



Chevron Environmental Management Company

# 2024 Annual Groundwater Monitoring Report

**Former Unocal South Vacuum Unit  
NMOCD Case No. 1R-277**

March 31, 2025

2024 Annual Groundwater Monitoring Report

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March 31, 2025

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## 2024 Annual Groundwater Monitoring Report

## Executive Summary

On behalf of Chevron Environmental Management Company (CEMC), Arcadis U.S., Inc (Arcadis) has performed the 2024 annual groundwater sampling and monitoring at the Former Unocal South Vacuum Unit (site), located at Township 18 South, Range 35 East, Section 36 in Lea County, New Mexico. CEMC is managing the Unocal's environmental liability at the site. The report documents the 2024 annual sampling event performed at the site by Arcadis on August 9, 2024. This report contains the historical groundwater elevation and analytical data from monitoring wells MW-1 through MW-6.

Based on the sampling and monitoring data to date, the following conclusions were observable from the groundwater conditions at the site:

- Chloride concentrations at the site exceed the New Mexico Water Quality Control Commission (NMWGCC) standard of 250 milligrams per liter (mg/L) at monitoring wells MW-1 (300 mg/L), MW-3 (322 mg/L), MW-4 (566 mg/L), and MW-6 (389 mg/L).
- Total dissolved solid concentration (TDS) at the site exceeds the NMWGCC of 1,000 mg/L at monitoring wells MW-1 (1,160 mg/L), MW-3 (1,320 mg/L), and MW-6 (1,280 mg/L).
- Chloride and TDS concentrations at monitoring well MW-3 have exhibited an increasing trend since 1999. Given that MW-3 is located upgradient relative to the site, it is believed that both chloride and TDS at this location are from an offsite, upgradient source.
- Updated solute transport modeling has been performed to demonstrate that historical and current plume trends can be represented by a historical source that ended about 1970 and that the same model with a finite source representation can be used to simulate the future migration of chloride and TDS in groundwater. According to the updated model, the chloride plume will travel a maximum of 3,350 feet southeast of the former source in approximately 200 years before concentrations return to levels below the NMWQCC of 250 mg/L. Results from the same transport model suggest that the TDS plume will travel 2,350 feet in approximately 140 years before the concentrations return to levels below the NMWQCC standard of 1,000 mg/L. Based on these results and predicted natural attenuation processes (advection and dispersion), there will be no adverse impact to human health and environment.
- Historical groundwater elevation data indicate that groundwater elevation at the site is steadily decreasing at a rate of 0.24 feet since the initial sampling event in January 1995. An exception to this decreasing trend occurred during 2004 and 2005 due to a higher-than-normal rainfall during this period. Monitoring well MW-1 also shows an increase in groundwater elevation during the 2024 groundwater sampling event.

Unocal performed effective remedial actions at the site, including the plugging of the saltwater disposal well in 1971 and encapsulating the former saltwater disposal pit with solidification material in 1995. Based on the potential receptors identified and updated solute transport modeling presented herein the chloride and TDS plumes at the site present very low risk to human health and the environment.

## 2024 Annual Groundwater Monitoring Report

## 1 Introduction

Arcadis U.S., Inc. (Arcadis) submits the Annual Groundwater Monitoring report herein, on behalf of Chevron Environmental Management Company (CEMC), which summarizes the groundwater monitoring activities conducted in 2024 at the Former Unocal South Vacuum Unit (Site), located at Township 18 South, Range 35 East, Section 36 in Lea County, New Mexico. This report documents the 2024 annual sampling event performed by Arcadis at the site on August 9, 2024. The sampling event was conducted in accordance with the November 2, 2000, Groundwater Remediation Plan submitted by Unocal and the requirements specified in the New Mexico Oil and Conservation Division (OCD) letter dated February 8, 2001 (Unocal 2001) (**Appendix A**).

## 2 Groundwater Monitoring and Sampling

Groundwater at the site is monitored annually from a network of six monitoring wells, MW-1 through MW-6. The monitoring wells are shown on **Figure 2**. Arcadis performed the 2024 annual groundwater sampling event on August 9, 2024.

On August 9, 2024, each of the monitoring wells were gauged for depth to groundwater using a Heron interface meter immediately prior to purging operations. A total of 17.5 gallons of groundwater were purged from the site monitoring wells using volumetric purging method with dedicated polyethylene bailers with the exception of monitoring well MW-2. Low-flow purging methodology with a monsoon pump was used at monitoring well MW-2. Groundwater parameters (pH, temperature, and conductivity) were measured using a YSI meter until a minimum of three well volumes was purged from each well or when parameters stabilized. Field data for well monitor activities are presented on **Appendix B**.

Groundwater samples for each monitoring well were transferred into lab provided plastic containers and immediately placed in an ice-filled cooler after sample collection. Samples were shipped to Pace National Analytical Laboratory at Mount Juliet, Tennessee to be analyzed for chloride using EPA Method 9056A and Total Dissolved Solids (TDS) using Method 2540 C-2011. Copies of the certified analytical reports and chain-of-custody documentation from Pace Analytical are provided in **Appendix C**.

### 2.1 Groundwater Monitoring Data

Depth to groundwater ranged from 55.61 at MW-2 to 76.42 at MW-6 below top of casing. Groundwater elevations are summarized in **Table 1**. Groundwater elevations ranged from 3782.36 at MW-6 to 3795.03 at MW-1. The groundwater gradient direction is to the southeast with a hydraulic gradient of 0.004 ft/ft. A groundwater gradient map depicting direction of groundwater flow is illustrated in **Figure 3** and a historical groundwater elevation graph is shown in **Appendix D**. According to published reports (Ash 1963; Nicholson and Clebesch 1961) the groundwater encountered at the site is that of the Tertiary-aged Ogalla Formation. The Ogalla Formation unconformably overlies the impermeable red-beds of the Triassic Chinle Formation at an elevation of approximately 3,700 ft above mean sea level (AMSL). Based on the current groundwater elevations measured on site and published data referenced, the saturated thickness of the Ogalla Formation at the site ranged from approximately 82 to 95 feet.

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## 2.2 Groundwater Analytical Results

During the August 2024 monitoring event all six wells at the site were sampled. Groundwater analytical results for Chloride and TDS were compared to the New Mexico Environment Department of Quality Control Commission (NMWQCC) Groundwater Standards (last amended December 2018). A cumulative summary of groundwater analytical results from 1995 through 2024 are presented in **Table 1**. The laboratory analytical reports are included in **Appendix C**.

### 2.2.1.1 Chloride

Chloride concentrations during the August 2024 sampling event exceeded the NMWQCC standard of 250 milligrams per liter (mg/L) in wells MW-1 (300 mg/L), MW-3 (322 mg/L), MW-4 (566 mg/L) and MW-6 (389 mg/L). Groundwater samples from the cross-gradient wells MW-2 and MW-5 had chloride concentrations below the NMWQCC standards. Chloride concentrations and estimated isopleths are depicted in **Figure 4**. A graph depicting historical chloride concentrations is presented in **Appendix E**.

### 2.2.1.2 TDS

TDS concentrations during the August 2024 sampling event exceeded the NMWQCC standard of 1,000 mg/L in monitoring wells MW-1 (1,160 mg/L), MW-3 (1,290 mg/L), MW-4 (1,320 mg/L) and MW-6 (1,280 mg/L). Groundwater samples from the cross-gradient wells MW-2 and MW-5 had TDS concentrations below the NMWQCC standards. TDS concentrations and estimated isopleths are depicted in **Figure 5**. A graph depicting historical TDS concentrations is presented in **Appendix E**.

## 3 Fate and Transport Model Results

Solute fate and transport modeling was performed by Arcadis to simulate the movement of the chloride and TDS groundwater plume over time. Simulations were conducted using the Ground Water Desktop (GWD), version 5.2.013, developed by S.S. Papadopoulos & Associates, Inc. to visualize and analyze environmental data and groundwater flow and transport models in three-dimensions. Contaminant transport was simulated using an enhanced version of EPA screening-level solute transport model BIOSCREEN, included in the GWD and called BIOSCREEN-AT3D. The enhanced version of BIOSCREEN includes exact analytical solution to the solute transport equation, 3D simulations, and multiple sources with several types of inflow concentration.

The updated model was based in part by the former site model developed by Trident (2023), the previous consultant. The updated model was developed to better understand the development of the chloride and TDS plumes from the historical source and to use this model to evaluate the future migration of chloride and TDS in groundwater. The updated model also uses a newer simulator (BIOSCREEN-AT3D) to simulate the migration of the chloride and TDS plumes and was selected because it has similar capabilities of the original software used by Trident (2023) but is publicly available, maintained, and supported by the software developers. The simulator used by Trident (2023) was proprietary and is no longer available from the developers.

The model relied in part on parameters used in previous modeling (Trident 2023), however during calibration of the model to historical concentration data, some adjustments to transport parameters were performed. The model simulated releases from the former source area from 1960 to 1970. The model was calibrated by adjusting

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solute transport parameters such as dispersivities, source magnitude, source location, and source timing to primarily match concentration trends from monitoring wells along the axis of the plume, primarily wells MW-1, MW-4 and MW-6. The decreasing concentration trends at MW-4 in the central area of the plume is the result of the discontinuation of source releases in the past. Figure 1 through 2 indicates a close representation of the trends along the axis of the plume with a finite source representation. Thus, the model indicates that a source terminating about 1970 replicates the behavior of the plume quite well. Lateral dispersivity terms were adjusted to best fit the width of the plume over time as represented in wells MW-2 and MW-5. The increasing trends observed in MW-6 are also represented by the model as plume mass within the plume continues to migrate downgradient. Once calibrated, the model was used to evaluate future chloride and TDS concentration trends and migration potential. The calibrated model was used to simulate the chloride and TDS plumes over various time increments and its simulated plumes are demonstrated in **Appendix F** and **G** for chloride and TDS, respectively. The simulation results show the center of plume mass is migrated downgradient by advective transport, whereas hydrodynamic dispersion demonstrates how the dimensions of plume are widened while reducing the concentrations in the central area of the plume.

## 4 Conclusions

Based on the groundwater monitoring and sampling event conducted by Arcadis in August 2024, the following conclusions were made:

- Groundwater elevation ranged from 3782.36 at MW-6 to 3795.03 at MW-1 and groundwater flow direction at the site is to the southeast with a hydraulic gradient of 0.004 ft/ft.
- Chloride concentrations during August 2024 sampling event were greater than the New Mexico Water Quality Control Commission (NMWQCC) of 250 mg/L in monitoring wells MW-1, MW-3, MW-4 and MW-6.
- TDS concentrations during August 2024 sampling event were greater than the New Mexico Water Quality Control Commission (NMWQCC) of 1000 mg/L in monitoring wells MW-1, MW-3, MW-4 and MW-6. The chloride concentrations in monitoring wells MW-1 and MW-4 appear to be on a decreasing trend but exceed the NMWQCC standard. In Monitoring well MW-2, chloride concentrations show a decreasing trend and is within the NMWQCC standard. Chloride concentrations in monitoring well MW-3 are greater than the standards and have remained relatively constant since August 2020. In monitoring well MW-6, chloride concentrations are increasing and remain above the NMWQCC standard, while monitoring well MW-5 shows a slight increase in chloride concentrations but remains within the acceptable limits.
- TDS concentrations in monitoring well MW-1 show a decreasing trend following a significant spike in August 2023 but remain above the NMWQCC standard. Monitoring wells MW-2 and MW-5 exhibit a relatively stable trend. MW-4 appears to be following a decreasing trend, but still exceeds the NMWQCC standard. In monitoring wells MW -3 and MW-6, TDS concentrations are increasing and exceed the NMWQCC standard.
- Fate and transport modeling results continue to show that the chloride and TDS plumes are unlikely to impact the existing water supply sources, the livestock (windmill (L 05339)) well is closest and over one-half mile south and downgradient of the source According to the 2023 Annual GWM Report, the windmill well has been abandoned due to the shallow depth and declining water level.
- According to the updated model simulations, the chloride plume will travel a maximum of 3,350 feet southeast of the former source in approximately 200 years before concentrations return to levels below the NMWQCC of 250 mg/L. Results from the same transport model suggest that the TDS plume will travel 2350 feet in approximately 140 years before the concentrations return to levels below the NMWQCC

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standard of 1,000 mg/L. Based on these results and predicted natural attenuation processes (advection and dispersion), there will be no adverse impact to human health and environment.

## 5 References

Ash. 1963. Ground-Water Conditions in Northern Lea County, New Mexico.

Nicholson and Clebesch. 1961. Geology and Groundwater Conditions in Southern Lea County New Mexico.

Unocal. 2001. Groundwater Remediation Plan. Submitted to the New Mexico Oil and Conservation Division (OCD). February.

Trident. 2023. 2023 Annual Groundwater Monitoring Report. Submitted to the New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division. October.

# Tables

# Tables

**Table 1**  
**Summary of Groundwater Elevation and Analytical Data**  
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**Former South Vacuum Field**  
**Hobbs, New Mexico**



Location ID	Date	Top of Casing (feet amsl)	Depth To Groundwater (feet btoc)	Corrected Groundwater Elevation (feet amsl) <sup>1</sup>	Chloride (mg/L)	TDS (mg/L)
<b>WQCC Standards</b>					<b>250</b>	<b>1,000</b>
MW-1	1/27/1995	3858.37	59.57	3798.80	1,174	2,250
MW-1	5/18/1995	3858.37	61.30	3797.07	983	2,251
MW-1	8/28/1996	3858.37	61.57	3796.80	1,420	2,730
MW-1	8/13/1997	3858.37	61.75	3796.62	1,400	2,800
MW-1	9/30/1999	3858.37	62.51	3795.86	1,094	2,318
MW-1	6/14/2000	3858.37	62.85	3795.52	927	2,040
MW-1	6/18/2001	3858.37	63.07	3795.30	813	1,790
MW-1	7/11/2002	3858.37	63.28	3795.09	784	1,680
MW-1	7/2/2003	3858.37	63.66	3794.71	715	2,090
MW-1	8/12/2004	3858.37	63.83	3794.54	628	2,050
MW-1	8/10/2005	3858.37	62.62	3795.75	774	1,830
MW-1	7/31/2006	3858.37	62.90	3795.47	860	2,010
MW-1	7/27/2007	3858.37	63.43	3794.94	732	1,790
MW-1	8/26/2008	3858.37	63.95	3794.42	895	1,960
MW-1	7/15/2009	3858.37	64.25	3794.12	852	2,300
MW-1	7/13/2010	3858.37	64.51	3793.86	934	2,590
MW-1	7/14/2011	3858.37	64.74	3793.63	824	2,370
MW-1	8/2/2012	3858.37	65.15	3793.22	854	2,740
MW-1	10/25/2013	3858.37	65.6	3792.77	761	1,700
MW-1	7/21/2014	3858.37	65.94	3792.43	757	1,980
MW-1	7/28/2015	3858.37	66.20	3792.17	711	1,860
MW-1	7/20/2016	3858.37	66.41	3791.96	686	2,260
MW-1	8/31/2017	3858.37	66.73	3791.64	636	2,080
MW-1	8/9/2018	3858.37	67.00	3791.37	587	1,480
MW-1	8/5/2019	3858.37	67.37	3791.00	507	992
MW-1	7/30/2020	3858.37	67.69	3790.68	430	1,100
MW-1	7/21/2021	3858.37	68.03	3790.34	410	1,000
MW-1	7/14/2022	3858.37	68.40	3789.97	410	790
MW-1	8/8/2023	3858.37	68.80	3789.57	408	1,400
MW-1	8/9/2024	3858.37	63.34	3795.03	300	1,160

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Location ID	Date	Top of Casing (feet amsl)	Depth To Groundwater (feet btoc)	Corrected Groundwater Elevation (feet amsl) <sup>1</sup>	Chloride (mg/L)	TDS (mg/L)
MW-2	9/30/1999	3841.64	49.51	3792.13	<b>298</b>	922
MW-2	6/14/2000	3841.64	49.81	3791.83	<b>317</b>	852
MW-2	6/18/2001	3841.64	50.06	3791.58	<b>288</b>	878
MW-2	7/11/2002	3841.64	50.29	3791.35	<b>284</b>	808
MW-2	7/2/2003	3841.64	50.63	3791.01	<b>268</b>	859
MW-2	8/12/2004	3841.64	50.81	3790.83	<b>451</b>	931
MW-2	8/10/2005	3841.64	49.58	3792.06	<b>355</b>	844
MW-2	7/31/2006	3841.64	49.83	3791.81	<b>401</b>	922
MW-2	7/27/2007	3841.64	50.33	3791.31	<b>430</b>	984
MW-2	8/26/2008	3841.64	50.80	3790.84	<b>354</b>	980
MW-2	7/15/2009	3841.64	51.04	3790.60	<b>482</b>	<b>1,060</b>
MW-2	7/13/2010	3841.64	51.37	3790.27	<b>494</b>	<b>1,070</b>
MW-2	7/14/2011	3841.64	51.53	3790.11	<b>486</b>	974
MW-2	8/2/2012	3841.64	51.89	3789.75	<b>531</b>	<b>1,110</b>
MW-2	10/25/2013	3841.64	52.33	3789.31	<b>483</b>	<b>1,070</b>
MW-2	7/21/2014	3841.64	52.62	3789.02	<b>437</b>	<b>1,040</b>
MW-2	7/28/2015	3841.64	52.84	3788.80	<b>461</b>	<b>1,000</b>
MW-2	7/20/2016	3841.64	53.07	3788.57	<b>421</b>	970
MW-2	8/31/2017	3841.64	53.29	3788.35	<b>383</b>	912
MW-2	8/9/2018	3841.64	53.51	3788.13	<b>399</b>	884
MW-2	8/5/2019	3841.64	53.83	3787.81	<b>345</b>	872
MW-2	7/30/2020	3841.64	54.13	3787.51	<b>300</b>	750
MW-2	7/21/2021	3841.64	54.44	3787.20	<b>260</b>	750
MW-2	7/14/2022	3841.64	54.76	3786.88	220	620
MW-2	8/8/2023	3841.64	55.15	3786.49	193	605
MW-2	8/9/2024	3841.64	55.61	3786.03	149 J6	577

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Location ID	Date	Top of Casing (feet amsl)	Depth To Groundwater (feet btoc)	Corrected Groundwater Elevation (feet amsl) <sup>1</sup>	Chloride (mg/L)	TDS (mg/L)
MW-3	9/30/1999	3864.73	66.74	3797.99	74	427
MW-3	6/14/2000	3864.73	67.01	3797.72	76	433
MW-3	6/18/2001	3864.73	67.29	3797.44	86	495
MW-3	7/11/2002	3864.73	67.59	3797.14	103	509
MW-3	7/2/2003	3864.73	67.94	3796.79	98	588
MW-3	8/12/2004	3864.73	68.07	3796.66	111	605
MW-3	8/10/2005	3864.73	66.81	3797.92	122	533
MW-3	7/31/2006	3864.73	67.21	3797.52	141	619
MW-3	7/27/2007	3864.73	67.79	3796.94	164	705
MW-3	8/26/2008	3864.73	68.30	3796.43	185	592
MW-3	7/15/2009	3864.73	68.50	3796.23	199	766
MW-3	7/13/2010	3864.73	68.52	3796.21	207	859
MW-3	7/14/2011	3864.73	69.19	3795.54	205	816
MW-3	8/2/2012	3864.73	69.60	3795.13	232	<b>1,010</b>
MW-3	10/25/2013	3864.73	70.09	3794.64	<b>273</b>	678
MW-3	7/21/2014	3864.73	70.46	3794.27	<b>262</b>	851
MW-3	7/28/2015	3864.73	70.75	3793.98	<b>268</b>	<b>1,090</b>
MW-3	7/20/2016	3864.73	71.08	3793.65	<b>279</b>	<b>1,140</b>
MW-3	8/31/2017	3864.73	71.36	3793.37	<b>268</b>	<b>1,170</b>
MW-3	8/9/2018	3864.73	71.68	3793.05	<b>283</b>	814
MW-3	8/5/2019	3864.73	72.06	3792.67	<b>287</b>	748
MW-3	7/30/2020	3864.73	72.43	3792.30	<b>330</b>	740
MW-3	7/21/2021	3864.73	72.80	3791.93	<b>320</b>	890
MW-3	7/14/2022	3864.73	73.18	3791.55	<b>330</b>	690
MW-3	8/8/2023	3864.73	73.56	3791.17	<b>340</b>	<b>1,090</b>
MW-3	8/9/2024	3864.73	74.17	3790.56	<b>322</b>	<b>1,290</b>

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Location ID	Date	Top of Casing (feet amsl)	Depth To Groundwater (feet btoc)	Corrected Groundwater Elevation (feet amsl) <sup>1</sup>	Chloride (mg/L)	TDS (mg/L)
MW-4	9/30/1999	3852.51	60.18	3792.33	1,576	2,981
MW-4	6/14/2000	3852.51	60.55	3791.96	1,500	2,910
MW-4	6/18/2001	3852.51	60.78	3791.73	1,530	3,180
MW-4	7/11/2002	3852.51	60.98	3791.53	1,290	2,660
MW-4	7/2/2003	3852.51	61.34	3791.17	1,250	2,610
MW-4	8/12/2004	3852.51	61.50	3791.01	1,130	2,480
MW-4	8/10/2005	3852.51	60.25	3792.26	1,050	2,230
MW-4	7/31/2006	3852.51	60.51	3792.00	926	2,030
MW-4	7/27/2007	3852.51	61.04	3791.47	758	1,940
MW-4	8/26/2008	3852.51	61.55	3790.96	720	1,790
MW-4	7/15/2009	3852.51	61.83	3790.68	632	1,780
MW-4	7/13/2010	3852.51	62.11	3790.40	687	1,750
MW-4	7/14/2011	3852.51	62.29	3790.22	707	1,600
MW-4	8/2/2012	3852.51	62.63	3789.88	804	1,760
MW-4	10/25/2013	3852.51	63.10	3789.41	894	1,890
MW-4	7/21/2014	3852.51	63.40	3789.11	938	2,320
MW-4	7/28/2015	3852.51	63.65	3788.86	1,100	1,940
MW-4	7/20/2016	3852.51	63.89	3788.62	1,100	2,070
MW-4	8/31/2017	3852.51	64.11	3788.40	1,100	2,250
MW-4	8/9/2018	3852.51	64.38	3788.13	1,090	2,030
MW-4	8/5/2019	3852.51	64.69	3787.82	917	2,030
MW-4	7/30/2020	3852.51	65.00	3787.51	770	1,800
MW-4	7/21/2021	3852.51	65.32	3787.19	780	1,700
MW-4	7/14/2022	3852.51	65.67	3786.84	650	1,500
MW-4	8/8/2023	3852.51	66.04	3786.47	613	1,280
MW-4	8/9/2024	3852.51	66.62	3785.89	566	1,320

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Location ID	Date	Top of Casing (feet amsl)	Depth To Groundwater (feet btoc)	Corrected Groundwater Elevation (feet amsl) <sup>1</sup>	Chloride (mg/L)	TDS (mg/L)
MW-5	6/14/2000	3859.84	68.57	3791.27	13.7	274
MW-5	6/18/2001	3859.84	68.80	3791.04	13.6	322
MW-5	7/11/2002	3859.84	68.98	3790.86	15.5	308
MW-5	7/2/2003	3859.84	69.32	3790.52	12.5	359
MW-5	8/12/2004	3859.84	69.46	3790.38	15.3	375
MW-5	8/10/2005	3859.84	68.15	3791.69	14.9	309
MW-5	7/31/2006	3859.84	68.52	3791.32	13.3	290
MW-5	7/27/2007	3859.84	69.07	3790.77	14.9	296
MW-5	8/26/2008	3859.84	69.61	3790.23	13.6	296
MW-5	7/15/2009	3859.84	69.91	3789.93	13.4	291
MW-5	7/13/2010	3859.84	70.19	3789.65	12.6	291
MW-5	7/14/2011	3859.84	70.35	3789.49	13.8	265
MW-5	8/2/2012	3859.84	70.74	3789.10	13.8	290
MW-5	10/25/2013	3859.84	71.16	3788.68	15.3	268
MW-5	7/21/2014	3859.84	71.56	3788.28	16.7	293
MW-5	7/28/2015	3859.84	71.77	3788.07	22	277
MW-5	7/20/2016	3859.84	72.04	3787.80	23.5	310
MW-5	8/31/2017	3859.84	72.27	3787.57	26.7	343
MW-5	8/9/2018	3859.84	72.57	3787.27	28.7	304
MW-5	8/5/2019	3859.84	72.91	3786.93	33.7	294
MW-5	7/30/2020	3859.84	73.27	3786.57	35	320
MW-5	7/21/2021	3859.84	73.60	3786.24	42	310
MW-5	7/14/2022	3859.84	73.97	3785.87	44	210
MW-5	8/8/2023	3859.84	74.28	3785.56	52.9	358
MW-5	8/9/2024	3859.84	74.91	3784.93	64.5	408

**Table 1**  
**Summary of Groundwater Elevation and Analytical Data**  
**2024 Annual Groundwater Monitoring Report**  
**Former South Vacuum Field**  
**Hobbs, New Mexico**



Location ID	Date	Top of Casing (feet amsl)	Depth To Groundwater (feet btoc)	Corrected Groundwater Elevation (feet amsl) <sup>1</sup>	Chloride (mg/L)	TDS (mg/L)
MW-6	6/14/2000	3858.78	70.79	3787.99	48	382
MW-6	6/18/2001	3858.78	70.98	3787.80	51	431
MW-6	7/11/2002	3858.78	71.26	3787.52	50	422
MW-6	7/2/2003	3858.78	71.52	3787.26	47	471
MW-6	8/12/2004	3858.78	71.62	3787.16	55	410
MW-6	8/10/2005	3858.78	70.33	3788.45	55	391
MW-6	7/31/2006	3858.78	70.64	3788.14	52	412
MW-6	7/27/2007	3858.78	71.15	3787.63	75	516
MW-6	8/26/2008	3858.78	71.61	3787.17	89	548
MW-6	7/15/2009	3858.78	71.90	3786.88	81	532
MW-6	7/13/2010	3858.78	72.20	3786.58	84	545
MW-6	7/14/2011	3858.78	72.37	3786.41	89	531
MW-6	8/2/2012	3858.78	72.72	3786.06	94	550
MW-6	10/25/2013	3858.78	73.14	3785.64	116	510
MW-6	7/21/2014	3858.78	73.40	3785.38	126	613
MW-6	7/28/2015	3858.78	73.63	3785.15	151	707
MW-6	7/20/2016	3858.78	73.81	3784.97	165	813
MW-6	8/30/2017	3858.78	73.98	3784.80	178	714
MW-6	8/9/2018	3858.78	74.30	3784.48	176	648
MW-6	8/5/2019	3858.78	74.56	3784.22	208	690
MW-6	7/30/2020	3858.78	74.91	3783.87	220	690
MW-6	7/21/2021	3858.78	75.22	3783.56	<b>280</b>	760
MW-6	7/14/2022	3858.78	75.56	3783.22	<b>290</b>	630
MW-6	8/8/2023	3858.78	75.95	3782.83	<b>319</b>	<b>1,040</b>
MW-6	8/9/2024	3858.78	76.42	3782.36	<b>389</b>	<b>1,280</b>

**Notes:**

Total Dissolved Solids (TDS) and chloride concentrations listed in milligrams per liter (mg/L).

Elevations and state plane coordinates surveyed by Basin Surveys, Hobbs, NM.

**BOLD** = Concentrations exceed New Mexico Water Quality Commission (WQCC) standards (Last Amended December 2018).

amsl = above mean sea level

btoc = below top of casing

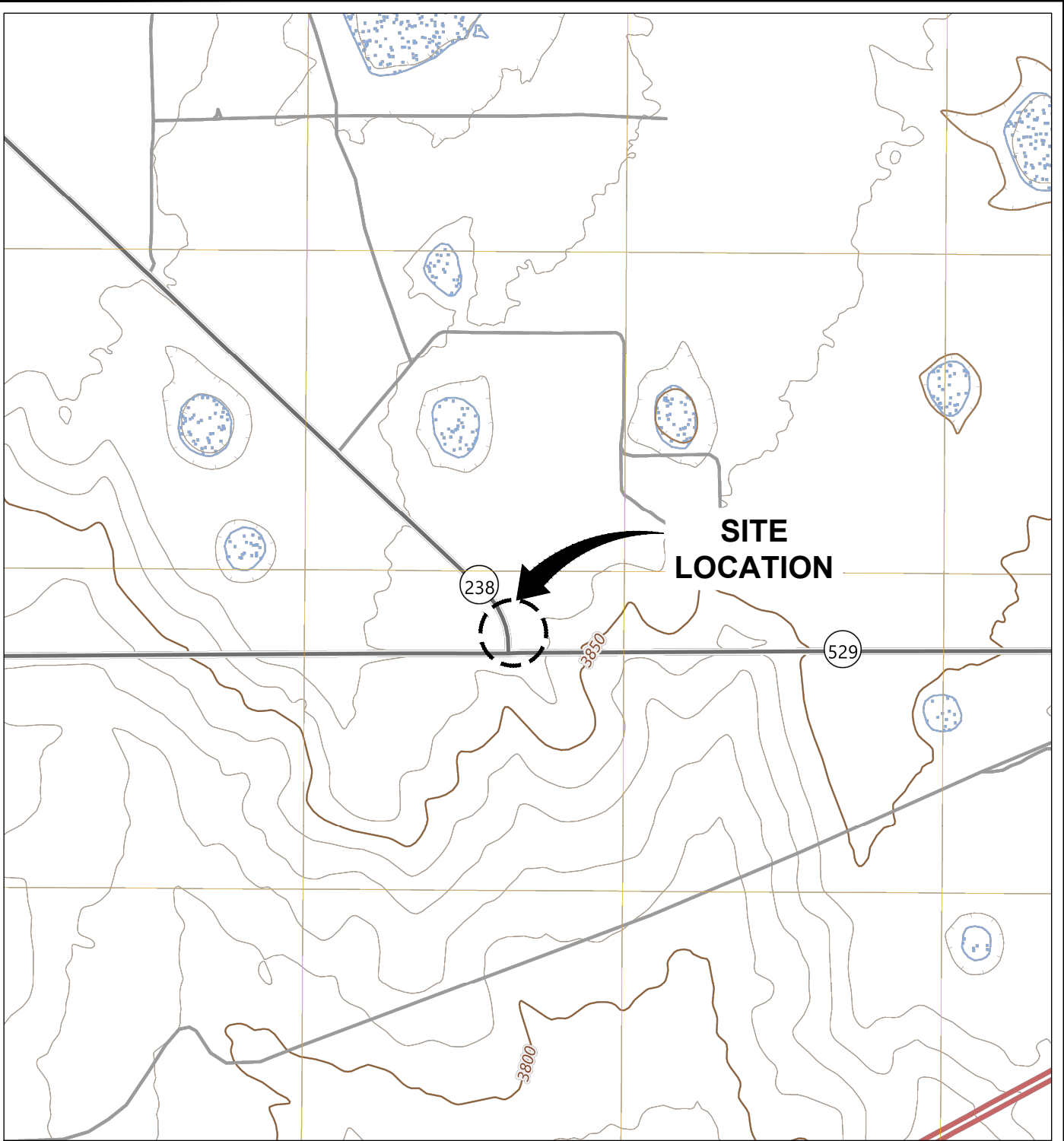
WQCC = Water Quality Control Commission (authority responsible for specifying water quality standards in the State of NM)

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

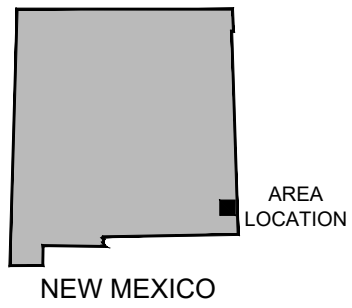
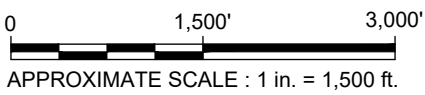
# Figures

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Arcadis Logo.png

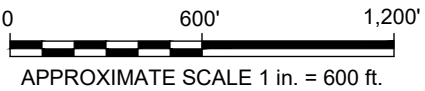


SOURCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., IRON HOUSE DRAW, NM 2023




CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY FORMER SOUTH VACUUM FIELD HOBBS, NEW MEXICO	
<b>SITE LOCATION MAP</b>	
	FIGURE <b>1</b>

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GEN-X-D-TITLE-PA

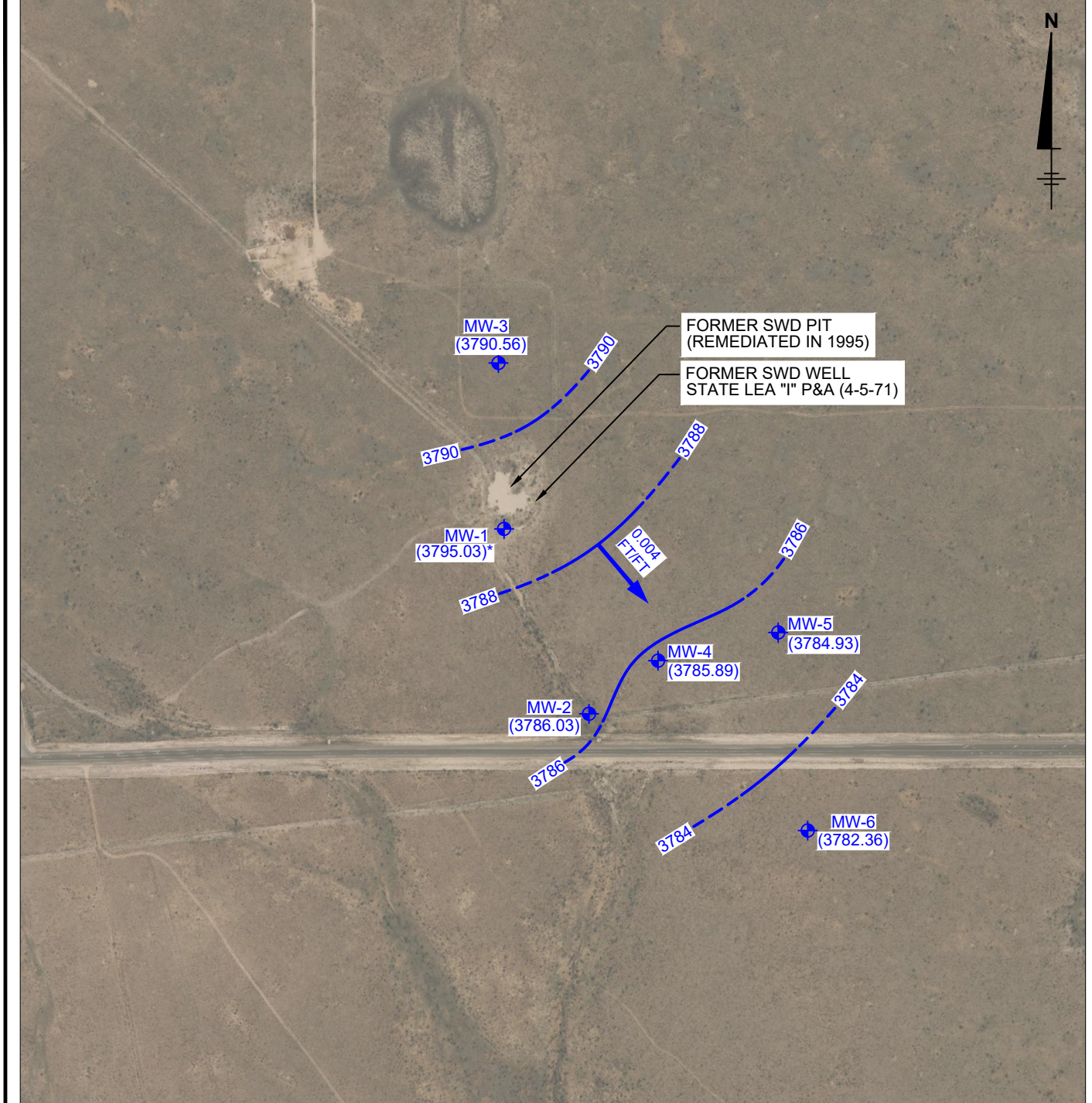


**LEGEND:**

 GROUNDWATER MONITORING WELL

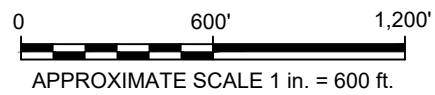
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY FORMER SOUTH VACUUM FIELD HOBBS, NEW MEXICO	
<b>SITE PLAN</b>	
	FIGURE <b>2</b>

C:\Users\ar007\IDC\ACCDocs\Arcadis ACC USA\US-99999999-CHEV\_PMG\_00209 HOBBS\_LEA COUNTY\_NMP\Project Files\10\_WIP\10T\_ARC\_ENV\2024\01-DWG\GWM-2024\03-F03-GWE.dwg LAYOUT: 3 SAVED: 10/6/2024 12:22 AM ACADVER: 24.2S (LMS TECH) PAGES: 10 PLOTSTYLETABLE: ... PLOTTED: 10/6/2024 12:22 AM BY: R. ANITA



**LEGEND:**

- GROUNDWATER MONITORING WELL
- 3790 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (3790.56) GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- APPROXIMATE DIRECTION OF GROUND WATER FLOW
- 0.004 FT/FT APPROXIMATE HYDRAULIC GRADIENT (FEET PER FOOT)
- WELL NOT USED FOR CONTOURING



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY FORMER SOUTH VACUUM FIELD HOBBS, NEW MEXICO	
<h2 style="margin: 0;">GROUNDWATER ELEVATION MAP</h2> <h3 style="margin: 0;">AUGUST 9, 2024</h3>	
	FIGURE <h1 style="font-size: 2em; margin: 0;">3</h1>

C:\Users\ar007\HDC\ACCDocs\Arcadis\ACC US\AUS-9999999-CHEV\_PMG\_00209 HOBBS\_LEA COUNTY\_NMP\Project Files\10\_WIP\101\_ARC\_ENV\2024\01-DWG\GWM\2024\03-F04-CHLORIDE ISOPLETH MAP.dwg LAYOUT: 4 SAVED: 10/6/2024 12:30 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: --- PLOTTED: 10/6/2024 12:31 AM BY: R. ANITA  
 XREFS: IMAGES: PROJECTNAME: --- GEN-X-D-TITLE-PA



**LEGEND:**

- GROUNDWATER MONITORING WELL
- (389) CHLORIDE ISOPLETH IN MILLIGRAMS PER LITER (mg/L)
- J6 THE SAMPLE MATRIX INTERFERED WITH THE ABILITY TO MAKE ANY ACCURATE DETERMINATION; SPIKE VALUE IS LOW
- CHLORIDE ISOPLETH ISOCONCENTRATION CONTOUR (mg/L; DASHED WHERE INFERRED)
- >250
- >500



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY  
 FORMER SOUTH VACUUM FIELD  
 HOBBS, NEW MEXICO

**CHLORIDE ISOCONCENTRATION MAP  
 AUGUST 9, 2024**









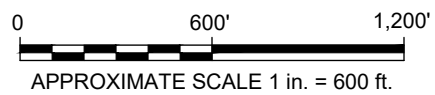
FIGURE  
**4**

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PLOTSTYLETABLE: --- PLOTTED: 10/7/2024 10:35 AM BY: R. ANITA  
XREFS: IMAGES: PROJECTNAME: ---  
GEN-X-D-TITLE-PA



**LEGEND:**

-  GROUNDWATER MONITORING WELL
-  TOTAL DISSOLVED SOLIDS IN MILLIGRAMS PER LITER (mg/L)
-  TOTAL DISSOLVED SOLIDS
-  TOTAL DISSOLVED SOLIDS ISOCONCENTRATION CONTOUR (mg/L; DASHED WHERE INFERRED)
-  >1,000
-  >1,200



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY FORMER SOUTH VACUUM FIELD HOBBS, NEW MEXICO	
<b>TDS ISOCONCENTRATION MAP</b> <b>AUGUST 9, 2024</b>	
	FIGURE <b>5</b>

# Appendix A

## NMOCD Correspondence



# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**GARY E. JOHNSON**  
Governor  
**Jennifer A. Salisbury**  
Cabinet Secretary

**Lori Wrotenbery**  
Director  
**Oil Conservation Division**

November 2, 2001

**CERTIFIED MAIL**  
**RETURN RECEIPT NO. 5357-8000**

Mr. Ben F. Terry, Jr.  
Unocal Corporation  
P.O. Box 1283  
Nederland, Texas 77627

**RE: GROUND WATER REMEDIATION PLAN  
UNOCAL SOUTH VACUUM PIT  
CASE #1R277**

Dear Mr. Terry:

The New Mexico Oil Conservation Division (OCD) has reviewed Unocal Corporation's (Unocal) April 6, 2001 "CASE #1R0277, GROUNDWATER REMEDIATION PLAN, FORMER UNOCAL SOUTH VACUUM UNIT" which was submitted on behalf of Unocal by their consultant Trident Environmental. This document contains Unocal's work plan for remediation and monitoring of ground water contamination related to the former Unocal South Vacuum Field pit.

The above referenced work plan is **approved with the following conditions:**

1. All ground water samples shall be obtained and analyzed using EPA approved methods and quality assurance/quality control.
2. Unocal shall submit the annual report OCD Santa Fe Office by April 1 of each year with a copy provided to the OCD Hobbs District Office.
3. Unocal shall notify the OCD at least 48 hours in advance of all scheduled activities such that the OCD has the opportunity to witness the events and split samples.

Please be advised that OCD approval does not limit Unocal to the proposed work plan should the plan fail to adequately remediate or monitor contamination related to Unocal's activities, or if contamination exists which is outside the scope of the work plan. In addition, OCD approval does not relieve Unocal of responsibility for compliance with any other federal, state or local laws and regulations.

If you have any questions or comments, please contact me at (505) 827-7154.

Sincerely,

A handwritten signature in black ink, appearing to read "Will Olson". The signature is fluid and cursive, written over a white background.

William C. Olson  
Hydrologist  
Environmental Bureau

xc: Chris Williams, OCD Hobbs District Office  
Gilbert J. Van Deventer, Trident Environmental

# Appendix B

## Monitoring Well Sampling Forms

<b>Project Number</b>	30062605	<b>Well ID</b>	MW-5	<b>Date</b>	8/9/2024	
<b>Site Location</b>	Hobbs, New Mexico	<b>Site ID</b>	PMG00209	<b>Weather (°F)</b>	Clear	<b>Sampled by</b> Luis Esparza
<b>Measuring Point Description</b>	Top of Casing	<b>Screen Depth Interval (ft-bmp)</b>	56 to 76	<b>Casing Diameter (in.)</b>	2	<b>Well Casing Material</b>
<b>Static Water Level (ft-bmp)</b>	74.91	<b>Total Depth (ft-bmp)</b>	78.5	<b>Water Column (ft)</b>	3.59	<b>Gallons in Well</b> 0.58

<b>Water Quality Meter Make/Model</b>		<b>Purge Method</b>	Volumetric	<b>Collection Type</b>	Grab	
<b>Sample Time</b>	12:12	<b>Well Volumes Purged</b>	3.09	<b>Sample ID</b>	MW-5-240809	<b>Purge Equipment</b> Bailer
<b>Purge Start</b>	12:07	<b>Gallons Purged</b>	1.79	<b>Duplicate ID</b>	--	<b>Sample Equipment</b> Bailer
<b>Purge End</b>	12:12	<b>Total Purge Time (h:m)</b>	0:5			

<b>Borehole Diameter:</b>	--	<b>One Borehole Volume (Gallons):</b>	0	<b>Specified Volumes:</b>	1.5	<b>Calculated Volumes:</b>	0
<b>Purge Rate (Gallons per Minute)</b>	--	<b>Recharge Type:</b>	--	<b>Depth to Water (ft-bmp)</b>	--	<b>Purging Method:</b>	Standard Three Well Volume Purge
<b>Decontamination Method:</b>	2 Stage Rinse	<b>Depth to Water with 80% Recharge (ft-bmp) :</b>	--	<b>Did well dewater?</b>	no	<b>Total Gallons Purged:</b>	1.79

Time	Gallons Removed	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
									Color	Odor
12:04	1	--	7.61	610	--	--	21.90	--	Clear	--
12:08	1	--	7.62	570	--	--	20.80	--	Clear	--
12:12	1	--	7.52	555	--	--	20.85	--	Clear	--

**Comments:** None

**Well Casing Volume Conversion**

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

**Sample Information**

<b>Sample ID:</b>	MW-5-240809	<b>Sample Time:</b>	12:12	<b>Sample Depth (ft-bmp) (e.g. pump intake):</b>	--
<b>Analytes and Methods:</b>	See Chain-of-Custody.			<b>Depth to Water at Time of Sampling</b>	74.91

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

<b>Project Number</b>	30062605	<b>Well ID</b>	MW-4	<b>Date</b>	8/9/2024	
<b>Site Location</b>	Hobbs, New Mexico	<b>Site ID</b>	PMG00209	<b>Weather (°F)</b>	Clear	<b>Sampled by</b> Luis Esparza
<b>Measuring Point Description</b>	Top of Casing	<b>Screen Depth Interval (ft-bmp)</b>	51 to 71	<b>Casing Diameter (in.)</b>	2	<b>Well Casing Material</b>
<b>Static Water Level (ft-bmp)</b>	66.62	<b>Total Depth (ft-bmp)</b>	72.4	<b>Water Column (ft)</b>	5.78	<b>Gallons in Well</b> 0.94
<b>Water Quality Meter Make/Model</b>		<b>Purge Method</b>	Volumetric	<b>Collection Type</b>	Grab	
<b>Sample Time</b>	11:25	<b>Well Volumes Purged</b>	3.07	<b>Sample ID</b>	MW-4-240809	<b>Purge Equipment</b> Bailer
<b>Purge Start</b>	11:18	<b>Gallons Purged</b>	2.89	<b>Duplicate ID</b>	--	<b>Sample Equipment</b> Bailer
<b>Purge End</b>	11:23	<b>Total Purge Time (h:m)</b>	0:5			

<b>Borehole Diameter:</b>	--	<b>One Borehole Volume (Gallons):</b>	0	<b>Specified Volumes:</b>	1.5	<b>Calculated Volumes:</b>	0
<b>Purge Rate (Gallons per Minute)</b>	--	<b>Recharge Type:</b>	--	<b>Depth to Water (ft-bmp)</b>	--	<b>Purging Method:</b>	Standard Three Well Volume Purge
<b>Decontamination Method:</b>	2 Stage Rinse	<b>Depth to Water with 80% Recharge (ft-bmp) :</b>	--	<b>Did well dewater?</b>	no	<b>Total Gallons Purged:</b>	2.89

Time	Gallons Removed	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
									Color	Odor
11:15	1	--	8.46	2395	--	--	22.30	--	Clear	--
11:20	1	--	8.50	2380	--	--	20.83	--	Clear	--
11:24	1	--	8.51	2397	--	--	21.33	--	Clear	--

**Comments:** None

**Well Casing Volume Conversion**

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

**Sample Information**

<b>Sample ID:</b>	MW-4-240809	<b>Sample Time:</b>	11:25	<b>Sample Depth (ft-bmp) (e.g. pump intake):</b>	--
<b>Analytes and Methods:</b>	See Chain-of-Custody.		<b>Depth to Water at Time of Sampling</b>	66.62	

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

<b>Project Number</b>	30062605	<b>Well ID</b>	MW-1	<b>Date</b>	8/9/2024	
<b>Site Location</b>	Hobbs, New Mexico	<b>Site ID</b>	PMG00209	<b>Weather (°F)</b>	Clear	<b>Sampled by</b> Luis Esparza
<b>Measuring Point Description</b>	Top of Casing	<b>Screen Depth Interval (ft-bmp)</b>	-- to --	<b>Casing Diameter (in.)</b>	2	<b>Well Casing Material</b>
<b>Static Water Level (ft-bmp)</b>	63.34	<b>Total Depth (ft-bmp)</b>	71	<b>Water Column (ft)</b>	7.66	<b>Gallons in Well</b> 1.24
<b>Water Quality Meter Make/Model</b>		<b>Purge Method</b>	Volumetric	<b>Collection Type</b>	Grab	
<b>Sample Time</b>	10:58	<b>Well Volumes Purged</b>	3.06	<b>Sample ID</b>	MW-1-240809	<b>Purge Equipment</b> Bailer
<b>Purge Start</b>	10:52	<b>Gallons Purged</b>	3.8	<b>Duplicate ID</b>	--	<b>Sample Equipment</b> Bailer
<b>Purge End</b>	10:56	<b>Total Purge Time (h:m)</b>	0:4			

<b>Borehole Diameter:</b>	--	<b>One Borehole Volume (Gallons):</b>	0	<b>Specified Volumes:</b>	1.5	<b>Calculated Volumes:</b>	0
<b>Purge Rate (Gallons per Minute)</b>	--	<b>Recharge Type:</b>	--	<b>Depth to Water (ft-bmp)</b>	--	<b>Purging Method:</b>	Standard Three Well Volume Purge
<b>Decontamination Method:</b>	2 Stage Rinse	<b>Depth to Water with 80% Recharge (ft-bmp) :</b>	--	<b>Did well dewater?</b>	no	<b>Total Gallons Purged:</b>	3.8

Time	Gallons Removed	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
									Color	Odor
10:52	1	--	7.13	1542	--	--	22.75	--	Clear	--
10:54	1	--	7.07	1497	--	--	21.35	--	Clear	--
10:56	1	--	7.08	1485	--	--	21.15	--	Clear	--
10:58	1	--	7.13	1468	--	--	21.07	--	Clear	--

**Comments:** None

**Well Casing Volume Conversion**

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

**Sample Information**

<b>Sample ID:</b>	MW-1-240809	<b>Sample Time:</b>	10:58	<b>Sample Depth (ft-bmp) (e.g. pump intake):</b>	--
<b>Analytes and Methods:</b>	See Chain-of-Custody.			<b>Depth to Water at Time of Sampling</b>	63.34

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

<b>Project Number</b>	30062605	<b>Well ID</b>	MW-3	<b>Date</b>	8/9/2024	
<b>Site Location</b>	Hobbs, New Mexico	<b>Site ID</b>	PMG00209	<b>Weather (°F)</b>	Clear	<b>Sampled by</b> Luis Esparza
<b>Measuring Point Description</b>	Top of Casing	<b>Screen Depth Interval (ft-bmp)</b>	57 to 77	<b>Casing Diameter (in.)</b>	2	<b>Well Casing Material</b>
<b>Static Water Level (ft-bmp)</b>	74.17	<b>Total Depth (ft-bmp)</b>	77.9	<b>Water Column (ft)</b>	3.73	<b>Gallons in Well</b> 0.61
<b>Water Quality Meter Make/Model</b>		<b>Purge Method</b>	Volumetric	<b>Collection Type</b>	Grab	
<b>Sample Time</b>	10:35	<b>Well Volumes Purged</b>	2.46	<b>Sample ID</b>	MW-3-240809	<b>Purge Equipment</b> Bailer
<b>Purge Start</b>	10:20	<b>Gallons Purged</b>	1.5	<b>Duplicate ID</b>	--	<b>Sample Equipment</b> Bailer
<b>Purge End</b>	10:26	<b>Total Purge Time (h:m)</b>	0:6			
<b>Borehole Diameter:</b>	--	<b>One Borehole Volume (Gallons):</b>	0	<b>Specified Volumes:</b>	1.5	<b>Calculated Volumes:</b> 0
<b>Purge Rate (Gallons per Minute)</b>	--	<b>Recharge Type:</b>	--	<b>Depth to Water (ft-bmp)</b>	--	<b>Purging Method:</b> Standard Three Well Volume Purge
<b>Decontamination Method:</b>	2 Stage Rinse	<b>Depth to Water with 80% Recharge (ft-bmp) :</b>	--	<b>Did well dewater?</b>	yes	<b>Total Gallons Purged:</b> 1.5

Time	Gallons Removed	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
									Color	Odor
10:21	1.1	--	7.04	1553	--	--	24.50	--	Clear	--
10:25	1.2	--	7.10	1505	--	--	20.80	--	Clear	--
10:29	1.1	--	7.12	1518	--	--	20.85	--	Clear	--

**Comments:** None

**Well Casing Volume Conversion**

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

**Sample Information**

Sample ID:           MW-3-240809           Sample Time:           10:35           Sample Depth (ft-bmp) (e.g. pump intake):           --            
 Analytes and Methods:           See Chain-of-Custody.           Depth to Water at Time of Sampling           74.17          

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

<b>Project Number</b>	30062605	<b>Well ID</b>	MW-6	<b>Date</b>	8/9/2024	
<b>Site Location</b>	Hobbs, New Mexico	<b>Site ID</b>	PMG00209	<b>Weather (°F)</b>	Clear	<b>Sampled by</b> Luis Esparza
<b>Measuring Point Description</b>	Top of Casing	<b>Screen Depth Interval (ft-bmp)</b>	56 to 76	<b>Casing Diameter (in.)</b>	2	<b>Well Casing Material</b>
<b>Static Water Level (ft-bmp)</b>	76.42	<b>Total Depth (ft-bmp)</b>	78.5	<b>Water Column (ft)</b>	2.08	<b>Gallons in Well</b> 0.34
<b>Water Quality Meter Make/Model</b>		<b>Purge Method</b>	Volumetric	<b>Collection Type</b>	Grab	
<b>Sample Time</b>	14:55	<b>Well Volumes Purged</b>	2.94	<b>Sample ID</b>	MW-6-240809	<b>Purge Equipment</b> Bailer
<b>Purge Start</b>	14:40	<b>Gallons Purged</b>	1	<b>Duplicate ID</b>	--	<b>Sample Equipment</b> Bailer
<b>Purge End</b>	14:50	<b>Total Purge Time (h:m)</b>	0:10			
<b>Borehole Diameter:</b>	--	<b>One Borehole Volume (Gallons):</b>	0	<b>Specified Volumes:</b>	1.5	<b>Calculated Volumes:</b> 0
<b>Purge Rate (Gallons per Minute)</b>	--	<b>Recharge Type:</b>	--	<b>Depth to Water (ft-bmp)</b>	--	<b>Purging Method:</b> Standard Three Well Volume Purge
<b>Decontamination Method:</b>	2 Stage Rinse	<b>Depth to Water with 80% Recharge (ft-bmp) :</b>	--	<b>Did well dewater?</b>	no	<b>Total Gallons Purged:</b> 1

Time	Gallons Removed	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
									Color	Odor
14:40	1	--	7.49	1753	--	--	22.34	--	Clear	--
14:45	1	--	7.38	1734	--	--	21.41	--	Clear	--
14:50	1	--	7.34	1745	--	--	20.97	--	Clear	--
14:55	1	--	7.27	1753	--	--	20.59	--	Clear	--

**Comments:** None

**Well Casing Volume Conversion**

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

**Sample Information**

<b>Sample ID:</b>	MW-6-240809	<b>Sample Time:</b>	14:55	<b>Sample Depth (ft-bmp) (e.g. pump intake):</b>	--
<b>Analytes and Methods:</b>	See Chain-of-Custody.			<b>Depth to Water at Time of Sampling</b>	76.42

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

<b>Project Number</b>	30062605	<b>Well ID</b>	MW-2	<b>Date</b>	8/9/2024	
<b>Site Location</b>	Hobbs, New Mexico	<b>Site ID</b>	PMG00209	<b>Weather (°F)</b>	Clear	<b>Sampled by</b> Luis Esparza
<b>Measuring Point Description</b>	Top of Casing	<b>Screen Depth Interval (ft-bmp)</b>	51 to 71	<b>Casing Diameter (in.)</b>	2	<b>Well Casing Material</b>
<b>Static Water Level (ft-bmp)</b>	55.61	<b>Total Depth (ft-bmp)</b>	71	<b>Water Column (ft)</b>	15.39	<b>Gallons in Well</b> 2.5
<b>Water Quality Meter Make/Model</b>	YSI 556 MP5	<b>Purge Method</b>	Volumetric	<b>Collection Type</b>	Grab	
<b>Sample Time</b>	13:10	<b>Well Volumes Purged</b>	2.60	<b>Sample ID</b>	MW-2-240809	<b>Purge Equipment</b> Bladder
<b>Purge Start</b>	12:45	<b>Gallons Purged</b>	6.5	<b>Duplicate ID</b>	--	<b>Sample Equipment</b> Bladder
<b>Purge End</b>	13:10	<b>Total Purge Time (h:m)</b>	0:25			

<b>Borehole Diameter:</b>	--	<b>One Borehole Volume (Gallons):</b>	0	<b>Specified Volumes:</b>	1.5	<b>Calculated Volumes:</b>	0
<b>Purge Rate (Gallons per Minute)</b>	--	<b>Recharge Type:</b>	--	<b>Depth to Water (ft-bmp)</b>	--	<b>Purging Method:</b>	Standard Three Well Volume Purge
<b>Decontamination Method:</b>	2 Stage Rinse	<b>Depth to Water with 80% Recharge (ft-bmp) :</b>	--	<b>Did well dewater?</b>	no	<b>Total Gallons Purged:</b>	6.5

Time	Gallons Removed	Depth to Water (ft)	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Appearance	
									Color	Odor
12:45	1.1	--	9.08	1063	--	--	22.95	--	Clear	--
12:50	1.1	--	8.83	1019	--	--	22.70	--	Clear	--
12:55	1.1	--	8.72	1017	--	--	22.88	--	Clear	--
13:00	1.1	--	8.67	1009	--	--	22.56	--	Clear	--
13:05	1.1	--	8.68	1017	--	--	23.25	--	Clear	--
13:10	1.1	--	8.70	1018	--	--	22.80	--	Clear	--

**Comments:** None

**Well Casing Volume Conversion**

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

**Sample Information**

<b>Sample ID:</b>	MW-2-240809	<b>Sample Time:</b>	13:10	<b>Sample Depth (ft-bmp) (e.g. pump intake):</b>	60
<b>Analytes and Methods:</b>	See Chain-of-Custody.			<b>Depth to Water at Time of Sampling</b>	55.61

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

## Laboratory Analytical Reports and Chain-of-Custody Documentation



# ANALYTICAL REPORT

August 20, 2024

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

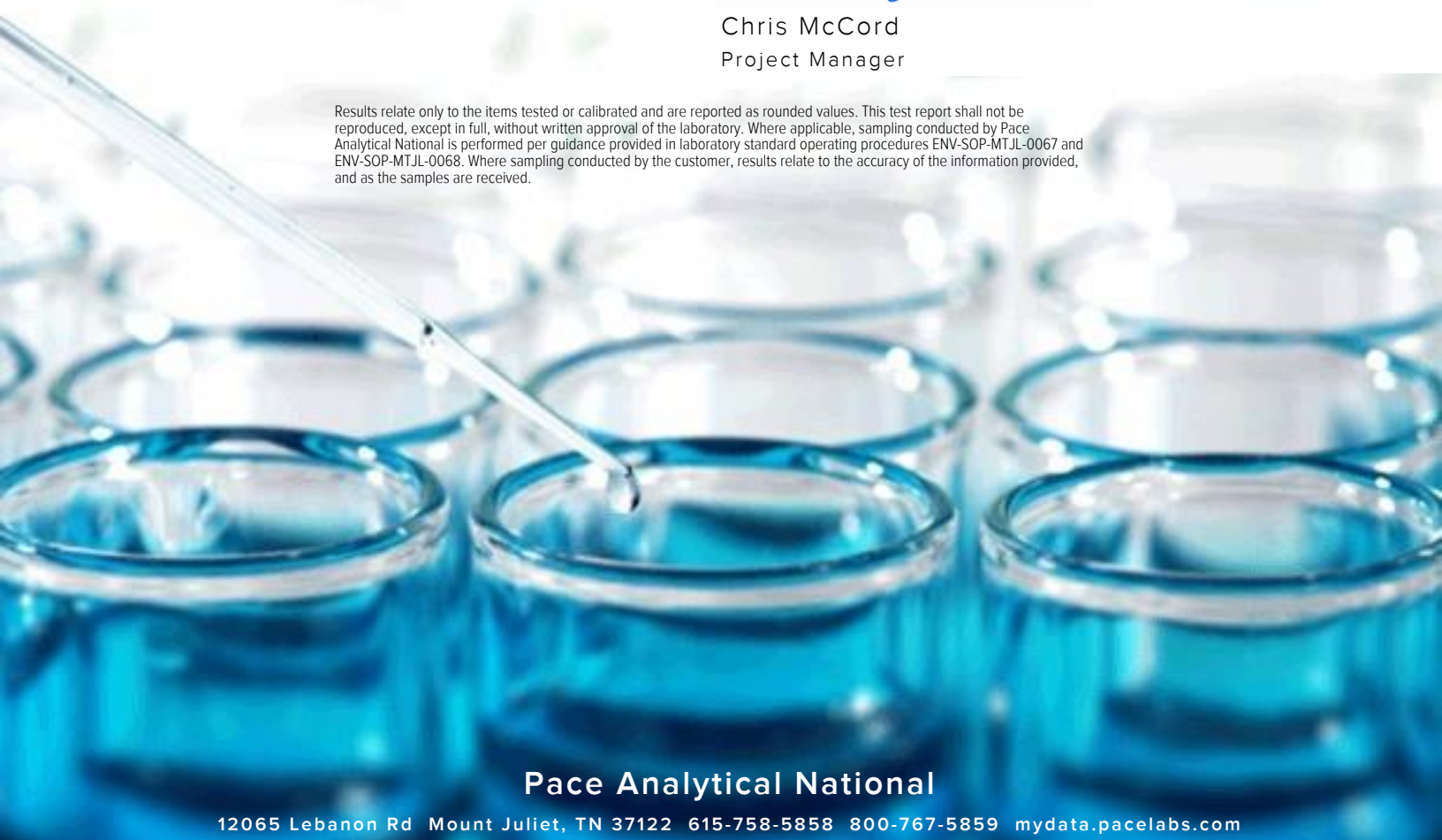
## Arcadis - Chevron - NM

Sample Delivery Group: L1766301  
 Samples Received: 08/10/2024  
 Project Number: 30062605; 19.45  
 Description: PMG00209 - Hobbs  
 Site: US-HOBBS  
 Report To: James Calhoun  
 1004 N Big Spring Street  
 Suite 121  
 Midland, TX 79701

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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**Tc: Table of Contents** 2

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**Cn: Case Narrative** 4

**Sr: Sample Results** 5

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**MW-5-W-240809 L1766301-05** 9

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**Qc: Quality Control Summary** 11

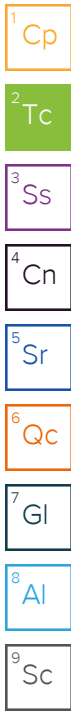
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MW-1-W-240809 L1766301-01 GW

Collected by Luis Esparza  
 Collected date/time 08/09/24 10:58  
 Received date/time 08/10/24 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2341983	1	08/13/24 15:26	08/14/24 11:53	DLS	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2343378	5	08/16/24 16:42	08/16/24 16:42	DLH	Mt. Juliet, TN

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

MW-2-W-240809 L1766301-02 GW

Collected by Luis Esparza  
 Collected date/time 08/09/24 13:10  
 Received date/time 08/10/24 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2341983	1	08/13/24 15:26	08/14/24 11:53	DLS	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2343378	1	08/16/24 16:51	08/16/24 16:51	DLH	Mt. Juliet, TN

MW-3-W-240809 L1766301-03 GW

Collected by Luis Esparza  
 Collected date/time 08/09/24 10:35  
 Received date/time 08/10/24 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2341983	1	08/13/24 15:26	08/14/24 11:53	DLS	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2343378	5	08/16/24 17:29	08/16/24 17:29	DLH	Mt. Juliet, TN

MW-4-W-240809 L1766301-04 GW

Collected by Luis Esparza  
 Collected date/time 08/09/24 11:25  
 Received date/time 08/10/24 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2341983	1	08/13/24 15:26	08/14/24 11:53	DLS	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2343378	5	08/16/24 17:39	08/16/24 17:39	DLH	Mt. Juliet, TN

MW-5-W-240809 L1766301-05 GW

Collected by Luis Esparza  
 Collected date/time 08/09/24 12:12  
 Received date/time 08/10/24 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2341983	1	08/13/24 15:26	08/14/24 11:53	DLS	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2343378	1	08/16/24 17:48	08/16/24 17:48	DLH	Mt. Juliet, TN

MW-6-W-240809 L1766301-06 GW

Collected by Luis Esparza  
 Collected date/time 08/09/24 14:55  
 Received date/time 08/10/24 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2341983	1	08/13/24 15:26	08/14/24 11:53	DLS	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2343378	5	08/16/24 17:58	08/16/24 17:58	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

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Collected date/time: 08/09/24 10:58

L1766301

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	1160		20.0	1	08/14/2024 11:53	<a href="#">WG2341983</a>

1 Cp

2 Tc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	300		2.74	5.00	5	08/16/2024 16:42	<a href="#">WG2343378</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Collected date/time: 08/09/24 13:10

L1766301

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	577		13.3	1	08/14/2024 11:53	<a href="#">WG2341983</a>

1 Cp

2 Tc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	149	<a href="#">J6</a>	0.547	1.00	1	08/16/2024 16:51	<a href="#">WG2343378</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Collected date/time: 08/09/24 10:35

L1766301

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	1290		20.0	1	08/14/2024 11:53	<a href="#">WG2341983</a>

1 Cp

2 Tc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	322		2.74	5.00	5	08/16/2024 17:29	<a href="#">WG2343378</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Collected date/time: 08/09/24 11:25

L1766301

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	1320		25.0	1	08/14/2024 11:53	<a href="#">WG2341983</a>

1 Cp

2 Tc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	566		2.74	5.00	5	08/16/2024 17:39	<a href="#">WG2343378</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Collected date/time: 08/09/24 12:12

L1766301

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	408		10.0	1	08/14/2024 11:53	<a href="#">WG2341983</a>

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	64.5		0.547	1.00	1	08/16/2024 17:48	<a href="#">WG2343378</a>

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Collected date/time: 08/09/24 14:55

L1766301

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	1280		20.0	1	08/14/2024 11:53	<a href="#">WG2341983</a>

1 Cp

2 Tc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	389		2.74	5.00	5	08/16/2024 17:58	<a href="#">WG2343378</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Gravimetric Analysis by Method 2540 C-2011

[L1766301-01,02,03,04,05,06](#)

Method Blank (MB)

(MB) R4108235-1 08/14/24 11:53

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Dissolved Solids	U		10.0	10.0

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

L1766233-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1766233-05 08/14/24 11:53 • (DUP) R4108235-3 08/14/24 11:53

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	337	336	1	0.297		10

<sup>4</sup>Cn

<sup>5</sup>Sr

L1766321-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1766321-01 08/14/24 11:53 • (DUP) R4108235-4 08/14/24 11:53

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	1670	1690	1	1.31		10

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

Laboratory Control Sample (LCS)

(LCS) R4108235-2 08/14/24 11:53

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

<sup>9</sup>Sc

Wet Chemistry by Method 9056A

[L1766301-01,02,03,04,05,06](#)

Method Blank (MB)

(MB) R4108522-1 08/16/24 16:23

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Chloride	U		0.547	1.00

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

L1766301-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1766301-02 08/16/24 16:51 • (DUP) R4108522-3 08/16/24 17:01

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Chloride	149	149	1	0.225		15

<sup>4</sup>Cn

<sup>5</sup>Sr

Laboratory Control Sample (LCS)

(LCS) R4108522-2 08/16/24 16:32

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Chloride	40.0	39.9	99.7	80.0-120	

<sup>6</sup>Qc

<sup>7</sup>Gl

L1766301-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1766301-02 08/16/24 16:51 • (MS) R4108522-4 08/16/24 17:10 • (MSD) R4108522-5 08/16/24 17:20

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Chloride	40.0	149	159	159	24.9	25.2	1	80.0-120	<u>J6</u>	<u>J6</u>	0.0869	15

<sup>8</sup>Al

<sup>9</sup>Sc

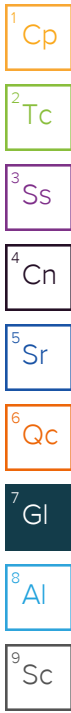
Guide to Reading and Understanding Your Laboratory Report

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.
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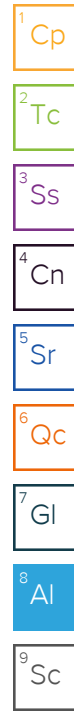
Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

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 <sup>1</sup>	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	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 <sup>1,6</sup>	KY90010	South Carolina	84004002
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas <sup>5</sup>	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 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>6</sup> 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**  
 1004 N Big Spring Street  
 Suite 121  
 Midland, TX 79701

Billing Information:  
**Accounts Payable**  
 630 Plaza Drive, Suite 600  
 Highlands Ranch, CO 80129

Report to:  
**James Calhoun**

Email To:  
 james.calhoun@arcadis.com;nadja.cintronfranq

Project Description:  
**PMG00209 - Hobbs**

City/State Collected:  
**NM**

Please Circle:  
 PT  MT  CT  ET

Phone: **425-919-2370**

Client Project #  
**30062605; 19.45**

Lab Project #  
**CHEVARCNM-USHOBBS**

Collected by (print):  
**Luis Esparza**

Site/Facility ID #  
**US-HOBBS**

P.O. #

Collected by (signature):  
*KE*

**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

Immediately Packed on Ice N \_\_\_ Y

No. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	TDS 1L-HDPE NoPres										
MW-1-W-240809	G	GW		8/9/24	1058	2	X	X										
MW-2-W-240809	G	GW		8/9/24	1310	2	X	X										
MW-3-W-240809	G	GW		8/9/24	1035	2	X	X										
MW-4-W-240809	G	GW		8/9/24	1125	2	X	X										
MW-5-W-240809	G	GW		8/9/24	1212	2	X	X										
MW-6-W-240809	G	GW		8/9/24	1455	2	X	X										

Analysis / Container / Preservative									

Chain of Custody

**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/hubs/pas-standard-terms.pdf>

SDG # **1766 301**  
**A069**

Acctnum: **CHEVARCNM**  
 Template: **T256504**  
 Prelogin: **P1088855**  
 PM: **526 - Chris McCord**  
 PB: **7-12-24 BK**

Shipped Via: **FedEX Ground**

Remarks | Sample # (lab only)

\* 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 # **7315 3210 3569**

**Sample Receipt Checklist**

COC Seal Present/Intact:  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)  
*L. Esparza KE*

Date: **8/9/24**

Time: **1600**

Received by: (Signature)

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Received for lab by: (Signature)  
*[Signature]*

Date: **8-10-24**

Time: **8:45**

Trip Blank Received: Yes/No  
 HCL / MeOH  
 TBR

Temp: **60.0** °C  
 Bottles Received: **3-24.3 = 3.5**

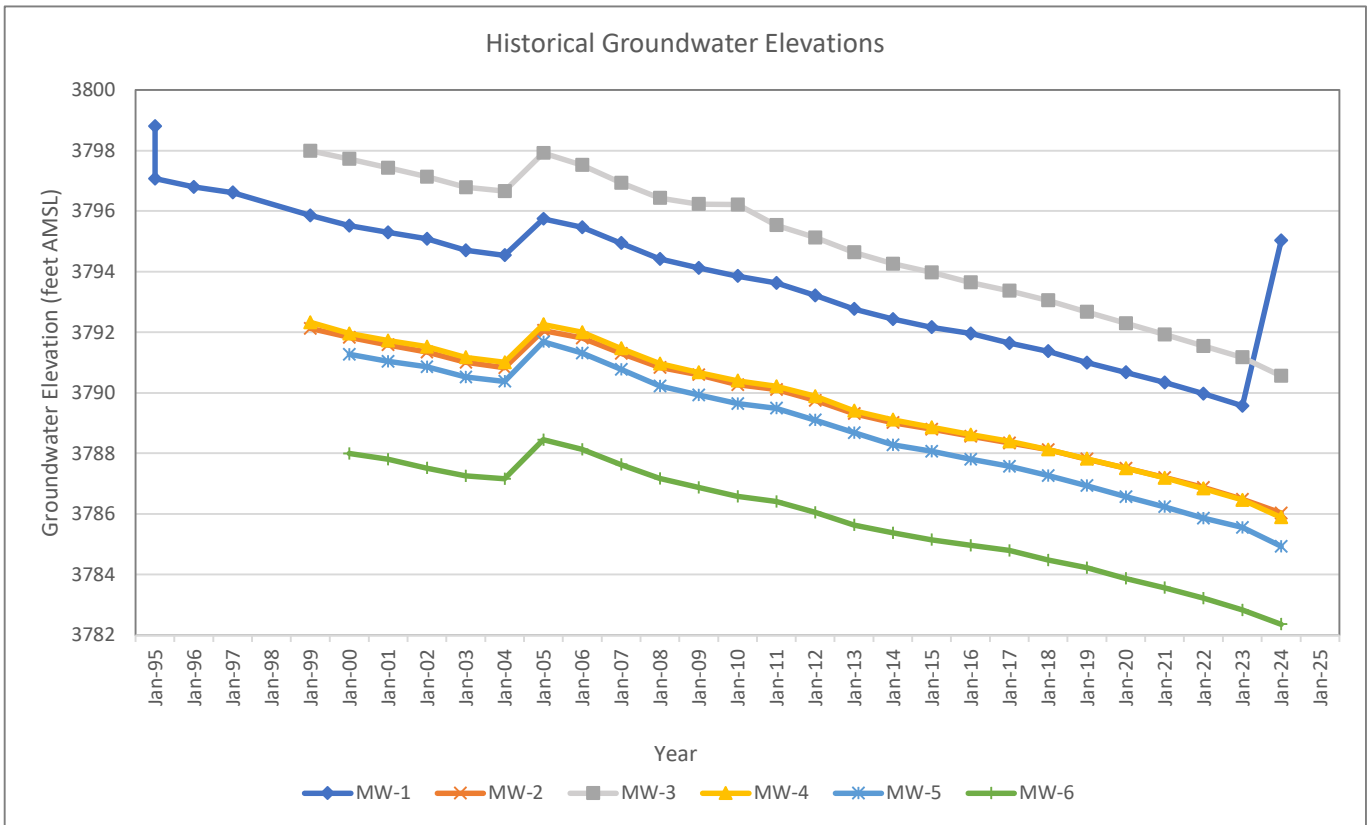
If preservation required by Login: Date/Time

Hold: \_\_\_\_\_

Condition: **NCF / OK**

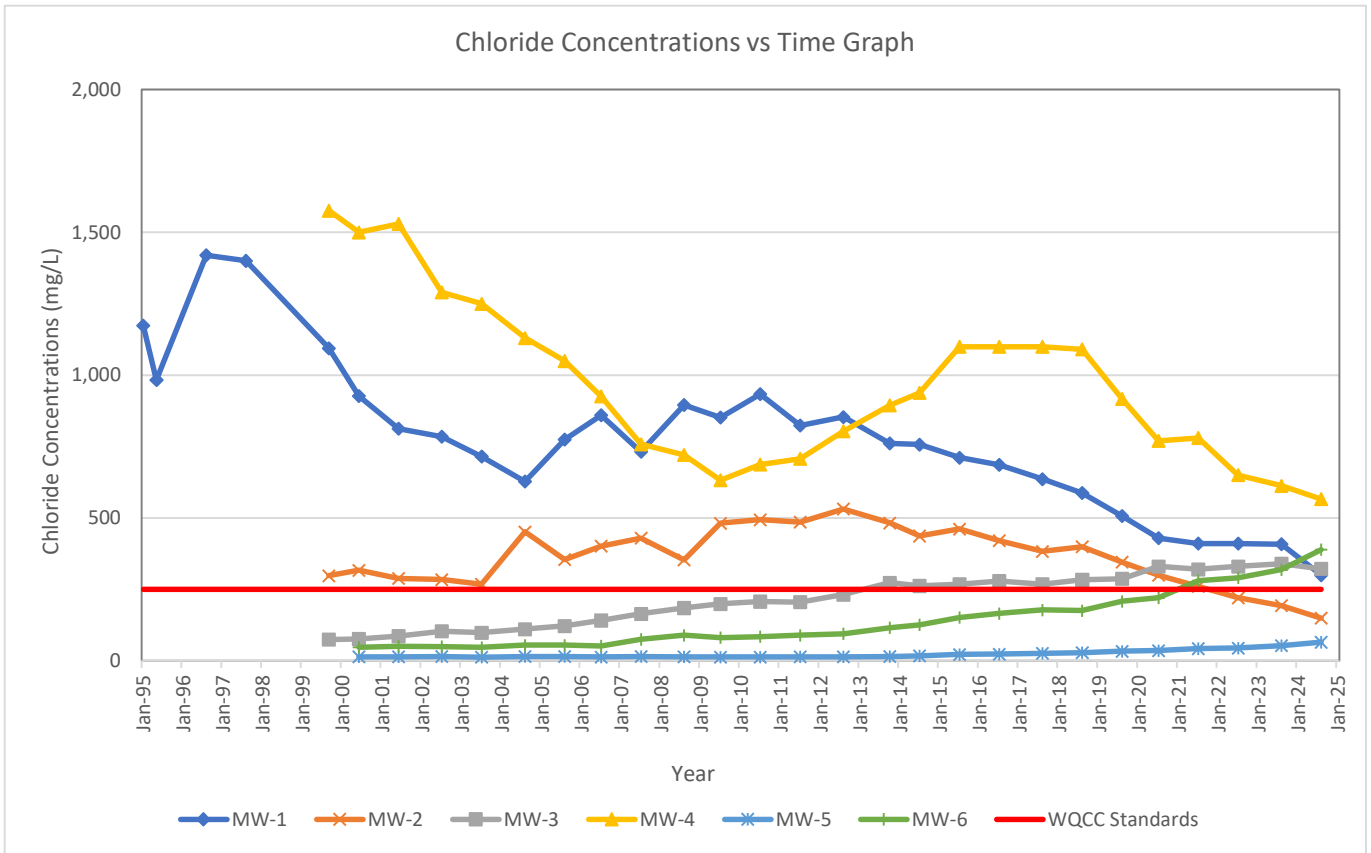
# Appendix D

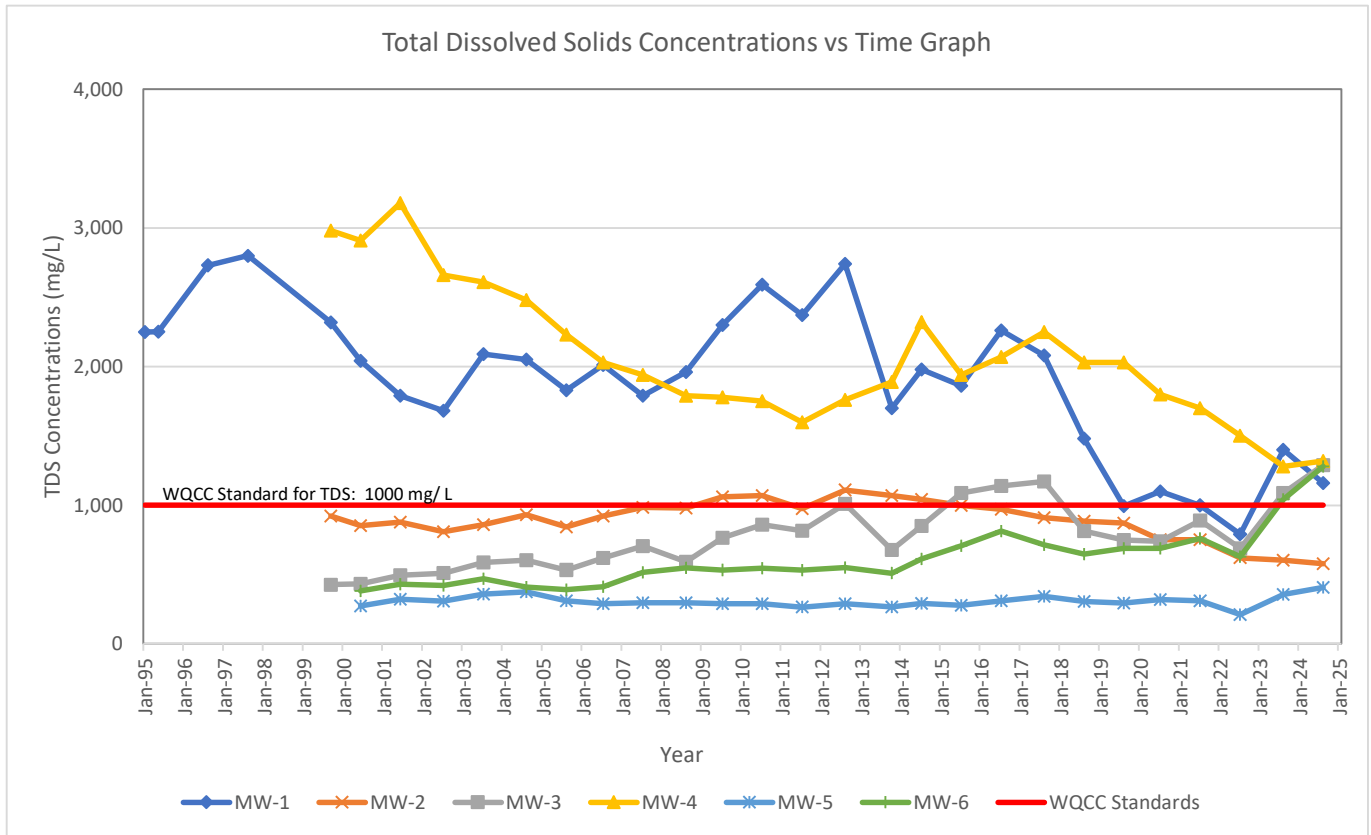
## Historical Groundwater Elevation Graph



# Appendix E

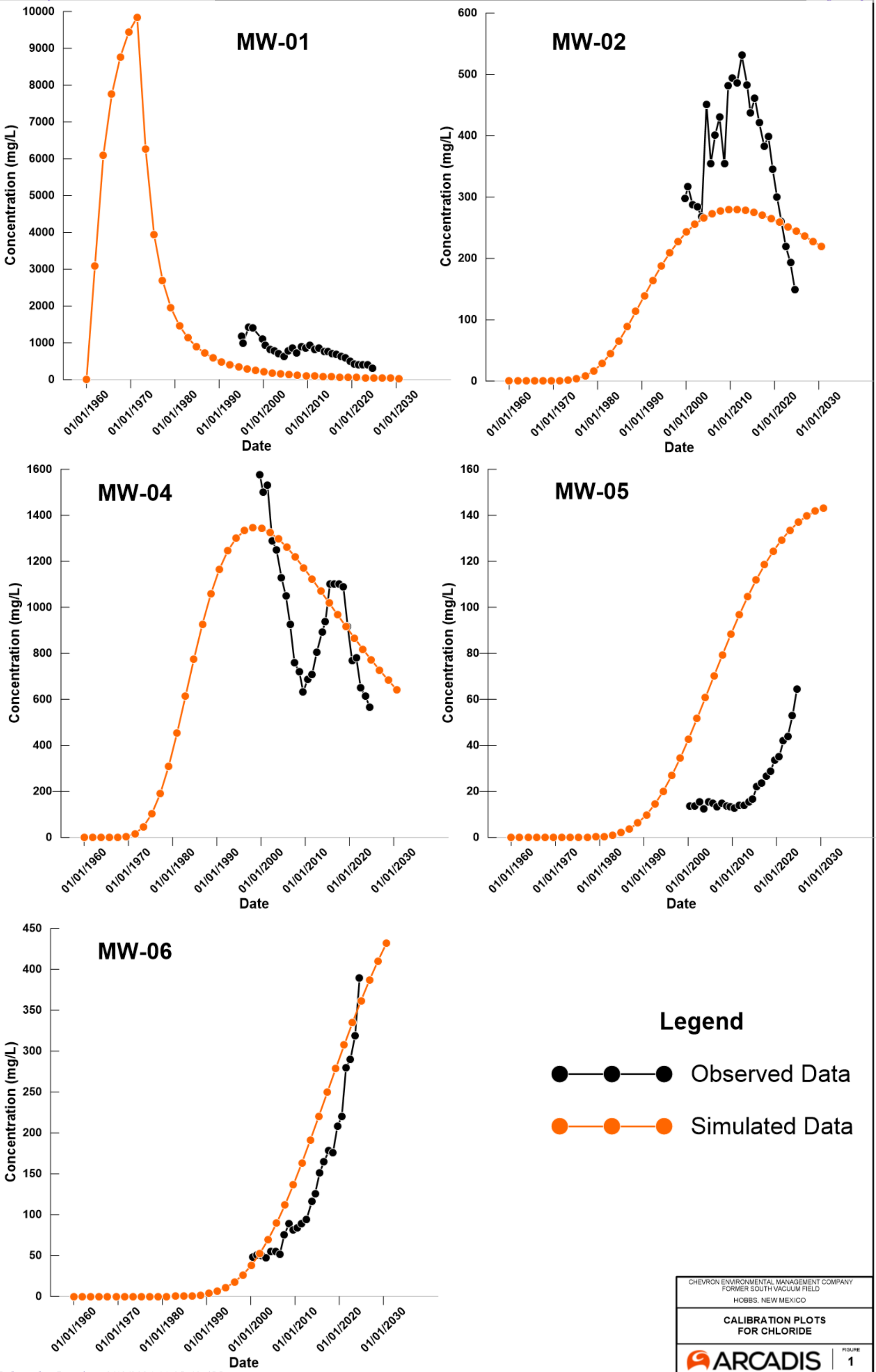
## Historical Chloride and TDS Concentration Graphs

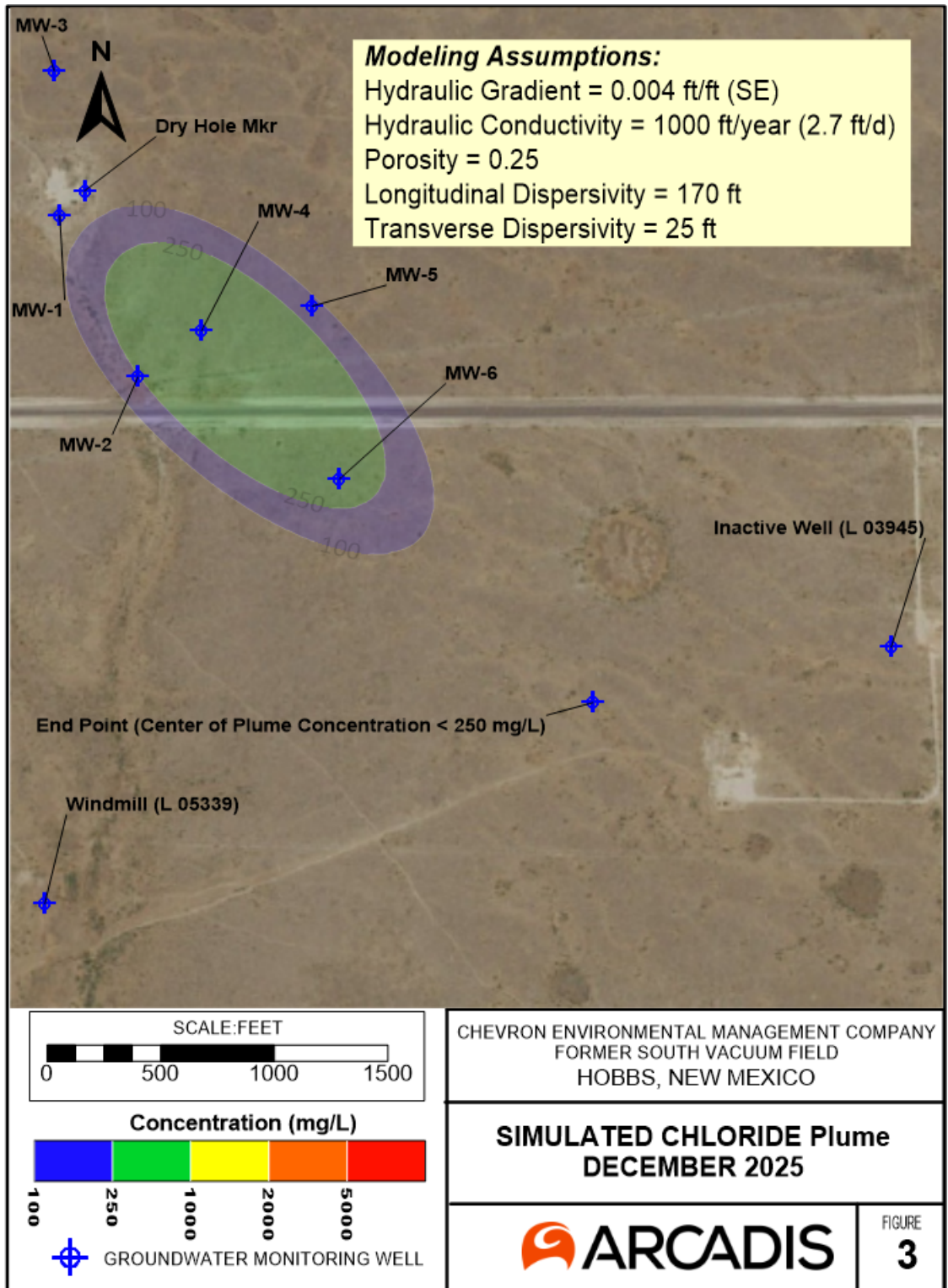


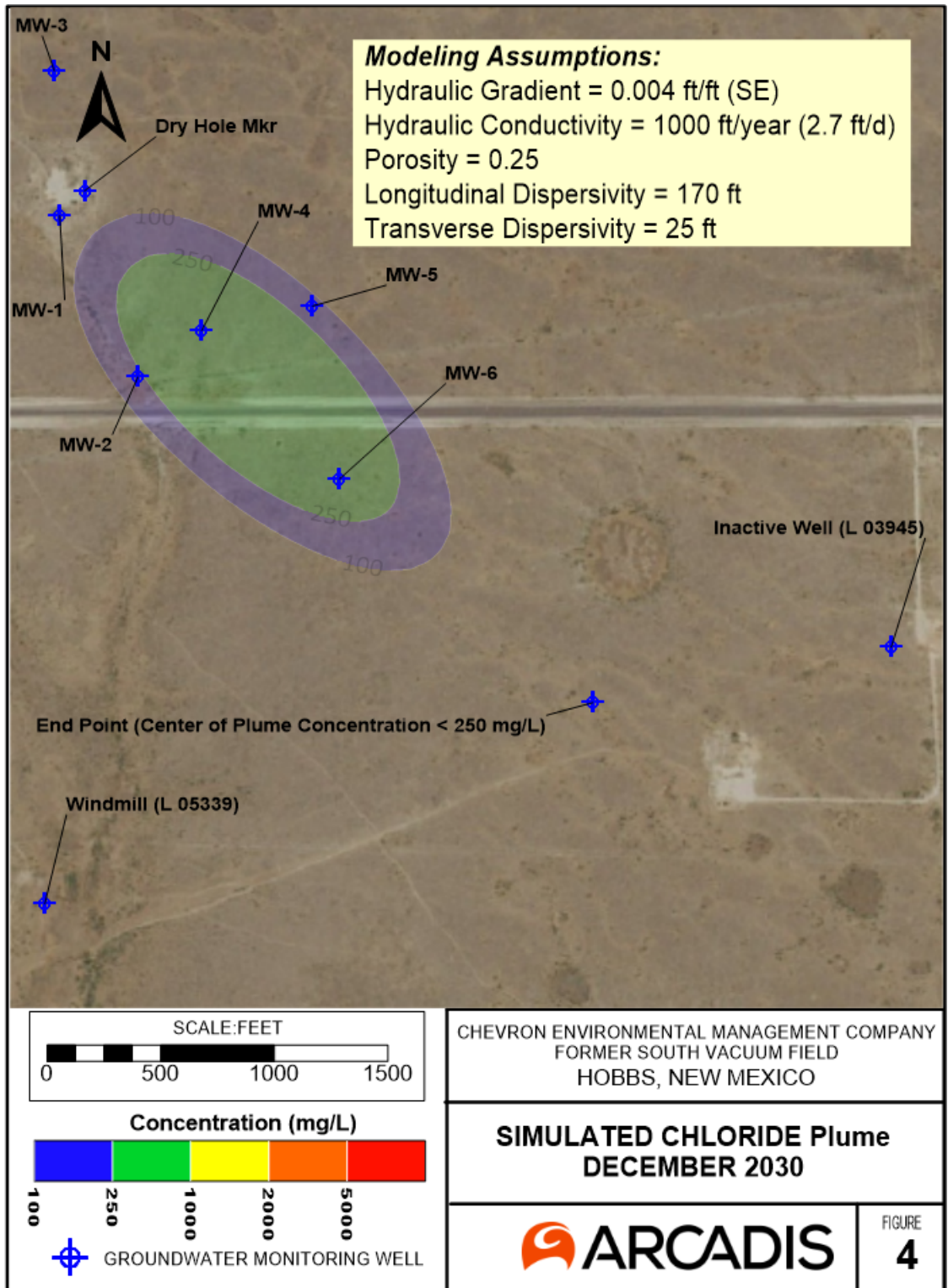


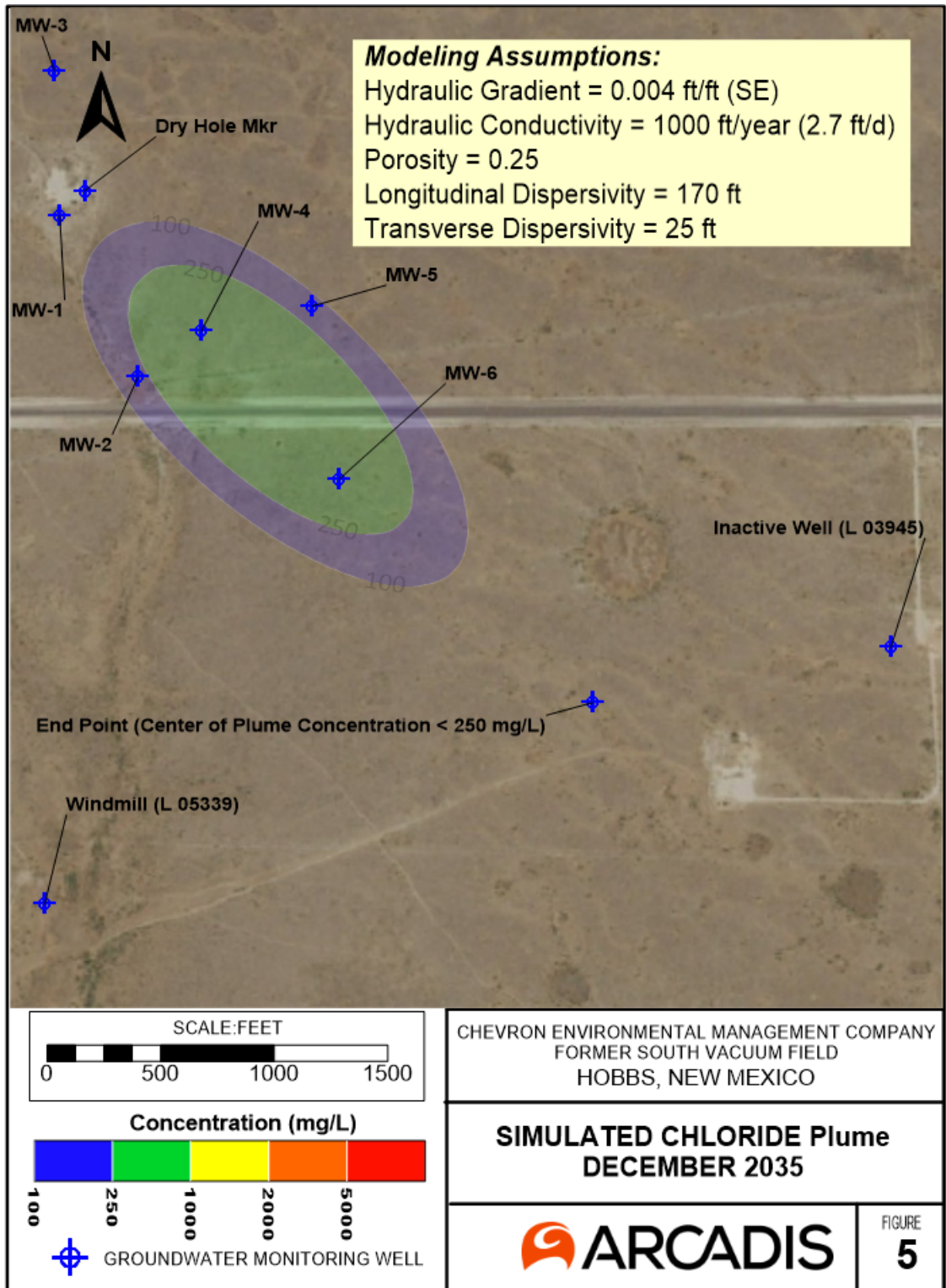
# Appendix F

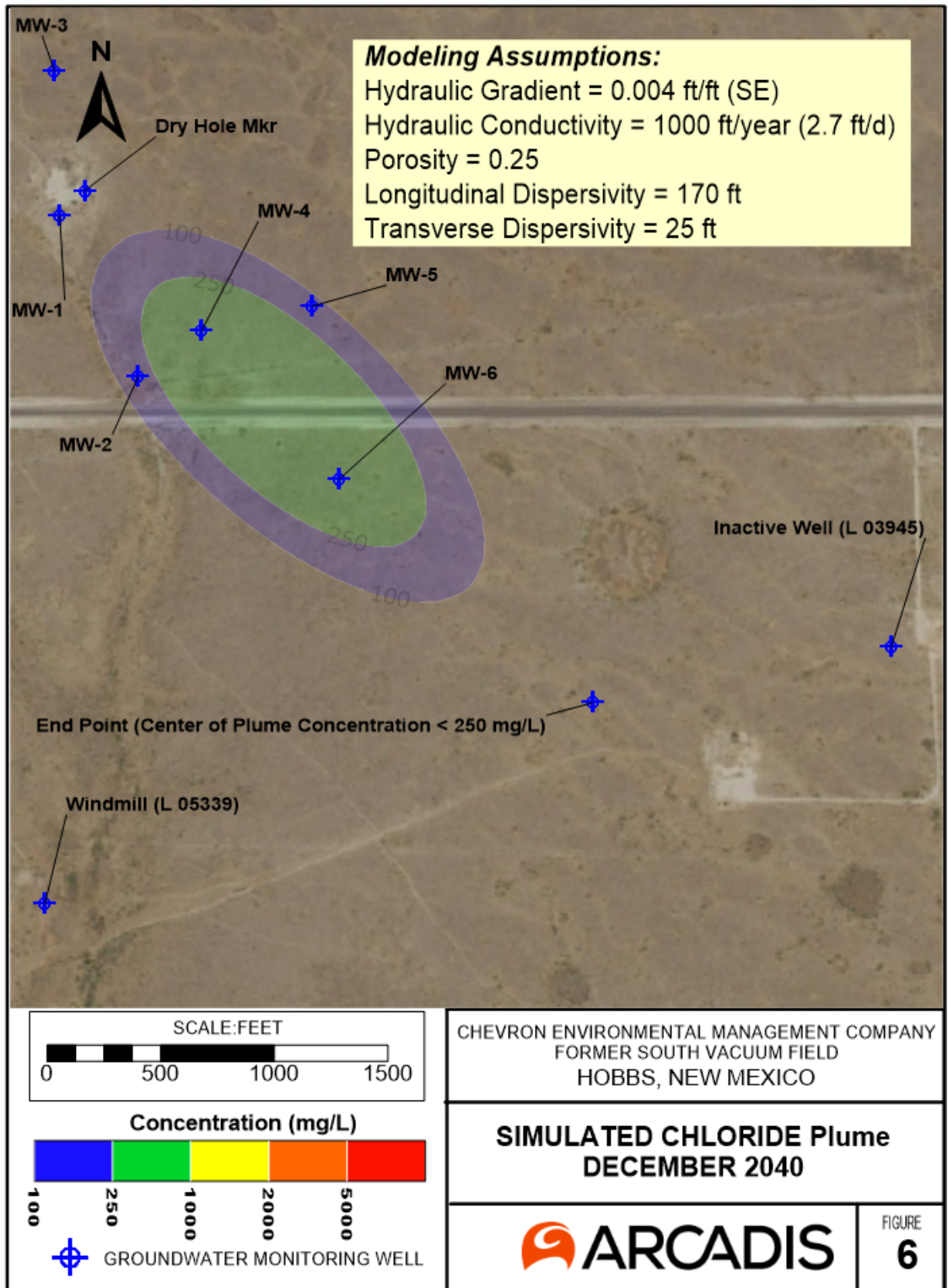
## Chloride Plume Simulation Results

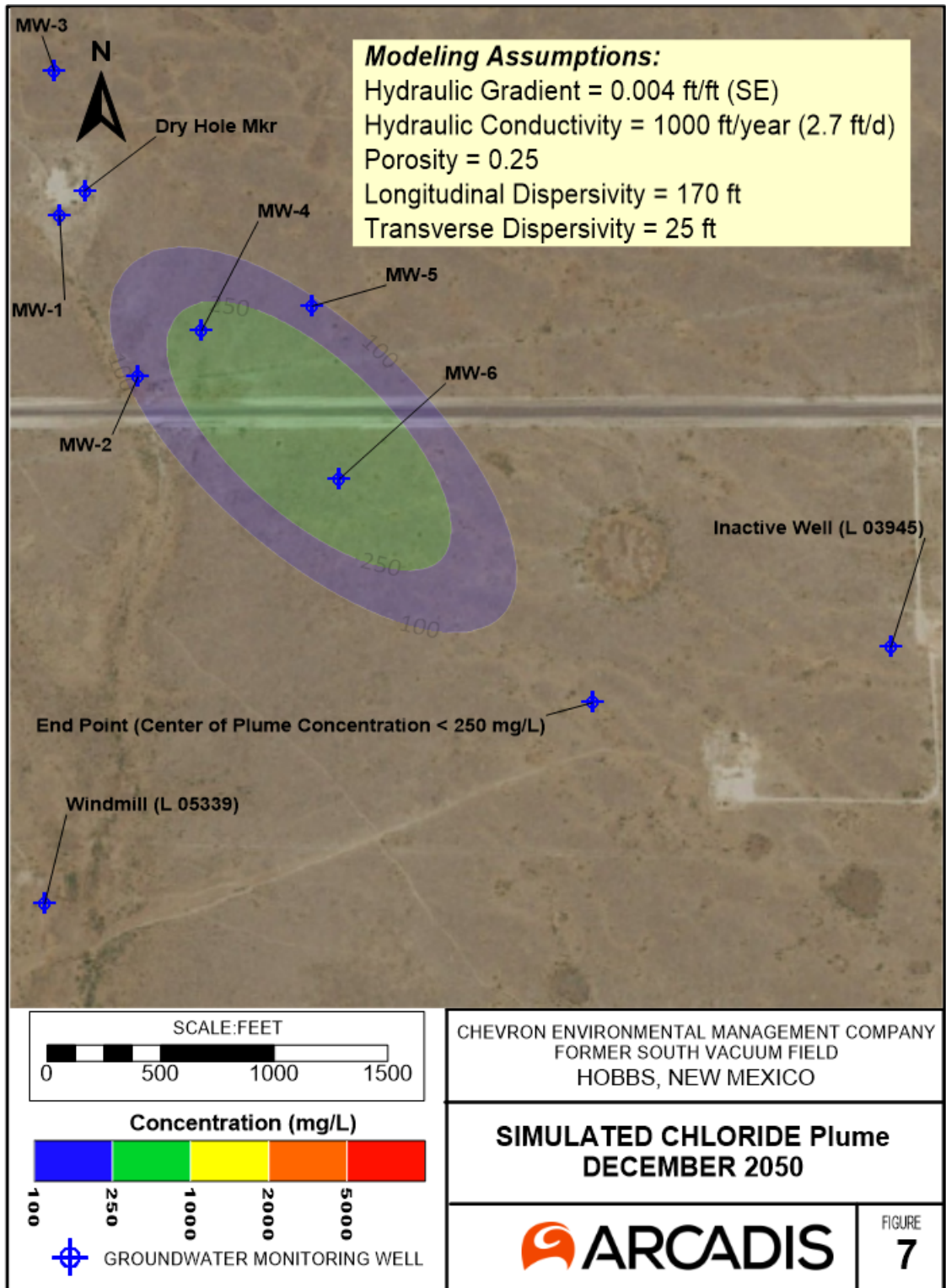


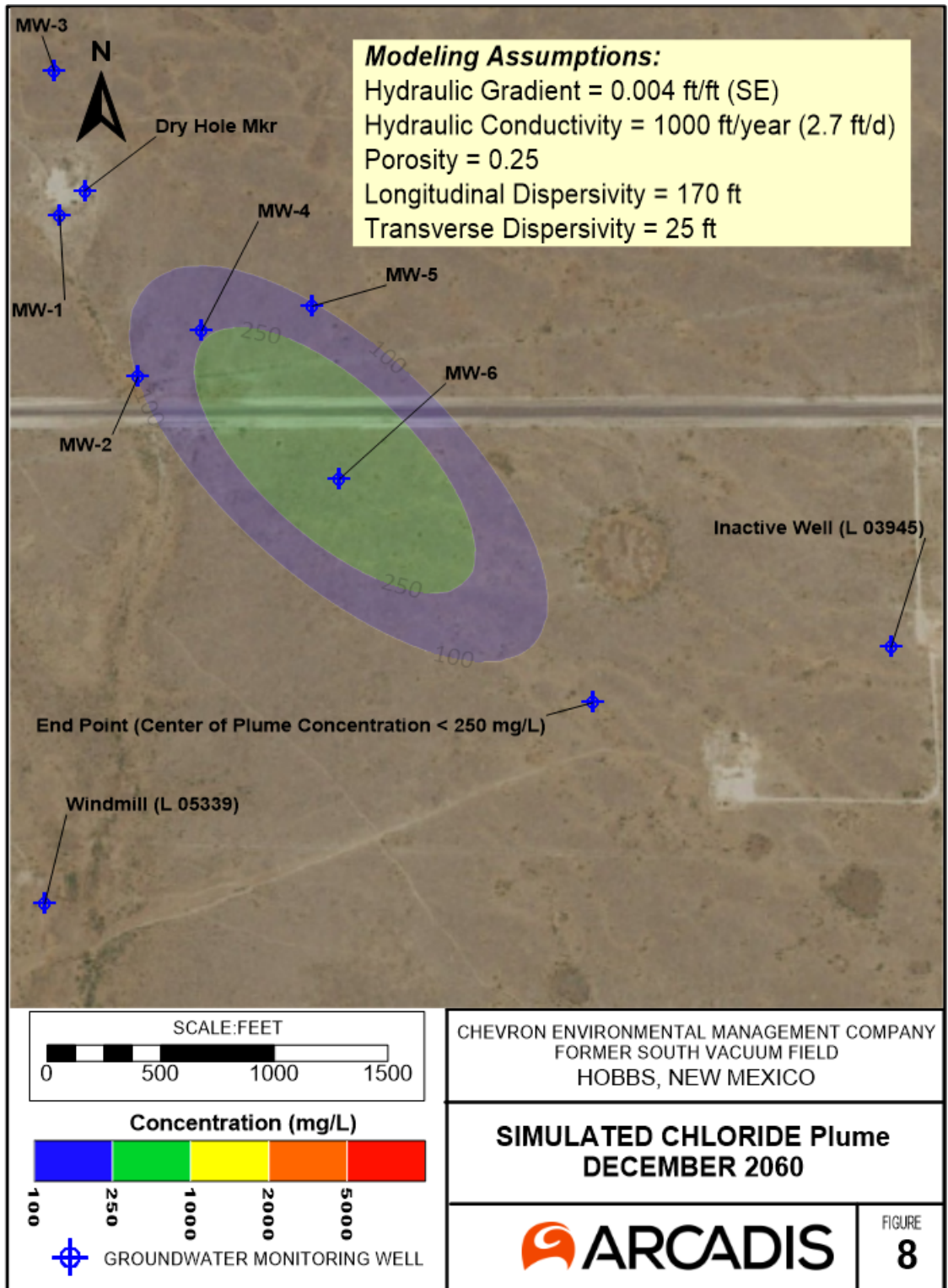


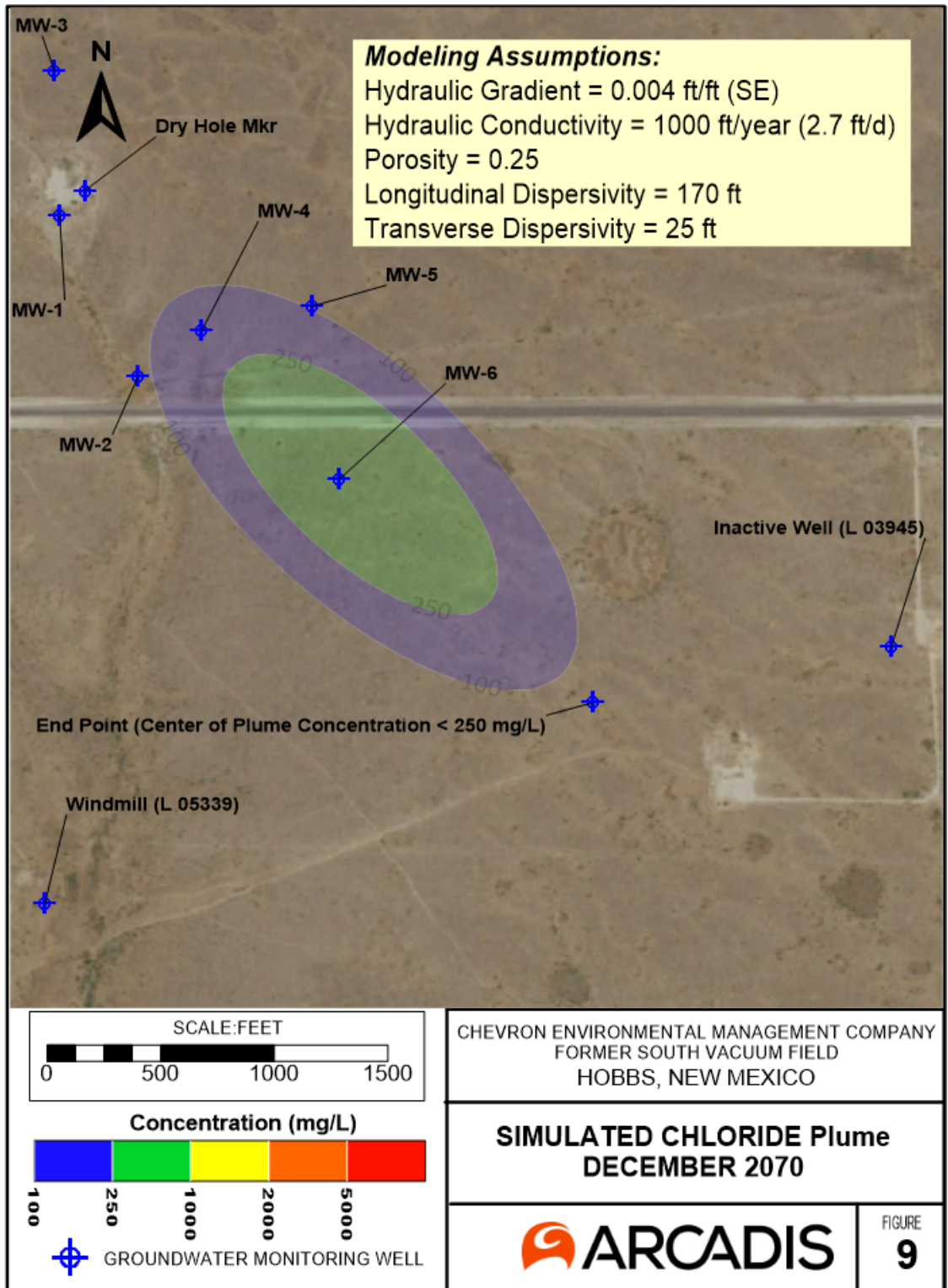


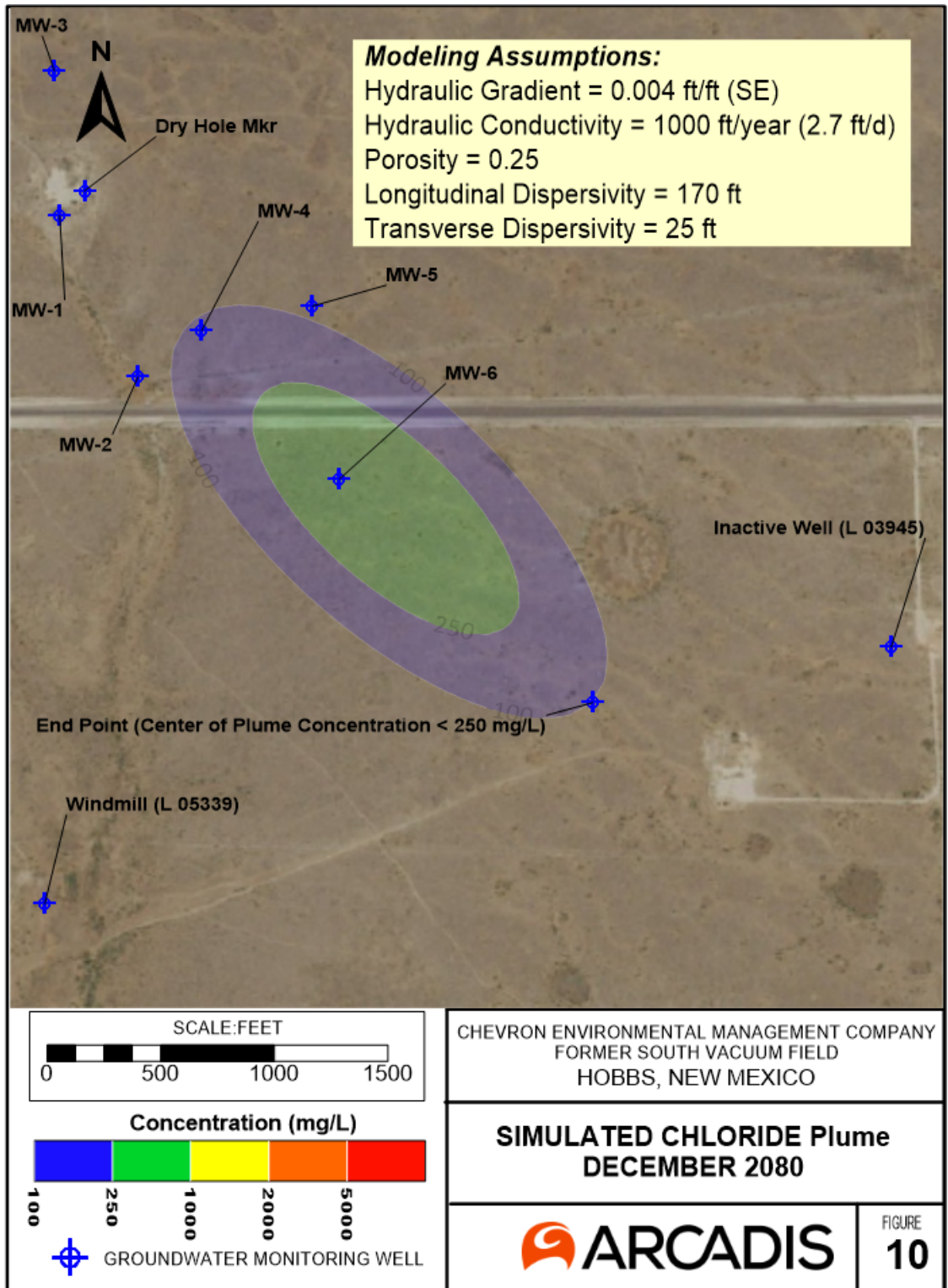


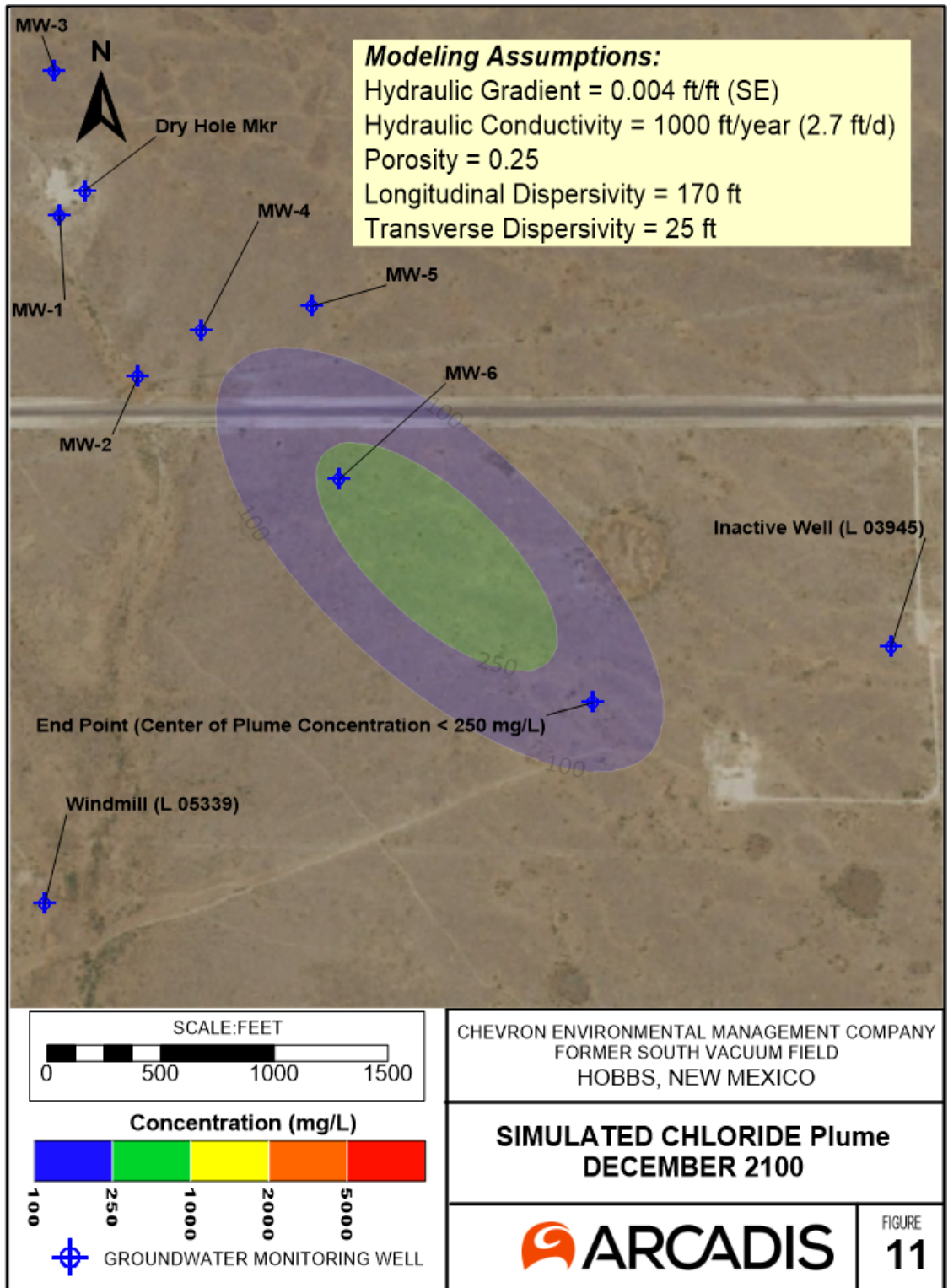


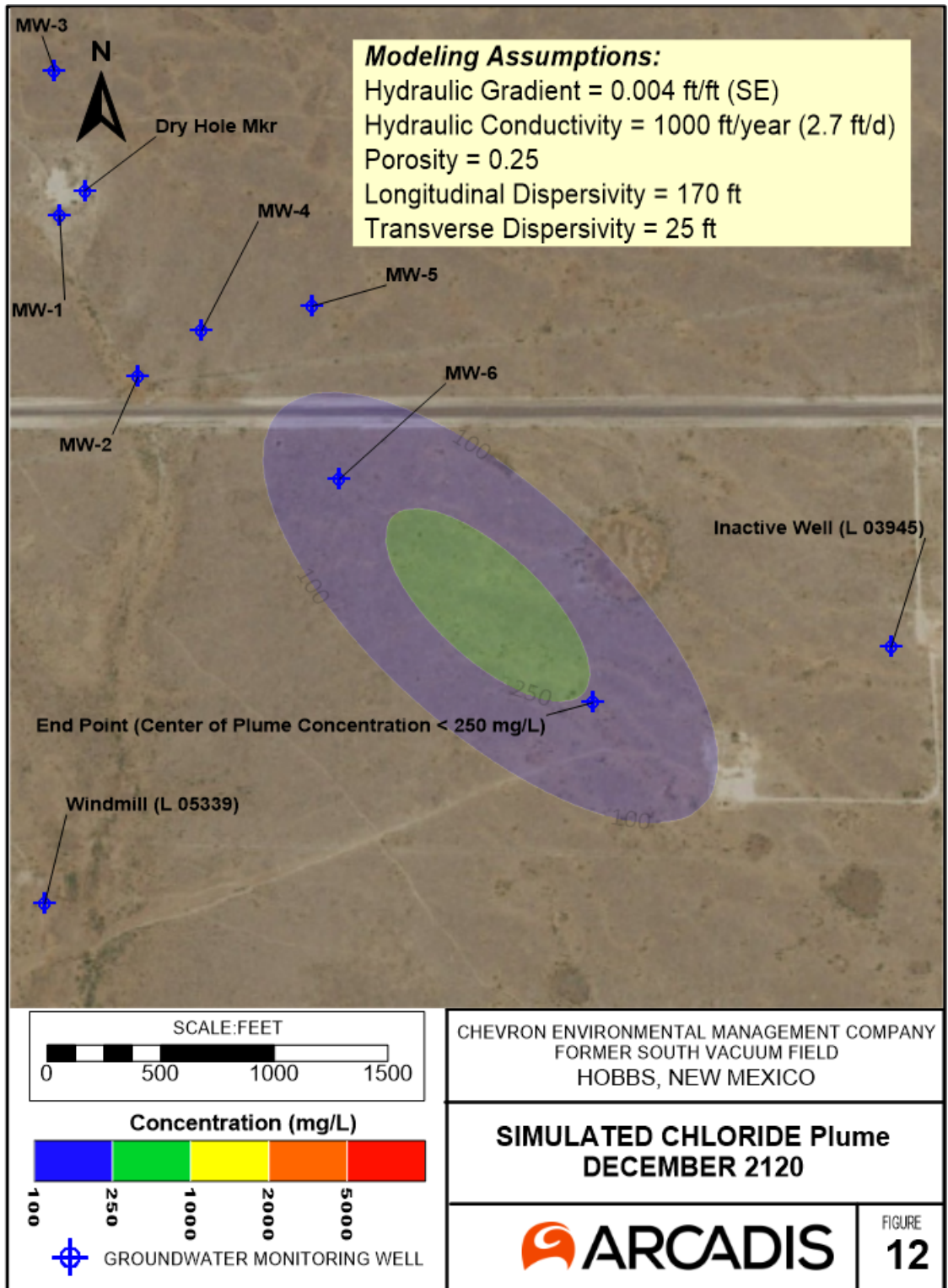


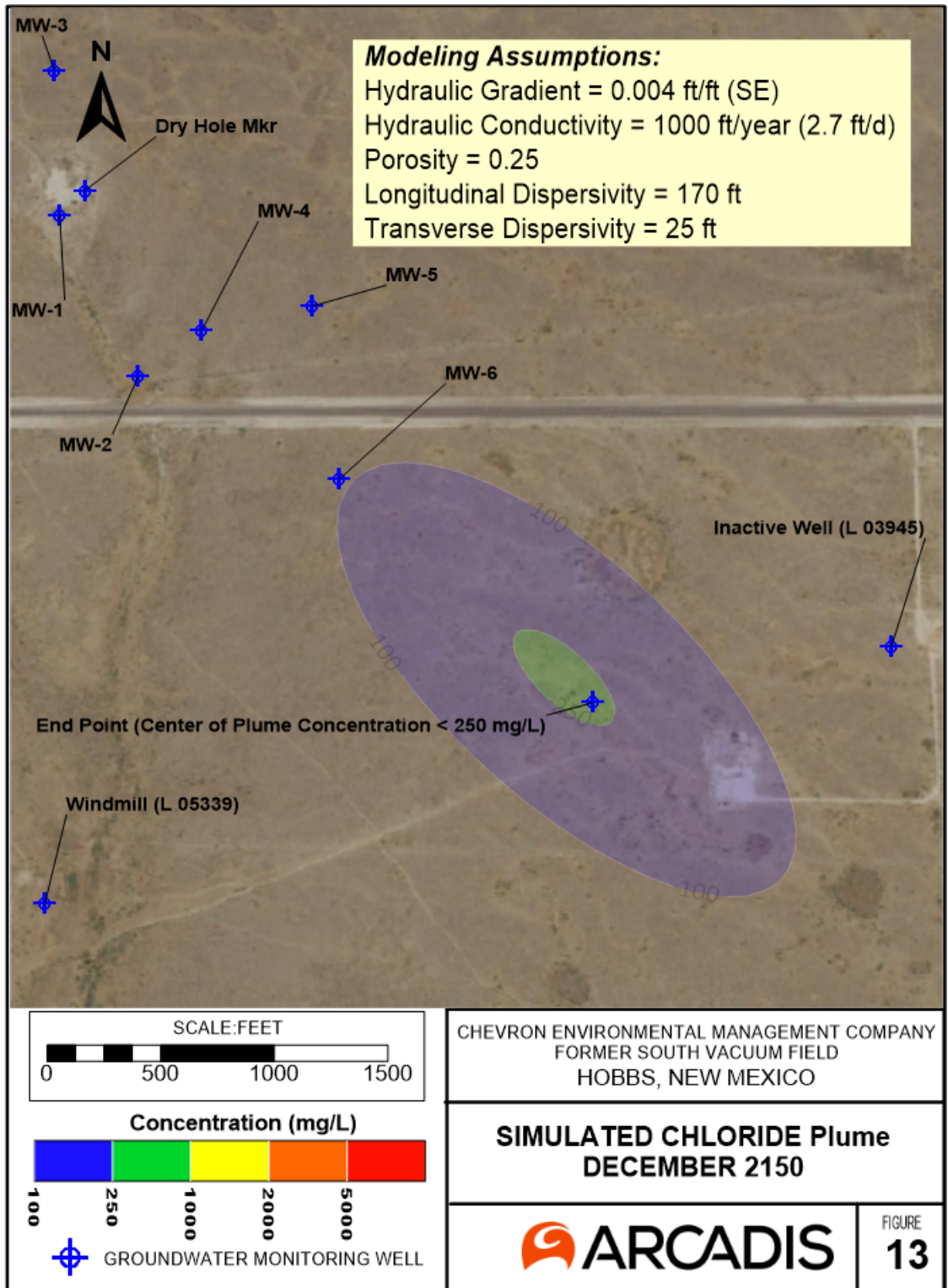


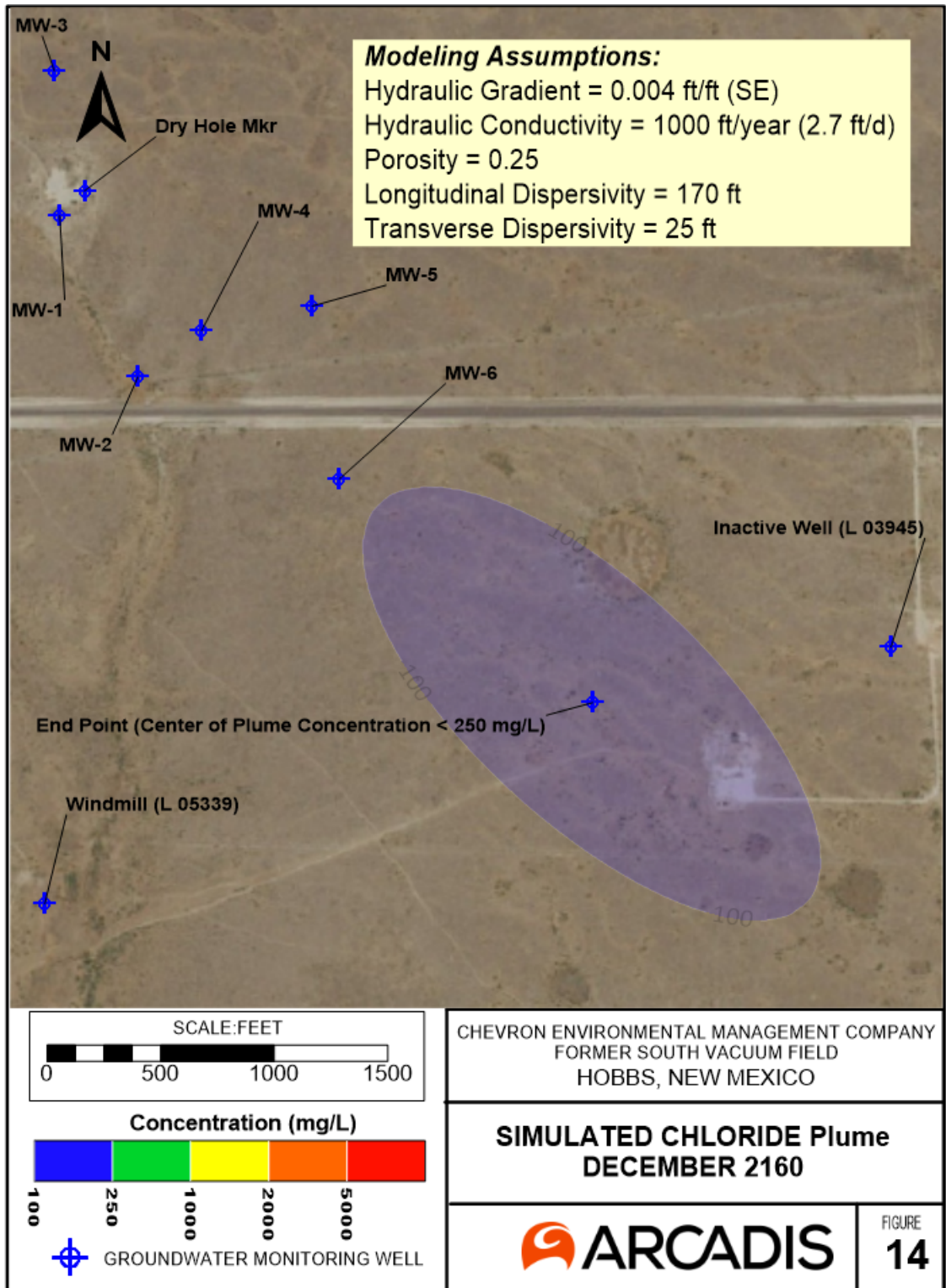






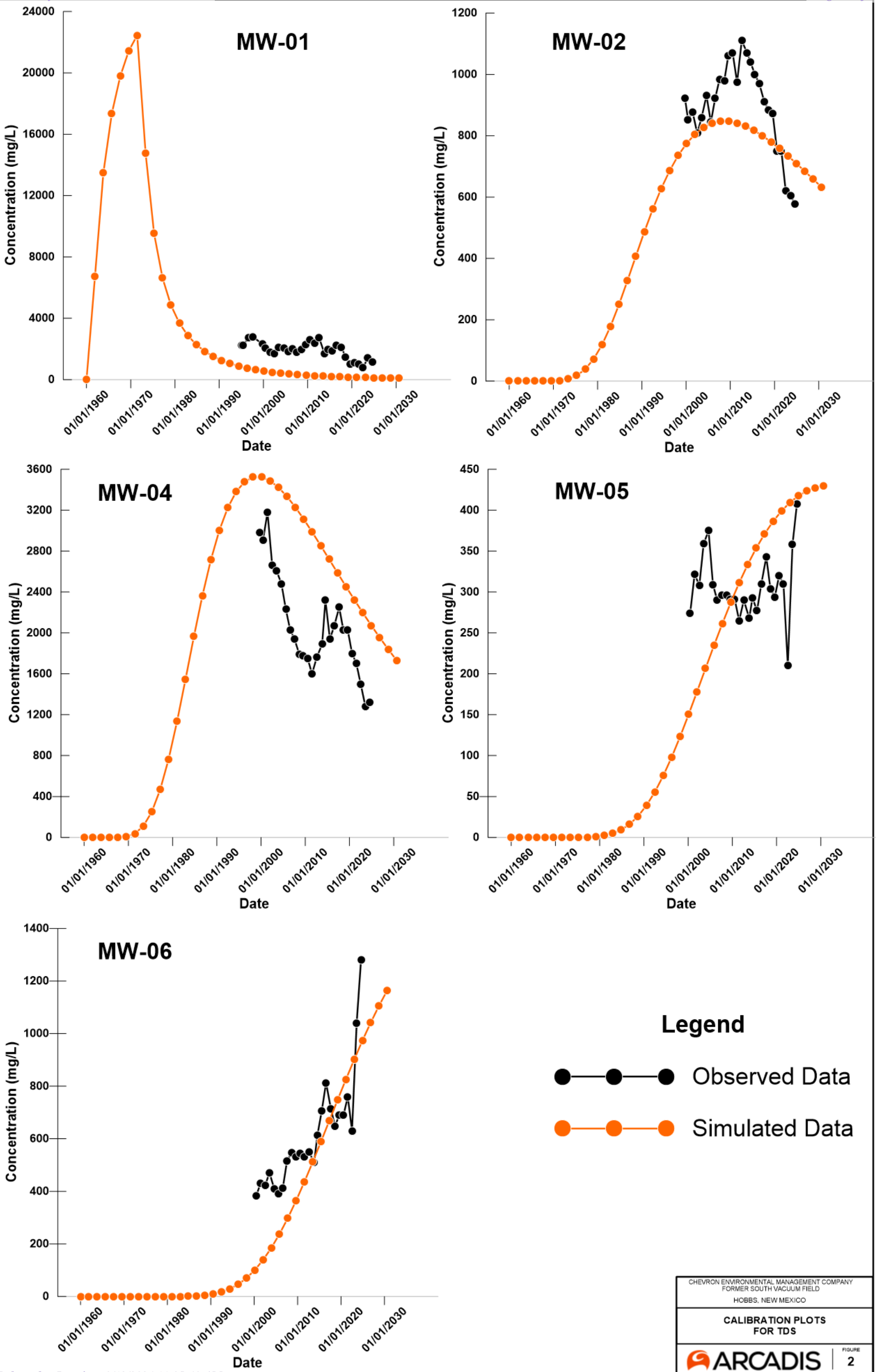


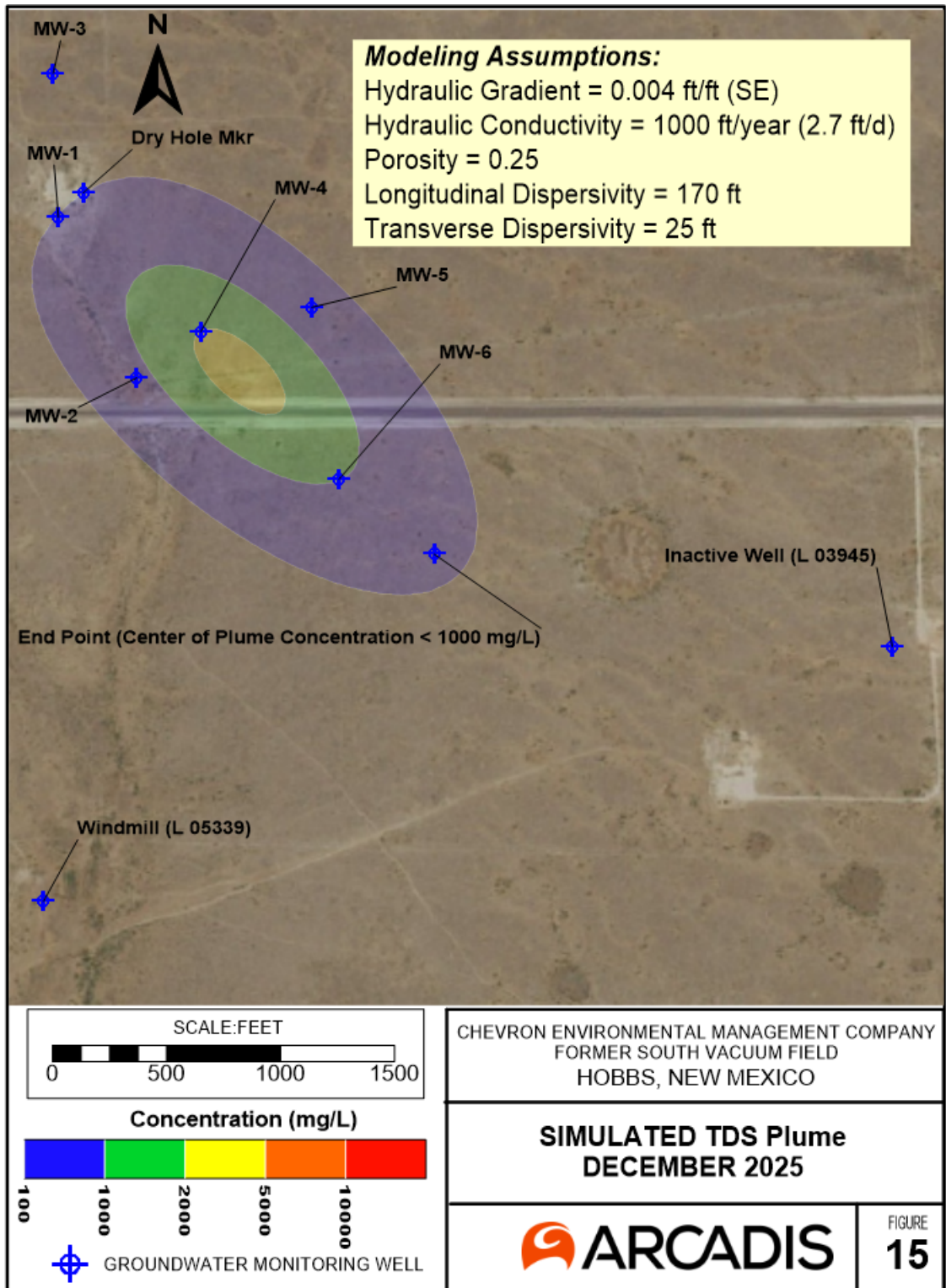


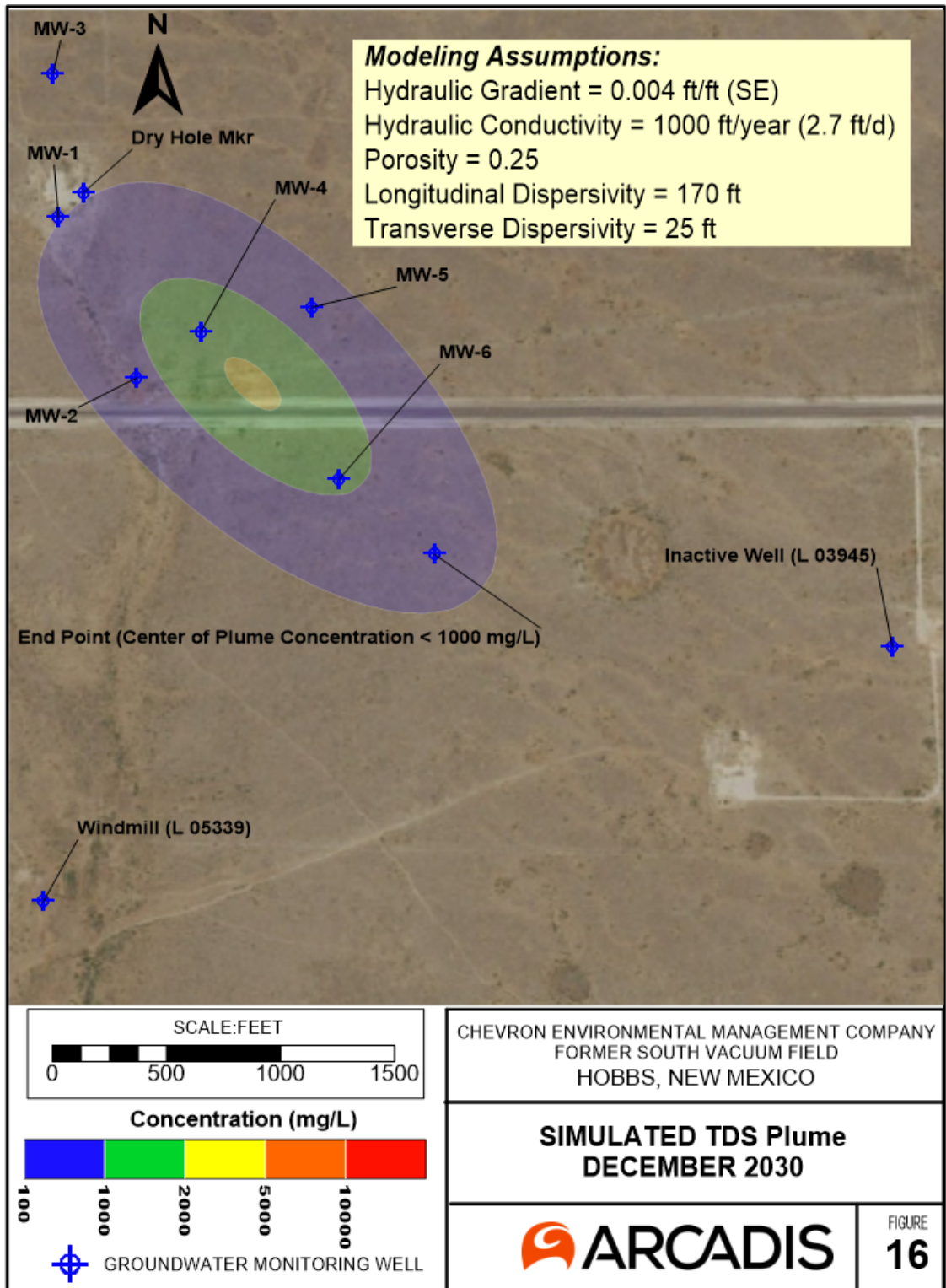


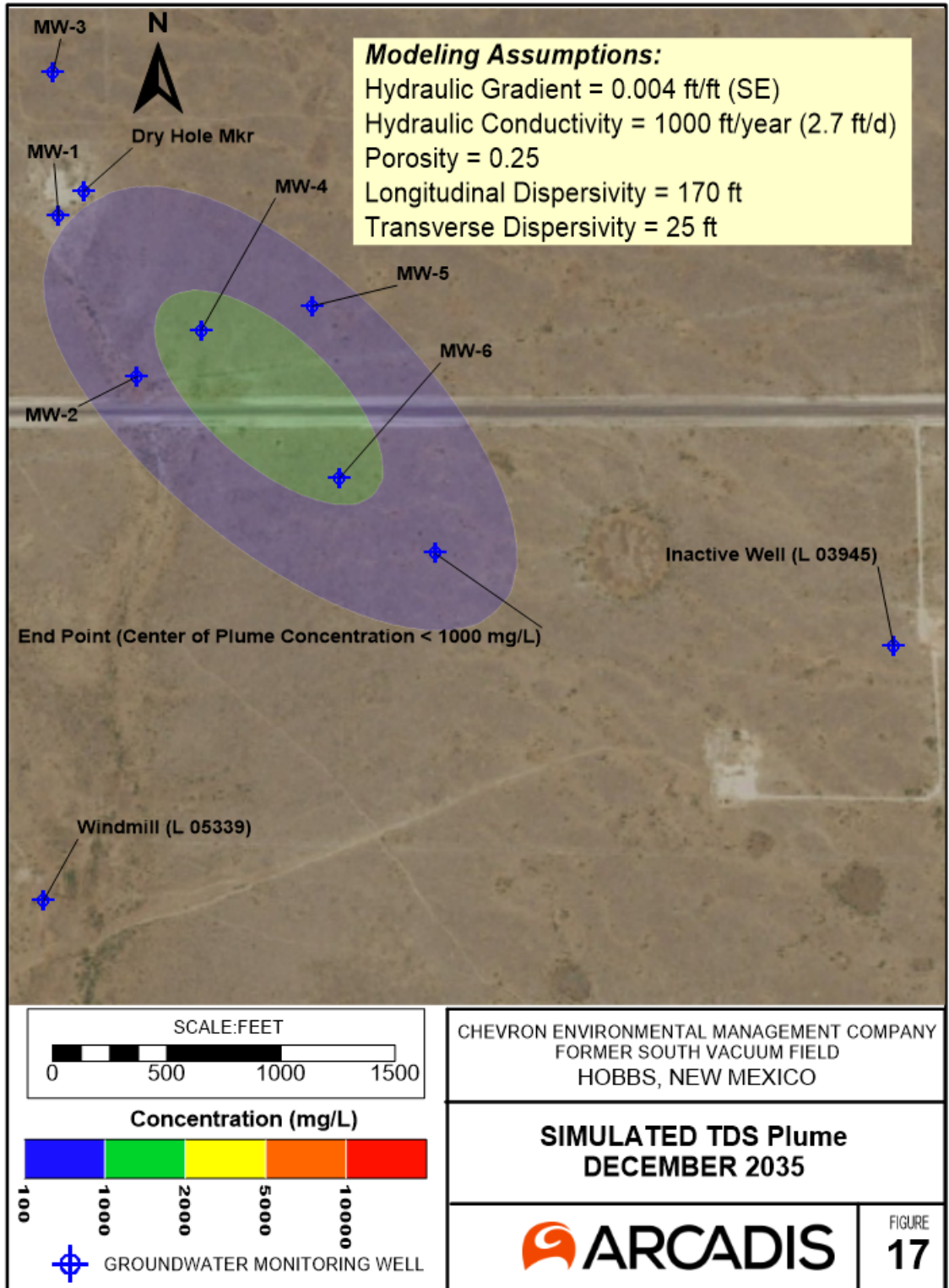
# Appendix G

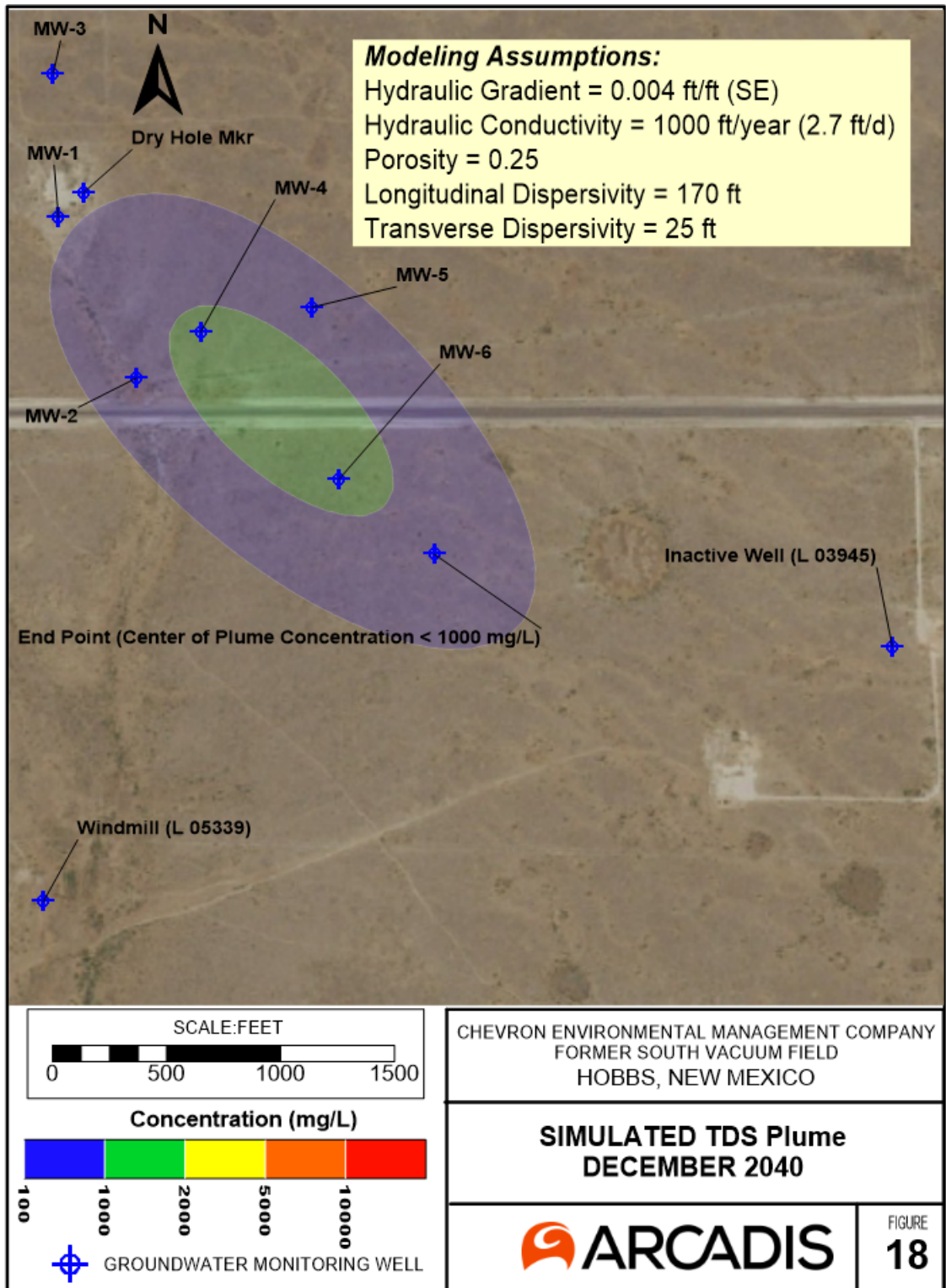
## TDS Plume Simulation Results

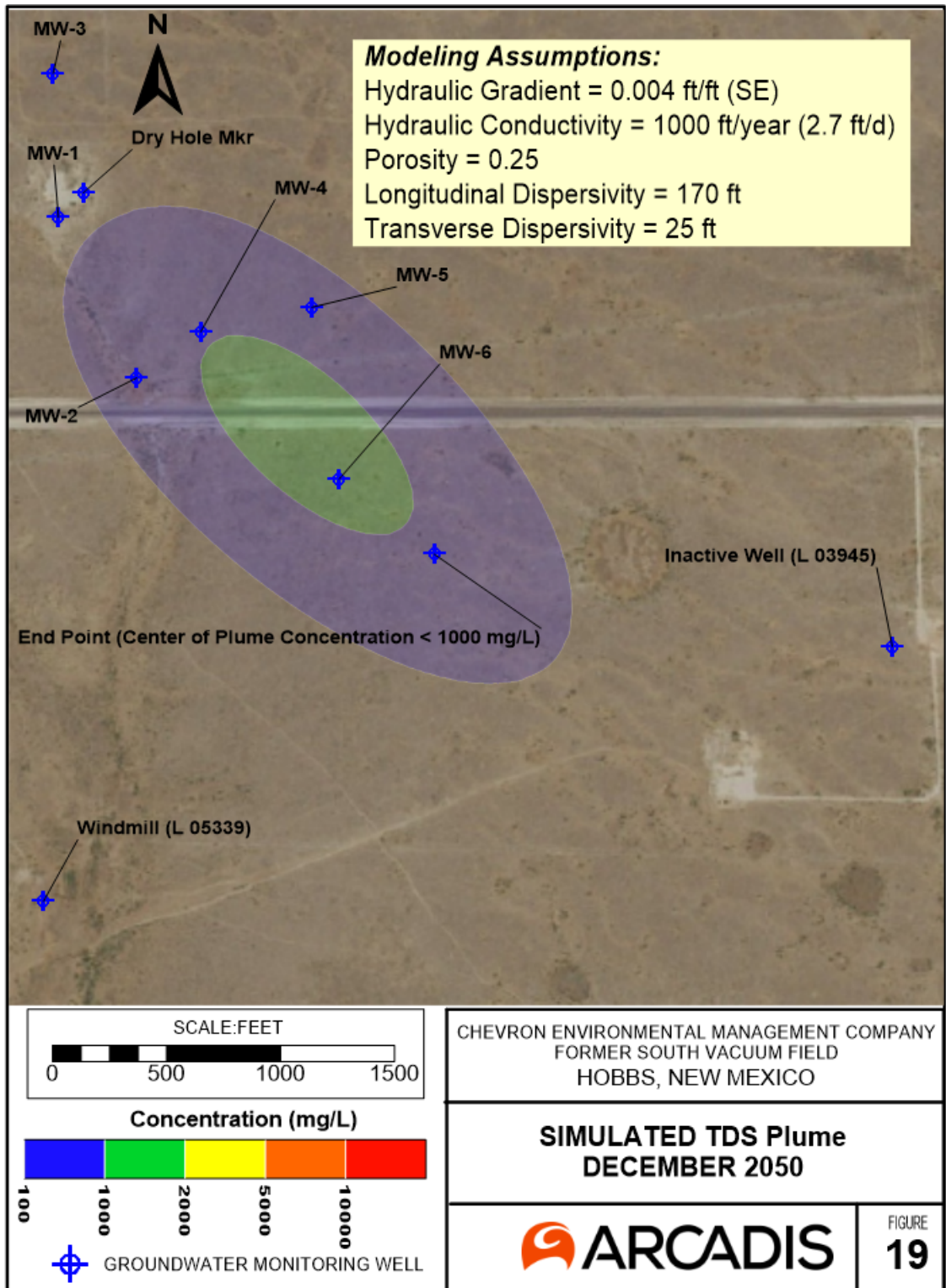


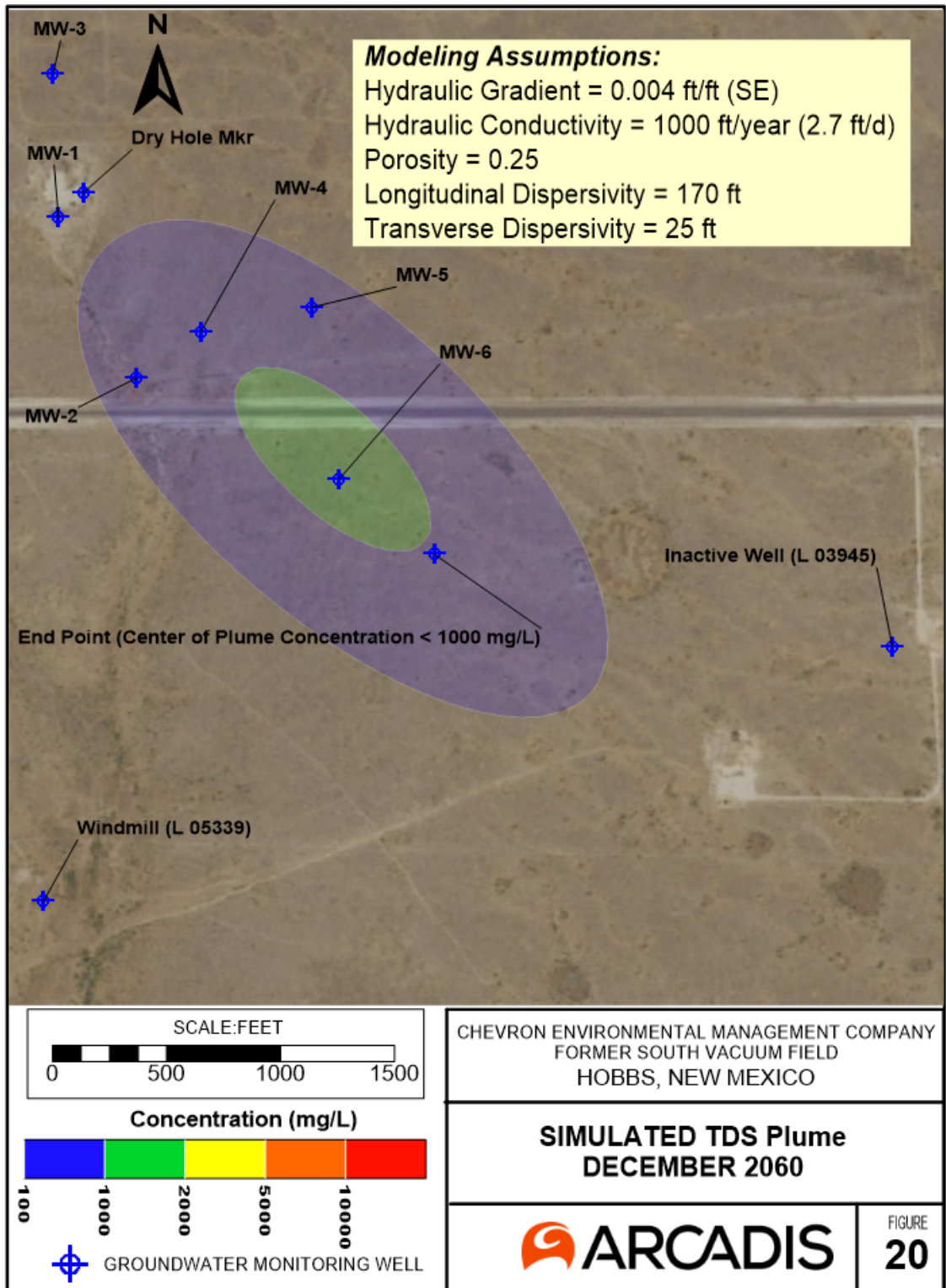


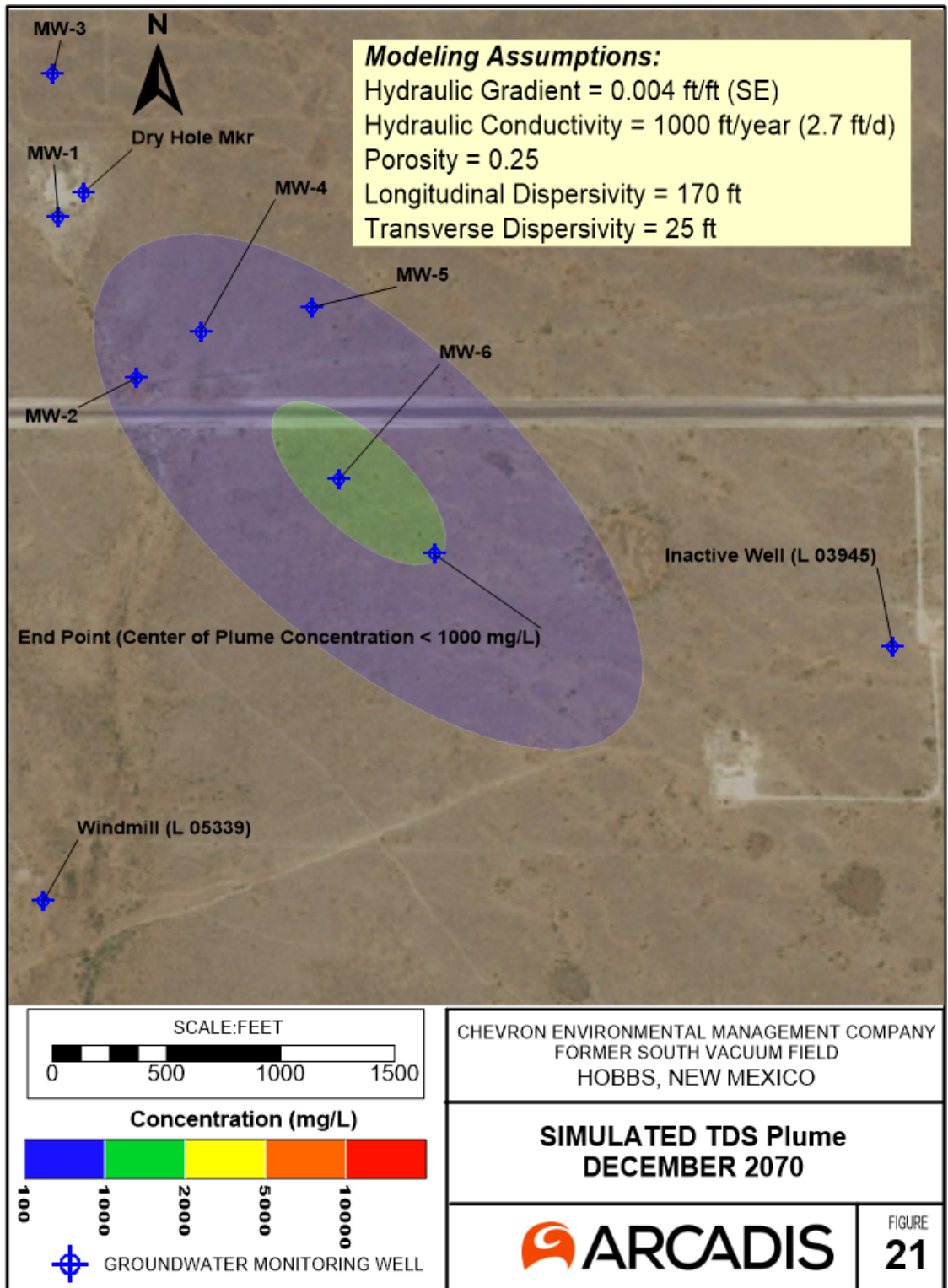


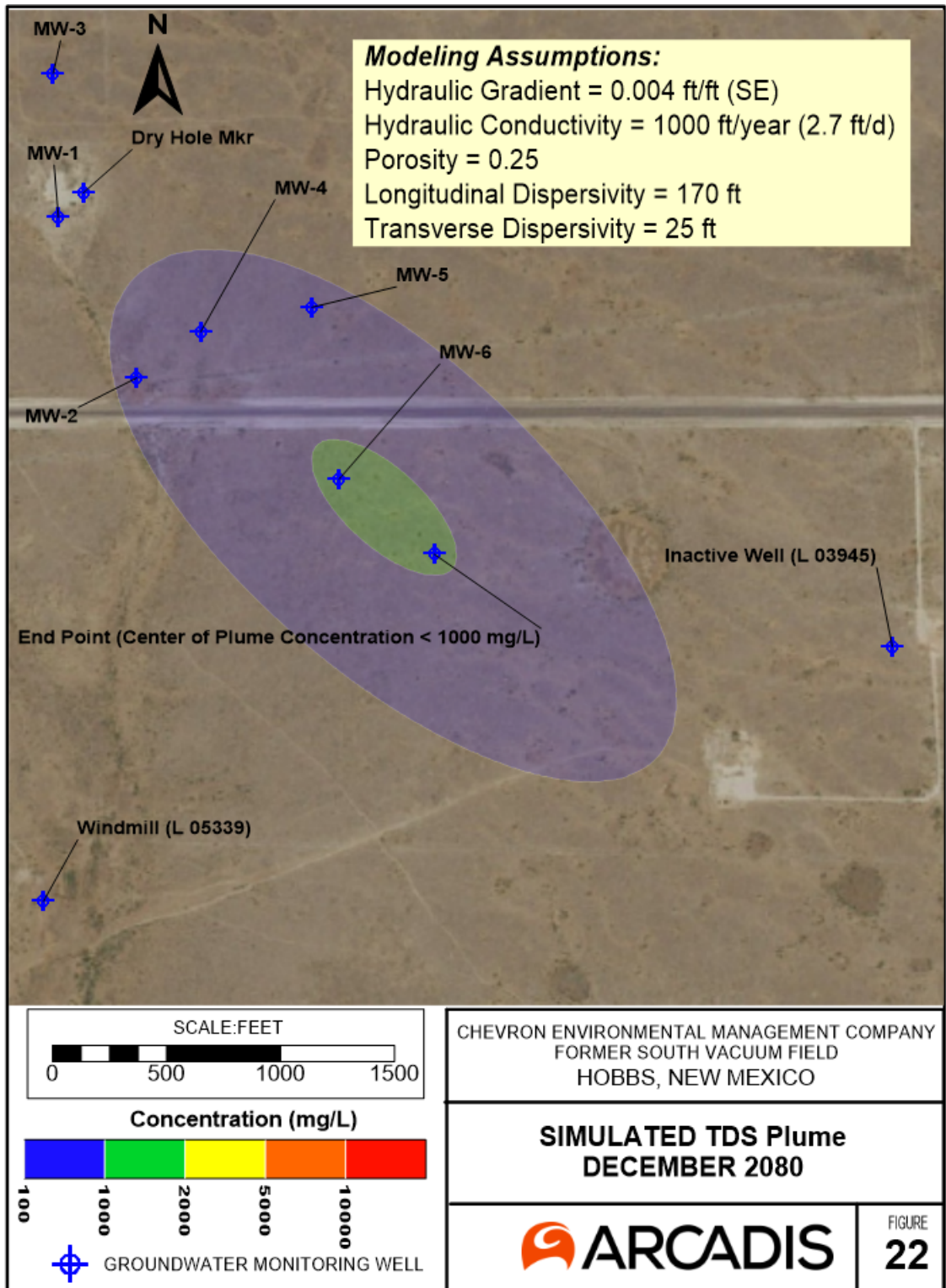


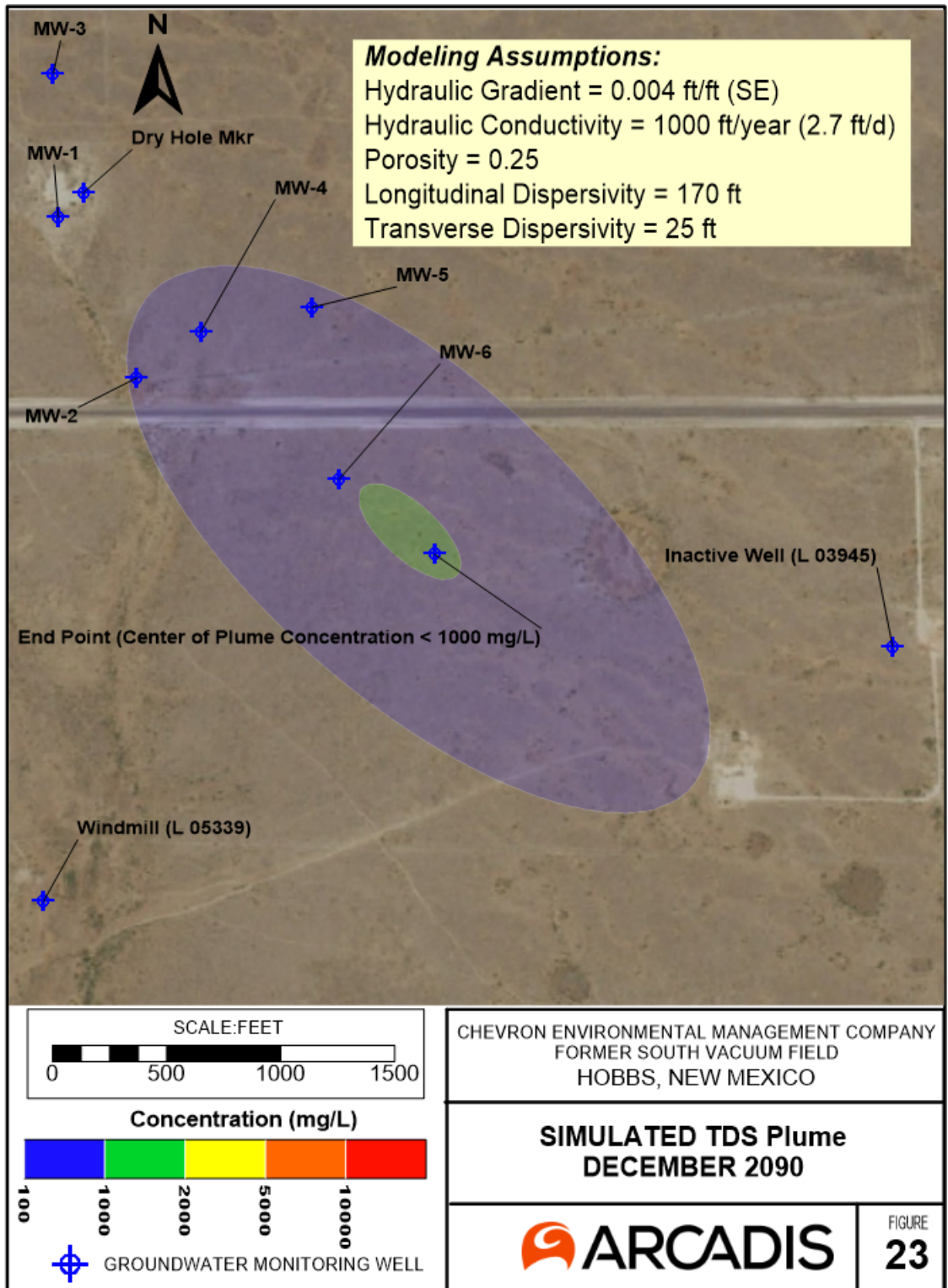


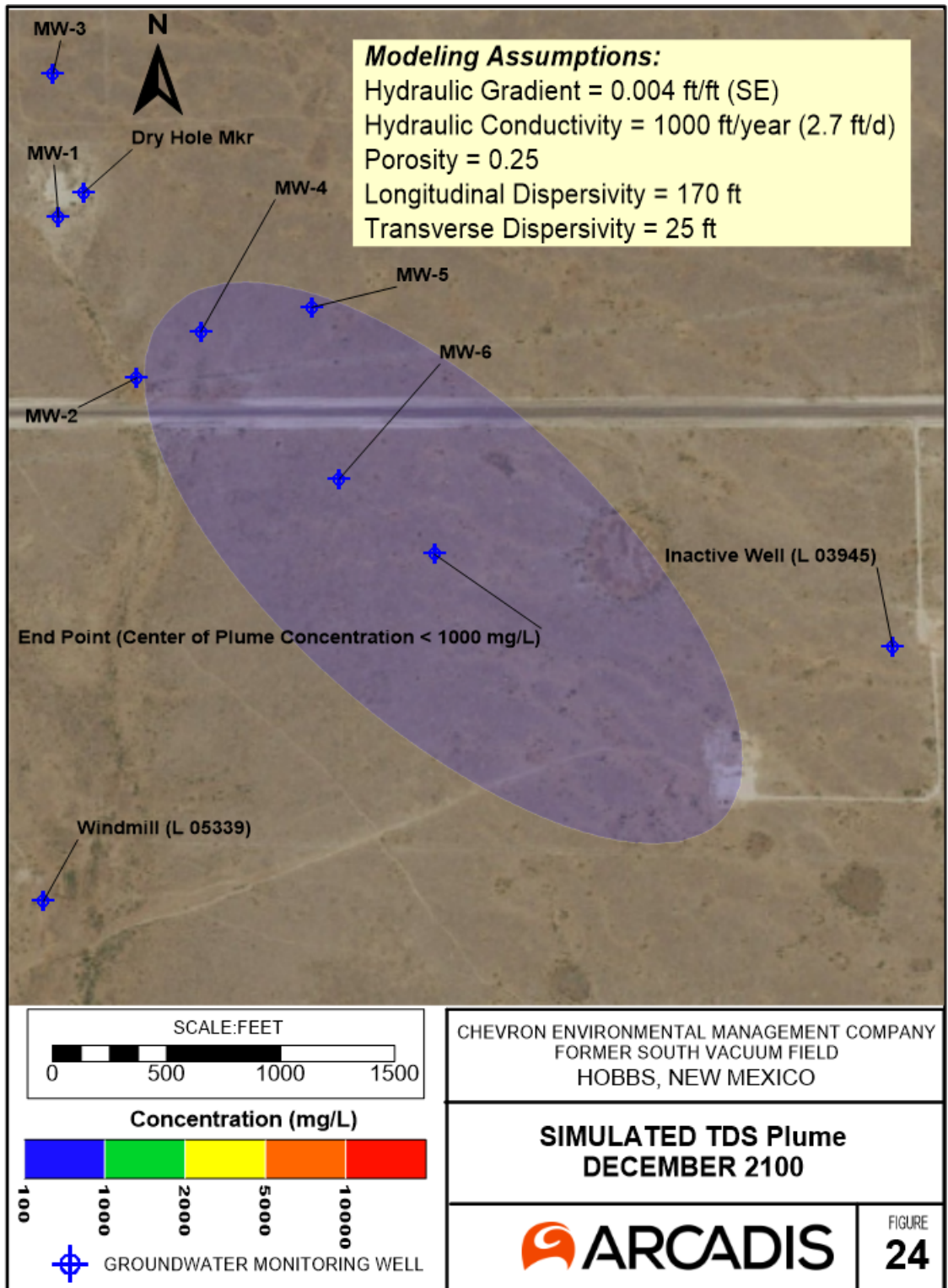


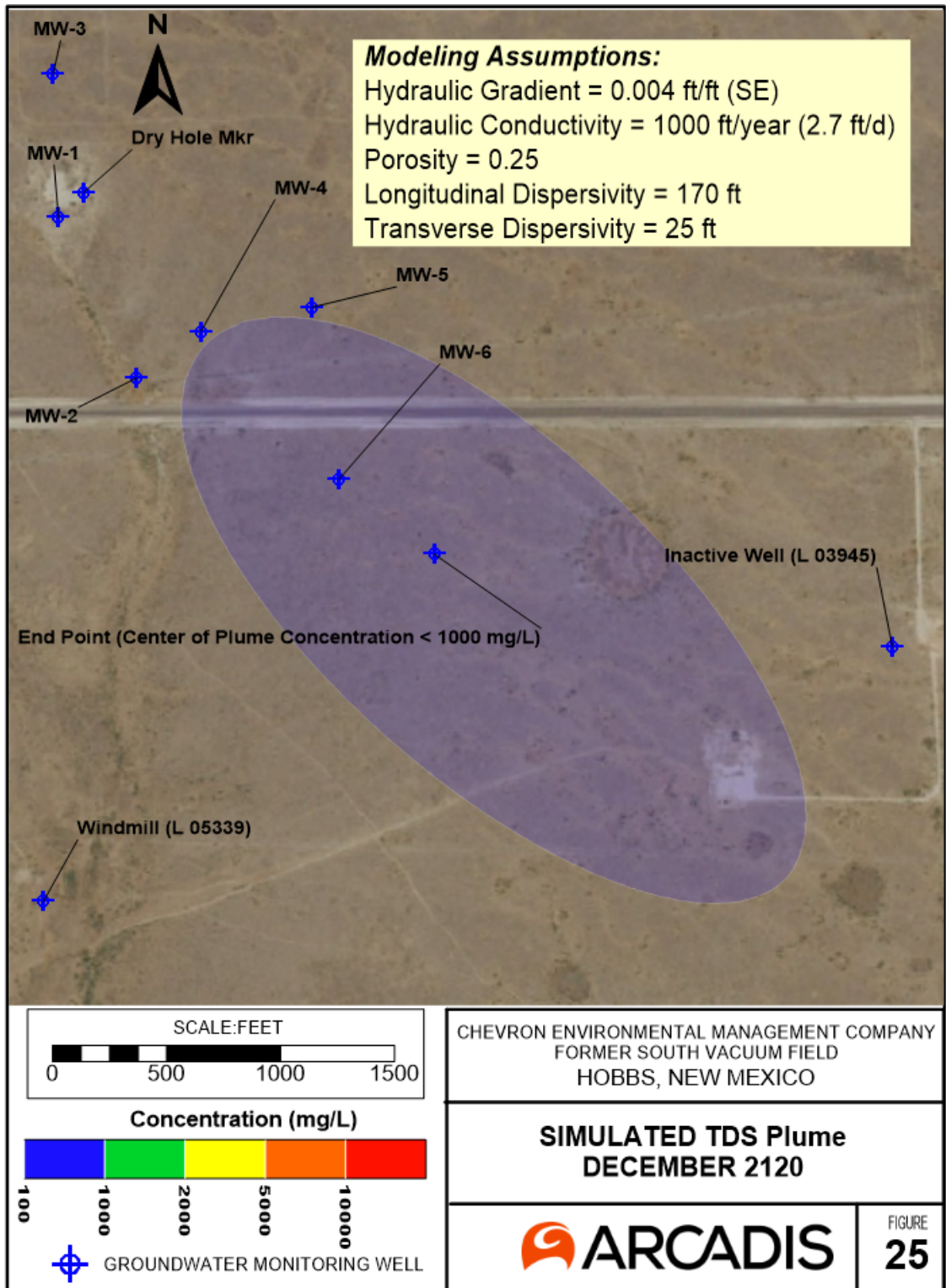


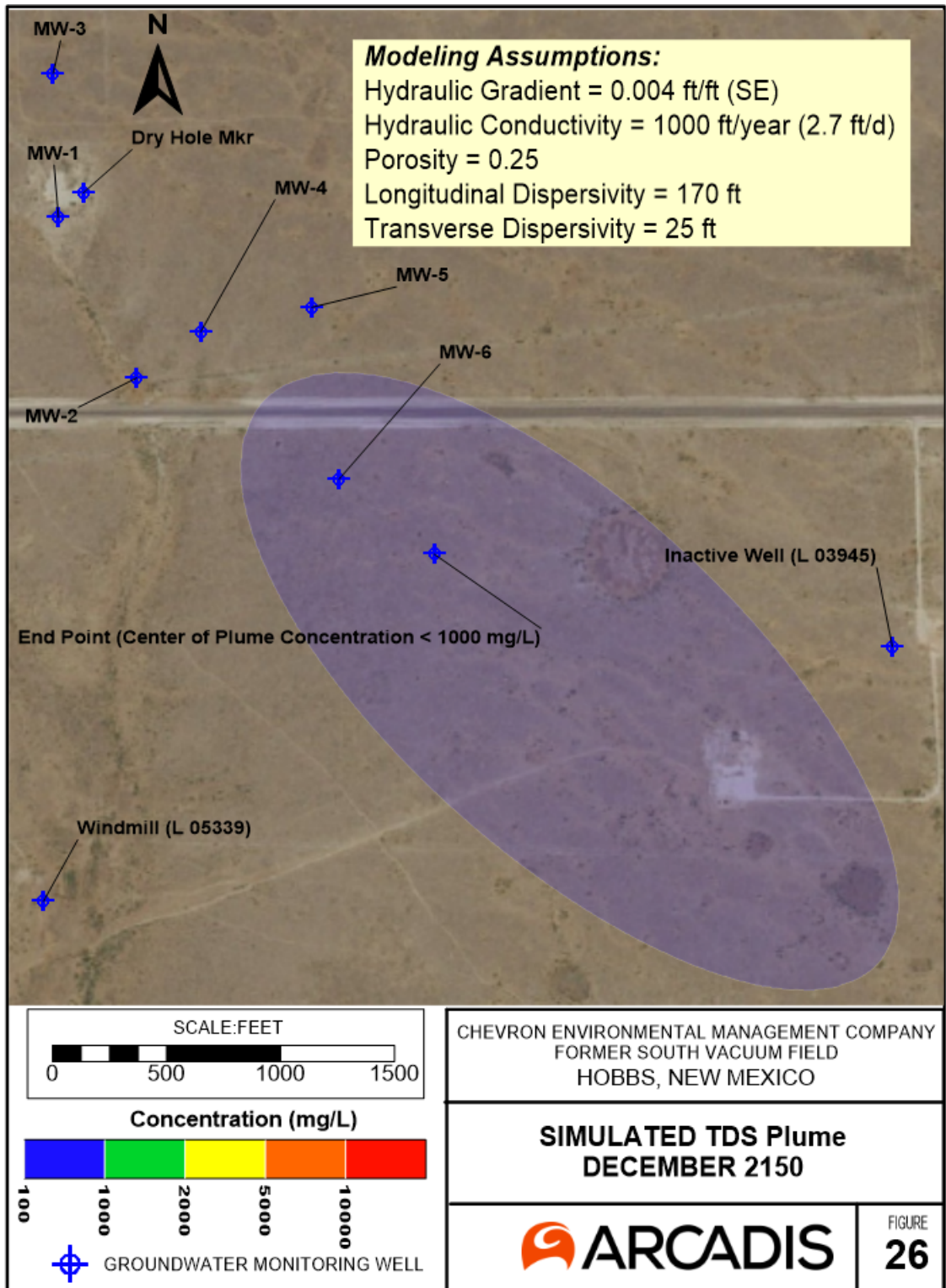












Arcadis U.S., Inc.  
2424 Harrodsburg Road, Suite 203  
Lexington, KY 40503  
United States  
Phone: 859 253 9036  
Fax:  
[www.arcadis.com](http://www.arcadis.com)

Sante Fe Main Office  
Phone: (505) 476-3441

General Information  
Phone: (505) 629-6116

Online Phone Directory  
<https://www.emnrd.nm.gov/ocd/contact-us>

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

CONDITIONS

Action 520287

**CONDITIONS**

Operator: UNION OIL CO OF CALIFORNIA P.O. Drawer 3100 Midland, TX BADADDR	OGRID: 23710
	Action Number: 520287
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

**CONDITIONS**

Created By	Condition	Condition Date
amaxwell	Report accepted for record.	3/18/2026