5.74	73.70	906.00
	10/07/14	<4.00	151.00	151.00	**292.00**	0.89	1.33	98.10	136.00	41.00	4.65	67.40	**1,110.00**
	05/22/15	--	--	--	**307.00**	<8.00	--	87.70	--	--	--	--	**1,170.00**
	10/20/15	--	--	--	202.00	<4.00	--	93.70	--	--	--	--	593.00
	05/25/16	--	--	--	**404.00**	**1.61**	--	108.00	--	--	--	--	**1,430.00**
Dup	05/26/16	--	--	--	**418.00**	1.60	--	111.00	--	--	--	--	**1,430.00**

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Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					*250*	*1.60*	*10*	*600.00*					*1,000*
MW-9 (Continued)	10/18/16	--	--	--	**445.00**	1.34	--	115.00	--	--	--	--	**1,490.00**
	05/11/17	--	--	--	**481.00**	<0.22	--	118.00	--	--	--	--	**1,090.00**
	10/24/17	--	--	--	**387.00**	**2.42**	--	102.00	--	--	--	--	**1,020.00**
	05/22/18	--	--	--	**460.00**	1.28	--	119.00	--	--	--	--	**1,010.00**
	10/18/18	--	--	--	**381.00**	1.41	--	117.00	--	--	--	--	903.00
	06/20/19	--	--	--	**621.00**	--	--	--	--	--	--	--	**2,930.00**
	11/24/19	--	--	--	**337.00**	--	--	80.60	--	--	--	--	**1,170.00**
	04/20/20	--	--	--	**1,070.00**	--	--	--	--	--	--	--	**3,090.00**
	10/12/20	--	--	--	**945.00**	--	--	--	--	--	--	--	**1,860.00**
	06/25/21	--	--	--	**952.00**	--	--	--	--	--	--	--	**1,970.00**
	12/07/21	--	--	--	**856.00**	--	--	--	--	--	--	--	**1,960.00**
	08/24/22	--	--	--	**1,040**	--	--	--	--	--	--	--	**2,320**
	12/21/22	--	--	--	**1,040**	--	--	--	--	--	--	--	**2,530**
	07/21/23	--	--	--	**1,050**	--	--	--	--	--	--	--	**2,620**
	11/14/23	--	--	--	**1,100**	--	--	--	--	--	--	--	**2,930**
	08/01/24	--	--	--	**1,010**	--	--	--	--	--	--	--	**3,060**
	11/13/24	--	--	--	**1,040**	--	--	--	--	--	--	--	**3,300**
MW-9A	05/14/98	--	--	280.00	**600.00**	--	--	**770.00**	338.00	96.00	12.00	334.00	**2,200.00**
	02/15/01	<1.00	142.00	142.00	85.00	1.40	2.20	71.00	71.60	19.20	6.94	46.00	400.00
	05/15/02	<1.00	136.00	136.00	148.00	<1.00	2.18	65.30	62.90	16.10	4.62	46.80	445.00
	10/23/02	--	--	--	168.00	--	--	75.50	--	--	--	--	651.00
	05/22/03	<1.00	126.00	126.00	207.00	<1.00	2.09	62.10	102.00	25.20	4.80	55.70	672.00
	11/26/03	<1.00	118.00	118.00	216.00	1.14	2.26	62.70	107.00	25.10	5.31	53.20	648.00
	05/12/04	<1.00	122.00	122.00	242.00	<1.00	2.10	64.70	105.00	26.20	5.11	26.20	950.00
	11/16/04	<1.00	114.00	114.00	**296.00**	1.24	2.74	67.50	130.00	33.10	6.24	70.30	826.00
	05/17/05	<1.00	112.00	112.00	**354.00**	1.04	2.85	77.10	131.00	31.70	6.39	60.50	828.00
	11/17/05	<10.00	121.00	121.00	**310 D1**	0.82	0.31	74.7 D1	337.00	41.40	8.08	74.50	**1,520 N**
	05/09/06	<10.00	670.00	670.00	**270.00**	0.67	1.60	78.00	111.00	27.10	3.88	58.70	992.00
	11/15/06	<10.00	1,600.00	1,600.00	**290.00**	0.62	1.60	72.00	126.00	33.40	4.74	68.40	**1,280.00**
	05/30/07	<10.00	586.00	586.00	**400.00**	0.70	1.69	83.00	153.00	36.90	<5.00	71.80	**1,450.00**
	11/14/07	<10.00	605.00	605.00	**285 D1**	0.62	1.52	64.7 D1	153.00	35.40	5.03	70.70	**1,430.00**
	05/15/08	<1.53	738.00	738.00	**380 D1**	0.45	1.62	86.8 D1	146.00	35.50	5.45	77.2 D1	**1,390.00**
	11/04/08	<5.00	370.00	370.00	**330.00**	<1.00	1.20	84.00	130.00	32.00	5.10	66.00	1,000.00
	05/20/09	<5.00	600.00	600.00	**480.00**	0.49	1.50	86.00	170.00	43.00	6.40	76.00	**1,600.00**
	11/04/09	<5.00	110.00	110.00	**430.00**	0.49	1.60	82.00	160.00	41.00	5.30	71.00	**1,500.00**
	05/07/10	<5.00	<5.00	121.00	**510.00**	0.21	1.62	80.50	188.00	44.90	4.90	73.60	**1,680.00**
	11/09/10	<5.00	115.00	115.00	**529.00**	0.33	1.72	86.00	159.00	44.30	5.00	76.10	**1,660.00**
	05/11/11	<5.00	146.00	146.00	**587.00**	1.18	1.90	415.00	166.00	80.60	11.30	211.00	**1,850.00**
	11/10/11	<5.00	115.00	115.00	**841.00**	0.19	1.56	125.00	280.00	84.80	7.51	117.00	**2,160.00**
	05/16/12	<5.00	135.00	135.00	**958.00**	0.37	1.74	143.00	249.00	62.60	6.50	97.70	**3,450.00**
Dup	05/16/12	<5.00	128.00	128.00	**882.00**	0.31	1.70	134.00	270.00	65.70	6.72	92.30	**3,050.00**
	10/11/12	<5.00	125.00	125.00	**628.00**	0.37	1.70	121.00	235.00	60.40	6.72	94.00	**1,810.00**
	05/17/13	<5.00	137.00	137.00	**754.00**	0.34	1.67	145.00	224.00	53.90	5.49	86.80	**1,930.00**
	10/08/13	<6.00	153.00	153.00	**534.00**	0.37	1.69	118.00	185.00	43.10	5.23	81.30	**1,210.00**
	10/07/14	Not Sampled											
	10/20/15	--	--	--	232.00	<4.00	--	95.40	--	--	--	--	599.00
	10/18/16	--	--	--	**337.00**	<0.50	--	113.00	--	--	--	--	**1,250.00**
	10/24/17	--	--	--	206.00	<0.50	--	96.60	--	--	--	--	681.00
	10/18/18	--	--	--	**276.00**	0.60	--	119.00	--	--	--	--	816.00
	06/20/19	--	--	--	**268.00**	--	--	--	--	--	--	--	**1,220.00**
	11/24/19				231.00			83.20					838.00
	04/20/20	--	--	--	**352.00**	--	--	--	--	--	--	--	940.00
	06/25/21	--	--	--	**307.00**	--	--	--	--	--	--	--	857.00
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	**--**
	08/24/22	--	--	--	**239**	--	--	--	--	--	--	--	773
	12/21/22	--	--	--	**--**	--	--	--	--	--	--	--	--
	07/21/23	--	--	--	**260**	--	--	--	--	--	--	--	753 B
	11/13/23	--	--	--	**--**	--	--	--	--	--	--	--	--
	08/01/24	--	--	--	**737**	--	--	--	--	--	--	--	**1,030**
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	05/14/98	--	--	240.00	**360**	--	--	450.00	211.00	62.00	11.00	190.00	**1,400.00**
	02/15/01	<1.00	140.00	140.00	190	**2.00**	2.30	97.00	108.00	32.30	8.20	61.00	660.00
	05/17/02	<1.00	152.00	152.00	204	**1.93**	2.19	99.10	109.00	31.70	7.60	62.40	713.00
	10/22/02	--	--	--	213	--	--	108.00	--	--	--	--	758.00
	05/22/03	<1.00	152.00	152.00	213	1.45	2.17	96.60	109.00	29.90	8.65	74.20	764.00
	11/26/03	<1.00	152.00	152.00	220	1.54	2.26	103.00	120.00	35.70	6.96	64.00	752.00
	05/13/04	<1.00	158.00	158.00	232	1.39	2.23	102.00	114.00	31.60	5.95	57.20	802.00
	11/17/04	<1.00	170.00	170.00	245	**1.73**	2.78	104.00	121.00	35.70	7.07	70.30	764.00
	05/17/05	<1.00	150.00	150.00	233	**1.77**	2.80	106.00	113.00	32.30	6.83	60.20	776.00
	11/17/05	<10.00	151.00	151.00	205 D1	1.20	0.26	111 D1	482.00	47.40	13.10	82.40	970 N
	05/09/06	<10.00	190.00	190.00	180	1.40	1.60	98.00	93.30	27.10	4.31	60.40	724.00

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-10	11/16/06	<10.00	320.00	320.00	190	1.20	1.60	92.00	101.00	30.00	4.75	64.10	900.00
(Continued)	05/30/07	<10.00	340.00	340.00	200	1.40	1.68	110.00	101.00	28.60	<5.00	62.40	820.00
	11/15/07	<10.00	189.00	189.00	**251 D1**	1.44	1.44	152 D1	104.00	33.40	6.01	84.70	**1,010.00**
	05/15/08	<1.53	374.00	374.00	**342 D1**	1.47	1.28	257 D1	106.00	52.90	11.70	165 D1	**1,140.00**
	11/06/08	<5.00	150.00	150.00	210	1.50	1.30	89.00	110.00	32.00	5.40	64.00	730.00
	05/20/09	<5.00	240.00	240.00	**270**	1.30	1.50	120.00	110.00	35.00	6.20	72.00	960.00
	11/04/09	<5.00	150.00	150.00	240	1.50	1.30	130.00	100.00	35.00	5.40	78.00	1,000.00
	05/07/10	<5.00	<5.00	157.00	236	1.18	1.62	106.00	111.00	30.70	4.59	60.30	940.00
	11/10/10	<5.00	166.00	166.00	**280**	1.16	1.61	112.00	98.40	36.90	5.63	81.00	812.00
	05/11/11	<5.00	157.00	157.00	**274**	1.11	1.99	87.20	117.00	32.20	5.63	85.00	930.00
	11/15/11	<5.00	150.00	150.00	**266**	1.03	6.93	94.90	128.00	32.30	4.58	62.80	**1,450.00**
	05/16/12	<5.00	163.00	163.00	**284**	1.12	1.58	99.90	132.00	36.80	5.22	72.90	**1,120.00**
	10/11/12	<5.00	151.00	151.00	**255**	1.32	1.75	98.70	113.00	34.30	5.68	67.60	**1,010.00**
	05/17/13	<5.00	154.00	154.00	**299**	1.34	1.61	108.00	117.00	33.70	4.57	64.60	**1,180.00**
	10/08/13	<6.00	165.00	165.00	**324**	1.14	1.62	103.00	154.00	41.60	5.36	78.10	**1,240.00**
	05/01/14	<10.00	156.00	156.00	**298**	1.05 J	1.58	111.00	135.00	41.60	5.30	75.50	**1,050.00**
Dup	05/01/14	<10.00	158.00	158.00	**301**	<0.10 J	1.66	112.00	134.00	42.50	5.29	79.50	**1,080.00**
	10/07/14	<4.00	163.00	163.00	249	0.71	1.64	108.00	127.00	36.80	4.91	67.20	**1,050.00**
	05/22/15	--	--	--	**298**	<8.00	--	102.00	--	--	--	--	975.00
	10/20/15	--	--	--	250	<4.00	--	108.00	--	--	--	--	823.00
	05/25/16	--	--	--	**307**	1.44	--	107.00	--	--	--	--	**1,080.00**
	10/18/16	--	--	--	**330**	0.86	--	103.00	--	--	--	--	**1,350.00**
	05/11/17	--	--	--	**353**	<0.22	--	112.00	--	--	--	--	**1,080.00**
	10/24/17	--	--	--	240	1.60	--	97.00	--	--	--	--	742.00
	05/22/18	--	--	--	**346**	0.97	--	113.00	--	--	--	--	**1,070.00**
	10/18/18	--	--	--	**351**	1.10	--	118.00	--	--	--	--	892.00
	06/20/19	--	--	--	NS	--	--	--	--	--	--	--	NS
	11/24/19				230			78.00					826.00
	04/20/20	--	--	--	372	--	--	--	--	--	--	--	**1,050.00**
	10/12/20	--	--	--	338	--	--	--	--	--	--	--	986.00
	06/25/21	--	--	--	**392**	--	--	--	--	--	--	--	**1,010.00**
	12/07/21	--	--	--	**339**	--	--	--	--	--	--	--	**1,020.00**
	08/23/22	--	--	--	***376***	--	--	--	--	--	--	--	***1,010***
	12/21/22	--	--	--	***406***	--	--	--	--	--	--	--	***1,120 J3***
Dup	12/21/22	--	--	--	218	--	--	--	--	--	--	--	*828*
	07/20/23	--	--	--	**364**	--	--	--	--	--	--	--	**1,210**
	11/14/23	--	--	--	**364**	--	--	--	--	--	--	--	**1,180**
	08/01/24	--	--	--	**344**	--	--	--	--	--	--	--	**1,180**
	11/13/24	--	--	--	**336**	--	--	--	--	--	--	--	**1,090**
MW-11	01/22/99	30.00	<1.00	30.00	46.00	**2.30**	4.20	94.00	33.00	7.00	9.10	58.00	370.00
	02/15/01	<1.00	156.00	156.00	37.00	**2.40**	2.40	120.00	64.00	19.10	7.83	50.10	360.00
	05/16/02	<1.00	160.00	160.00	31.90	**2.13**	2.33	98.80	63.50	17.20	4.83	47.00	444.00
	10/23/02	--	--	--	37.20	--	--	102.00	--	--	--	--	447.00
	05/22/03	12.00	154.00	166.00	32.30	**1.74**	2.28	96.70	62.30	0.00	4.63	47.60	437.00
	11/26/03	<1.00	160.00	160.00	32.40	**1.83**	2.23	96.40	59.20	16.60	4.67	48.60	448.00
	05/12/04	<1.00	164.00	164.00	34.60	**1.71**	2.38	97.70	54.80	15.70	4.28	46.20	457.00
	11/16/04	<1.00	160.00	160.00	39.00	**2.17**	2.81	100.00	65.20	16.80	5.14	54.30	454.00
	05/17/05	4.00	158.00	162.00	43.10	**1.87**	2.82	94.60	68.40	16.90	6.45	44.00	429.00
	11/17/05	<10.0	161.00	161.00	58.10	1.50	2.10	91.3 D1	75.00	17.70	4.55	64.70	700 N
	05/09/06	<10.00	180.00	180.00	37.00	**1.80**	1.70	100.00	54.10	16.20	3.26	46.90	456.00
	11/14/06	<10.00	170.00	170.00	34.00	**1.80**	1.80	110.00	58.00	18.20	4.13	53.40	532.00
	05/30/07	<10.00	142.00	142.00	36.00	**1.90**	1.79	120.00	54.00	16.70	<5.00	50.80	456.00
	11/14/07	<10.00	189.00	189.00	42.30	**1.98**	1.54	95.6 D1	57.20	17.40	<5.000	52.40	452.00
	05/15/08	<1.53	177.00	177.00	72.4 D1	**1.86**	1.71	141.00	58.00	19.40	4.93	66.5 D1	544.00
	11/04/08	<5.00	170.00	170.00	49.00	1.50	1.30	90.00	60.00	16.00	3.60	47.00	440.00
	05/20/09	<5.00	360.00	360.00	40.00	**2.20**	1.70	130.00	51.00	17.00	4.50	53.00	450.00
	11/04/09	<5.00	150.00	150.00	43.00	1.60	1.60	100.00	52.00	15.00	2.90	42.00	470.00
	05/07/10	<5.00	<5.00	167.00	36.50	**1.97**	1.78	117.00	49.70	14.90	3.42	44.70	494.00
	11/09/10	<5.00	269.00	269.00	52.50	1.45	1.79	95.40	61.00	16.70	3.56	50.00	438.00
	05/11/11	<5.00	161.00	161.00	133.00	1.43	2.08	140.00	78.10	37.00	6.32	103.00	664.00
Dup	05/11/11	<5.00	161.00	161.00	130.00	1.44	2.01	137.00	77.40	37.00	6.29	104.00	706.00
	11/10/11	<5.00	162.00	162.00	38.80	**1.86**	1.49	97.10	66.20	17.90	3.62	52.30	420.00
	05/17/12	<5.00	176.00	176.00	45.80	1.29	1.62	88.50	63.60	16.30	3.66	53.40	456.00
	10/11/12	<5.00	166.00	166.00	44.60	1.49	1.74	95.10	55.80	15.80	3.80	49.30	440.00
	05/17/13	<5.00	171.00	171.00	43.60	**1.87**	1.67	106.00	57.70	14.80	3.18	42.90	428.00
	10/08/13	<6.00	178.00	178.00	45.20	1.55	1.74	95.50	60.90	16.10	3.33	52.00	450.00
	05/01/14	<10.00	173.00	173.00	63.30	<0.10	2.06	93.30	64.40	17.60	3.38	51.50	434.00
	10/07/14	<4.00	176.00	176.00	34.70	1.10	1.71	101.00	59.20	16.70	3.06	46.50	399.00
	05/22/15	--	--	--	40.40	<4.00	--	87.20	--	--	--	--	428.00
	10/20/15	--	--	--	37.60	<2.00	--	89.30	--	--	--	--	356.00
	05/25/16	--	--	--	34.30	**1.87**	--	103.00	--	--	--	--	475.00

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Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-11	10/18/16	--	--	--	39.30	0.87	--	96.40	--	--	--	--	418.00
(Continued)	05/11/17	--	--	--	35.10	<0.11	--	110.00	--	--	--	--	416.00
	10/24/17	--	--	--	35.10	**1.87**	--	95.30	--	--	--	--	438.00
	05/22/18	--	--	--	34.60	1.58	--	110.00	--	--	--	--	421.00
Dup	05/22/18	--	--	--	34.50	**1.64**	--	110.00	--	--	--	--	415.00
	10/18/18	--	--	--	36.90	**1.69**	--	114.00	--	--	--	--	413.00
	06/20/19	--	--	--	34.40	--	--	--	--	--	--	--	407.00
	11/24/19				45.80			113.00					364.00
	04/20/20	--	--	--	29.00	--	--	--	--	--	--	--	394.00
	06/25/21	--	--	--	37.30	--	--	--	--	--	--	--	431.00
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--
	08/24/22	--	--	--	35.70	--	--	--	--	--	--	--	410.00
	12/21/22	--	--	--	--	--	--	--	--	--	--	--	--
	07/21/23	--	--	--	35.0	--	--	--	--	--	--	--	410 B
	11/13/23	--	--	--	--	--	--	--	--	--	--	--	--
	08/02/24	--	--	--	35.1	--	--	--	--	--	--	--	417
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
MW-12*	05/15/02	<1.00	160.00	160.00	58.30	1.09	2.44	91.30	53.50	15.90	5.52	50.30	462.00
	10/23/02	--	--	--	65.00	--	--	102.00	--	--	--	--	477.00
	05/22/03	<1.00	148.00	148.00	91.10	1.04	2.30	87.70	74.20	21.00	4.89	57.60	516.00
	11/25/03	<1.00	142.00	142.00	93.10	1.18	2.36	90.90	74.70	20.90	5.41	52.50	548.00
	05/12/04	<1.00	458.00	458.00	72.90	1.04	2.35	86.70	58.10	19.00	5.92	51.80	489.00
	11/15/04	<1.00	184.00	184.00	79.80	1.39	2.83	88.80	59.70	21.50	16.50	77.40	512.00
	11/17/05	<10.00	151.00	151.00	109.00	0.93	0.12	94.6 D1	193.00	26.60	13.40	87.50	700.00
	11/16/06	<10.00	270.00	270.00	120.00	0.71	1.70	84.00	82.30	27.00	4.82	62.20	620.00
	11/16/07	<10.00	170.00	170.00	**258.00**	1.21	1.55	191 D1	77.20	42.70	11.00	154.00	**1,270.00**
	11/06/08	<5.00	130.00	130.00	110.00	0.89	1.40	79.00	61.00	20.00	4.50	52.00	460.00
	11/03/09	<25.00	2,000.00	2,000.00	120.00	0.87	1.60	98.00	68.00	24.00	6.00	79.00	600.00
	11/09/10	<5.00	144.00	144.00	211.00	0.57	1.76	89.80	75.60	27.80	4.60	60.60	712.00
	11/10/11	<5.00	134.00	134.00	179.00	0.46	1.37	92.80	93.80	27.80	4.53	64.00	594.00
	10/11/12	<5.00	145.00	145.00	179.00	0.71	0.79	86.50	80.40	25.40	5.44	62.90	724.00
	10/08/13	<6.00	160.00	160.00	246.00	0.62	1.64	84.50	110.00	30.40	4.92	67.80	944.00
	10/07/14	<4.00	145.00	145.00	200.00	0.29	1.70	86.80	93.10	29.30	5.06	65.00	765.00
	10/21/15	--	--	--	165.00	<4.00	--	72.60	--	--	--	--	487.00
	10/18/16	--	--	--	**270.00**	<0.50	--	95.00	--	--	--	--	888.00
	10/24/17	--	--	--	150.00	<0.50	--	64.90	--	--	--	--	579.00
Dup	10/24/17	--	--	--	149.00	<0.50	--	64.80	--	--	--	--	565.00
	10/18/18	--	--	--	**290.00**	0.74	--	106.00	--	--	--	--	790.00
	06/20/19	--	--	--	**254.00**	--	--	--	--	--	--	--	580.00
	04/20/20	--	--	--	245.00	--	--	--	--	--	--	--	902.00
	10/12/20	--	--	--	**254.00**	--	--	--	--	--	--	--	732.00
	06/25/21	--	--	--	**461.00**	--	--	--	--	--	--	--	984.00
	12/06/21	--	--	--	**361.00**	--	--	--	--	--	--	--	**1,130.00**
	08/24/22	--	--	--	**489**	--	--	--	--	--	--	--	**1,040**
	12/21/22	--	--	--	**482**	--	--	--	--	--	--	--	**1,280**
	07/21/23	--	--	--	**469**	--	--	--	--	--	--	--	**1,300**
	11/13/23	--	--	--	**447**	--	--	--	--	--	--	--	**1,470**
	08/02/24	--	--	--	**404**	--	--	--	--	--	--	--	**1,600**
	11/12/24	--	--	--	**504**	--	--	--	--	--	--	--	**1,560**
MW-13*	05/13/02	<1.00	100.00	100.00	**517.00**	<1.00	1.61	437.00	116.00	76.00	19.40	269.00	**1,596.00**
	10/23/02	--	--	--	**549.00**	--	--	370.00	--	--	--	--	**1,740.00**
	05/22/03	<1.00	186.00	186.00	**944.00**	<2.00	2.33	361.00	289.00	101.00	15.30	458.00	**3,060.00**
	11/25/03	<1.00	226.00	226.00	**1,460.00**	<2.00	2.22	372.00	369.00	117.00	20.00	478.00	**3,445.00**
	05/12/04	<1.00	234.00	234.00	**1,550.00**	<4.00	4.58	369.00	384.00	114.00	18.60	485.00	**4,240.00**
	11/15/04	<1.00	226.00	226.00	**1,870.00**	<2.00	4.92	384.00	510.00	164.00	16.50	627.00	**3,600.00**
	11/17/05	<10.00	201.00	201.00	**722.00**	1.00	2.50	206 D1	786.00	91.60	19.70	276.00	**2,350.00**
	11/16/06	<10.00	1,500.00	1,500.00	**2,000.00**	<0.50 N	2.70	500 N	529.00	176.00	14.20	493.00	**5,060.00**
	11/16/07	<10.00	236.00	236.00	**2,000.00**	0.33	3.05 D1	312 D1	361.00	105.00	11.40	553 D1	**6,320.00**
	11/06/08	<5.00	180.00	180.00	**970.00**	0.98	1.80	280.00	240.00	96.00	17.00	370.00	**2,400.00**
	11/03/09	<25.00	15,000.00	15,000.00	**2,200.00**	<0.50	2.60	440.00	490.00	180.00	22.00	490.00	**5,600.00**
	11/09/10	<5.00	267.00	267.00	**1,680.00**	0.22	2.82	405.00	400.00	120.00	10.40	540.00	**4,270.00**
	11/10/11	<5.00	206.00	206.00	**2,110.00**	0.18	<0.50	273.00	690.00	223.00	13.20	472.00	**4,870.00**
	10/11/12	<5.00	204.00	204.00	**2,360.00**	0.31	2.70	422.00	706.00	228.00	14.40	423.00	**6,290.00**
	10/08/13	<6.00	1,780.00	1,780.00	**2,710.00**	0.30	2.59	448.00	768.00	225.00	14.00	457.00	**7,320.00**
	10/07/14	<4.00	267.00	267.00	**1,430.00**	<0.10	1.91	379.00	355.00	109.00	11.30	612.00	**3,940.00**
	10/21/15	--	--	--	**1,400.00**	<40.0	--	353.00	--	--	--	--	**3,260.00**
	10/18/16	--	--	--	**1,940.00**	<0.50	--	440.00	--	--	--	--	**5,310.00**
	Well Plugged and Abandoned on 7/11/2017												
MW-14	10/08/13	<6.00	267.00	267.00	162.00	**3.69**	<0.10	127.00	74.40	32.30	8.42	145.00	854.00
Dup	10/08/13	<6.00	271.00	271.00	166.00	**3.74**	<0.10	130.00	60.70	26.30	7.97	145.00	848.00
	05/01/14	<10.00	199.00	199.00	64.00	1.19 J	<0.10	84.90	60.80	21.70	3.82	59.80	468.00

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	10/07/14	<4.00	227.00	2,227.00	95.20	0.79	<0.023	22.90	71.30	24.90	3.99	61.80	460.00
Dup	10/07/14	<4.00	194.00	194.00	55.70	1.36	<0.023	88.80	59.30	19.10	3.21	49.50	490.00
	05/22/15	--	--	--	77.80	<4.00	--	45.40	--	--	--	--	468.00
Dup	05/22/15	--	--	--	77.40	<4.00	--	49.00	--	--	--	--	470.00
	10/20/15	--	--	--	29.1 J	<2.00	--	53.5 J	--	--	--	--	294.00
Dup	10/21/15	--	--	--	58.9 J	<2.00	--	101 J	--	--	--	--	407.00
	05/25/16	--	--	--	79.00	1.37	--	19.90	--	--	--	--	552.00
	10/18/16	--	--	--	51.80	1.07	--	104.00	--	--	--	--	422.00
Dup	10/18/16	--	--	--	61.20	1.25	--	108 J	--	--	--	--	459.00
	05/11/17	--	--	--	70.50	<0.11	--	17.70	--	--	--	--	412.00
	10/24/17	--	--	--	57.40	**1.77**	--	42.20	--	--	--	--	423.00
	05/22/18	--	--	--	54.90	1.20	--	47.80	--	--	--	--	390.00
	10/18/18	--	--	--	57.20	1.35	--	47.20	--	--	--	--	401.00
	06/20/19	--	--	--	42.10	--	--	--	--	--	--	--	481.00
	11/24/19	--	--	--	37.10	--	--	94.50	--	--	--	--	328.00
	04/20/20	--	--	--	46.00	--	--	--	--	--	--	--	400.00
	06/25/21	--	--	--	42.30	--	--	--	--	--	--	--	429.00
	12/06/21	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	08/23/22	--	--	--	48.00	--	--	--	--	--	--	--	**1,090.00**
	12/21/22	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	07/20/23	--	--	--	57.5	--	--	--	--	--	--	--	471
	11/13/23	--	--	--	--	--	--	--	--	--	--	--	--
	07/31/24	--	--	--	61.4	--	--	--	--	--	--	--	473
	11/12/24	--	--	--	--	--	--	--	--	--	--	--	--
RW-1	05/27/99	0.00	224.00	224.00	**8,700.00**	**2.70**	7.00	**840.00**	679.00	521.00	34.00	3,290.00	**14,000.00**
	05/22/03	<1.00	190.00	190.00	**2,410.00**	**2.46**	4.23	345.00	162.00	145.00	25.40	1,180.00	**5,260.00**
	11/26/03	<1.00	184.00	184.00	**1,990.00**	<4.00	**20.00**	324.00	199.00	147.00	38.60	1,080.00	**5,050.00**
	05/11/04	<1.00	148.00	148.00	**491.00**	1.32	2.65	109.00	66.30	23.40	11.20	252.00	**1,224.00**
	11/17/04	<1.00	160.00	160.00	**633.00**	**1.65**	3.23	121.00	89.70	43.50	18.00	382.00	**1,314.00**
	11/17/05	<10.00	221.00	221.00	**895.00**	1.00	1.40	166 D1	122.00	70.90	8.40	493.00	**2,380.00**
	11/16/06	<10.00	380.00	380.00	**11,000.00**	<0.50	<20.00 HC	**1,100.00**	539.00	694.00	43.30	5,580.00	**22,000.00**
	11/15/07	<10.00	359.00	359.00	**2,380.00**	1.26	3.74 D1	252 D1	141.00	137.00	16.00	1,100 D1	**5,280.00**
Dup	11/15/07	<10.00	208.00	208.00	**2,620.00**	1.24	3.85 D1	316 D1	136.00	133.00	15.50	1,040 D1	**5,360.00**
	11/12/08	<5.00	210.00	210.00	**370.00**	0.82	1.90	97.00	66.00	34.00	5.00	190.00	920.00
	11/04/09	<5.00	170.00	170.00	**1,700.00**	1.10	2.60	250.00	110.00	120.00	22.00	750.00	**3,800.00**
	11/11/10	<5.00	192.00	192.00	**1,340.00**	0.72	2.72	204.00	95.50	104.00	12.60	792.00	**2,830.00**
	11/10/11	<5.00	396.00	396.00	**14,000.00**	**3.32**	9.16	**1,540.00**	942.00	1,260.00	44.60	8,720.00	**32,200.00**
	10/11/12	<5.00	263.00	263.00	**6,530.00**	**2.19**	4.75	**625.00**	314.00	445.00	28.00	3,490.00	**10,100.00**
Dup	10/11/12	<5.00	286.00	286.00	**2,440.00**	0.31	1.23	194.00	128.00	156.00	18.60	1,260.00	**17000****
	10/08/13	<6.00	285.00	285.00	**6,050.00**	0.95	4.29	546.00	760.00	919.00	39.00	6,370.00	**11,200.00**
Dup	10/08/13	<6.00	216.00	216.00	**10,500.00**	1.27	5.98	**926.00**	490.00	581.00	31.40	4,170.00	**1870****
	10/07/14	<4.00	207.00	207.00	**2,240.00**	1.36	3.62	338.00	69.60	106.00	24.00	1,130.00	**2,760.00**
Dup	10/07/14	<4.00	192.00	192.00	**2,570.00**	**2.51**	3.70	363.00	82.30	125.00	26.80	1,350.00	**1970****
	10/21/15	--	--	--	**9,110.00**	<80.00	--	**953 J**	--	--	--	--	**15,300.00**
Dup	10/20/15	--	--	--	**10,200.00**	<200.00	--	**1,120 J**	--	--	--	--	**21,600.00**
	12/15/15	--	--	--	**1,130.00**	--	--	--	--	--	--	--	**2,290.00**
	12/16/15	--	--	--	**1,190.00**	--	--	--	--	--	--	--	**2,580.00**
	12/17/15	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,260.00**
	12/18/15	--	--	--	**988.00**	--	--	--	--	--	--	--	**2,350.00**
	01/04/16	--	--	--	**1,200.00**	--	--	--	--	--	--	--	**2,280.00**
	01/05/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,190.00**
	01/06/16	--	--	--	**1,120.00**	--	--	--	--	--	--	--	**2,240.00**
	01/07/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,200.00**
	01/08/16	--	--	--	**1,310.00**	--	--	--	--	--	--	--	**2,370.00**
	01/11/16	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,210.00**
	01/12/16	--	--	--	**1,520.00**	--	--	--	--	--	--	--	**2,850.00**
	10/18/16	--	--	--	**277.00**	<0.50	--	87.50	--	--	--	--	715.00
Dup	10/18/16	--	--	--	**316.00**	<0.50	--	88.9 J	--	--	--	--	922.00
	10/25/17	--	--	--	**254.00**	1.02	--	75.50	--	--	--	--	**2,040.00**
	10/16/18***	--	--	--	**304.00**	0.61	--	93.40	--	--	--	--	757.00
	10/18/18	--	--	--	**7,870.00**	<0.10	--	**807.00**	--	--	--	--	**15,400.00**
Dup	10/18/18	--	--	--	**7,830.00**	<0.10	--	**873.00**	--	--	--	--	**12,700.00**
	06/20/19	--	--	--	**9,290.00**	--	--	--	--	--	--	--	**22,100.00**
Dup	06/20/19	--	--	--	**9,200.00**	--	--	--	--	--	--	--	**22,800.00**
	11/24/19				**5,780.00**			**722.00**					**12,200.00**
	04/20/20	--	--	--	**9,640.00**	--	--	--	--	--	--	--	**12,700.00**
	10/12/20	--	--	--	**8,470.00**	--	--	--	--	--	--	--	**14,900.00**
	06/25/21	--	--	--	**7,370.00**	--	--	--	--	--	--	--	**13,500.00**
	12/06/21	--	--	--	**7,440.00**	--	--	--	--	--	--	--	**9,490.00**
	08/23/22	--	--	--	***8,180***	--	--	--	--	--	--	--	**6,920**

Appendix C
Cumulative Summary of Groundwater Analytical Results
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
RW-1	12/21/22	--	--	--	**5,070**	--	--	--	--	--	--	--	**3,940**
(Continued)	07/20/23	--	--	--	**3,440**	--	--	--	--	--	--	--	**2,790**
Dup	07/20/23	--	--	--	**4,340**	--	--	--	--	--	--	--	**3,190**
	11/13/23	--	--	--	**2,160**	--	--	--	--	--	--	--	**6,540**
Dup	11/13/23	--	--	--	**1,810**	--	--	--	--	--	--	--	**3,530**
	07/31/24				**1,540**								**13,900**
Dup	07/31/24	--	--	--	**1,680**	--	--	--	--	--	--	--	**9,820**
	11/12/24				**2,220**			--					**4,280**
Dup	11/12/24	--	--	--	**5,890**	--	--	--	--	--	--	--	**6,980**
RW-2	05/22/03	324.00	<4.00	780.00	**1,580.00**	<2.00	2.43	23.90	1,060.00	<0.500	20.20	258.00	**4,310.00**
	11/26/03	64.00	<4.00	704.00	**1,480.00**	<5.00	5.81	38.30	988.00	<0.500	23.80	240.00	**3,535.00**
	11/17/04	104.00	<4.00	692.00	**2,280.00**	<10.00	<10.00	116.00	1,180.00	<0.500	18.50	415.00	**3,915.00**
	11/17/05	281.00	<10.00	422.00	**1,770.00**	0.89	0.60	175 D1	861.00	16.60	13.10	361.00	**7,350.00**
	11/16/06	49.00	150.00	199.00	**2,500.00**	0.57	1.90	370.00	978.00	48.80	18.00	437.00	**5,270.00**
	11/15/07	170.00	37.80	208.00	**1,680.00**	0.49	1.52	166 D1	586.00	<5.000	11.20	245.00	**5,590.00**
	11/12/08	150.00	<5.00	390.00	**2,500.00**	<0.50	0.24	250.00	1,200.00	<0.38	6.00	400.00	**4,800.00**
	11/04/09	34.00	<5.00	220.00	**2,200.00**	<0.50	1.70	240.00	940.00	0.18	16.00	420.00	**6,300.00**
	11/11/10	113.00	<5.00	172.00	**2,100.00**	<0.50	2.03	233.00	967.00	4.06	8.86	426.00	**4,550.00**
	11/10/11	36.90	<5.00	384.00	**4,330.00**	<10.00	2.13	305.00	2,040.00	1.12	18.70	711.00	**8,300.00**
	10/11/12	27.10	<5.00	202.00	**1,920.00**	<0.50	1.93	223.00	842.00	0.46	9.30	385.00	**6,680.00**
Dup	10/11/12	31.90	<5.00	206.00	**2,310.00**	<0.50	1.98	228.00	1,090.00	2.42	10.50	430.00	**5,250.00**
	10/08/13	66.30	<6.00	117.00	**2,450.00**	0.14	2.36	309.00	1,570.00	2.15	15.30	639.00	**4,420.00**
	10/07/14	35.20	<4.00	35.20	**2,250.00**	<0.10	2.52	378.00	995.00	21.60	10.30	408.00	**3,090.00**
	10/20/15	--	--	--	**699.00**	<20.00	--	118.00	--	--	--	--	**2,190.00**
	12/15/15	--	--	--	**1,130.00**	--	--	--	--	--	--	--	**2,290.00**
	12/16/15	--	--	--	**1,190.00**	--	--	--	--	--	--	--	**2,580.00**
	12/17/15	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,260.00**
	12/18/15	--	--	--	**988.00**	--	--	--	--	--	--	--	**2,350.00**
	01/04/16	--	--	--	**1,200.00**	--	--	--	--	--	--	--	**2,280.00**
	01/05/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,190.00**
	01/06/16	--	--	--	**1,120.00**	--	--	--	--	--	--	--	**2,240.00**
	01/07/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,200.00**
	01/08/16	--	--	--	**1,310.00**	--	--	--	--	--	--	--	**2,370.00**
	01/11/16	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,210.00**
	01/12/16	--	--	--	**1,520.00**	--	--	--	--	--	--	--	**2,850.00**
	10/18/16	--	--	--	**1,450.00**	<0.50	--	270.00	--	--	--	--	**3,910.00**
	10/25/17	--	--	--	**1,760.00**	<5.00	--	288.00	--	--	--	--	**4,440.00**
	10/18/18	--	--	--	**3,640.00**	<0.10	--	534.00	--	--	--	--	**6,890.00**
	06/20/19	--	--	--	**3,180.00**	--	--	--	--	--	--	--	**10,200 H**
	11/24/19				**3,510.00**			464.00					**9,880.00**
	04/20/20	--	--	--	**3,610.00**	--	--	--	--	--	--	--	**7,890.00**
	10/12/20	--	--	--	**3,070.00**	--	--	--	--	--	--	--	**5,140.00**
Dup	10/12/20	--	--	--	**2,990.00**	--	--	--	--	--	--	--	**5,460.00**
	06/25/21	--	--	--	**1,150.00**	--	--	--	--	--	--	--	**2,270.00**
Dup	06/25/21	--	--	--	**1,690.00**	--	--	--	--	--	--	--	**3,340.00**
	12/07/21	--	--	--	**582.00**	--	--	--	--	--	--	--	**1,040.00**
Dup	12/07/21	--	--	--	**567.00**	--	--	--	--	--	--	--	**1,250.00**
	08/23/22				**948**	--	--	--	--	--	--	--	***2,390***
Dup	08/23/22	--	--	--	**1,390**	--	--	--	--	--	--	--	***3,860***
	12/21/22	--	--	--	232	--	--	--	--	--	--	--	824 J3
	07/20/23	--	--	--	**2,910**	--	--	--	--	--	--	--	**4,950**
Dup	07/20/23	--	--	--	**2,840**	--	--	--	--	--	--	--	**4,310**
	11/14/23	--	--	--	**890**	--	--	--	--	--	--	--	**2,640**
	07/31/24	--	--	--	**533**	--	--	--	--	--	--	--	**3,510**
	11/13/24	--	--	--	**747**	--	--	--	--	--	--	--	**1,370**
RW-2R	10/08/13	<6.00	146.00	146.00	**6,550.00**	0.45	1.79	**762.00**	1,850.00	616.00	25.50	1,350.00	**14,600.00**
	10/07/14	<4.00	169.00	169.00	**5,400.00**	1.56	2.17	**707.00**	1,280.00	470.00	20.90	1,170.00	**13,200.00**
	10/20/15	--	--	--	**5,990.00**	<80.00	--	**806.00**	--	--	--	--	**16,200.00**
	10/18/16	--	--	--	**6,390.00**	<0.50	--	**797.00**	--	--	--	--	**15,200.00**
	10/25/17	--	--	--	**7,030.00**	<5.00	--	**872.00**	--	--	--	--	**12,300.00**
	10/16/18***	--	--	--	**1,960.00**	<0.10	--	467.00	--	--	--	--	**3,380.00**
	10/18/18	--	--	--	**7,920.00**	<0.10	--	**891.00**	--	--	--	--	**13,700.00**
Dup	10/18/18	--	--	--	**8,060.00**	<0.10	--	**815.00**	--	--	--	--	**13,300.00**
	06/20/19	--	--	--	**7,860.00**	--	--	--	--	--	--	--	**29,400.00**
	11/24/19				**7,720.00**			**943.00**					**21,000.00**
	04/20/20	--	--	--	**9,210.00**	--	--	--	--	--	--	--	**21,500.00**
	10/12/20	--	--	--	**7,860.00**	--	--	--	--	--	--	--	**13,800.00**
	06/25/21	--	--	--	**7,250.00**	--	--	--	--	--	--	--	**12,400.00**
	12/07/21	--	--	--	**7,400.00**	--	--	--	--	--	--	--	**6,330.00**
	08/23/22	--	--	--	**8,070**	--	--	--	--	--	--	--	**10,100**
	12/21/22	--	--	--	**7,480**	--	--	--	--	--	--	--	**14,600**
	07/20/23	--	--	--	**8,290**	--	--	**904**	--	--	--	--	**17,100**

Appendix C
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Lea County, New Mexico

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
RW-2R (Continued) Dup	11/14/23	--	--	--	**8,300**	--	--	--	--	--	--	--	**13,500**
	07/31/24	--	--	--	**7,590**	--	--	**845**	--	--	--	--	**20,100**
	07/31/24	--	--	--	**8,010**	--	--	**881**	--	--	--	--	**18,400**
	11/13/24	--	--	--	**8,080**	--	--	**--**	--	--	--	--	**18,600**

Notes:
1. Bold and Italics value indicates a laboratory detection and New Mexico Water Quality Control Commission (NMWQCC) exceedance.
2. Results shown in mg/L.
3. NS - Not Sampled.
4. D1 - The analysis was performed at a dilution due to the high analyte concentration.
5. B - The same anlayte is found in the associated blank.
6. H - The analysis was performed past holding time.
7. C - Elevated detection limit due to matrix effect.
8. J - Estimated Concentration.
9. J3 - The associated batch QC was outside the established quality control range for precision.
10. J6- The sample matrix interfered with the ability to make any accurate determination; spike value is low.
11. < - Analyte detected below quantitation limit.
12. -- - Not Analysed
13. [1] Human Health Standards for Groundwater.
14. [2] Other Standards for Domestic Water Supply.
15. * - Indicates groundwater monitor well installed off-Site and upgradient of plume.
16. ** - Reported TDS concentration includes a low bias. Not used in trend comparison.
17. *** - Indicates groundwater monitor well that was sampled prior to semiannual groundwater event via low-flow purge for internal use.

Appendix D

Cumulative Summary of Groundwater Potentiometric Elevation Data

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-1	05/18/98	135.05	3184.95	----	173.00	2.00	153-173
3320.00	05/25/99	134.93	3185.07	----	---	---	---
	02/08/01	134.80	3185.20	----	---	---	---
	05/10/02	134.77	3185.23	----	---	---	---
	10/22/02	134.89	3185.11	----	---	---	---
	05/20/03	135.17	3184.83	----	---	---	---
	11/24/03	134.70	3185.30	----	---	---	---
	05/11/04	134.75	3185.25	----	---	---	---
	11/15/04	134.76	3185.24	----	---	---	---
	05/17/05	134.29	3185.71	----	---	---	---
	11/15/05	134.93	3185.07	----	---	---	---
	05/08/06	134.68	3185.32	----	---	---	---
	11/13/06	134.62	3185.38	----	---	---	---
	05/29/07	134.71	3185.29	----	---	---	---
	11/16/07	134.70	3185.30	----	---	---	---
	05/14/08	134.73	3185.27	----	---	---	---
	11/03/08	134.69	3185.31	----	---	---	---
	05/19/09	134.64	3185.36	----	---	---	---
	11/02/09	134.71	3185.29	----	---	---	---
	05/05/10	134.90	3185.10	----	---	---	---
	11/08/10	134.50	3185.50	----	---	---	---
	05/11/11	134.60	3185.40	----	---	---	---
	11/08/11	134.64	3185.36	----	---	---	---
	05/16/12	134.60	3185.40	----	---	---	---
	10/10/12	134.73	3185.27	----	---	---	---
	05/16/13	134.58	3185.42	----	---	---	---
	10/08/13	134.53	3185.47	----	---	---	---
	05/01/14	134.70	3185.30	----	---	---	---
	10/05/14	134.49	3185.51	----	---	---	---
	05/21/15	134.56	3185.44	----	---	---	---
	10/19/15	134.80	3185.20	----	---	---	---
	05/25/16	134.69	3185.31	171.01	---	---	---
	10/17/16	134.35	3185.65	170.93	---	---	---
	05/10/17	134.44	3185.56	135.45	---	---	---
3321.94	10/24/17	134.63	3187.31	171.10	---	---	---
	05/22/18	134.45	3187.49	----	---	---	---
	10/17/18	134.54	3187.40	----	---	---	---
	06/20/19	134.56	3187.38	171.17	---	---	---
	11/20/19	134.45	3187.49	174.20	---	---	---
	04/13/20	134.56	3187.38	169.91	---	---	---
	10/12/20	134.72	3187.22	168.44	---	---	---
	06/21/21	134.58	3187.36	169.05	---	---	---
	12/06/21	134.57	3187.37	170.94	---	---	---
	08/22/22	134.47	3187.47	169.05	---	---	---
	12/21/22	134.38	3187.56	140.84	---	---	---
	07/20/23	134.52	3187.42	169.98	---	---	---
	11/13/23	134.45	3187.49	169.81	---	---	---
	07/30/24	134.41	3187.53	169.58	---	---	---
	11/12/24	134.36	3187.58	169.59	---	---	---

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Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-2	05/18/98	135.00	3184.86	----	173.00	2.00	163-173
3319.86	05/25/99	134.79	3185.07	----	---	---	---
	02/08/01	134.63	3185.23	----	---	---	---
	05/10/02	134.65	3185.21	----	---	---	---
	10/22/02	134.72	3185.14	----	---	---	---
	05/20/03	134.95	3184.91	----	---	---	---
	11/24/03	134.56	3185.30	----	---	---	---
	05/11/04	134.55	3185.31	----	---	---	---
	11/15/04	134.53	3185.33	----	---	---	---
	05/17/05	134.39	3185.47	----	---	---	---
	11/15/05	134.77	3185.09	----	---	---	---
	05/08/06	134.52	3185.34	----	---	---	---
	11/13/06	134.44	3185.42	----	---	---	---
	05/29/07	134.54	3185.32	----	---	---	---
	11/14/07	134.52	3185.34	----	---	---	---
	05/14/08	134.53	3185.33	----	---	---	---
	11/03/08	134.44	3185.42	----	---	---	---
	05/19/09	134.46	3185.40	----	---	---	---
	11/16/09	134.51	3185.35	----	---	---	---
	05/05/10	134.62	3185.24	----	---	---	---
	11/08/10	134.25	3185.61	----	---	---	---
	05/11/11	134.31	3185.55	----	---	---	---
	11/08/11	134.36	3185.50	----	---	---	---
	05/16/12	134.31	3185.55	----	---	---	---
	10/10/12	134.51	3185.35	----	---	---	---
	05/16/13	134.33	3185.53	----	---	---	---
	10/07/13	142.85	3177.01	----	---	---	---
	05/01/14	134.37	3185.49	----	---	---	---
	10/05/14	134.14	3185.72	----	---	---	---
	05/21/15	134.21	3185.65	----	---	---	---
	10/19/15	134.20	3185.66	----	---	---	---
	05/25/16	134.38	3185.48	170.95	---	---	---
	10/17/16	134.00	3185.86	170.80	---	---	---
	05/10/17	134.13	3185.73	171.40	---	---	---
3321.27	10/25/17	134.32	3186.95	170.90	---	---	---
	05/22/18	134.11	3187.16	----	---	---	---
	10/17/18	134.21	3187.06	----	---	---	---
	06/20/19	134.27	3187.00	168.39	---	---	---
	11/20/19	134.21	3187.06	168.57	---	---	---
	04/13/20	134.2	3187.07	168.52	---	---	---
	10/12/20	134.49	3186.78	168.63	---	---	---
	06/21/21	134.39	3186.88	169.68	---	---	---
	12/06/21	134.21	3187.06	170.67	---	---	---
	08/22/22	134.16	3187.11	169.68	---	---	---
	12/21/22	143.07	3178.20	170.06	---	---	---
	07/20/23	134.20	3187.07	170.45	---	---	---
	11/13/23	134.11	3187.16	169.02	---	---	---
	07/30/24	134.12	3187.15	168.98	---	---	---
	11/12/24	134.05	3187.22	168.97	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-2A	05/18/98	134.80	3185.06	----	145	2.00	130-145
3319.86	05/25/99	134.73	3185.13	----	---	---	---
	02/08/01	134.58	3185.28	----	---	---	---
	05/10/02	134.50	3185.36	----	---	---	---
	10/22/02	134.66	3185.20	----	---	---	---
	05/20/03	135.80	3184.06	----	---	---	---
	11/24/03	134.60	3185.26	----	---	---	---
	05/11/04	134.53	3185.33	----	---	---	---
	11/15/04	134.58	3185.28	----	---	---	---
	05/17/05	134.47	3185.39	----	---	---	---
	11/15/05	134.74	3185.12	----	---	---	---
	05/08/06	134.46	3185.40	----	---	---	---
	11/13/06	134.39	3185.47	----	---	---	---
	05/29/07	134.50	3185.36	----	---	---	---
	11/14/07	134.48	3185.38	----	---	---	---
	05/14/08	134.49	3185.37	----	---	---	---
	11/03/08	134.46	3185.40	----	---	---	---
	05/19/09	134.42	3185.44	----	---	---	---
	11/02/09	134.45	3185.41	----	---	---	---
	05/05/10	134.52	3185.34	----	---	---	---
	11/08/10	134.30	3185.56	----	---	---	---
	05/11/11	134.38	3185.48	----	---	---	---
	11/08/11	134.42	3185.44	----	---	---	---
	05/16/12	134.43	3185.43	----	---	---	---
	10/10/12	134.65	3185.21	----	---	---	---
	05/16/13	134.35	3185.51	----	---	---	---
	10/07/13	134.20	3185.66	----	---	---	---
	05/01/14	134.45	3185.41	----	---	---	---
	10/05/14	134.15	3185.71	----	---	---	---
	05/21/15	134.32	3185.54	----	---	---	---
	10/19/15	134.40	3185.46	----	---	---	---
	05/25/16	134.49	3185.37	142.39	---	---	---
	10/17/16	134.10	3185.76	142.20	---	---	---
	05/10/17	134.29	3185.57	142.67	---	---	---
3321.30	10/25/17	134.40	3186.90	142.20	---	---	---
	05/22/18	134.31	3186.99	----	---	---	---
	10/17/18	134.31	3186.99	----	---	---	---
	06/20/19	134.43	3186.87	142.47	---	---	---
	11/20/19	134.24	3187.06	142.23	---	---	---
	04/13/20	134.29	3187.01	142.29	---	---	---
	10/12/20	134.45	3186.85	142.86	---	---	---
	06/21/21	134.29	3187.01	142.16	---	---	---
	12/06/21	134.29	3187.01	142.15	---	---	---
	08/22/22	134.23	3187.07	142.16	---	---	---
	12/21/22	134.14	3187.16	142.17	---	---	---
	07/20/23	134.25	3187.05	142.15	---	---	---
	11/13/23	134.19	3187.11	142.15	---	---	---
	07/30/24	134.18	3187.12	142.19	---	---	---
	11/12/24	134.13	3187.17	142.18	---	---	---

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Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-3	05/18/98	132.65	3185.56	----	171	2.00	161-171
3318.21	05/25/99	132.52	3185.69	----	---	---	---
	02/08/01	132.40	3185.81	----	---	---	---
	05/10/02	132.40	3185.81	----	---	---	---
	10/22/02	132.49	3185.72	----	---	---	---
	05/20/03	132.75	3185.46	----	---	---	---
	11/24/03	132.29	3185.92	----	---	---	---
	05/11/04	132.38	3185.83	----	---	---	---
	11/15/04	132.46	3185.75	----	---	---	---
	05/17/05	132.32	3185.89	----	---	---	---
	11/15/05	132.55	3185.66	----	---	---	---
	05/08/06	132.32	3185.89	----	---	---	---
	11/13/06	132.27	3185.94	----	---	---	---
	05/29/07	132.36	3185.85	----	---	---	---
	11/16/07	132.34	3185.87	----	---	---	---
	05/14/08	132.36	3185.85	----	---	---	---
	11/03/08	132.31	3185.90	----	---	---	---
	05/19/09	132.25	3185.96	----	---	---	---
	11/02/09	132.37	3185.84	----	---	---	---
	05/05/10	132.48	3185.73	----	---	---	---
	11/08/10	132.14	3186.07	----	---	---	---
	05/11/11	132.24	3185.97	----	---	---	---
	11/08/11	132.30	3185.91	----	---	---	---
	05/16/12	132.25	3185.96	----	---	---	---
	10/10/12	132.54	3185.67	----	---	---	---
	05/16/13	132.25	3185.96	----	---	---	---
	10/08/13	132.14	3186.07	----	---	---	---
	05/01/14	132.10	3186.11	----	---	---	---
	10/05/14	132.58	3185.63	----	---	---	---
	05/21/15	132.25	3185.96	----	---	---	---
	10/19/15	132.25	3185.96	----	---	---	---
	05/25/16	132.34	3185.87	171.93	---	---	---
	10/17/16	132.00	3186.21	171.83	---	---	---
	05/10/17	132.21	3186.00	162.35	---	---	---
3320.08	10/24/17	132.30	3187.78	171.97	---	---	---
	05/22/18	132.15	3187.93	----	---	---	---
	10/17/18	132.21	3187.87	----	---	---	---
	06/20/19	132.24	3187.84	171.93	---	---	---
	11/19/19	132.5	3187.58	175.90	---	---	---
	04/13/20	132.32	3187.76	161.64	---	---	---
	10/12/20	132.36	3187.72	161.09	---	---	---
	06/22/21	132.12	3187.96	171.84	---	---	---
	12/06/21	132.16	3187.92	171.98	---	---	---
	08/22/22	132.03	3188.05	171.84	---	---	---
	12/21/22	132.00	3188.08	171.85	---	---	---
	07/21/23	132.21	3187.87	171.98	---	---	---
	11/13/23	132.07	3188.01	171.80	---	---	---
	07/31/24	132.06	3188.02	172.27	---	---	---
	11/12/24	131.96	3188.12	172.29	---	---	---

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Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-4	05/18/98	136.01	3183.73	----	171.00	2.00	161-171
3319.74	05/25/99	135.57	3184.17	----	---	---	---
	02/08/01	135.87	3183.87	----	---	---	---
	05/10/02	135.67	3184.07	----	---	---	---
	10/22/02	135.90	3183.84	----	---	---	---
	05/20/03	136.00	3183.74	----	---	---	---
	11/24/03	135.70	3184.04	----	---	---	---
	05/11/04	135.34	3184.40	----	---	---	---
	11/15/04	135.76	3183.98	----	---	---	---
	05/17/05	135.69	3184.05	----	---	---	---
	11/15/05	135.85	3183.89	----	---	---	---
	05/08/06	135.60	3184.14	----	---	---	---
	11/13/06	135.59	3184.15	----	---	---	---
	05/29/07	135.75	3183.99	----	---	---	---
	11/14/07	135.62	3184.12	----	---	---	---
	05/14/08	135.76	3183.98	----	---	---	---
	11/03/08	135.66	3184.08	----	---	---	---
	05/19/09	135.67	3184.07	----	---	---	---
	11/02/09	135.68	3184.06	----	---	---	---
	05/05/10	135.83	3183.91	----	---	---	---
	11/08/10	135.36	3184.38	----	---	---	---
	05/05/11	135.40	3184.34	----	---	---	---
	11/08/11	135.43	3184.31	----	---	---	---
	05/16/12	135.38	3184.36	----	---	---	---
	10/10/12	135.55	3184.19	----	---	---	---
	05/16/13	135.38	3184.36	----	---	---	---
	10/07/13	135.53	3184.21	----	---	---	---
	05/01/14	135.41	3184.33	----	---	---	---
	10/05/14	135.61	3184.13	----	---	---	---
	05/21/15	135.25	3184.49	----	---	---	---
	10/19/15	135.70	3184.04	----	---	---	---
	05/25/16	135.44	3184.30	171.79	---	---	---
	10/17/16	135.11	3184.63	173.06	---	---	---
	05/10/17	135.20	3184.54	169.58	---	---	---
3321.58	10/25/17	135.40	3186.18	172.1	---	---	---
	05/22/18	135.13	3186.45	----	---	---	---
	10/16/18	135.32	3186.26	----	---	---	---
	06/20/19	136.21	3185.37	171.81	---	---	---
	11/19/19	135.06	3186.52	177.64	---	---	---
	04/15/20	135.25	3186.33	171.71	---	---	---
	10/12/20	135.41	3186.17	171.71	---	---	---
	06/21/21	135.28	3186.30	171.95	---	---	---
	12/06/21	135.23	3186.35	171.73	---	---	---
	08/22/22	135.27	3186.31	171.95	---	---	---
	12/21/22	134.98	3186.60	171.64	---	---	---
	07/20/23	135.24	3186.34	171.81	---	---	---
	11/13/23	135.10	3186.48	171.53	---	---	---
	07/30/24	135.15	3186.43	171.77	---	---	---
	11/12/24	135.03	3186.55	171.79	---	---	---

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Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-4A	05/18/98	135.68	3183.90	----	143.00	2.00	128-143
3319.58	05/21/99	135.65	3183.93	----	---	---	---
	05/25/99	135.90	3183.68	----	---	---	---
	02/08/01	135.34	3184.24	----	---	---	---
	05/10/02	135.30	3184.28	----	---	---	---
	10/22/02	135.51	3184.07	----	---	---	---
	05/20/03	135.55	3184.03	----	---	---	---
	11/24/03	135.31	3184.27	----	---	---	---
	05/11/04	135.72	3183.86	----	---	---	---
	11/15/04	135.38	3184.20	----	---	---	---
	05/17/05	135.32	3184.26	----	---	---	---
	11/15/05	135.52	3184.06	----	---	---	---
	05/08/06	135.26	3184.32	----	---	---	---
	11/13/06	135.20	3184.38	----	---	---	---
	05/29/07	135.32	3184.26	----	---	---	---
	11/14/07	135.20	3184.38	----	---	---	---
	05/14/08	135.31	3184.27	----	---	---	---
	11/03/08	135.27	3184.31	----	---	---	---
	05/19/09	135.25	3184.33	----	---	---	---
	11/02/09	135.25	3184.33	----	---	---	---
	05/05/10	135.33	3184.25	----	---	---	---
	11/08/10	135.18	3184.40	----	---	---	---
	05/11/11	135.17	3184.41	----	---	---	---
	11/08/11	135.22	3184.36	----	---	---	---
	05/16/12	135.18	3184.40	----	---	---	---
	10/10/12	135.33	3184.25	----	---	---	---
	05/16/13	135.20	3184.38	----	---	---	---
	10/07/13	135.01	3184.57	----	---	---	---
	05/01/14	135.26	3184.32	----	---	---	---
	10/05/14	135.05	3184.53	----	---	---	---
	05/21/15	135.11	3184.47	----	---	---	---
	10/19/15	135.20	3184.38	----	---	---	---
	05/25/16	135.27	3184.31	145.55	---	---	---
	10/17/16	135.00	3184.58	145.61	---	---	---
	05/10/17	135.01	3184.57	145.51	---	---	---
3321.42	10/25/17	135.22	3186.20	145.60	---	---	---
	05/22/18	134.97	3186.45	----	---	---	---
	10/16/18	135.11	3186.31	----	---	---	---
	06/20/19	134.98	3186.44	145.55	---	---	---
	11/19/19	134.95	3186.47	147.60	---	---	---
	04/15/20	136.09	3185.33	145.35	---	---	---
	10/12/20	136.13	3185.29	145.46	---	---	---
	06/21/21	135.15	3186.27	145.39	---	---	---
	12/06/21	135.08	3186.34	145.49	---	---	---
	08/22/22	135.05	3186.37	145.39	---	---	---
	12/21/22	134.86	3186.56	145.19	---	---	---
	07/20/23	135.06	3186.36	145.64	---	---	---
	11/13/23	134.98	3186.44	145.65	---	---	---
	07/30/24	134.97	3186.45	145.98	---	---	---
	11/12/24	134.93	3186.49	145.97	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-5	05/18/98	137.42	3183.68	----	171.00	2.00	161-171
3321.10	05/25/99	137.28	3183.82	----	---	---	---
	02/08/01	137.18	3183.92	----	---	---	---
	05/10/02	137.10	3184.00	----	---	---	---
	10/22/02	137.04	3184.06	----	---	---	---
	05/20/03	137.45	3183.65	----	---	---	---
	11/24/03	137.01	3184.09	----	---	---	---
	05/11/04	137.01	3184.09	----	---	---	---
	11/15/04	137.08	3184.02	----	---	---	---
	05/17/05	137.00	3184.10	----	---	---	---
	11/15/05	137.18	3183.92	----	---	---	---
	05/08/06	136.90	3184.20	----	---	---	---
	11/13/06	136.81	3184.29	----	---	---	---
	05/29/07	136.92	3184.18	----	---	---	---
	11/14/07	136.85	3184.25	----	---	---	---
	05/14/08	136.97	3184.13	----	---	---	---
	11/03/08	136.89	3184.21	----	---	---	---
	05/19/09	136.90	3184.20	----	---	---	---
	11/02/09	136.90	3184.20	----	---	---	---
	05/05/10	137.02	3184.08	----	---	---	---
	11/08/10	136.93	3184.17	----	---	---	---
	05/11/11	136.92	3184.18	----	---	---	---
	11/08/11	136.84	3184.26	----	---	---	---
	05/16/12	136.80	3184.30	----	---	---	---
	10/10/12	136.98	3184.12	----	---	---	---
	05/16/13	136.80	3184.30	----	---	---	---
	10/07/13	136.79	3184.31	----	---	---	---
	05/01/14	136.83	3184.27	----	---	---	---
	10/05/14	136.63	3184.47	----	---	---	---
	05/21/15	130.60	3190.50	----	---	---	---
	10/19/15	136.70	3184.40	----	---	---	---
	05/25/16	136.79	3184.31	173.60	---	---	---
	10/17/16	136.51	3184.59	173.67	---	---	---
	05/10/17	136.53	3184.57	173.48	---	---	---
3322.98	10/25/17	136.80	3186.18	174.01	---	---	---
	05/22/18	136.51	3186.47	----	---	---	---
	10/16/18	136.58	3186.40	----	---	---	---
	06/20/19	136.65	3186.33	173.72	---	---	---
	11/19/19	136.91	3186.07	177.50	---	---	---
	04/15/20	136.48	3186.50	173.46	---	---	---
	10/12/20	136.78	3186.20	173.84	---	---	---
	06/21/21	136.64	3186.34	173.62	---	---	---
	12/06/21	136.58	3186.40	179.65	---	---	---
	08/22/22	136.52	3186.46	173.62	---	---	---
	12/21/22	136.38	3186.60	173.59	---	---	---
	07/20/23	136.56	3186.42	173.89	---	---	---
	11/13/23	136.45	3186.53	173.52	---	---	---
	07/30/24	136.45	3186.53	174.16	---	---	---
	11/12/24	136.39	3186.59	174.17	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-5A	05/18/98	137.20	3183.87	----	141.00	2.00	126-141
3321.07	05/25/99	137.11	3183.96	----	---	---	---
	02/08/01	136.99	3184.08	----	---	---	---
	05/10/02	136.90	3184.17	----	---	---	---
	10/22/02	137.17	3183.90	----	---	---	---
	05/20/03	137.24	3183.83	----	---	---	---
	11/24/03	136.91	3184.16	----	---	---	---
	05/11/04	136.88	3184.19	----	---	---	---
	11/15/04	136.92	3184.15	----	---	---	---
	05/17/05	136.83	3184.24	----	---	---	---
	11/15/05	137.06	3184.01	----	---	---	---
	05/08/06	136.80	3184.27	----	---	---	---
	11/13/06	136.74	3184.33	----	---	---	---
	05/29/07	136.82	3184.25	----	---	---	---
	11/14/07	136.88	3184.19	----	---	---	---
	05/14/08	136.83	3184.24	----	---	---	---
	11/03/08	136.81	3184.26	----	---	---	---
	05/19/09	136.78	3184.29	----	---	---	---
	11/02/09	136.80	3184.27	----	---	---	---
	05/05/10	136.91	3184.16	----	---	---	---
	11/08/10	136.69	3184.38	----	---	---	---
	05/11/11	136.87	3184.20	----	---	---	---
	11/08/11	136.77	3184.30	----	---	---	---
	05/16/12	136.74	3184.33	----	---	---	---
	10/10/12	136.85	3184.22	----	---	---	---
	05/16/13	136.72	3184.35	----	---	---	---
	10/07/13	137.45	3183.62	----	---	---	---
	05/01/14	136.81	3184.26	----	---	---	---
	10/05/14	136.61	3184.46	----	---	---	---
	05/21/15	136.68	3184.39	----	---	---	---
	10/19/15	136.55	3184.52	----	---	---	---
	05/25/16	136.84	3184.23	144.01	---	---	---
	10/17/16	136.43	3184.64	144.60	---	---	---
	05/10/17	136.66	3184.41	144.23	---	---	---
	10/25/17	136.80	3184.27	143.97	---	---	---
	05/22/18	136.55	3184.52	----	---	---	---
	10/16/18	136.64	3184.43	----	---	---	---
	06/20/19	144.05	3177.02	176.71	---	---	---
	11/19/19	136.46	3184.61	139.98	---	---	---
	04/15/20	136.60	3184.47	143.91	---	---	---
	10/12/20	136.80	3184.27	144.00	---	---	---
	06/21/21	136.71	3184.36	143.96	---	---	---
	12/06/21	136.56	3184.51	143.94	---	---	---
	08/22/22	136.55	3184.52	143.96	---	---	---
	12/21/22	136.49	3184.58	143.86	---	---	---
	07/20/23	136.66	3184.41	144.02	---	---	---
	11/13/23	136.52	3184.55	144.06	---	---	---
	07/30/24	136.53	3184.54	144.22	---	---	---
	11/12/24	136.45	3184.62	144.22	---	---	---

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Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-6	05/18/98	136.73	3184.42	----	170.00	2.00	120-170
3321.15	05/25/99	136.61	3184.54	----	---	---	---
	02/08/01	136.50	3184.65	----	---	---	---
	05/10/02	136.40	3184.75	----	---	---	---
	10/22/02	136.57	3184.58	----	---	---	---
	05/20/03	136.85	3184.30	----	---	---	---
	11/24/03	136.38	3184.77	----	---	---	---
	05/11/04	136.41	3184.74	----	---	---	---
	11/15/04	136.08	3185.07	----	---	---	---
	05/17/05	136.58	3184.57	----	---	---	---
	11/15/05	136.82	3184.33	----	---	---	---
	05/08/06	136.58	3184.57	----	---	---	---
	11/13/06	136.49	3184.66	----	---	---	---
	05/29/07	136.61	3184.54	----	---	---	---
	11/15/07	136.59	3184.56	----	---	---	---
	05/14/08	136.58	3184.57	----	---	---	---
	11/03/08	136.52	3184.63	----	---	---	---
	05/19/09	136.52	3184.63	----	---	---	---
	11/02/09	136.51	3184.64	----	---	---	---
	05/05/10	136.53	3184.62	----	---	---	---
	11/08/10	136.40	3184.75	----	---	---	---
	05/11/11	Well Casing Damaged					
	11/08/11	Well Casing Damaged					
	05/16/12	Well Casing Damaged					
	10/09/12	Well Casing Damaged					
	09/30/13	Well Plugged and Abandonded 9/30/2013					
MW-6R	05/01/14	136.25	3185.25	----	----	4	136-176
3321.50	10/05/14	136.40	3185.10	----	---	---	---
	05/21/15	136.13	3185.37	----	---	---	---
	10/19/15	136.20	3185.30	----	---	---	---
	05/25/16	136.27	3185.23	177.80	---	---	---
	10/17/16	135.96	3185.54	176.00	---	---	---
	05/10/17	136.07	3185.43	179.88	---	---	---
3323.04	10/25/17	136.20	3186.84	178.78	---	---	---
	05/22/18	136.03	3187.01	----	---	---	---
	10/17/18	136.09	3186.95	----	---	---	---
	06/20/19	----	----	----	---	---	---
	11/19/19	136.04	3187.00	187.37	---	---	---
	04/13/20	135.97	3187.07	177.82	---	---	---
	10/12/20	136.27	3186.77	184.73	---	---	---
	06/21/21	163.11	3159.93	177.85	---	---	---
	12/06/21	136.09	3186.95	177.74	---	---	---
	08/22/22	136.02	3187.02	177.85	---	---	---
	12/21/22	135.91	3187.13	177.74	---	---	---
	07/20/23	136.07	3186.97	179.01	---	---	---
	11/13/23	135.97	3187.07	179.09	---	---	---
	07/30/24	135.48	3187.56	177.55	---	---	---
	11/12/24	135.94	3187.10	177.55	---	---	---

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Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-7	05/18/98	136.19	3182.20	----	166.00	2.00	151-166
3318.39	05/25/99	135.98	3182.41	----	---	---	---
	02/08/01	135.87	3182.52	----	---	---	---
	05/10/02	135.67	3182.72	----	---	---	---
	10/22/02	135.89	3182.50	----	---	---	---
	05/20/03	136.12	3182.27	----	---	---	---
	11/24/03	135.71	3182.68	----	---	---	---
	05/11/04	135.74	3182.65	----	---	---	---
	11/15/04	135.78	3182.61	----	---	---	---
	05/17/05	135.68	3182.71	----	---	---	---
	11/15/05	135.90	3182.49	----	---	---	---
	05/08/06	135.64	3182.75	----	---	---	---
	11/13/06	135.58	3182.81	----	---	---	---
	05/29/07	135.73	3182.66	----	---	---	---
	11/15/07	135.64	3182.75	----	---	---	---
	05/14/08	135.68	3182.71	----	---	---	---
	11/03/08	135.66	3182.73	----	---	---	---
	05/19/09	135.63	3182.76	----	---	---	---
	11/02/09	135.65	3182.74	----	---	---	---
	05/05/10	135.80	3182.59	----	---	---	---
	11/08/10	135.51	3182.88	----	---	---	---
	05/11/11	135.68	3182.71	----	---	---	---
	11/08/11	135.62	3182.77	----	---	---	---
	05/16/12	135.55	3182.84	----	---	---	---
	10/10/12	135.79	3182.60	----	---	---	---
	05/16/13	135.59	3182.80	----	---	---	---
	10/07/13	NS	NS	----	---	---	---
	05/01/14	135.65	3182.74	----	---	---	---
	10/05/14	135.58	3182.81	----	---	---	---
	05/21/15	135.52	3182.87	----	---	---	---
	10/19/15	135.54	3182.85	----	---	---	---
	05/25/16	135.75	3182.64	162.18	---	---	---
	10/17/16	135.35	3183.04	163.60	---	---	---
	05/10/17	135.39	3183.00	162.53	---	---	---
3320.19	10/24/17	135.38	3184.81	162.50	---	---	---
	05/22/18	135.39	3184.80	----	---	---	---
	10/15/18	135.59	3184.60	----	---	---	---
	06/20/19	135.48	3184.71	162.60	---	---	---
	11/20/19	135.50	3184.69	162.58	---	---	---
	04/15/20	135.59	3184.60	163.35	---	---	---
	10/12/20	135.64	3184.55	162.75	---	---	---
	06/22/21	135.50	3184.69	162.85	---	---	---
	12/06/21	135.44	3184.75	179.65	---	---	---
	08/22/22	135.40	3184.79	162.85	---	---	---
	12/21/22	135.26	3184.93	162.73	---	---	---
	07/20/23	135.50	3184.69	163.44	---	---	---
	11/13/23	135.37	3184.82	163.20	---	---	---
	07/30/24	135.39	3184.80	163.88	---	---	---
	11/12/24	135.33	3184.86	163.92	---	---	---

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MW-8	05/18/98	134.36	3182.78	----	170.00	2.00	155-170
3317.14	05/25/99	134.21	3182.93	----	---	---	---
	02/08/01	134.08	3183.06	----	---	---	---
	05/10/02	133.95	3183.19	----	---	---	---
	10/22/02	134.18	3182.96	----	---	---	---
	05/20/03	134.38	3182.76	----	---	---	---
	11/24/03	133.99	3183.15	----	---	---	---
	05/11/04	134.02	3183.12	----	---	---	---
	11/15/04	134.11	3183.03	----	---	---	---
	05/17/05	133.97	3183.17	----	---	---	---
	11/15/05	134.21	3182.93	----	---	---	---
	05/08/06	133.94	3183.20	----	---	---	---
	11/13/06	133.90	3183.24	----	---	---	---
	05/29/07	134.02	3183.12	----	---	---	---
	11/15/07	133.76	3183.38	----	---	---	---
	05/15/08	133.98	3183.16	----	---	---	---
	11/03/08	134.01	3183.13	----	---	---	---
	05/19/09	133.97	3183.17	----	---	---	---
	11/02/09	134.00	3183.14	----	---	---	---
	05/05/10	134.08	3183.06	----	---	---	---
	11/08/10	134.03	3183.11	----	---	---	---
	05/11/11	133.98	3183.16	----	---	---	---
	11/08/11	133.96	3183.18	----	---	---	---
	05/16/12	133.84	3183.30	----	---	---	---
	10/10/12	134.15	3182.99	----	---	---	---
	05/16/13	133.94	3183.20	----	---	---	---
	10/07/13	133.90	3183.24	----	---	---	---
	05/01/14	133.91	3183.23	----	---	---	---
	10/05/14	133.75	3183.39	----	---	---	---
	05/21/15	133.88	3183.26	----	---	---	---
	10/19/15	133.88	3183.26	----	---	---	---
	05/25/16	133.86	3183.28	146.27	---	---	---
	10/17/16	133.68	3183.46	147.30	---	---	---
	05/10/17	133.84	3183.30	146.54	---	---	---
3319.06	10/24/17	133.72	3185.34	146.35	---	---	---
	05/22/18	133.77	3185.29	----	---	---	---
	10/17/18	133.87	3185.19	----	---	---	---
	06/20/19	133.87	3185.19	146.85	---	---	---
	11/20/19	133.84	3185.22	146.92	---	---	---
	04/15/20	133.81	3185.25	146.58	---	---	---
	10/12/20	133.96	3185.10	146.45	---	---	---
	06/22/21	133.74	3185.32	146.80	---	---	---
	12/06/21	133.74	3185.32	146.48	---	---	---
	08/22/22	133.68	3185.38	146.80	---	---	---
	12/21/22	133.64	3185.42	146.92	---	---	---
	07/20/23	133.81	3185.25	146.91	---	---	---
	11/13/23	133.72	3185.34	146.94	---	---	---
	07/30/24	133.60	3185.46	146.76	---	---	---
	11/12/24	133.61	3185.45	146.81	---	---	---

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Cooper-Jal Unit South Injection Station
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Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-9	05/18/98	132.89	3179.90	----	164.00	2.00	149-164
3312.79	05/25/99	132.68	3180.11	----	---	---	---
	02/08/01	132.52	3180.27	----	---	---	---
	05/10/02	137.20	3175.59	----	---	---	---
	10/22/02	132.56	3180.23	----	---	---	---
	05/20/03	132.75	3180.04	----	---	---	---
	11/24/03	132.35	3180.44	----	---	---	---
	05/11/04	132.39	3180.40	----	---	---	---
	11/15/04	132.43	3180.36	----	---	---	---
	05/17/05	132.26	3180.53	----	---	---	---
	11/15/05	132.60	3180.19	----	---	---	---
	05/08/06	132.26	3180.53	----	---	---	---
	11/13/06	132.19	3180.60	----	---	---	---
	05/29/07	132.32	3180.47	----	---	---	---
	11/14/07	132.34	3180.45	----	---	---	---
	05/15/08	132.29	3180.50	----	---	---	---
	11/03/08	132.33	3180.46	----	---	---	---
	05/19/09	132.21	3180.58	----	---	---	---
	11/02/09	132.35	3180.44	----	---	---	---
	05/05/10	132.41	3180.38	----	---	---	---
	11/08/10	132.10	3180.69	----	---	---	---
	05/11/11	132.22	3180.57	----	---	---	---
	11/08/11	132.19	3180.60	----	---	---	---
	05/16/12	132.05	3180.74	----	---	---	---
	10/10/12	132.32	3180.47	----	---	---	---
	05/16/13	132.08	3180.71	----	---	---	---
	10/07/13	131.94	3180.85	----	---	---	---
	05/01/14	Not Measured - Obstruction In Well					
	10/05/14	131.95	3180.84	----	---	---	---
	05/21/15	132.05	3180.74	----	---	---	---
	10/19/15	132.01	3180.78	----	---	---	---
	05/25/16	131.98	3180.81	161.03	---	---	---
	10/17/16	131.91	3180.88	161.51	---	---	---
	05/10/17	131.95	3180.84	145.16	---	---	---
3314.68	10/24/17	131.92	3182.76	161.50	---	---	---
	05/22/18	131.90	3182.78	----	---	---	---
	10/17/18	131.98	3182.70	----	---	---	---
	06/20/19	131.95	3182.73	161.46	---	---	---
	11/20/19	131.86	3182.82	162.00	---	---	---
	04/15/20	139.92	3174.76	161.15	---	---	---
	10/12/20	132.09	3182.59	161.34	---	---	---
	06/22/21	131.94	3182.74	161.43	---	---	---
	12/06/21	131.87	3182.81	161.34	---	---	---
	08/22/22	131.86	3182.82	161.43	---	---	---
	12/21/22	131.68	3183.00	161.92	---	---	---
	07/20/23	131.90	3182.78	161.17	---	---	---
	11/13/23	131.76	3182.92	161.27	---	---	---
	07/31/24	131.83	3182.85	161.71	---	---	---
	11/12/24	131.71	3182.97	161.74	---	---	---

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Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-9A	05/18/98	132.65	3179.91	----	142.00	2.00	127-142
3312.56	05/25/99	132.43	3180.13	----	---	---	---
	02/08/01	132.37	3180.19	----	---	---	---
	05/10/02	137.20	3175.36	----	---	---	---
	10/22/02	132.35	3180.21	----	---	---	---
	05/20/03	132.55	3180.01	----	---	---	---
	11/24/03	132.10	3180.46	----	---	---	---
	05/11/04	132.14	3180.42	----	---	---	---
	11/15/04	132.19	3180.37	----	---	---	---
	05/17/05	132.06	3180.50	----	---	---	---
	11/15/05	132.35	3180.21	----	---	---	---
	05/08/06	132.02	3180.54	----	---	---	---
	11/13/06	131.09	3181.47	----	---	---	---
	05/29/07	132.08	3180.48	----	---	---	---
	11/14/07	132.06	3180.50	----	---	---	---
	05/15/08	132.03	3180.53	----	---	---	---
	11/03/08	131.98	3180.58	----	---	---	---
	05/19/09	132.00	3180.56	----	---	---	---
	11/02/09	131.90	3180.66	----	---	---	---
	05/05/10	131.96	3180.60	----	---	---	---
	11/08/10	131.85	3180.71	----	---	---	---
	05/11/11	132.06	3180.50	----	---	---	---
	11/08/11	131.95	3180.61	----	---	---	---
	05/16/12	131.81	3180.75	----	---	---	---
	10/10/12	132.09	3180.47	----	---	---	---
	05/16/13	131.88	3180.68	----	---	---	---
	10/07/13	131.90	3180.66	----	---	---	---
	05/01/14	Not Measured - Obstruction In Well					
	10/05/14	Not Measured - Obstruction In Well					
	05/21/15	Not Measured - Obstruction In Well					
	10/19/15	131.68	3180.88	----	---	---	---
	05/25/16	131.73	3180.83	140.32	---	---	---
	10/17/16	131.62	3180.94	141.42	---	---	---
	05/10/17	131.68	3180.88	141.07	---	---	---
3314.48	10/24/17	131.60	3182.88	141.57	---	---	---
	05/22/18	131.81	3182.67	----	---	---	---
	10/17/18	131.72	3182.76	----	---	---	---
	06/20/19	131.69	3182.79	141.72	---	---	---
	11/20/19	131.63	3182.85	145.66	---	---	---
	04/15/20	131.5	3182.98	142.05	---	---	---
	10/12/20	131.86	3182.62	142.10	---	---	---
	06/22/21	131.65	3182.83	144.65	---	---	---
	12/06/21	131.64	3182.84	146.19	---	---	---
	08/22/22	131.53	3182.95	144.65	---	---	---
	12/21/22	131.41	3183.07	143.15	---	---	---
	07/20/23	131.60	3182.88	142.10	---	---	---
	11/13/23	131.50	3182.98	142.13	---	---	---
	07/31/24	131.58	3182.90	142.41	---	---	---
	11/12/24	131.50	3182.98	142.45	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-10	05/18/98	137.18	3182.12	----	166.00	2.00	151-166
3319.30	05/25/99	137.04	3182.26	----	---	---	---
	02/08/01	136.88	3182.42	----	---	---	---
	05/10/02	136.80	3182.50	----	---	---	---
	10/22/02	136.91	3182.39	----	---	---	---
	05/20/03	137.13	3182.17	----	---	---	---
	11/24/03	136.71	3182.59	----	---	---	---
	05/11/04	136.77	3182.53	----	---	---	---
	11/15/04	136.82	3182.48	----	---	---	---
	05/17/05	136.34	3182.96	----	---	---	---
	11/15/05	136.95	3182.35	----	---	---	---
	05/08/06	136.65	3182.65	----	---	---	---
	11/13/06	136.59	3182.71	----	---	---	---
	05/29/07	136.68	3182.62	----	---	---	---
	11/15/07	136.61	3182.69	----	---	---	---
	05/15/08	136.65	3182.65	----	---	---	---
	11/03/08	136.60	3182.70	----	---	---	---
	05/19/09	136.60	3182.70	----	---	---	---
	11/02/09	136.60	3182.70	----	---	---	---
	05/05/10	136.44	3182.86	----	---	---	---
	11/08/10	136.58	3182.72	----	---	---	---
	05/11/11	136.62	3182.68	----	---	---	---
	11/08/11	136.57	3182.73	----	---	---	---
	05/16/12	136.44	3182.86	----	---	---	---
	10/10/12	136.91	3182.39	----	---	---	---
	05/16/13	136.51	3182.79	----	---	---	---
	10/07/13	136.55	3182.75	----	---	---	---
	05/01/14	136.37	3182.93	----	---	---	---
	10/05/14	136.42	3182.88	----	---	---	---
	05/21/15	136.40	3182.90	----	---	---	---
	10/19/15	136.41	3182.89	----	---	---	---
	05/25/16	136.40	3182.90	160.55	---	---	---
	10/17/16	136.33	3182.97	161.57	---	---	---
	05/10/17	136.34	3182.96	143.71	---	---	---
3321.12	10/24/17	136.28	3184.84	161.67	---	---	---
	05/22/18	130.07	3191.05	----	---	---	---
	10/15/18	136.34	3184.78	----	---	---	---
	06/20/19	136.28	3184.84	160.72	---	---	---
	11/20/19	136.36	3184.76	160.71	---	---	---
	04/15/20	136.23	3184.89	159.94	---	---	---
	10/12/20	136.56	3184.56	160.95	---	---	---
	06/22/21	136.37	3184.75	161.37	---	---	---
	12/06/21	136.29	3184.83	160.82	---	---	---
	08/22/22	136.25	3184.87	161.37	---	---	---
	12/21/22	136.11	3185.01	160.94	---	---	---
	07/20/23	136.31	3184.81	160.79	---	---	---
	11/13/23	136.22	3184.90	160.97	---	---	---
	07/30/24	136.18	3184.94	160.98	---	---	---
	11/12/24	136.18	3184.94	160.98	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-11	03/23/99	131.12	3178.57	----	140.00	4.00	125-140
3309.69	05/25/99	130.91	3178.78	----	---	---	---
	02/08/01	130.11	3179.58	----	---	---	---
	05/10/02	135.60	3174.09	----	---	---	---
	10/22/02	130.76	3178.93	----	---	---	---
	05/20/03	131.03	3178.66	----	---	---	---
	11/24/03	130.57	3179.12	----	---	---	---
	05/11/04	130.61	3179.08	----	---	---	---
	11/15/04	130.65	3179.04	----	---	---	---
	05/17/05	131.56	3178.13	----	---	---	---
	11/15/05	130.70	3178.99	----	---	---	---
	05/08/06	130.41	3179.28	----	---	---	---
	11/13/06	130.42	3179.27	----	---	---	---
	05/29/07	130.52	3179.17	----	---	---	---
	11/14/07	130.42	3179.27	----	---	---	---
	05/15/08	130.46	3179.23	----	---	---	---
	11/03/08	130.41	3179.28	----	---	---	---
	05/19/09	130.40	3179.29	----	---	---	---
	11/02/09	130.40	3179.29	----	---	---	---
	05/05/10	130.43	3179.26	----	---	---	---
	11/08/10	130.28	3179.41	----	---	---	---
	05/11/11	130.40	3179.29	----	---	---	---
	11/08/11	130.37	3179.32	----	---	---	---
	05/16/12	130.23	3179.46	----	---	---	---
	10/10/12	130.49	3179.20	----	---	---	---
	05/16/13	130.27	3179.42	----	---	---	---
	10/07/13	130.12	3179.57	----	---	---	---
	05/01/14	130.21	3179.48	----	---	---	---
	10/05/14	130.16	3179.53	----	---	---	---
	05/21/15	130.17	3179.52	----	---	---	---
	10/19/15	130.20	3179.49	----	---	---	---
	05/25/16	130.17	3179.52	165.42	---	---	---
	10/17/16	130.02	3179.67	165.87	---	---	---
	05/10/17	130.09	3179.60	164.91	---	---	---
3311.56	10/24/17	130.14	3181.42	165.74	---	---	---
	05/22/18	130.07	3181.49	----	---	---	---
	10/17/18	130.09	3181.47	----	---	---	---
	06/20/19	130.13	3181.43	165.71	---	---	---
	11/20/19	130.04	3181.52	172.30	---	---	---
	04/15/20	130.06	3181.50	165.50	---	---	---
	10/12/20	130.19	3181.37	165.51	---	---	---
	06/22/21	130.03	3181.53	167.12	---	---	---
	12/06/21	129.99	3181.57	165.53	---	---	---
	08/22/22	129.95	3181.61	167.12	---	---	---
	12/21/22	129.82	3181.74	165.51	---	---	---
	07/21/23	130.05	3181.51	166.98	---	---	---
	11/13/23	129.89	3181.67	167.02	---	---	---
	07/31/24	129.97	3181.59	165.48	---	---	---
	11/12/24	129.85	3181.71	165.5	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-12*	05/10/02	139.57	3188.86	----	171.65	4.00	157-172
3328.43	10/22/02	139.73	3188.70	----	---	---	---
	05/20/03	139.72	3188.71	----	---	---	---
	11/24/03	139.69	3188.74	----	---	---	---
	05/11/04	139.64	3188.79	----	---	---	---
	11/15/04	139.68	3188.75	----	---	---	---
	05/17/05	139.58	3188.85	----	---	---	---
	11/15/05	139.83	3188.60	----	---	---	---
	05/08/06	139.55	3188.88	----	---	---	---
	11/13/06	139.53	3188.90	----	---	---	---
	05/29/07	139.65	3188.78	----	---	---	---
	11/16/07	139.05	3189.38	----	---	---	---
	05/14/08	139.69	3188.74	----	---	---	---
	11/03/08	139.61	3188.82	----	---	---	---
	05/19/09	139.59	3188.84	----	---	---	---
	11/02/09	139.62	3188.81	----	---	---	---
	05/05/10	139.66	3188.77	----	---	---	---
	11/08/10	139.55	3188.88	----	---	---	---
	05/11/11	139.04	3189.39	----	---	---	---
	11/08/11	139.68	3188.75	----	---	---	---
	05/16/12	139.65	3188.78	----	---	---	---
	10/10/12	139.95	3188.48	----	---	---	---
	05/16/13	139.67	3188.76	----	---	---	---
	10/07/13	139.50	3188.93	----	---	---	---
	05/01/14	139.58	3188.85	----	---	---	---
	10/05/14	139.56	3188.87	----	---	---	---
	05/21/15	139.65	3188.78	----	---	---	---
	10/19/15	139.65	3188.78	----	---	---	---
	05/25/16	139.71	3188.72	171.00	---	---	---
	10/17/16	139.45	3188.98	171.20	---	---	---
	05/10/17	139.61	3188.82	171.80	---	---	---
3330.33	10/24/17	139.72	3190.61	171.67	---	---	---
	05/22/18	139.59	3190.74	----	---	---	---
	10/17/18	139.68	3190.65	----	---	---	---
	06/20/19	139.72	3190.61	171.02	---	---	---
	11/20/19	139.65	3190.68	174.57	---	---	---
	04/13/20	139.78	3190.55	169.81	---	---	---
	10/12/20	139.88	3190.45	171.08	---	---	---
	06/22/21	139.61	3190.72	170.85	---	---	---
	12/06/21	139.64	3190.69	170.94	---	---	---
	08/22/22	139.63	3190.70	170.85	---	---	---
	12/21/22	139.55	3190.78	171.41	---	---	---
	07/21/23	139.81	3190.52	171.00	---	---	---
	11/13/23	139.62	3190.71	172.07	---	---	---
	07/31/24	139.68	3190.65	171.34	---	---	---
	11/12/24	139.59	3190.74	171.35	---	---	---

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Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-13*	05/10/02	144.45	3194.04	----	171.65	4.00	157-172
3338.49	10/22/02	144.49	3194.00	----	---	---	---
	05/20/03	144.90	3193.59	----	---	---	---
	11/24/03	144.37	3194.12	----	---	---	---
	05/11/04	144.47	3194.02	----	---	---	---
	11/15/04	144.56	3193.93	----	---	---	---
	05/17/05	144.36	3194.13	----	---	---	---
	11/15/05	144.60	3193.89	----	---	---	---
	05/08/06	144.29	3194.20	----	---	---	---
	11/13/06	144.38	3194.11	----	---	---	---
	05/29/07	144.54	3193.95	----	---	---	---
	11/16/07	144.54	3193.95	----	---	---	---
	05/14/08	144.45	3194.04	----	---	---	---
	11/03/08	144.36	3194.13	----	---	---	---
	05/19/09	144.51	3193.98	----	---	---	---
	11/02/09	144.35	3194.14	----	---	---	---
	05/05/10	144.39	3194.10	----	---	---	---
	11/08/10	144.40	3194.09	----	---	---	---
	05/11/11	144.60	3193.89	----	---	---	---
	11/08/11	144.74	3193.75	----	---	---	---
	05/16/12	144.70	3193.79	----	---	---	---
	10/10/12	144.82	3193.67	----	---	---	---
	05/16/13	144.70	3193.79	----	---	---	---
	10/07/13	144.60	3193.89	----	---	---	---
	05/01/14	144.53	3193.96	----	---	---	---
	10/05/14	144.70	3193.79	----	---	---	---
	05/21/15	144.78	3193.71	----	---	---	---
	10/19/15	144.75	3193.74	----	---	---	---
	05/25/16	144.87	3193.62	170.52	---	---	---
	10/17/16	144.54	3193.95	170.43	---	---	---
	05/10/17	144.66	3193.83	171.04	---	---	---
	07/11/17	Well Plugged and Abandonded on 7/11/2017					
MW-14	10/07/13	134.60	3182.24	----	171.50	4.00	131-171
3316.84	05/01/14	134.51	3182.33	----	---	---	---
	10/05/14	134.44	3182.40	----	---	---	---
	05/21/15	134.31	3182.53	----	---	---	---
	10/19/15	134.49	3182.35	----	---	---	---
	05/25/16	134.42	3182.42	173.76	---	---	---
	10/17/16	134.30	3182.54	174.60	---	---	---
	05/10/17	134.35	3182.49	173.03	---	---	---
3318.36	10/24/17	134.30	3184.06	174.50			
	05/22/18	134.32	3184.04	----	---	---	---
	10/15/18	134.41	3183.95	----	---	---	---
	06/20/19	134.78	3183.58	178.74	---	---	---
	11/20/19	130.48	3187.88	178.42	---	---	---
	04/15/20	134.29	3184.07	173.39	---	---	---
	10/12/20	134.60	3183.76	173.25	---	---	---
	06/23/21	134.36	3184.00	175.56	---	---	---
	12/06/21	134.42	3183.94	173.73	---	---	---
	08/22/22	134.19	3184.17	175.56	---	---	---
	12/21/22	134.14	3184.22	173.48	---	---	---
	07/20/23	134.33	3184.03	174.49	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	11/13/23	134.40	3183.96	174.51	---	---	---
	07/30/24	134.22	3184.14	174.62	---	---	---
	11/12/24	134.23	3184.13	174.33	---	---	---

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Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
RW-1	05/21/99	134.32	3184.18	----	175.00	5.00	130-174
3318.50	05/25/99	134.24	3184.26	----	---	---	---
	02/08/01	134.15	3184.35	----	---	---	---
	05/10/02	134.00	3184.50	----	---	---	---
	10/22/02	134.17	3184.33	----	---	---	---
	05/20/03	134.40	3184.10	----	---	---	---
	11/24/03	134.02	3184.48	----	---	---	---
	05/11/04	134.01	3184.49	----	---	---	---
	11/15/04	134.06	3184.44	----	---	---	---
	05/17/05	133.97	3184.53	----	---	---	---
	11/15/05	134.20	3184.30	----	---	---	---
	05/08/06	133.93	3184.57	----	---	---	---
	11/13/06	133.92	3184.58	----	---	---	---
	05/29/07	134.00	3184.50	----	---	---	---
	11/15/07	133.88	3184.62	----	---	---	---
	05/14/08	133.98	3184.52	----	---	---	---
	11/03/08	133.99	3184.51	----	---	---	---
	05/19/09	133.92	3184.58	----	---	---	---
	11/02/09	134.00	3184.50	----	---	---	---
	05/05/10	134.03	3184.47	----	---	---	---
	11/08/10	133.81	3184.69	----	---	---	---
	05/11/11	133.83	3184.67	----	---	---	---
	11/08/11	133.88	3184.62	----	---	---	---
	05/16/12	133.84	3184.66	----	---	---	---
	10/10/12	135.01	3183.49	----	---	---	---
	05/16/13	133.85	3184.65	----	---	---	---
	10/07/13	133.68	3184.82	----	---	---	---
	05/01/14	133.91	3184.59	----	---	---	---
	10/05/14	133.64	3184.86	----	---	---	---
	05/21/15	133.73	3184.77	----	---	---	---
	10/19/15	133.73	3184.77	----	---	---	---
	05/25/16	133.73	3184.77	162.63	---	---	---
	10/17/16	133.80	3184.70	163.54	---	---	---
	05/10/17	133.67	3184.83	162.15	---	---	---
3320.31	10/25/17	133.80	3186.51	162.70	---	---	---
	05/22/18	133.61	3186.70	----	---	---	---
	10/16/18	133.76	3186.55	----	---	---	---
	06/20/19	133.64	3186.67	164.03	---	---	---
	11/20/19	133.63	3186.68	163.79	---	---	---
	04/15/20	133.68	3186.63	161.65	---	---	---
	10/12/20	133.95	3186.36	162.20	---	---	---
	06/21/21	133.84	3186.47	162.85	---	---	---
	12/06/21	133.74	3186.57	162.36	---	---	---
	08/22/22	133.69	3186.62	162.85	---	---	---
	12/21/22	133.52	3186.79	162.33	---	---	---
	07/20/23	133.71	3186.60	165.46	---	---	---
	11/13/23	133.64	3186.67	162.15	---	---	---
	07/30/24	133.61	3186.70	163.88	---	---	---
	11/12/24	133.58	3186.73	163.90	---	---	---

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Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
RW-2	02/08/01	135.58	3183.04	----	160.00	5.00	134-173
3318.62	05/10/02	135.55	3183.07	----	---	---	---
	10/22/02	135.55	3183.07	----	---	---	---
	05/20/03	135.58	3183.04	----	---	---	---
	11/24/03	135.54	3183.08	----	---	---	---
	05/11/04	135.48	3183.14	----	---	---	---
	11/15/04	135.43	3183.19	----	---	---	---
	05/17/05	135.46	3183.16	----	---	---	---
	11/15/05	135.65	3182.97	----	---	---	---
	05/08/06	135.42	3183.20	----	---	---	---
	11/13/06	135.47	3183.15	----	---	---	---
	05/29/07	135.54	3183.08	----	---	---	---
	11/15/07	135.48	3183.14	----	---	---	---
	05/14/08	135.48	3183.14	----	---	---	---
	11/03/08	135.44	3183.18	----	---	---	---
	05/19/09	135.44	3183.18	----	---	---	---
	11/02/09	135.45	3183.17	----	---	---	---
	05/05/10	135.47	3183.15	----	---	---	---
	11/08/10	135.30	3183.32	----	---	---	---
	05/11/11	135.55	3183.07	----	---	---	---
	11/08/11	135.46	3183.16	----	---	---	---
	05/16/12	135.40	3183.22	----	---	---	---
	10/10/12	135.49	3183.13	----	---	---	---
	05/16/13	135.33	3183.29	----	---	---	---
	05/01/14	135.40	3183.22	----	---	---	---
	10/05/14	135.29	3183.33	----	---	---	---
	05/21/15	135.28	3183.34	----	---	---	---
	10/19/15	135.32	3183.30	----	---	---	---
	05/25/16	135.21	3183.41	157.33	---	---	---
	10/17/16	135.15	3183.47	157.20	---	---	---
	05/10/17	135.14	3183.48	155.68	---	---	---
3320.42	10/25/17	135.30	3185.12	156.70	---	---	---
	05/22/18	135.12	3185.30	----	---	---	---
	10/15/18	135.21	3185.21	----	---	---	---
	06/20/19	135.23	3185.19	156.50	---	---	---
	11/19/19	135.08	3185.34	172.60	---	---	---
	04/15/20	135.28	3185.14	155.60	---	---	---
	10/12/20	135.38	3185.04	155.95	---	---	---
	06/21/21	135.26	3185.16	155.86	---	---	---
	12/06/21	135.16	3185.26	154.14	---	---	---
	08/22/22	135.15	3185.27	155.86	---	---	---
	12/21/22	134.97	3185.45	155.99	---	---	---
	07/20/23	135.20	3185.22	156.26	---	---	---
	11/13/23	135.08	3185.34	156.01	---	---	---
	07/30/24	135.04	3185.38	157.46	---	---	---
	11/12/24	135.08	3185.34	157.48	---	---	---

Appendix D
Cumulative Summary of Groundwater Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Total Depth (ft bgs)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
RW-2R	10/07/13	135.43	3183.19	----	173.00	6.00	133-173
3320.68	10/07/13	136.94	3183.74	----	---	---	---
	05/01/14	137.05	3183.63	----	---	---	---
	10/05/14	136.85	3183.83	----	---	---	---
	05/21/15	136.85	3183.83	----	---	---	---
	10/19/15	136.92	3183.76	----	---	---	---
	05/25/16	136.89	3183.79	176.55	---	---	---
	10/17/16	136.75	3183.93	176.00	---	---	---
	05/10/17	136.77	3183.91	177.00	---	---	---
3320.68	10/25/17	137.00	3183.68	176.61	---	---	---
	05/22/18	136.76	3183.92	----	---	---	---
	10/15/18	136.87	3183.81	----	---	---	---
	06/20/19	136.79	3183.89	176.82	---	---	---
	11/19/19	136.71	3183.97	188.97	---	---	---
	04/15/20	136.82	3183.86	176.40	---	---	---
	10/12/20	137.05	3183.63	176.45	---	---	---
	06/21/21	136.95	3183.73	176.22	---	---	---
	12/06/21	136.85	3183.83	176.57	---	---	---
	08/22/22	136.78	3183.90	176.22	---	---	---
	12/21/22	136.67	3184.01	176.34	---	---	---
	07/20/23	136.83	3183.85	180.85	---	---	---
	11/13/23	137.67	3183.01	178.66	---	---	---
	07/30/24	136.73	3183.95	180.36	---	---	---
	11/12/24	136.70	3183.98	180.37	---	---	---

Notes:
1. TOC - Top of Casing
2. ft bgs - feet below ground surface
3. in - inches
4. A - Indicates groundwater monitor well installed in shallow Uppermost Groundwater Bearing Unit.
5. MSL - Mean Sea Level
6. * - Indicates groundwater monitor well installed off-Site and upgradient of plume.
7. --- - Indicates information is the same as above
8. ---- - Indicates information not available
9. NS - Not sampled

Appendix E

Analytical Reports

Pace Analytical®

ANALYTICAL REPORT

August 20, 2024

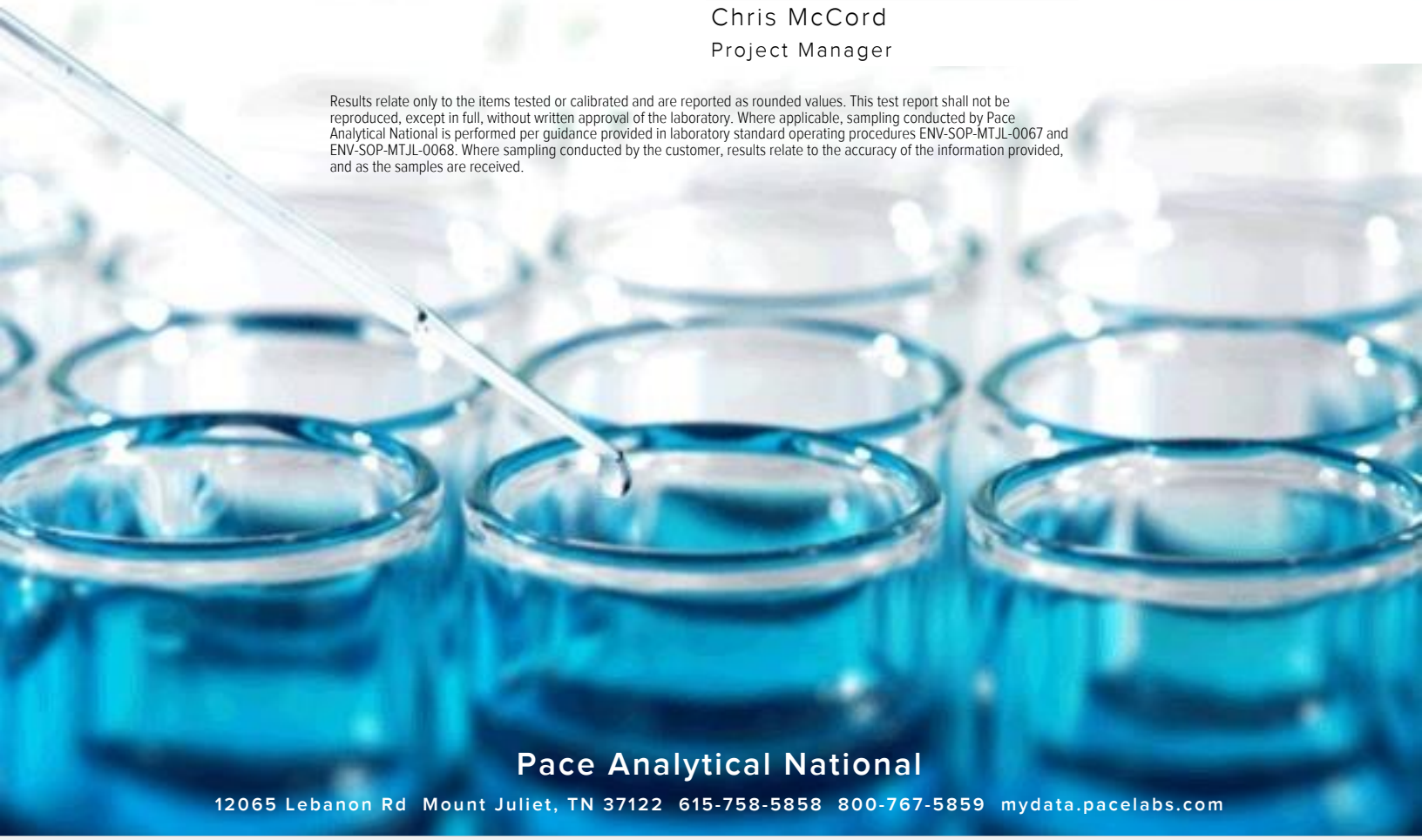
Arcadis - Chevron - NM

Sample Delivery Group:	L1762826
Samples Received:	08/02/2024
Project Number:	30230083 TASK 00002
Description:	UEM4822 - Cooper Jal
Site:	COOPER JAL
Report To:	Russell Grant 10205 Westheimer Rd. #800 Houston, TX 77042

Entire Report Reviewed By:

Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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MW-1-W-20240801 L1762826-01 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 09:40 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	5	08/02/24 13:52	08/02/24 13:52	DLH	Mt. Juliet, TN

MW-2-W-20240801 L1762826-02 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 10:20 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	1	08/02/24 14:02	08/02/24 14:02	DLH	Mt. Juliet, TN

MW-2A-W-20240801 L1762826-03 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 10:40 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	1	08/02/24 14:40	08/02/24 14:40	DLH	Mt. Juliet, TN

MW-6R-W-20240801 L1762826-04 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 11:00 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	1	08/02/24 15:09	08/02/24 15:09	DLH	Mt. Juliet, TN

MW-5-W-20240801 L1762826-05 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 11:35 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	10	08/02/24 15:18	08/02/24 15:18	DLH	Mt. Juliet, TN

MW-5A-W-20240801 L1762826-06 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 11:50 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	1	08/02/24 15:28	08/02/24 15:28	DLH	Mt. Juliet, TN

MW-4-W-20240801 L1762826-07 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 12:30 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	100	08/02/24 15:37	08/02/24 15:37	DLH	Mt. Juliet, TN

MW-10-W-20240801 L1762826-08 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 13:20 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	5	08/02/24 15:47	08/02/24 15:47	DLH	Mt. Juliet, TN

MW-7-W-20240801 L1762826-09 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 13:50 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335186	1	08/02/24 12:52	08/03/24 14:33	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	100	08/02/24 16:15	08/02/24 16:15	DLH	Mt. Juliet, TN

MW-9-W-20240801 L1762826-10 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 14:50 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335186	1	08/02/24 12:52	08/03/24 14:33	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	10	08/02/24 16:25	08/02/24 16:25	DLH	Mt. Juliet, TN

MW-9A-W-20240801 L1762826-11 GW

Collected by: Daniel McGee | Collected date/time: 08/01/24 14:50 | Received date/time: 08/02/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335186	1	08/02/24 12:52	08/03/24 14:33	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335059	10	08/02/24 16:34	08/02/24 16:34	DLH	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Chris McCord
Project Manager

Released to Imaging: 6/17/2025 10:21:10 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1640		50.0	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	598		2.74	5.00	5	08/02/2024 13:52	WG2335059

Received by OCD: 4/2/2025 10:24:50 AM

MW-2-W-20240801
Collected date/time: 08/01/24 10:20
L1762826

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	672		13.3	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	116	J6	0.547	1.00	1	08/02/2024 14:02	WG2335059

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Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	522		10.0	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	107	J6	0.547	1.00	1	08/02/2024 14:40	WG2335059

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	480		10.0	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	76.9		0.547	1.00	1	08/02/2024 15:09	WG2335059

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2260		50.0	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	941		5.47	10.0	10	08/02/2024 15:18	WG2335059

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	609		10.0	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	161		0.547	1.00	1	08/02/2024 15:28	WG2335059

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	26500		400	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	10800		54.7	100	100	08/02/2024 15:37	WG2335059

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1180		20.0	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	344		2.74	5.00	5	08/02/2024 15:47	WG2335059

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	14800		200	1	08/03/2024 14:33	WG2335186

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	5080		54.7	100	100	08/02/2024 16:15	WG2335059

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	3060		50.0	1	08/03/2024 14:33	WG2335186

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	1010		5.47	10.0	10	08/02/2024 16:25	WG2335059

Received by OCD: 4/2/2025 10:24:50 AM

MW-9A-W-20240801
Collected date/time: 08/01/24 14:50
L1762826

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1030		20.0	1	08/03/2024 14:33	WG2335186

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	737		5.47	10.0	10	08/02/2024 16:34	WG2335059

Released to Imaging: 6/17/2025 10:21:10 AM

Method Blank (MB)

(MB) R4103911-1 08/03/24 11:37

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1762758-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1762758-04 08/03/24 11:37 • (DUP) R4103911-3 08/03/24 11:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	18400	18500	1	0.434		10

L1762826-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1762826-08 08/03/24 11:37 • (DUP) R4103911-4 08/03/24 11:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1180	1170	1	0.493		10

Laboratory Control Sample (LCS)

(LCS) R4103911-2 08/03/24 11:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8470	96.3	85.0-115	

Method Blank (MB)

(MB) R4103920-1 08/03/24 14:33

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1762826-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1762826-09 08/03/24 14:33 • (DUP) R4103920-3 08/03/24 14:33

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	14800	14800	1	0.541		10

L1762932-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1762932-03 08/03/24 14:33 • (DUP) R4103920-4 08/03/24 14:33

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	333	337	1	1.19		10

Laboratory Control Sample (LCS)

(LCS) R4103920-2 08/03/24 14:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8510	96.7	85.0-115	

Method Blank (MB)

(MB) R4103206-1 08/02/24 13:34

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.547	1.00

L1762826-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1762826-02 08/02/24 14:02 • (DUP) R4103206-3 08/02/24 14:11

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	116	116	1	0.0262		15

L1762826-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1762826-03 08/02/24 14:40 • (DUP) R4103206-6 08/02/24 14:50

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	107	108	1	0.844		15

Laboratory Control Sample (LCS)

(LCS) R4103206-2 08/02/24 13:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	38.7	96.6	90.0-110	

L1762826-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1762826-02 08/02/24 14:02 • (MS) R4103206-4 08/02/24 14:21 • (MSD) R4103206-5 08/02/24 14:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	116	133	133	42.9	42.1	1	90.0-110	J6	J6	0.253	15

L1762826-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L1762826-03 08/02/24 14:40 • (MS) R4103206-7 08/02/24 14:59

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40.0	107	126	47.3	1	90.0-110	J6

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Arcadis - Chevron - NM
10205 Westheimer Rd.
#800
Houston. TX 77042

Billing Information:
Accounts Payable
401 East Main Street
Suite 400
El Paso, TX 79901

Pres Chk

Report to: **Russell Grant**

Email To: russell.grant@arcadis.com;sheila.hernandez@ar

Project Description: **UEM4822 - Cooper Jal**

City/State Collected: Jal, NM

Please Circle: PT MT (CT) ET

Phone: **916-786-5246**

Client Project # **30230083 TASK 00002**

Lab Project # **CHEVARCNM-COOPERJAL**

Collected by (print): Daniel McGee

Site/Facility ID # **COOPER JAL -UEM4822**

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: standard

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	SULFATE 125mlHDPE-NoPres	TDS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-1-W-20240801	G	GW		8-1-24	0940	2	X		X		-01
MW-2-W-20240801		GW			1020	2	X		X		-02
MW-2A-W-20240801		GW			1040	2	X		X		-03
MW-6R-W-20240801		GW			1100	2	X		X		-04
MW-5-W-20240801		GW			1135	2	X		X		-05
MW-5A-W-20240801		GW			1150	2	X		X		-06
MW-4-W-20240801		GW			1230	2	X		X		-07
MW-10-W-20240801		GW			1320	2	X		X		-08
MW-7-W-20240801		GW			~~1145~~ 1350	2	X		X		-09
MW-9-W-20240801	G	GW		8-1-24	1450	2	X		X		-10

Chain of Custody Page 1 of 2

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MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

LN028260
1199

Table #

Acctnum: **CHEVARCNM**
Template: **T200378**
Prelogin: **P1088859**
PM: **526 - Chris McCord**
PB: LM 7/19/24
Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	8-1-24	1710		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
	8-1-24	17:40		Multi 22
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
				8/2/24 0800

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

Company Name/Address:
Arcadis - Chevron - NM

10205 Westheimer Rd.
#800
Houston. TX 77042

Billing Information:
Accounts Payable
401 East Main Street
Suite 400
El Paso, TX 79901

Report to:
Russell Grant

Email To:
russell.grant@arcadis.com;sheila.hernandez@ar

Project Description:
UEM4822 - Cooper Jal

City/State Collected: **Jal, NM**

Please Circle: PT MT (CT) ET

Phone: **916-786-5246**

Client Project #
30230083 TASK 00002

Lab Project #
CHEVARCNM-COOPERJAL

Collected by (print):
Daniel McLee

Site/Facility ID #
COOPER JAL -UEM4822

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: **Standard**

Analysis / Container / Preservative

Pres Chk

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	SULFATE 125mlHDPE-NoPres	TDS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-2A-W-20240801	G	GW		8-1-24	1450	2	X		X		-11
		GW									
		GW									

Chain of Custody Page ___ of ___

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN

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SDG # L1760280

Table #

Acctnum: **CHEVARCNM**
Template: **T200378**
Prelogin: **P1088859**
PM: **526 - Chris McCord**
PB: **LM 7/19/24**
Shipped Via: **FedEx Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

	Date:	Time:	
Relinquished by : (Signature)	8-1-24	1710	Received by: (Signature) James Cobb
Relinquished by : (Signature) James Cobb	8/1/24	17:40	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: Mult °C Bottles Received:

Date: 8/2/24 Time: 0800

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

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EOA9 4762826

Tracking Numbers	Temperature
—	3.7 + .3 = 4.1
—	3.5 + .3 = 3.7

Name

8/2/24
Date

Received by OCD: 4/2/2025 10:24:50 AM

Released to Imaging: 6/17/2025 10:21:10 AM

ANALYTICAL REPORT

August 26, 2024

Arcadis - Chevron - NM

Sample Delivery Group:	L1762758
Samples Received:	08/01/2024
Project Number:	30230083 TASK 00002
Description:	UEM4822 - Cooper Jal
Site:	COOPER JAL-UEM4822
Report To:	Russell Grant 10205 Westheimer Rd. #800 Houston, TX 77042

Entire Report Reviewed By:

Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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Released to Imaging: 6/17/2025 10:21:10 AM

RW-2R-W-20240731 L1762758-01 WW

Collected by: Daniel McGee | Collected date/time: 07/31/24 14:00 | Received date/time: 08/01/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2334887	1	08/03/24 09:10	08/03/24 09:11	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	10	08/04/24 08:56	08/04/24 08:56	JDG	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	100	08/04/24 09:11	08/04/24 09:11	BMD	Mt. Juliet, TN

RW-2-W-20240731 L1762758-02 GW

Collected by: Daniel McGee | Collected date/time: 07/31/24 14:30 | Received date/time: 08/01/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2334887	1	08/03/24 09:10	08/03/24 09:11	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	5	08/04/24 09:27	08/04/24 09:27	DLH	Mt. Juliet, TN

MW-14-W-20240731 L1762758-03 GW

Collected by: Daniel McGee | Collected date/time: 07/31/24 14:45 | Received date/time: 08/01/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2334887	1	08/03/24 09:10	08/03/24 09:11	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	1	08/04/24 10:15	08/04/24 10:15	DLH	Mt. Juliet, TN

DUP-2-W-20240731 L1762758-04 WW

Collected by: Daniel McGee | Collected date/time: 07/31/24 00:00 | Received date/time: 08/01/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	10	08/04/24 10:31	08/04/24 10:31	JDG	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	100	08/04/24 10:47	08/04/24 10:47	BMD	Mt. Juliet, TN

RW-1-W-20240731 L1762758-05 GW

Collected by: Daniel McGee | Collected date/time: 07/31/24 13:20 | Received date/time: 08/01/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	100	08/04/24 11:03	08/04/24 11:03	DLH	Mt. Juliet, TN

DUP-1-W-20240731 L1762758-06 GW

Collected by: Daniel McGee | Collected date/time: 07/31/24 00:00 | Received date/time: 08/01/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	100	08/04/24 11:19	08/04/24 11:19	DLH	Mt. Juliet, TN

MW-4A-W-20240731 L1762758-07 WW

Collected by: Daniel McGee | Collected date/time: 07/31/24 15:30 | Received date/time: 08/01/24 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2335184	1	08/02/24 12:46	08/03/24 11:37	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	1	08/04/24 11:35	08/04/24 11:35	JDG	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2335055	5	08/04/24 11:51	08/04/24 11:51	BMD	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Chris McCord
Project Manager

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	20100		400	1	08/03/2024 09:11	WG2334887

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7590		54.7	100	100	08/04/2024 09:11	WG2335055
Sulfate	845		6.37	50.0	10	08/04/2024 08:56	WG2335055

Received by OCD: 4/2/2025 10:24:50 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	3510		50.0	1	08/03/2024 09:11	WG2334887

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	533		2.74	5.00	5	08/04/2024 09:27	WG2335055

Released to Imaging: 6/17/2025 10:21:10 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	473		10.0	1	08/03/2024 09:11	WG2334887

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	61.4		0.547	1.00	1	08/04/2024 10:15	WG2335055

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	18400		400	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	8010		54.7	100	100	08/04/2024 10:47	WG2335055
Sulfate	881		6.37	50.0	10	08/04/2024 10:31	WG2335055

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	13900		400	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	1540		54.7	100	100	08/04/2024 11:03	WG2335055

Received by OCD: 4/2/2025 10:24:50 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	9820		200	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	1680		54.7	100	100	08/04/2024 11:19	WG2335055

Released to Imaging: 6/17/2025 10:21:10 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1200		20.0	1	08/03/2024 11:37	WG2335184

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	422		2.74	5.00	5	08/04/2024 11:51	WG2335055
Sulfate	91.7		0.637	5.00	1	08/04/2024 11:35	WG2335055

Method Blank (MB)

(MB) R4103919-1 08/03/24 09:11

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1762596-12 Original Sample (OS) • Duplicate (DUP)

(OS) L1762596-12 08/03/24 09:11 • (DUP) R4103919-3 08/03/24 09:11

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1470	1460	1	1.02		10

L1762758-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1762758-03 08/03/24 09:11 • (DUP) R4103919-4 08/03/24 09:11

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	473	468	1	1.06		10

Laboratory Control Sample (LCS)

(LCS) R4103919-2 08/03/24 09:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8770	99.7	85.0-115	

Method Blank (MB)

(MB) R4103911-1 08/03/24 11:37

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1762758-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1762758-04 08/03/24 11:37 • (DUP) R4103911-3 08/03/24 11:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	18400	18500	1	0.434		10

L1762826-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1762826-08 08/03/24 11:37 • (DUP) R4103911-4 08/03/24 11:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1180	1170	1	0.493		10

Laboratory Control Sample (LCS)

(LCS) R4103911-2 08/03/24 11:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8470	96.3	85.0-115	

Method Blank (MB)

(MB) R4103109-1 08/04/24 01:31

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.547	1.00
Sulfate	U		0.637	5.00

L1762674-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1762674-01 08/04/24 02:02 • (DUP) R4103109-3 08/04/24 02:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	7.96	8.15	1	2.28		15

L1762674-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1762674-01 08/04/24 03:06 • (DUP) R4103109-6 08/04/24 03:21

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	233	230	5	1.10		15

L1762674-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1762674-02 08/04/24 03:37 • (DUP) R4103109-7 08/04/24 03:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	7.71	7.69	1	0.248		15

L1762674-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1762674-02 08/04/24 04:25 • (DUP) R4103109-9 08/04/24 04:41

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	218	217	5	0.855		15

Laboratory Control Sample (LCS)

(LCS) R4103109-2 08/04/24 01:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.2	98.1	90.0-110	
Sulfate	40.0	39.1	97.7	90.0-110	

L1762674-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1762674-01 08/04/24 02:02 • (MS) R4103109-4 08/04/24 02:34 • (MSD) R4103109-5 08/04/24 02:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	7.96	45.7	45.8	94.3	94.5	1	90.0-110			0.224	15

L1762674-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1762674-02 08/04/24 03:37 • (MS) R4103109-8 08/04/24 04:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40.0	7.71	45.3	94.1	1	90.0-110	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Arcadis - Chevron - NM
10205 Westheimer Rd.
#800
Houston, TX 77042

Billing Information:
Accounts Payable
401 East Main Street
Suite 400
El Paso, TX 79901

Pres Chk

Report to: Russell Grant

Email To: russell.grant@arcadis.com;sheila.hernandez@ar

Project Description: UEM4822 - Cooper Jal

City/State Collected: Jal, NM

Please Circle: PT MT CT ET

Phone: 916-786-5246

Client Project # 30183400 task 0002

Lab Project # CHEVARCNM-COOPERJAL

Collected by (print): Daniel McKee

Site/Facility ID # COOPER JAL - UEM4822

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: Standard

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

Pace PEOPLE ADVANCING SCIENCE

MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 1762758

B128

Acctnum: CHEVARCNM
Template: T200378
Prelogin: P1088859
PM: 526 - Chris McCord
PB: LM 7/19/24
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	SULFATE 125mlHDPE-NoPres	TDS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
~~RW-1-W-20240731~~	~~G~~	~~GW~~		~~7-31-24~~	~~1320~~	~~3~~	~~X~~	~~X~~	~~X~~		
~~DUP-1-W-20240731~~	~~G~~	~~GW~~		~~7-31-24~~	~~—~~	~~3~~	~~X~~	~~X~~	~~X~~		
~~RW-2-2R RW-2R-W-2024~~		GW									-01
RW-2R-W-20240731	G	GW		7-31-24	1400	3	X	X	X		-02
RW-2-W-20240731	G	GW		|	1430	2	X		X		-03
MW-14-W-20240731	G	GW		|	1445	2	X		X		-04
DUP-2-W-20240731	G	GW		7-31-24	—	3	X	X	X		-05
RW-1-W-20240731	G	GW		7-31-24	1320	2	X		X		-06
DUP-1-W-20240731	G	GW		7-31-24	—	2	X		X		-07
MW-4A-W-20240731	G	GW		7-31-24	1530	3	X	X	X		

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: ✓NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
[signature]	7-31-24	1715	James Colston		
Relinquished by: (Signature) James Colston	Date: 7/31/24	Time: 17:45	Received by: (Signature)	Temp: EBAg °C 1.4+.3=1.7 Bottles Received: 17	If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) alexa mitchell	Date: 8/1/24 Time: 0800	Hold: Condition: NCF / OK

Pace Analytical®

ANALYTICAL REPORT

August 20, 2024

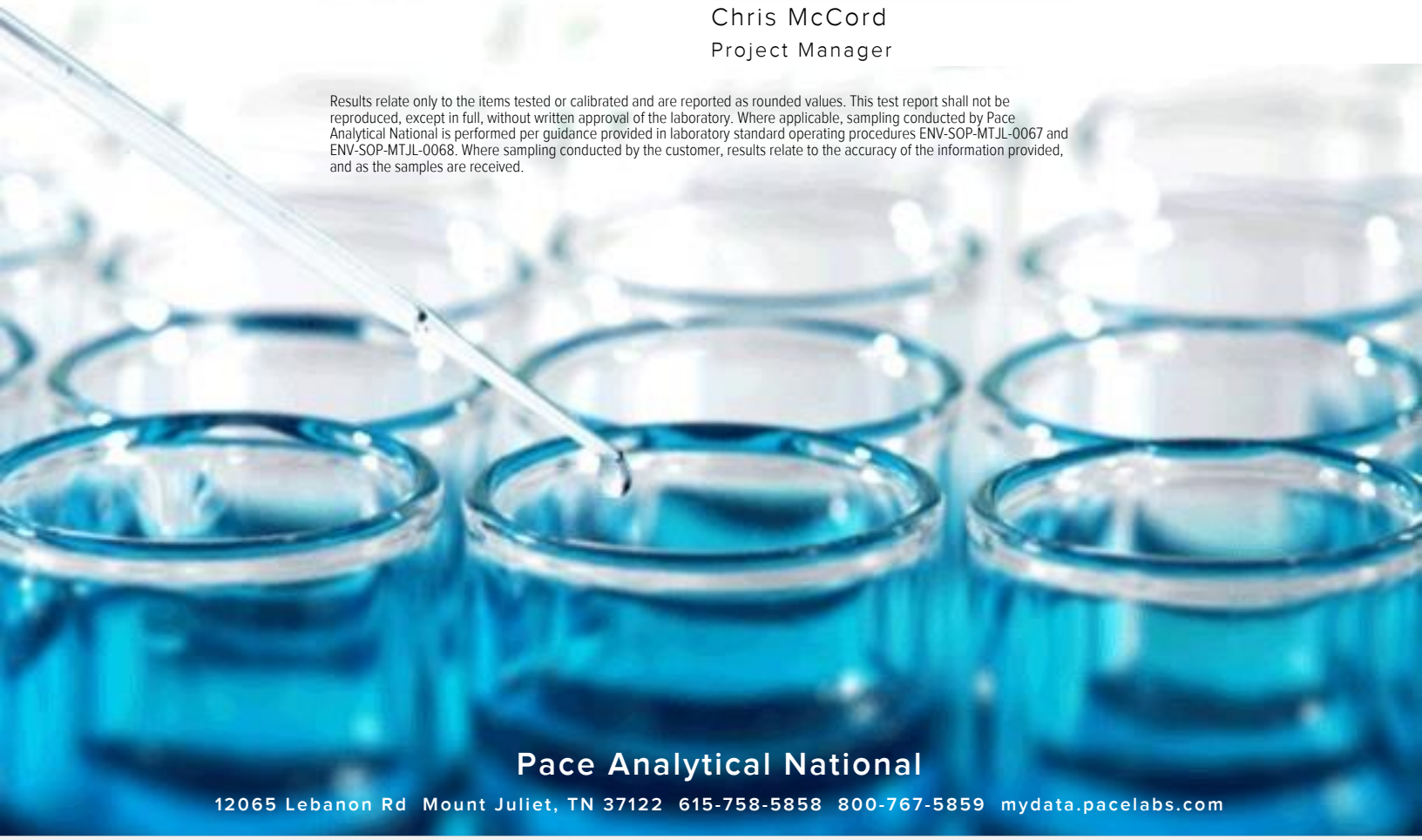
Arcadis - Chevron - NM

Sample Delivery Group:	L1763583
Samples Received:	08/03/2024
Project Number:	30183400 task 0002
Description:	UEM4822 - Cooper Jal
Site:	COOPER JAL
Report To:	Russell Grant 10205 Westheimer Rd. #800 Houston, TX 77042

Entire Report Reviewed By:

Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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MW-11-W-20240802 L1763583-01 GW

Collected by: Daniel McGee
Collected date/time: 08/02/24 10:00
Received date/time: 08/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2336630	1	08/05/24 14:59	08/06/24 11:59	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2336716	1	08/10/24 05:11	08/10/24 05:11	DLH	Mt. Juliet, TN

MW-8-W-20240802 L1763583-02 GW

Collected by: Daniel McGee
Collected date/time: 08/02/24 10:25
Received date/time: 08/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2336630	1	08/05/24 14:59	08/06/24 11:59	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2336716	1	08/10/24 05:24	08/10/24 05:24	DLH	Mt. Juliet, TN

MW-3-W-20240802 L1763583-03 GW

Collected by: Daniel McGee
Collected date/time: 08/02/24 10:50
Received date/time: 08/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2336630	1	08/05/24 14:59	08/06/24 11:59	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2336716	1	08/10/24 06:05	08/10/24 06:05	DLH	Mt. Juliet, TN

MW-12-W-20240802 L1763583-04 GW

Collected by: Daniel McGee
Collected date/time: 08/02/24 11:20
Received date/time: 08/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2336627	1	08/05/24 14:52	08/06/24 10:29	JAC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2336716	5	08/10/24 06:18	08/10/24 06:18	DLH	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Chris McCord
Project Manager

Received by OCD: 4/2/2025 10:24:50 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	417		10.0	1	08/06/2024 11:59	WG2336630

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	35.1		0.547	1.00	1	08/10/2024 05:11	WG2336716

Released to Imaging: 6/17/2025 10:21:10 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	419		10.0	1	08/06/2024 11:59	WG2336630

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	34.9		0.547	1.00	1	08/10/2024 05:24	WG2336716

Received by OCD: 4/3/2025 10:24:50 AM

MW-3-W-20240802
Collected date/time: 08/02/24 10:50
L1763583

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	422		10.0	1	08/06/2024 11:59	WG2336630

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	33.5		0.547	1.00	1	08/10/2024 06:05	WG2336716

Released to Imaging: 6/17/2025 10:21:10 AM

Received by OCD: 4/2/2025 10:24:50 AM

MW-12-W-20240802
Collected date/time: 08/02/24 11:20

SAMPLE RESULTS - 04

L1763583

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1600		20.0	1	08/06/2024 10:29	WG2336627

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	404		2.74	5.00	5	08/10/2024 06:18	WG2336716

Released to Imaging: 6/17/2025 10:21:10 AM

Method Blank (MB)

(MB) R4104562-1 08/06/24 10:29

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1763428-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1763428-01 08/06/24 10:29 • (DUP) R4104562-3 08/06/24 10:29

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	ND	ND	1	0.000		10

L1763583-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1763583-04 08/06/24 10:29 • (DUP) R4104562-4 08/06/24 10:29

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1600	1590	1	0.376		10

Laboratory Control Sample (LCS)

(LCS) R4104562-2 08/06/24 10:29

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8680	98.6	85.0-115	

Method Blank (MB)

(MB) R4104496-1 08/06/24 11:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1763434-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1763434-03 08/06/24 11:59 • (DUP) R4104496-3 08/06/24 11:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	3780	3910	1	3.38		10

L1763621-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1763621-03 08/06/24 11:59 • (DUP) R4104496-4 08/06/24 11:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1800	1820	1	1.10		10

Laboratory Control Sample (LCS)

(LCS) R4104496-2 08/06/24 11:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8700	98.9	85.0-115	

Method Blank (MB)

(MB) R4106111-1 08/10/24 01:48

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.547	1.00

L1763542-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1763542-01 08/10/24 02:15 • (DUP) R4106111-3 08/10/24 02:29

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	134	133	1	0.193		15

L1763542-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1763542-02 08/10/24 03:09 • (DUP) R4106111-6 08/10/24 03:23

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	107	107	1	0.364		15

Laboratory Control Sample (LCS)

(LCS) R4106111-2 08/10/24 02:02

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	37.1	92.7	80.0-120	

L1763542-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1763542-01 08/10/24 02:15 • (MS) R4106111-4 08/10/24 02:42 • (MSD) R4106111-5 08/10/24 02:56

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	134	146	145	32.1	28.2	1	80.0-120	J6	J6	1.08	15

L1763542-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1763542-02 08/10/24 03:09 • (MS) R4106111-7 08/10/24 03:36

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40.0	107	125	45.2	1	80.0-120	J6

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Received by OCD: 4/2/2025 10:24:50 AM

Arcadis - Chevron - NM
10205 Westheimer Rd.
#800
Houston, TX 77042

Billing Information:
Accounts Payable
401 East Main Street
Suite 400
El Paso, TX 79901

Pres Chk

Report to: Russell R Grant

Email To: russell.grant@arcadis.com; sherla.hernandez@arcadis.com

Project Description: UEM4822 - Cooper Jal

City/State Collected: Jal, NM

Phone: 916-786-5246
Fax:

Client Project # 30230083 Task 00007

Lab Project # chevarcnm - cooperjal

Collected by (print): Daniel Milee

Site/Facility ID # Cooper Jal - UEM4822

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: Standard

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 176 5583

F071

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Chloride 125 ml HDPE - No Pres	TDS 250 ml HDPE - No Pres	Remarks	Sample # (lab only)
MW-11-W-20240802	G	GW		8-2-24	1000	2	X	X		-01
MW-8-W-20240802	"	"		"	1025	2	X	X		-02
MW-3-W-20240802	"	"		"	1050	2	X	X		-03
MW-12-W-20240802	G	GW		8-2-24	~~1020~~ 1100	2	X	X		-04

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking # 7359 4591 0396

Sample Receipt Checklist
COC Seal Present/Intact: X NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	8-2-24	3:00		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.0 °C 1.4+1.3=4.7 Bottles Received: 8
James Colato	8/2/24	3:20		
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8-3-24 Time: 9:00
			Charles Stevenson	

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

Released to Imaging: 6/17/2025 10:21:10 AM

ANALYTICAL REPORT

November 22, 2024

Arcadis - Chevron - NM

Sample Delivery Group:	L1799867
Samples Received:	11/14/2024
Project Number:	30183400 task 0002
Description:	UEM4822 - Cooper Jal
Site:	COOPER JAL
Report To:	Russell Grant 10205 Westheimer Rd. #800 Houston, TX 77042

Entire Report Reviewed By:

Haley Torrence
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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MW-12-W-20241112 L1799867-01 GW

Collected by: Daniel McGee | Collected date/time: 11/12/24 12:30 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	10	11/19/24 02:12	11/19/24 02:12	ZSA	Mt. Juliet, TN

MW-1-W-20241112 L1799867-02 GW

Collected by: Daniel McGee | Collected date/time: 11/12/24 12:50 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	100	11/19/24 02:21	11/19/24 02:21	ZSA	Mt. Juliet, TN

MW-2-W-20241112 L1799867-03 GW

Collected by: Daniel McGee | Collected date/time: 11/12/24 13:15 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	5	11/19/24 02:31	11/19/24 02:31	ZSA	Mt. Juliet, TN

MW-5-W-20241112 L1799867-04 GW

Collected by: Daniel McGee | Collected date/time: 11/12/24 13:45 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	50	11/19/24 02:40	11/19/24 02:40	ZSA	Mt. Juliet, TN

MW-4-W-20241112 L1799867-05 GW

Collected by: Daniel McGee | Collected date/time: 11/12/24 14:00 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	500	11/20/24 23:16	11/20/24 23:16	DLH	Mt. Juliet, TN

RW-1-W-20241112 L1799867-06 GW

Collected by: Daniel McGee | Collected date/time: 11/12/24 14:25 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	50	11/19/24 02:59	11/19/24 02:59	ZSA	Mt. Juliet, TN

DUP-1-W-20241112 L1799867-07 GW

Collected by: Daniel McGee | Collected date/time: 11/12/24 00:00 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	100	11/19/24 03:09	11/19/24 03:09	ZSA	Mt. Juliet, TN

RW-2R-W-20241113 L1799867-08 GW

Collected by: Daniel McGee | Collected date/time: 11/13/24 09:35 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	100	11/19/24 03:19	11/19/24 03:19	ZSA	Mt. Juliet, TN

RW-2-W-20241113 L1799867-09 GW

Collected by: Daniel McGee | Collected date/time: 11/13/24 10:00 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	10	11/19/24 03:28	11/19/24 03:28	ZSA	Mt. Juliet, TN

MW-10-W-20241113 L1799867-10 GW

Collected by: Daniel McGee | Collected date/time: 11/13/24 10:30 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	5	11/19/24 03:38	11/19/24 03:38	ZSA	Mt. Juliet, TN

MW-7-W-20241113 L1799867-11 GW

Collected by: Daniel McGee | Collected date/time: 11/13/24 11:00 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	100	11/19/24 04:06	11/19/24 04:06	ZSA	Mt. Juliet, TN

MW-9-W-20241113 L1799867-12 GW

Collected by: Daniel McGee | Collected date/time: 11/13/24 11:30 | Received date/time: 11/14/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2402628	1	11/17/24 10:40	11/17/24 12:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2402330	50	11/19/24 04:16	11/19/24 04:16	ZSA	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Haley Torrence

Haley Torrence
Project Manager

Released to Imaging: 6/17/2025 10:21:10 AM

Received by OCD: 4/2/2025 10:24:50 AM

MW-12-W-20241112
Collected date/time: 11/12/24 12:30
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1560		20.0	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	504		5.47	10.0	10	11/19/2024 02:12	WG2402330

Released to Imaging: 6/17/2025 10:21:10 AM

Received by OCD: 4/2/2025 10:24:50 AM

MW-1-W-20241112
Collected date/time: 11/12/24 12:50
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2290		50.0	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	768		54.7	100	100	11/19/2024 02:21	WG2402330

Released to Imaging: 6/17/2025 10:21:10 AM

Received by OCD: 4/2/2025 10:24:50 AM

MW-2-W-20241112
Collected date/time: 11/12/24 13:15
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	596		13.3	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	152		2.74	5.00	5	11/19/2024 02:31	WG2402330

Released to Imaging: 6/17/2025 10:21:10 AM

Received by OCD: 4/2/2025 10:24:50 AM

MW-3-W-20241112
Collected date/time: 11/12/24 13:45
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2310		50.0	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	921		27.4	50.0	50	11/19/2024 02:40	WG2402330

Released to Imaging: 6/17/2025 10:21:10 AM

Received by OCD: 4/2/2025 10:24:50 AM

MW-4-W-20241112
Collected date/time: 11/12/24 14:00
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	22900		400	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	13400		274	500	500	11/20/2024 23:16	WG2402330

Released to Imaging: 6/17/2025 10:21:10 AM

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	4280		100	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	2220		27.4	50.0	50	11/19/2024 02:59	WG2402330

Received by OCD: 4/2/2025 10:24:50 AM

DUP-1-W-20241112
Collected date/time: 11/12/24 00:00
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	6980		200	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	5890		54.7	100	100	11/19/2024 03:09	WG2402330

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Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	18600		400	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	8080		54.7	100	100	11/19/2024 03:19	WG2402330

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1370		20.0	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	747		5.47	10.0	10	11/19/2024 03:28	WG2402330

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1090		20.0	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	336		2.74	5.00	5	11/19/2024 03:38	WG2402330

Received by OCD: 4/2/2025 10:24:50 AM

MW-7-W-20241113
Collected date/time: 11/13/24 11:00
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	15500		200	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	5500		54.7	100	100	11/19/2024 04:06	WG2402330

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Received by OCD: 4/2/2025 10:24:50 AM

MW-9-W-20241113
Collected date/time: 11/13/24 11:30
L1799867

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	3300		50.0	1	11/17/2024 12:24	WG2402628

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	1040		27.4	50.0	50	11/19/2024 04:16	WG2402330

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Method Blank (MB)

(MB) R4147670-1 11/17/24 12:24

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1799799-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1799799-15 11/17/24 12:24 • (DUP) R4147670-3 11/17/24 12:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1630	1690	1	3.32		10

L1800186-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1800186-04 11/17/24 12:24 • (DUP) R4147670-4 11/17/24 12:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	7460	7480	1	0.268		10

Laboratory Control Sample (LCS)

(LCS) R4147670-2 11/17/24 12:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8740	99.3	85.0-115	

Method Blank (MB)

(MB) R4147986-1 11/19/24 01:53

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.547	1.00

L1799964-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1799964-01 11/19/24 04:25 • (DUP) R4147986-3 11/19/24 04:35

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	77.8	78.2	1	0.577		15

L1799964-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1799964-04 11/19/24 05:13 • (DUP) R4147986-5 11/19/24 05:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	35.6	35.3	1	0.672		15

Laboratory Control Sample (LCS)

(LCS) R4147986-2 11/19/24 02:02

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.4	98.6	90.0-110	

L1799964-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1799964-01 11/19/24 04:25 • (MS) R4147986-4 11/19/24 04:44

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40.0	77.8	102	60.9	1	90.0-110	E J6

L1799964-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1799964-04 11/19/24 05:13 • (MS) R4147986-6 11/19/24 05:32 • (MSD) R4147986-7 11/19/24 05:41

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	35.6	68.0	67.5	81.2	79.8	1	90.0-110	J6	J6	0.831	15

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Arcadis - Chevron - NM

10205 Westheimer Rd.
#800
Houston. TX 77042

Billing Information:
Arcadis, US. Inc.
630 Plaza Drive, Suite 200
Highlands Ranch, CO 80129

Pres Chk

Report to: **Russell Grant**

Email To: russell.grant@arcadis.com;sheila.hernandez@ar

Project Description: **UEM4822 - Cooper Jal**

City/State Collected: Sol NM

Please Circle: PT MT (CT) ET

Phone: **916-786-5246**

Client Project # **30183400 task 0002**

Lab Project # **CHEVARCNM-COOPERJAL**

Collected by (print): Daniel McGee

Site/Facility ID # **COOPER JAL**

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: Standard

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	TDS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-12-W-20241112	G	GW		11-12-24	1230	2	X	X		-01
MW-1-W-20241112		GW			1250	2	X	X		-02
MW-2-W-20241112		GW			1315	2	X	X		-03
MW-5-W-20241112		GW			1345	2	X	X		-04
MW-4-W-20241112		GW			1400	2	X	X		-05
RW-1-W-20241112		GW			1425	2	X	X		-06
DUP-1-W-20241112		GW		11-12-24	—	2	X	X		-07
RW-2R-W-20241113		GW		11-13-24	0935	2	X	X		-08
RW-2-W-20241113		GW		"	1000	2	X	X		-09
MW-10-W-20241113	G	GW		11-13-24	1030	2	X	X		-10

Chain of Custody Page 1 of 2

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MT JULIET, TN

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Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1799867

Tabl C133

Acctnum: **CHEVARCNM**
Template: **T263567**
Prelogin: **P1113142**
PM: **3842 - Haley Torrence**
PB:

Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 642683085233

Sample Receipt Checklist
COC Seal Present/Intact: __NP X Y __N
COC Signed/Accurate: X Y __N
Bottles arrive intact: X Y __N
Correct bottles used: X Y __N
Sufficient volume sent: X Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: X Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	11-13-24	1420	James Colston	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
James Colston	11/13/24	1455		KA92300523 DM
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
				11/14/24 0900

If preservation required by Login: Date/Time

Hold:

Condition: NCF (OK)

Company Name/Address:
Arcadis - Chevron - NM
10205 Westheimer Rd.
#800
Houston. TX 77042

Billing Information:
Arcadis, US. Inc.
630 Plaza Drive, Suite 200
Highlands Ranch, CO 80129

Pres Chk

Report to: **Russell Grant**

Email To: **russell.grant@arcadis.com;sheila.hernandez@ar**

Project Description: **UEM4822 - Cooper Jal**

City/State Collected: Jal, NM

Please Circle: PT MT CT ET

Phone: **916-786-5246**

Client Project # **30230083 TASK 00002**

Lab Project # **CHEVARCNM-COOPERJAL**

Collected by (print): Daniel McBee

Site/Facility ID # **COOPER JAL**

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: Standard

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	TDS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-7-W-20241113	G	GW		11-13-24	1100	2	X	X		-11
~~MW-10 MW-11~~		GW				2	X	X		
MW-9-W-20241113	G	GW		11-13-24	1130	2	X	X		-12

Rad 11-13-24

Analysis / Container / Preservative

Chain of Custody Page 2 of 2

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MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1799867

Table #

Acctnum: **CHEVARCNM**
Template: **T263567**
Prelogin: **P1113142**
PM: **3842 - Haley Torrence**
PB:

Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 6426 83685233

Sample Receipt Checklist
COC Seal Present/Intact: __NP X Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: X Y __N
Correct bottles used: X Y __N
Sufficient volume sent: X Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: X Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	11-13-24	1420	James Colston	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
James Colston	11/13/24	1455		TCA92350=23 24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
				11/14/24 0900

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

Appendix F

Cooper Jal Groundwater Recovery System 30% Basis of Design

ARCADIS Design & Consultancy for natural and built assets

Chevron

Chevron Environmental Management Company

GROUNDWATER RECOVERY SYSTEM

30 PERCENT DESIGN BASIS

Cooper Jal, New Mexico

October 2024

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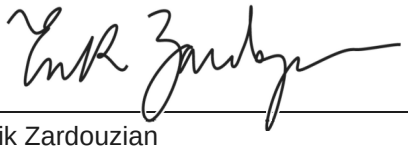
William Semel, P.E.
Principal Engineer



Russell Grant
Certified Project Manager



Erik Zardouzian
Project Environmental Engineer

GROUNDWATER RECOVERY SYSTEM 30 PERCENT DESIGN BASIS

Cooper Jal, New Mexico

Prepared for:

Armando Martinez

Operations Lead - Central

Chevron Environmental Management Company

P.O. Box 469

Questa, NM 87564

Prepared by:

Arcadis U.S., Inc.

10205 Westheimer Road

Suite 800

Houston

Texas 77042

Tel 713 953 4800

Fax 713 977 4620

Our Ref.: 30230082.00003

Date: October 2024

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VERSION CONTROL, OPTIONAL

Issue	Revision No	Date Issued	Page No	Description	Reviewed by
1	0	10/11/2024	N/A	Draft 30 Percent Design Basis	W, Semel

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TABLES

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Table 2. Groundwater Recovery Well Construction

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FIGURES

Figure 1. Site Location Map

Figure 2. Site Layout

ATTACHMENTS

Attachment A Cooper Jal Groundwater Model Memo

Attachment B Groundwater Recovery System 30% Design Drawings

Attachment C Groundwater Data Tables

Attachment D Groundwater Recovery Well Head Loss Calculation

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ACRONYMS AND ABBREVIATIONS

ac-ft	acre-foot
AST	aboveground storage tank
bbl	barrel
bgs	below ground surface
CEMC	Chevron Environmental Management Company
Chevron USA	Chevron U.S.A., Inc.
COC	constituent of concern
CRA	Conestoga-Rovers & Associates, Inc.
Cu/Ni	copper-nickel
cy	cubic yard
ESCI	Environmental Spill Control, Inc.
GFCI	ground fault circuit interrupter
gpm	gallons per minute
GWRS	Groundwater Recovery System
HDPE	high-density polyethylene
HMI	human-machine interface
HVAC	heating, ventilation, and air conditioning
mg/L	milligrams per liter
NMOCD	New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division
NMOSE	New Mexico Office of the State Engineer
NMWQCC	New Mexico Water Quality Control Commission
PFD	process flow diagram
PHA	Process Hazard Assessment
PLC	programmable logic controller
psi	pounds per square inch
PVC	polyvinyl chloride
SCADA	supervisory control and data acquisition
SO_4	sulfate

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TDS	total dissolved solids
Texaco	Texaco Exploration and Production, Inc.
VFD	variable frequency drive

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1 INTRODUCTION

This *Groundwater Recovery System 30 Percent Design Basis* was prepared to establish the basis for a detailed engineering design of a groundwater recovery system (GWRS) for remediation of impacted groundwater at the Cooper Jal site. The Cooper Jal site is located on Lea County Road J7, approximately 5.5 miles northwest of Jal, New Mexico, in Section 24, Township 24 South, Range 36 East, Lea County, New Mexico (the Site). The latitude and longitude coordinates of the Site are 32° 12' 7.13" N and 103° 13' 4.36" W. Chevron Environmental Management Company (CEMC) is planning to install a GWRS to treat chloride in groundwater at the Site.

The proposed GWRS will be located on privately owned property and is assumed will require an access agreement between the landowner and Chevron. The GWRS will store extracted groundwater until third-party trucks remove stored groundwater for offsite disposal. In the future, an on-site disposal well may be utilized to replace the offsite disposal currently in the design. The extracted groundwater layout and flowrates outlined in this document are based on groundwater modeling aimed to restore the aquifer and enhance cleanup timeframe. Historical operations that have resulted in groundwater impacts at the site are summarized in the sections below.

1.1 Site Background

Land in the vicinity of the Site is used primarily for livestock ranching and oil and gas production and has areas of undeveloped rangeland vegetated with indigenous grass. An injection well facility, operated by Team Operating, L.L.C, (Team Operating) is located adjacent to the Site. No active Chevron U.S.A. Inc. (Chevron) operations are present in the area. The topography slopes southeast toward Monument Draw located approximately 7.5 miles east and southeast of the Site. A Site Location Map is presented as Figure 1.

Site assessment was initiated in 1993 when Environmental Spill Control, Inc. (ESCI) of Hobbs, New Mexico performed a subsurface assessment of an unlined earthen produced water overflow pit, reportedly located adjacent to the western edge of the Site. During the investigation, five boreholes were advanced to depths ranging from 15 feet below ground surface (ft bgs) to 100 ft bgs. The investigation revealed the presence of hydrocarbon-impacted soil. In 1996, Texaco Exploration and Production, Inc. (Texaco) filed a notice of intent to close the pit with the New Mexico Oil Conservation Division (NMOCD). Approximately 1,248 cubic yards (cy) of hydrocarbon-impacted soil were removed from the pit. During closure, the excavation was lined with imported clay and backfilled with imported caliche. Texaco submitted a pit closure report to the NMOCD in December 1996.

In 1997, the NMOCD requested additional assessment to define the vertical extent of affected soil beneath the former pit. Assessment activities performed by Highlander Environmental Corporation revealed elevated chloride concentrations in the soil. In October 1997, monitoring well MW-1 was installed near the former pit. Groundwater samples collected from MW-1 contained chloride concentrations above the New Mexico Water Quality Control Commission (NMWQCC) Human Health Standards for Groundwater (250 milligrams per liter [mg/L]). Assessment activities performed through May 1998 included the installation of 13 additional monitoring wells. In 1998, electromagnetic (EM 34) terrain conductivity surveys were completed to identify areas of elevated chloride concentrations in soil.

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In June 1998, Texaco prepared a groundwater corrective action plan to mitigate chloride concentrations and to provide plume containment by extracting groundwater from the affected groundwater-bearing unit (GWBU). Between 1999 and 2013, assessment activities included the installation of wells MW-6R, MW-11 to MW-14, RW-1, RW-2, and RW-2R. Monitoring well MW-6 was plugged and abandoned in September 2013 due to a damaged well casing.

Because on-site wells (MW-1, MW-2, MW-2A, MW-3, and MW-6R) had fully delineated the northern boundary of the chloride plume, monitoring well MW-13, located approximately 1,000 feet upgradient and off site, was plugged and abandoned on July 11, 2017.

Historically, chloride concentrations exhibit decreasing trends in upgradient monitoring wells MW-1, MW-2, and MW-5. Increasing trends have been observed since 1997 in downgradient monitoring wells MW-7, MW-9, MW-9A, and MW-10, although more recent data indicated that these concentrations are stabilizing with some variability, except for monitor well MW-7. Similar trends are apparent in total dissolved solids (TDS) and sulfate concentrations. There are no significant variations in trends in the observed historical concentrations of fluoride. Based on current and historical concentration data, the groundwater plume at the Site is fully delineated.

1.2 Treatment Goals

The NMOCD has regulatory jurisdiction over corrective actions conducted at the Site. Corrective actions follow guidance provided by the NMOCD in Guidelines for Remediation of Leaks, Spills, and Releases (August 13, 1993). These guidelines require remediation of four constituents of concern (COCs; chloride, TDS, sulfate, and fluoride) in groundwater to the human health standards of the NMWQCC set forth in New Mexico Administrative Code 20.6.2.3103B as follows:

Table 1. Human Health Standards of the NMWQCC

Analyte	NMWQCC Standard for Groundwater (mg/L)
Chloride	250
TDS	1,000
Fluoride	1.6
Sulfate (SO_4)	600

1.3 Groundwater Monitoring Program

No changes are anticipated or recommended to the approved groundwater monitoring program upon startup and operation of the proposed groundwater recovery system.

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2 GENERAL DESIGN CONSIDERATIONS

The GWRS will include groundwater pumped from seven groundwater recovery wells (RW-1 through RW-7) using submersible multi-stage pumps. Groundwater will run through conveyance lines from each individual well to a manifold adjacent to an aboveground storage tank (AST), located within secondary containment. Stored groundwater will be disposed of every 2 to 3 days via third-party trucking transport. In the future, an on-site disposal well may be used to dispose extracted groundwater collected at the system compound. If disposal through an on-site disposal well is approved, an injection pump and associated conveyance piping would be installed to move extracted groundwater to the disposal well. Groundwater will not be treated aboveground before off-site disposal.

2.1 Groundwater Recovery System Location

The proposed GWRS is located near Well 148 south of Cooper Cemetery Road (J7) and east of Road 7, owned by Team Operating, L.L.C. Figure 2 is a site layout that provides the approximate location of the GWRS. The location is ideal for the GWRS because it is centrally located within the plume and provides sufficient space for conveyance piping, system infrastructure installation, and truck loading for off-site disposal. Based on preliminary review of the area surrounding the Site, the location of available electricity to power the system is an existing overhead power line on Cooper Cemetery Road, located approximately 0.5 mile from the proposed system compound. Additional information and details of this overhead line will be obtained in future design stages.

2.2 Well and Conveyance Piping Placement

The groundwater recovery well locations were placed based on conclusions drawn from groundwater modelling as part of the Stage 1 & 2 Abatement Plan (Arcadis 2024). The Cooper Jal Groundwater Model Memo from the Stage 1 & 2 Abatement plan is included as Attachment A. Each of the proposed groundwater recovery wells and conveyance piping is located on privately owned land and expected to require a landowner access agreement.

2.3 Frost Protection

Below freezing temperatures are expected to occur at the Site throughout the winter season. Frost protection for conveyance piping and equipment will be incorporated in later design stages and will include adequate ground cover for conveyance lines, aboveground pipe insulation, and other frost protection components, as needed.

2.4 Uptime Target

There is no uptime target for the GWRS. It is expected that extracted groundwater will be trucked off site no less frequently than every 3 days. As a result, the holding tank has been sized to allow for 3 days (72 hrs) of uptime with a 30 percent safety factor. If there is an upset at the system, the safety factor allows for delays from truck offloading and/or operator response from Midland, Texas.

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2.5 Abatement Plan and Water Rights Considerations

The Site does not currently have any approved permits to appropriate groundwater. The target flow rates included in Section 4.2 for each phase of the remediation process are within the water usage permits previously approved by New Mexico Office of State Engineer (NMOSE). NMOSE previously approved CP-884 and CP-885 for RW-2 and RW-1. respectively, for 32.5 acre-feet (ac-ft) per annum from each recovery well.

3 GROUNDWATER MODEL AND WELLFIELD DESIGN

The wellfield was designed in accordance with the conditions described in Scenario 3 of the Cooper Jal Groundwater Model Memo (Attachment A). Existing groundwater recovery wells RW-1 and RW-2R would be integrated into the GWRS. Proposed groundwater recovery wells, RW-3 and RW-5, will be located along the centerline and adjacent to the highest concentration of the plume, whereas proposed groundwater recovery well, RW-4, will be placed further downgradient along plume centerline to prevent downgradient migration as well as to provide contaminant mass recovery. Proposed groundwater recovery well, RW-6, will be located between RW-1 and RW-2R and within the highest concentration (>5,000 mg/L) footprint of the chloride plume to enhance mass removal, whereas proposed groundwater recovery well, RW-7, will be positioned between RW-3 and RW-4 to accelerate plume attenuation. Further detail of pumping rates during multiple phases of operation are included in Section 4.2.

4 GROUNDWATER CONVEYANCE

4.1 Remedial Well Design

Proposed groundwater recovery wells (RW-3 through RW-7) installed at Cooper Jal will be 6-inch-diameter wells, with a total depth of approximately 178 ft bgs. The wells will have 40 feet of screened interval, from approximately 133 to 173 feet bgs, and a sump extending 5 feet from the bottom of the screened interval to a total depth of approximately 178 ft bgs. An appropriate filter pack will be installed with the pack extending to 5 feet above the top of the screen. Five feet of transition sand will be installed on top of the filter pack to prevent seal material from entering the filter pack. A bentonite plug or choker sand will be installed as part of the well seal. A neat cement (depending on compatibility with chloride) will be installed to the surface. Well construction details are shown in Table 2 below.

Table 2. Groundwater Recovery Well Construction

Well ID	Well Screen Interval (ft)	Depth to Top Screen (ft bgs)	Depth to Bottom Screen (ft bgs)	Total depth (ft bgs)	Well Screen Diameter (inches)	Well Screen/Casing Material
RW-1	**TBD based on field investigation**					
RW-2R						
RW-3	40	133	173	178	6	chloride resistance

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Well ID	Well Screen Interval (ft)	Depth to Top Screen (ft bgs)	Depth to Bottom Screen (ft bgs)	Total depth (ft bgs)	Well Screen Diameter (inches)	Well Screen/Casing Material
RW-4	40	133	173	178	6	chloride resistance
RW-5	40	133	173	178	6	chloride resistance
RW-6	40	133	173	178	6	chloride resistance
RW-7	40	133	173	178	6	chloride resistance

1) Well screens will be placed to ensure the top of the screen is always submerged and drawdown will not allow for air intrusion and oxidation within the well.
2) The lifespan of the well will be a minimum of 25 years.
3) Chloride concentrations greater than 1,000 mg/L require careful consideration of corrosion potential. As concentrations greater than 1,000 mg/L are anticipated, the following materials will be considered for well construction materials:
    a) Well casing and screen material:
        i) 316 stainless steel is only good for chloride concentrations up to approximately 1,000 mg/L. Stainless steel well construction materials in areas with higher chloride concentrations could require a different alloy; either copper-nickel (Cu/Ni) or austenitic. Well materials constructed with these alloys can increase cost by 500 percent over 316 stainless steel.
        ii) Slotted polyvinyl chloride (PVC) screens can be used in the presence of high chloride concentrations, but they are more challenging to develop and redevelop than stainless steel wire-wrapped screens. Slotted PVC screens also provide less open area.
    b) Well seal materials will be evaluated for compatibility with high chloride concentrations.
4) Wells will be installed with 20-slot PVC well screens, which should be large enough to provide the target flow rates.
5) Air rotary or mud rotary will be the well installation method based on capabilities of preferred local drilling contractors.
6) Pilot borings may be used in some locations to help with final well design.
7) A 5-foot sump will be installed at the bottom of each well.
8) An appropriate filter pack will be installed with the pack extending to 5 feet above the top of the screen.
9) Five feet of transition sand will be installed on top of the filter pack to prevent seal material from entering the filter pack.
    a) A bentonite plug or choker sand will be installed as part of the well seal.

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10) A neat cement (depending on compatibility with chloride) will be installed to the surface.

4.2 Groundwater Extraction and Conveyance

Groundwater will be extracted using submersible pumps as described in Section 7.1. Groundwater recovery well construction details are shown in Table 2 in Section 4.1. Extracted groundwater will be pumped from the groundwater recovery well network consisting of seven recovery wells (existing on-site wells RW-1 and RW-2R) as well as five additional groundwater recovery wells (RW-3, RW-4, RW-5, RW-6, and RW-7), which have yet to be installed. The site layout and approximate groundwater recovery well locations are identified on **Figure 2**. Extracted groundwater will be pumped to a 40,000-gallon tank via individual conveyance lines from each groundwater recovery well to a manifold at the system compound. Extracted groundwater conveyance piping will be 1-inch-diameter high-density polyethylene (HDPE), either run at grade buried in a raised mound or trenched below grade, both with sufficient ground cover for frost protection. Well layouts and conveyance piping are shown on C-01 of the 30% Design Drawing Package (Attachment B).

Initial extraction flow rates are based on modeling described in Section 3. Flow rates will be adjusted based on changing conditions of the groundwater plume. It is anticipated that flow rates will be optimized per the phasing schedule in Table 3 below, which is expected to operate over 15 years.

Extracted groundwater will be stored in the groundwater AST for off-site disposal. In the future, if approved, recovered groundwater may be conveyed to an on-site disposal well.

Table 3. Groundwater Recovery Well Flow Rates per Phase

Groundwater Recovery Well ID	Phase One (Years 0-10) Extraction Flow Rate (gpm)	Phase Two (Years 10-13) Extraction Flow Rate (gpm)	Phase Three (Years 13-15) Extraction Flow Rate (gpm)
RW-1	**1.3**	0.0	0.0
RW-2R	**1.0**	0.0	0.0
RW-3	**0.8**	**1.3**	**2.1**
RW-4	**1.2**	**1.5**	**2.0**
RW-5	**1.0**	**1.0**	**1.0**
RW-6	**1.0**	**1.3**	0.0
RW-7	**0.8**	**0.8**	0.0
Total	**7.1**	**5.9**	**5.1**

gpm = gallons per minute

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5 INFLUENT WATER QUALITY

Water quality data for the Site at Cooper Jal is included in the groundwater data tables in Attachment C. Chloride concentrations will be considered when determining compatible materials of well construction as well as for conveyance line and associated system equipment.

6 MAJOR UNIT PROCESSES

6.1 Groundwater AST and Transfer Station Location

Extracted groundwater will be pumped to an AST staged within a concrete pad with secondary containment (see Section 7.3). The proposed AST and transfer station are located near Well 148. Based on preliminary review of the area surrounding the Site, the location of available electricity to power the system is an existing overhead power line on Cooper Cemetery Road, located approximately 0.5 mile from the proposed system compound. Additional information and details on the overhead line will be determined in future design stages. A flow distribution manifold and associated pumping equipment will be installed at the system compound.

A process flow diagram (PFD) and process and instrumentation diagram are included in the Groundwater Recovery System 30% Design Drawings (Attachment B).

7 ANCILLARY PROCESSES

7.1 System Pumps

Head loss for each groundwater recovery well pump and associated conveyance piping was calculated using the Hazen-Williams equation. In addition to head loss, maximum discharge pressure was evaluated for each pump. Characteristics include length of conveyance piping, material of construction, pipe diameter, discharge elevation, and head loss through respective unit processes. Hydraulic analysis calculations are provided in **Attachment D**.

All the pumps, except for the sump pumps, will be equipped with variable frequency drives (VFDs). All buried or surficial conveyance piping outside of the system compound will be constructed of HDPE, and all conveyance piping inside the containment berm will be Schedule 80 PVC.

The sump pump was sized at 30 gpm to convey process waste from a critical failure of either a process line or storage tank to the influent equalization tank during an emergency. Pump sizing conditions are summarized in **Table 4**.

An electrical one-line diagram is included in the Groundwater Recovery System 30% Design Drawings (Attachment B).

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Table 4. Pump Sizing Design Parameters

Pump ID	Description	Pump Type	Design Flow (gpm)	Head (psi)	Horsepower	Basis
RW-1	Extraction Pump	Submersible Multistage	1.1	~110	3/4	Remediation well design, head loss calculations
RW-2R	Extraction Pump	Submersible Multistage	1.2	~110	3/4	Remediation well design, head loss calculations
RW-3	Extraction Pump	Submersible Multistage	0.8	~110	3/4	Remediation well design, head loss calculations
RW-4	Extraction Pump	Submersible Multistage	1.2	~110	3/4	Remediation well design, head loss calculations
RW-5	Extraction Pump	Submersible Multistage	1	~110	3/4	Remediation well design, head loss calculations
RW-6	Extraction Pump	Submersible Multistage	1	~110	3/4	Remediation well design, head loss calculations
RW-7	Extraction Pump	Submersible Multistage	0.8	~110	3/4	Remediation well design, head loss calculations
P-008	GWRS Sump Pump	Submersible	30	~10	1/2	Collection and conveyance of failure of tank or process pipe, head loss calculations

psi = pounds per square inch

7.2 Groundwater AST Sizing and Offload Frequency

Groundwater recovery wells are expected to produce approximately 10,224 gallons of groundwater each day during Phase One operations. The groundwater AST will be sized to allow for 3 days (72 hrs) of uptime and a 30 percent safety factor (approximately 40,000 gallons) in the event truck offloading is delayed and to include run time in the event of an upset at the system to allow for operator response from Midland, Texas. Extracted groundwater will be removed and disposed via third-party trucking transport in trucks capable of transporting 110 barrels (bbl; or 4,620 gallons) per truck. This volume would require approximately 5 truckloads every 2 days, or approximately 7 truckloads every 3 days.

If disposal through an on-site disposal well is confirmed as an option, an injection pump would be installed to move the stored groundwater to the disposal well.

7.3 Secondary Containment

The GWRS and distribution manifold and tanks located at Cooper Jal will be constructed with secondary containment to reduce the risk of untreated groundwater or chemical release. The secondary containment system will be designed to hold 110 percent of the largest tank contained within the system per the Chevron EMC Mechanical Remediation System Design Standard Version 3 (CEMC 2016). An additional 4 inches for rain and freeboard will also be included in the design. The design for a secondary

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containment system will also include a sump, sump pump with low- and high-level switches, and a check valve to prevent backflow through the sump pump.

7.4 Instrumentation and Controls

The groundwater extraction system will incorporate a programmable logic controller- (PLC-) based supervisory control and data acquisition (SCADA) system. The SCADA system will provide monitoring, supervisory control, alarming, and data collection. System and remediation well processes, including pump and flow control, will be programmed for automatic operation with the ability to respond to manual control when necessary. Process pumps, equipment, and instrumentation will be monitored via the SCADA system. All SCADA information will be displayed on a human-machine interface (HMI) and will be accessible remotely by an operator through a secured remote connection via cellular service (or satellite if needed).

Alarm interlocks based on the monitored process variables will be incorporated into the PLC program to enable automatic shutdown of pertinent equipment due to alarm conditions (e.g., low discharge flow, high discharge pressure, tank low/high levels, motor overload, high-level vault alarms). Critical alarm conditions will deactivate the entire system, requiring an operator to review the alarm log to determine the cause for system shutdown. Depending on the alarm condition, the system may be reset remotely after acknowledging the alarm. Other alarm conditions may require on-site attention by the operator before the system can be reactivated. The HMI of the SCADA system will include sufficient access to modify system setpoints, parameters, alarm limits, and indication of associated process variables and instruments. These data will also be available to the SCADA system for remote control, alarming, trending, archiving, and other related tasks.

For heat and frost protection, the PLC based SCADA system and HMI will include either in-panel heating, ventilation, and air conditioning (HVAC), or the panels will be housed within a small structure with HVAC. The details of this heating and cooling approach will be determined in later design stages.

A process and instrumentation diagram is included in the Groundwater Recovery System 30% Design Drawings (Attachment B).

7.5 Fire Protection

Fire protection will consist of fire extinguishers and will meet Lea County and local fire department requirements. Fire protection design details will be obtained during the building permitting process.

7.6 Grounding

The GWRS will be equipped with a grounding electrode system designed in accordance with the 2020 National Electrical Code including New Mexico amendments.

To ensure that the grounding electrode system has been properly installed, a ground resistance test will be performed no sooner than 48 hours after a rainfall, with results to confirm a maximum resistance of 5 ohms.

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7.7 Hazardous Area Classification

Based on the water quality and site COC data available for the Site, no flammable compounds are expected to be present from extracted groundwater. Therefore, no hazard area classifications are expected to be required as part of this design.

7.8 Eye Wash and Safety Shower

Eyewashes and safety showers will be designed in accordance with Chevron Safety In Design principles. Eyewash stations and safety showers will also be designed in accordance with United States Department of Labor, Occupational Safety and Health Administration 29 CFR 1910.151(c). Eyewash and safety shower design specifications will adhere to the American National Standards Institute Z358.1-2014 for Emergency Eyewash and Shower Equipment. Because no municipal water supply is present at or near the Site, emergency eyewash and safety showers will be self-contained packages with integrated water storage and controls.

8 SAFETY IN DESIGN

Arcadis will complete multiple safety evaluations in order to ensure that the GWRS design incorporates robust health and safety design principles. These evaluations will include an initial review of the Chevron Safety In Designs Manual to identify appropriate design safety measures, a D-TRACK review, and a Process Hazard Analysis (PHA) with CEMC. D-TRACK is an Arcadis PHA tool that uses the “what if?” method along with the Arcadis health and safety principles - Think through the task, Recognize the hazards, Assess the risks, Control the risks, Keep health and safety first. The elements from the Safety in Designs Manual that will be incorporated into the design, if applicable, are:

- Egress and Walkways – this guidance will be followed to provide open areas required for designated egress, walkways, and work areas.
- Equipment Access – this guidance will be followed to ensure proper body position during system operation; best practices will be applied for control heights and display heights.
- Electrical Equipment Design - this guidance will be followed where applicable including ground fault circuit interrupter (GFCI) requirements.
- The safety shower and eyewash standards will be followed for the safety shower.
- Lighting and emergency lighting standards will be followed for the GWRS design.
- Arcadis will apply other labelling and signage standards during construction.

The D-TRACK will be completed before initiating the 100 percent design effort. After the D-TRACK is completed, Arcadis and CEMC will collaborate to complete a Chevron PHA.

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8.1 Pressure Control

As part of the D-TRACK and PHA process, pressure vessels and piping will be evaluated for high-pressure scenarios including operation and deadhead pressure. The analysis will be prepared during later design stages.

9 REFERENCES

Arcadis. 2024. 2023 Stage 1 & 2 Abatement Plan. Cooper-Jal Unit South Injection Station Section 24, Township 24 South, Range 36 East, Lea County, New Mexico. OGRID No: 4323. Incident ID: nAUTOfAB000105. January.

Chevron Environmental Management Company (CEMC). 2016. Mechanical Remediation System Design Standard (Version 3.0). June.

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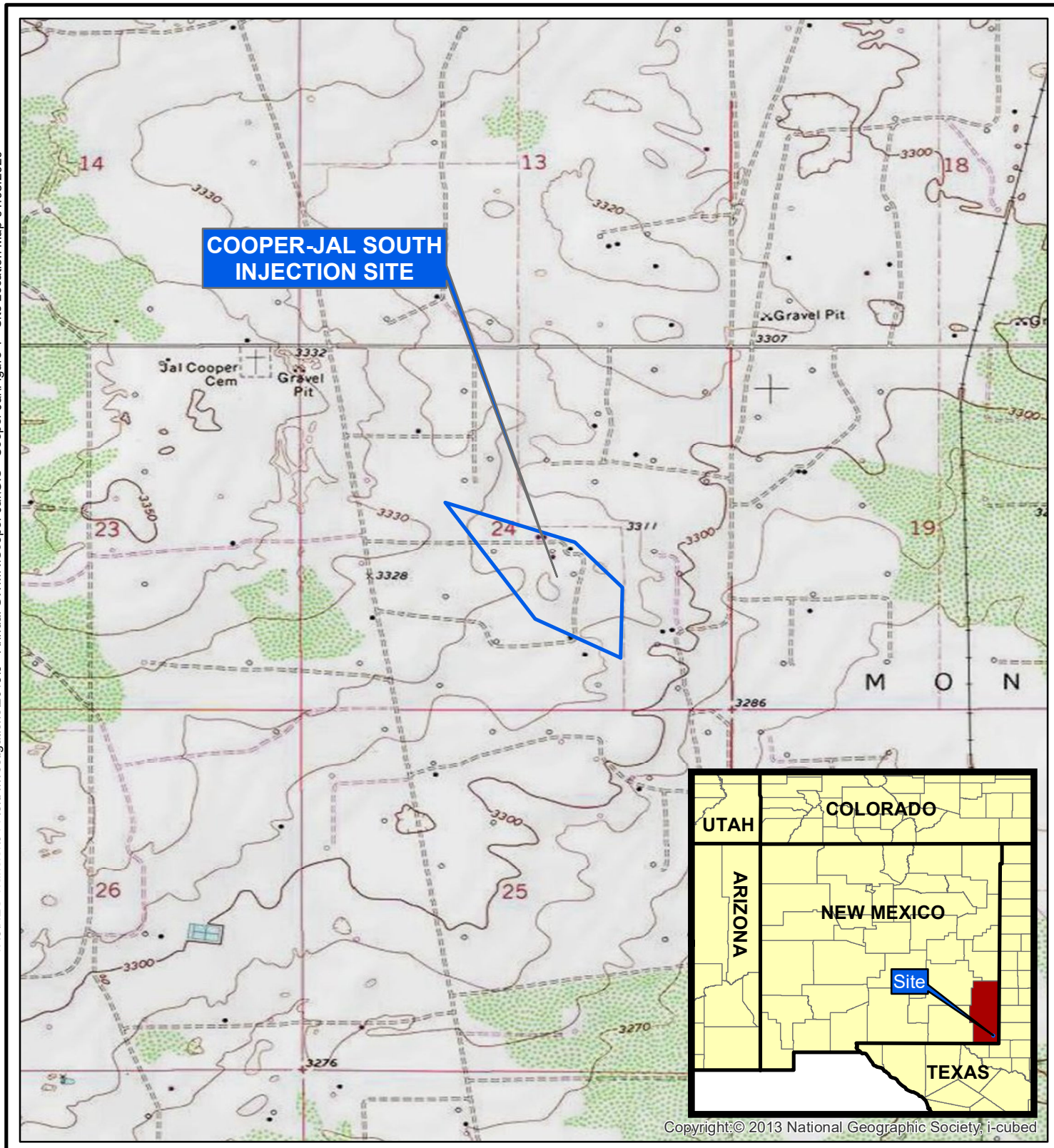
FIGURES



Legend

Site Boundary

Notes:
1. Datum: D_WGS_1984
2. Source: United States Geological Survey 7.5 Minute Quadrangle Map
3. Site Location: 32.19891, -103.21523

N

0 1,000 2,000 4,000 Feet

Chevron Environmental Management Company
Cooper-Jal Unit South Injection Site
Lea County, New Mexico

SITE LOCATION MAP

ARCADIS

FIGURE 1

Document Path:\\arcadis-us\officedata\Houston-TX\ENV\Chevron\Texaco TX8\HES Transfer\04 Field Investigations\2019\6 - Annual GWMR\Cooper Jal\GIS - Cooper Jal\Figure 1 - Site Location Map 01.08.2020

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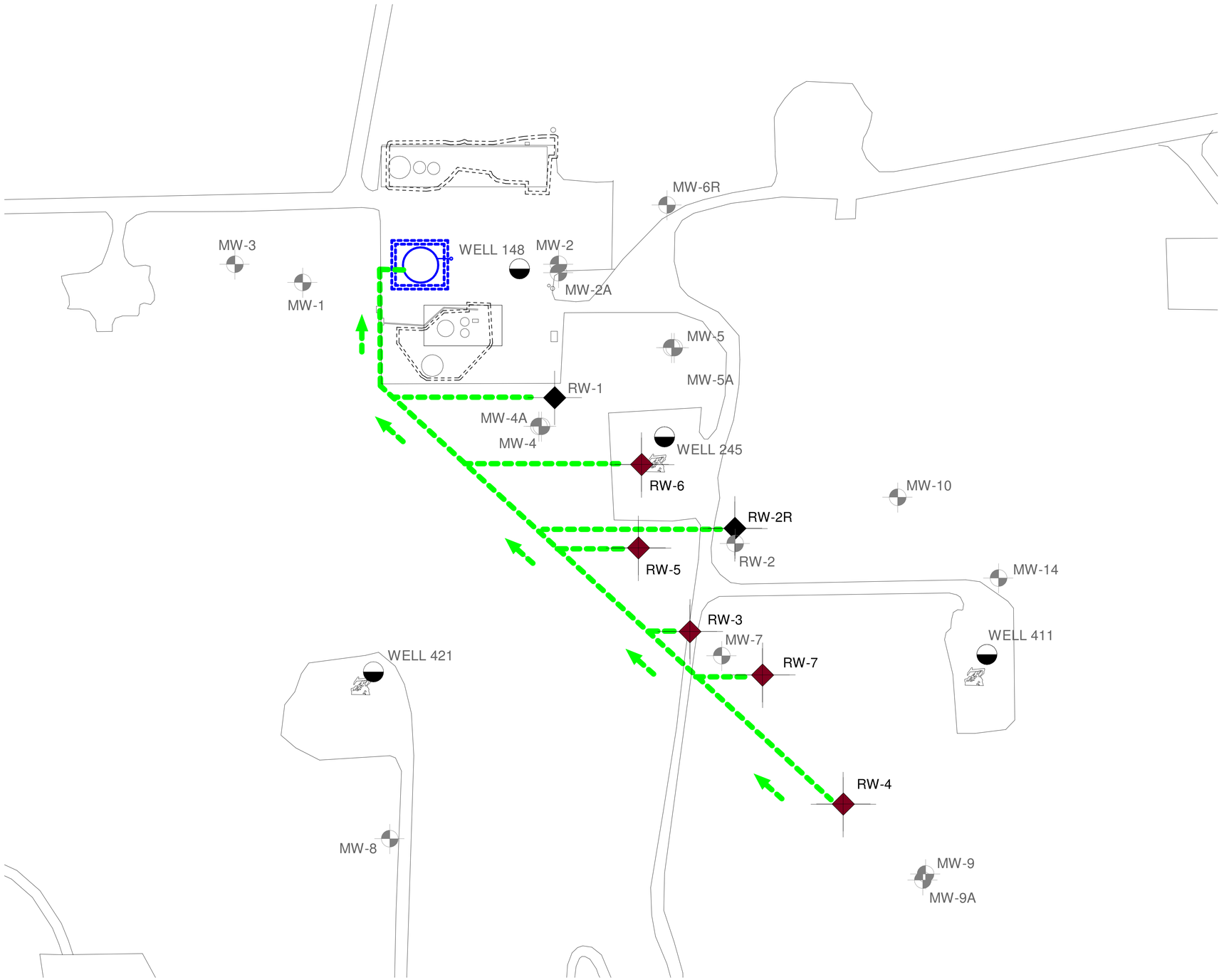
LEGENDS

- MONITORING WELL
- EXISTING GROUNDWATER RECOVERY WELL
- PROPOSED GROUNDWATER RECOVERY WELL
- COOPER JAL OIL WELL
- FLOW DIRECTION
- DIRT ROAD
- PROPOSED GROUNDWATER RECOVERY AST
- PROPOSED INFLUENT RECOVERY LINE
- EXISTING SECONDARY CONTAINMENT BERM
- PROPOSED AST SECONDARY BATTERY CONTAINMENT BERM
- AST — ABOVEGROUND STORAGE TANK



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No.	Date	Revisions	By	Ckd

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Professional Engineer's Name		
Professional Engineer's No.		
State	Date Signed	Project Mgr.
Designed by	Drawn by: HD	Checked by

30% DESIGN

ARCADIS

ARCADIS U.S., INC.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY

COOPER JAL 30% GROUNDWATER RECOVERY SYSTEM DESIGN

SITE LAYOUT

CIVIL

ARCADIS Project No.
30230083

Date
OCTOBER 2024

Arcadis U.S., Inc.
10205 Westheimer Road
Suite 800,Houston
Texas 77042
Phone: 713 953 4800

Figure 2

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Attachment A: Cooper Jal Groundwater Model Memo

MEMO

ARCADIS Design & Consultancy for natural and built assets

To:

Bradford G. Billings

EMNRD/OCD

5200 Oakland, NE, Suite 100

Albuquerque, NM 87113

Copies:

File

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From:

Khandaker Ashfaque

Jack Wang

Date:

August 10, 2020

Arcadis Project No.:

30045941.0003A

Subject:

Cooper-Jal Groundwater Model
Chevron Environmental Management Company
Lea County, New Mexico

BACKGROUND

This technical memorandum summarizes the work conducted by Arcadis for the Chevron Environmental Management Company to assess the potential effectiveness of a chloride plume containment system at the Cooper-Jal Unit South Injection Station (Site), approximately 5.5 miles northeast of Jal, New Mexico, in Section 24, Township 24 South, Range 36 East, Lea County, New Mexico. The location of the Site is shown on **Figure 1**.

Chloride is presented at elevated concentrations in groundwater beneath the Site as a result of historic operations; in 2019 chloride concentrations exceeded 9,300 milligrams per Liter (mg/L) at RW-1.

GHD previously developed a Site-specific three-dimensional groundwater flow and transport model for the Site to assess potential future chloride migration in groundwater and evaluate potential options to remediate the chloride plume. Review of GHD supplied modeling files suggest four remedial alternative scenarios were evaluated with varying number of extraction / injection wells and pumping rates. A closer look at simulation results indicate it will take approximately 90 to 95 years for complete attenuation of the chloride plume under a proposed 21-gallons per minute (gpm) system consisting of 3 extraction and 1 injection wells.

A brief summary of the Site Setting and Hydrogeologic Conditions can be found in 2016 Annual Groundwater Monitoring Report (GHD 2016).

SCOPE OF WORK

Arcadis has been tasked with reviewing the original model design and construction, revising, and recalibrating the groundwater model, and applying the model to evaluate chloride plume transport under three scenarios:

- Scenario 1 – Monitored Natural Attenuation (non-pumping condition),
- Scenario 2 – Five (5) recovery wells with time-varying strategic pumping conditions, and
- Scenario 3 – Seven (7) recovery wells with time-varying strategic pumping conditions.

CONCEPTUAL SITE MODEL

The uppermost groundwater bearing zone underlying the Site is the Tertiary Ogallala Aquifer (Ogallala) formation which reportedly spans from approximately 165 feet to 175 feet below ground surface (bgs) across the Site. Based on Site boring logs, the average saturated aquifer thickness noted below the Site is approximately 40 feet and is generally encountered between 130 feet bgs and 175 feet bgs. “Red beds” consisting of fine-grained materials like shale, silt, or clay were encountered at approximately 171 feet bgs in several borings.

Hydraulic properties of the Ogallala formation were characterized through a pumping test performed on October 2, 2013 on recovery well RW-2R, and several slug tests carried out on 10 monitoring wells on March 21 and 23, 2017. Evaluation of the pumping test data resulted in a calculated aquifer transmissivity of 25.62 square feet per day and a hydraulic conductivity of 0.73 feet per day [ft/day]. However, hydraulic conductivity values obtained from slug test analysis ranged from 0.23 to 3.76 ft/d, with a geometric mean of 1.79 ft/d.

GROUNDWATER FLOW MODEL DEVELOPMENT

Flow Model Code Selection and Description

The groundwater flow model was developed using MODFLOW, a publicly-available groundwater flow simulation program developed by the USGS (McDonald and Harbaugh, 1988). MODFLOW is thoroughly documented; widely used by consultants, government agencies, and researchers; and is consistently accepted in regulatory environments. MODFLOW uses the method of finite differences to approximate groundwater flow equations. Spatial discretization consists of subdividing the entire model domain into a grid or mesh or blocks or cells. In the discretized system, hydraulic heads are computed at the center of each grid block. In general, computational accuracy increases as the number of rows and columns in the grid increases (the grid cells become smaller). MODFLOW allows the use of variable mesh spacing to enhance model accuracy in the area of concern — in this case, the Site area, within the chloride plume, and in the vicinity of existing and proposed groundwater pumping.

The hydrogeologic framework and the dynamics of the flow system require a code capable of simulating three-dimensional flow with dipping layers. The unconfined nature of the aquifer necessitates a code option for simulating a free-water surface. Simulation of various boundary conditions (specified flux and

free-surface) is required, as is the ability to simulate the distribution of various aquifer and hydrologic parameters. MODFLOW meets all of these requirements.

Model Domain and Grid

The numerical model domain for the Site covers an aerial extent of approximately 7,100 feet by 3,800 feet (**Figure 2**). The model domain has been extended to better represent regional hydrogeologic boundaries. The finite-difference grid spacing ranges from 10 feet by 10 feet near the Site to 110 feet by 110 feet along the model extents. Vertically, the model consists of one layer, and represents the Tertiary Ogallala Aquifer formation.

Boundary Conditions

The numerical model is bounded by regional water level contours on the south-east and north-west, and no-flow boundary representing inferred regional groundwater flow line to the north-east and south-west (**Figure 2**). The boundary conditions align with the regional groundwater levels and extends a sufficient distance from the area of concern to minimize potential for boundary effects.

Head-dependent flux boundaries (i.e., general head boundaries) were utilized at the upgradient and downgradient model bounds based on 2019 gauged water levels from on-Site monitoring wells (i.e. MW-13 and MW-11). During flow model calibration, the stage and hydraulic conductance of flux boundaries were adjusted to better match observed flow conditions.

Hydraulic Parameters

The following sections discuss hydraulic parameter assignments in the model.

Hydraulic Conductivity

Initially, the groundwater model utilized a uniform hydraulic conductivity of 2.79 ft/day. During flow model calibration, the hydraulic conductivity value was adjusted to 1.4 ft/day – a value comparable to the calculated geomean of 1.79 ft/day from slug test analyses.

Recharge

Even though the annual evaporation rate likely exceeds annual precipitation, small amount of recharge likely occurs in months when evaporation rates are the lowest. As such, aerial recharge was applied uniformly over the model domain and was modified during model calibration. The rate of aerial recharge assigned in the calibrated model was estimated to be 0.06 inches per year, which is consistent with values obtained at nearby McKnight and Erwin facilities.

GROUNDWATER FLOW MODEL CALIBRATION

Calibration of a groundwater flow model refers to the process of adjusting model parameters to obtain a reasonable match between observed and simulated water levels. Model calibration is an iterative procedure that involves adjustment of hydraulic properties and/or boundary conditions to achieve the best match between observed and simulated water levels. During model calibration, model parameters are varied over a narrow range set by Site-specific data using the conceptual Site model as a guide.

The use of point data (targets) during calibration eliminates the potential for interpretive bias that may result from attempting to match a contoured potentiometric surface (Konikow, 1978; Anderson and

Woessner, 1992). The steady-state flow model was calibrated to average water level elevations between 2017 and 2019 collected at 19 water-level targets and distributed across the Site (**Figure 3**).

Simulated groundwater elevations and calibration target residuals for the Site area are shown on **Figure 3**. Residuals are defined as the difference between the model-simulated heads and the observed values. Positive residual values indicate that the model-simulated values are lower than the target values, and negative residual values indicate that the model-simulated values are higher than the target values. The residuals shown on **Figure 3** suggest measured water levels match reasonably well with model-simulated water levels in the Site area. Additionally, over-predictions in water levels are generally balanced with under-predicted water levels across the Site area which suggest minimal spatial bias in residuals.

The quality of the model calibration can be determined by a statistical analysis of the residuals, as shown in **Table 1**. Residual statistics **(Table 1)** for the calibrated groundwater flow model indicate an acceptable agreement between simulated and measured groundwater elevations. The residual mean, residual standard deviation, and sum of squared residuals (SSR) were calculated to be -0.07 feet, 0.43 feet, and 3.56 square feet, respectively. The scaled standard deviation (standard deviation divided by the range in observed water levels) is 4.6%. Ideally, the scaled standard deviation should be less than 10% to ensure the model accurately predicts groundwater flow direction and rates. These statistics indicate a good fit between the observed and simulated water levels. A plot of observed vs. simulated groundwater elevations for the 19 calibration targets is presented on **Figure 4**, which indicates that all simulated water levels are within 10% of the observed target levels.

SOLUTE TRANSPORT MODEL DEVELOPMENT

Transport Model Code Selection and Description

The solute transport modeling was performed using the modular three-dimensional transport model referred to as MT3DMS which was originally developed by Zheng and Wang (1999) for the United States Army Corps of Engineers. The MT3DMS code uses the flows computed by MODFLOW in its transport calculations and the same finite-difference grid structure and boundary conditions as MODFLOW, simplifying the effort to construct the solute transport model. MT3DMS has a comprehensive set of options and capabilities for simulating advection, dispersion/diffusion, and chemical reactions of contaminants in groundwater flow systems under a range of hydrogeologic conditions.

Solute Transport Parameters

The solute transport model was simulated using a single domain with an average porosity of 20%. No sorption, dispersion, or decay were simulated which is appropriate for evaluating chloride transport. However, the model included numerical dispersion, which is typical on the order of one half the grid cell spacing or about 5 feet. Plume dilution is represented by the groundwater recharge in the flow model and the dilution effect is expected to be minimal on the simulated chloride concentration.

CHLORIDE TRANSPORT ASSESSMENT

Solute transport modeling was performed to evaluate the migration and fate of the chloride plume detected in groundwater beneath the Site. Initial chloride plume was delineated based on observed chloride concentrations from June 2019 and November 2019 sampling events (**Figure 5**). To add conservatism in simulation results, maximum concentrations of the two sampling events at the monitoring wells were utilized. The solute transport model used the output from the calibrated flow model to simulate chloride transport under current average ambient groundwater flow conditions. The solute transport model was

used to assess the effectiveness of various remedial alternatives in reducing chloride concentrations in groundwater.

Chloride plume transport was assessed under three scenarios:

- Scenario 1 – Monitored Natural Attenuation (non-pumping condition),
- Scenario 2 – Five (5) recovery wells with time-varying strategic pumping conditions, and
- Scenario 3 – Seven (7) recovery wells with time-varying strategic pumping conditions.

The following sections describe the results of transport simulations for each scenario. Each transport scenario began with the initial chloride plume distribution shown on **Figure 5**. Transport model output are shown on **Figures 6**, **8**, and **10**. Recovery well configurations for Scenarios 2 and 3 are presented on **Figures 7** and **9**.

Scenario 1. Monitored Natural Attenuation (MNA)

This scenario simulated the movement of the chloride plume under non-pumping conditions (i.e., RW-1 and RW-2R were not pumped). **Figure 6** depicts chloride plume distributions after 5, 10, 20, 30, and 50 years of simulated transport. The figure indicates that the extent of the highest concentration portion of the plume (>5,000 mg/L) remains generally unchanged from the start of the simulation. Also, the leading edge of the plume slowly migrates downgradient with minimal spreading and attenuation suggesting chloride mass is expected to remain fairly unchanged under MNA scenario.

Scenario 2. Five (5) Recovery Wells with Time-Varying Strategic Pumping

This scenario simulated the fate and transport of the chloride plume under the influence of pumping from select recovery wells. Note that there are currently two non-operational recovery wells, RW-1 and RW-2 at the Site (**Figure 7**). Based on preliminary modeling evaluation, three additional recovery wells (RW-3, RW-4, and RW-5) were proposed at strategic locations with respect to the chloride plume footprint. Recovery wells RW-3 and RW-5 are located along the centerline and adjacent to the highest concentration of the plume; whereas, recovery well RW-4 is placed further downgradient along plume centerline to prevent downgradient migration as well as to provide contaminant mass recovery. The configuration of recovery wells with respect to initial chloride plume distribution is presented on **Figure 7**.

Figure 8 illustrates chloride plume distributions after 10, 15, 18, 19, and 25 years of simulated transport. The transport simulation was performed in phases, where operation of various recovery wells was adjusted and individual well flow rates were optimized (i.e., reduced pumping rates, turning on and off recovery wells) to achieve chloride plume attenuation within a reasonable timeframe. The following table lists the different phases of modeling simulation along with active recovery wells and total pumping rates corresponding to individual phases:

Modeling Phase	Simulation Time Period (Years)	Total Pumping Rate (gpm)	Total Number of Operational Wells	Operating Recovery Wells
Phase 1	0 to 10	6.2	5	RW-1 through RW-5
Phase 2	10 to 15	6.0	4	RW-2 through RW-5
Phase 3	15 to 18	5.0	3	RW-3 through RW-5
Phase 4	18 to 19	3.6	2	RW-3 and RW-4
Phase 5	19 to 25	2.9	1	RW-4

As the table suggests, the total pumping rate for the recovery wells vary from 2.9 to 6.2 gpm across various phases. The table further indicates that the number of active recovery wells becomes less over time as the extent of the chloride plume decreases and the total chloride mass reduces, which are depicted on **Figure 8**. Modeling results (**Figure 8**) indicate that under the proposed five recovery well pumping configuration, chloride plume is expected to be completely attenuated below 250 mg/L in approximately 25 years.

Scenario 3. Seven (7) Recovery Wells with Time-Varying Strategic Pumping

The purpose of this scenario was to evaluate a pump-only remedy configuration that would achieve chloride plume attenuation in approximately 15 years. Based on review of Scenario 2 modeling results, two more recovery wells (RW-6 and RW-7) were added to the proposed five recovery wells from Scenario 2. **Figure 9** portrays the configuration of the seven recovery wells under Scenario 3 along with the initial chloride footprint. Besides existing recovery wells RW-1 and RW-2R, proposed locations of recovery wells RW-3 through RW-5 are generally consistent with those from Scenario-2. Additional recovery well RW-6 was proposed between RW-1 and RW-2R, and within the highest concentration (>5,000 mg/L) footprint of the chloride plume to enhance mass removal; whereas RW-7 was positioned between RW-3 and RW-4 to accelerate plume attenuation.

Figure 10 illustrates chloride plume distributions after 10, 13, and 15 years of simulated transport. Similar to Scenario 2, the transport simulation was performed in phases, where operation of various recovery wells was adjusted, and individual well flow rates were optimized to achieve chloride plume attenuation within a shorter timeframe. The following table lists the total pumping rates along with the number of recovery wells corresponding to each transport simulation phases:

Modeling Phase	Simulation Time Period (Years)	Total Pumping Rate (gpm)	Total Number of Operational Wells	Operating Recovery Wells
Phase 1	0 to 10	7.1	7	RW-1 through RW-7
Phase 2	10 to 13	5.9	5	RW-3 through RW-7
Phase 3	13 to 15	5.1	3	RW-3 through RW-5

As the table suggests, the total pumping rate for the recovery wells vary from 5.1 to 7.1 gpm across various phases. The table further indicates that the number of active recovery wells becomes less over time as the extent of the chloride plume decreases and chloride mass reduces, which are depicted on

Figure 10. Modeling results (**Figure 10**) indicate that under the proposed seven recovery well pumping configuration, chloride plume is expected to be completely attenuated below 250 mg/L in approximately 15 years.

CONCLUSIONS

A Site-specific, three-dimensional groundwater flow and solute transport model was used to assess potential approaches to mitigate the migration of a chloride plume beneath the Site. Using an initial chloride distribution based on 2019 groundwater quality samples, three scenarios were evaluated including MNA, time-varying strategic pumping with five recovery wells (two existing and three proposed wells), and time-varying strategic pumping with seven recovery wells (two existing and five proposed wells). The transport simulation predicted that chloride plume is expected to be completely attenuated below 250 mg/L in approximately 25 and 15 years under the five recovery well and seven recovery well scenarios, respectively.

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Konikow, L. 1978. Calibration of Groundwater Models, in Proceedings of the Specialty Conferences on Verification of Mathematical and Physical Models in Hydraulic Engineering, College Park, Maryland, August 9-11, 1978.

McDonald, Michael G. and Arlen W. Harbaugh. 1988. A Modular Three-Dimensional Finite-Difference Ground-Water Flow Model. Techniques of Water-Resources Investigations of the United States Geological Survey, Chapter A1.

Zheng, Chunmiao and P. Patrick Wang. 1999. MT3DMS: A Modular Three-Dimensional Multispecies Transport Model for Simulation of Advection, Dispersion, and Chemical Reactions of Contaminants in Groundwater Systems; Documentation and User's Guide Strategic Environmental Research and Development Program. Prepared for U.S. Army Corps of Engineers, Washington, DC. Contract Report SERDP-99-1. December.

Table 1
Groundwater Flow Model Steady-State Calibration Targets
Cooper-Jal Groundwater Model
Lea County, New Mexico

Well ID	Model Layer	Observed Groundwater Elevation (feet msl)	Simulated Groundwater Elevation (feet msl)	Residual (observed - simulated, feet)
MW-1	1	3187.11	3186.98	0.13
MW-10	1	3185.54	3184.61	0.93
MW-11	1	3181.16	3181.55	-0.39
MW-12	1	3190.35	3190.38	-0.03
MW-14	1	3184.33	3183.95	0.38
MW-2	1	3186.83	3186.57	0.26
MW-2A	1	3186.73	3186.60	0.13
MW-3	1	3187.50	3187.48	0.02
MW-4	1	3185.89	3186.13	-0.24
MW-4A	1	3186.07	3186.11	-0.04
MW-5	1	3186.00	3185.93	0.07
MW-6R	1	3186.65	3186.45	0.20
MW-7	1	3184.44	3184.66	-0.22
MW-8	1	3184.92	3185.13	-0.21
MW-9	1	3182.44	3182.98	-0.55
MW-9A	1	3182.47	3182.98	-0.51
RW-1	1	3186.32	3186.22	0.10
RW-2	1	3184.94	3185.05	-0.11
RW-2R	1	3183.86	3185.09	-1.23

Total targets: 19

Mean residual: -0.07 feet

Residual standard deviation: 0.43 feet

Observed target range: 9.20 feet

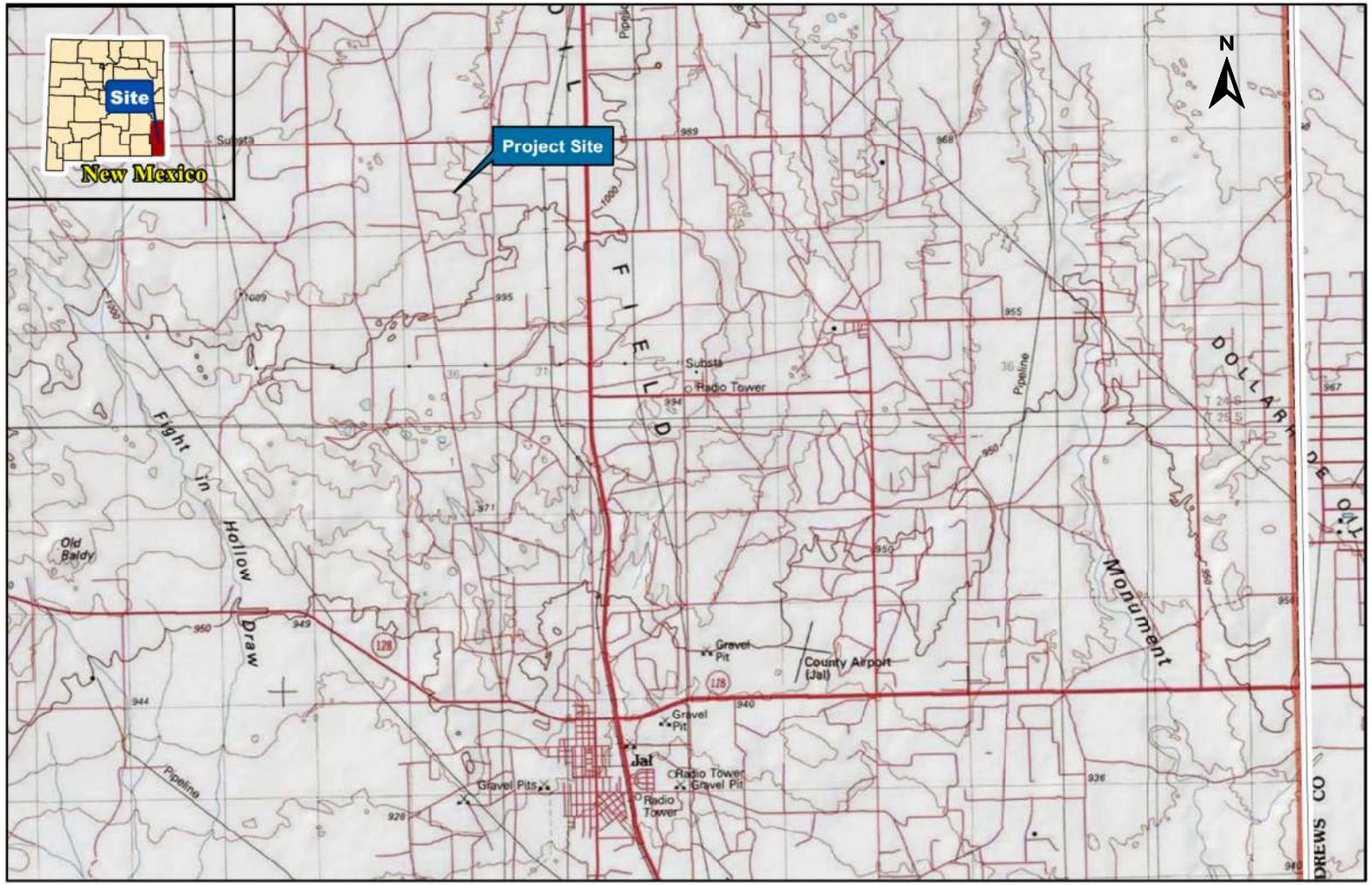
Residual sum-of-squares: 3.56 ft^2

Notes:

Average water-level measurements from 2019.

ft^2 = square feet

msl = mean sea level



SOURCE: USGS 7.5 MINUTE QUADRANGLE; JAL NW, NEW MEXICO (1977)

0 500 1500ft

Coordinate System:
NAD83 State Plane
New Mexico East

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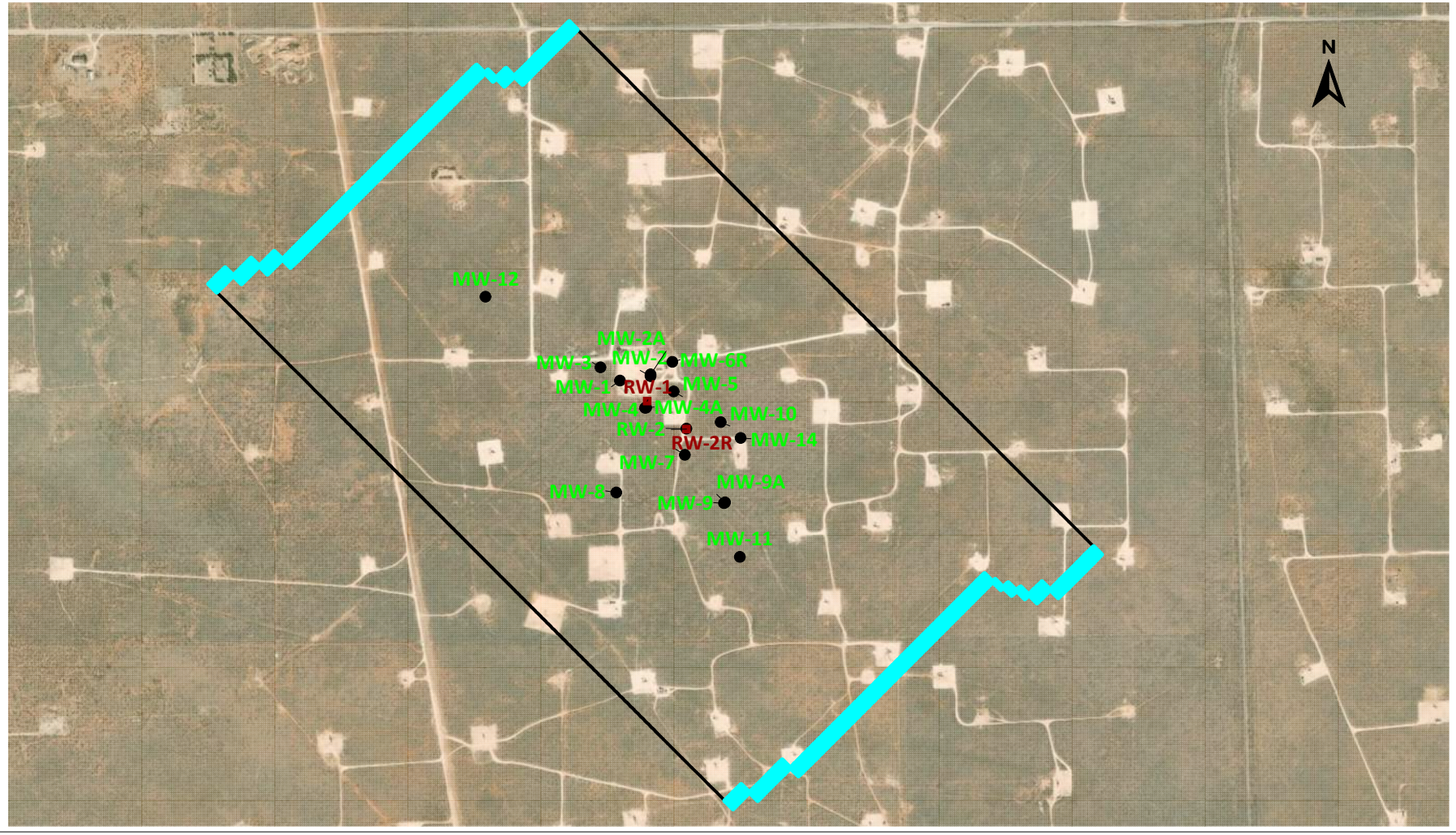
LEA COUNTY, NEW MEXICO

COOPER-JAL GROUNDWATER MODEL

SITE LOCATION

ARCADIS

FIGURE
1



Model Extent

General Head Boundary

MW-2 Monitoring Wells

RW-1 Extraction Wells

SCALE IN FEET

0 1000 2000 3000

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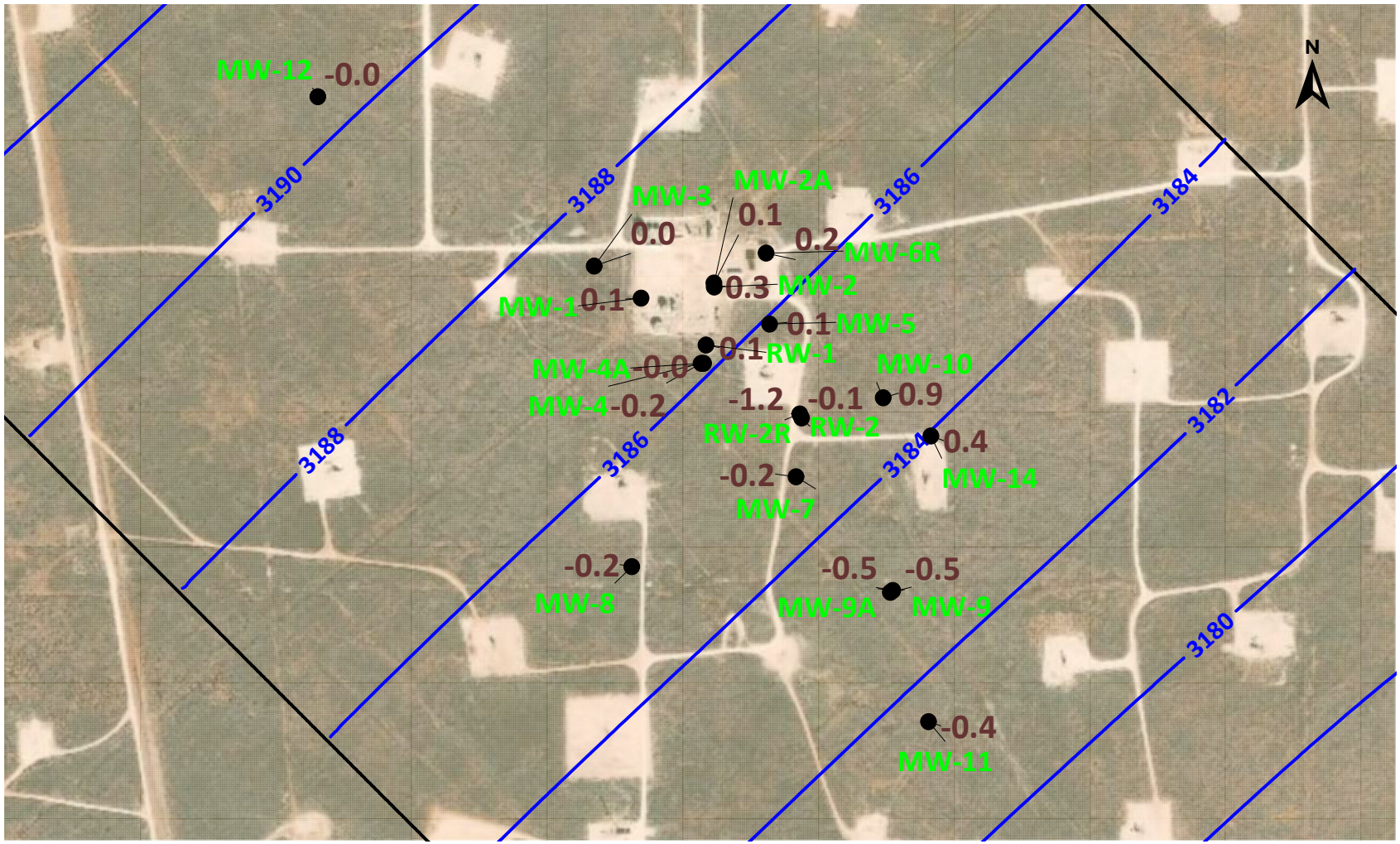
LEA COUNTY, NEW MEXICO

COOPER-JAL GROUNDWATER MODEL

GROUNDWATER MODEL EXTENT AND BOUNDARY CONDITIONS

ARCADIS

FIGURE 2



Model Extent

SCALE IN FEET

0 500 1000

--3190-- Simulated Water Level Contours (feet msl)
(contour interval: 2 feet); msl = mean sea level

-0.2
MW-2
Simulated Residuals (feet)
[Observed minus Modeled Water Levels]

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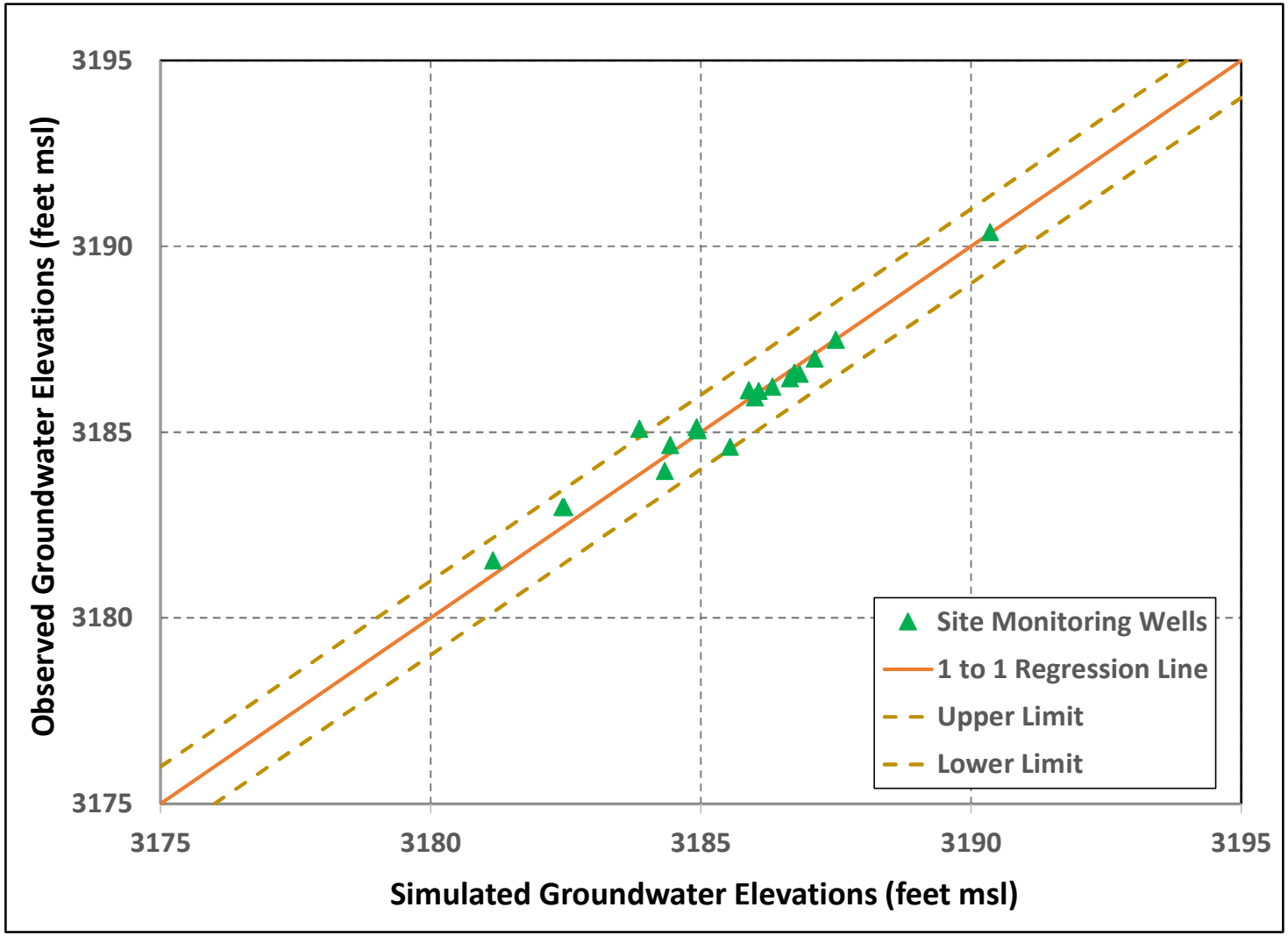
LEA COUNTY, NEW MEXICO

COOPER-JAL GROUNDWATER MODEL

SIMULATED NON-PUMPING WATER LEVEL AND RESIDUAL DISTRIBUTIONS

ARCADIS

FIGURE
3



Steady-State calibration statistics:

1. Residual Mean is -0.07 feet.
2. Redisual Standard Deviation is 0.43 feet.
3. Sum of Square is 3.56 feet^2.

Note: msl = mean sea level

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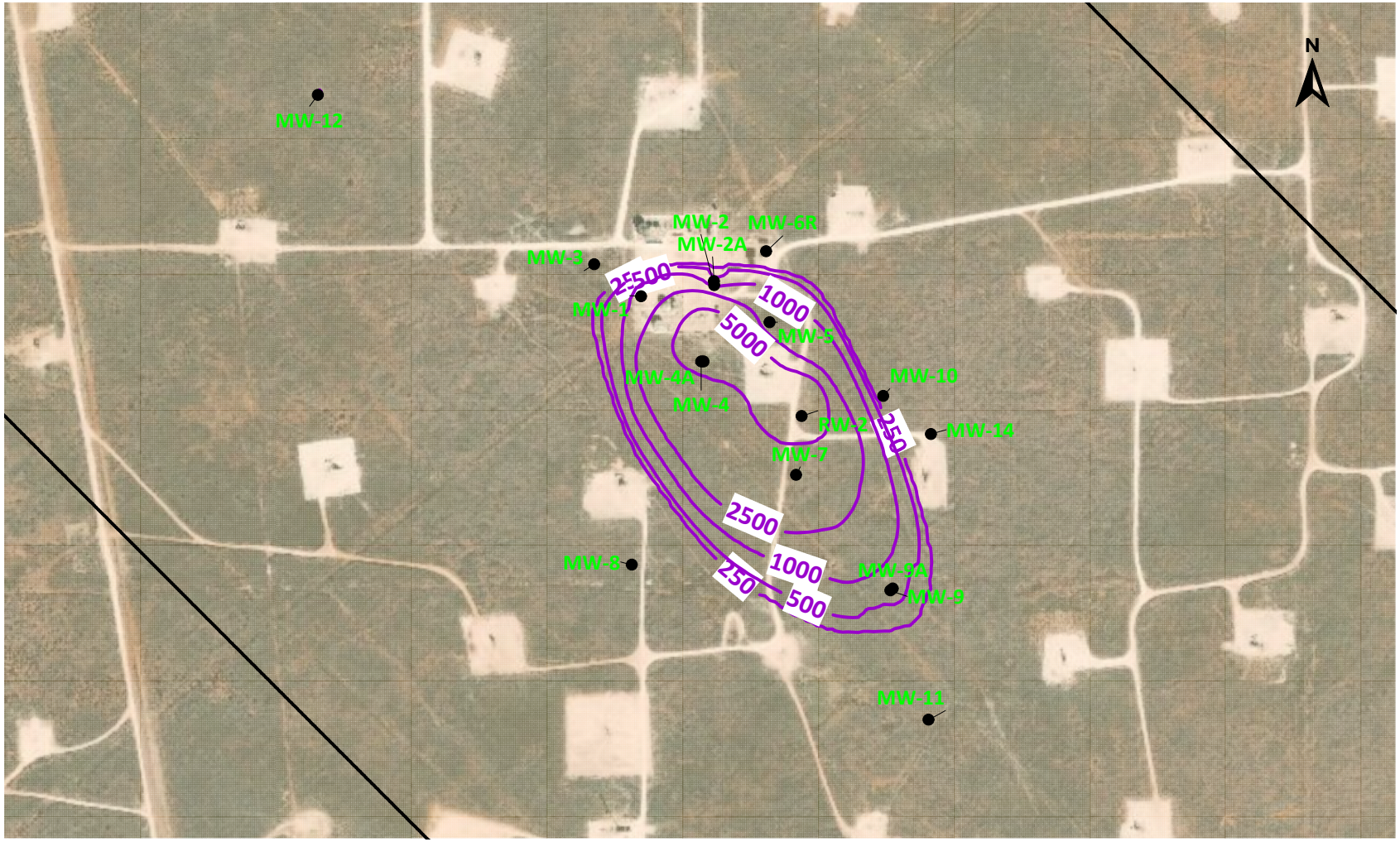
LEA COUNTY, NEW MEXICO

COOPER-JAL GROUNDWATER MODEL

STEADY-STATE MODEL CALIBRATION TARGETS: OBSERVED VS SIMULATED GROUNDWATER ELEVATIONS

ARCADIS

FIGURE
4



Model Extent

SCALE IN FEET

0 500 1000

--500-- Simulated Chloride Concentration Contours (mg/L)
mg/L = milligrams per liter

MW-2 Monitoring Wells

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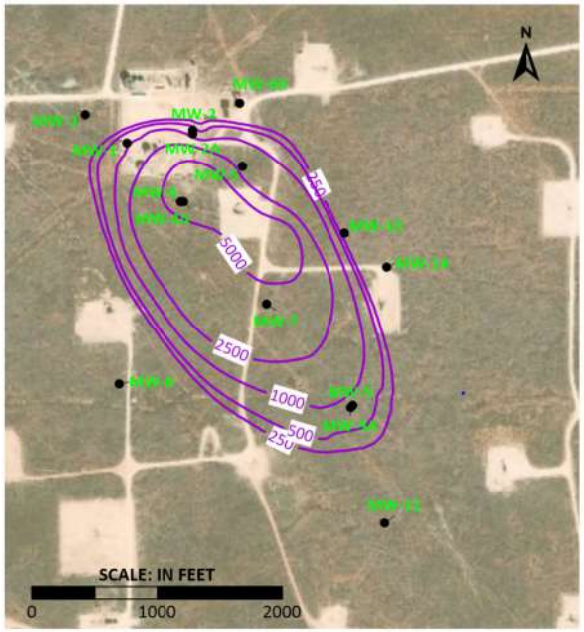
COOPER-JAL GROUNDWATER MODEL

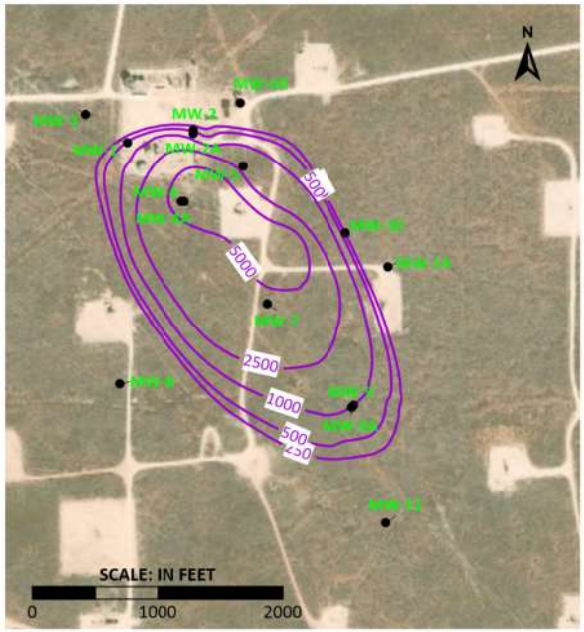
INITIAL CHLORIDE PLUME DISTRIBUTION

ARCADIS

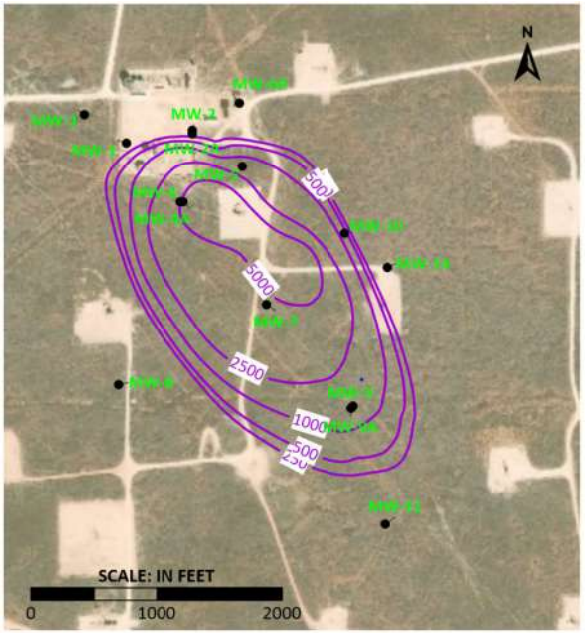
FIGURE 5



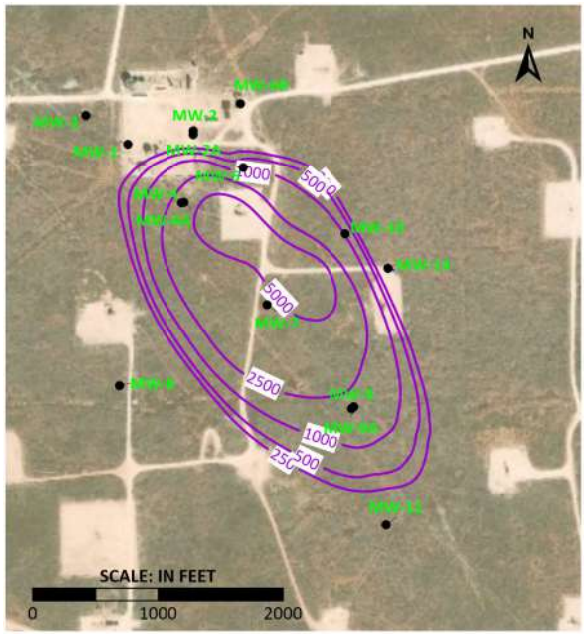
YEAR 5



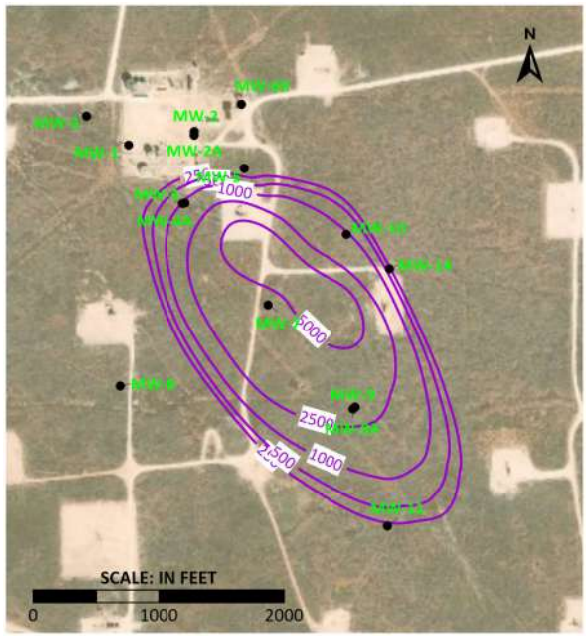
YEAR 10



YEAR 20



YEAR 30



YEAR 50

—250— Simulated Chloride Concentration Contours (miligram per liter)

MW-2 ● Monitoring Wells

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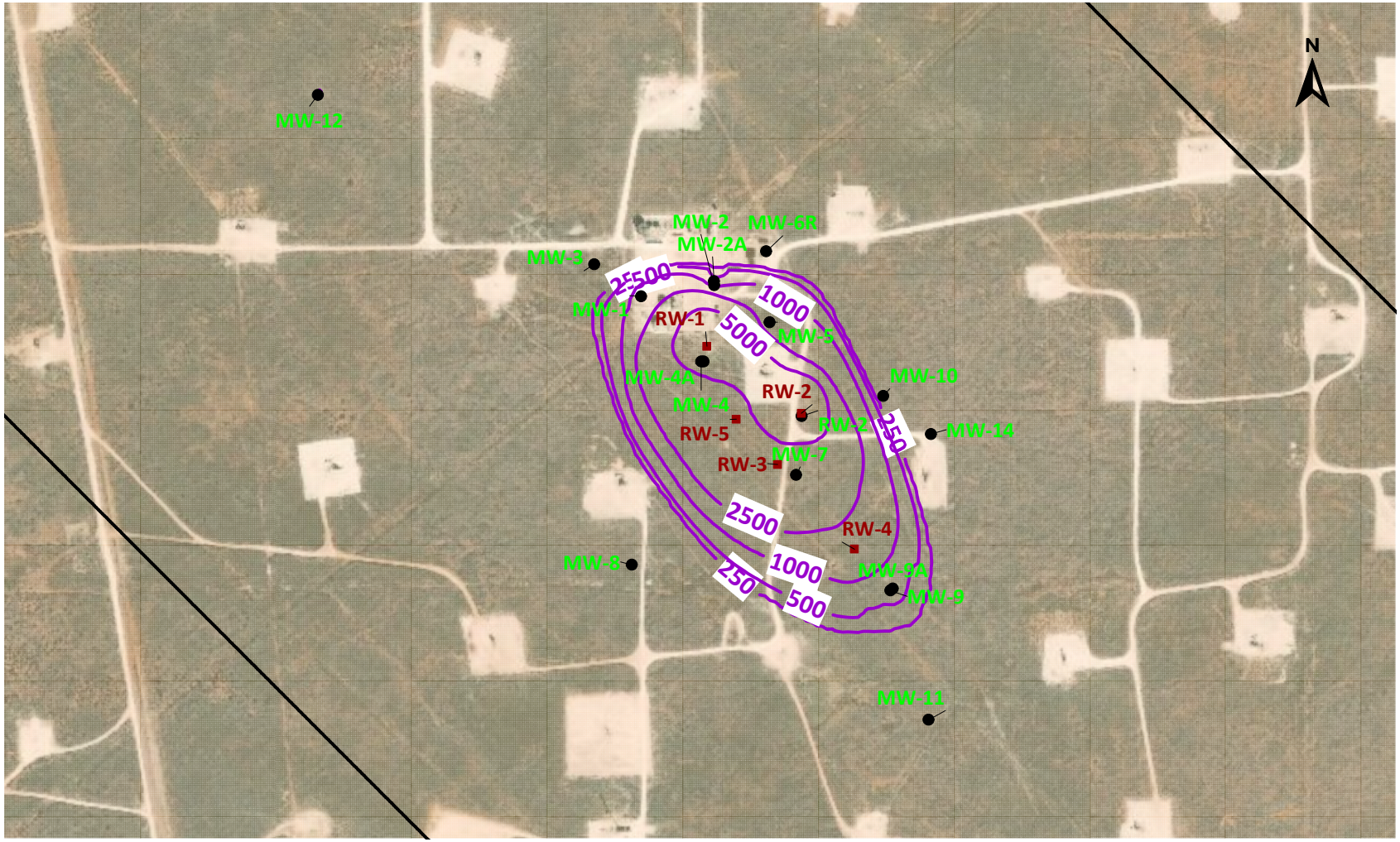
COOPER-JAL GROUNDWATER MODEL

SIMULATED CHLORIDE PLUME DISTRIBUTIONS AFTER 5, 10, 20, 30, AND 50 YEARS UNDER SCENARIO-1 (MNA)

ARCADIS

FIGURE
6



Model Extent

SCALE IN FEET

0 500 1000

--500-- Simulated Chloride Concentration Contours (mg/L)
mg/L = milligrams per liter

RW-1 Recovery Wells

MW-2 Monitoring Wells

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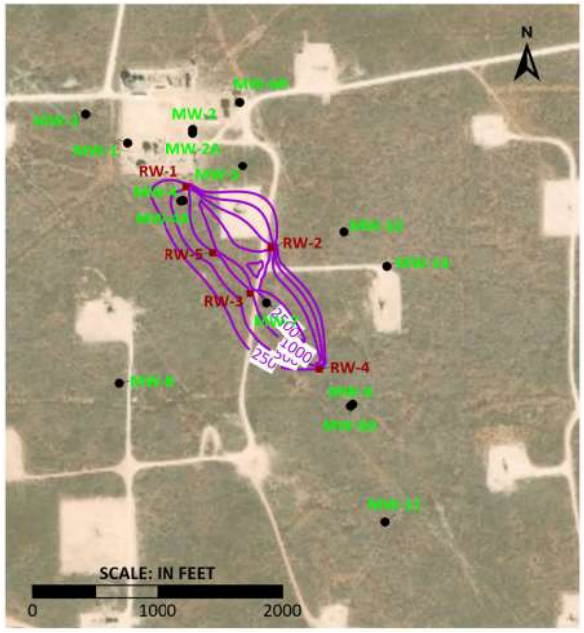
COOPER-JAL GROUNDWATER MODEL

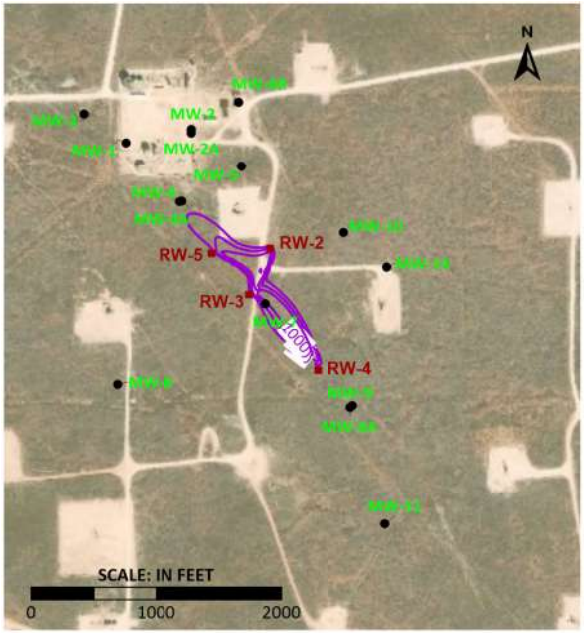
INITIAL CHLORIDE PLUME DISTRIBUTION AND RECOVERY WELL CONFIGURATION FOR SCENARIO-2 (5 RWs)

ARCADIS

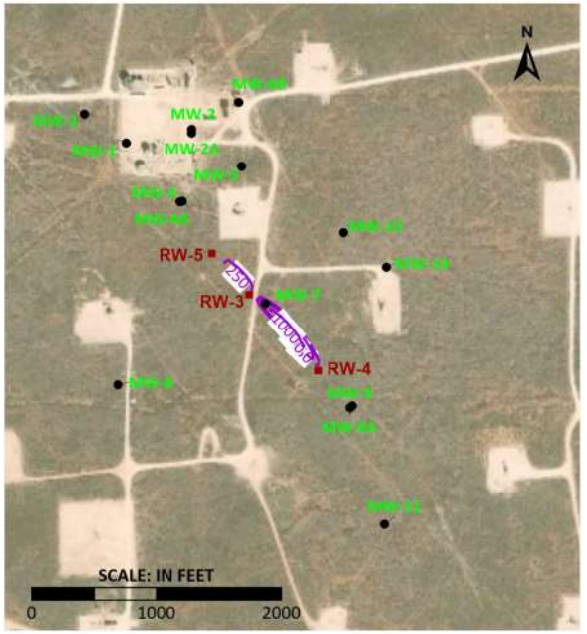
FIGURE 7



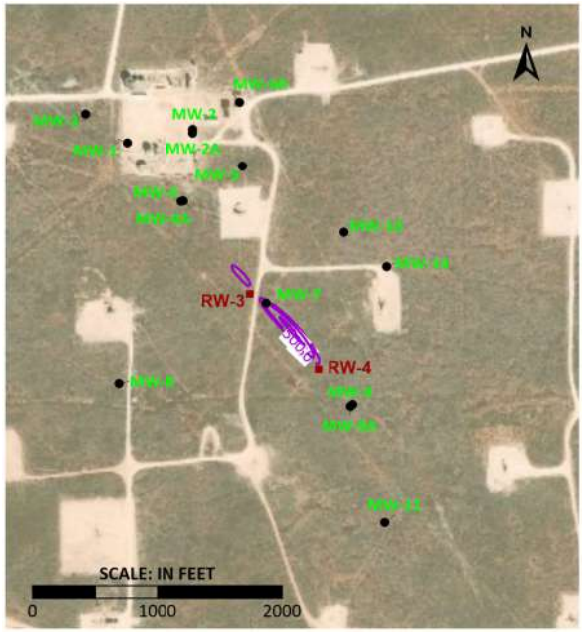
YEAR 10



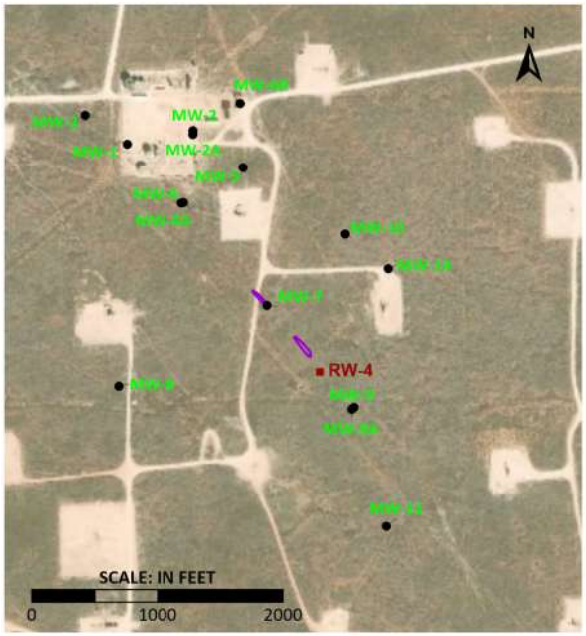
YEAR 15



YEAR 18



YEAR 19



YEAR 25

250 — Simulated Chloride Concentration Contours (miligram per liter)

MW-2 ● Monitoring Wells

RW-1 ■ Recovery Wells

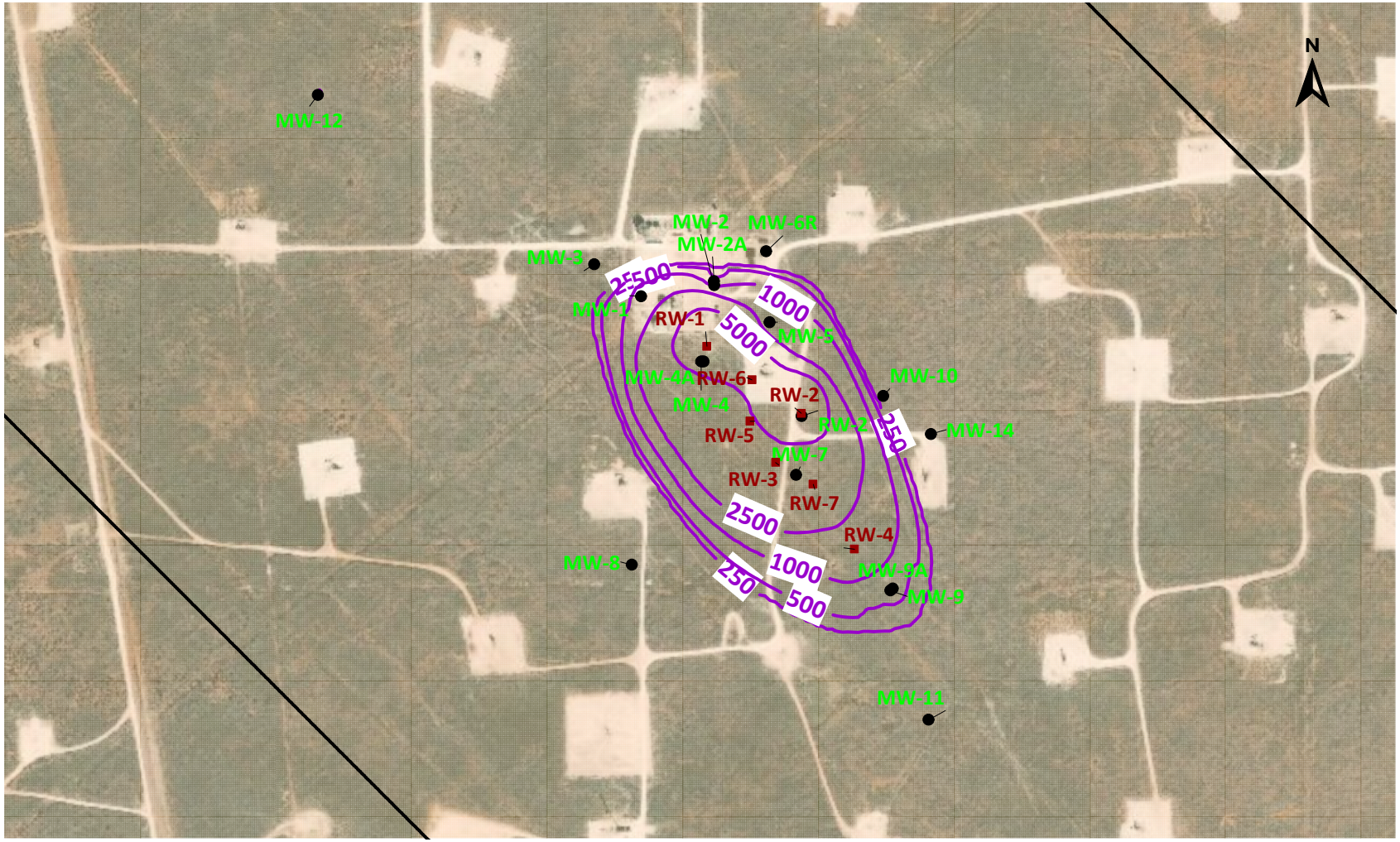
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
LEA COUNTY, NEW MEXICO

COOPER-JAL GROUNDWATER MODEL

SIMULATED CHLORIDE PLUME DISTRIBUTIONS AFTER 10, 15, 18, 19, AND 25 YEARS UNDER SCENARIO-2 (5 RWs)

ARCADIS

FIGURE
8



Model Extent

SCALE IN FEET

0 500 1000

--500-- Simulated Chloride Concentration Contours (mg/L)
mg/L = milligrams per liter

RW-1 Recovery Wells

MW-2 Monitoring Wells

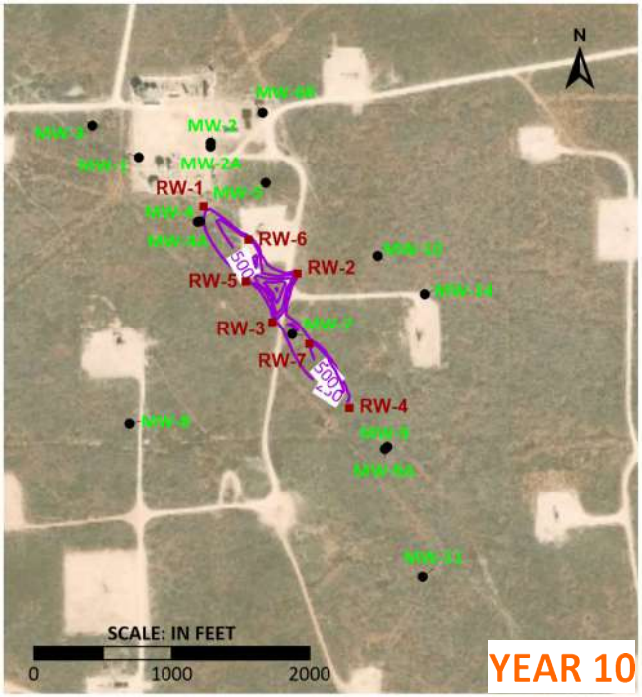
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
LEA COUNTY, NEW MEXICO

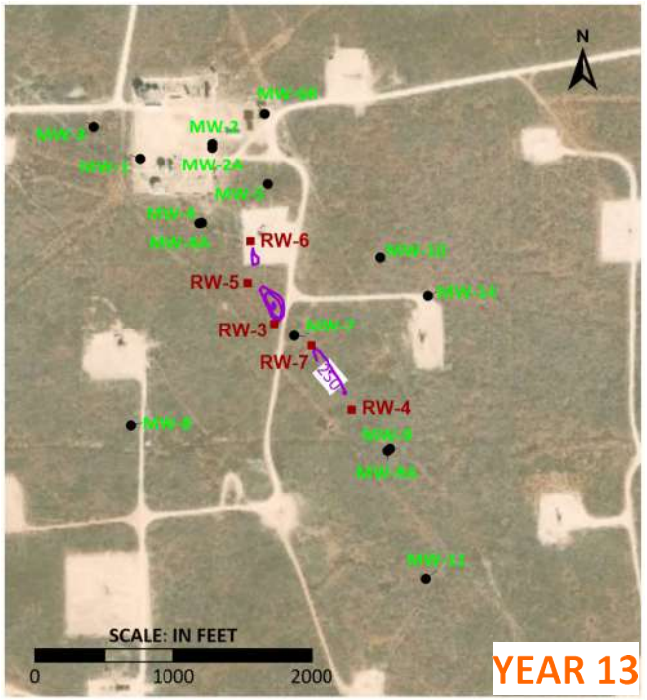
COOPER-JAL GROUNDWATER MODEL

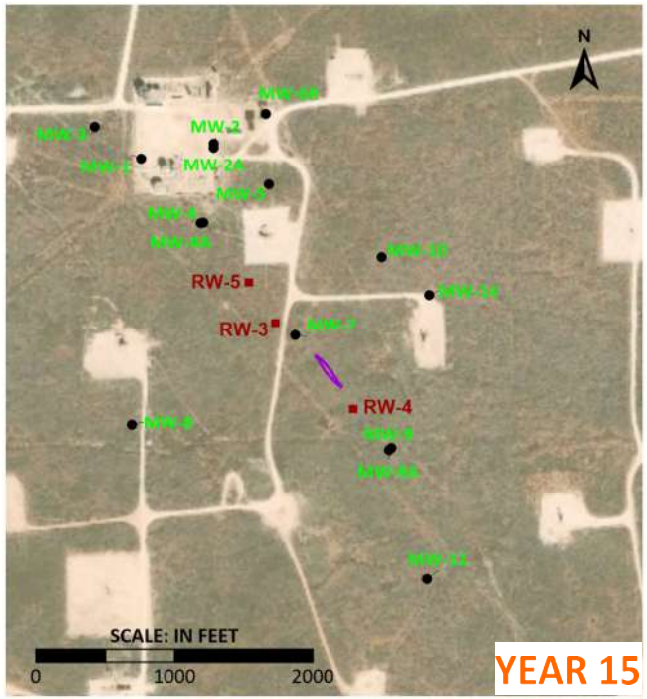
INITIAL CHLORIDE PLUME DISTRIBUTION AND RECOVERY WELL CONFIGURATION FOR SCENARIO-3 (7 RWs)

ARCADIS

FIGURE 9







250 — Simulated Chloride Concentration Contours (miligram per liter)

MW-2 ● Monitoring Wells

RW-1 ■ Recovery Wells

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
LEA COUNTY, NEW MEXICO

COOPER-JAL GROUNDWATER MODEL

SIMULATED CHLORIDE PLUME DISTRIBUTIONS AFTER 10, 13, AND 15 YEARS UNDER SCENARIO-3 (7 RWs)

ARCADIS

FIGURE
10

Attachment B: Groundwater Recovery System 30% Design Drawings

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30% DESIGN DRAWINGS

COOPER JAL

GROUNDWATER RECOVERY SYSTEM

DRAFT

KEY CONTACTS

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MANAGEMENT COMPANY
P.O. BOX 469
QUESTA, NM 87564
MR. ARMANDO MARTINEZ

ENGINEER
ARCADIS U.S., INC.
10205 WESTHEIMER ROAD
SUITE 800
HOUSTON
TEXAS 77042
PHONE: 713 953 4800

DATE ISSUED
OCTOBER 2024

INDEX OF DRAWINGS

CIVIL

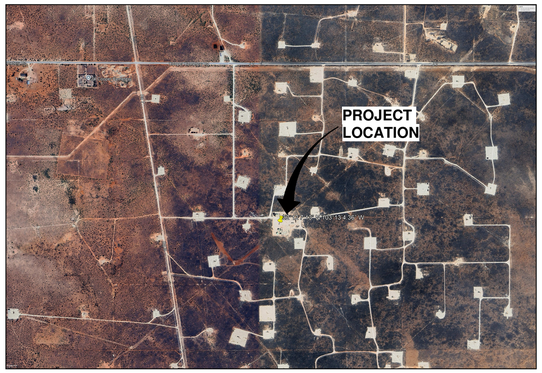
C-01	SITE LAYOUT

PROCESS

P-01	PIPING AND INSTRUMENTATION DIAGRAM LEGEND
P-02	PROCESS FLOW DIAGRAM
P-03	PIPING AND INSTRUMENTATION DIAGRAM

ELECTRICAL

E-01	ONE-LINE DIAGRAM



REFERENCE: IMAGE 2020 MICROSOFT CORPORATION

LOCATION MAP



NEW MEXICO

SITE COORDINATES:

32°12'7.13" N and 103°13'4.36" W

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
JAL, LEA COUNTY, NEW MEXICO
ARCADIS PROJECT NO. 30230083

ARCADIS U.S., INC.

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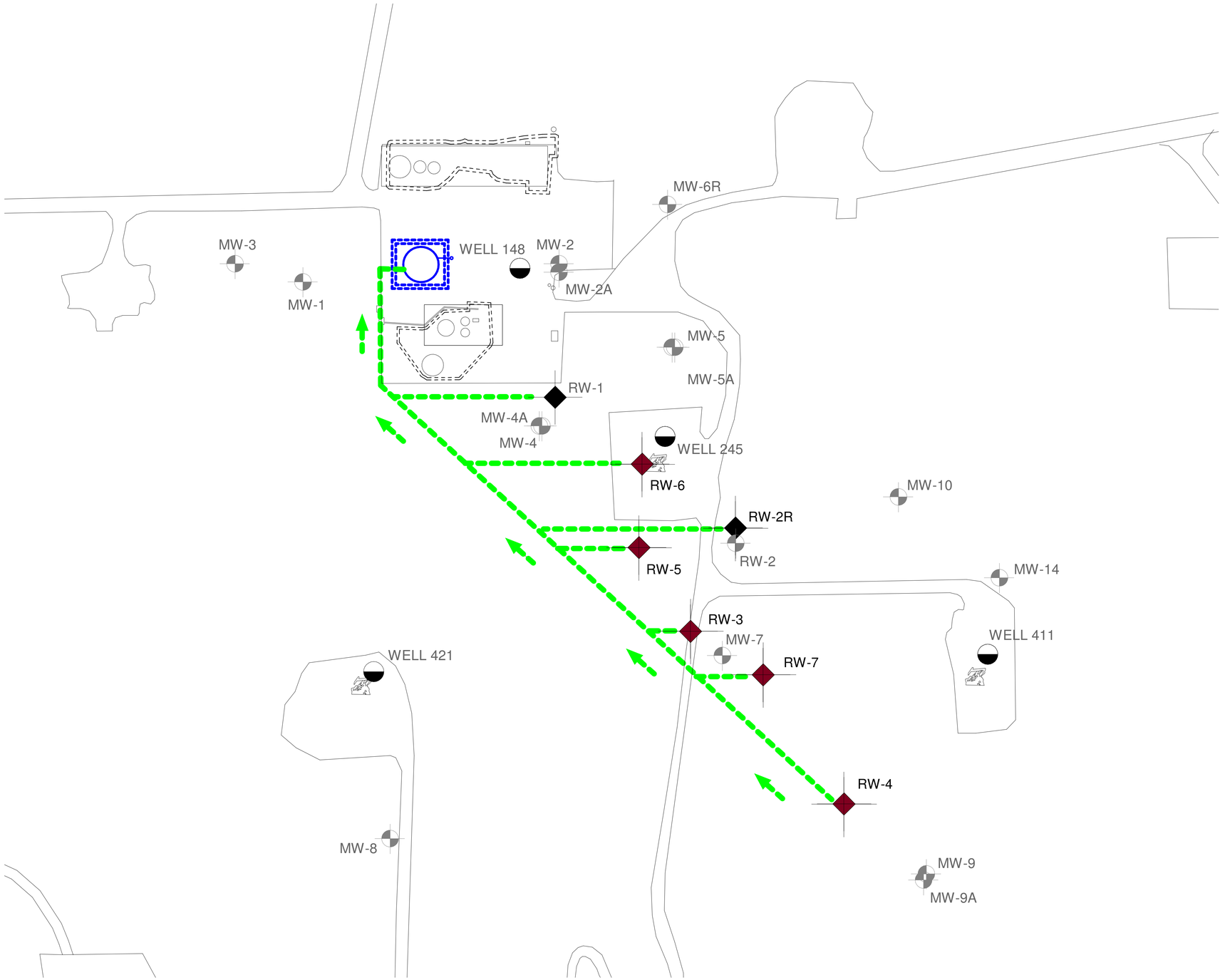
LEGENDS

- MONITORING WELL
- EXISTING GROUNDWATER RECOVERY WELL
- PROPOSED GROUNDWATER RECOVERY WELL
- COOPER JAL OIL WELL
- FLOW DIRECTION
- DIRT ROAD
- PROPOSED GROUNDWATER RECOVERY AST
- PROPOSED INFLUENT RECOVERY LINE
- EXISTING SECONDARY CONTAINMENT BERM
- PROPOSED AST SECONDARY BATTERY CONTAINMENT BERM
- AST — ABOVEGROUND STORAGE TANK



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Professional Engineer's Name		
Professional Engineer's No.		
State	Date Signed	Project Mgr.
Designed by	Drawn by: HD	Checked by

30% DESIGN

ARCADIS

ARCADIS U.S., INC.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY

COOPER JAL 30% GROUNDWATER RECOVERY SYSTEM DESIGN

SITE LAYOUT

CIVIL

ARCADIS Project No.
30230083

Date
OCTOBER 2024

Arcadis U.S., Inc.
10205 Westheimer Road
Suite 800,Houston
Texas 77042
Phone: 713 953 4800

C-01

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LEGEND:

MAIN PROCESS LINE

MINOR PROCESS LINE

EXISTING EQUIPMENT OR SKID OUTLINE

INTERMITTENT MINOR PROCESS LINE

AIR LINE

BUILDING PERIMETER

SLUDGE LINE

GLOBE VALVE

CHECK VALVE

GATE VALVE

BALL VALVE

PRESSURE REDUCING REGULATOR

PRESSURE RELIEF VALVE

VACUUM RELIEF VALVE

FLANGES

REDUCER

STATIC/LINE MIXER

UNION

ROTAMETER

POSITIVE DISPLACEMENT FLOWMETER

TEMPERATURE INDICATOR WITH THERMOWELL (SUCH AS DIAL, GLASS OR BIMETALLIC THERMOMETER

PRESSURE INDICATOR

PRESSURE TRANSMITTER

CENTRIFUGAL OR GENERIC PUMP SYMBOL (USED ON PFD AND MFD)

VERTICAL INLINE PUMP

DIAPHRAGM PUMP

ROTARY BLOWER

TANK

VESSEL TOWER OR COLUMN

AIR FILTER

FILTER

ABBREVIATIONS

AC	AIR COMPRESSOR
ARV	AIR RELEASE VALVE
AOP	ADVANCED OXIDATION PROCESS
BF	BAG FILTER
CS	CARBON STEEL
D/P	DIFFERENTIAL PRESSURE
DIA	DIAMETER
EQ	EQUALIZATION
FBR	FLUIDIZED BED REACTOR
FE	FLOW ELEMENT
GAC	GRANULAR ACTIVATED CARBON
GAL	GALLON
GV	GATE VALVE
HOA	HANDS/OFF/AUTOMATIC
HS	HAND SWITCH
HDPE	HIGH DENSITY POLYETHYLENE
KO	KNOCK OUT
LGAC	LIQUID GRANULAR ACTIVATED CARBON
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH HIGH
LSL	LEVEL SWITCH LOW
LSLL	LEVEL SWITCH LOW LOW
MMF	MULTIMEDIA FILTERS
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
PCV	PRESSURE CONTROL VALVE
PI	PRESSURE INDICATOR
SOV	SOLENOID VALVE
SS	STAINLESS STEEL
TYP	TYPICAL
VGAC	VAPOR GRANULAR ACTIVATED CARBON
VRV	VACUUM RELEASE VALVE

GENERAL INSTRUMENT SYMBOLS

LOCATION/ACCESSIBILITY	DISCRETE INSTRUMENTS	SHARED DISPLAY HMI AND CONTROL (PCS) (NOTE 2)	PLC/SIS (NOTE 3)	DISCRETE HARDWARE INTERLOCK (NOTE 4)
FIELD MOUNTED 1. FIELD OR LOCALLY MOUNTED. 2. ACCESSIBLE TO AN OPERATOR AT DEVICE. 3. VISIBLE AT FIELD LOCATION.	XX ###	XX ###	XX ###	I X
PRIMARY LOCATION NORMALLY ACCESSIBLE TO AN OPERATOR 1. CENTRAL OR MAIN CONTROL ROOM. 2. FRONT OF MAIN PANEL OR CONSOLE MOUNTED. 3. VISIBLE ON VIDEO DISPLAY. 4. ACCESSIBLE TO AN OPERATOR AT DEVICE OR CONSOLE.	XX ###	XX ###	XX ###	
PRIMARY LOCATION NORMALLY INACCESSIBLE TO AN OPERATOR 1. CENTRAL OR MAIN CONTROL ROOM. 2. REAR OF PANEL OR CABINET MOUNTED. 3. NOT VISIBLE ON VIDEO DISPLAY. 4. NOT NORMALLY ACCESSIBLE TO AN OPERATOR AT DEVICE OR CONSOLE.	XX ###	XX ###	XX ###	
AUXILIARY LOCATION NORMALLY ACCESSIBLE TO AN OPERATOR 1. SECONDARY OR LOCAL CONTROL ROOM. 2. FIELD OR LOCAL CONTROL PANEL. 3. FRONT OF SECONDARY OR LOCAL PANEL MOUNTED. 4. VISIBLE ON VIDEO DISPLAY. 5. ACCESSIBLE TO AN OPERATOR AT DEVICE OR CONSOLE.	XX ###	XX ###	XX ###	
ALTERNATE REPRESENTATION FOR INSTRUMENTED PROTECTIVE FUNCTION (IPL) INSTRUMENTATION. FIELD OR CONTROL PANEL.	XX ###	XX ###		

INSTRUMENT IDENTIFICATION LETTERS

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM	ALARM	ACCESS
B	BURNER COMBUSTION	BLOWDOWN	USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	CONDUCTIVITY (ELECTRICAL) CORROSION			CONTROL, CONTROLLER	CLOSE
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL, DIFFERENCE, DELUGE	BLOWDOWN, SHUTDOWN (SEE B OR S FIRST LETTER)	DEVIATION, DIVERT	DEVIATION
E	VOLTAGE (EMF)	EMERGENCY	PRIMARY ELEMENT		EMERGENCY OR FIRE
F	FLOW, FLOW RATE	RATIO (FRACTION)	PRE-CONDITION		
G	USER'S CHOICE	GAUGING	GLASS, GAUGE VIEWING DEVICE	GATEWAY	
H	HAND (MANUALLY INDICATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE, INDICATOR		INTERFACE
J	POWER		SCAN		
K	TIME OR TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY	MOTOR			MIDDLE OR INTERMEDIATE
N	*	USER'S CHOICE	WIRELESS ADAPTER		USER'S CHOICE
O	USER'S CHOICE		ORIFICE	OPERATED	OPEN
P	PRESSURE OR VACUUM	RELIEF FOR PRESSURE RELIEF VALVE	PROBE, POINT (TEST CONNECTION)	POINT	
Q	QUANTITY OR HEAT DUTY	INTEGRATE OR TOTALIZE, QUANTITY	INTEGRATE OR TOTALIZE	INTEGRATE OR TOTALIZE	
R	RADIOACTIVITY OR RESTRICTION		RECORD OR PRINT		RUN
S	SPEED, FREQUENCY OR SURFACE	SAFETY OR SHUTDOWN	SAMPLE SYSTEM	SWITCH, SAFETY INSTRUMENTED DEVICES (PER API RP 14C; ON OFFSHORE FACILITIES	STOP
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE	FLAME	MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, (MECHANICAL) ANALYSIS OR VISCOSITY		VACUUM	VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE	WIRELESS	WELL		
X	USER'S CHOICE	X - AXIS, ON-OFF	ISOLATION OR DEPRESSURING	TRANSMITTING (PER RP14C; ON OFFSHORE FACILITIES) OR ACCESSORIES	UNCLASSIFIED
Y	EVENT, STATE OR PRESENSE	Y - AXIS		RELAY OR COMPUTE OR POSITIONER	
Z	POSITION, DIMENSION	Z - AXIS	SAFETY, SAFETY INSTRUMENTED DEVICE	DRIVE, ACTUATE, OR UNCLASSIFIED FINAL CONTROL ELEMENT RELAY OR COMPUTE	

NOTE: (1) ALTERNATE USE

* WIRELESS (RESERVE FOR WIRELESS EQUIPMENT (e.g., GALAXY/ACCESS POINT)

LINE TYPE

D = DUCT
P = PIPE
C = DOUBLE WALL CONTAINMENT PIPE
T = TUBING
H = HOSE

MATERIAL

BRZ - BRASS/BRONZE
CIR - CAST IRON
CST - CARBON STEEL
CPR - COPPER
CVC - CHLORINATED POLYVINYL CHLORIDE
DIR - DUCTILE IRON
FRP - FIBERGLASS
GCS - GALVANIZED CARBON STEEL
NYL - NYLON
PET - POLYETHYLENE
POP - POLYPROPYLENE
PVC - POLYVINYL CHLORIDE
S04 - 304 STAINLESS STEEL
S4L - 304L STAINLESS STEEL
S16 - 316 STAINLESS STEEL
VIT - VITON
HDP - HIGH DENSITY POLYETHYLENE

PIPE LINE DESIGNATION

X-MAT-LN (6"-SCH80PVCP-101)

- LINE NUMBER (OPTIONAL)
- LINE TYPE (OPTIONAL)
- MATERIAL
- WALL THICKNESS
- SIZE

INSTRUMENT IDENTIFICATION LETTER NOTES:

1. ANY FIRST LETTER COMBINED WITH MODIFIER REPRESENTS A NEW AND SEPARATE MEASURED VARIABLE. EXAMPLES: PD = DIFFERENTIAL PRESSURE, FQ = TOTALIZED OR INTEGRATED FLOW. EXCEPTION IS THE MODIFIER "J" FOR MULTIPOINT SCANNING.
2. FOR ANALYSIS NOT IDENTIFIED BY A SPECIFIC LETTER IN THE TABLE, USE FIRST LETTER "A" NEAR THE INSTRUMENT SYMBOL, SPECIFICALLY THE NATURE OF THE ANALYSIS, EXAMPLE: PH.
3. MEANING OF A "USER CHOICE" LETTER SHALL BE CONSISTENT THROUGHOUT A PROJECT, AND SHALL BE SPECIFIED IN THE DRAWING LEGEND.
4. UNCLASSIFIED LETTER MAY HAVE A FEW DIFFERENT MEANINGS ON A PROJECT. THE MEANING SHALL BE SPECIFIED NEAR EACH INSTRUMENT SYMBOL, USING THE UNCLASSIFIED LETTER.
5. THE MODIFIER "SCAN" APPLIES TO MULTIPOINT PRINTING INSTRUMENTS, SUCH AS CJRS (MULTIPOINT CONDUCTIVITY RECORDER WITH ALARM SWITCHES).

GENERAL INSTRUMENT SYMBOL NOTES:

1. ALL ANALOG SET POINTS SHALL BE FIELD ADJUSTED BY OPERATOR AT HMI INTERFACE SCREEN.
2. PCS SYMBOLS SHALL BE USED FOR PLC BASED CONTROL SYSTEMS THAT ARE THE MAIN OPERATOR INTERFACE.
3. THE PLC SYMBOL IS USED FOR AUXILIARY PLCS SUCH AS SAFETY SYSTEMS AND PACKAGED EQUIPMENT CONTROLLERS. DESCRIPTION OF PLC TYPE (EG., SIS, MCC, FBG, STC.) MAY BE PLACED OUTSIDE BOX ON UPPER RIGHT-HAND SIDE.
4. DIAMOND IS UNIVERSAL SYMBOL FOR INTERLOCK FUNCTION AND MAY RESIDE ON DCS, PLC, OR DISCRETE HARDWARE.
5. ALARMS THAT SHUT DOWN EXTRACTION WELLS AND TREATMENT EQUIPMENT MUST BE CLEANED BY OPERATOR BEFORE BEING RESTATED.
6. THIS DRAWING IS PROVIDE FOR INFORMATIONAL PURPOSES ONLY.

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Professional Engineer's Name

Professional Engineer's No.

State	Date Signed	Project Mgr.

Designed by	Drawn by	Checked by
	HD	

30% DESIGN

ARCADIS

ARCADIS U.S., INC.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY

COOPER JAL 30% GROUNDWATER RECOVERY SYSTEM DESIGN

PIPING AND INSTRUMENTATION DIAGRAM LEGEND

PROCESS

ARCADIS Project No.
30230083

Date
OCTOBER 2024

Arcadis U.S., Inc.
10205 Westheimer Road
Suite 800,Houston
Texas 77042
Phone: 713 953 4800

P-01

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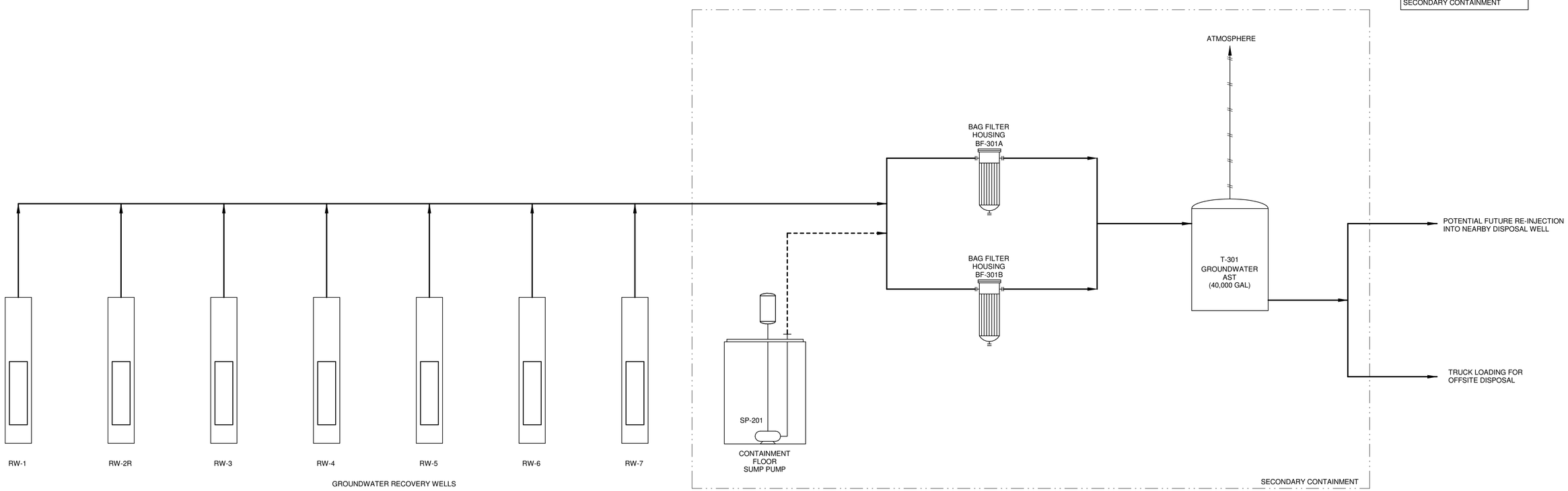

LEGEND:

———	MAIN PROCESS LINE
—// —// —	AIR LINE
- - - - - - - -	INTERMITTENT MINOR PROCESS LINE
—— · · ——	SECONDARY CONTAINMENT
GAL	GALLON
RW	GROUNDWATER RECOVERY WELL

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Professional Engineer's Name
Professional Engineer's No.
State | Date Signed | Project Mgr.
Designed by | Drawn by: HD | Checked by

30% DESIGN

ARCADIS U.S., INC.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
COOPER JAL 30% GROUNDWATER RECOVERY SYSTEM DESIGN
PROCESS FLOW DIAGRAM
PROCESS

ARCADIS Project No.
30230083
Date
OCTOBER 2024
Arcadis U.S., Inc.
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Suite 800,Houston
Texas 77042
Phone: 713 953 4800

P-02

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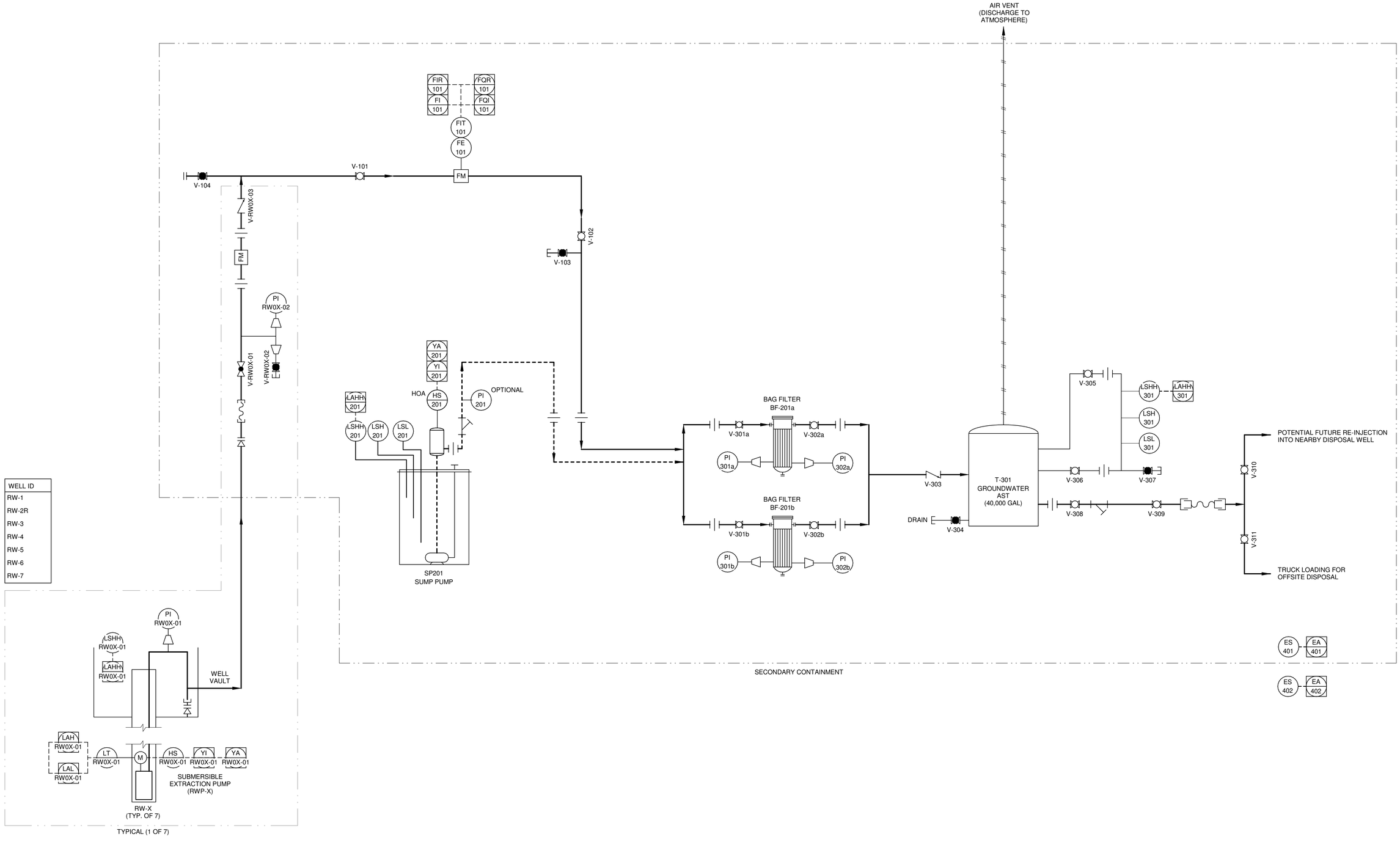

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			Professional Engineer's No.		ARCADIS U.S., INC.		Date OCTOBER 2024	
			State / Date Signed / Project Mgr.				Arcadis U.S., Inc. 10205 Westheimer Road Suite 800,Houston Texas 77042 Phone: 713 953 4800	
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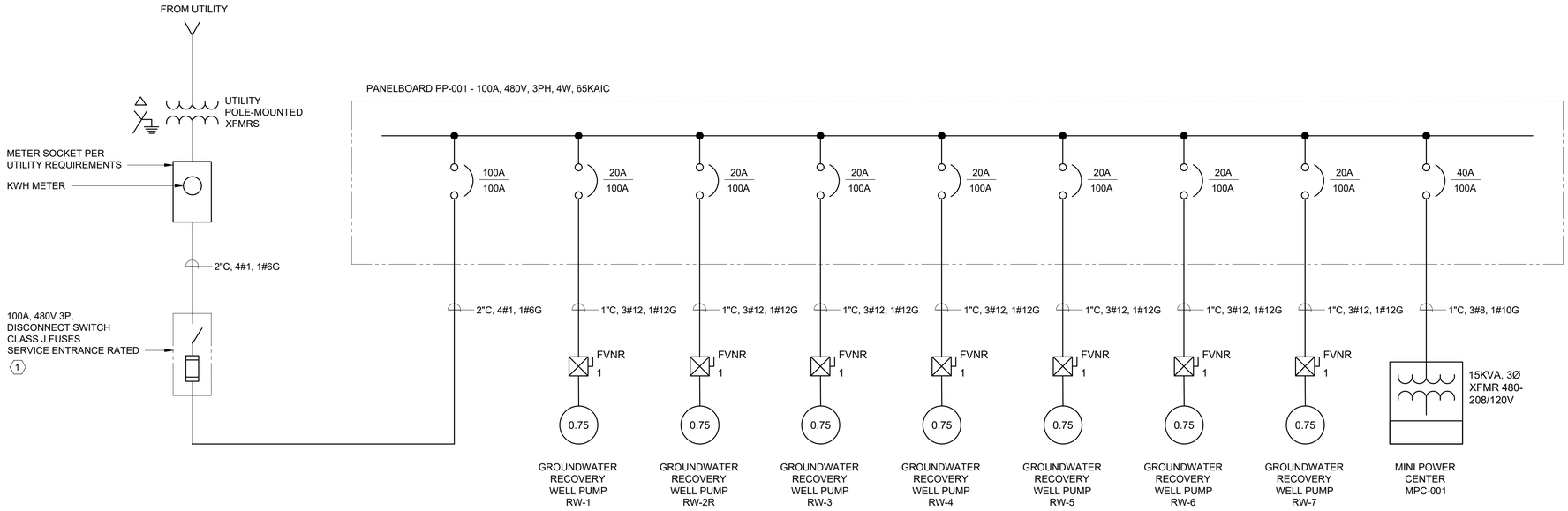

GENERAL NOTES:

1. COORDINATE WITH LOCAL ELECTRIC UTILITY TO PROVIDE ELECTRICAL SERVICE TO EQUIPMENT AS SHOWN. CONTRACTOR SHALL PROVIDE INSTALLATION IN ACCORDANCE WITH ALL UTILITY COMPANY REQUIREMENTS
2. ALL ELECTRICAL EQUIPMENT SHALL BE PROVIDED IN NEMA 3R ENCLOSURES.

KEYED NOTES:

(1) PROVIDE #6 AWG AT NEUTRAL LUG CONNECTION AT MAIN DISCONNECT SWITCH AND BOND TO THE GROUNDING SYSTEM IN ACCORDANCE WITH THE NEC.

PANELBOARD: MPC-001

VOLTAGE, PHASE & WIRE:	208/120	VAC 3PH, 4W	LOCATION:	ELECTRICAL RACK
BUS SIZE	100	AMPS	ENCLOSURE:	NEMA 3R
PRIMARY BREAKER SIZE:	40	AMPS	MOUNTING:	RACK MOUNTED
SECONDARY BREAKER SIZE:	50	AMPS	AIC / BRACING:	22 K FULLY RATED
BREAKER TYPE	BOLT ON		FED FROM:	PANELBOARD PP-001

CKT NO.	LOAD DESCRIPTION	BREAKER AMP	KVA A	KVA B	KVA A	KVA B	BREAKER AMP	LOAD DESCRIPTION	CKT NO.
1	SUMP PUMP CONTROL PANEL	20	1.5		0.0		20	SPARE	2
3	AREA LIGHTING	20		0.2		0.0	20	SPARE	4
5	SPARE	20	0.0		0.0		20	SPARE	6
7	SPARE	20		0.0		0.0	20	SPARE	8
9	SPARE	20	0.0		0.0		20	SPARE	10
11	SPARE	20		0.0		0.0	20	SPARE	12
13	SPARE	20	0.0		0.0		20	SPARE	14
15	SPACE	20		0.0		0.0	-	SPACE	16
17	SPACE	-	0.0		0.0		-	SPACE	18
	SUBTOTALS		1.5	0.2	0.0	0.0			

KVA A PHASE = 1.5 AMPS A PHASE = 12.5

KVA B PHASE = 0.2 AMPS B PHASE = 1.7

TOTAL KVA = 1.7

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Professional Engineer's Name

Professional Engineer's No.

State | Date Signed | Project Mgr. MP

Designed by BY | Drawn by HW | Checked by JS

30% DESIGN

ARCADIS U.S., INC.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
COPPER JAL 30% GROUNDWATER RECOVERY SYSTEM

ONE-LINE DIAGRAM

ELECTRICAL

ARCADIS Project No. 30230083

Date OCTOBER 2024

ARCADIS U.S., INC.
10205 WESTHEIMER RD.
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HOUSTON, TX 77042
TEL. 713.953.4800

E-01

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Attachment C: Groundwater Data Tables

Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
MW-1	05/18/98	135.05	3184.95	173.00	2.00	153-173
3320.00	05/25/99	134.93	3185.07	---	---	---
	02/08/01	134.80	3185.20	---	---	---
	05/10/02	134.77	3185.23	---	---	---
	10/22/02	134.89	3185.11	---	---	---
	05/20/03	135.17	3184.83	---	---	---
	11/24/03	134.70	3185.30	---	---	---
	05/11/04	134.75	3185.25	---	---	---
	11/15/04	134.76	3185.24	---	---	---
	05/17/05	134.29	3185.71	---	---	---
	11/15/05	134.93	3185.07	---	---	---
	05/08/06	134.68	3185.32	---	---	---
	11/13/06	134.62	3185.38	---	---	---
	05/29/07	134.71	3185.29	---	---	---
	11/16/07	134.70	3185.30	---	---	---
	05/14/08	134.73	3185.27	---	---	---
	11/03/08	134.69	3185.31	---	---	---
	05/19/09	134.64	3185.36	---	---	---
	11/02/09	134.71	3185.29	---	---	---
	05/05/10	134.90	3185.10	---	---	---
	11/08/10	134.50	3185.50	---	---	---
	05/11/11	134.60	3185.40	---	---	---
	11/08/11	134.64	3185.36	---	---	---
	05/16/12	134.60	3185.40	---	---	---
	10/10/12	134.73	3185.27	---	---	---
	05/16/13	134.58	3185.42	---	---	---
	10/08/13	134.53	3185.47	---	---	---
	05/01/14	134.70	3185.30	---	---	---
	10/05/14	134.49	3185.51	---	---	---
	05/21/15	134.56	3185.44	---	---	---
	10/19/15	134.80	3185.20	---	---	---
	05/25/16	134.69	3185.31	---	---	---
	10/17/16	134.35	3185.65	---	---	---
	05/10/17	134.44	3185.56	---	---	---
3321.94	10/24/17	134.63	3187.31	---	---	---
	05/22/18	134.45	3187.49	---	---	---
	10/17/18	134.54	3187.40	---	---	---
	06/20/19	134.56	3187.38	171.17	---	---
	04/13/20	134.56	3187.38	---	---	---
	10/12/20	134.72	3187.22	---	---	---
	06/21/21	134.58	3187.36	---	---	---
	12/06/21	134.57	3187.37	---	---	---
	08/22/22	134.47	3187.47	---	---	---
	12/21/22	134.38	3187.56	---	---	---
	07/20/23	134.52	3187.42	---	---	---
MW-2	05/18/98	135.00	3184.86	173.00	2.00	163-173
3319.86	05/25/99	134.79	3185.07	---	---	---
	02/08/01	134.63	3185.23	---	---	---
	05/10/02	134.65	3185.21	---	---	---
	10/22/02	134.72	3185.14	---	---	---
	05/20/03	134.95	3184.91	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	11/24/03	134.56	3185.30	---	---	---
	05/11/04	134.55	3185.31	---	---	---
	11/15/04	134.53	3185.33	---	---	---
	05/17/05	134.39	3185.47	---	---	---
	11/15/05	134.77	3185.09	---	---	---
	05/08/06	134.52	3185.34	---	---	---
	11/13/06	134.44	3185.42	---	---	---
	05/29/07	134.54	3185.32	---	---	---
	11/14/07	134.52	3185.34	---	---	---
	05/14/08	134.53	3185.33	---	---	---
	11/03/08	134.44	3185.42	---	---	---
	05/19/09	134.46	3185.40	---	---	---
	11/16/09	134.51	3185.35	---	---	---
	05/05/10	134.62	3185.24	---	---	---
	11/08/10	134.25	3185.61	---	---	---
	05/11/11	134.31	3185.55	---	---	---
	11/08/11	134.36	3185.50	---	---	---
	05/16/12	134.31	3185.55	---	---	---
	10/10/12	134.51	3185.35	---	---	---
	05/16/13	134.33	3185.53	---	---	---
	10/07/13	142.85	3177.01	---	---	---
	05/01/14	134.37	3185.49	---	---	---
	10/05/14	134.14	3185.72	---	---	---
	05/21/15	134.21	3185.65	---	---	---
	10/19/15	134.20	3185.66	---	---	---
	05/25/16	134.38	3185.48	---	---	---
	10/17/16	134.00	3185.86	---	---	---
	05/10/17	134.13	3185.73	---	---	---
3321.27	10/25/17	134.32	3186.95	---	---	---
	05/22/18	134.11	3187.16	---	---	---
	10/17/18	134.21	3187.06	---	---	---
	06/20/19	134.27	3187.00	168.39	---	---
	04/13/20	134.2	3187.07	---	---	---
	10/12/20	134.49	3186.78	---	---	---
	06/21/21	134.39	3186.88	---	---	---
	12/06/21	134.21	3187.06	---	---	---
	08/22/22	134.16	3187.11	---	---	---
	12/21/22	143.07	3178.20	---	---	---
	07/20/23	134.20	3187.07	---	---	---
MW-2A	05/18/98	134.80	3185.06	145.00	2.00	130-145
3319.86	05/25/99	134.73	3185.13	---	---	---
	02/08/01	134.58	3185.28	---	---	---
	05/10/02	134.50	3185.36	---	---	---
	10/22/02	134.66	3185.20	---	---	---
	05/20/03	135.80	3184.06	---	---	---
	11/24/03	134.60	3185.26	---	---	---
	05/11/04	134.53	3185.33	---	---	---
	11/15/04	134.58	3185.28	---	---	---
	05/17/05	134.47	3185.39	---	---	---
	11/15/05	134.74	3185.12	---	---	---
	05/08/06	134.46	3185.40	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	11/13/06	134.39	3185.47	---	---	---
	05/29/07	134.50	3185.36	---	---	---
	11/14/07	134.48	3185.38	---	---	---
	05/14/08	134.49	3185.37	---	---	---
	11/03/08	134.46	3185.40	---	---	---
	05/19/09	134.42	3185.44	---	---	---
	11/02/09	134.45	3185.41	---	---	---
	05/05/10	134.52	3185.34	---	---	---
	11/08/10	134.30	3185.56	---	---	---
	05/11/11	134.38	3185.48	---	---	---
	11/08/11	134.42	3185.44	---	---	---
	05/16/12	134.43	3185.43	---	---	---
	10/10/12	134.65	3185.21	---	---	---
	05/16/13	134.35	3185.51	---	---	---
	10/07/13	134.20	3185.66	---	---	---
	05/01/14	134.45	3185.41	---	---	---
	10/05/14	134.15	3185.71	---	---	---
	05/21/15	134.32	3185.54	---	---	---
	10/19/15	134.40	3185.46	---	---	---
	05/25/16	134.49	3185.37	---	---	---
	10/17/16	134.10	3185.76	---	---	---
	05/10/17	134.29	3185.57	---	---	---
3321.3	10/25/17	134.40	3186.90	---	---	---
	05/22/18	134.31	3186.99	---	---	---
	10/17/18	134.31	3186.99	---	---	---
	06/20/19	134.43	3186.87	142.47	---	---
	4/13/2020	134.29	3187.01	---	---	---
	10/12/2020	134.45	3186.85	---	---	---
	6/21/2021	134.29	3187.01	---	---	---
	12/6/2021	134.29	3187.01	---	---	---
	08/22/22	134.23	3187.07	---	---	---
	12/21/22	134.14	3187.16	---	---	---
	07/20/23	134.25	3187.05	---	---	---
MW-3	05/18/98	132.65	3185.56	171.00	2.00	161-171
3318.21	05/25/99	132.52	3185.69	---	---	---
	02/08/01	132.40	3185.81	---	---	---
	05/10/02	132.40	3185.81	---	---	---
	10/22/02	132.49	3185.72	---	---	---
	05/20/03	132.75	3185.46	---	---	---
	11/24/03	132.29	3185.92	---	---	---
	05/11/04	132.38	3185.83	---	---	---
	11/15/04	132.46	3185.75	---	---	---
	05/17/05	132.32	3185.89	---	---	---
	11/15/05	132.55	3185.66	---	---	---
	05/08/06	132.32	3185.89	---	---	---
	11/13/06	132.27	3185.94	---	---	---
	05/29/07	132.36	3185.85	---	---	---
	11/16/07	132.34	3185.87	---	---	---
	05/14/08	132.36	3185.85	---	---	---
	11/03/08	132.31	3185.90	---	---	---
	05/19/09	132.25	3185.96	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	11/02/09	132.37	3185.84	---	---	---
	05/05/10	132.48	3185.73	---	---	---
	11/08/10	132.14	3186.07	---	---	---
	05/11/11	132.24	3185.97	---	---	---
	11/08/11	132.30	3185.91	---	---	---
	05/16/12	132.25	3185.96	---	---	---
	10/10/12	132.54	3185.67	---	---	---
	05/16/13	132.25	3185.96	---	---	---
	10/08/13	132.14	3186.07	---	---	---
	05/01/14	132.10	3186.11	---	---	---
	10/05/14	132.58	3185.63	---	---	---
	05/21/15	132.25	3185.96	---	---	---
	10/19/15	132.25	3185.96	---	---	---
	05/25/16	132.34	3185.87	---	---	---
	10/17/16	132.00	3186.21	---	---	---
	05/10/17	132.21	3186.00	---	---	---
3320.08	10/24/17	132.30	3187.78	---	---	---
	05/22/18	132.15	3187.93	---	---	---
	10/17/18	132.21	3187.87	---	---	---
	06/20/19	132.24	3187.84	171.93	---	---
	04/13/20	132.32	3187.76	---	---	---
	10/12/20	132.36	3187.72	---	---	---
	06/22/21	132.12	3187.96	---	---	---
	12/06/21	132.16	3187.92	---	---	---
	08/22/22	132.03	3188.05	---	---	---
	12/21/22	132.00	3188.08	---	---	---
	07/21/23	132.21	3187.87	---	---	---
MW-4	05/18/98	136.01	3183.73	171.00	2.00	161-171
3319.74	05/25/99	135.57	3184.17	---	---	---
	02/08/01	135.87	3183.87	---	---	---
	05/10/02	135.67	3184.07	---	---	---
	10/22/02	135.90	3183.84	---	---	---
	05/20/03	136.00	3183.74	---	---	---
	11/24/03	135.70	3184.04	---	---	---
	05/11/04	135.34	3184.40	---	---	---
	11/15/04	135.76	3183.98	---	---	---
	05/17/05	135.69	3184.05	---	---	---
	11/15/05	135.85	3183.89	---	---	---
	05/08/06	135.60	3184.14	---	---	---
	11/13/06	135.59	3184.15	---	---	---
	05/29/07	135.75	3183.99	---	---	---
	11/14/07	135.62	3184.12	---	---	---
	05/14/08	135.76	3183.98	---	---	---
	11/03/08	135.66	3184.08	---	---	---
	05/19/09	135.67	3184.07	---	---	---
	11/02/09	135.68	3184.06	---	---	---
	05/05/10	135.83	3183.91	---	---	---
	11/08/10	135.36	3184.38	---	---	---
	05/05/11	135.40	3184.34	---	---	---
	11/08/11	135.43	3184.31	---	---	---
	05/16/12	135.38	3184.36	---	---	---

Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	10/10/12	135.55	3184.19	---	---	---
	05/16/13	135.38	3184.36	---	---	---
	10/07/13	135.53	3184.21	---	---	---
	05/01/14	135.41	3184.33	---	---	---
	10/05/14	135.61	3184.13	---	---	---
	05/21/15	135.25	3184.49	---	---	---
	10/19/15	135.70	3184.04	---	---	---
	05/25/16	135.44	3184.30	---	---	---
	10/17/16	135.11	3184.63	---	---	---
	05/10/17	135.20	3184.54	---	---	---
3321.58	10/25/17	135.40	3186.18	---	---	---
	05/22/18	135.13	3186.45	---	---	---
	10/16/18	135.32	3186.26	---	---	---
	06/20/19	136.21	3185.37	171.81	---	---
	4/15/2020	135.25	3186.33	---	---	---
	10/12/2020	135.41	3186.17	---	---	---
	6/21/2021	135.28	3186.30	---	---	---
	12/6/2021	135.23	3186.35	---	---	---
	08/22/22	135.27	3186.31	---	---	---
	12/21/22	134.98	3186.60	---	---	---
	07/20/23	135.24	3186.34	---	---	---
MW-4A	05/18/98	135.68	3183.90	143.00	2.00	128-143
3319.58	05/21/99	135.65	3183.93	---	---	---
	05/25/99	135.90	3183.68	---	---	---
	02/08/01	135.34	3184.24	---	---	---
	05/10/02	135.30	3184.28	---	---	---
	10/22/02	135.51	3184.07	---	---	---
	05/20/03	135.55	3184.03	---	---	---
	11/24/03	135.31	3184.27	---	---	---
	05/11/04	135.72	3183.86	---	---	---
	11/15/04	135.38	3184.20	---	---	---
	05/17/05	135.32	3184.26	---	---	---
	11/15/05	135.52	3184.06	---	---	---
	05/08/06	135.26	3184.32	---	---	---
	11/13/06	135.20	3184.38	---	---	---
	05/29/07	135.32	3184.26	---	---	---
	11/14/07	135.20	3184.38	---	---	---
	05/14/08	135.31	3184.27	---	---	---
	11/03/08	135.27	3184.31	---	---	---
	05/19/09	135.25	3184.33	---	---	---
	11/02/09	135.25	3184.33	---	---	---
	05/05/10	135.33	3184.25	---	---	---
	11/08/10	135.18	3184.40	---	---	---
	05/11/11	135.17	3184.41	---	---	---
	11/08/11	135.22	3184.36	---	---	---
	05/16/12	135.18	3184.40	---	---	---
	10/10/12	135.33	3184.25	---	---	---
	05/16/13	135.20	3184.38	---	---	---
	10/07/13	135.01	3184.57	---	---	---
	05/01/14	135.26	3184.32	---	---	---
	10/05/14	135.05	3184.53	---	---	---

Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/21/15	135.11	3184.47	---	---	---
	10/19/15	135.20	3184.38	---	---	---
	05/25/16	135.27	3184.31	---	---	---
	10/17/16	135.00	3184.58	---	---	---
	05/10/17	135.01	3184.57	---	---	---
3321.42	10/25/17	135.22	3186.20	---	---	---
	05/22/18	134.97	3186.45	---	---	---
	10/16/18	135.11	3186.31	---	---	---
	06/20/19	134.98	3186.44	145.55	---	---
	4/15/2020	136.09	3185.33	---	---	---
	10/12/2020	136.13	3185.29	---	---	---
	6/21/2021	135.15	3186.27	---	---	---
	12/6/2021	135.08	3186.34	---	---	---
	08/22/22	135.05	3186.37	---	---	---
	12/21/22	134.86	3186.56	---	---	---
	07/20/23	135.06	3186.36	---	---	---
MW-5	05/18/98	137.42	3183.68	171.00	2.00	161-171
3321.10	05/25/99	137.28	3183.82	---	---	---
	02/08/01	137.18	3183.92	---	---	---
	05/10/02	137.10	3184.00	---	---	---
	10/22/02	137.04	3184.06	---	---	---
	05/20/03	137.45	3183.65	---	---	---
	11/24/03	137.01	3184.09	---	---	---
	05/11/04	137.01	3184.09	---	---	---
	11/15/04	137.08	3184.02	---	---	---
	05/17/05	137.00	3184.10	---	---	---
	11/15/05	137.18	3183.92	---	---	---
	05/08/06	136.90	3184.20	---	---	---
	11/13/06	136.81	3184.29	---	---	---
	05/29/07	136.92	3184.18	---	---	---
	11/14/07	136.85	3184.25	---	---	---
	05/14/08	136.97	3184.13	---	---	---
	11/03/08	136.89	3184.21	---	---	---
	05/19/09	136.90	3184.20	---	---	---
	11/02/09	136.90	3184.20	---	---	---
	05/05/10	137.02	3184.08	---	---	---
	11/08/10	136.93	3184.17	---	---	---
	05/11/11	136.92	3184.18	---	---	---
	11/08/11	136.84	3184.26	---	---	---
	05/16/12	136.80	3184.30	---	---	---
	10/10/12	136.98	3184.12	---	---	---
	05/16/13	136.80	3184.30	---	---	---
	10/07/13	136.79	3184.31	---	---	---
	05/01/14	136.83	3184.27	---	---	---
	10/05/14	136.63	3184.47	---	---	---
	05/21/15	130.60	3190.50	---	---	---
	10/19/15	136.70	3184.40	---	---	---
	05/25/16	136.79	3184.31	---	---	---
	10/17/16	136.51	3184.59	---	---	---
	05/10/17	136.53	3184.57	---	---	---
3322.98	10/25/17	136.80	3186.18	---	---	---

Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/22/18	136.51	3186.47	---	---	---
	10/16/18	136.58	3186.40	---	---	---
	06/20/19	136.65	3186.33	173.72	---	---
	04/15/20	136.48	3186.50	---	---	---
	10/12/20	136.78	3186.20	---	---	---
	06/21/21	136.64	3186.34	---	---	---
	12/06/21	136.58	3186.40	---	---	---
	08/22/22	136.52	3186.46	---	---	---
	12/21/22	136.38	3186.60	---	---	---
	07/20/23	136.56	3186.42	---	---	---
MW-5A	05/18/98	137.20	3183.87	141.00	2.00	126-141
3321.07	05/25/99	137.11	3183.96	---	---	---
	02/08/01	136.99	3184.08	---	---	---
	05/10/02	136.90	3184.17	---	---	---
	10/22/02	137.17	3183.90	---	---	---
	05/20/03	137.24	3183.83	---	---	---
	11/24/03	136.91	3184.16	---	---	---
	05/11/04	136.88	3184.19	---	---	---
	11/15/04	136.92	3184.15	---	---	---
	05/17/05	136.83	3184.24	---	---	---
	11/15/05	137.06	3184.01	---	---	---
	05/08/06	136.80	3184.27	---	---	---
	11/13/06	136.74	3184.33	---	---	---
	05/29/07	136.82	3184.25	---	---	---
	11/14/07	136.88	3184.19	---	---	---
	05/14/08	136.83	3184.24	---	---	---
	11/03/08	136.81	3184.26	---	---	---
	05/19/09	136.78	3184.29	---	---	---
	11/02/09	136.80	3184.27	---	---	---
	05/05/10	136.91	3184.16	---	---	---
	11/08/10	136.69	3184.38	---	---	---
	05/11/11	136.87	3184.20	---	---	---
	11/08/11	136.77	3184.30	---	---	---
	05/16/12	136.74	3184.33	---	---	---
	10/10/12	136.85	3184.22	---	---	---
	05/16/13	136.72	3184.35	---	---	---
	10/07/13	137.45	3183.62	---	---	---
	05/01/14	136.81	3184.26	---	---	---
	10/05/14	136.61	3184.46	---	---	---
	05/21/15	136.68	3184.39	---	---	---
	10/19/15	136.55	3184.52	---	---	---
	05/25/16	136.84	3184.23	---	---	---
	10/17/16	136.43	3184.64	---	---	---
	05/10/17	136.66	3184.41	---	---	---
3321.07	10/25/17	136.80	3184.27	---	---	---
	05/22/18	136.55	3184.52	---	---	---
	10/16/18	136.64	3184.43	---	---	---
	06/20/19	144.05	3177.02	176.71	---	---
	04/15/20	136.60	3184.47	---	---	---
	10/12/20	136.80	3184.27	---	---	---
	06/21/21	136.71	3184.36	---	---	---

Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	12/06/21	136.56	3184.51	---	---	---
	08/22/22	136.55	3184.52	---	---	---
	12/21/22	136.49	3184.58	---	---	---
	07/20/23	136.66	3184.41	---	---	---
MW-6	05/18/98	136.73	3184.42	170.00	2.00	120-170
3321.15	05/25/99	136.61	3184.54	---	---	---
	02/08/01	136.50	3184.65	---	---	---
	05/10/02	136.40	3184.75	---	---	---
	10/22/02	136.57	3184.58	---	---	---
	05/20/03	136.85	3184.30	---	---	---
	11/24/03	136.38	3184.77	---	---	---
	05/11/04	136.41	3184.74	---	---	---
	11/15/04	136.08	3185.07	---	---	---
	05/17/05	136.58	3184.57	---	---	---
	11/15/05	136.82	3184.33	---	---	---
	05/08/06	136.58	3184.57	---	---	---
	11/13/06	136.49	3184.66	---	---	---
	05/29/07	136.61	3184.54	---	---	---
	11/15/07	136.59	3184.56	---	---	---
	05/14/08	136.58	3184.57	---	---	---
	11/03/08	136.52	3184.63	---	---	---
	05/19/09	136.52	3184.63	---	---	---
	11/02/09	136.51	3184.64	---	---	---
	05/05/10	136.53	3184.62	---	---	---
	11/08/10	136.40	3184.75	---	---	---
	05/11/11	Well Casing Damaged				
	11/08/11	Well Casing Damaged				
	05/16/12	Well Casing Damaged				
	10/09/12	Well Casing Damaged				
	09/30/13	Well Plugged and Abandonded 9/30/2013				
3321.50	05/01/14	136.25	3185.25	---	---	---
	10/05/14	136.40	3185.10	---	---	---
	05/21/15	136.13	3185.37	---	---	---
	10/19/15	136.20	3185.30	---	---	---
	05/25/16	136.27	3185.23	---	---	---
	10/17/16	135.96	3185.54	---	---	---
	05/10/17	136.07	3185.43	---	---	---
3323.04	10/25/17	136.20	3186.84	---	---	---
	05/22/18	136.03	3187.01	---	---	---
	10/17/18	136.09	3186.95	---	---	---
	06/20/19	---	---	---	---	---
	06/21/21	163.11	3159.93	---	---	---
	12/06/21	136.09	3186.95	---	---	---
MW-6R	08/22/22	136.02	3187.02	---	---	---
	12/21/22	135.91	3187.13	---	---	---
	07/20/23	136.07	3186.97	---	---	---
MW-7	05/18/98	136.19	3182.20	166.00	2.00	151-166
3318.39	05/25/99	135.98	3182.41	---	---	---
	02/08/01	135.87	3182.52	---	---	---
	05/10/02	135.67	3182.72	---	---	---
	10/22/02	135.89	3182.50	---	---	---

Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/20/03	136.12	3182.27	---	---	---
	11/24/03	135.71	3182.68	---	---	---
	05/11/04	135.74	3182.65	---	---	---
	11/15/04	135.78	3182.61	---	---	---
	05/17/05	135.68	3182.71	---	---	---
	11/15/05	135.90	3182.49	---	---	---
	05/08/06	135.64	3182.75	---	---	---
	11/13/06	135.58	3182.81	---	---	---
	05/29/07	135.73	3182.66	---	---	---
	11/15/07	135.64	3182.75	---	---	---
	05/14/08	135.68	3182.71	---	---	---
	11/03/08	135.66	3182.73	---	---	---
	05/19/09	135.63	3182.76	---	---	---
	11/02/09	135.65	3182.74	---	---	---
	05/05/10	135.80	3182.59	---	---	---
	11/08/10	135.51	3182.88	---	---	---
	05/11/11	135.68	3182.71	---	---	---
	11/08/11	135.62	3182.77	---	---	---
	05/16/12	135.55	3182.84	---	---	---
	10/10/12	135.79	3182.60	---	---	---
	05/16/13	135.59	3182.80	---	---	---
	10/07/13	NS	NS	---	---	---
	05/01/14	135.65	3182.74	---	---	---
	10/05/14	135.58	3182.81	---	---	---
	05/21/15	135.52	3182.87	---	---	---
	10/19/15	135.54	3182.85	---	---	---
	05/25/16	135.75	3182.64	---	---	---
	10/17/16	135.35	3183.04	---	---	---
	05/10/17	135.39	3183.00	---	---	---
3320.19	10/24/17	135.38	3184.81	---	---	---
	05/22/18	135.39	3184.80	---	---	---
	10/15/18	135.59	3184.60	---	---	---
	06/20/19	135.48	3184.71	162.60	---	---
	04/15/20	135.59	3184.60	---	---	---
	10/12/20	135.64	3184.55	---	---	---
	06/22/21	135.50	3184.69	---	---	---
	12/06/21	135.44	3184.75	---	---	---
	08/22/22	135.4	3184.79	---	---	---
	12/21/22	135.26	3184.93	---	---	---
	07/20/23	135.50	3184.69	---	---	---
MW-8	05/18/98	134.36	3182.78	170.00	2.00	155-170
3317.14	05/25/99	134.21	3182.93	---	---	---
	02/08/01	134.08	3183.06	---	---	---
	05/10/02	133.95	3183.19	---	---	---
	10/22/02	134.18	3182.96	---	---	---
	05/20/03	134.38	3182.76	---	---	---
	11/24/03	133.99	3183.15	---	---	---
	05/11/04	134.02	3183.12	---	---	---
	11/15/04	134.11	3183.03	---	---	---
	05/17/05	133.97	3183.17	---	---	---
	11/15/05	134.21	3182.93	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/08/06	133.94	3183.20	---	---	---
	11/13/06	133.90	3183.24	---	---	---
	05/29/07	134.02	3183.12	---	---	---
	11/15/07	133.76	3183.38	---	---	---
	05/15/08	133.98	3183.16	---	---	---
	11/03/08	134.01	3183.13	---	---	---
	05/19/09	133.97	3183.17	---	---	---
	11/02/09	134.00	3183.14	---	---	---
	05/05/10	134.08	3183.06	---	---	---
	11/08/10	134.03	3183.11	---	---	---
	05/11/11	133.98	3183.16	---	---	---
	11/08/11	133.96	3183.18	---	---	---
	05/16/12	133.84	3183.30	---	---	---
	10/10/12	134.15	3182.99	---	---	---
	05/16/13	133.94	3183.20	---	---	---
	10/07/13	133.90	3183.24	---	---	---
	05/01/14	133.91	3183.23	---	---	---
	10/05/14	133.75	3183.39	---	---	---
	05/21/15	133.88	3183.26	---	---	---
	10/19/15	133.88	3183.26	---	---	---
	05/25/16	133.86	3183.28	---	---	---
	10/17/16	133.68	3183.46	---	---	---
	05/10/17	133.84	3183.30	---	---	---
3319.06	10/24/17	133.72	3185.34	---	---	---
	05/22/18	133.77	3185.29	---	---	---
	10/17/18	133.87	3185.19	---	---	---
	06/20/19	133.87	3185.19	146.85	---	---
	04/15/20	133.81	3185.25	---	---	---
	10/12/20	133.96	3185.10	---	---	---
	06/22/21	133.74	3185.32	---	---	---
	12/06/21	133.74	3185.32	---	---	---
	08/22/22	133.68	3185.38	---	---	---
	12/21/22	133.64	3185.42	---	---	---
	07/20/23	133.81	3185.25	---	---	---
MW-9	05/18/98	132.89	3179.90	164.00	2.00	149-164
3312.79	05/25/99	132.68	3180.11	---	---	---
	02/08/01	132.52	3180.27	---	---	---
	05/10/02	137.20	3175.59	---	---	---
	10/22/02	132.56	3180.23	---	---	---
	05/20/03	132.75	3180.04	---	---	---
	11/24/03	132.35	3180.44	---	---	---
	05/11/04	132.39	3180.40	---	---	---
	11/15/04	132.43	3180.36	---	---	---
	05/17/05	132.26	3180.53	---	---	---
	11/15/05	132.60	3180.19	---	---	---
	05/08/06	132.26	3180.53	---	---	---
	11/13/06	132.19	3180.60	---	---	---
	05/29/07	132.32	3180.47	---	---	---
	11/14/07	132.34	3180.45	---	---	---
	05/15/08	132.29	3180.50	---	---	---
	11/03/08	132.33	3180.46	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/19/09	132.21	3180.58	---	---	---
	11/02/09	132.35	3180.44	---	---	---
	05/05/10	132.41	3180.38	---	---	---
	11/08/10	132.10	3180.69	---	---	---
	05/11/11	132.22	3180.57	---	---	---
	11/08/11	132.19	3180.60	---	---	---
	05/16/12	132.05	3180.74	---	---	---
	10/10/12	132.32	3180.47	---	---	---
	05/16/13	132.08	3180.71	---	---	---
	10/07/13	131.94	3180.85	---	---	---
	05/01/14	Not Measured - Obstruction In Well				
	10/05/14	131.95	3180.84	---	---	---
	05/21/15	132.05	3180.74	---	---	---
	10/19/15	132.01	3180.78	---	---	---
	05/25/16	131.98	3180.81	---	---	---
	10/17/16	131.91	3180.88	---	---	---
	05/10/17	131.95	3180.84	---	---	---
3314.68	10/24/17	131.92	3182.76	---	---	---
	05/22/18	131.90	3182.78	---	---	---
	10/17/18	131.98	3182.70	---	---	---
	06/20/19	131.95	3182.73	161.46	---	---
	04/15/20	139.92	3174.76	---	---	---
	10/12/20	132.09	3182.59	---	---	---
	06/22/21	131.94	3182.74	---	---	---
	12/06/21	131.87	3182.81	---	---	---
	08/22/22	131.86	3182.82	---	---	---
	12/21/22	131.68	3183.00	---	---	---
	07/21/23	131.9	3182.78	---	---	---
MW-9A	05/18/98	132.65	3179.91	142.00	2.00	127-142
3312.56	05/25/99	132.43	3180.13	---	---	---
	02/08/01	132.37	3180.19	---	---	---
	05/10/02	137.20	3175.36	---	---	---
	10/22/02	132.35	3180.21	---	---	---
	05/20/03	132.55	3180.01	---	---	---
	11/24/03	132.10	3180.46	---	---	---
	05/11/04	132.14	3180.42	---	---	---
	11/15/04	132.19	3180.37	---	---	---
	05/17/05	132.06	3180.50	---	---	---
	11/15/05	132.35	3180.21	---	---	---
	05/08/06	132.02	3180.54	---	---	---
	11/13/06	131.09	3181.47	---	---	---
	05/29/07	132.08	3180.48	---	---	---
	11/14/07	132.06	3180.50	---	---	---
	05/15/08	132.03	3180.53	---	---	---
	11/03/08	131.98	3180.58	---	---	---
	05/19/09	132.00	3180.56	---	---	---
	11/02/09	131.90	3180.66	---	---	---
	05/05/10	131.96	3180.60	---	---	---
	11/08/10	131.85	3180.71	---	---	---
	05/11/11	132.06	3180.50	---	---	---
	11/08/11	131.95	3180.61	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/16/12	131.81	3180.75	---	---	---
	10/10/12	132.09	3180.47	---	---	---
	05/16/13	131.88	3180.68	---	---	---
	10/07/13	131.90	3180.66	---	---	---
	05/01/14	Not Measured - Obstruction In Well				
	10/05/14	Not Measured - Obstruction In Well				
	05/21/15	Not Measured - Obstruction In Well				
	10/19/15	131.68	3180.88	---	---	---
	05/25/16	131.73	3180.83	---	---	---
	10/17/16	131.62	3180.94	---	---	---
	05/10/17	131.68	3180.88	---	---	---
3314.48	10/24/17	131.60	3182.88	---	---	---
	05/22/18	131.81	3182.67	---	---	---
	10/17/18	131.72	3182.76	---	---	---
	06/20/19	131.69	3182.79	141.72	---	---
	04/15/20	131.5	3182.98	---	---	---
	10/12/20	131.86	3182.62	---	---	---
	06/22/21	131.65	3182.83	---	---	---
	12/06/21	131.64	3182.84	---	---	---
	08/22/22	131.53	3182.95	---	---	---
	12/21/22	131.41	3183.07	---	---	---
	07/21/23	131.60	3182.88	---	---	---
MW-10	05/18/98	137.18	3182.12	166.00	2.00	151-166
3319.30	05/25/99	137.04	3182.26	---	---	---
	02/08/01	136.88	3182.42	---	---	---
	05/10/02	136.80	3182.50	---	---	---
	10/22/02	136.91	3182.39	---	---	---
	05/20/03	137.13	3182.17	---	---	---
	11/24/03	136.71	3182.59	---	---	---
	05/11/04	136.77	3182.53	---	---	---
	11/15/04	136.82	3182.48	---	---	---
	05/17/05	136.34	3182.96	---	---	---
	11/15/05	136.95	3182.35	---	---	---
	05/08/06	136.65	3182.65	---	---	---
	11/13/06	136.59	3182.71	---	---	---
	05/29/07	136.68	3182.62	---	---	---
	11/15/07	136.61	3182.69	---	---	---
	05/15/08	136.65	3182.65	---	---	---
	11/03/08	136.60	3182.70	---	---	---
	05/19/09	136.60	3182.70	---	---	---
	11/02/09	136.60	3182.70	---	---	---
	05/05/10	136.44	3182.86	---	---	---
	11/08/10	136.58	3182.72	---	---	---
	05/11/11	136.62	3182.68	---	---	---
	11/08/11	136.57	3182.73	---	---	---
	05/16/12	136.44	3182.86	---	---	---
	10/10/12	136.91	3182.39	---	---	---
	05/16/13	136.51	3182.79	---	---	---
	10/07/13	136.55	3182.75	---	---	---
	05/01/14	136.37	3182.93	---	---	---
	10/05/14	136.42	3182.88	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

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Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/21/15	136.40	3182.90	---	---	---
	10/19/15	136.41	3182.89	---	---	---
	05/25/16	136.40	3182.90	---	---	---
	10/17/16	136.33	3182.97	---	---	---
	05/10/17	136.34	3182.96	---	---	---
3321.12	10/24/17	136.28	3184.84	---	---	---
	05/22/18	130.07	3191.05	---	---	---
	10/15/18	136.34	3184.78	---	---	---
	06/20/19	136.28	3184.84	160.72	---	---
	04/15/20	136.23	3184.89	---	---	---
	10/12/20	136.56	3184.56	---	---	---
	06/22/21	136.37	3184.75	---	---	---
	12/06/21	136.29	3184.83	---	---	---
	08/22/22	136.25	3184.87	---	---	---
	12/21/22	136.11	3185.01	---	---	---
	07/20/23	136.31	3184.81	---	---	---
MW-11	03/23/99	131.12	3178.57	140.00	4.00	125-140
3309.69	05/25/99	130.91	3178.78	---	---	---
	02/08/01	130.11	3179.58	---	---	---
	05/10/02	135.60	3174.09	---	---	---
	10/22/02	130.76	3178.93	---	---	---
	05/20/03	131.03	3178.66	---	---	---
	11/24/03	130.57	3179.12	---	---	---
	05/11/04	130.61	3179.08	---	---	---
	11/15/04	130.65	3179.04	---	---	---
	05/17/05	131.56	3178.13	---	---	---
	11/15/05	130.70	3178.99	---	---	---
	05/08/06	130.41	3179.28	---	---	---
	11/13/06	130.42	3179.27	---	---	---
	05/29/07	130.52	3179.17	---	---	---
	11/14/07	130.42	3179.27	---	---	---
	05/15/08	130.46	3179.23	---	---	---
	11/03/08	130.41	3179.28	---	---	---
	05/19/09	130.40	3179.29	---	---	---
	11/02/09	130.40	3179.29	---	---	---
	05/05/10	130.43	3179.26	---	---	---
	11/08/10	130.28	3179.41	---	---	---
	05/11/11	130.40	3179.29	---	---	---
	11/08/11	130.37	3179.32	---	---	---
	05/16/12	130.23	3179.46	---	---	---
	10/10/12	130.49	3179.20	---	---	---
	05/16/13	130.27	3179.42	---	---	---
	10/07/13	130.12	3179.57	---	---	---
	05/01/14	130.21	3179.48	---	---	---
	10/05/14	130.16	3179.53	---	---	---
	05/21/15	130.17	3179.52	---	---	---
	10/19/15	130.20	3179.49	---	---	---
	05/25/16	130.17	3179.52	---	---	---
	10/17/16	130.02	3179.67	---	---	---
	05/10/17	130.09	3179.60	---	---	---
3311.56	10/24/17	130.14	3181.42	---	---	---

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Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/22/18	130.07	3181.49	---	---	---
	10/17/18	130.09	3181.47	---	---	---
	06/20/19	130.13	3181.43	165.71	---	---
	04/15/20	130.06	3181.50	---	---	---
	10/12/20	130.19	3181.37	---	---	---
	06/22/21	130.03	3181.53	---	---	---
	12/06/21	129.99	3181.57	---	---	---
	08/22/22	129.95	3181.61	---	---	---
	12/21/22	129.82	3181.74	---	---	---
	07/21/23	130.05	3181.51	---	---	---
MW-12*	05/10/02	139.57	3188.86	171.65	4.00	157-172
3328.43	10/22/02	139.73	3188.70	---	---	---
	05/20/03	139.72	3188.71	---	---	---
	11/24/03	139.69	3188.74	---	---	---
	05/11/04	139.64	3188.79	---	---	---
	11/15/04	139.68	3188.75	---	---	---
	05/17/05	139.58	3188.85	---	---	---
	11/15/05	139.83	3188.60	---	---	---
	05/08/06	139.55	3188.88	---	---	---
	11/13/06	139.53	3188.90	---	---	---
	05/29/07	139.65	3188.78	---	---	---
	11/16/07	139.05	3189.38	---	---	---
	05/14/08	139.69	3188.74	---	---	---
	11/03/08	139.61	3188.82	---	---	---
	05/19/09	139.59	3188.84	---	---	---
	11/02/09	139.62	3188.81	---	---	---
	05/05/10	139.66	3188.77	---	---	---
	11/08/10	139.55	3188.88	---	---	---
	05/11/11	139.04	3189.39	---	---	---
	11/08/11	139.68	3188.75	---	---	---
	05/16/12	139.65	3188.78	---	---	---
	10/10/12	139.95	3188.48	---	---	---
	05/16/13	139.67	3188.76	---	---	---
	10/07/13	139.50	3188.93	---	---	---
	05/01/14	139.58	3188.85	---	---	---
	10/05/14	139.56	3188.87	---	---	---
	05/21/15	139.65	3188.78	---	---	---
	10/19/15	139.65	3188.78	---	---	---
	05/25/16	139.71	3188.72	---	---	---
	10/17/16	139.45	3188.98	---	---	---
	05/10/17	139.61	3188.82	---	---	---
3330.33	10/24/17	139.72	3190.61	---	---	---
	05/22/18	139.59	3190.74	---	---	---
	10/17/18	139.68	3190.65	---	---	---
	06/20/19	139.72	3190.61	171.02	---	---
	04/13/20	139.78	3190.55	---	---	---
	10/12/20	139.88	3190.45	---	---	---
	06/22/21	139.61	3190.72	---	---	---
	12/06/21	139.64	3190.69	---	---	---
	08/22/22	139.63	3190.70	---	---	---
	12/21/22	139.55	3190.78	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	07/21/23	139.81	3190.52	---	---	---
MW-13*	05/10/02	144.45	3194.04	171.65	4.00	157-172
3338.49	10/22/02	144.49	3194.00	---	---	---
	05/20/03	144.90	3193.59	---	---	---
	11/24/03	144.37	3194.12	---	---	---
	05/11/04	144.47	3194.02	---	---	---
	11/15/04	144.56	3193.93	---	---	---
	05/17/05	144.36	3194.13	---	---	---
	11/15/05	144.60	3193.89	---	---	---
	05/08/06	144.29	3194.20	---	---	---
	11/13/06	144.38	3194.11	---	---	---
	05/29/07	144.54	3193.95	---	---	---
	11/16/07	144.54	3193.95	---	---	---
	05/14/08	144.45	3194.04	---	---	---
	11/03/08	144.36	3194.13	---	---	---
	05/19/09	144.51	3193.98	---	---	---
	11/02/09	144.35	3194.14	---	---	---
	05/05/10	144.39	3194.10	---	---	---
	11/08/10	144.40	3194.09	---	---	---
	05/11/11	144.60	3193.89	---	---	---
	11/08/11	144.74	3193.75	---	---	---
	05/16/12	144.70	3193.79	---	---	---
	10/10/12	144.82	3193.67	---	---	---
	05/16/13	144.70	3193.79	---	---	---
	10/07/13	144.60	3193.89	---	---	---
	05/01/14	144.53	3193.96	---	---	---
	10/05/14	144.70	3193.79	---	---	---
	05/21/15	144.78	3193.71	---	---	---
	10/19/15	144.75	3193.74	---	---	---
	05/25/16	144.87	3193.62	---	---	---
	10/17/16	144.54	3193.95	---	---	---
	05/10/17	144.66	3193.83	---	---	---
3316.84	05/01/14	134.51	3182.33	---	---	---
	10/05/14	134.44	3182.40	---	---	---
	05/21/15	134.31	3182.53	---	---	---
	10/19/15	134.49	3182.35	---	---	---
	05/25/16	134.42	3182.42	---	---	---
	10/17/16	134.30	3182.54	---	---	---
	05/10/17	134.35	3182.49	---	---	---
3318.36	07/11/17	Well Plugged and Abandonded on 7/11/2017				
	05/22/18	134.32	3184.04	---	---	---
	10/15/18	134.41	3183.95	---	---	---
	06/20/19	134.78	3183.58	178.74	---	---
MW-14	06/23/21	134.36	3184.00	---	---	---
3318.36	12/06/21	134.42	3183.94	---	---	---
	08/22/22	134.19	3184.17	---	---	---
	12/21/22	134.14	3184.22	---	---	---
	07/20/23	134.33	3184.03	---	---	---
RW-1	05/21/99	134.32	3184.18	175.00	5.00	130-174
3318.50	05/25/99	134.24	3184.26	---	---	---
	02/08/01	134.15	3184.35	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/10/02	134.00	3184.50	---	---	---
	10/22/02	134.17	3184.33	---	---	---
	05/20/03	134.40	3184.10	---	---	---
	11/24/03	134.02	3184.48	---	---	---
	05/11/04	134.01	3184.49	---	---	---
	11/15/04	134.06	3184.44	---	---	---
	05/17/05	133.97	3184.53	---	---	---
	11/15/05	134.20	3184.30	---	---	---
	05/08/06	133.93	3184.57	---	---	---
	11/13/06	133.92	3184.58	---	---	---
	05/29/07	134.00	3184.50	---	---	---
	11/15/07	133.88	3184.62	---	---	---
	05/14/08	133.98	3184.52	---	---	---
	11/03/08	133.99	3184.51	---	---	---
	05/19/09	133.92	3184.58	---	---	---
	11/02/09	134.00	3184.50	---	---	---
	05/05/10	134.03	3184.47	---	---	---
	11/08/10	133.81	3184.69	---	---	---
	05/11/11	133.83	3184.67	---	---	---
	11/08/11	133.88	3184.62	---	---	---
	05/16/12	133.84	3184.66	---	---	---
	10/10/12	135.01	3183.49	---	---	---
	05/16/13	133.85	3184.65	---	---	---
	10/07/13	133.68	3184.82	---	---	---
	05/01/14	133.91	3184.59	---	---	---
	10/05/14	133.64	3184.86	---	---	---
	05/21/15	133.73	3184.77	---	---	---
	10/19/15	133.73	3184.77	---	---	---
	05/25/16	133.73	3184.77	---	---	---
	10/17/16	133.80	3184.70	---	---	---
	05/10/17	133.67	3184.83	---	---	---
3320.31	10/25/17	133.80	3186.51	---	---	---
	05/22/18	133.61	3186.70	---	---	---
	10/16/18	133.76	3186.55	---	---	---
	06/20/19	133.64	3186.67	164.03	---	---
	04/15/20	133.68	3186.63	---	---	---
	10/12/20	133.95	3186.36	---	---	---
	06/21/21	133.84	3186.47	---	---	---
	12/06/21	133.74	3186.57	---	---	---
	08/22/22	133.69	3186.62	---	---	---
	12/21/22	133.52	3186.79	---	---	---
	07/20/23	133.71	3186.60	---	---	---
RW-2	02/08/01	135.58	3183.04	160.00	5.00	134-173
3318.62	05/10/02	135.55	3183.07	---	---	---
	10/22/02	135.55	3183.07	---	---	---
	05/20/03	135.58	3183.04	---	---	---
	11/24/03	135.54	3183.08	---	---	---
	05/11/04	135.48	3183.14	---	---	---
	11/15/04	135.43	3183.19	---	---	---
	05/17/05	135.46	3183.16	---	---	---
	11/15/05	135.65	3182.97	---	---	---

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Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	05/08/06	135.42	3183.20	---	---	---
	11/13/06	135.47	3183.15	---	---	---
	05/29/07	135.54	3183.08	---	---	---
	11/15/07	135.48	3183.14	---	---	---
	05/14/08	135.48	3183.14	---	---	---
	11/03/08	135.44	3183.18	---	---	---
	05/19/09	135.44	3183.18	---	---	---
	11/02/09	135.45	3183.17	---	---	---
	05/05/10	135.47	3183.15	---	---	---
	11/08/10	135.30	3183.32	---	---	---
	05/11/11	135.55	3183.07	---	---	---
	11/08/11	135.46	3183.16	---	---	---
	05/16/12	135.40	3183.22	---	---	---
	10/10/12	135.49	3183.13	---	---	---
	05/16/13	135.33	3183.29	---	---	---
	05/01/14	135.40	3183.22	---	---	---
	10/05/14	135.29	3183.33	---	---	---
	05/21/15	135.28	3183.34	---	---	---
	10/19/15	135.32	3183.30	---	---	---
	05/25/16	135.21	3183.41	---	---	---
	10/17/16	135.15	3183.47	---	---	---
	05/10/17	135.14	3183.48	---	---	---
3320.42	10/25/17	135.30	3185.12	---	---	---
	05/22/18	135.12	3185.30	---	---	---
	10/15/18	135.21	3185.21	---	---	---
	06/20/19	135.23	3185.19	156.50	---	---
	04/15/20	135.28	3185.14	---	---	---
	10/12/20	135.38	3185.04	---	---	---
	06/21/21	135.26	3185.16	---	---	---
	12/06/21	135.16	3185.26	---	---	---
	08/22/22	135.15	3185.27	---	---	---
	12/21/22	134.97	3185.45	---	---	---
	07/20/23	135.20	3185.22	---	---	---
RW-2R	10/07/13	135.43	3183.19	173.00	6.00	133-173
3320.68	10/07/13	136.94	3183.74	---	---	---
	05/01/14	137.05	3183.63	---	---	---
	10/05/14	136.85	3183.83	---	---	---
	05/21/15	136.85	3183.83	---	---	---
	10/19/15	136.92	3183.76	---	---	---
	05/25/16	136.89	3183.79	---	---	---
	10/17/16	136.75	3183.93	---	---	---
	05/10/17	136.77	3183.91	---	---	---
3320.68	10/25/17	137.00	3183.68	---	---	---
	05/22/18	136.76	3183.92	---	---	---
	10/15/18	136.87	3183.81	---	---	---
	06/20/19	136.79	3183.89	176.82	---	---
	04/15/20	136.82	3183.86	---	---	---
	10/12/20	137.05	3183.63	---	---	---
	06/21/21	136.95	3183.73	---	---	---
	12/06/21	136.85	3183.83	---	---	---
	08/22/22	136.78	3183.90	---	---	---

Attachment C - 1 Cumulative Summary of Potentiometric Elevation Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

Well ID TOC Elevation (ft MSL)	Collection Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft MSL)	Constructed Depth (ft below TOC)	Casing Diameter (in)	Well Screen Interval (ft bgs)
	12/21/22	136.67	3184.01	---	---	---
	07/20/23	136.83	3183.85	---	---	---
MW-6R 3323.04	10/07/13	135.43	3187.61	173.00	6.00	133-173
	04/13/20	135.97	3187.07	173.00	6.00	133-174
	10/12/20	136.27	3186.77	173.00	6.00	133-175

Notes:
1. TOC - Top of Casing
2. ft bgs - feet below ground surface
3. in - inches
4. NS - Not sampled
5. A - Indicates groundwater monitor well installed in shallow Uppermost Groundwater Bearing Unit.
6. MSL - Mean Sea Level
7. * - Indicates groundwater monitor well installed off-Site and upgradient of plume.

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
MW-1	9/16/97	--	--	280.00	**8,500.00**	--	--	**1,100.00**	520.00	630.00	50.00	4,300.00	**15,000.00**
	2/25/98	--	--	280.00	**5,600.00**	--	--	570.00	285.00	520.00	116.00	2,900.00	**9,300.00**
	2/14/01	<1.00	306.00	306.00	**11,000.00**	**4.40**	7.70	**1,000.00**	374.00	780.00	236.00	5,236.00	**20,000.00**
	5/17/02	<1.00	208.00	208.00	237.00	**5.83**	3.28	86.90	45.70	20.10	11.90	184.00	784.00
	10/23/02	--	--	--	168.00	--	--	96.80	--	--	--	--	696.00
	5/21/03	<1.00	290.00	290.00	**6,600.00**	<8.00	**10.90**	**875.00**	238.00	475.00	96.50	3,410.00	**13,200.00**
	11/25/03	<1.00	250.00	250.00	**402.00**	**7.03**	2.72	125.00	19.20	22.00	18.50	294.00	**1,158.00**
	5/12/04	<1.00	264.00	264.00	**504.00**	**7.31**	2.70	136.00	17.20	23.10	22.40	355.00	**1,328.00**
	11/16/04	<1.00	232.00	232.00	**384.00**	**4.94**	3.30	103.00	29.20	22.70	25.40	373.00	952.00
	11/16/05	<10.00	262.00	262.00	**1,210.00**	**3.00**	2.40	215 D1	85.40	92.60	23.00	847.00	**2,640.00**
	11/14/06	<10.00	200.00	200.00	96.00	**4.20**	2.00	76.00	13.20	6.49	15.60	172.00	624.00
	11/16/07	<10.00	255.00	255.00	**4,250.00**	**3.70**	3.90 D1	602 D1	154.00	187.00	54.00	2,100 D1	**10,900.00**
	11/4/08	<5.00	190.00	190.00	110.00	**6.30**	1.60	83.00	10.00	5.80	7.90	180.00	590.00
	11/3/09	<10.00	270.00	270.00	**4,100.00**	**4.10**	2.80	**640.00**	190.00	250.00	61.00	2,300.00	**8,000.00**
	11/10/10	<10.00	223.00	223.00	**2,670.00**	**1.92**	2.62	373.00	138.00	196.00	21.50	1,480.00	**5,020.00**
	11/10/11	<5.00	209.00	209.00	**3,220.00**	1.02	2.37	275.00	169.00	176.00	22.50	1,340.00	**5,250.00**
Dup	11/10/11	<5.00	213.00	213.00	**2,930.00**	1.05	2.35	240.00	183.00	197.00	22.60	1,480.00	**4,640.00**
	10/11/12	<5.00	190.00	190.00	**2,190.00**	**6.74**	4.52	301.00	132.00	145.00	17.90	1,140.00	**1,880.00**
	10/8/13	<6.00	211.00	211.00	**1,890.00**	1.46	2.39	247.00	131.00	114.00	15.30	914.00	**2,380.00**
	10/7/14	<4.00	205.00	205.00	**1,700.00**	0.46	2.37	277.00	118.00	126.00	14.90	860.00	**3,690.00**
	10/21/15	--	--	--	182.00	<4.00	--	78.10	--	--	--	--	559.00
	10/18/16	--	--	--	**1,320.00**	0.83	--	221.00	--	--	--	--	**2,700.00**
	10/24/17	--	--	--	148.00	**2.57**	--	79.40	--	--	--	--	594.00
	10/18/18	--	--	--	**1,290.00**	0.79	--	215.00	--	--	--	--	**2,360.00**
	6/20/19	--	--	--	**1,110.00**	--	--	--	--	--	--	--	**2,510.00**
	4/20/20	--	--	--	**317.00**	--	--	--	--	--	--	--	826.00
	10/12/20	--	--	--	**285.00**	--	--	--	--	--	--	--	799.00
	6/25/21	--	--	--	**938.00**	--	--	--	--	--	--	--	**2,030.00**
	12/6/21	--	--	--	**656.00**	--	--	--	--	--	--	--	**1,800.00**
	8/23/22	--	--	--	***805***	--	--	--	--	--	--	--	***1,540***
	12/21/22	--	--	--	***960***	--	--	--	--	--	--	--	***1,240***
MW-1	7/20/23	--	--	--	***736***	--	--	--	--	--	--	--	**1,720**
MW-2	2/25/98	--	--	210.00	**5,900.00**	--	--	**760.00**	840.00	380.00	30.00	2,650.00	**9,400.00**
	4/9/98	--	--	290.00	**8,200.00**	--	--	**990.00**	1,100.00	490.00	29.00	3,430.00	**15,000.00**
	2/14/01	<1.00	184.00	184.00	**7,400.00**	**2.30**	4.10	**870.00**	1,025.00	488.00	48.50	3,189.00	**15,000.00**
	5/17/02	<1.00	160.00	160.00	**3,200.00**	**1.72**	3.18	483.00	587.00	239.00	35.60	1,160.00	**6,040.00**
	10/23/02	--	--	--	**2,920.00**	--	--	451.00	--	--	--	--	**6,770.00**
	5/22/03	<1.00	158.00	158.00	**2,550.00**	**2.04**	3.87	386.00	448.00	176.00	20.00	1,020.00	**5,880.00**
	11/25/03	<1.00	160.00	160.00	**3,330.00**	<4.00	5.63	446.00	555.00	227.00	32.00	1,120.00	**6,760.00**
	5/12/04	<1.00	146.00	146.00	**1,750.00**	<2.00	2.78	246.00	308.00	112.00	29.70	549.00	**3,965.00**
	11/16/04	<1.00	120.00	120.00	**430.00**	<1.00	2.13	56.90	104.00	29.40	22.40	158.00	832.00
	11/16/05	<10.00	171.00	171.00	**4,720.00**	0.72	2.60	645 D1	594.00	209.00	20.80	3,290.00	**10,000.00**
	11/14/06	<10.00	160.00	160.00	**3,500.00**	0.78 N	2.10	470.00	535.00	212.00	21.00	15,400.00	**8,260.00**
	11/14/07	<10.00	178.00	178.00	**3,280.00**	0.76	1.93	462 D1	449.00	152.00	16.20	1310 D1	**9,110.00**
	11/4/08	<5.00	150.00	150.00	**2,900.00**	<1.0	1.10	430.00	380.00	160.00	26.00	1,200.00	**5,600.00**
	11/16/09	<10.00	150.00	150.00	**2,000.00**	1.10	1.60	340.00	290.00	120.00	20.00	750.00	**4,300.00**
	11/12/10	<10.00	186.00	186.00	**1,890.00**	0.73	1.86	327.00	326.00	120.00	9.80	795.00	**3,680.00**
	11/10/11	<5.00	175.00	175.00	**1,480.00**	0.81	1.31	150.00	227.00	83.20	9.75	668.00	**2,860.00**
	10/11/12	<5.00	149.00	149.00	**524.00**	0.55	1.92	231.00	119.00	31.70	8.78	286.00	**1,090.00**
	10/8/13	<6.00	269.00	269.00	**1,180.00**	1.20	<0.10	169.00	178.00	64.70	8.16	505.00	**2,520.00**
	10/7/14	<4.00	196.00	196.00	**695.00**	0.52	<0.023	147.00	143.00	47.50	7.30	343.00	**1,310.00**
	10/21/15	--	--	--	27.10	<2.00	--	58.60	--	--	--	--	388.00
	10/18/16	--	--	--	26.70	<0.50	--	34.40	--	--	--	--	352.00
	10/25/17	--	--	--	35.80	1.00	--	36.30	--	--	--	--	331.00
	10/18/18	--	--	--	65.90	0.66	--	48.50	--	--	--	--	384.00
	6/20/19	--	--	--	**283.00**	--	--	--	--	--	--	--	960.00
	4/20/20	--	--	--	**263.00**	--	--	--	--	--	--	--	624.00
	10/12/20	--	--	--	221.00	--	--	--	--	--	--	--	675.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	6/25/21	--	--	--	205.00	--	--	--	--	--	--	--	685.00
	12/6/21	--	--	--	183.00	--	--	--	--	--	--	--	675.00
	8/23/22	--	--	--	***1,190***	--	--	--	--	--	--	--	***2,250***
	12/21/22	--	--	--	*239*	--	--	--	--	--	--	--	*494*
	7/20/23	--	--	--	137	--	--	--	--	--	--	--	437
MW-2A	2/26/98	--	--	190.00	**280.00**	--	--	330.00	144.00	36.00	5.70	215.00	**1,200.00**
	2/14/01	<1.00	162.00	162.00	44.00	1.30	2.30	76.00	64.40	16.70	7.02	45.50	390.00
	5/15/02	<1.00	176.00	176.00	36.60	<1.00	2.34	79.10	57.60	13.90	4.35	43.80	435.00
	10/23/02	--	--	--	44.30	--	--	97.00	--	--	--	--	425.00
	5/22/03	<1.00	168.00	168.00	40.50	<1.00	2.18	75.50	67.20	14.30	3.76	47.90	418.00
	11/25/03	<1.00	166.00	166.00	43.10	1.00	2.23	77.40	51.70	14.40	3.98	43.80	452.00
	5/12/04	<1.00	176.00	176.00	44.80	<1.00	2.24	76.50	62.90	15.00	3.66	43.60	440.00
	11/16/04	<1.00	164.00	164.00	52.50	1.22	2.78	75.40	68.80	15.30	3.98	49.10	428.00
	11/16/05	<10.00	151.00	151.00	56.80	0.60	2.30	75.1 D1	157.00	18.00	4.20	49.80	630 N
	11/14/06	<10.00	180.00	180.00	49.00	0.55	1.60	76.00	69.80	15.60	3.47	49.90	488.00
	11/14/07	<10.00	170.00	170.00	74.60	0.58	1.51	66.8 D1	666.00	15.30	<5.00	45.40	504.00
	11/4/08	<5.00	220.00	220.00	68.00	0.49	1.40	74.00	67.00	15.00	3.20	42.00	470.00
	11/3/09	<10.00	230.00	230.00	62.00	0.59	1.60	81.00	66.00	15.00	3.40	50.00	480.00
	11/11/10	<10.00	158.00	158.00	86.10	0.45	1.73	74.00	53.90	14.90	2.86	42.80	474.00
	11/10/11	<5.00	175.00	175.00	129.00	0.28	1.25	101.00	92.50	23.30	4.17	64.70	614.00
	10/11/12	<5.00	173.00	173.00	76.50	0.46	1.60	79.40	69.20	15.70	3.62	45.30	500.00
	10/8/13	<6.00	248.00	248.00	78.60	0.41	0.62	75.40	92.60	18.70	4.06	51.20	496.00
	10/7/14	<4.00	188.00	188.00	72.50	0.20	1.55	79.40	77.10	17.20	3.00	44.30	496.00
	10/21/15	--	--	--	76.70	<4.00	--	77.50	--	--	--	--	441.00
	10/18/16	--	--	--	84.60	<0.50	--	83.40	--	--	--	--	455.00
	10/25/17	--	--	--	83.10	1.23	--	77.30	--	--	--	--	512.00
	10/18/18	--	--	--	103.00	0.67	--	88.30	--	--	--	--	491.00
	6/20/19	--	--	--	86.50	--	--	--	--	--	--	--	554.00
	4/20/20	--	--	--	126.00	--	--	--	--	--	--	--	526.00
	6/25/21	--	--	--	96.30	--	--	--	--	--	--	--	510.00
	12/6/21	--	--	--	--	--	--	--	--	--	--	--	--
	8/23/22	--	--	--	124.00	--	--	--	--	--	--	--	560.00
	7/20/23	--	--	--	102	--	--	--	--	--	--	--	551
MW-3	2/27/98	--	--	190.00	**452.00**	--	--	406.00	200.00	50.00	11.00	237.00	**1,500.00**
	2/14/01	<1.00	158.00	158.00	34.00	**1.60**	2.40	100.00	54.50	19.00	7.61	48.60	440.00
	5/17/02	<1.00	158.00	158.00	30.60	1.56	2.35	102.00	55.60	18.40	5.04	50.00	433.00
	10/23/02	--	--	--	35.40	--	--	104.00	--	--	--	--	419.00
	5/22/03	<1.00	156.00	156.00	30.60	1.17	2.25	96.30	53.20	17.80	5.39	54.60	435.00
	11/25/03	<1.00	160.00	160.00	31.40	1.35	2.30	103.00	46.50	18.00	5.19	51.70	440.00
	5/12/04	<1.00	164.00	164.00	32.30	1.20	2.38	101.00	52.20	16.80	4.77	47.50	448.00
	11/16/04	<1.00	166.00	166.00	35.10	1.53	2.77	95.40	56.30	23.60	12.70	58.90	424.00
	11/17/05	<10.0	171.00	171.00	96.30	0.97	2.20	108 D1	89.20	22.10	8.87	93.40	840.00
	11/15/06	<10.00	170.00	170.00	30.00	0.92 N	1.70	96.00	51.30	17.30	4.30	57.20	505.00
	11/16/07	<10.00	170.00	170.00	39.70	0.93	1.58	88.2 D1	50.80	16.30	<5.00	50.60	570.00
	11/6/08	<5.00	150.00	150.00	36.00	1.10	1.40	97.00	50.00	17.00	4.00	48.00	430.00
	11/3/09	<10.00	160.00	160.00	35.00	1.10	1.60	110.00	49.00	17.00	4.20	56.00	410.00
	11/10/10	<10.00	164.00	164.00	35.40	0.84	1.77	99.90	48.80	15.20	3.42	45.10	380.00
	11/10/11	<5.00	165.00	165.00	36.40	0.83	1.35	87.90	57.90	18.00	3.79	53.00	404.00
	10/11/12	<5.00	162.00	162.00	36.60	1.01	1.74	100.00	51.20	16.90	4.11	51.00	438.00
	10/8/13	<6.00	194.00	194.00	38.40	1.02	1.17	98.70	56.50	18.30	4.08	54.90	450.00
	10/7/14	<4.00	187.00	187.00	19.50	0.37	1.39	62.80	44.30	9.82	22.40	38.80	332.00
	10/21/15	--	--	--	25.60	<2.00	--	74.80	--	--	--	--	307.00
	10/18/16	--	--	--	37.10	0.66	--	109.00	--	--	--	--	464.00
	10/24/17	--	--	--	35.90	1.50	--	98.70	--	--	--	--	442.00
	10/18/18	--	--	--	209.00	**5.35**	--	567.00	--	--	--	--	415.00
	6/20/19	--	--	--	40.00	--	--	--	--	--	--	--	448.00
	4/20/20	--	--	--	**68.5 F2 F1**	--	--	--	--	--	--	--	435.00
Duplicate	4/20/20	--	--	--	69.60	--	--	--	--	--	--	--	502.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	06/25/21	--	--	--	42.20	**--**	--	**--**	--	--	--	--	424.00
	12/06/21	--	--	--	**--**	**--**	--	**--**	--	--	--	--	**--**
	08/24/22	--	--	--	43.10	**--**	--	**--**	--	--	--	--	417.00
	7/21/23	--	--	--	41.7	--	--	--	--	--	--	--	430 B
MW-4	2/27/98	--	--	230.00	**12,000.00**	--	--	**1,300.00**	1,700.00	880.00	48.00	5,300.00	**22,000.00**
	4/9/98	--	--	240.00	**13,000.00**	--	--	**1,500.00**	1,740.00	840.00	42.00	5,400.00	**23,000.00**
	2/14/01	<1.00	232.00	232.00	**15,000.00**	**1.80**	6.80	**1,500.00**	--	--	--	--	**29,000.00**
	5/17/02	<1.00	232.00	232.00	**11,300.00**	**2.01**	6.09	**1,380.00**	1,610.00	814.00	60.90	4,310.00	**22,600.00**
	10/23/02	--	--	--	**11,300.00**	--	--	**1,320.00**	--	--	--	--	**23,200.00**
	5/22/03	<1.00	220.00	220.00	**11,300.00**	<10.00	**12.30**	**1,370.00**	1,450.00	659.00	47.30	4,140.00	**62,500.00**
	11/26/03	<1.00	218.00	218.00	**12,100.00**	<8.00	**12.30**	**1,400.00**	1,830.00	889.00	62.00	4,620.00	**54,450.00**
	5/11/04	<1.00	214.00	214.00	**14,200.00**	<8.00	8.97	**1,560.00**	1,800.00	829.00	60.70	4,850.00	**65,450.00**
	11/17/04	<1.00	222.00	222.00	**13,600.00**	<20.00	**31.50**	**1,410.00**	2,020.00	972.00	73.60	5,900.00	**25,200.00**
	11/17/05	<10.00	181.00	181.00	**9,440.00**	0.82	0.20	45.8 D1	849.00	387.00	28.10	3,880.00	**24,300.00**
	11/15/06	<10.00	260.00	260.00	**14,000.00**	<5.00 C	5.20	**1,400.00**	1,760.00	897.00	58.80	6,150.00	**28,700.00**
	11/14/07	<10.00	255.00	255.00	**14,800.00**	0.54	7.15 D1	1,410 D1	1,170.00	382.00	48.00	4,760 D1	**36,300.00**
	11/12/08	<5.00	200.00	200.00	**12,000.00**	1.20	0.33	**1,300.00**	1,500.00	840.00	82.00	4,800.00	**22,000.00**
	11/4/09	<5.00	250.00	250.00	**15,000.00**	1.10	5.30	**1,600.00**	1,500.00	1,000.00	65.00	5,800.00	**30,000.00**
	11/11/10	<5.00	294.00	294.00	**15,500.00**	<1.00	**10.20**	**1,270.00**	1,380.00	904.00	40.40	5,450.00	**25,500.00**
	11/10/11	<5.00	277.00	277.00	**16,900.00**	0.11	6.16	**1,060.00**	1,680.00	1,110.00	40.00	6,490.00	**28,900.00**
	10/11/12	<5.00	256.00	256.00	**5,850.00**	**2.10**	4.58	**629.00**	434.00	334.00	21.20	2,620.00	**12,000.00**
	10/8/13	<6.00	294.00	294.00	**16,200.00**	0.72	6.79	**1,460.00**	1,690.00	1,180.00	40.80	7,370.00	**36,300.00**
	10/7/14	<4.00	291.00	291.00	**15,000.00**	<100.00	7.15	**1,740.00**	1,350.00	1,060.00	44.10	4,250.00	**32,400.00**
	10/20/15	--	--	--	**3,200.00**	<40.00	--	402.00	--	--	--	--	**7,070.00**
	10/18/16	--	--	--	**17,900.00**	<1.00	--	**1,890.00**	--	--	--	--	**35,300.00**
	10/25/17	--	--	--	**6,830.00**	<5.00	--	**754.00**	--	--	--	--	**12,300.00**
	10/18/18	--	--	--	**14,800.00**	<0.10	--	**1,510.00**	--	--	--	--	**24,700.00**
	04/20/20	--	--	--	**14,600.00**	--	--	--	--	--	--	--	**28,900.00**
	10/12/20	--	--	--	**14,200.00**	--	--	--	--	--	--	--	**25,600.00**
	6/25/21	--	--	--	**13,600.00**	--	--	--	--	--	--	--	**28,400.00**
	12/06/21	--	--	--	**8,700.00**	--	--	--	--	--	--	--	**24,000.00**
	8/23/22	--	--	--	73.6	--	--	--	--	--	--	--	465.00
	12/21/22	--	--	--	***13,600***	--	--	--	--	--	--	--	***16,400***
	7/21/23	--	--	--	***13,300***	--	--	--	--	--	--	--	***19,800***
MW-4A	2/27/98	--	--	180.00	**1,600.00**	--	--	410.00	470.00	130.00	11.00	620.00	**3,300.00**
	2/14/01	<1.00	154.00	154.00	**1,600.00**	1.40	2.80	210.00	--	--	--	--	**4,000.00**
	5/15/02	<1.00	156.00	156.00	**577.00**	<1.00	2.23	121.00	200.00	49.50	10.30	125.00	**1,610.00**
	10/23/02	--	--	--	**478.00**	--	--	114.00	--	--	--	--	**1,430.00**
	5/22/03	<1.00	154.00	154.00	**844.00**	<1.00	2.43	160.00	279.00	58.90	10.10	248.00	**2,200.00**
	11/26/03	<1.00	158.00	158.00	**1,060.00**	<4.00	5.82	182.00	337.00	79.30	15.20	329.00	**2,585.00**
	5/11/04	<1.00	156.00	156.00	**984.00**	<2.00	3.30	179.00	297.00	66.50	11.50	279.00	**2,300.00**
	11/17/04	<1.00	164.00	164.00	**1,110.00**	<2.00	4.62	186.00	369.00	75.40	14.90	413.00	**2,235.00**
	11/16/05	<10.0	181.00	181.00	**827 D1**	<0.50	2.20	160 D1	335.00	64.40	9.23	382.00	**2,340 N**
	11/15/06	<10.00	620.00	620.00	**960.00**	<0.50	2.60	170.00	227.00	53.50	8.10	406.00	**2,870.00**
	11/14/07	<10.00	311.00	311.00	**845 D1**	0.35	3.60 D1	167 D1	205.00	44.90	7.33	334.00	**2,650.00**
	11/12/08	<5.00	640.00	640.00	**650.00**	0.32	2.20	170.00	160.00	37.00	9.90	290.00	**1,700.00**
	11/4/09	<5.00	670.00	670.00	**670.00**	0.56	2.60	150.00	110.00	27.00	7.40	300.00	**1,600.00**
	11/11/10	<5.00	217.00	217.00	**663.00**	0.51	2.58	125.00	65.90	15.60	4.42	317.00	**1,760.00**
	11/10/11	<5.00	171.00	171.00	**621.00**	0.78	2.02	134.00	78.80	18.70	4.71	389.00	**1,400.00**
	10/11/12	<5.00	169.00	169.00	**516.00**	1.12	2.60	100.00	48.70	11.30	4.45	359.00	**1,200.00**
	10/8/13	<6.00	199.00	199.00	**512.00**	**2.63**	2.47	100.00	47.70	9.93	3.64	410.00	**1,170.00**
	10/7/14	<4.00	186.00	186.00	**387.00**	**1.69**	2.54	102.00	37.10	7.78	3.17	276.00	962.00
	10/20/15	--	--	--	**328.00**	<4.00	--	83.30	--	--	--	--	819.00
	10/18/16	--	--	--	**440.00**	1.49	--	97.60	--	--	--	--	**1,150.00**
	10/25/17	--	--	--	**341.00**	**2.83**	--	93.40	--	--	--	--	960.00
	10/18/18	--	--	--	**366.00**	1.29	--	99.60	--	--	--	--	901.00
	6/20/19	--	--	--	**336.00**	--	--	--	--	--	--	--	**1,040.00**
	4/20/20	--	--	--	**311 F1**	--	--	--	--	--	--	--	808.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	6/25/21	--	--	--	**409.00**	--	--	--	--	--	--	--	**1,030.00**
	12/6/21	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	8/23/22	--	--	--	**424.00**	--	--	--	--	--	--	--	988.00
	7/20/23	--	--	--	**424**	--	--	101	--	--	--	--	**1,260**
MW-5	2/26/98	--	--	180.00	**6,600.00**	--	--	**910.00**	1,400.00	470.00	31.00	2,400.00	**12,000.00**
	2/14/01	<1.00	166.00	166.00	**7,700.00**	**1.80**	4.10	**910.00**	--	--	--	--	**18,000.00**
	5/17/02	<1.00	156.00	156.00	**4,040.00**	1.53	4.56	586.00	757.00	319.00	60.90	1,260.00	**8,340.00**
	10/23/02	--	--	--	**3,900.00**	--	--	94.80	--	--	--	--	422.00
	5/22/03	<1.00	158.00	158.00	**3,170.00**	<4.00	6.52	550.00	644.00	215.00	49.90	1,240.00	**7,860.00**
	11/25/03	<1.00	168.00	168.00	**5,120.00**	<4.00	6.77	**739.00**	978.00	365.00	54.90	1,680.00	**11,940.00**
	5/11/04	<1.00	160.00	160.00	**6,760.00**	<3.00	4.65	**1,030.00**	1,180.00	417.00	40.30	2,120.00	**20,380.00**
	11/17/04	<1.00	172.00	172.00	**6,750.00**	<10.00	**16.60**	**786.00**	1,210.00	486.00	40.60	2,300.00	**11,980.00**
	11/17/05	<10.00	161.00	161.00	**2,140 D1**	0.79	0.16	334 D1	339.00	126.00	10.80	791.00	**7,120 N**
	11/14/06	<10.00	160.00	160.00	**2,000.00**	0.60	1.50	300.00	437.00	173.00	14.20	918.00	**4,420.00**
	11/14/07	<10.00	161.00	161.00	**5,790 D1**	0.37	4.01 D1	668 D1	812.00	240.00	23.30	1,850 D1	**16,300.00**
	11/6/08	<5.00	160.00	160.00	**4,900.00**	0.78	0.32	540.00	660.00	310.00	35.00	1,600.00	**9,700.00**
	11/3/09	<10.00	160.00	160.00	**5,100.00**	0.51	2.30	**710.00**	860.00	320.00	<13.00	1,800.00	**11,000.00**
	11/11/10	<5.00	176.00	176.00	**4,200.00**	0.16	2.37	554.00	687.00	250.00	17.30	1,400.00	**8,890.00**
	11/10/11	<5.00	172.00	172.00	**4,340.00**	0.24	0.55	411.00	944.00	326.00	19.70	1,780.00	**7,840.00**
	10/11/12	<5.00	164.00	164.00	**3,630.00**	0.38	2.26	474.00	671.00	239.00	17.00	1,360.00	**8,300.00**
	10/8/13	<6.00	176.00	176.00	**3,730.00**	0.37	1.56	425.00	659.00	253.00	15.40	1,440.00	**8,060.00**
	10/7/14	<4.00	172.00	172.00	**2,830.00**	<0.10	2.19	398.00	521.00	195.00	15.10	979.00	**5,280.00**
	10/21/15	--	--	--	**2,480.00**	<40.00	--	362.00	--	--	--	--	**5,510.00**
	10/18/16	--	--	--	**2,260.00**	<0.50	--	326.00	--	--	--	--	**5,380.00**
	10/25/17	--	--	--	**2,090.00**	<5.00	--	318.00	--	--	--	--	**3,780.00**
Dup	10/25/17	--	--	--	**2,010.00**	<5.00	--	300.00	--	--	--	--	**3,240.00**
	10/18/18	--	--	--	**1,890.00**	<0.10	--	323.00	--	--	--	--	**3,420.00**
	6/20/19	--	--	--	**1,700.00**	--	--	--	--	--	--	--	**4,280.00**
	4/20/20	--	--	--	**1,870.00**	--	--	--	--	--	--	--	**4,150.00**
	10/12/20	--	--	--	**1,460.00**	--	--	--	--	--	--	--	**2,960.00**
	6/25/21	--	--	--	**1,330.00**	--	--	--	--	--	--	--	**2,590.00**
	12/6/21	--	--	--	**1,190.00**	--	--	--	--	--	--	--	**2,630.00**
	8/23/22	--	--	--	101	--	--	--	--	--	--	--	493
	12/21/22	--	--	--	**1150**	--	--	--	--	--	--	--	**2,230**
	7/20/23	--	--	--	**1,050**	--	--	--	--	--	--	--	**2,440**
MW-5A	2/26/98	--	--	170.00	190.00	--	--	180.00	107.00	23.00	3.50	117.00	740.00
	2/15/01	<1.00	164.00	164.00	140.00	1.20	2.10	130.00	90.20	27.90	8.70	74.60	670.00
	5/15/02	<1.00	182.00	182.00	53.50	<1.00	2.23	84.40	63.20	16.10	4.69	43.60	475.00
	10/23/02	--	--	--	50.00	--	--	**616.00**	--	--	--	--	**8,670.00**
	5/22/03	<1.00	158.00	158.00	32.50	<1.00	2.10	69.90	55.50	13.80	3.41	41.50	416.00
	11/25/03	<1.00	332.00	332.00	34.10	1.05	2.20	75.50	60.90	14.60	4.08	45.00	422.00
	5/11/04	<1.00	164.00	164.00	38.80	<1.00	2.25	75.80	60.90	15.00	3.40	43.20	484.00
	11/17/04	<1.00	152.00	152.00	39.60	1.37	2.66	74.30	58.10	13.60	3.83	48.50	430.00
	11/16/05	<10.00	191.00	191.00	40.20	0.82	2.10	75.2 D1	176.00	17.80	4.22	45.30	570 N
	11/14/06	<10.00	240.00	240.00	47.00	0.64	1.50	79.00	90.40	16.10	3.58	51.40	588.00
	11/14/07	<10.00	227.00	227.00	54.40	0.66	1.45	68.7 D1	73.70	14.00	<5.00	44.20	528.00
	11/6/08	<5.00	350.00	350.00	53.00	0.70	1.30	72.00	76.00	15.00	3.40	43.00	450.00
	11/3/09	<10.00	710.00	710.00	47.00	0.72	1.50	79.00	65.00	14.00	3.30	50.00	440.00
	11/11/10	<5.00	182.00	182.00	49.60	0.57	1.61	73.60	55.70	12.90	2.79	42.00	606.00
	11/10/11	<5.00	170.00	170.00	131.00	0.49	1.15	116.00	83.80	29.90	5.16	85.70	594.00
	10/11/12	<5.00	163.00	163.00	68.00	0.63	1.57	69.80	60.60	15.30	3.96	49.20	534.00
	10/8/13	<6.00	182.00	182.00	80.20	0.57	1.60	67.50	69.30	16.20	3.29	53.40	462.00
	10/7/14	<4.00	168.00	168.00	73.60	0.29	1.56	64.90	66.20	15.70	2.76	45.20	432.00
	10/21/15	--	--	--	84.90	<4.00	--	65.60	--	--	--	--	499.00
	10/18/16	--	--	--	101.00	<0.50	--	65.40	--	--	--	--	466.00
	10/25/17	--	--	--	99.60	1.14	--	59.30	--	--	--	--	537.00
	10/18/18	--	--	--	132.00	0.79	--	67.50	--	--	--	--	477.00
	6/20/19	--	--	--	118.00	--	--	--	--	--	--	--	650.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	4/20/20	--	--	--	120.00	--	--	--	--	--	--	--	571.00
	6/25/21	--	--	--	140.00	--	--	--	--	--	--	--	529.00
	12/6/21	--	--	--	**--**	**--**	--	**--**	--	--	--	--	**--**
	8/23/22	--	--	--	**15,000**	**--**	--	**--**	--	--	--	--	**18,500**
	7/20/23	--	--	--	146	--	--	--	--	--	--	--	552
MW-6	2/26/98	--	--	200.00	**260.00**	--	--	400.00	180.00	44.00	6.20	205.00	**1,200.00**
	2/14/01	<1.00	158.00	158.00	59.00	**1.70**	2.20	99.00	67.50	22.10	7.67	52.30	470.00
	5/17/02	<1.00	162.00	162.00	37.80	**1.62**	2.14	99.30	63.10	19.60	5.12	48.60	427.00
	10/23/02	--	--	--	46.10	--	--	109.00	--	--	--	--	331.00
	5/22/03	<1.00	162.00	162.00	40.30	1.24	2.13	94.40	61.70	17.40	4.23	51.90	464.00
	11/25/03	<1.00	154.00	154.00	53.60	1.40	2.18	98.00	53.60	18.70	4.97	51.70	482.00
	5/11/04	<1.00	156.00	156.00	54.40	1.23	2.19	97.00	59.00	18.10	4.22	47.80	506.00
	11/16/04	<1.00	162.00	162.00	57.90	**1.64**	2.68	99.80	66.60	19.60	5.16	57.00	464.00
	11/17/05	<10.00	201.00	201.00	101.00	0.97	0.35	97.8 D1	103.00	20.20	4.10	59.10	730.00
	11/15/06	<10.00	750.00	750.00	68.00	0.99	1.50	93.00	64.60	20.40	4.23	57.10	507.00
	11/15/07	<10.00	284.00	284.00	162.00	**51.00**	1.35	96.3 D1	84.10	25.20	<5.00	62.10	630.00
	11/6/08	<5.00	220.00	220.00	84.00	1.20	1.20	95.00	67.00	21.00	4.30	53.00	490.00
	11/3/09	<10.00	190.00	190.00	81.00	1.20	1.40	100.00	66.00	20.00	4.50	59.00	550.00
	11/8/10	NS - Well Damaged											
	11/10/11	NS - Well Damaged											
	10/11/12	NS - Well Damaged											
	9/30/13	Well Plugged and Abandoned											
MW-6R	10/8/13	<6.00	225.00	225.00	110.00	**1.91**	<0.10	102.00	69.90	24.40	5.17	85.60	600.00
	10/7/14	<4.00	182.00	182.00	39.70	0.55	0.68	93.00	59.20	18.20	3.10	48.20	402.00
	10/21/15	--	--	--	40.70	<2.00	--	98.60	--	--	--	--	390.00
	10/18/16	--	--	--	42.30	0.63	--	105 J	--	--	--	--	442.00
	10/25/17	--	--	--	49.30	1.46	--	93.80	--	--	--	--	465.00
	10/18/18	--	--	--	69.10	1.05	--	107.00	--	--	--	--	442.00
	6/20/19	--	--	--	59.10	--	--	--	--	--	--	--	482.00
Dup	6/20/19	--	--	--	64.40	--	--	--	--	--	--	--	592.00
	11/23/19	--	--	--	69.40	--	--	95.20	--	--	--	--	384.00
	4/20/20	--	--	--	77.40	--	--	--	--	--	--	--	506.00
	6/25/21	--	--	--	71.70	--	--	--	--	--	--	--	487.00
	12/6/21	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	8/23/22	--	--	--	145	--	--	--	--	--	--	--	514
	7/20/23	--	--	--	71.5	--	--	--	--	--	--	--	479
MW-7	5/14/98	--	--	230.00	**430.00**	--	--	340.00	214.00	66.00	13.00	165.00	**1,200.00**
	2/14/01	<1.00	150.00	150.00	**510.00**	**1.70**	2.40	150.00	--	--	--	--	**1,500.00**
	5/16/02	<1.00	150.00	150.00	75.70	1.59	2.27	97.40	68.60	23.20	6.63	54.30	501.00
	10/22/02	--	--	--	88.60	--	--	109.00	--	--	--	--	490.00
	5/22/03	<1.00	140.00	140.00	173.00	1.17	2.14	88.90	85.50	28.20	6.18	64.60	631.00
	11/26/03	<1.00	136.00	136.00	189.00	1.29	2.23	93.50	95.70	31.00	7.91	63.60	704.00
	5/13/04	<1.00	130.00	130.00	**267.00**	1.11	2.18	94.70	107.00	34.70	6.59	62.90	914.00
	11/16/04	<1.00	130.00	130.00	**367.00**	1.49	2.72	97.30	142.00	49.30	8.61	87.90	870.00
	11/17/05	<10.0	121.00	121.00	**456 D1**	0.53	0.28	106 D1	412.00	64.70	12.10	100.00	**1,440.00**
	11/15/06	<10.00	240.00	240.00	**550.00**	0.63	1.50	110.00	202.00	70.30	7.40	102.00	**2,100.00**
	11/15/07	<10.00	189.00	189.00	**458 D1**	1.20	1.39	176 D1	144.00	59.50	9.95	148.00	**1,880.00**
	11/12/08	<5.00	110.00	110.00	**650.00**	0.84	1.20	140.00	210.00	76.00	12.00	120.00	**1,600.00**
	11/4/09	<5.00	110.00	110.00	**1,100.00**	0.63	1.50	160.00	310.00	120.00	11.00	130.00	**2,800.00**
	11/10/10	<5.00	111.00	111.00	**1,310.00**	0.37	1.64	173.00	415.00	149.00	10.00	150.00	**3,130.00**
	11/10/11	<5.00	106.00	109.00	**1,710.00**	0.30	1.45	147.00	662.00	203.00	12.30	198.00	**3,660.00**
	10/11/12	<5.00	108.00	108.00	**2,020.00**	0.44	1.71	261.00	619.00	215.00	12.30	208.00	**5,580.00**
	10/8/13	<6.00	142.00	142.00	**2,840.00**	0.45	2.11	331.00	916.00	258.00	13.30	265.00	**7,530.00**
	10/7/14	<4.00	116.00	116.00	**2,190.00**	<0.10	2.03	317.00	682.00	238.00	12.20	227.00	**7,920.00**
	10/20/15	--	--	--	**1,420.00**	<20.00	--	231.00	--	--	--	--	**3,130.00**
	10/18/16	--	--	--	**2,920.00**	<0.50	--	385.00	--	--	--	--	**7,160.00**
	10/24/17	--	--	--	**1,670.00**	<2.00	--	249.00	--	--	--	--	**2,660.00**
	10/18/18	--	--	--	**4,000.00**	<0.10	--	482.00	--	--	--	--	**6,450.00**

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	6/20/19	--	--	--	**4,210.00**	--	--	--	--	--	--	--	**15,500.00**
	4/20/20	--	--	--	**4,570.00**	--	--	--	--	--	--	--	**14,100.00**
	10/12/20	--	--	--	**4,560.00**	--	--	--	--	--	--	--	**8,090.00**
	6/25/21	--	--	--	**4,140.00**	--	--	--	--	--	--	--	298.00
	12/7/21	--	--	--	**3,780.00**	--	--	--	--	--	--	--	**8,540.00**
	8/23/22	--	--	--	**5,170**	--	--	--	--	--	--	--	**10,800**
	12/21/22	--	--	--	**5,280**	--	--	--	--	--	--	--	**11,700**
	7/20/23	--	--	--	**5,150**	--	--	--	--	--	--	--	**14,500**
MW-8	5/13/98	--	--	200.00	**270.00**	--	--	390.00	190.00	60.00	12.00	170.00	**1,200.00**
	2/14/01	<1.00	156.00	156.00	49.00	**1.80**	2.50	100.00	59.90	21.50	7.84	52.90	400.00
	5/16/02	<1.00	158.00	158.00	32.90	1.57	2.33	101.00	56.60	19.20	5.20	49.50	432.00
	10/22/02	--	--	--	40.80	--	--	104.00	--	--	--	--	392.00
	5/22/03	8.00	160.00	168.00	33.20	1.40	2.32	98.30	53.90	18.30	9.31	46.40	410.00
	11/26/03	<1.00	142.00	142.00	31.70	1.59	2.38	95.60	55.30	18.20	5.31	50.20	443.00
	5/12/04	<1.00	154.00	154.00	36.30	1.39	2.38	101.00	53.00	17.30	4.56	48.10	435.00
	11/16/04	<1.00	170.00	170.00	39.80	**1.94**	2.94	103.00	57.80	18.60	5.63	56.40	435.00
	5/17/05	4.00	152.00	156.00	41.00	**1.64**	2.94	105.00	61.00	18.60	5.78	47.30	434.00
	11/17/05	<10.00	171.00	171.00	113.00	1.10	<0.05	115 D1	83.40	21.70	5.74	102.00	750.00
	5/9/06	<10.00	160.00	160.00	210.00	0.89	1.40	200.00	72.70	33.30	7.12	125.00	896.00
	11/14/06	<10.00	150.00	150.00	230.00	1.10	1.20	200.00	74.20	38.30	9.61	162.00	912.00
	5/30/07	<10.00	141.00	141.00	62.00	1.20	1.74	120.00	54.10	19.10	<5.00	59.30	500.00
	11/15/07	<10.00	159.00	159.00	43.10	1.33	1.56	94.2 D1	52.10	17.20	<5.000	49.80	540.00
	5/15/08	<1.53	151.00	151.00	40.70	1.40	1.78	99.6 D1	51.70	16.80	4.10	54.8 D1	427.00
	11/12/08	<5.00	140.00	140.00	39.00	1.40	1.50	97.00	52.00	17.00	<2.6	46.00	350.00
	5/20/09	<5.00	140.00	140.00	39.00	1.30	1.60	110.00	50.00	17.00	4.30	49.00	430.00
	11/4/09	<5.00	150.00	150.00	41.00	1.40	1.70	110.00	46.00	16.00	3.30	47.00	450.00
	5/7/10	<5.00	<5.00	172.00	34.90	1.09	1.70	97.80	49.50	15.70	3.52	45.50	426.00
Dup	5/7/10	<5.00	<5.00	157.00	34.90	1.09	1.71	98.00	51.00	14.50	3.21	43.60	466.00
	11/12/10	<5.00	172.00	172.00	38.70	1.10	1.77	98.20	48.90	15.70	3.40	45.40	410.00
Dup	11/12/10	<5.00	160.00	160.00	38.70	1.10	1.76	98.30	50.50	15.30	3.44	44.80	398.00
	5/11/11	<5.00	170.00	170.00	185.00	1.20	1.60	93.00	73.00	28.40	5.68	165.00	692.00
	11/10/11	<5.00	161.00	161.00	36.90	1.06	1.41	87.40	57.10	17.00	3.46	48.60	406.00
	5/17/12	<5.00	173.00	173.00	37.90	1.09	1.59	92.90	53.30	16.40	3.83	56.70	440.00
	10/11/12	<5.00	158.00	158.00	39.90	1.29	1.83	103.00	49.00	16.60	4.30	49.00	444.00
	5/17/13	<5.00	167.00	167.00	38.30	1.37	1.70	106.00	55.30	17.50	3.67	45.90	416.00
	10/8/13	<6.00	182.00	182.00	39.50	1.17	1.78	96.20	57.40	19.70	4.35	57.60	446.00
	5/1/14	<10.00	165.00	165.00	40.60	1.12 J	1.81	106.00	55.10	19.90	3.82	52.90	436.00
	10/7/14	<4.00	176.00	176.00	8.14	0.16	1.07	30.50	40.00	4.98	7.81	35.10	259.00
	5/22/15	--	--	--	10.00	<2.00	--	30.10	--	--	--	--	252.00
	10/20/15	--	--	--	8.03	<2.00	--	32.50	--	--	--	--	146.00
	5/25/16	--	--	--	30.00	0.85	--	88.70	--	--	--	--	434.00
	10/18/16	--	--	--	4.28	<0.50	--	32.80	--	--	--	--	261.00
	05/11/17	--	--	--	9.10	<0.02	--	32.20	--	--	--	--	214.00
Dup	05/11/17	--	--	--	8.62	<0.02	--	32.20	--	--	--	--	182.00
	10/24/17	--	--	--	3.69	0.23	--	18.30	--	--	--	--	286.00
	05/22/18	--	--	--	5.22	0.32	--	21.90	--	--	--	--	282.00
	10/18/18	--	--	--	5.41	0.61	--	19.10	--	--	--	--	258.00
	6/20/19	--	--	--	NS	--	--	--	--	--	--	--	NS
	4/20/20	--	--	--	49.00	--	--	--	--	--	--	--	305.00
	6/25/21	--	--	--	28.90	--	--	--	--	--	--	--	391.00
	12/6/21	--	--	--	--	--	--	--	--	--	--	--	--
	8/24/22	--	--	--	32.0	--	--	--	--	--	--	--	371
	7/20/23	--	--	--	36.9	--	--	--	--	--	--	--	432
MW-9	5/14/98	--	--	190.00	**350.00**	--	--	470.00	207.00	61.00	12.00	200.00	**1,300.00**
	2/15/01	<1.00	156.00	156.00	35.00	**2.60**	2.40	110.00	60.40	19.80	7.47	47.00	430.00
	5/16/02	<1.00	160.00	160.00	31.70	**2.22**	2.28	99.40	60.80	17.60	5.32	50.10	440.00
	10/23/02	--	--	--	39.00	--	--	102.00	--	--	--	--	436.00
	5/22/03	<1.00	160.00	160.00	31.00	**1.75**	2.19	93.30	52.20	15.80	4.75	50.20	455.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	11/26/03	<1.00	150.00	150.00	31.80	**1.99**	2.34	99.80	57.70	16.60	4.69	46.30	452.00
	5/12/04	<1.00	164.00	164.00	33.60	**1.79**	2.29	99.20	54.80	16.00	4.27	43.50	467.00
	11/16/04	8.00	154.00	162.00	**367.00**	1.49	2.72	97.30	63.20	17.80	5.59	55.50	433.00
	5/17/05	4.00	154.00	154.00	44.20	**2.43**	3.05	117.00	58.80	16.70	5.94	44.10	434.00
	11/17/05	<10.00	161.00	161.00	83.50	1.30	0.14	111 D1	149.00	26.20	7.43	80.40	790 N
	5/9/06	<10.00	170.00	170.00	37.00	**1.80**	1.80	99.00	52.70	15.00	3.21	45.50	428.00
	11/15/06	<10.00	150.00	150.00	210.00	1.10	1.20	190.00	70.50	35.80	8.64	152.00	905.00
	5/30/07	<10.00	153.00	153.00	35.00	**2.10**	1.69	110.00	52.20	15.80	<5.00	44.70	464.00
	11/14/07	<10.00	151.00	151.00	186.00	1.49	1.48	156 D1	74.10	39.40	8.73	141.00	808.00
	5/15/08	<1.53	174.00	174.00	42.50	**2.38**	1.72	105 D1	55.60	17.00	3.99	54.1 D1	467.00
	11/4/08	<5.00	160.00	160.00	39.00	**2.10**	1.40	98.00	54.00	16.00	3.70	47.00	440.00
	5/20/09	<5.00	320.00	320.00	69.00	**2.10**	1.50	120.00	58.00	19.00	4.60	58.00	520.00
	11/4/09	<5.00	160.00	160.00	42.00	**2.20**	1.60	110.00	50.00	15.00	3.00	43.00	460.00
	5/7/10	<5.00	<5.00	162.00	50.20	**2.02**	1.66	97.50	53.60	15.70	3.32	43.50	442.00
	11/9/10	<5.00	186.00	186.00	60.70	**1.97**	1.74	98.00	59.20	18.10	3.64	50.00	446.00
	5/11/11	<5.00	160.00	160.00	80.30	**1.71**	1.72	75.70	73.90	25.80	4.61	67.90	518.00
	11/10/11	<5.00	151.00	151.00	138.00	**1.66**	1.38	107.00	82.70	26.90	4.34	65.40	582.00
	5/16/12	<5.00	162.00	162.00	137.00	**1.75**	1.61	93.50	83.80	23.20	4.39	60.30	584.00
	10/11/12	<5.00	147.00	147.00	148.00	**1.90**	1.71	98.70	80.50	25.80	4.94	59.80	644.00
	5/17/13	<5.00	144.00	144.00	246.00	**1.86**	1.61	99.30	107.00	30.20	4.43	60.20	**1,010.00**
	10/8/13	<6.00	164.00	164.00	150.00	**1.88**	1.81	99.80	90.00	25.20	4.62	60.80	620.00
	5/2/14	<10.00	143.00	143.00	**382.00**	1.56	1.77	103.00	132.00	35.70	5.74	73.70	906.00
	10/7/14	<4.00	151.00	151.00	**292.00**	0.89	1.33	98.10	136.00	41.00	4.65	67.40	**1,110.00**
	5/22/15	--	--	--	**307.00**	<8.00	--	87.70	--	--	--	--	**1,170.00**
	10/20/15	--	--	--	202.00	<4.00	--	93.70	--	--	--	--	593.00
	5/25/16	--	--	--	**404.00**	**1.61**	--	108.00	--	--	--	--	**1,430.00**
Dup	5/26/16	--	--	--	**418.00**	1.60	--	111.00	--	--	--	--	**1,430.00**
	10/18/16	--	--	--	**445.00**	1.34	--	115.00	--	--	--	--	**1,490.00**
	05/11/17	--	--	--	**481.00**	<0.22	--	118.00	--	--	--	--	**1,090.00**
	10/24/17	--	--	--	**387.00**	**2.42**	--	102.00	--	--	--	--	**1,020.00**
	05/22/18	--	--	--	**460.00**	1.28	--	119.00	--	--	--	--	**1,010.00**
	10/18/18	--	--	--	**381.00**	1.41	--	117.00	--	--	--	--	903.00
	6/20/19	--	--	--	**621.00**	--	--	--	--	--	--	--	**2,930.00**
	11/24/19	--	--	--	**337.00**	--	--	80.60	--	--	--	--	**1,170.00**
	4/20/20	--	--	--	**1,070.00**	--	--	--	--	--	--	--	**3,090.00**
	10/12/20	--	--	--	**945.00**	--	--	--	--	--	--	--	**1,860.00**
		--	--	--	**340.00**	--	--	--	--	--	--	--	**1,173.00**
	06/25/21	--	--	--	**952.00**	--	--	--	--	--	--	--	**1,970.00**
	12/07/21	--	--	--	**856.00**	--	--	--	--	--	--	--	**1,960.00**
	08/24/22	--	--	--	**1,040**	--	--	--	--	--	--	--	**2,320**
	12/21/22	--	--	--	**1,040**	--	--	--	--	--	--	--	**2,530**
	7/21/23	--	--	--	**1,050**	--	--	--	--	--	--	--	**2,620**
MW-9A	5/14/98	--	--	280.00	**600.00**	--	--	**770.00**	338.00	96.00	12.00	334.00	**2,200.00**
	2/15/01	<1.00	142.00	142.00	85.00	1.40	2.20	71.00	71.60	19.20	6.94	46.00	400.00
	5/15/02	<1.00	136.00	136.00	148.00	<1.00	2.18	65.30	62.90	16.10	4.62	46.80	445.00
	10/23/02	--	--	--	168.00	--	--	75.50	--	--	--	--	651.00
	5/22/03	<1.00	126.00	126.00	207.00	<1.00	2.09	62.10	102.00	25.20	4.80	55.70	672.00
	11/26/03	<1.00	118.00	118.00	216.00	1.14	2.26	62.70	107.00	25.10	5.31	53.20	648.00
	5/12/04	<1.00	122.00	122.00	242.00	<1.00	2.10	64.70	105.00	26.20	5.11	26.20	950.00
	11/16/04	<1.00	114.00	114.00	**296.00**	1.24	2.74	67.50	130.00	33.10	6.24	70.30	826.00
	5/17/05	<1.00	112.00	112.00	**354.00**	1.04	2.85	77.10	131.00	31.70	6.39	60.50	828.00
	11/17/05	<10.00	121.00	121.00	**310 D1**	0.82	0.31	74.7 D1	337.00	41.40	8.08	74.50	**1,520 N**
	5/9/06	<10.00	670.00	670.00	**270.00**	0.67	1.60	78.00	111.00	27.10	3.88	58.70	992.00
	11/15/06	<10.00	1,600.00	1,600.00	**290.00**	0.62	1.60	72.00	126.00	33.40	4.74	68.40	**1,280.00**
	5/30/07	<10.00	586.00	586.00	**400.00**	0.70	1.69	83.00	153.00	36.90	<5.00	71.80	**1,450.00**
	11/14/07	<10.00	605.00	605.00	**285 D1**	0.62	1.52	64.7 D1	153.00	35.40	5.03	70.70	**1,430.00**
	5/15/08	<1.53	738.00	738.00	**380 D1**	0.45	1.62	86.8 D1	146.00	35.50	5.45	77.2 D1	**1,390.00**
	11/4/08	<5.00	370.00	370.00	**330.00**	<1.00	1.20	84.00	130.00	32.00	5.10	66.00	1,000.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	5/20/09	<5.00	600.00	600.00	**480.00**	0.49	1.50	86.00	170.00	43.00	6.40	76.00	**1,600.00**
	11/4/09	<5.00	110.00	110.00	**430.00**	0.49	1.60	82.00	160.00	41.00	5.30	71.00	**1,500.00**
	5/7/10	<5.00	<5.00	121.00	**510.00**	0.21	1.62	80.50	188.00	44.90	4.90	73.60	**1,680.00**
	11/9/10	<5.00	115.00	115.00	**529.00**	0.33	1.72	86.00	159.00	44.30	5.00	76.10	**1,660.00**
	5/11/11	<5.00	146.00	146.00	**587.00**	1.18	1.90	415.00	166.00	80.60	11.30	211.00	**1,850.00**
	11/10/11	<5.00	115.00	115.00	**841.00**	0.19	1.56	125.00	280.00	84.80	7.51	117.00	**2,160.00**
	5/16/12	<5.00	135.00	135.00	**958.00**	0.37	1.74	143.00	249.00	62.60	6.50	97.70	**3,450.00**
Dup	5/16/12	<5.00	128.00	128.00	**882.00**	0.31	1.70	134.00	270.00	65.70	6.72	92.30	**3,050.00**
	10/11/12	<5.00	125.00	125.00	**628.00**	0.37	1.70	121.00	235.00	60.40	6.72	94.00	**1,810.00**
	5/17/13	<5.00	137.00	137.00	**754.00**	0.34	1.67	145.00	224.00	53.90	5.49	86.80	**1,930.00**
	10/8/13	<6.00	153.00	153.00	**534.00**	0.37	1.69	118.00	185.00	43.10	5.23	81.30	**1,210.00**
	10/7/14	Not Sampled											
	10/20/2015	--	--	--	232.00	<4.00	--	95.40	--	--	--	--	599.00
	10/18/16	--	--	--	**337.00**	<0.50	--	113.00	--	--	--	--	**1,250.00**
	10/24/17	--	--	--	206.00	<0.50	--	96.60	--	--	--	--	681.00
	10/18/18	--	--	--	**276.00**	0.60	--	119.00	--	--	--	--	816.00
	06/20/19	--	--	--	**268.00**	--	--	--	--	--	--	--	**1,220.00**
	04/20/20	--	--	--	**352.00**	--	--	--	--	--	--	--	940.00
	06/25/21	--	--	--	**307.00**	--	--	--	--	--	--	--	857.00
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--
	08/24/22	--	--	--	**239**	--	--	--	--	--	--	--	773
	7/21/23	--	--	--	**260**	--	--	--	--	--	--	--	753 B
MW-10	5/14/98	--	--	240.00	**360.00**	--	--	450.00	211.00	62.00	11.00	190.00	**1,400.00**
	2/15/01	<1.00	140.00	140.00	190.00	**2.00**	2.30	97.00	108.00	32.30	8.20	61.00	660.00
	5/17/02	<1.00	152.00	152.00	204.00	**1.93**	2.19	99.10	109.00	31.70	7.60	62.40	713.00
	10/22/02	--	--	--	213.00	--	--	108.00	--	--	--	--	758.00
	5/22/03	<1.00	152.00	152.00	213.00	1.45	2.17	96.60	109.00	29.90	8.65	74.20	764.00
	11/26/03	<1.00	152.00	152.00	220.00	1.54	2.26	103.00	120.00	35.70	6.96	64.00	752.00
	5/13/04	<1.00	158.00	158.00	232.00	1.39	2.23	102.00	114.00	31.60	5.95	57.20	802.00
	11/17/04	<1.00	170.00	170.00	245.00	**1.73**	2.78	104.00	121.00	35.70	7.07	70.30	764.00
	5/17/05	<1.00	150.00	150.00	233.00	**1.77**	2.80	106.00	113.00	32.30	6.83	60.20	776.00
	11/17/05	<10.00	151.00	151.00	205 D1	1.20	0.26	111 D1	482.00	47.40	13.10	82.40	970 N
	5/9/06	<10.00	190.00	190.00	180.00	1.40	1.60	98.00	93.30	27.10	4.31	60.40	724.00
	11/16/06	<10.00	320.00	320.00	190.00	1.20	1.60	92.00	101.00	30.00	4.75	64.10	900.00
	5/30/07	<10.00	340.00	340.00	200.00	1.40	1.68	110.00	101.00	28.60	<5.00	62.40	820.00
	11/15/07	<10.00	189.00	189.00	**251 D1**	1.44	1.44	152 D1	104.00	33.40	6.01	84.70	**1,010.00**
	5/15/08	<1.53	374.00	374.00	**342 D1**	1.47	1.28	257 D1	106.00	52.90	11.70	165 D1	**1,140.00**
	11/6/08	<5.00	150.00	150.00	210.00	1.50	1.30	89.00	110.00	32.00	5.40	64.00	730.00
	5/20/09	<5.00	240.00	240.00	**270.00**	1.30	1.50	120.00	110.00	35.00	6.20	72.00	960.00
	11/4/09	<5.00	150.00	150.00	240.00	1.50	1.30	130.00	100.00	35.00	5.40	78.00	1,000.00
	5/7/10	<5.00	<5.00	157.00	236.00	1.18	1.62	106.00	111.00	30.70	4.59	60.30	940.00
	11/10/10	<5.00	166.00	166.00	**280.00**	1.16	1.61	112.00	98.40	36.90	5.63	81.00	812.00
	5/11/11	<5.00	157.00	157.00	**274.00**	1.11	1.99	87.20	117.00	32.20	5.63	85.00	930.00
	11/15/11	<5.00	150.00	150.00	**266.00**	1.03	6.93	94.90	128.00	32.30	4.58	62.80	**1,450.00**
	5/16/12	<5.00	163.00	163.00	**284.00**	1.12	1.58	99.90	132.00	36.80	5.22	72.90	**1,120.00**
	10/11/12	<5.00	151.00	151.00	**255.00**	1.32	1.75	98.70	113.00	34.30	5.68	67.60	**1,010.00**
	5/17/13	<5.00	154.00	154.00	**299.00**	1.34	1.61	108.00	117.00	33.70	4.57	64.60	**1,180.00**
	10/8/13	<6.00	165.00	165.00	**324.00**	1.14	1.62	103.00	154.00	41.60	5.36	78.10	**1,240.00**
	5/1/14	<10.00	156.00	156.00	**298.00**	1.05 J	1.58	111.00	135.00	41.60	5.30	75.50	**1,050.00**
Dup	5/1/14	<10.00	158.00	158.00	**301.00**	<0.10 J	1.66	112.00	134.00	42.50	5.29	79.50	**1,080.00**
	10/7/14	<4.00	163.00	163.00	249.00	0.71	1.64	108.00	127.00	36.80	4.91	67.20	**1,050.00**
	5/22/15	--	--	--	**298.00**	<8.00	--	102.00	--	--	--	--	975.00
	10/20/15	--	--	--	250.00	<4.00	--	108.00	--	--	--	--	823.00
	5/25/16	--	--	--	**307.00**	1.44	--	107.00	--	--	--	--	**1,080.00**
	10/18/16	--	--	--	**330.00**	0.86	--	103.00	--	--	--	--	**1,350.00**
	05/11/17	--	--	--	**353.00**	<0.22	--	112.00	--	--	--	--	**1,080.00**
	10/24/17	--	--	--	240.00	1.60	--	97.00	--	--	--	--	742.00
	05/22/18	--	--	--	**346.00**	0.97	--	113.00	--	--	--	--	**1,070.00**

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
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Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	10/18/18	--	--	--	**351.00**	1.10	--	118.00	--	--	--	--	892.00
	6/20/19	--	--	--	NS	--	--	--	--	--	--	--	NS
	4/20/20	--	--	--	372.00	--	--	--	--	--	--	--	**1,050.00**
	10/12/20	--	--	--	338.00	--	--	--	--	--	--	--	986.00
	6/25/21	--	--	--	**392.00**	--	--	--	--	--	--	--	**1,010.00**
	12/7/21	--	--	--	**339.00**	--	--	--	--	--	--	--	**1,020.00**
	8/23/22	--	--	--	***376***	--	--	--	--	--	--	--	***1,010***
	12/21/22	--	--	--	***406***	--	--	--	--	--	--	--	***1,120 J3***
Dup	12/21/22	--	--	--	218	--	--	--	--	--	--	--	*828*
	7/20/23	--	--	--	**364**	--	--	--	--	--	--	--	**1,210**
MW-11	1/22/99	30.00	<1.00	30.00	46.00	**2.30**	4.20	94.00	33.00	7.00	9.10	58.00	370.00
	2/15/01	<1.00	156.00	156.00	37.00	**2.40**	2.40	120.00	64.00	19.10	7.83	50.10	360.00
	5/16/02	<1.00	160.00	160.00	31.90	**2.13**	2.33	98.80	63.50	17.20	4.83	47.00	444.00
	10/23/02	--	--	--	37.20	--	--	102.00	--	--	--	--	447.00
	5/22/03	12.00	154.00	166.00	32.30	**1.74**	2.28	96.70	62.30	0.00	4.63	47.60	437.00
	11/26/03	<1.00	160.00	160.00	32.40	**1.83**	2.23	96.40	59.20	16.60	4.67	48.60	448.00
	5/12/04	<1.00	164.00	164.00	34.60	**1.71**	2.38	97.70	54.80	15.70	4.28	46.20	457.00
	11/16/04	<1.00	160.00	160.00	39.00	**2.17**	2.81	100.00	65.20	16.80	5.14	54.30	454.00
	5/17/05	4.00	158.00	162.00	43.10	**1.87**	2.82	94.60	68.40	16.90	6.45	44.00	429.00
	11/17/05	<10.0	161.00	161.00	58.10	1.50	2.10	91.3 D1	75.00	17.70	4.55	64.70	700 N
	5/9/06	<10.00	180.00	180.00	37.00	**1.80**	1.70	100.00	54.10	16.20	3.26	46.90	456.00
	11/14/06	<10.00	170.00	170.00	34.00	**1.80**	1.80	110.00	58.00	18.20	4.13	53.40	532.00
	5/30/07	<10.00	142.00	142.00	36.00	**1.90**	1.79	120.00	54.00	16.70	<5.00	50.80	456.00
	11/14/07	<10.00	189.00	189.00	42.30	**1.98**	1.54	95.6 D1	57.20	17.40	<5.000	52.40	452.00
	5/15/08	<1.53	177.00	177.00	72.4 D1	**1.86**	1.71	141.00	58.00	19.40	4.93	66.5 D1	544.00
	11/4/08	<5.00	170.00	170.00	49.00	1.50	1.30	90.00	60.00	16.00	3.60	47.00	440.00
	5/20/09	<5.00	360.00	360.00	40.00	**2.20**	1.70	130.00	51.00	17.00	4.50	53.00	450.00
	11/4/09	<5.00	150.00	150.00	43.00	1.60	1.60	100.00	52.00	15.00	2.90	42.00	470.00
	5/7/10	<5.00	<5.00	167.00	36.50	**1.97**	1.78	117.00	49.70	14.90	3.42	44.70	494.00
	11/9/10	<5.00	269.00	269.00	52.50	1.45	1.79	95.40	61.00	16.70	3.56	50.00	438.00
	5/11/11	<5.00	161.00	161.00	133.00	1.43	2.08	140.00	78.10	37.00	6.32	103.00	664.00
Dup	5/11/11	<5.00	161.00	161.00	130.00	1.44	2.01	137.00	77.40	37.00	6.29	104.00	706.00
	11/10/11	<5.00	162.00	162.00	38.80	**1.86**	1.49	97.10	66.20	17.90	3.62	52.30	420.00
	5/17/12	<5.00	176.00	176.00	45.80	1.29	1.62	88.50	63.60	16.30	3.66	53.40	456.00
	10/11/12	<5.00	166.00	166.00	44.60	1.49	1.74	95.10	55.80	15.80	3.80	49.30	440.00
	5/17/13	<5.00	171.00	171.00	43.60	**1.87**	1.67	106.00	57.70	14.80	3.18	42.90	428.00
	10/8/13	<6.00	178.00	178.00	45.20	1.55	1.74	95.50	60.90	16.10	3.33	52.00	450.00
	5/1/14	<10.00	173.00	173.00	63.30	<0.10	2.06	93.30	64.40	17.60	3.38	51.50	434.00
	10/7/14	<4.00	176.00	176.00	34.70	1.10	1.71	101.00	59.20	16.70	3.06	46.50	399.00
	5/22/15	--	--	--	40.40	<4.00	--	87.20	--	--	--	--	428.00
	10/20/15	--	--	--	37.60	<2.00	--	89.30	--	--	--	--	356.00
	5/25/16	--	--	--	34.30	**1.87**	--	103.00	--	--	--	--	475.00
	10/18/16	--	--	--	39.30	0.87	--	96.40	--	--	--	--	418.00
	05/11/17	--	--	--	35.10	<0.11	--	110.00	--	--	--	--	416.00
	10/24/17	--	--	--	35.10	**1.87**	--	95.30	--	--	--	--	438.00
	05/22/18	--	--	--	34.60	1.58	--	110.00	--	--	--	--	421.00
Dup	05/22/18	--	--	--	34.50	**1.64**	--	110.00	--	--	--	--	415.00
	10/18/18	--	--	--	36.90	**1.69**	--	114.00	--	--	--	--	413.00
	06/20/19	--	--	--	34.40	--	--	--	--	--	--	--	407.00
	04/20/20	--	--	--	29.00	--	--	--	--	--	--	--	394.00
	06/25/21	--	--	--	37.30	--	--	--	--	--	--	--	431.00
	12/06/21	--	--	--	**--**	--	--	--	--	--	--	--	**--**
	08/24/22	--	--	--	35.70	--	--	--	--	--	--	--	410.00
	7/21/23	--	--	--	35.0	--	--	--	--	--	--	--	410 B
MW-12*	5/15/02	<1.00	160.00	160.00	58.30	1.09	2.44	91.30	53.50	15.90	5.52	50.30	462.00
	10/23/02	--	--	--	65.00	--	--	102.00	--	--	--	--	477.00
	5/22/03	<1.00	148.00	148.00	91.10	1.04	2.30	87.70	74.20	21.00	4.89	57.60	516.00
	11/25/03	<1.00	142.00	142.00	93.10	1.18	2.36	90.90	74.70	20.90	5.41	52.50	548.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	5/12/04	<1.00	458.00	458.00	72.90	1.04	2.35	86.70	58.10	19.00	5.92	51.80	489.00
	11/15/04	<1.00	184.00	184.00	79.80	1.39	2.83	88.80	59.70	21.50	16.50	77.40	512.00
	11/17/05	<10.00	151.00	151.00	109.00	0.93	0.12	94.6 D1	193.00	26.60	13.40	87.50	700.00
	11/16/06	<10.00	270.00	270.00	120.00	0.71	1.70	84.00	82.30	27.00	4.82	62.20	620.00
	11/16/07	<10.00	170.00	170.00	**258.00**	1.21	1.55	191 D1	77.20	42.70	11.00	154.00	**1,270.00**
	11/6/08	<5.00	130.00	130.00	110.00	0.89	1.40	79.00	61.00	20.00	4.50	52.00	460.00
	11/3/09	<25.00	2,000.00	2,000.00	120.00	0.87	1.60	98.00	68.00	24.00	6.00	79.00	600.00
	11/9/10	<5.00	144.00	144.00	211.00	0.57	1.76	89.80	75.60	27.80	4.60	60.60	712.00
	11/10/11	<5.00	134.00	134.00	179.00	0.46	1.37	92.80	93.80	27.80	4.53	64.00	594.00
	10/11/12	<5.00	145.00	145.00	179.00	0.71	0.79	86.50	80.40	25.40	5.44	62.90	724.00
	10/8/13	<6.00	160.00	160.00	246.00	0.62	1.64	84.50	110.00	30.40	4.92	67.80	944.00
	10/7/14	<4.00	145.00	145.00	200.00	0.29	1.70	86.80	93.10	29.30	5.06	65.00	765.00
	10/21/15	--	--	--	165.00	<4.00	--	72.60	--	--	--	--	487.00
	10/18/16	--	--	--	**270.00**	<0.50	--	95.00	--	--	--	--	888.00
	10/24/17	--	--	--	150.00	<0.50	--	64.90	--	--	--	--	579.00
Dup	10/24/17	--	--	--	149.00	<0.50	--	64.80	--	--	--	--	565.00
	10/18/18	--	--	--	**290.00**	0.74	--	106.00	--	--	--	--	790.00
	06/20/19	--	--	--	**254.00**	--	--	--	--	--	--	--	580.00
	04/20/20	--	--	--	245.00	--	--	--	--	--	--	--	902.00
	10/12/20	--	--	--	**254.00**	--	--	--	--	--	--	--	732.00
	06/25/21	--	--	--	**461.00**	--	--	--	--	--	--	--	984.00
	12/06/21	--	--	--	**361.00**	--	--	--	--	--	--	--	**1,130.00**
	08/24/22	--	--	--	**489**	--	--	--	--	--	--	--	**1,040**
	12/21/22	--	--	--	**482**	--	--	--	--	--	--	--	**1,280**
	7/21/23	--	--	--	**469**	--	--	--	--	--	--	--	**1,300**
MW-13*	5/13/02	<1.00	100.00	100.00	**517.00**	<1.00	1.61	437.00	116.00	76.00	19.40	269.00	**1,596.00**
	10/23/02	--	--	--	**549.00**	--	--	370.00	--	--	--	--	**1,740.00**
	5/22/03	<1.00	186.00	186.00	**944.00**	<2.00	2.33	361.00	289.00	101.00	15.30	458.00	**3,060.00**
	11/25/03	<1.00	226.00	226.00	**1,460.00**	<2.00	2.22	372.00	369.00	117.00	20.00	478.00	**3,445.00**
	5/12/04	<1.00	234.00	234.00	**1,550.00**	<4.00	4.58	369.00	384.00	114.00	18.60	485.00	**4,240.00**
	11/15/04	<1.00	226.00	226.00	**1,870.00**	<2.00	4.92	384.00	510.00	164.00	16.50	627.00	**3,600.00**
	11/17/05	<10.00	201.00	201.00	**722.00**	1.00	2.50	206 D1	786.00	91.60	19.70	276.00	**2,350.00**
	11/16/06	<10.00	1,500.00	1,500.00	**2,000.00**	<0.50 N	2.70	500 N	529.00	176.00	14.20	493.00	**5,060.00**
	11/16/07	<10.00	236.00	236.00	**2,000.00**	0.33	3.05 D1	312 D1	361.00	105.00	11.40	553 D1	**6,320.00**
	11/6/08	<5.00	180.00	180.00	**970.00**	0.98	1.80	280.00	240.00	96.00	17.00	370.00	**2,400.00**
	11/3/09	<25.00	15,000.00	15,000.00	**2,200.00**	<0.50	2.60	440.00	490.00	180.00	22.00	490.00	**5,600.00**
	11/9/10	<5.00	267.00	267.00	**1,680.00**	0.22	2.82	405.00	400.00	120.00	10.40	540.00	**4,270.00**
	11/10/11	<5.00	206.00	206.00	**2,110.00**	0.18	<0.50	273.00	690.00	223.00	13.20	472.00	**4,870.00**
	10/11/12	<5.00	204.00	204.00	**2,360.00**	0.31	2.70	422.00	706.00	228.00	14.40	423.00	**6,290.00**
	10/8/13	<6.00	1,780.00	1,780.00	**2,710.00**	0.30	2.59	448.00	768.00	225.00	14.00	457.00	**7,320.00**
	10/7/14	<4.00	267.00	267.00	**1,430.00**	<0.10	1.91	379.00	355.00	109.00	11.30	612.00	**3,940.00**
	10/21/15	--	--	--	**1,400.00**	<40.0	--	353.00	--	--	--	--	**3,260.00**
	10/18/16	--	--	--	**1,940.00**	<0.50	--	440.00	--	--	--	--	**5,310.00**
	Well Plugged and Abandoned on 7/11/2017												
MW-14	10/8/13	<6.00	267.00	267.00	162.00	**3.69**	<0.10	127.00	74.40	32.30	8.42	145.00	854.00
Dup	10/8/13	<6.00	271.00	271.00	166.00	**3.74**	<0.10	130.00	60.70	26.30	7.97	145.00	848.00
	5/1/14	<10.00	199.00	199.00	64.00	1.19 J	<0.10	84.90	60.80	21.70	3.82	59.80	468.00
	10/7/14	<4.00	227.00	2,227.00	95.20	0.79	<0.023	22.90	71.30	24.90	3.99	61.80	460.00
Dup	10/7/14	<4.00	194.00	194.00	55.70	1.36	<0.023	88.80	59.30	19.10	3.21	49.50	490.00
	5/22/15	--	--	--	77.80	<4.00	--	45.40	--	--	--	--	468.00
Dup	5/22/15	--	--	--	77.40	<4.00	--	49.00	--	--	--	--	470.00
	10/20/15	--	--	--	29.1 J	<2.00	--	53.5 J	--	--	--	--	294.00
Dup	10/21/15	--	--	--	58.9 J	<2.00	--	101 J	--	--	--	--	407.00
	5/25/16	--	--	--	79.00	1.37	--	19.90	--	--	--	--	552.00
	10/18/16	--	--	--	51.80	1.07	--	104.00	--	--	--	--	422.00
Dup	10/18/16	--	--	--	61.20	1.25	--	108 J	--	--	--	--	459.00
	05/11/17	--	--	--	70.50	<0.11	--	17.70	--	--	--	--	412.00
	10/24/17	--	--	--	57.40	**1.77**	--	42.20	--	--	--	--	423.00

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	05/22/18	--	--	--	54.90	1.20	--	47.80	--	--	--	--	390.00
	10/18/18	--	--	--	57.20	1.35	--	47.20	--	--	--	--	401.00
	06/20/19	--	--	--	42.10	--	--	--	--	--	--	--	481.00
	11/24/19	--	--	--	37.10	--	--	94.50	--	--	--	--	328.00
	04/20/20	--	--	--	46.00	--	--	--	--	--	--	--	400.00
	06/25/21	--	--	--	42.30	--	--	--	--	--	--	--	429.00
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--
	08/23/22	--	--	--	48.00	--	--	--	--	--	--	--	**1,090.00**
	7/20/23	--	--	--	57.5	--	--	--	--	--	--	--	471
RW-1	5/27/99	0.00	224.00	224.00	**8,700.00**	**2.70**	7.00	**840.00**	679.00	521.00	34.00	3,290.00	**14,000.00**
	5/22/03	<1.00	190.00	190.00	**2,410.00**	**2.46**	4.23	345.00	162.00	145.00	25.40	1,180.00	**5,260.00**
	11/26/03	<1.00	184.00	184.00	**1,990.00**	<4.00	**20.00**	324.00	199.00	147.00	38.60	1,080.00	**5,050.00**
	5/11/04	<1.00	148.00	148.00	**491.00**	1.32	2.65	109.00	66.30	23.40	11.20	252.00	**1,224.00**
	11/17/04	<1.00	160.00	160.00	**633.00**	**1.65**	3.23	121.00	89.70	43.50	18.00	382.00	**1,314.00**
	11/17/05	<10.00	221.00	221.00	**895.00**	1.00	1.40	166 D1	122.00	70.90	8.40	493.00	**2,380.00**
	11/16/06	<10.00	380.00	380.00	**11,000.00**	<0.50	<20.00 HC	**1,100.00**	539.00	694.00	43.30	5,580.00	**22,000.00**
	11/15/07	<10.00	359.00	359.00	**2,380.00**	1.26	3.74 D1	252 D1	141.00	137.00	16.00	1,100 D1	**5,280.00**
Dup	11/15/07	<10.00	208.00	208.00	**2,620.00**	1.24	3.85 D1	316 D1	136.00	133.00	15.50	1,040 D1	**5,360.00**
	11/12/08	<5.00	210.00	210.00	**370.00**	0.82	1.90	97.00	66.00	34.00	5.00	190.00	920.00
	11/4/09	<5.00	170.00	170.00	**1,700.00**	1.10	2.60	250.00	110.00	120.00	22.00	750.00	**3,800.00**
	11/11/10	<5.00	192.00	192.00	**1,340.00**	0.72	2.72	204.00	95.50	104.00	12.60	792.00	**2,830.00**
	11/10/11	<5.00	396.00	396.00	**14,000.00**	**3.32**	9.16	**1,540.00**	942.00	1,260.00	44.60	8,720.00	**32,200.00**
	10/11/12	<5.00	263.00	263.00	**6,530.00**	**2.19**	4.75	**625.00**	314.00	445.00	28.00	3,490.00	**10,100.00**
Dup	10/11/12	<5.00	286.00	286.00	**2,440.00**	0.31	1.23	194.00	128.00	156.00	18.60	1,260.00	**17000****
	10/8/13	<6.00	285.00	285.00	**6,050.00**	0.95	4.29	546.00	760.00	919.00	39.00	6,370.00	**11,200.00**
Dup	10/8/13	<6.00	216.00	216.00	**10,500.00**	1.27	5.98	**926.00**	490.00	581.00	31.40	4,170.00	**1870****
	10/7/14	<4.00	207.00	207.00	**2,240.00**	1.36	3.62	338.00	69.60	106.00	24.00	1,130.00	**2,760.00**
Dup	10/7/14	<4.00	192.00	192.00	**2,570.00**	**2.51**	3.70	363.00	82.30	125.00	26.80	1,350.00	**1970****
	10/21/15	--	--	--	**9,110.00**	<80.00	--	**953 J**	--	--	--	--	**15,300.00**
Dup	10/20/15	--	--	--	**10,200.00**	<200.00	--	**1,120 J**	--	--	--	--	**21,600.00**
	12/15/15	--	--	--	**1,130.00**	--	--	--	--	--	--	--	**2,290.00**
	12/16/15	--	--	--	**1,190.00**	--	--	--	--	--	--	--	**2,580.00**
	12/17/15	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,260.00**
	12/18/15	--	--	--	**988.00**	--	--	--	--	--	--	--	**2,350.00**
	1/4/16	--	--	--	**1,200.00**	--	--	--	--	--	--	--	**2,280.00**
	1/5/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,190.00**
	1/6/16	--	--	--	**1,120.00**	--	--	--	--	--	--	--	**2,240.00**
	1/7/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,200.00**
	1/8/16	--	--	--	**1,310.00**	--	--	--	--	--	--	--	**2,370.00**
	1/11/16	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,210.00**
	1/12/16	--	--	--	**1,520.00**	--	--	--	--	--	--	--	**2,850.00**
	10/18/16	--	--	--	**277.00**	<0.50	--	87.50	--	--	--	--	715.00
Dup	10/18/16	--	--	--	**316.00**	<0.50	--	88.9 J	--	--	--	--	922.00
	10/25/17	--	--	--	**254.00**	1.02	--	75.50	--	--	--	--	**2,040.00**
	10/16/18***	--	--	--	**304.00**	0.61	--	93.40	--	--	--	--	757.00
	10/18/18	--	--	--	**7,870.00**	<0.10	--	**807.00**	--	--	--	--	**15,400.00**
Dup	10/18/18	--	--	--	**7,830.00**	<0.10	--	**873.00**	--	--	--	--	**12,700.00**
	6/20/19	--	--	--	**9,290.00**	--	--	--	--	--	--	--	**22,100.00**
Dup	6/20/19	--	--	--	**9,200.00**	--	--	--	--	--	--	--	**22,800.00**
	4/20/20	--	--	--	**9,640.00**	--	--	--	--	--	--	--	**12,700.00**
	10/12/20	--	--	--	**8,470.00**	--	--	--	--	--	--	--	**14,900.00**
	6/25/21	--	--	--	**7,370.00**	--	--	--	--	--	--	--	**13,500.00**
	12/6/21	--	--	--	**7,440.00**	--	--	--	--	--	--	--	**9,490.00**
	8/23/22	--	--	--	***8,180***	--	--	--	--	--	--	--	**6,920**
	12/21/22	--	--	--	**5,070**	--	--	--	--	--	--	--	**3,940**
	7/20/23	--	--	--	**3,440**	--	--	--	--	--	--	--	**2,790**
Dup	7/20/23	--	--	--	**4,340**	--	--	--	--	--	--	--	**3,190**
RW-2	5/22/03	324.00	<4.00	780.00	**1,580.00**	<2.00	2.43	23.90	1,060.00	<0.500	20.20	258.00	**4,310.00**

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***
	11/26/03	64.00	<4.00	704.00	**1,480.00**	<5.00	5.81	38.30	988.00	<0.500	23.80	240.00	**3,535.00**
	11/17/04	104.00	<4.00	692.00	**2,280.00**	<10.00	<10.00	116.00	1,180.00	<0.500	18.50	415.00	**3,915.00**
	11/17/05	281.00	<10.00	422.00	**1,770.00**	0.89	0.60	175 D1	861.00	16.60	13.10	361.00	**7,350.00**
	11/16/06	49.00	150.00	199.00	**2,500.00**	0.57	1.90	370.00	978.00	48.80	18.00	437.00	**5,270.00**
	11/15/07	170.00	37.80	208.00	**1,680.00**	0.49	1.52	166 D1	586.00	<5.000	11.20	245.00	**5,590.00**
	11/12/08	150.00	<5.00	390.00	**2,500.00**	<0.50	0.24	250.00	1,200.00	<0.38	6.00	400.00	**4,800.00**
	11/4/09	34.00	<5.00	220.00	**2,200.00**	<0.50	1.70	240.00	940.00	0.18	16.00	420.00	**6,300.00**
	11/11/10	113.00	<5.00	172.00	**2,100.00**	<0.50	2.03	233.00	967.00	4.06	8.86	426.00	**4,550.00**
	11/10/11	36.90	<5.00	384.00	**4,330.00**	<10.00	2.13	305.00	2,040.00	1.12	18.70	711.00	**8,300.00**
	10/11/12	27.10	<5.00	202.00	**1,920.00**	<0.50	1.93	223.00	842.00	0.46	9.30	385.00	**6,680.00**
Dup	10/11/12	31.90	<5.00	206.00	**2,310.00**	<0.50	1.98	228.00	1,090.00	2.42	10.50	430.00	**5,250.00**
	10/8/13	66.30	<6.00	117.00	**2,450.00**	0.14	2.36	309.00	1,570.00	2.15	15.30	639.00	**4,420.00**
	10/7/14	35.20	<4.00	35.20	**2,250.00**	<0.10	2.52	378.00	995.00	21.60	10.30	408.00	**3,090.00**
	10/20/15	--	--	--	**699.00**	<20.00	--	118.00	--	--	--	--	**2,190.00**
	12/15/15	--	--	--	**1,130.00**	--	--	--	--	--	--	--	**2,290.00**
	12/16/15	--	--	--	**1,190.00**	--	--	--	--	--	--	--	**2,580.00**
	12/17/15	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,260.00**
	12/18/15	--	--	--	**988.00**	--	--	--	--	--	--	--	**2,350.00**
	1/4/16	--	--	--	**1,200.00**	--	--	--	--	--	--	--	**2,280.00**
	1/5/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,190.00**
	1/6/16	--	--	--	**1,120.00**	--	--	--	--	--	--	--	**2,240.00**
	1/7/16	--	--	--	**1,080.00**	--	--	--	--	--	--	--	**2,200.00**
	1/8/16	--	--	--	**1,310.00**	--	--	--	--	--	--	--	**2,370.00**
	1/11/16	--	--	--	**1,030.00**	--	--	--	--	--	--	--	**2,210.00**
	1/12/16	--	--	--	**1,520.00**	--	--	--	--	--	--	--	**2,850.00**
	10/18/16	--	--	--	**1,450.00**	<0.50	--	270.00	--	--	--	--	**3,910.00**
	10/25/17	--	--	--	**1,760.00**	<5.00	--	288.00	--	--	--	--	**4,440.00**
	10/18/18	--	--	--	**3,640.00**	<0.10	--	534.00	--	--	--	--	**6,890.00**
	6/20/19	--	--	--	**3,180.00**	--	--	--	--	--	--	--	**10,200 H**
	4/20/20	--	--	--	**3,610.00**	--	--	--	--	--	--	--	**7,890.00**
	10/12/20	--	--	--	**3,070.00**	--	--	--	--	--	--	--	**5,140.00**
Dup	10/12/20	--	--	--	**2,990.00**	--	--	--	--	--	--	--	**5,460.00**
	6/25/21	--	--	--	**1,150.00**	--	--	--	--	--	--	--	**2,270.00**
Dup	6/25/21	--	--	--	**1,690.00**	--	--	--	--	--	--	--	**3,340.00**
	12/7/21	--	--	--	**582.00**	--	--	--	--	--	--	--	**1,040.00**
Dup	12/7/21	--	--	--	**567.00**	--	--	--	--	--	--	--	**1,250.00**
	8/23/22				**948**	--	--	--	--	--	--	--	***2,390***
Dup	8/23/22	--	--	--	**1,390**	--	--	--	--	--	--	--	***3,860***
	12/21/22	--	--	--	232	--	--	--	--	--	--	--	824 J3
	7/20/23	--	--	--	**2,910**	--	--	--	--	--	--	--	**4,950**
Dup	7/20/23	--	--	--	**2,840**	--	--	--	--	--	--	--	**4,310**
RW-2R	10/8/13	<6.00	146.00	146.00	**6,550.00**	0.45	1.79	**762.00**	1,850.00	616.00	25.50	1,350.00	**14,600.00**
	10/7/14	<4.00	169.00	169.00	**5,400.00**	1.56	2.17	**707.00**	1,280.00	470.00	20.90	1,170.00	**13,200.00**
	10/20/15	--	--	--	**5,990.00**	<80.00	--	**806.00**	--	--	--	--	**16,200.00**
	10/18/16	--	--	--	**6,390.00**	<0.50	--	**797.00**	--	--	--	--	**15,200.00**
	10/25/17	--	--	--	**7,030.00**	<5.00	--	**872.00**	--	--	--	--	**12,300.00**
	10/16/18***	--	--	--	**1,960.00**	<0.10	--	467.00	--	--	--	--	**3,380.00**
	10/18/18	--	--	--	**7,920.00**	<0.10	--	**891.00**	--	--	--	--	**13,700.00**
Dup	10/18/18	--	--	--	**8,060.00**	<0.10	--	**815.00**	--	--	--	--	**13,300.00**
	6/20/19	--	--	--	**7,860.00**	--	--	--	--	--	--	--	**29,400.00**
	4/20/20	--	--	--	**9,210.00**	--	--	--	--	--	--	--	**21,500.00**
	10/12/20	--	--	--	**7,860.00**	--	--	--	--	--	--	--	**13,800.00**
	6/25/21	--	--	--	**7,250.00**	--	--	--	--	--	--	--	**12,400.00**
	12/7/21	--	--	--	**7,400.00**	--	--	--	--	--	--	--	**6,330.00**
	8/23/22	--	--	--	**8,070**	--	--	--	--	--	--	--	**10,100**
	12/21/22	--	--	--	**7,480**	--	--	--	--	--	--	--	**14,600**
	7/20/23	--	--	--	**8,290**	--	--	**904**	--	--	--	--	**17,100**

Attachment C - 2 Cumulative Summary of Groundwater Quality Data
Cooper-Jal Unit South Injection Station
Lea County, New Mexico

ARCADIS

Sample ID	Sample Date	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Chloride[1]	Fluoride[2]	Nitrate - N[2]	Sulfate[1]	Calcium	Magnesium	Potassium	Sodium	TDS[1]
NMWQCC Groundwater Standard					***250***	***1.60***	***10***	***600.00***					***1,000***

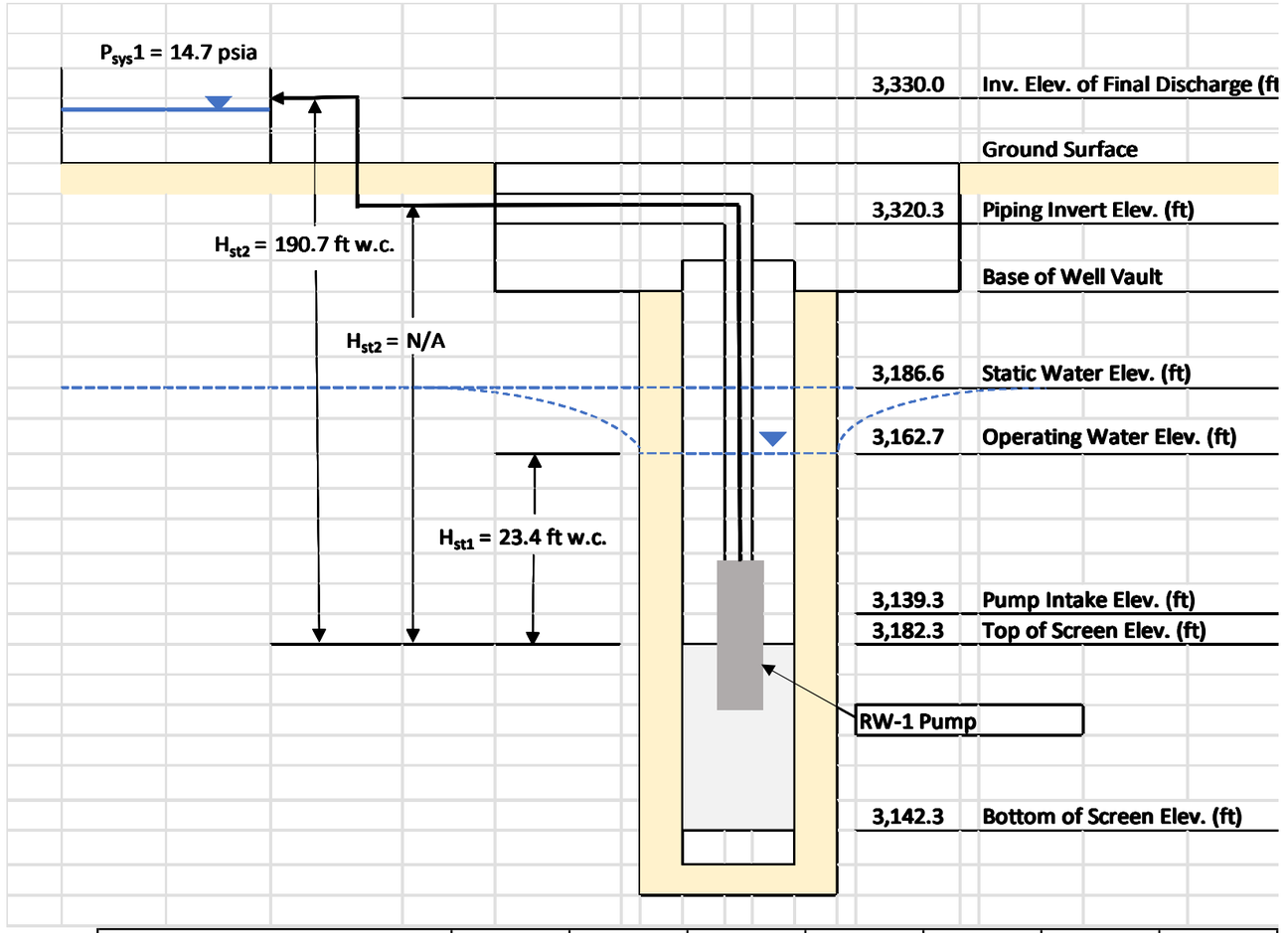
Notes:
1. Bold and Italics value indicates a laboratory detection and New Mexico Water Quality Control Commission (NMWQCC) exceedance.
2. Results shown in mg/L.
3. NS - Not Sampled.
4. D1 - The analysis was performed at a dilution due to the high analyte concentration.
5. B- The same anlayte is found in the associated blank.
6. H - The analysis was performed past holding time.
7. C - Elevated detection limit due to matrix effect.
8. J - Estimated Concentration.
9. J3 - The associated batch QC was outside the established quality control range for precision.
10. < - Analyte detected below quantitation limit.
11. [1] Human Health Standards for Groundwater.
12. [2] Other Standards for Domestic Water Supply.
13. * - Indicates groundwater monitor well installed off-Site and upgradient of plume.
14. ** - Reported TDS concentration includes a low bias. Not used in trend comparison.
15. *** - Indicates groundwater monitor well that was sampled prior to semiannual groundwater event via low-flow purge for internal use.

Attachment D: Groundwater Recovery Well Head Loss Calculation

ARCADIS Design & Consultancy for natural and built assets

PROJECT:	Cooper Jal, Lea County, New Mexico	BY:	E. Zardouzian	DATE:	26-Mar-2025
JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Pump ID:	RW-1 Pump
Fluid:	Water
Fluid Description:	Groundwater
Enter Fluid Density if Other than Water (lb/ft^3):	
Enter Fluid Viscosity if Other than Water (cp):	
Enter Vapor Pressure if Other than Water (psi):	
Minimum Flow Rate (gpm):	0.2
Design Flow Rate (gpm):	1.3
Maximum Flow Rate (gpm):	2.2
Pressure of System to be Pumped, P_{sys1} (psia):	14.7
Pressure of System Discharged, P_{sys2} (psia):	14.7
Fluid Temperature (°F):	68
Inv. Elev. of Extraction Well Discharge Pipe (ft):	3320.31
Inv. Elev. of Final Discharge [If Applicable] (ft):	3330
Top of Screen Elevation (ft):	3182.3
Bottom of Screen Elevation (ft):	3142.3
Static Water Level Elevation (ft):	3186.6
Operating Water Level Elevation (ft):	3162.7
Pump Impeller Centerline Elevation (ft):	3139.3
Discharge Elevation (ft):	3330
Static Head of Discharge Line , H_{st2} (ft):	190.7
Static Head of Liquid to be Pumped, H_{st1} (ft):	23.4
Safety Factor:	20.0%
Vapor Pressure (ft. w.c.):	0.783
Fluid density, ρ (lb/ft^3):	62.32
Fluid Kinematic Viscosity, η (ft^2/s):	1.08E-05
Include Exit Headloss at Discharge, H_v:	Yes



Notes:

- GW Elevation based on 7/23 RW-1 data
- Well discharge pipe based on RW-1 TOC
- Surface Elevation assumed to be 3315.3 ft MSL
- Drawdown assumed to be 23.9 feet per GW model

Flow Rates (gpm):	0.2	0.6	1.0	1.3	1.6	1.9	2.2
(gpd):	288	864	1,440	1,872	2,304	2,736	3,168
(MGD):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Optional - Pump Head (ft w.c.):							
Optional - NSPH Required (ft w.c.):							

In-Line Equipment Headloss:

Equipment Tag	Pressure Loss (ft w.c.)	Equipment Tag	Pressure Loss (ft w.c.)
Flow Meter	15.0		
Subtotal:	*15.0*	*Subtotal:*	*0.0*

Total Headloss (ft w.c.): 15.0

ARCADIS Design & Consultancy for natural and built assets

PROJECT:	Cooper Jal, Lea County, New Mexico	BY:	E. Zardouzian	DATE:	26-Mar-2025
JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 1 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	190.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Stop Check Valve (piston), flow thru	6.9	1	6.9
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	1	0.69
Gate Valve	0.18	1	0.18
Standard Tee, thru branch	1.38	2	2.76
1" x 1.25" Expansion Fitting	0.19	1	0.19
3" x 6" Expansion Fitting			0
		Total K:	10.8

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.22	0.36	0.47	0.58	0.69	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.78E+03	2.97E+03	3.86E+03	4.75E+03	5.64E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0359	0.0437	0.0404	0.038	0.0362	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0003	0.001	0.0016	0.0022	0.003	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	8.86	26.60	21.85	23.64	25.13	26.38	27.52
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	198.86	216.60	211.85	213.64	215.13	216.38	217.52
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.02**	**0.06**	**0.21**	**0.34**	**0.47**	**0.65**	**0.85**

Discharge Line Segment No. 2 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	15.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	2	1.38
		1	0
		1	0
			0
			0
			0
		Total K:	1.5

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.22	0.36	0.47	0.58	0.69	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.78E+03	2.97E+03	3.86E+03	4.75E+03	5.64E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0359	0.0437	0.0404	0.038	0.0362	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0003	0.001	0.0016	0.0022	0.003	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	1.19	3.57	2.94	3.18	3.38	3.54	3.70
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	16.19	18.57	17.94	18.18	18.38	18.54	18.70
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.06**	**0.07**

ARCADIS Design & Consultancy for natural and built assets

PROJECT:	Cooper Jal, Lea County, New Mexico	BY:	E. Zardouzian	DATE:	26-Mar-2025
JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 3 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	640.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.22	0.36	0.47	0.58	0.69	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.78E+03	2.97E+03	3.86E+03	4.75E+03	5.64E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0359	0.0437	0.0404	0.038	0.0362	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0003	0.001	0.0016	0.0022	0.003	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	640.00	640.00	640.00	640.00	640.00	640.00	640.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.06**	**0.19**	**0.64**	**1.02**	**1.41**	**1.92**	**2.50**

Discharge Line Segment No. 4 Headloss:

Flow Ratio:	5.461538462
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.939
Pipe Lenth, L (ft):	15.00
Pipe Material:	SCH 80 - PVC/CPVC
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.09438E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.06	1	0.06
Gate Valve	0.15	1	0.15
Pipe Exit (sharp edged)	1	1	1
Standard Elbow, 90°	0.57	3	1.71
Standard Tee, thru flow	0.38	7	2.66
2" x 1" Expansion	0.56	1	0.56
			0
		Total K:	6.1

Segment Flowrate (gpm):	1.0923077	3.2769231	5.4615385	7.1	8.7384615	10.376923	12.015385
Eqn. (1) - Velocity, v (ft/s):	0.12	0.36	0.59	0.77	0.95	1.13	1.31
Eqn. (2) - Reynolds Number, Re:	1.78E+03	5.33E+03	8.88E+03	1.15E+04	1.42E+04	1.69E+04	1.95E+04
Pipe Friction Factor, f:	0.036	0.0368	0.0319	0.0298	0.0282	0.0271	0.0261
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0.0004	0.0011	0.0017	0.0024	0.0033	0.0043
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	27.56	26.96	31.10	33.29	35.18	36.61	38.01
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	42.56	41.96	46.10	48.29	50.18	51.61	53.01
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.02**	**0.05**	**0.08**	**0.12**	**0.17**	**0.23**

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ARCADIS Design & Consultancy for natural and built assets

PROJECT:	Cooper Jal, Lea County, New Mexico	BY:	E. Zardouzian	DATE:	26-Mar-2025
JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 5 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	6
Pipe Inner Diameter, ID (in):	5.348
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	1.12191E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, v (ft/s):	0.00	0.01	0.01	0.02	0.02	0.03	0.03
Eqn. (2) - Reynolds Number, Re:	1.18E+02	3.54E+02	5.89E+02	7.66E+02	9.43E+02	1.12E+03	1.30E+03
Pipe Friction Factor, f:	0.5429	0.181	0.1086	0.0835	0.0679	0.0572	0.0494
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 6 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.07	0.11	0.14	0.18	0.21	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	9.87E+02	1.64E+03	2.14E+03	2.63E+03	3.12E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0649	0.0389	0.0484	0.0454	0.043	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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ARCADIS Design & Consultancy for natural and built assets

PROJECT:	Cooper Jal, Lea County, New Mexico	BY:	E. Zardouzian	DATE:	26-Mar-2025
JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 7 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.07	0.11	0.14	0.18	0.21	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	9.87E+02	1.64E+03	2.14E+03	2.63E+03	3.12E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0649	0.0389	0.0484	0.0454	0.043	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 8 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.07	0.11	0.14	0.18	0.21	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	9.87E+02	1.64E+03	2.14E+03	2.63E+03	3.12E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0649	0.0389	0.0484	0.0454	0.043	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 9 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.07	0.11	0.14	0.18	0.21	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	9.87E+02	1.64E+03	2.14E+03	2.63E+03	3.12E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0649	0.0389	0.0484	0.0454	0.043	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 10 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	3
Pipe Inner Diameter, ID (in):	2.825
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	2.12389E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.6	1	1.3	1.6	1.9	2.2
Eqn. (1) - Velocity, v (ft/s):	0.01	0.03	0.05	0.07	0.08	0.10	0.11
Eqn. (2) - Reynolds Number, Re:	2.23E+02	6.69E+02	1.12E+03	1.45E+03	1.79E+03	2.12E+03	2.45E+03
Pipe Friction Factor, f:	0.2868	0.0956	0.0574	0.0441	0.0359	0.0485	0.0463
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Piping Headloss, $H_{p(discharge)}$ (ft w.c.):	**0.08**	**0.28**	**0.92**	**1.47**	**2.04**	**2.80**	**3.65**
Exit Velocity at Liquid Discharge, v (ft/s):	**0.14**	**0.36**	**0.59**	**0.77**	**0.95**	**1.13**	**1.31**
Eqn. (6) Exit Loss at Liquid Discharge, H_v (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.02**	**0.03**
Eqn. (7) Total Dynamic Head, TDH (ft w.c.):	**182.38**	**182.58**	**183.23**	**183.78**	**184.35**	**185.12**	**185.98**
Design System TDH with 20.0% Factor of Safety, (ft w.c.):	**218.86**	**219.10**	**219.88**	**220.54**	**221.22**	**222.14**	**223.18**

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JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

References:

1. Crane Co., Technical Paper No. 410: Flow of Fluids Through Valves, Fittings, and Pipe, 1988.
2. Cameron Hydraulic Data, 18th Edition, 2nd Printing, 1995.
3. Piping Handbook, 7th edition, Mohinder L. Nayyar, McGraw-Hill, New York, NY, 2000.
4. Lamont, Peter A. (1981, May). Common Pipe Flow Formulas Compared with the Theory of Roughness, Journal of the American Water Works Association, Denver, CO.
5. Hydraulic Institute, Engineering Data Book, 2nd Edition.
6. Plastic Pipe Institute's Handbook of Polyethylene Pipe, 2nd. Edition.

Equations:

Eqn. (1):

$$v = \frac{\frac{gpm}{448.8312}}{\frac{\pi}{4} \cdot \left(\frac{ID}{12}\right)^2}$$

Eqn. (2):

$$Re = \frac{v \cdot \frac{ID}{12}}{\eta}$$

Eqn. (3):

$$H = \frac{f \cdot v^2}{2 \cdot g \cdot \frac{ID}{12}} = \frac{f \cdot v^2}{2 \cdot (32.174) \cdot \frac{ID}{12}}$$

Eqn. (4a):

$$L_F = \frac{k \cdot \frac{ID}{12}}{f}$$

Eqn. (4b):

$$L_{eq} = L + L_F$$

Eqn. (5):

$$H_P = H \cdot L_{eq}$$

Eqn. (6):

$$H_v = \frac{v^2}{2 \cdot g} = \frac{v^2}{2 \cdot (32.174)}$$

Eqn. (7):

$$TDH = 2.31 \cdot \left(P_{sys2} - P_{sys1}\right) + H_{st2} + Inline\ Equipment\ Headloss + H_{p(discharge)} + H_v - H_{st1}$$

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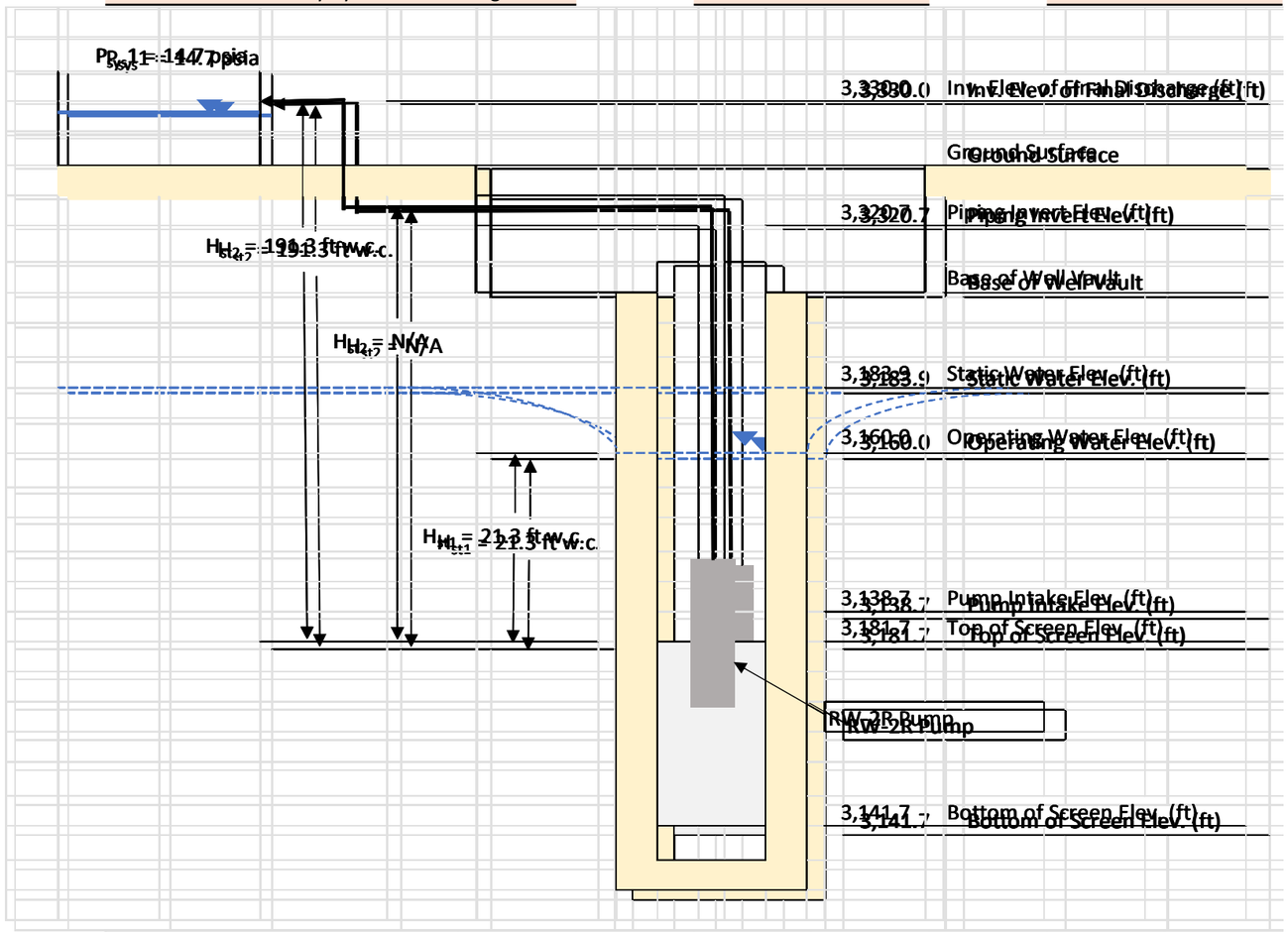
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Pump ID:	RW-2R Pump
Fluid:	Water
Fluid Description:	Groundwater
Enter Fluid Density if Other than Water (lb/ft^3):	
Enter Fluid Viscosity if Other than Water (cp):	
Enter Vapor Pressure if Other than Water (psi):	
Minimum Flow Rate (gpm):	0.2
Design Flow Rate (gpm):	1
Maximum Flow Rate (gpm):	2.2
Pressure of System to be Pumped, P_{sys1} (psia):	14.7
Pressure of System Discharged, P_{sys2} (psia):	14.7
Fluid Temperature (°F):	68
Inv. Elev. of Extraction Well Discharge Pipe (ft):	3320.68
Inv. Elev. of Final Discharge [If Applicable] (ft):	3330
Top of Screen Elevation (ft):	3181.7
Bottom of Screen Elevation (ft):	3141.7
Static Water Level Elevation (ft):	3183.85
Operating Water Level Elevation (ft):	3159.95
Pump Impeller Centerline Elevation (ft):	3138.7
Discharge Elevation (ft):	3330
Static Head of Discharge Line , H_{st2} (ft):	191.3
Static Head of Liquid to be Pumped, H_{st1} (ft):	21.25
Safety Factor:	20.0%
Vapor Pressure (ft. w.c.):	0.783
Fluid density, ρ (lb/ft^3):	62.32
Fluid Kinematic Viscosity, η (ft^2/s):	1.08E-05
Include Exit Headloss at Discharge, H_v:	Yes



Notes:

GW Elevation based on 7/23 RW-2R data
Well discharge Pipe based on RW-2R TOC
Surface elevation assumed to be 3314.7 ft MSL
Drawdown assumed to be 23.9 feet per GW model

Flow Rates (gpm):	0.2	0.5	0.8	1.0	1.4	1.8	2.2
(gpd):	288	720	1,152	1,440	2,016	2,592	3,168
(MGD):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Optional - Pump Head (ft w.c.):							
Optional - NSPH Required (ft w.c.):				32.81			

In-Line Equipment Headloss:

Equipment Tag	Pressure Loss (ft w.c.)	Equipment Tag	Pressure Loss (ft w.c.)
Flow Meter	15.0		
Subtotal:	*15.0*	*Subtotal:*	*0.0*

Total Headloss (ft w.c.): 15.0

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Discharge Line Segment No. 1 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	190.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Stop Check Valve (piston), flow thru	6.9	1	6.9
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	1	0.69
Gate Valve	0.18	1	0.18
Standard Tee, thru branch	1.38	2	2.76
1" x 1.25" Expansion Fitting	0.19	1	0.19
3" x 6" Expansion Fitting			0
		Total K:	10.8

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	8.86	22.16	20.36	21.85	24.18	25.95	27.52
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	198.86	212.16	210.36	211.85	214.18	215.95	217.52
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.02**	**0.04**	**0.15**	**0.21**	**0.39**	**0.58**	**0.85**

Discharge Line Segment No. 2 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	15.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	2	1.38
		1	0
		1	0
			0
			0
			0
		Total K:	1.5

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	1.19	2.98	2.74	2.94	3.25	3.49	3.70
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	16.19	17.98	17.74	17.94	18.25	18.49	18.70
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.02**	**0.03**	**0.05**	**0.07**

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Discharge Line Segment No. 3 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	1,050.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	1,050.00	1,050.00	1,050.00	1,050.00	1,050.00	1,050.00	1,050.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.11**	**0.21**	**0.74**	**1.05**	**1.89**	**2.84**	**4.10**

Discharge Line Segment No. 4 Headloss:

Flow Ratio:	7.1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.939
Pipe Lenth, L (ft):	15.00
Pipe Material:	SCH 80 - PVC/CPVC
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.09438E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.06	1	0.06
Gate Valve	0.15	1	0.15
Pipe Exit (sharp edged)	1	1	1
Standard Elbow, 90°	0.57	3	1.71
Standard Tee, thru flow	0.38	7	2.66
2" x 1" Expansion	0.56	1	0.56
			0
		Total K:	6.1

Segment Flowrate (gpm):	1.42	3.55	5.68	7.1	9.94	12.78	15.62
Eqn. (1) - Velocity, v (ft/s):	0.15	0.39	0.62	0.77	1.08	1.39	1.70
Eqn. (2) - Reynolds Number, Re:	2.31E+03	5.77E+03	9.23E+03	1.15E+04	1.62E+04	2.08E+04	2.54E+04
Pipe Friction Factor, f:	0.0473	0.0359	0.0316	0.0298	0.0274	0.0257	0.0245
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0005	0.0012	0.0017	0.0031	0.0048	0.0068
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	20.98	27.64	31.40	33.29	36.21	38.60	40.49
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	35.98	42.64	46.40	48.29	51.21	53.60	55.49
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.02**	**0.06**	**0.08**	**0.16**	**0.26**	**0.38**

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PROJECT:	Cooper Jal, Lea County, New Mexico	BY:	E. Zardouzian	DATE:	26-Mar-2025
JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 5 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	6
Pipe Inner Diameter, ID (in):	5.348
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	1.12191E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.00	0.01	0.01	0.01	0.02	0.03	0.03
Eqn. (2) - Reynolds Number, Re:	1.18E+02	2.95E+02	4.72E+02	5.89E+02	8.25E+02	1.06E+03	1.30E+03
Pipe Friction Factor, f:	0.5429	0.2172	0.1357	0.1086	0.0776	0.0603	0.0494
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 6 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 7 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, *f*:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 8 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, *f*:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 9 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 10 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	3
Pipe Inner Diameter, ID (in):	2.825
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	2.12389E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.01	0.03	0.04	0.05	0.07	0.09	0.11
Eqn. (2) - Reynolds Number, Re:	2.23E+02	5.58E+02	8.93E+02	1.12E+03	1.56E+03	2.01E+03	2.45E+03
Pipe Friction Factor, f:	0.2868	0.1147	0.0717	0.0574	0.041	0.0494	0.0463
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Piping Headloss, $H_{p(discharge)}$ (ft w.c.):	**0.13**	**0.27**	**0.96**	**1.36**	**2.47**	**3.73**	**5.40**
Exit Velocity at Liquid Discharge, v (ft/s):	**0.14**	**0.57**	**0.62**	**0.77**	**1.08**	**1.39**	**1.70**
Eqn. (6) Exit Loss at Liquid Discharge, H_v (ft w.c.):	**0.00**	**0.01**	**0.01**	**0.01**	**0.02**	**0.03**	**0.04**
Eqn. (7) Total Dynamic Head, TDH (ft w.c.):	**185.18**	**185.33**	**186.02**	**186.42**	**187.54**	**188.81**	**190.49**
Design System TDH with 20.0% Factor of Safety, (ft w.c.):	**222.22**	**222.40**	**223.22**	**223.70**	**225.05**	**226.57**	**228.59**

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SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

References:

1. Crane Co., Technical Paper No. 410: Flow of Fluids Through Valves, Fittings, and Pipe, 1988.
2. Cameron Hydraulic Data, 18th Edition, 2nd Printing, 1995.
3. Piping Handbook, 7th edition, Mohinder L. Nayyar, McGraw-Hill, New York, NY, 2000.
4. Lamont, Peter A. (1981, May). Common Pipe Flow Formulas Compared with the Theory of Roughness, Journal of the American Water Works Association, Denver, CO.
5. Hydraulic Institute, Engineering Data Book, 2nd Edition.
6. Plastic Pipe Institute's Handbook of Polyethylene Pipe, 2nd. Edition.

Equations:

Eqn. (1):

$$v = \frac{\frac{gpm}{448.8312}}{\frac{\pi}{4} \cdot \left(\frac{ID}{12}\right)^2}$$

Eqn. (2):

$$Re = \frac{v \cdot \frac{ID}{12}}{\eta}$$

Eqn. (3):

$$H = \frac{f \cdot v^2}{2 \cdot g \cdot \frac{ID}{12}} = \frac{f \cdot v^2}{2 \cdot (32.174) \cdot \frac{ID}{12}}$$

Eqn. (4a):

$$L_F = \frac{k \cdot \frac{ID}{12}}{f}$$

Eqn. (4b):

$$L_{eq} = L + L_F$$

Eqn. (5):

$$H_P = H \cdot L_{eq}$$

Eqn. (6):

$$H_v = \frac{v^2}{2 \cdot g} = \frac{v^2}{2 \cdot (32.174)}$$

Eqn. (7):

$$TDH = 2.31 \cdot \left(P_{sys2} - P_{sys1}\right) + H_{st2} + Inline\ Equipment\ Headloss + H_{p(discharge)} + H_v - H_{st1}$$

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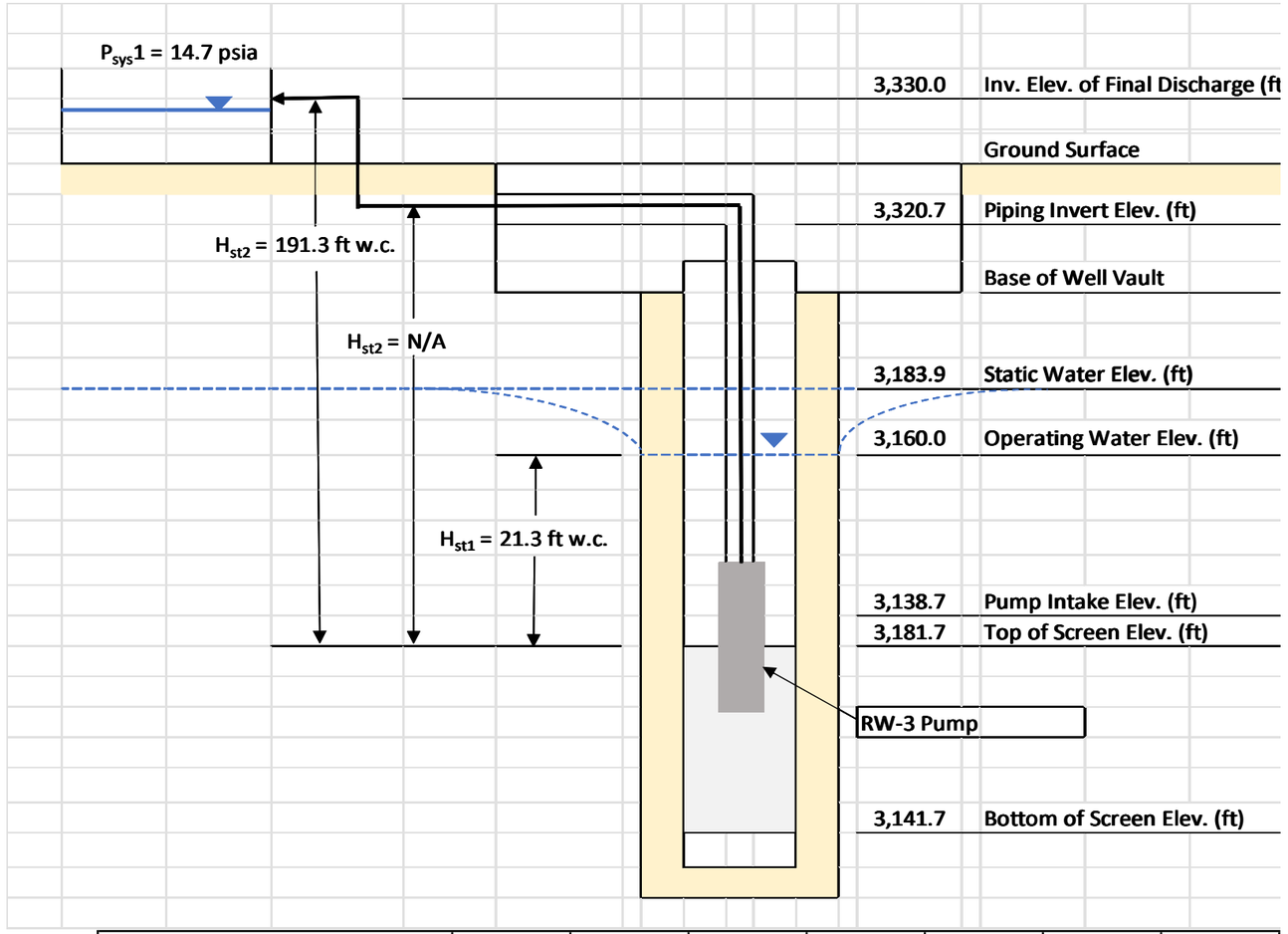
Pump ID:	RW-3 Pump
Fluid:	Water
Fluid Description:	Groundwater
Enter Fluid Density if Other than Water (lb/ft^3):	
Enter Fluid Viscosity if Other than Water (cp):	
Enter Vapor Pressure if Other than Water (psi):	
Minimum Flow Rate (gpm):	0.2
Design Flow Rate (gpm):	0.8
Maximum Flow Rate (gpm):	2.2
Pressure of System to be Pumped, P_{sys1} (psia):	14.7
Pressure of System Discharged, P_{sys2} (psia):	14.7
Fluid Temperature (°F):	68
Inv. Elev. of Extraction Well Discharge Pipe (ft):	3320.68
Inv. Elev. of Final Discharge [If Applicable] (ft):	3330
Top of Screen Elevation (ft):	3181.7
Bottom of Screen Elevation (ft):	3141.7
Static Water Level Elevation (ft):	3183.85
Operating Water Level Elevation (ft):	3159.95
Pump Impeller Centerline Elevation (ft):	3138.7
Discharge Elevation (ft):	3330
Static Head of Discharge Line , H_{st2} (ft):	191.3
Static Head of Liquid to be Pumped, H_{st1} (ft):	21.25
Safety Factor:	20.0%
Vapor Pressure (ft. w.c.):	0.783
Fluid density, ρ (lb/ft^3):	62.32
Fluid Kinematic Viscosity, η (ft^2/s):	1.08E-05
Include Exit Headloss at Discharge, H_v:	Yes



Notes:

- GW Elevation based on 7/23 RW-2R data
- Well discharge Pipe based on RW-2R TOC
- Surface elevation assumed to be 3314.7 ft MSL
- Drawdown assumed to be 23.9 feet per GW model

Flow Rates (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
(gpd):	288	576	864	1,152	1,872	2,592	3,168
(MGD):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Optional - Pump Head (ft w.c.):							
Optional - NSPH Required (ft w.c.):				32.81			

In-Line Equipment Headloss:

Equipment Tag	Pressure Loss (ft w.c.)	Equipment Tag	Pressure Loss (ft w.c.)
Flow Meter	15.0		
Subtotal:	*15.0*	*Subtotal:*	*0.0*

Total Headloss (ft w.c.): **15.0**

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Discharge Line Segment No. 1 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	190.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Stop Check Valve (piston), flow thru	6.9	1	6.9
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	1	0.69
Gate Valve	0.18	1	0.18
Standard Tee, thru branch	1.38	2	2.76
1" x 1.25" Expansion Fitting	0.19	1	0.19
3" x 6" Expansion Fitting			0
		Total K:	10.8

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.14	0.22	0.29	0.47	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.19E+03	1.78E+03	2.37E+03	3.86E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0539	0.0359	0.0469	0.0404	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0003	0.0007	0.0016	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	8.86	17.72	26.60	20.36	23.64	25.95	27.52
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	198.86	207.72	216.60	210.36	213.64	215.95	217.52
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.02**	**0.04**	**0.06**	**0.15**	**0.34**	**0.58**	**0.85**

Discharge Line Segment No. 2 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	15.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	2	1.38
		1	0
		1	0
			0
			0
			0
		Total K:	1.5

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.14	0.22	0.29	0.47	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.19E+03	1.78E+03	2.37E+03	3.86E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0539	0.0359	0.0469	0.0404	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0003	0.0007	0.0016	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	1.19	2.38	3.57	2.74	3.18	3.49	3.70
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	16.19	17.38	18.57	17.74	18.18	18.49	18.70
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.01**	**0.03**	**0.05**	**0.07**

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Discharge Line Segment No. 3 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	1,040.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.14	0.22	0.29	0.47	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.19E+03	1.78E+03	2.37E+03	3.86E+03	5.34E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0539	0.0359	0.0469	0.0404	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0003	0.0007	0.0016	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	1,040.00	1,040.00	1,040.00	1,040.00	1,040.00	1,040.00	1,040.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.10**	**0.21**	**0.31**	**0.73**	**1.66**	**2.81**	**4.06**

Discharge Line Segment No. 4 Headloss:

Flow Ratio:	8.875
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.939
Pipe Lenth, L (ft):	15.00
Pipe Material:	SCH 80 - PVC/CPVC
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.09438E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.06	1	0.06
Gate Valve	0.15	1	0.15
Pipe Exit (sharp edged)	1	1	1
Standard Elbow, 90°	0.57	3	1.71
Standard Tee, thru flow	0.38	7	2.66
2" x 1" Expansion	0.56	1	0.56
			0
		Total K:	6.1

Segment Flowrate (gpm):	1.775	3.55	5.325	7.1	11.5375	15.975	19.525
Eqn. (1) - Velocity, v (ft/s):	0.19	0.39	0.58	0.77	1.25	1.74	2.12
Eqn. (2) - Reynolds Number, Re:	2.89E+03	5.77E+03	8.66E+03	1.15E+04	1.88E+04	2.60E+04	3.17E+04
Pipe Friction Factor, f:	0.0441	0.0359	0.0321	0.0298	0.0264	0.0244	0.0233
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0002	0.0005	0.001	0.0017	0.004	0.0071	0.0101
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	22.50	27.64	30.91	33.29	37.58	40.66	42.58
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	37.50	42.64	45.91	48.29	52.58	55.66	57.58
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.01**	**0.02**	**0.05**	**0.08**	**0.21**	**0.40**	**0.58**

ARCADIS Design & Consultancy for natural and built assets

PROJECT:	Cooper Jal, Lea County, New Mexico		BY:	E. Zardouzian	DATE: 26-Mar-2025
JOB NO.:	302230083		CHKD. BY:	W. Semel	DATE: 26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis		APPVD. BY:	W. Semel	DATE: 26-Mar-2025

Discharge Line Segment No. 5 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	6
Pipe Inner Diameter, ID (in):	5.348
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	1.12191E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.00	0.01	0.01	0.01	0.02	0.03	0.03
Eqn. (2) - Reynolds Number, Re:	1.18E+02	2.36E+02	3.54E+02	4.72E+02	7.66E+02	1.06E+03	1.30E+03
Pipe Friction Factor, f:	0.5429	0.2715	0.181	0.1357	0.0835	0.0603	0.0494
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 6 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 7 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 8 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 9 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 10 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	3
Pipe Inner Diameter, ID (in):	2.825
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	2.12389E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.01	0.02	0.03	0.04	0.07	0.09	0.11
Eqn. (2) - Reynolds Number, Re:	2.23E+02	4.46E+02	6.69E+02	8.93E+02	1.45E+03	2.01E+03	2.45E+03
Pipe Friction Factor, f:	0.2868	0.1434	0.0956	0.0717	0.0441	0.0494	0.0463
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Piping Headloss, $H_{p(discharge)}$ (ft w.c.):	**0.13**	**0.27**	**0.43**	**0.97**	**2.24**	**3.84**	**5.56**
Exit Velocity at Liquid Discharge, v (ft/s):	**0.27**	**0.53**	**0.58**	**0.77**	**1.25**	**1.74**	**2.12**
Eqn. (6) Exit Loss at Liquid Discharge, H_v (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.01**	**0.02**	**0.05**	**0.07**
Eqn. (7) Total Dynamic Head, TDH (ft w.c.):	**185.18**	**185.32**	**185.49**	**186.03**	**187.31**	**188.94**	**190.68**
Design System TDH with 20.0% Factor of Safety, (ft w.c.):	**222.22**	**222.38**	**222.59**	**223.24**	**224.77**	**226.73**	**228.82**

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JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

References:

1. Crane Co., Technical Paper No. 410: Flow of Fluids Through Valves, Fittings, and Pipe, 1988.
2. Cameron Hydraulic Data, 18th Edition, 2nd Printing, 1995.
3. Piping Handbook, 7th edition, Mohinder L. Nayyar, McGraw-Hill, New York, NY, 2000.
4. Lamont, Peter A. (1981, May). Common Pipe Flow Formulas Compared with the Theory of Roughness, Journal of the American Water Works Association, Denver, CO.
5. Hydraulic Institute, Engineering Data Book, 2nd Edition.
6. Plastic Pipe Institute's Handbook of Polyethylene Pipe, 2nd. Edition.

Equations:

Eqn. (1):

$$v = \frac{\frac{gpm}{448.8312}}{\frac{\pi}{4} \cdot \left(\frac{ID}{12}\right)^2}$$

Eqn. (2):

$$Re = \frac{v \cdot \frac{ID}{12}}{\eta}$$

Eqn. (3):

$$H = \frac{f \cdot v^2}{2 \cdot g \cdot \frac{ID}{12}} = \frac{f \cdot v^2}{2 \cdot (32.174) \cdot \frac{ID}{12}}$$

Eqn. (4a):

$$L_F = \frac{k \cdot \frac{ID}{12}}{f}$$

Eqn. (4b):

$$L_{eq} = L + L_F$$

Eqn. (5):

$$H_P = H \cdot L_{eq}$$

Eqn. (6):

$$H_v = \frac{v^2}{2 \cdot g} = \frac{v^2}{2 \cdot (32.174)}$$

Eqn. (7):

$$TDH = 2.31 \cdot \left(P_{sys2} - P_{sys1}\right) + H_{st2} + Inline\ Equipment\ Headloss + H_{p(discharge)} + H_v - H_{st1}$$

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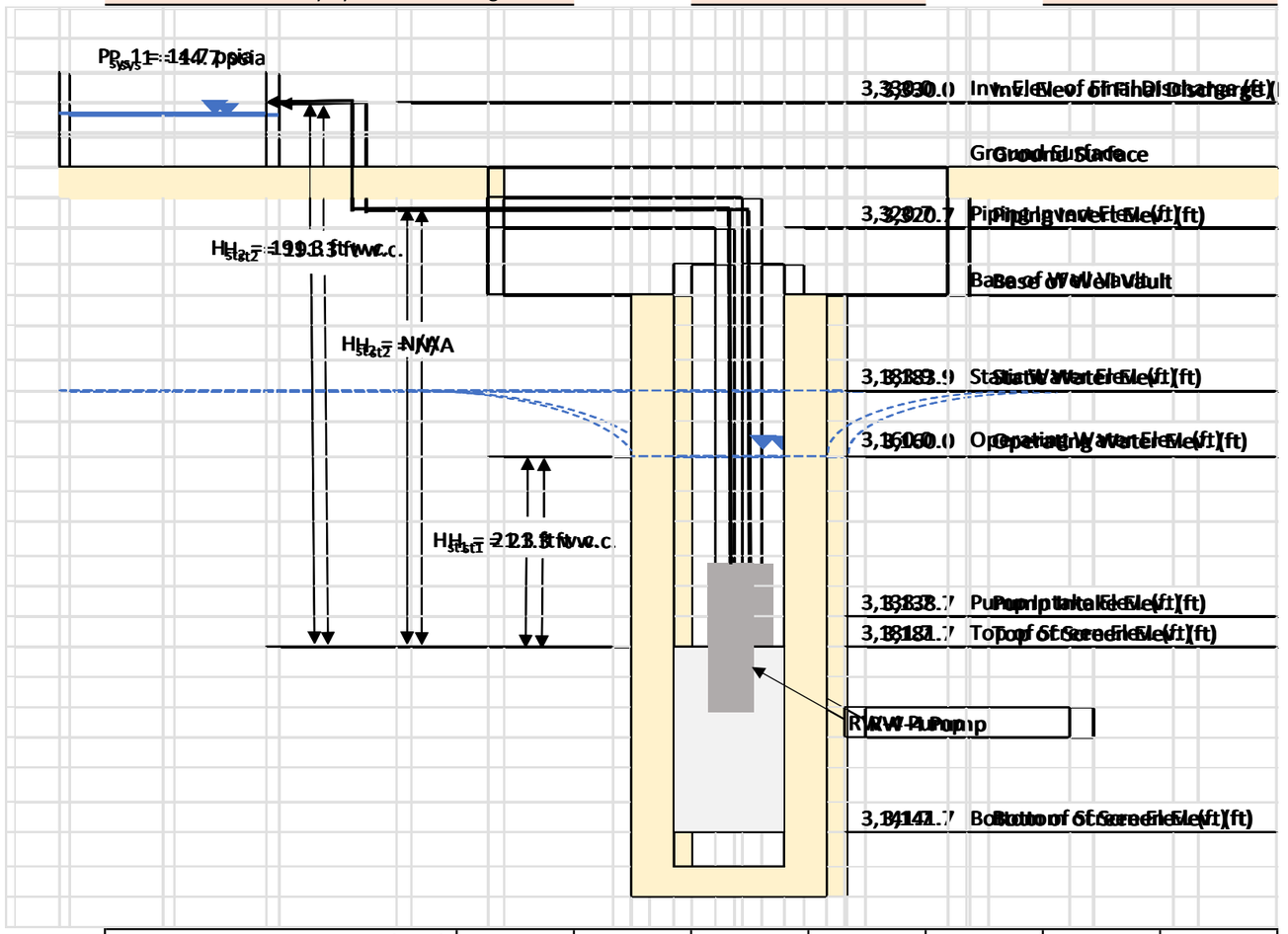
Pump ID:	RW-4 Pump
Fluid:	Water
Fluid Description:	Groundwater
Enter Fluid Density if Other than Water (lb/ft^3):	
Enter Fluid Viscosity if Other than Water (cp):	
Enter Vapor Pressure if Other than Water (psi):	
Minimum Flow Rate (gpm):	0.2
Design Flow Rate (gpm):	1.2
Maximum Flow Rate (gpm):	2.2
Pressure of System to be Pumped, P_{sys1} (psia):	14.7
Pressure of System Discharged, P_{sys2} (psia):	14.7
Fluid Temperature (°F):	68
Inv. Elev. of Extraction Well Discharge Pipe (ft):	3320.68
Inv. Elev. of Final Discharge [If Applicable] (ft):	3330
Top of Screen Elevation (ft):	3181.7
Bottom of Screen Elevation (ft):	3141.7
Static Water Level Elevation (ft):	3183.85
Operating Water Level Elevation (ft):	3159.95
Pump Impeller Centerline Elevation (ft):	3138.7
Discharge Elevation (ft):	3330
Static Head of Discharge Line , H_{st2} (ft):	191.3
Static Head of Liquid to be Pumped, H_{st1} (ft):	21.25
Safety Factor:	20.0%
Vapor Pressure (ft. w.c.):	0.783
Fluid density, ρ (lb/ft^3):	62.32
Fluid Kinematic Viscosity, η (ft^2/s):	1.08E-05
Include Exit Headloss at Discharge, H_v:	Yes



Notes:

- GW Elevation based on 7/23 RW-2R data
- Well discharge Pipe based on RW-2R TOC
- Surface elevation assumed to be 3314.7 ft MSL
- Drawdown assumed to be 23.9 feet per GW model

Flow Rates (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
(gpd):	288	720	1,152	1,728	2,160	2,592	3,168
(MGD):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Optional - Pump Head (ft w.c.):							
Optional - NSPH Required (ft w.c.):				32.81			

In-Line Equipment Headloss:

Equipment Tag	Pressure Loss (ft w.c.)	Equipment Tag	Pressure Loss (ft w.c.)
Flow Meter	15.0		
Subtotal:	*15.0*	*Subtotal:*	*0.0*

Total Headloss (ft w.c.): 15.0

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Discharge Line Segment No. 1 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	190.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Stop Check Valve (piston), flow thru	6.9	1	6.9
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	1	0.69
Gate Valve	0.18	1	0.18
Standard Tee, thru branch	1.38	2	2.76
1" x 1.25" Expansion Fitting	0.19	1	0.19
3" x 6" Expansion Fitting			0
		Total K:	10.8

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.18	0.29	0.43	0.54	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	3.56E+03	4.45E+03	5.34E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0431	0.0469	0.0414	0.0387	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.0014	0.002	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	8.86	22.16	20.36	23.07	24.67	25.95	27.52
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	198.86	212.16	210.36	213.07	214.67	215.95	217.52
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.02**	**0.04**	**0.15**	**0.30**	**0.43**	**0.58**	**0.85**

Discharge Line Segment No. 2 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	15.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	2	1.38
		1	0
		1	0
			0
			0
			0
		Total K:	1.5

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.18	0.29	0.43	0.54	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	3.56E+03	4.45E+03	5.34E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0431	0.0469	0.0414	0.0387	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.0014	0.002	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	1.19	2.98	2.74	3.10	3.32	3.49	3.70
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	16.19	17.98	17.74	18.10	18.32	18.49	18.70
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.03**	**0.04**	**0.05**	**0.07**

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PROJECT:	Cooper Jal, Lea County, New Mexico	BY:	E. Zardouzian	DATE:	26-Mar-2025
JOB NO.:	302230083	CHKD. BY:	W. Semel	DATE:	26-Mar-2025
SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 3 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	1,400.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.18	0.29	0.43	0.54	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	3.56E+03	4.45E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0431	0.0469	0.0414	0.0387	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.0014	0.002	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	1,400.00	1,400.00	1,400.00	1,400.00	1,400.00	1,400.00	1,400.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.14**	**0.28**	**0.98**	**1.96**	**2.80**	**3.78**	**5.46**

Discharge Line Segment No. 4 Headloss:

Flow Ratio:	5.916666667
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.939
Pipe Lenth, L (ft):	15.00
Pipe Material:	SCH 80 - PVC/CPVC
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.09438E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.06	1	0.06
Gate Valve	0.15	1	0.15
Pipe Exit (sharp edged)	1	1	1
Standard Elbow, 90°	0.57	3	1.71
Standard Tee, thru flow	0.38	7	2.66
2" x 1" Expansion	0.56	1	0.56
			0
		Total K:	6.1

Segment Flowrate (gpm):	1.1833333	2.9583333	4.7333333	7.1	8.875	10.65	13.016667
Eqn. (1) - Velocity, *v* (ft/s):	0.13	0.32	0.51	0.77	0.96	1.16	1.41
Eqn. (2) - Reynolds Number, Re:	1.92E+03	4.81E+03	7.69E+03	1.15E+04	1.44E+04	1.73E+04	2.12E+04
Pipe Friction Factor, *f*:	0.0333	0.0378	0.0332	0.0298	0.0281	0.0269	0.0256
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0004	0.0008	0.0017	0.0025	0.0035	0.0049
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	29.79	26.25	29.88	33.29	35.31	36.88	38.75
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	44.79	41.25	44.88	48.29	50.31	51.88	53.75
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.02**	**0.04**	**0.08**	**0.13**	**0.18**	**0.26**

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Discharge Line Segment No. 5 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	6
Pipe Inner Diameter, ID (in):	5.348
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	1.12191E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.00	0.01	0.01	0.02	0.02	0.03	0.03
Eqn. (2) - Reynolds Number, Re:	1.18E+02	2.95E+02	4.72E+02	7.07E+02	8.84E+02	1.06E+03	1.30E+03
Pipe Friction Factor, f:	0.5429	0.2172	0.1357	0.0905	0.0724	0.0603	0.0494
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 6 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.13	0.17	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.97E+03	2.47E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0324	0.0463	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 7 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.02	0.06	0.09	0.13	0.17	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.97E+03	2.47E+03	2.96E+03	3.62E+03
Pipe Friction Factor, *f*:	0.1946	0.0778	0.0487	0.0324	0.0463	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 8 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.02	0.06	0.09	0.13	0.17	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.97E+03	2.47E+03	2.96E+03	3.62E+03
Pipe Friction Factor, *f*:	0.1946	0.0778	0.0487	0.0324	0.0463	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 9 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.13	0.17	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.97E+03	2.47E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0324	0.0463	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0.0001	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 10 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	3
Pipe Inner Diameter, ID (in):	2.825
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	2.12389E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1.2	1.5	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.01	0.03	0.04	0.06	0.08	0.09	0.11
Eqn. (2) - Reynolds Number, Re:	2.23E+02	5.58E+02	8.93E+02	1.34E+03	1.67E+03	2.01E+03	2.45E+03
Pipe Friction Factor, f:	0.2868	0.1147	0.0717	0.0478	0.0382	0.0494	0.0463
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Piping Headloss, $H_{p(discharge)}$ (ft w.c.):	**0.16**	**0.34**	**1.18**	**2.37**	**3.40**	**4.59**	**6.64**
Exit Velocity at Liquid Discharge, v (ft/s):	**0.14**	**0.50**	**0.51**	**0.77**	**0.96**	**1.16**	**1.41**
Eqn. (6) Exit Loss at Liquid Discharge, H_v (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.02**	**0.03**
Eqn. (7) Total Dynamic Head, TDH (ft w.c.):	**185.21**	**185.39**	**186.23**	**187.43**	**188.46**	**189.66**	**191.72**
Design System TDH with 20.0% Factor of Safety, (ft w.c.):	**222.25**	**222.47**	**223.48**	**224.92**	**226.15**	**227.59**	**230.06**

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SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

References:

1. Crane Co., Technical Paper No. 410: Flow of Fluids Through Valves, Fittings, and Pipe, 1988.
2. Cameron Hydraulic Data, 18th Edition, 2nd Printing, 1995.
3. Piping Handbook, 7th edition, Mohinder L. Nayyar, McGraw-Hill, New York, NY, 2000.
4. Lamont, Peter A. (1981, May). Common Pipe Flow Formulas Compared with the Theory of Roughness, Journal of the American Water Works Association, Denver, CO.
5. Hydraulic Institute, Engineering Data Book, 2nd Edition.
6. Plastic Pipe Institute's Handbook of Polyethylene Pipe, 2nd. Edition.

Equations:

Eqn. (1):

$$v = \frac{\frac{gpm}{448.8312}}{\frac{\pi}{4} \cdot \left(\frac{ID}{12}\right)^2}$$

Eqn. (2):

$$Re = \frac{v \cdot \frac{ID}{12}}{\eta}$$

Eqn. (3):

$$H = \frac{f \cdot v^2}{2 \cdot g \cdot \frac{ID}{12}} = \frac{f \cdot v^2}{2 \cdot (32.174) \cdot \frac{ID}{12}}$$

Eqn. (4a):

$$L_F = \frac{k \cdot \frac{ID}{12}}{f}$$

Eqn. (4b):

$$L_{eq} = L + L_F$$

Eqn. (5):

$$H_P = H \cdot L_{eq}$$

Eqn. (6):

$$H_v = \frac{v^2}{2 \cdot g} = \frac{v^2}{2 \cdot (32.174)}$$

Eqn. (7):

$$TDH = 2.31 \cdot \left(P_{sys2} - P_{sys1}\right) + H_{st2} + Inline\ Equipment\ Headloss + H_{p(discharge)} + H_v - H_{st1}$$

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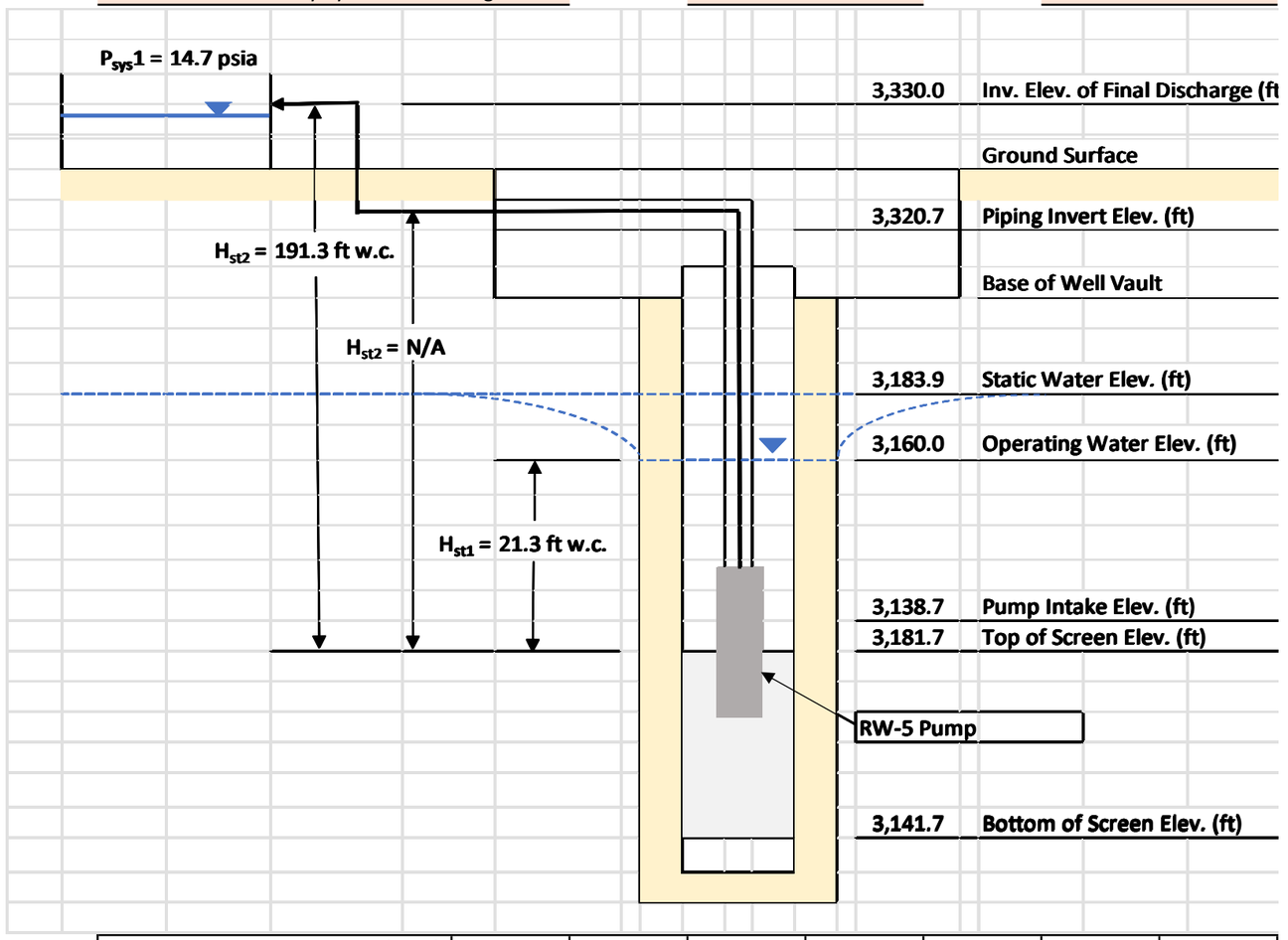
Pump ID:	RW-5 Pump
Fluid:	Water
Fluid Description:	Groundwater
Enter Fluid Density if Other than Water (lb/ft^3):	
Enter Fluid Viscosity if Other than Water (cp):	
Enter Vapor Pressure if Other than Water (psi):	
Minimum Flow Rate (gpm):	0.2
Design Flow Rate (gpm):	1
Maximum Flow Rate (gpm):	2.2
Pressure of System to be Pumped, P_{sys1} (psia):	14.7
Pressure of System Discharged, P_{sys2} (psia):	14.7
Fluid Temperature (°F):	68
Inv. Elev. of Extraction Well Discharge Pipe (ft):	3320.68
Inv. Elev. of Final Discharge [If Applicable] (ft):	3330
Top of Screen Elevation (ft):	3181.7
Bottom of Screen Elevation (ft):	3141.7
Static Water Level Elevation (ft):	3183.85
Operating Water Level Elevation (ft):	3159.95
Pump Impeller Centerline Elevation (ft):	3138.7
Discharge Elevation (ft):	3330
Static Head of Discharge Line , H_{st2} (ft):	191.3
Static Head of Liquid to be Pumped, H_{st1} (ft):	21.25
Safety Factor:	20.0%
Vapor Pressure (ft. w.c.):	0.783
Fluid density, ρ (lb/ft^3):	62.32
Fluid Kinematic Viscosity, η (ft^2/s):	1.08E-05
Include Exit Headloss at Discharge, H_v:	Yes



Notes:

GW Elevation based on 7/23 RW-2R data
Well discharge Pipe based on RW-2R TOC
Surface elevation assumed to be 3314.7 ft MSL
Drawdown assumed to be 23.9 feet per GW model

Flow Rates (gpm):	0.2	0.5	0.8	1.0	1.4	1.8	2.2
(gpd):	288	720	1,152	1,440	2,016	2,592	3,168
(MGD):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Optional - Pump Head (ft w.c.):							
Optional - NSPH Required (ft w.c.):				32.81			

In-Line Equipment Headloss:

Equipment Tag	Pressure Loss (ft w.c.)	Equipment Tag	Pressure Loss (ft w.c.)
Flow Meter	15.0		
Subtotal:	*15.0*	*Subtotal:*	*0.0*

Total Headloss (ft w.c.): **15.0**

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Discharge Line Segment No. 1 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	190.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Stop Check Valve (piston), flow thru	6.9	1	6.9
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	1	0.69
Gate Valve	0.18	1	0.18
Standard Tee, thru branch	1.38	2	2.76
1" x 1.25" Expansion Fitting	0.19	1	0.19
3" x 6" Expansion Fitting			0
		Total K:	10.8

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	8.86	22.16	20.36	21.85	24.18	25.95	27.52
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	198.86	212.16	210.36	211.85	214.18	215.95	217.52
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.02**	**0.04**	**0.15**	**0.21**	**0.39**	**0.58**	**0.85**

Discharge Line Segment No. 2 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	15.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	2	1.38
		1	0
		1	0
			0
			0
			0
		Total K:	1.5

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	1.19	2.98	2.74	2.94	3.25	3.49	3.70
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	16.19	17.98	17.74	17.94	18.25	18.49	18.70
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.02**	**0.03**	**0.05**	**0.07**

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SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 3 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	900.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	900.00	900.00	900.00	900.00	900.00	900.00	900.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.09**	**0.18**	**0.63**	**0.90**	**1.62**	**2.43**	**3.51**

Discharge Line Segment No. 4 Headloss:

Flow Ratio:	7.1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.939
Pipe Lenth, L (ft):	15.00
Pipe Material:	SCH 80 - PVC/CPVC
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.09438E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.06	1	0.06
Gate Valve	0.15	1	0.15
Pipe Exit (sharp edged)	1	1	1
Standard Elbow, 90°	0.57	3	1.71
Standard Tee, thru flow	0.38	7	2.66
2" x 1" Expansion	0.56	1	0.56
			0
		Total K:	6.1

Segment Flowrate (gpm):	1.42	3.55	5.68	7.1	9.94	12.78	15.62
Eqn. (1) - Velocity, v (ft/s):	0.15	0.39	0.62	0.77	1.08	1.39	1.70
Eqn. (2) - Reynolds Number, Re:	2.31E+03	5.77E+03	9.23E+03	1.15E+04	1.62E+04	2.08E+04	2.54E+04
Pipe Friction Factor, f:	0.0473	0.0359	0.0316	0.0298	0.0274	0.0257	0.0245
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0005	0.0012	0.0017	0.0031	0.0048	0.0068
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	20.98	27.64	31.40	33.29	36.21	38.60	40.49
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	35.98	42.64	46.40	48.29	51.21	53.60	55.49
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.02**	**0.06**	**0.08**	**0.16**	**0.26**	**0.38**

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Discharge Line Segment No. 5 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	6
Pipe Inner Diameter, ID (in):	5.348
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	1.12191E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.00	0.01	0.01	0.01	0.02	0.03	0.03
Eqn. (2) - Reynolds Number, Re:	1.18E+02	2.95E+02	4.72E+02	5.89E+02	8.25E+02	1.06E+03	1.30E+03
Pipe Friction Factor, f:	0.5429	0.2172	0.1357	0.1086	0.0776	0.0603	0.0494
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 6 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 7 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 8 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 9 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 10 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	3
Pipe Inner Diameter, ID (in):	2.825
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	2.12389E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.01	0.03	0.04	0.05	0.07	0.09	0.11
Eqn. (2) - Reynolds Number, Re:	2.23E+02	5.58E+02	8.93E+02	1.12E+03	1.56E+03	2.01E+03	2.45E+03
Pipe Friction Factor, f:	0.2868	0.1147	0.0717	0.0574	0.041	0.0494	0.0463
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Piping Headloss, $H_{p(discharge)}$ (ft w.c.):	**0.11**	**0.24**	**0.85**	**1.21**	**2.20**	**3.32**	**4.81**
Exit Velocity at Liquid Discharge, v (ft/s):	**0.14**	**0.57**	**0.62**	**0.77**	**1.08**	**1.39**	**1.70**
Eqn. (6) Exit Loss at Liquid Discharge, H_v (ft w.c.):	**0.00**	**0.01**	**0.01**	**0.01**	**0.02**	**0.03**	**0.04**
Eqn. (7) Total Dynamic Head, TDH (ft w.c.):	**185.16**	**185.30**	**185.91**	**186.27**	**187.27**	**188.40**	**189.90**
Design System TDH with 20.0% Factor of Safety, (ft w.c.):	**222.19**	**222.36**	**223.09**	**223.52**	**224.72**	**226.08**	**227.88**

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References:

1. Crane Co., Technical Paper No. 410: Flow of Fluids Through Valves, Fittings, and Pipe, 1988.
2. Cameron Hydraulic Data, 18th Edition, 2nd Printing, 1995.
3. Piping Handbook, 7th edition, Mohinder L. Nayyar, McGraw-Hill, New York, NY, 2000.
4. Lamont, Peter A. (1981, May). Common Pipe Flow Formulas Compared with the Theory of Roughness, Journal of the American Water Works Association, Denver, CO.
5. Hydraulic Institute, Engineering Data Book, 2nd Edition.
6. Plastic Pipe Institute's Handbook of Polyethylene Pipe, 2nd. Edition.

Equations:

Eqn. (1):

$$v = \frac{\frac{gpm}{448.8312}}{\frac{\pi}{4} \cdot \left(\frac{ID}{12}\right)^2}$$

Eqn. (2):

$$Re = \frac{v \cdot \frac{ID}{12}}{\eta}$$

Eqn. (3):

$$H = \frac{f \cdot v^2}{2 \cdot g \cdot \frac{ID}{12}} = \frac{f \cdot v^2}{2 \cdot (32.174) \cdot \frac{ID}{12}}$$

Eqn. (4a):

$$L_F = \frac{k \cdot \frac{ID}{12}}{f}$$

Eqn. (4b):

$$L_{eq} = L + L_F$$

Eqn. (5):

$$H_P = H \cdot L_{eq}$$

Eqn. (6):

$$H_v = \frac{v^2}{2 \cdot g} = \frac{v^2}{2 \cdot (32.174)}$$

Eqn. (7):

$$TDH = 2.31 \cdot \left(P_{sys2} - P_{sys1}\right) + H_{st2} + Inline\ Equipment\ Headloss + H_{p(discharge)} + H_v - H_{st1}$$

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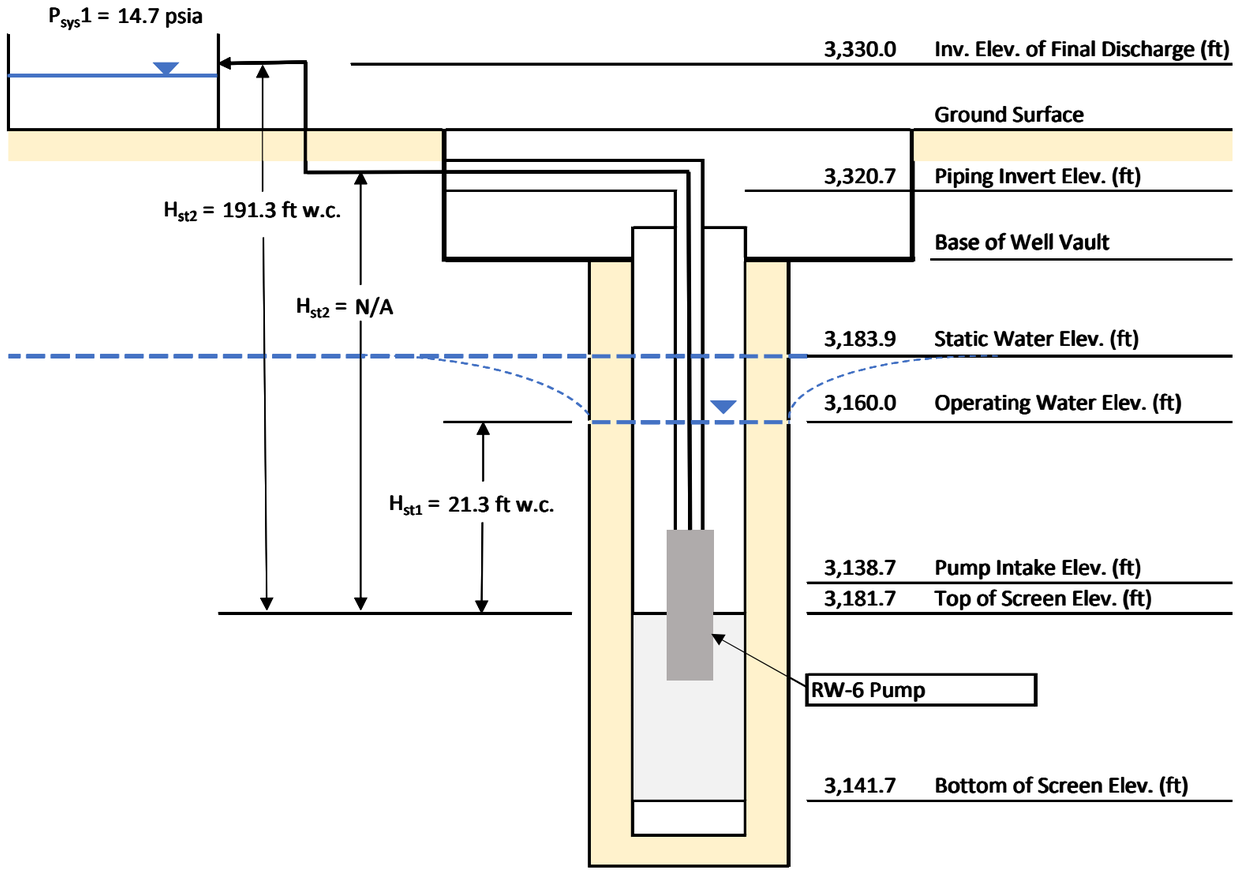
Pump ID:	RW-6 Pump
Fluid:	Water
Fluid Description:	Groundwater
Enter Fluid Density if Other than Water (lb/ft^3):	
Enter Fluid Viscosity if Other than Water (cp):	
Enter Vapor Pressure if Other than Water (psi):	
Minimum Flow Rate (gpm):	0.2
Design Flow Rate (gpm):	1
Maximum Flow Rate (gpm):	2.2
Pressure of System to be Pumped, P_{sys1} (psia):	14.7
Pressure of System Discharged, P_{sys2} (psia):	14.7
Fluid Temperature (°F):	68
Inv. Elev. of Extraction Well Discharge Pipe (ft):	3320.68
Inv. Elev. of Final Discharge [If Applicable] (ft):	3330
Top of Screen Elevation (ft):	3181.7
Bottom of Screen Elevation (ft):	3141.7
Static Water Level Elevation (ft):	3183.85
Operating Water Level Elevation (ft):	3159.95
Pump Impeller Centerline Elevation (ft):	3138.7
Discharge Elevation (ft):	3330
Static Head of Discharge Line , H_{st2} (ft):	191.3
Static Head of Liquid to be Pumped, H_{st1} (ft):	21.25
Safety Factor:	20.0%
Vapor Pressure (ft. w.c.):	0.783
Fluid density, ρ (lb/ft^3):	62.32
Fluid Kinematic Viscosity, η (ft^2/s):	1.08E-05
Include Exit Headloss at Discharge, H_v:	Yes



Notes:

GW Elevation based on 7/23 RW-2R data
Well discharge Pipe based on RW-2R TOC
Surface elevation assumed to be 3314.7 ft MSL
Drawdown assumed to be 23.9 feet per GW model

Flow Rates (gpm):	0.2	0.5	0.8	1.0	1.4	1.8	2.2
(gpd):	288	720	1,152	1,440	2,016	2,592	3,168
(MGD):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Optional - Pump Head (ft w.c.):							
Optional - NSPH Required (ft w.c.):				32.81			

In-Line Equipment Headloss:

Equipment Tag	Pressure Loss (ft w.c.)	Equipment Tag	Pressure Loss (ft w.c.)
Flow Meter	15.0		
Subtotal:	*15.0*	*Subtotal:*	*0.0*

Total Headloss (ft w.c.): **15.0**

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SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

Discharge Line Segment No. 1 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	190.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Stop Check Valve (piston), flow thru	6.9	1	6.9
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	1	0.69
Gate Valve	0.18	1	0.18
Standard Tee, thru branch	1.38	2	2.76
1" x 1.25" Expansion Fitting	0.19	1	0.19
3" x 6" Expansion Fitting			0
		Total K:	10.8

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	8.86	22.16	20.36	21.85	24.18	25.95	27.52
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	198.86	212.16	210.36	211.85	214.18	215.95	217.52
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.02**	**0.04**	**0.15**	**0.21**	**0.39**	**0.58**	**0.85**

Discharge Line Segment No. 2 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	15.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	2	1.38
		1	0
		1	0
			0
			0
			0
		Total K:	1.5

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	1.19	2.98	2.74	2.94	3.25	3.49	3.70
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	16.19	17.98	17.74	17.94	18.25	18.49	18.70
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.02**	**0.03**	**0.05**	**0.07**

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Discharge Line Segment No. 3 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	820.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.18	0.29	0.36	0.51	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.48E+03	2.37E+03	2.97E+03	4.16E+03	5.34E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0431	0.0469	0.0437	0.0395	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0007	0.001	0.0018	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	820.00	820.00	820.00	820.00	820.00	820.00	820.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.08**	**0.16**	**0.57**	**0.82**	**1.48**	**2.21**	**3.20**

Discharge Line Segment No. 4 Headloss:

Flow Ratio:	7.1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.939
Pipe Lenth, L (ft):	15.00
Pipe Material:	SCH 80 - PVC/CPVC
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.09438E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.06	1	0.06
Gate Valve	0.15	1	0.15
Pipe Exit (sharp edged)	1	1	1
Standard Elbow, 90°	0.57	3	1.71
Standard Tee, thru flow	0.38	7	2.66
2" x 1" Expansion	0.56	1	0.56
			0
		Total K:	6.1

Segment Flowrate (gpm):	1.42	3.55	5.68	7.1	9.94	12.78	15.62
Eqn. (1) - Velocity, v (ft/s):	0.15	0.39	0.62	0.77	1.08	1.39	1.70
Eqn. (2) - Reynolds Number, Re:	2.31E+03	5.77E+03	9.23E+03	1.15E+04	1.62E+04	2.08E+04	2.54E+04
Pipe Friction Factor, f:	0.0473	0.0359	0.0316	0.0298	0.0274	0.0257	0.0245
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0005	0.0012	0.0017	0.0031	0.0048	0.0068
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	20.98	27.64	31.40	33.29	36.21	38.60	40.49
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	35.98	42.64	46.40	48.29	51.21	53.60	55.49
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.02**	**0.06**	**0.08**	**0.16**	**0.26**	**0.38**

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Discharge Line Segment No. 5 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	6
Pipe Inner Diameter, ID (in):	5.348
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	1.12191E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.00	0.01	0.01	0.01	0.02	0.03	0.03
Eqn. (2) - Reynolds Number, Re:	1.18E+02	2.95E+02	4.72E+02	5.89E+02	8.25E+02	1.06E+03	1.30E+03
Pipe Friction Factor, f:	0.5429	0.2172	0.1357	0.1086	0.0776	0.0603	0.0494
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 6 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 7 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 8 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 9 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.06	0.09	0.11	0.16	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	8.22E+02	1.32E+03	1.64E+03	2.30E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0778	0.0487	0.0389	0.0473	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 10 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	3
Pipe Inner Diameter, ID (in):	2.825
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	2.12389E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.5	0.8	1	1.4	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.01	0.03	0.04	0.05	0.07	0.09	0.11
Eqn. (2) - Reynolds Number, Re:	2.23E+02	5.58E+02	8.93E+02	1.12E+03	1.56E+03	2.01E+03	2.45E+03
Pipe Friction Factor, f:	0.2868	0.1147	0.0717	0.0574	0.041	0.0494	0.0463
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Piping Headloss, $H_{p(discharge)}$ (ft w.c.):	**0.10**	**0.22**	**0.79**	**1.13**	**2.06**	**3.10**	**4.50**
Exit Velocity at Liquid Discharge, v (ft/s):	**0.14**	**0.57**	**0.62**	**0.77**	**1.08**	**1.39**	**1.70**
Eqn. (6) Exit Loss at Liquid Discharge, H_v (ft w.c.):	**0.00**	**0.01**	**0.01**	**0.01**	**0.02**	**0.03**	**0.04**
Eqn. (7) Total Dynamic Head, TDH (ft w.c.):	**185.15**	**185.28**	**185.85**	**186.19**	**187.13**	**188.18**	**189.59**
Design System TDH with 20.0% Factor of Safety, (ft w.c.):	**222.18**	**222.34**	**223.02**	**223.43**	**224.56**	**225.82**	**227.51**

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SUBJECT:	Groundwater Recovery System 30% Design Basis	APPVD. BY:	W. Semel	DATE:	26-Mar-2025

References:

1. Crane Co., Technical Paper No. 410: Flow of Fluids Through Valves, Fittings, and Pipe, 1988.
2. Cameron Hydraulic Data, 18th Edition, 2nd Printing, 1995.
3. Piping Handbook, 7th edition, Mohinder L. Nayyar, McGraw-Hill, New York, NY, 2000.
4. Lamont, Peter A. (1981, May). Common Pipe Flow Formulas Compared with the Theory of Roughness, Journal of the American Water Works Association, Denver, CO.
5. Hydraulic Institute, Engineering Data Book, 2nd Edition.
6. Plastic Pipe Institute's Handbook of Polyethylene Pipe, 2nd. Edition.

Equations:

Eqn. (1):

$$v = \frac{\frac{gpm}{448.8312}}{\frac{\pi}{4} \cdot \left(\frac{ID}{12}\right)^2}$$

Eqn. (2):

$$Re = \frac{v \cdot \frac{ID}{12}}{\eta}$$

Eqn. (3):

$$H = \frac{f \cdot v^2}{2 \cdot g \cdot \frac{ID}{12}} = \frac{f \cdot v^2}{2 \cdot (32.174) \cdot \frac{ID}{12}}$$

Eqn. (4a):

$$L_F = \frac{k \cdot \frac{ID}{12}}{f}$$

Eqn. (4b):

$$L_{eq} = L + L_F$$

Eqn. (5):

$$H_P = H \cdot L_{eq}$$

Eqn. (6):

$$H_v = \frac{v^2}{2 \cdot g} = \frac{v^2}{2 \cdot (32.174)}$$

Eqn. (7):

$$TDH = 2.31 \cdot \left(P_{sys2} - P_{sys1}\right) + H_{st2} + Inline\ Equipment\ Headloss + H_{p(discharge)} + H_v - H_{st1}$$

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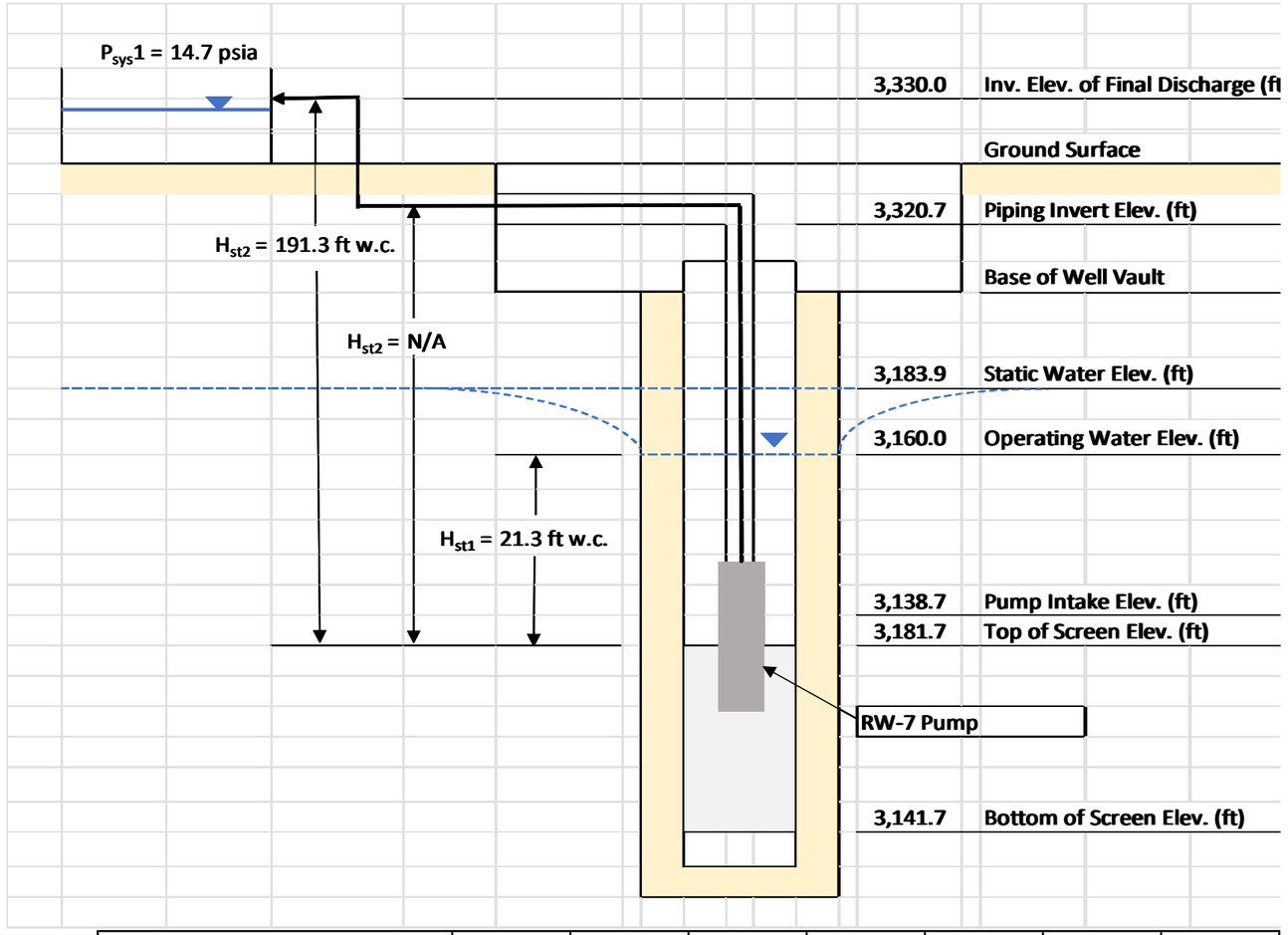
Pump ID:	RW-7 Pump
Fluid:	Water
Fluid Description:	Groundwater
Enter Fluid Density if Other than Water (lb/ft^3):	
Enter Fluid Viscosity if Other than Water (cp):	
Enter Vapor Pressure if Other than Water (psi):	
Minimum Flow Rate (gpm):	0.2
Design Flow Rate (gpm):	0.8
Maximum Flow Rate (gpm):	2.2
Pressure of System to be Pumped, P_{sys1} (psia):	14.7
Pressure of System Discharged, P_{sys2} (psia):	14.7
Fluid Temperature (°F):	68
Inv. Elev. of Extraction Well Discharge Pipe (ft):	3320.68
Inv. Elev. of Final Discharge [If Applicable] (ft):	3330
Top of Screen Elevation (ft):	3181.7
Bottom of Screen Elevation (ft):	3141.7
Static Water Level Elevation (ft):	3183.85
Operating Water Level Elevation (ft):	3159.95
Pump Impeller Centerline Elevation (ft):	3138.7
Discharge Elevation (ft):	3330
Static Head of Discharge Line , H_{st2} (ft):	191.3
Static Head of Liquid to be Pumped, H_{st1} (ft):	21.25
Safety Factor:	20.0%
Vapor Pressure (ft. w.c.):	0.783
Fluid density, ρ (lb/ft^3):	62.32
Fluid Kinematic Viscosity, η (ft^2/s):	1.08E-05
Include Exit Headloss at Discharge, H_v:	Yes



Notes:

- GW Elevation based on 7/23 RW-2R data
- Well discharge Pipe based on RW-2R TOC
- Surface elevation assumed to be 3314.7 ft MSL
- Drawdown assumed to be 23.9 feet per GW model

Flow Rates (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
(gpd):	288	576	864	1,152	1,872	2,592	3,168
(MGD):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Optional - Pump Head (ft w.c.):							
Optional - NSPH Required (ft w.c.):				32.81			

In-Line Equipment Headloss:

Equipment Tag	Pressure Loss (ft w.c.)	Equipment Tag	Pressure Loss (ft w.c.)	
Flow Meter	15.0			
Subtotal:	*15.0*	*Subtotal:*	*0.0*	**Total Headloss (ft w.c.):** **15.0**

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Discharge Line Segment No. 1 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	190.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Stop Check Valve (piston), flow thru	6.9	1	6.9
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	1	0.69
Gate Valve	0.18	1	0.18
Standard Tee, thru branch	1.38	2	2.76
1" x 1.25" Expansion Fitting	0.19	1	0.19
3" x 6" Expansion Fitting			0
		Total K:	10.8

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.14	0.22	0.29	0.47	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.19E+03	1.78E+03	2.37E+03	3.86E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0539	0.0359	0.0469	0.0404	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0003	0.0007	0.0016	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	8.86	17.72	26.60	20.36	23.64	25.95	27.52
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	198.86	207.72	216.60	210.36	213.64	215.95	217.52
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.02**	**0.04**	**0.06**	**0.15**	**0.34**	**0.58**	**0.85**

Discharge Line Segment No. 2 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	15.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.07	1	0.07
Standard Elbow, 90°	0.69	2	1.38
		1	0
		1	0
			0
			0
			0
		Total K:	1.5

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, *v* (ft/s):	0.07	0.14	0.22	0.29	0.47	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.19E+03	1.78E+03	2.37E+03	3.86E+03	5.34E+03	6.53E+03
Pipe Friction Factor, *f*:	0.1078	0.0539	0.0359	0.0469	0.0404	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0003	0.0007	0.0016	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	1.19	2.38	3.57	2.74	3.18	3.49	3.70
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	16.19	17.38	18.57	17.74	18.18	18.49	18.70
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.01**	**0.03**	**0.05**	**0.07**

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Discharge Line Segment No. 3 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	1
Pipe Inner Diameter, ID (in):	1.062
Pipe Length, L (ft):	1,200.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	5.64972E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.07	0.14	0.22	0.29	0.47	0.65	0.80
Eqn. (2) - Reynolds Number, Re:	5.94E+02	1.19E+03	1.78E+03	2.37E+03	3.86E+03	5.34E+03	6.53E+03
Pipe Friction Factor, f:	0.1078	0.0539	0.0359	0.0469	0.0404	0.0368	0.0347
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0001	0.0002	0.0003	0.0007	0.0016	0.0027	0.0039
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	1,200.00	1,200.00	1,200.00	1,200.00	1,200.00	1,200.00	1,200.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.12**	**0.24**	**0.36**	**0.84**	**1.92**	**3.24**	**4.68**

Discharge Line Segment No. 4 Headloss:

Flow Ratio:	8.875
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.939
Pipe Lenth, L (ft):	15.00
Pipe Material:	SCH 80 - PVC/CPVC
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.09438E-05

Valve/Fitting Tag	K	No. Units	Total K
Ball Valve	0.06	1	0.06
Gate Valve	0.15	1	0.15
Pipe Exit (sharp edged)	1	1	1
Standard Elbow, 90°	0.57	3	1.71
Standard Tee, thru flow	0.38	7	2.66
2" x 1" Expansion	0.56	1	0.56
			0
		Total K:	6.1

Segment Flowrate (gpm):	1.775	3.55	5.325	7.1	11.5375	15.975	19.525
Eqn. (1) - Velocity, v (ft/s):	0.19	0.39	0.58	0.77	1.25	1.74	2.12
Eqn. (2) - Reynolds Number, Re:	2.89E+03	5.77E+03	8.66E+03	1.15E+04	1.88E+04	2.60E+04	3.17E+04
Pipe Friction Factor, f:	0.0441	0.0359	0.0321	0.0298	0.0264	0.0244	0.0233
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0.0002	0.0005	0.001	0.0017	0.004	0.0071	0.0101
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	22.50	27.64	30.91	33.29	37.58	40.66	42.58
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	37.50	42.64	45.91	48.29	52.58	55.66	57.58
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.01**	**0.02**	**0.05**	**0.08**	**0.21**	**0.40**	**0.58**

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Discharge Line Segment No. 5 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	6
Pipe Inner Diameter, ID (in):	5.348
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	1.12191E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.00	0.01	0.01	0.01	0.02	0.03	0.03
Eqn. (2) - Reynolds Number, Re:	1.18E+02	2.36E+02	3.54E+02	4.72E+02	7.66E+02	1.06E+03	1.30E+03
Pipe Friction Factor, f:	0.5429	0.2715	0.181	0.1357	0.0835	0.0603	0.0494
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 6 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 7 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 8 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Discharge Line Segment No. 9 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	2
Pipe Inner Diameter, ID (in):	1.917
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	3.12989E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.02	0.04	0.07	0.09	0.14	0.20	0.24
Eqn. (2) - Reynolds Number, Re:	3.29E+02	6.58E+02	9.87E+02	1.32E+03	2.14E+03	2.96E+03	3.62E+03
Pipe Friction Factor, f:	0.1946	0.0973	0.0649	0.0487	0.0484	0.0437	0.0411
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0.0001	0.0002	0.0002
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Line Segment No. 10 Headloss:

Flow Ratio:	1
Nominal Pipe Diameter (in):	3
Pipe Inner Diameter, ID (in):	2.825
Pipe Length, L (ft):	0.00
Pipe Material:	SDR 11 - HDPE
Pipe Type:	Smooth Pipes (PE and other thermoplastics)
Roughness, e (ft):	0.000005
e / ID:	2.12389E-05

Valve/Fitting Tag	K	No. Units	Total K
			0
			0
			0
			0
			0
			0
			0
		Total K:	0.0

Segment Flowrate (gpm):	0.2	0.4	0.6	0.8	1.3	1.8	2.2
Eqn. (1) - Velocity, v (ft/s):	0.01	0.02	0.03	0.04	0.07	0.09	0.11
Eqn. (2) - Reynolds Number, Re:	2.23E+02	4.46E+02	6.69E+02	8.93E+02	1.45E+03	2.01E+03	2.45E+03
Pipe Friction Factor, f:	0.2868	0.1434	0.0956	0.0717	0.0441	0.0494	0.0463
Eqn. (3) - Head Loss Across Pipe Segment, H (ft w.c./ft):	0	0	0	0	0	0	0
Eqn. (4a) - Fittings Equivalent Length, L_F (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (4b) Equivalent Length of Pipe Segment, L_{eq} (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eqn. (5) Pipe Segment Headloss, H_p (ft w.c.):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Discharge Piping Headloss, $H_{p(discharge)}$ (ft w.c.):	**0.15**	**0.30**	**0.48**	**1.08**	**2.50**	**4.27**	**6.18**
Exit Velocity at Liquid Discharge, v (ft/s):	**0.27**	**0.53**	**0.58**	**0.77**	**1.25**	**1.74**	**2.12**
Eqn. (6) Exit Loss at Liquid Discharge, H_v (ft w.c.):	**0.00**	**0.00**	**0.01**	**0.01**	**0.02**	**0.05**	**0.07**
Eqn. (7) Total Dynamic Head, TDH (ft w.c.):	**185.20**	**185.35**	**185.54**	**186.14**	**187.57**	**189.37**	**191.30**
Design System TDH with 20.0% Factor of Safety, (ft w.c.):	**222.24**	**222.42**	**222.65**	**223.37**	**225.08**	**227.24**	**229.56**

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5. Hydraulic Institute, Engineering Data Book, 2nd Edition.
6. Plastic Pipe Institute's Handbook of Polyethylene Pipe, 2nd. Edition.

Equations:

Eqn. (1):

$$v = \frac{\frac{gpm}{448.8312}}{\frac{\pi}{4} \cdot \left(\frac{ID}{12}\right)^2}$$

Eqn. (2):

$$Re = \frac{v \cdot \frac{ID}{12}}{\eta}$$

Eqn. (3):

$$H = \frac{f \cdot v^2}{2 \cdot g \cdot \frac{ID}{12}} = \frac{f \cdot v^2}{2 \cdot (32.174) \cdot \frac{ID}{12}}$$

Eqn. (4a):

$$L_F = \frac{k \cdot \frac{ID}{12}}{f}$$

Eqn. (4b):

$$L_{eq} = L + L_F$$

Eqn. (5):

$$H_P = H \cdot L_{eq}$$

Eqn. (6):

$$H_v = \frac{v^2}{2 \cdot g} = \frac{v^2}{2 \cdot (32.174)}$$

Eqn. (7):

$$TDH = 2.31 \cdot \left(P_{sys2} - P_{sys1}\right) + H_{st2} + Inline\ Equipment\ Headloss + H_{p(discharge)} + H_v - H_{st1}$$

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CONDITIONS

Operator:	OGRID:
CHEVRON U S A INC 6301 Deauville Blvd Midland, TX 79706	4323
	Action Number: 447999
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
jburdine	Review of the Cooper Jal 2024 Annual Groundwater Monitoring Report: Content Satisfactory 1. Continue to conduct groundwater monitoring at the site on a semi-annual basis, following the SAP approved by NMOCD. 2. Proceed with further evaluation as needed for analyses results for MW-4, MW-5, MW-5A, MW-14, RW-2 3. Provide findings from evaluations and recommendations for path forward in the 2025 annual report. 4. Submit the 2025 Annual Groundwater Monitoring Report by April 1, 2026.	6/17/2025