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March 15, 2019

Mr. Aaron Yue
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Subject: *Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California* (PGE20180115A)

Dear Mr. Yue:

Enclosed is the Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California, for Pacific Gas and Electric Company's Interim Measures (IMs) Performance Monitoring Program, the Groundwater Monitoring Program, and the Surface Water Monitoring Program for the Topock Project. This report presents the Fourth Quarter (November through December 2018) performance monitoring results for the IM-3 hydraulic containment system and provides the annual performance evaluation for the 2018 Annual Reporting Period (January through December 2018). This report also presents groundwater and surface water monitoring activities, results, and analyses related to the Groundwater and Surface Water Monitoring Programs during the Fourth Quarter 2018 and 2018 Annual Reporting Period.

The IM quarterly performance monitoring report is submitted in conformance with the reporting requirements in the California Environmental Protection Agency, Department of Toxic Substances Control's (DTSC) IM directive, dated February 14, 2005, and updates and modifications approved by DTSC in letters or emails dated October 12, 2007; July 14, 2008; July 17, 2008; March 3, 2010; April 28, 2010; July 23, 2010; June 27, 2014; July 20, 2015; and August 18, 2017.

Please contact me at 760.791.5884 if you have any questions on the combined monitoring report.

Sincerely,

Curt Russell
Topock Remediation Project Manager

Cc: Chris Guerre/DTSC
Pam Innis/DOI
Ken Foster/CA-SLC
Bruce Campbell/AZ-SLD

Topock Project Executive Abstract

Document Title:

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-Wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles CA

Submitting Agency: DTSC

Final Document? ☒ Yes ☐ No

Date of Document: March 15, 2019

Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other) – PG&E

Priority Status: ☐ **HIGH** ☐ **MED** ☒ **LOW**
Is this time critical? ☐ Yes ☒ No

Type of Document:
☐ Draft ☒ Report ☐ Letter ☐ Memo
☐ Other / Explain:

Action Required:
☒ Information Only ☐ Review & Comment
Return to: _____
By Date:_____
☐ Other / Explain:

What does this information pertain to?
☐ Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA)
☐ RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment)
☐ Corrective Measures Study (CMS)/Feasibility Study (FS)
☐ Corrective Measures Implementation (CMI)/Remedial Action
☐ California Environmental Quality Act (CEQA)/Environmental Impact Report (EIR)
☒ Interim Measures
☐ Other / Explain:

Is this a Regulatory Requirement?
☒ Yes ☐ No
If no, why is the document needed?

What is the consequence of NOT doing this item? What is the consequence of DOING this item?
Submittal of this report is a compliance requirement under DTSC requirements.

Other Justification/s:
☐ Permit ☐ Other / Explain:

Brief Summary of attached document:

This quarterly report documents the monitoring activities and performance evaluation of the interim measure (IM) hydraulic containment system under the IM Performance Monitoring Program, the Groundwater Monitoring Program, and Surface Water Monitoring Program for the Topock Project. Hydraulic and chemical monitoring data were collected and used to evaluate the IM hydraulic containment system performance based on a set of standards approved by the California Department of Substances Control (DTSC). Key items included in this report are: (1) measured groundwater elevations and hydraulic gradient data at compliance well pairs that indicate the direction of groundwater flow is away from the Colorado River and toward the pumping centers on site; (2) hexavalent chromium data for monitoring wells; (3) pumping rates and volumes from the IM extraction system; and (4) Groundwater Monitoring Program and Surface Water Monitoring Program activities and results.

Based on the data and evaluation presented in this report, the IM performance standard has been met for the Fourth Quarter 2018 and the 2018 Annual Reporting Period. On July 23, 2010, DTSC approved a revised reporting schedule for this report that included a revised IM-3 sample collection period from November 1, 2018 through December 31, 2018.

Written by: PG&E

Recommendations:
none

How is this information related to the Final Remedy or Regulatory Requirements:

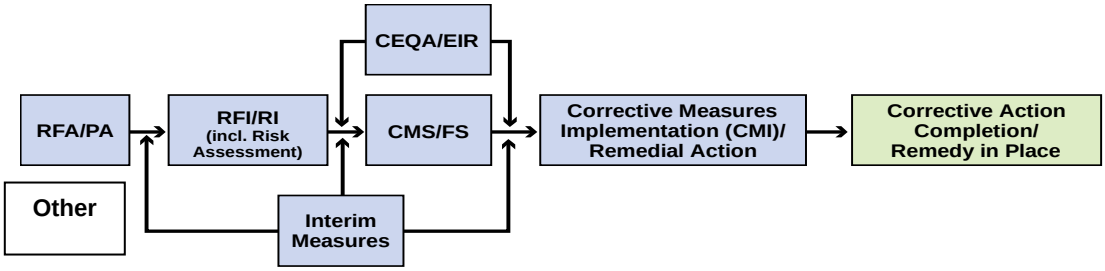
This report is required by DTSC as part of the Interim Measures Performance Monitoring Program.

Other requirements of this information?

None.

Related Reports and Documents:

Click any boxes in the Regulatory Road Map (below) to be linked to the Documents Library on the DTSC Topock Web Site (www.dtsc-topock.com).



Legend
RFA/PA – RCRA Facility Assessment/Preliminary Assessment
RFI/RI – RCRA Facility Investigation/CERCLA Remedial Investigation (including Risk Assessment)
CMS/FS – RCRA Corrective Measure Study/CERCLA Feasibility Study
CEQA/EIR – California Environmental Quality Act/Environmental Impact Report

Version 9

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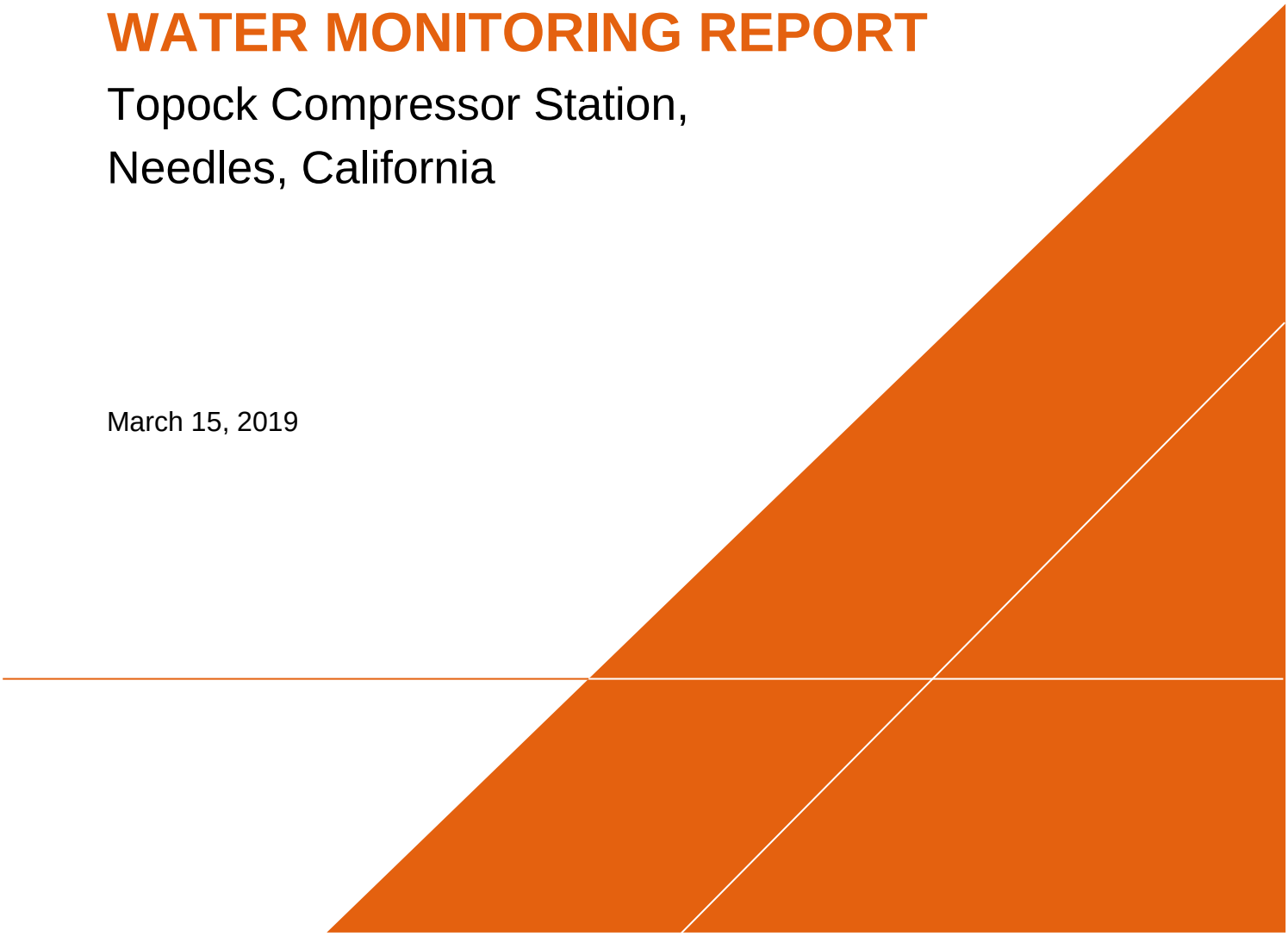
Pacific Gas and Electric Company

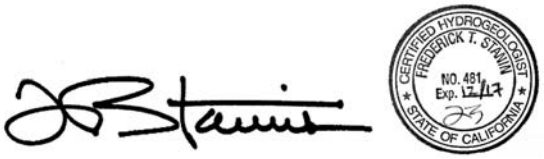
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

Topock Compressor Station,
Needles, California

March 15, 2019



This report was prepared under the supervision of a California Professional Geologist



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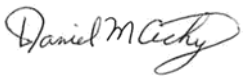

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FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

Topock Compressor Station
Needles, California

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California Department of Toxic Substances Control

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ACRONYMS AND ABBREVIATIONS

3V	three-volume
µg/L	micrograms per liter
bgs	below ground surface
COPC	constituent of potential concern
Cr(VI)	hexavalent chromium
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
ft/ft	foot or feet per foot
GMP	Groundwater Monitoring Program
gpm	gallons per minute
IM	interim measure
IM-3	Interim Measures number 3
IMCP	Interim Measures Contingency Plan
mg/L	milligrams per liter
MCL	Maximum Contaminant Level
MS	matrix spike
MSD	matrix spike duplicate
ORP	oxidation-reduction potential
PG&E	Pacific Gas and Electric Company
PMP	Performance Monitoring Program
QC	quality control
RCRA	Resource Conservation and Recovery Act
RMP	Surface Water Monitoring Program
RPD	relative percent difference
RRB	Red Rock Bridge
TDS	total dissolved solids
TSS	total suspended solids
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit

EXECUTIVE SUMMARY

This combined quarterly and annual report documents the monitoring activities and performance evaluation of the interim measure (IM) hydraulic containment system under the Groundwater Monitoring Program (GMP), Surface Water Monitoring Program (RMP), and IM Performance Monitoring Program (PMP) for the Topock Compressor Station (the site). Chemical and hydraulic monitoring data were collected and used to determine if site conditions have changed and to evaluate the IM hydraulic containment system performance based on a set of standards approved by the California Department of Toxic Substances Control (DTSC).

Key items in this report include: (1) GMP and RMP activities and results; (2) hexavalent chromium data for monitoring wells in the floodplain area; (3) measured groundwater elevations and hydraulic gradient data at compliance well pairs; and (4) pumping rates and volumes from the IM extraction system.

During Fourth Quarter 2018, IM extraction well TW-03D was operated to support hydraulic control. Hydraulic gradient data indicate that the minimum landward gradient target of 0.001 feet per foot was exceeded each month, providing evidence of hydraulic containment of the hexavalent chromium plume. Hexavalent chromium concentrations greater than 20 micrograms per liter in the floodplain area were contained for removal and treatment. Based on the data and evaluation presented in this report, the IM performance standard has been met for the Fourth Quarter 2018.

1 INTRODUCTION

Pacific Gas and Electric Company (PG&E) is implementing interim measures (IMs) to address chromium concentrations in groundwater at the Topock Compressor Station (the site). The Topock Compressor Station is located in eastern San Bernardino County, 15 miles southeast of the City of Needles, California, as shown on Figure 1-1.

This report presents the monitoring data from three PG&E monitoring programs:

- Site-wide Groundwater Monitoring Program (GMP)
- Site-wide Surface Water Monitoring Program (RMP)
- Interim Measures (currently Interim Measure Number 3 [IM-3]) Performance Monitoring Program (PMP).

This report presents the monitoring data collected from PG&E's GMP, RMP, and PMP programs between November 1 and December 31, 2018 (hereafter referred to as "Fourth Quarter 2018"). In addition, this report serves as an annual report and provides a summary of monitoring data collected from the GMP, RMP, and PMP programs between January 1 and December 31, 2018 (hereafter referred to as the "Annual Reporting Period"). Table 1-1 shows the current reporting schedule for these programs.

This report is divided into six sections:

Section 1 introduces the site; the GMP, RMP, and PMP programs; and the regulatory framework.

Section 2 describes the Fourth Quarter 2018 monitoring activities and site operations conducted in support of these programs.

Section 3 presents GMP and RMP monitoring results for the Fourth Quarter 2018.

Section 4 presents GMP and RMP monitoring results for the Annual Reporting Period.

Section 5 presents PMP monitoring results and the IM evaluation for the Fourth Quarter 2018.

Section 6 presents PMP monitoring results and the IM evaluation for the Annual Reporting Period.

Section 7 describes upcoming monitoring events for the First Quarter 2019.

Section 8 lists the references cited throughout this report.

This combined GMP, RMP, and PMP reporting format was approved by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in May 2009 (DTSC 2009).

1.1 Fourth Quarter 2018 Regulatory Communication

PG&E communications with the DTSC in Fourth Quarter 2018 in regard to the GMP, RMP, and/or PMP programs are outlined below. Communications from First, Second, and Third Quarter 2018 are provided in previous reports (Arcadis 2018a, 2018b, 2018c).

- The Third Quarter 2018 Interim Measures Performance Monitoring and Site-Wide Groundwater and Surface Water Monitoring Report ("PMP-GMP Report") was submitted to the DTSC on December 15, 2018 (Arcadis 2018c).
- Required GMP, RMP, and PMP notifications submitted for Fourth Quarter 2018 included:
    - On January 16, 2019, Arcadis, on behalf of PG&E, sent a quarterly email notification to the DTSC providing preliminary, unvalidated hexavalent chromium (Cr[VI]) and dissolved results from the December 2018 shoreline and in-channel surface water sampling event. Cr(VI) and dissolved chromium concentrations were lower than the respective reporting limits; therefore, no additional actions were needed.
    - On March 5, 2019, Arcadis, on behalf of PG&E, sent a quarterly email notification to the DTSC providing Cr(VI) and dissolved chromium results from four subject floodplain wells (MW-34-100, MW-44-115, MW-46-175, and MW-44-125).
    - As part of the conditional approval for the shutdown of extraction well PE-01, GMP monitoring results for monitoring wells listed in the July 20, 2015 DTSC approval letter (see Section 1.4.2.2; DTSC 2015) are compared to the maximum Cr(VI) and dissolved chromium concentrations measured in 2014 (or for biennial sampling frequency, the 2013 maximum concentrations), and results that exceed the previous maximum are required to be reported to the DTSC within 40 days after the end of the quarterly GMP sampling event. In Fourth Quarter 2018, Cr(VI) and/or dissolved chromium concentrations at six monitoring wells (MW-30-050, MW-31-135, MW-39-080, MW-39-100, MW-47-055, and TW-04) exceeded the 2013/2014 maximum concentrations, and a notification email was submitted to the DTSC on January 25, 2019.

1.2 History of Groundwater Impact at the Site

1.2.1 Cr(VI) Impacts to Groundwater

The Topock Compressor Station began operations in 1951. Remediation efforts are ongoing to address Cr(VI) in soil and groundwater resulting from the historical water discharge practices. A comprehensive library documenting the history of remediation at the Topock Compressor Station is available on the DTSC website at http://dtsc-topock.com/ (DTSC 2018).

1.2.2 Background Concentrations of Cr(VI)

Based on a regional study of naturally occurring metals in groundwater and a statistical evaluation of these data, naturally occurring Cr(VI) in groundwater was calculated to exhibit an upper tolerance limit (UTL) concentration of 32 micrograms per liter (µg/L; CH2M Hill [CH2M] 2009b). This concentration is used as the background concentration for remedial activities. At the site, the Cr(VI) plume is mostly present within unconsolidated alluvial fan and fluvial deposits within the Alluvial Aquifer, and, to a lesser extent, in fractured bedrock. Natural groundwater gradients are generally west-to-east at most of the site. The depth to groundwater and the thickness of the saturated sediments vary significantly across the site based on surface topography and the paleo-topography of the top of bedrock surface underneath the site.

1.3 Site-wide Groundwater and Surface Water Monitoring Programs

1.3.1 Basis for GMP and RMP Programs

Routine groundwater and surface water monitoring activities at the site began in 1998 following a Resource Conservation and Recovery Act (RCRA) facility investigation and are ongoing (CH2M 2005). The main objectives of the GMP and RMP programs are to monitor concentrations of Cr(VI) and other site constituents in groundwater and surface water to determine if site conditions have changed, and to make decisions about remedial options and future monitoring (CH2M 2005). In accordance with the 2005 Monitoring Plan for Groundwater and Surface Water Monitoring (CH2M 2005), quarterly monitoring reports document groundwater and surface water monitoring activities performed at the site during each reporting period. Monitoring reports to date are available on the DTSC website. This report documents the GMP and RMP monitoring activities conducted in Fourth Quarter 2018 and during the Annual Reporting Period.

1.3.2 GMP and RMP Monitoring Networks

The GMP monitoring well network and RMP surface water monitoring network are shown on Figures 1-2 and 1-3, respectively, and are summarized in the table below. The complete GMP network includes 145 wells that monitor groundwater in the Alluvial Aquifer and bedrock. Well construction details for wells in the GMP monitoring well network are summarized in Table 1-2. The RMP network consists of 16 surface water monitoring locations, nine of which are sampled at multiple depths.

Groundwater Monitoring Wells	Surface Water Monitoring Wells
133 monitoring wells in California, including two normally dry wells	10 river channel locations (9 of which are sampled at two different depths)
8 monitoring wells in Arizona	4 shoreline locations
4 IM-3 extraction wells	2 other surface water sampling locations (adjacent to the shoreline)

GMP and RMP monitoring consists of collecting groundwater and surface water samples, inspecting the monitoring wells, and taking corrective actions as needed. GMP and RMP monitoring is performed quarterly, although the monitoring wells included in each GMP event vary by quarter. In addition, GMP monitoring is performed monthly at two extraction wells (TW-03D and PE-01). Table 1-2 provides a list of the monitoring wells and surface water monitoring locations included in the GMP and RMP programs and the monitoring frequency at each location. Monitoring frequency at GMP wells is also shown on Figure 1-2.

If a storm causes surface water flow in Bat Cave Wash, additional groundwater samples are collected from monitoring wells MW-09, MW-10, and MW-11. Bat Cave Wash is an incised ephemeral stream adjacent to the Topock Compressor Station, which flows following rainfall events and drains into the Colorado River (Figures 1-1 and 1-2).

1.4 Interim Measure Performance Monitoring Program

1.4.1 Basis for PMP Program

Operation of the current IM-3 system began in July 2005. The IM-3 system is intended to maintain hydraulic control of the groundwater Cr(VI) plume until the final corrective action is in place at the site (CH2M 2007). The IM-3 system consists of a groundwater extraction system (four extraction wells: TW-02D, TW-03D, TW-02S, and PE-01), conveyance piping, a groundwater treatment plant, and an injection well field (for the discharge of the treated groundwater). Figure 1-1 shows the locations of the IM-3 extraction, conveyance, treatment, and injection facilities.

In a letter dated February 14, 2005, the DTSC issued an IM performance directive that established the operational requirements for the IM and methods for evaluating the performance of the IM (DTSC 2005). As defined by the DTSC, the performance standard for the IM is to *"establish and maintain a net landward hydraulic gradient, both horizontally and vertically, that ensures that Cr(VI) concentrations at or greater than 20 micrograms per liter [µg/L] in the floodplain are contained for removal and treatment"* (DTSC 2005). The IM is required to maintain a landward hydraulic gradient of at least 0.001 foot per foot (ft/ft) within the lower portion of the Alluvial Aquifer (DTSC 2005).

In accordance with the February 2005 DTSC directive, the following conditions must be met to demonstrate achievement of the IM performance standard (DTSC 2015):

- Demonstrate that a landward hydraulic gradient is maintained within the lower portion of the Alluvial Aquifer in the floodplain by:
  - Providing potentiometric surface contour maps of the Alluvial Aquifer within the floodplain area.
  - Providing calculated hydraulic gradients using established gradient well pairs.
- Demonstrate that Cr(VI) concentrations greater than 20 µg/L in the floodplain area are contained for removal and treatment by:
  - Depicting the 20 and 50 µg/L isoconcentration contours for Cr(VI) within the floodplain on potentiometric surface maps and hydrogeologic cross sessions.
  - Providing maps and cross-sections of the Cr(VI) concentration for the upper, middle, and lower portions of the Alluvial Aquifer in the floodplain area.
  - Providing time versus concentration graphs for Cr(VI) measured in floodplain wells.

The February 2005 DTSC directive also defined the reporting requirements for the IM (DTSC 2005). In October 2007, the DTSC approved modifications to the reporting requirements, discontinuing monthly performance monitoring reports and continuing with quarterly and annual reports (DTSC 2007). The DTSC approved additional updates and modifications to the PMP in letters dated October 12, 2007; July 14, 2008; July 16, 2008; March 3, 2010; April 28, 2010; and June 27, 2014 (DTSC 2007, 2008a, 2008b, 2010a, 2010b, 2014).

1.4.2 PMP Monitoring Network

The PMP consists of a network of monitoring wells that are used to demonstrate achievement of the IM performance standard. Subsets of wells within the PMP network, including the (1) chromium monitoring network, (2) IM extraction wells, (3) IM hydraulic monitoring network, (4) IM Contingency Plan (IMCP) monitoring wells, and (5) IM chemical performance monitoring network, focus on different methods for evaluating performance of the IM. The PMP monitoring network is presented in the table below, and shown on Figure 1-4.

PMP Monitoring Network
Chromium Monitoring Network (145 monitoring wells included in the GMP)
IM Extraction Wells (4 monitoring wells) • TW-02D • TW-03D • TW-02S • PE-01
IM Hydraulic Monitoring Network (57 monitoring wells and 2 river monitoring locations) • 16 shallow monitoring wells • 15 mid-depth monitoring wells • 26 deep monitoring wells • 2 river monitoring locations: 1-3 and RRB
IMCP Monitoring Wells (24 monitoring wells) • 6 shallow monitoring wells • 5 mid-depth monitoring wells • 13 deep monitoring wells
IM Chemical Performance Monitoring Network (10 monitoring wells and 1 river monitoring location) • 5 shallow monitoring wells • 2 mid-depth monitoring wells • 3 deep monitoring wells • 1 river monitoring location: R-28

The subsets of monitoring well networks within the PMP are described in the following subsections.

1.4.2.1 Chromium Monitoring Network

Cr(VI) data, collected as part of the GMP, are used to generate maps, cross-sections, and concentration time series charts that demonstrate that Cr(VI) concentrations greater than 20 µg/L in the floodplain area

are contained for removal and treatment. As described in Section 1.3.2, groundwater sampling events are performed quarterly; however, the monitoring wells included in each sampling event vary by quarter. In addition, groundwater sampling is performed monthly at extraction wells TW-03D and PE-01. Table 1-2 provides a list of monitoring wells included in the chromium monitoring network (i.e., the GMP monitoring network) and the monitoring frequency of each location.

1.4.2.2 IM Extraction Wells

The PMP includes four IM extraction wells, which are used to ensure a landward hydraulic gradient via groundwater extraction (Figure 1-4). The operation of the IM extraction system, including pumping rates, planned/unplanned downtime, and volume of groundwater extracted from each extraction well, is documented to demonstrate proper operation of the extraction system. In addition, the wells are sampled as part of the GMP: extraction wells TW-03D and PE-01 are sampled monthly, TW-02D is sampled quarterly, and TW-02S is sampled annually.

Wells Monitored for Conditional Shutdown of PE-01

On July 20, 2015, the DTSC conditionally approved a proposal to modify the IM-3 pumping regime by allowing PE-01 to be shut off and pumping to be shifted to TW-03D and TW-02D or TW-02S, so long as gradient targets are maintained, and contingency is not triggered based on chromium concentrations in select floodplain wells (DTSC 2015). Because PE-01 pumps water with low concentrations of chromium (typically less than 5 µg/L), shifting more pumping to a higher concentration extraction well can increase the rate of chromium removal from the floodplain.

As part of the conditional approval for PE-01 shutdown, GMP monitoring results from 47 monitoring wells listed in the July 20, 2015 DTSC approval letter (i.e., wells within approximately 800 feet of TW-03D; Table 1-2) are compared to the maximum detected Cr(VI) and dissolved chromium concentrations from 2014 (or 2013 for wells sampled biennially). If any of the wells exceed the 2014 maximum concentration, then the DTSC must be notified within 40 days after completion of the field sampling event to determine if PE-01 pumping should be reinitiated (DTSC 2015).

1.4.2.3 IM Hydraulic Monitoring Network

The IM hydraulic monitoring network consists of 52 monitoring wells located on the California side of the Colorado River and two river monitoring locations (I-3 and RRB) used to evaluate the performance of the IM-3 system by demonstrating compliance of the required hydraulic gradient of 0.001 ft/ft (Figure 1-4, Table 1-2). In addition, five groundwater monitoring wells located on the Arizona side of the Colorado River (MW-54-085, MW-54-140, MW-54-195, MW-55-045, and MW-55-120; not formally part of the PMP) also provide groundwater elevation data that demonstrate hydraulic gradients on the Arizona side of the river (Figure 1-4). Groundwater and surface water elevation data from these locations are collected monthly using pressure transducers installed at each location.

Groundwater elevation data collected from the IM hydraulic monitoring network are used to develop potentiometric maps of shallow, mid-depth, and deep groundwater and measure hydraulic gradients of three well pairs (northern, central, and southern) to demonstrate compliance with the required 0.001 ft/ft landward hydraulic gradient. On August 18, 2017, the DTSC approved use of monitoring well MW-20-130 in place of well MW-45-095 in the central and southern gradient well pairs during months when extraction

well PE-01 is not pumped for hydraulic control at the site (DTSC 2017b). The current gradient well pairs are:

- Northern Gradient Pair: MW-31-135 and MW-33-150
- When PE-01 is operated for hydraulic control:
  - Central Gradient Pair: MW-45-095 and MW-34-100
  - Southern Gradient Pair: MW-45-095 and MW-27-085
- When PE-01 is not operated for hydraulic control:
  - Central Gradient Pair: MW-20-130 and MW-34-100
  - Southern Gradient Pair: MW-20-130 and MW-27-085

1.4.2.4 IM Contingency Plan Monitoring Wells

The IMCP was developed to detect and control possible migration of the Cr(VI) plume toward the Colorado River (DTSC 2005). Twenty-four IMCP wells were selected as part of an early detection system to detect any increases in chromium concentrations at areas of interest across the site (Figure 1-4, Table 1-2). The IMCP wells are sampled quarterly, as part of the GMP monitoring program (note that not all 24 wells are sampled each quarter), to determine if any increasing trends in Cr(VI) concentrations are observed. If Cr(VI) concentrations exceed the established trigger levels (based on historical Cr(VI) concentrations), then a contingency plan must be implemented in accordance with the Revised Contingency Plan Flow Chart (DTSC 2005; PG&E 2008).

1.4.2.5 IM Chemical Performance Monitoring Network

Eleven IM chemical performance monitoring wells are sampled annually or biennially to help evaluate performance of the future remedy (Figure 1-4, Table 1-2). Wells are sampled for an expanded chemistry suite (dissolved boron, bromide, dissolved calcium, chloride, dissolved magnesium, nitrate/nitrite as nitrogen, dissolved potassium, dissolved sodium, sulfate, total alkalinity [as calcium carbonate], total dissolved solids [TDS], and stable isotopes [oxygen-18 {δ18O} and deuterium {δ2H}]), which was last amended in 2008 (DTSC 2008b; PG&E 2008). Currently, nine monitoring wells and one river monitoring location (R-28) are sampled annually, and one well is sampled biennially (MW-26).

1.5 Sustainability

The GMP, RMP, and PMP programs strive to use sustainable sampling and data collection practices. This section briefly describes some of the sustainability practices now in use, which aim to reduce emissions from travel, reduce waste, conserve resources, and reduce potential impacts to nesting habitat and culturally sensitive areas.

- Groundwater sampling purge water is disposed on-site via the IM-3 treatment plant and injection process.
- The RMP boat contractor is employed locally.

- Laboratory services are provided by a California-certified Las Vegas-based lab.
- Cr(VI) and nitrate analytical methods were revised to methods with longer holding times.
- Reports are submitted via the DTSC website and electronically, and the number of hard copy quarterly report submittals has been reduced over time.
- Solar-powered data telemetry systems are used at six key gradient compliance well locations located in floodplain areas with nesting habitat for sensitive avian species.
- Low-flow sampling methods are used at most wells screened in the Alluvial Aquifer, reducing the volume of purge water.
- For wells still using the three-volume purge sampling methods, pumps and tubing are sized for the optimum purge technique at each well.
- Utility vehicles (e.g., Polaris Ranger or Kawasaki Mule) and a quiet electric four-wheel-drive utility vehicle are used to access wells on the floodplain and in some culturally sensitive areas rather than the full-size pickup truck.
- The IM-3 pumping regime was modified to allow PE-01 to be periodically shut off with pumping shifted to TW-03D and TW-02D or TW-02S. When applied, this modification allows for an increase in the rate of chromium removal from the floodplain.

2 FOURTH QUARTER 2018 MONITORING ACTIVITIES

This section summarizes the monitoring activities completed during Fourth Quarter 2018 for the GMP, RMP, and PMP programs.

2.1 Groundwater Monitoring Program

The Fourth Quarter 2018 GMP consisted of monthly and quarterly groundwater monitoring and sampling method trials at select monitoring wells.

2.1.1 Monthly Groundwater Monitoring

Monthly GMP monitoring events were performed at IM extraction wells PE-01 and TW-03D in November and December 2018 and consisted of groundwater sampling. The monitoring well locations are shown on Figure 1-2 and listed in Table 1-2. Samples were collected from the tap of the extraction wells (see Table 1-2). During collection of each groundwater sample, field parameters were recorded (i.e., temperature, pH, specific conductivity, oxidation-reduction potential [ORP], turbidity, TDS, and salinity). Samples were sent to Asset Laboratories in Las Vegas, Nevada. Samples were analyzed for the following constituents:

- Cr(VI) and dissolved chromium
- General chemistry parameters: specific conductivity, pH, alkalinity, chloride, sulfate, and TDS
- Constituents of potential concern (COPCs): nitrate/nitrite as nitrogen
- In-situ by-products: dissolved iron and dissolved manganese
- Cations: dissolved calcium, dissolved magnesium, and dissolved sodium

2.1.2 Quarterly Groundwater Monitoring

The quarterly GMP monitoring event was performed from December 4 through 17, 2018 and consisted of groundwater sampling and inspection of 141 monitoring wells. The monitoring well locations are shown on Figure 1-2 and listed in Table 1-2. Samples were collected using one or multiple sampling methods (including low-flow, three-volume purge, grab, and HydraSleeve; see Table 1-2). During collection of each groundwater sample, field parameters were recorded (i.e., temperature, pH, specific conductivity, ORP, turbidity, TDS, and salinity). Samples were sent to Asset Laboratories in Las Vegas, NV; samples collected from monitoring locations in Arizona were sent to EMAX Laboratories, Inc. in Torrance, CA and Eurofins Eaton Analytical in Monrovia, CA. Samples were analyzed for the following constituents (note that not all samples were analyzed for the complete analytical suite listed below):

- Cr(VI) and dissolved chromium (with samples collected from Park Moabi wells Park Moabi-3 and Park Moabi-4 also analyzed for total chromium)
- General chemistry parameters: Specific conductivity, fluoride, and total organic carbon
- COPCs: dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen
- In-situ by-products: dissolved arsenic, dissolved iron, and dissolved manganese

In addition, 10 monitoring wells (MW-10, MW-12, MW-14, MW-22, MW-24A, MW-24B, MW-26, MW-35-060, MW-35-135, and MW-59-100) were analyzed for Title 22 metals, listed in California Code of Regulations, Title 22, Section 66261.24(a)(2)(A), which consist of the following constituents (dissolved): antimony, arsenic, barium, beryllium, cadmium, cobalt, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc.

2.1.3 Implementation of Alternative Sampling Methods

2.1.3.1 Site-wide Implementation of Low-flow Sampling Method

On June 27, 2014, the DTSC approved a change from the traditional three-volume purge sampling method to using a low-flow sampling method (DTSC 2014b). This approval applied to monitoring wells screened in alluvial/fluvial sediments with saturated screen lengths of 20 feet or less. Sample collection using the low-flow method at wells meeting the screen length criterion was initiated during the Third Quarter 2014 sampling event and has continued through Fourth Quarter 2018.

In October 2017, the DTSC approved switching additional monitoring wells from the three-volume purge method to low-flow sampling as part of conditional approval for expanded well sampling trials (DTSC 2017c). Two wells in the GMP program (bedrock well MW-61-110 and observation well OW-3S) were approved to switch from three-volume purge to low-flow sampling (with the rest of the wells approved for this switch under the Compliance Monitoring Program – reported under separate cover). No sampling methods were changed for any wells in Fourth Quarter 2018.

2.1.3.2 Sampling Method Trials at Select Wells

In addition to the low-flow sampling method change, and in accordance with a June 27, 2014 email from the DTSC, PG&E began conducting sampling method trials at monitoring wells MW-38S, MW-38D, MW-40S, and MW-40D during Fourth Quarter 2014 (DTSC 2014b). The purpose of the sampling method trials is to directly compare two different sampling methods. In August 2015, PG&E sent a letter to the DTSC recommending additional wells for low-flow sampling and proposing an additional sampling method trial for select bedrock wells (PG&E 2015). The DTSC responded to this request with a technical memorandum on April 6 and October 20, 2017, which provided conditional approval for actions including expanding the sampling method trials to specific long-screen and bedrock wells (DTSC 2017a, 2017c).

During the Annual Reporting Period, sampling method trials were conducted at the 10 monitoring wells and frequencies listed below. In Fourth Quarter 2018, all 10 wells were sampled as part of the GMP program using the specified sampling methods.

- Low-flow versus three-volume purge methods: MW-38S (quarterly), MW-38D (semiannual), MW-57-185 (semiannual; sampled at two depth intervals), MW-60BR-245 (quarterly; sampled at two depth intervals), MW-70BR-225 (semiannual; sampled at two depth intervals), MW-72BR-200 (quarterly; sampled at two depth intervals), TW-04 (semiannual), and TW-05 (semiannual)
- Low-flow versus HydraSleeve purge methods: MW-40S (semiannual) and MW-40D (semiannual).

An evaluation of the sampling method trials is provided in this report.

2.2 Surface Water Monitoring Program

The Fourth Quarter 2018 RMP monitoring event was performed on December 11 and 12, 2018, and consisted of collecting 25 surface water samples from 16 locations. At 9 of the 16 locations, samples were collected from two depth intervals – shallow (1 foot below water surface) and deep (1 foot above the river bottom). The surface water locations are shown on Figure 1-3 and listed in Table 1-2. During collection of each surface water sample, field parameters were recorded (i.e., temperature, pH, specific conductivity, ORP, turbidity, TDS, and salinity). Samples were sent to Asset Laboratories in Las Vegas, Nevada for analysis of the following constituents:

- Cr(VI) and dissolved chromium
- General chemistry parameters: Specific conductivity and pH
- COPCs: dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen
- In-Situ By-Products: dissolved arsenic, total and dissolved iron, and dissolved manganese
- Geochemical Parameters: dissolved barium and total suspended solids (TSS).

2.3 IM Performance Monitoring Program

IM performance monitoring in Fourth Quarter 2018 consisted of groundwater chromium monitoring within the floodplain area, a review of IM extraction system operation, IM hydraulic monitoring, and IM chemical performance monitoring. In addition, Cr(VI) and dissolved chromium data collected during chromium monitoring activities were used to monitor shutdown of extraction well PE-01 and evaluate the need to implement the IMCP.

2.3.1 Chromium Monitoring

Chromium monitoring was performed as part of the monthly and quarterly GMP monitoring activities. One-hundred and forty-one monitoring wells were sampled for Cr(VI) in December 2018. Extraction wells PE-01 and TW-03D were sampled monthly for Cr(VI) in November and December 2018. The monitoring well locations are shown on Figure 1-4 and listed in Table 1-2. Cr(VI) analytical results were used to evaluate Cr(VI) distribution in the floodplain area.

2.3.2 IM Extraction System Operation

The IM extraction system was operated in November and December 2018. Pumping rates, any planned or unplanned downtime, and the volume of groundwater extracted from each IM extraction well were documented. Daily IM-3 inspections were performed, including general facility inspections, flow measurements, and site security monitoring. Daily logs with documentation of inspections are maintained on site.

Wells Monitored for Conditional Shutdown of PE-01

As discussed in Section 1.4.2.2, 47 GMP monitoring wells were sampled for Cr(VI) and dissolved chromium in Fourth Quarter 2018 as part of conditional approval for PE-01 shutdown. The monitoring well locations are shown on Figure 1-2 and listed in Table 1-2. Results were evaluated against the

maximum detected Cr(VI) and dissolved chromium concentrations from 2014 (or 2013 for wells sampled biennially).

2.3.3 IM Hydraulic Monitoring

Groundwater elevation data from monitoring wells and river monitoring locations within the IM hydraulic monitoring network are measured using pressure transducers, which record water levels at 30-minute intervals. Pressure transducers were downloaded in Fourth Quarter 2018 during the first 2 weeks of each month (November and December) from the 52 monitoring wells in the IM hydraulic monitoring network, two river monitoring locations (I-3 and RRB), and five wells located on the Arizona side of the Colorado River. The monitoring well and river monitoring locations are shown on Figure 1-4 and listed in Table 1-2. Pressure transducers at the six gradient control monitoring wells (MW-27-085, MW-31-135, MW-33-150, MW-34-100, MW-45-095, and MW-20-130) were downloaded via a cellular telemetry system.

In addition, a site-wide water level survey was performed on December 12, 2018, which collected manual groundwater level measurements at 26 shallow wells within an approximate 6-hour period.

2.3.4 IM Contingency Plan Monitoring

As discussed in Section 1.4.2.4, 24 IMCP monitoring wells were sampled for Cr(VI) as part of the Fourth Quarter 2018 GMP program. The monitoring well locations are shown on Figure 1-4 and listed in Table 1-2. Results were evaluated against established trigger levels (based on historical Cr[VI] concentrations).

2.3.5 IM Chemical Performance Monitoring

Nine monitoring wells and one river monitoring location (R-28) were sampled in December 2018 as part of IM Chemical Performance Monitoring, an expanded chemistry suite used to evaluate long-term trends in general water quality response to IM groundwater extraction. The monitoring well locations are shown on Figure 1-4 and listed in Table 1-2. Field parameters, including temperature, pH, specific conductivity, ORP, turbidity, TDS, and salinity, were collected during collection of each groundwater sample. Samples were sent to Asset Laboratories in Las Vegas, Nevada for analysis of the following constituents:

- Boron
- Bromide
- Cations (calcium, magnesium, potassium, sodium)
- Chloride
- Nitrate/nitrite as nitrogen
- Stable isotopes (as δ18O and δ2H)
- Sulfate
- Total alkalinity as calcium carbonate
- TDS

3 FOURTH QUARTER 2018 SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING RESULTS

This section summarizes results from the groundwater and surface water monitoring activities performed during Fourth Quarter 2018 for the GMP and RMP programs.

3.1 Groundwater Monitoring Results

3.1.1 Cr(VI) and Dissolved Chromium

Table 3-1 presents the Fourth Quarter 2018 groundwater sample results for Cr(VI) and dissolved chromium, as well as general chemistry parameters (specific conductivity, ORP, pH, and turbidity). The laboratory reports for samples analyzed during Fourth Quarter 2018 are provided in Appendix A. Note that monitoring wells MW-57-050 and MW-58-065 were dry during the sampling event; therefore, these wells are not included on Table 3-1 as analytical results are not available for these locations.

Figures 3-1a, 3-1b, and 3-1c show the distribution of Cr(VI) concentrations across the site in wells monitoring the upper-depth (shallow), mid-depth, and lower-depth (deep) intervals of the Alluvial Aquifer and bedrock. These figures also show the interpreted extent of groundwater Cr(VI) concentrations higher than 32 µg/L for each depth interval. The value of 32 µg/L is based on the calculated natural background UTL for Cr(VI) in groundwater from the background study (CH2M 2009b). The extent of the Cr(VI) plume is consistent with previous years.

During Fourth Quarter 2018, the maximum detected Cr(VI) and dissolved chromium concentrations were 22,000 µg/L at MW-68-180 and 24,000 µg/L at MW-68-180, respectively.

3.1.2 Contaminants of Potential Concern and In-Situ By-Products

Table 3-1 presents the Fourth Quarter 2018 groundwater sample results for COPCs (dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen) and in-situ by-products (dissolved arsenic, dissolved iron, and dissolved manganese).

Figures 3-2a through 3-2e present Fourth Quarter 2018 COPC and in-situ by-product results in plan view for wells monitoring the upper depth (shallow), mid depth, and lower depth (deep) intervals of the Alluvial Aquifer and bedrock. Results are compared to the calculated background UTLs from the background study (CH2M 2009a, 2009b) and United States Environmental Protection Agency (USEPA) maximum contaminant levels (MCLs; USEPA 2017) where available. Background UTLs were only calculated for regional alluvial wells during the background study; therefore, these background UTLs may not be appropriate for bedrock wells. The figures also show the interpreted extent of groundwater Cr(VI) concentrations higher than 32 µg/L (calculated natural background UTL) for each depth interval.

A summary of Fourth Quarter 2018 COPC and in-situ by-product results is provided in the table below.

Constituent (# of wells sampled)	Calculated Background UTL (# exceedances in Q4 2018)	USEPA MCL (# exceedances in Q4 2018)	Q4 2018 Highest Detected Concentration (Location)
Dissolved molybdenum (148)	36.3 µg/L (52)	None	530 µg/L (MW-33-040)
Dissolved selenium (148)	10.3 µg/L (12)	50 µg/L (2)	410 µg/L (MW-67-185)
Nitrate/nitrite as nitrogen (98)	5.03 mg/L (18)	10 mg/L (nitrate as nitrogen; 7)	47 mg/L (MW-67-185)
Dissolved arsenic (113)	24.3 µg/L (4)	10 µg/L (14)	40 µg/L (MW-12)
Dissolved iron (135)	None	300 µg/L* (23)	50,000 (PGE-07BR)
Dissolved manganese (153)	1,320 µg/L (5)	50 µg/L* (65)	6,100 µg/L MW-22

Note: Except for nitrite/nitrite as nitrogen, calculated background UTLs are applicable to only the dissolved fractions for the listed analytes, while the USEPA MCLs are applicable to total fractions.
* = Secondary MCL.
# = number.

3.1.3 Title 22 Metals

Table 3-2 presents the Title 22 metals groundwater sample results for Fourth Quarter 2018. Results are compared to the California MCLs where available.

Groundwater concentrations for the Title 22 metals were below the California MCLs at the 10 monitoring wells where samples were analyzed for all of the Title 22 metals (MW-10, MW-12, MW-14, MW-22, MW-24A, MW-24B, MW-26, MW-35-060, MW-35-135, and MW-59-100) with the following exceptions:

- Dissolved arsenic (MCL 10 µg/L) was exceeded at MW-12 (40 µg/L)
- Dissolved chromium (MCL 50 µg/L) was exceeded at MW-10 (120 µg/L), MW-12 (1,500 µg/L), MW-24B (150 µg/L), MW-26 (2,300 µg/L), and MW-59-100 (3,300 µg/L).

3.1.4 Well Maintenance

Monitoring wells were inspected during groundwater sampling activities in Fourth Quarter 2018. No corrective or maintenance actions were needed. Appendix B provides a summary of the inspection results.

3.2 Surface Water Monitoring Results

3.2.1 Cr(VI) and Dissolved Chromium

Table 3-3 presents the Fourth Quarter 2018 surface water sample results for Cr(VI) and dissolved chromium, as well as general chemistry parameters (pH and specific conductivity). Cr(VI) and dissolved chromium were not detected at concentrations higher than reporting limits at any surface water

monitoring locations. The laboratory reports for samples analyzed during Fourth Quarter 2018 are provided in Appendix A. Note that monitoring location RRB was not accessible during the Fourth Quarter 2018 sampling event, so no analytical results are available for this location.

3.2.2 Contaminants of Potential Concern and In-Situ By-Products

Table 3-3 presents the Fourth Quarter 2018 surface water results for COPCs (dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen), in-situ by-products (dissolved arsenic, total iron, dissolved iron, and dissolved manganese), and other geochemical indicator parameters (barium and TSS). Maximum concentrations for each constituent are summarized below (with associated location):

- Dissolved molybdenum: 5.8 µg/L (C-MAR-D)
- Dissolved selenium: 1.9 µg/L (R-19)
- Nitrate/nitrite as nitrogen: 0.47 mg/L (C-CON-S)
- Dissolved arsenic: 2.7 µg/L (C-NR1-S)
- Total iron: 3,200 µg/L (C-MAR-D)
- Dissolved iron: 100 µg/L (C-MAR-S)
- Dissolved manganese: 220 µg/L (C-MAR-D)
- Dissolved barium: 140 µg/L (C-MAR-D)
- TSS: 88 mg/L (C-MAR-D).

3.3 Data Validation and Completeness

Laboratory analytical data from the Fourth Quarter 2018 sampling events were reviewed by project chemists to assess data quality and to identify deviations from analytical requirements.

The following bullets summarize the notable analytical qualifications in data reported for the Fourth Quarter 2018:

- Forty-two Cr(VI) (USEPA Method 218.6) results exhibited a matrix interference issue that required a dilution to achieve satisfactory matrix spike recovery, resulting in an elevated reporting limit. No flags were applied.
- The dissolved selenium concentrations in samples MW-52S-Q418, MW-60BR-245-LF_SQ418, and OW-03D-Q418 are considered estimated results.
- Ten samples in one sample delivery group were received at 11 degrees Celsius, which is above the Quality Assurance Project Plan criteria. The associated results are considered estimated.
- Thirty-eight dissolved iron results were associated with an ICSAB recovery that was slightly below quality control (QC) criteria. The results were qualified as estimated nondetects and detects.
- Twelve dissolved boron results were associated with a continuing calibration blank that was detected less than the reporting limit. The results were qualified as nondetects at the measured concentration.

- Dissolved barium was recovered at a concentration lower than QC limit in the matrix spike (MS) of sample C-TAZ-D-Q418. The associated parent sample was qualified as an estimated detect.
- Dissolved boron was recovered at concentrations greater than QC limits in either the MS, matrix spike duplicate (MSD), post-digestion spike (PDS), or some combination thereof, in samples MW-23-060-Q418 MW-30-030-Q418, MW-43-025-Q418, MW-49-135-Q418, MW-58BR-Q418, MW-68BR-280-Q418, MW-69-195-Q418, MW-923-Q418. The associated parent sample results and field duplicate results were qualified as estimated detects.
- Dissolved chromium was recovered at concentrations lower than QC limits in the MS and MSD sample MW-67-260-Q418. The associated parent sample result was qualified as an estimated detect.
- Dissolved copper was recovered at concentrations lower than QC limits in the MS, MSD and PDS of sample MW-35-060-Q418. The associated parent sample result was qualified as an estimated nondetect and flagged “UJ”.
- Dissolved iron was recovered at concentrations greater than QC limits in the MSD of sample MW-43-025-Q418. The associated parent sample result was qualified as an estimated detect.
- Dissolved magnesium was recovered at concentrations lower than QC limits in the MSD of sample MW-58BR-Q418. The associated serial dilution (SD) exceeded QC criteria as well. The associated parent sample result was qualified as an estimated detect.
- Dissolved manganese was recovered at concentrations greater than QC limits in the MS, MSD, and PDS of sample MW-49-135-Q418. The associated SD exceeded QC criteria as well. The associated sample result was qualified as an estimated detect.
- Dissolved molybdenum was recovered at concentrations greater than QC limits in the MS, MSD, and PDS of sample MW-35-060-Q418. The associated sample result was qualified as an estimated detect.
- Dissolved molybdenum was recovered at concentrations lower than QC limits in the MS of sample MW-67-260-Q418. The associated parent sample result was qualified as an estimated detect.
- Dissolved zinc was recovered at concentrations less than QC limits in the MS, MSD, and PDS of sample MW-35-060-Q418. The associated sample result was qualified as an estimated nondetect.
- Total organic carbon was recovered at concentrations lower than QC limit in the MS and MSD in samples MW-25-Q418, MW-33-040-Q418, and PT2M-Q418. The associated sample results were qualified as estimated nondetects.
- Dissolved iron and dissolved magnesium did not meet QC criteria in the SD of sample MW-30-030-Q418. The associated results were qualified as estimated detects.
- The serial dilution for dissolved manganese did not meet QC criteria in sample MW-49-135-Q418. The associated result was qualified as an estimated detect.
- Field duplicate samples were collected, analyzed and generally met QC criteria with the exceptions outlined in the table below. The resulting estimated detected and nondetected results are considered estimated.

Parent Sample ID	Field Duplicate ID	Analytical Method	Analyte
MW-71-035-Q418	MW-925-Q418	SW6020A	Arsenic, dissolved
MW-44-125-Q418	MW-914-Q418	EPA 300.0	Chloride
MW-47-115-Q418	MW-915-Q418	SW6010B	Iron, dissolved
MW-59-100-Q418	MW-926-Q418	SW6010B	Iron, dissolved
MW-71-035-Q418	MW-925-Q418	SW6010B	Iron, dissolved
MW-11-Q418	MW-903-Q418	SW6020A	Manganese, dissolved
MW-59-100-Q418	MW-926-Q418	SW6020A	Manganese, dissolved
MW-71-035-Q418	MW-925-Q418	SW6010B	Sodium, dissolved
MW-44-125-Q418	MW-914-Q418	E120.1	Specific conductance
MW-44-125-Q418	MW-914-Q418	EPA 300.0	Sulfate
MW-44-125-Q418	MW-914-Q418	SM2540C	Total dissolved solids

- Based on the March 2007 USEPA ruling, and reaffirmed in the May 2012 USEPA ruling, pH has a 15-minute holding time. As a result, all samples analyzed in a certified lab by Method SM4500-HB (pH) are analyzed outside the USEPA-recommended holding time. Therefore, the pH results for the Fourth Quarter 2018 sampling event analyzed in a certified lab are considered estimated.
- No other significant analytical deficiencies were identified in the Fourth Quarter 2018 data. Additional details are provided in the data validation reports kept in the project file and available upon request.

4 ANNUAL SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING RESULTS

This section summarizes groundwater and surface water monitoring results from the Annual Reporting Period for the GMP and RMP programs. Field forms and a summary of field parameters from the groundwater and surface water monitoring events performed January through December 2018 are provided in Appendices C and D, respectively.

4.1 Groundwater Monitoring Results

4.1.1 Cr(VI) and Dissolved Chromium

Cr(VI) and dissolved chromium results from January through December 2018 are presented in Table 3-1. Historical Cr(VI) and dissolved chromium concentration results from January 2017 through December 2018 are presented in Appendix E.

During the Annual Reporting Period, the maximum detected Cr(VI) and dissolved chromium concentrations were at monitoring well MW-68-180 (24,000 µg/L and 24,000 µg/L, respectively).

Appendix F presents concentration versus time graphs for Cr(VI). Throughout the Annual Reporting Period, Cr(VI) concentrations were generally within historical ranges and/or consistent with historical concentration trends. Additional discussion about the distribution of Cr(VI) across the floodplain is presented in Sections 5.1 and 6.1.

4.1.2 Contaminants of Potential Concern and In-Situ By-Products

Groundwater COPCs (dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen) and in-situ by-product (dissolved arsenic, dissolved iron, and dissolved manganese) results from January through December 2018 are presented in Table 3-1.

COPC Evaluation

Maximum COPC concentrations detected during the Annual Reporting Period are summarized below (with associated location):

- Dissolved molybdenum: 530 µg/L (MW-33-040)
- Dissolved selenium: 410 µg/L (MW-67-185)
- Nitrate/nitrite as nitrogen: 77 mg/L (MW-67-185).

Appendix F presents concentration versus time graphs for the COPCs. Throughout the Annual Reporting Period, concentrations of these constituents were within historical ranges and/or consistent with historical concentration trends.

In-Situ By-Product Evaluation

Dissolved arsenic, dissolved iron, and dissolved manganese samples were collected during the Annual Reporting Period to establish baseline conditions of in-situ by-products that may be released upon

implementation of the groundwater remedy. Figure 4-1 shows comparisons of these in-situ by-products to Cr(VI) concentrations and other redox indicators (i.e., nitrate/nitrite as nitrogen and ORP) in plan view for wells monitoring the upper-depth, mid-depth, and lower-depth intervals of the Alluvial Aquifer and bedrock. Figure 4-2 shows these same comparisons along cross-section A oriented west to east across the floodplain. The location of cross-section A is shown on Figure 1-4. The distribution of the redox indicators across the site is generally consistent with that from previous years, particularly dissolved analytes, including iron and manganese. Reducing conditions are prevalent in wells located near the Colorado River, where there is a higher level of organic material in the fluvial sediments compared to wells located farther west from the Colorado River completed in alluvial sediments with a lower organic carbon content. In many cases, although concentrations of redox-sensitive dissolved analytes were similar within historically observed variability, the measured ORP was lower in 2018 compared to 2017 (e.g., MW-35-060, MW-47-055, MW-25, MW-30-050, MW-34-055, MW-47-115, MW-50-200, and MW-31-135), while in other cases the measured ORP was higher in 2018 (e.g., MW-20-070, MW-24A, and MW-52D). This is likely reflective of the difficulty in obtaining stable ORP readings in the field for certain water types rather than a true change in the redox condition over time, particularly since other redox-sensitive analytes (including iron and manganese) were more consistent in general.

4.1.3 Alternative Sampling Methods Evaluation

During the Annual Reporting Period, sampling method trials were performed at the 10 monitoring wells listed in the table below. The methodology used to evaluate the sampling method trial results and a summary of trial results are provided in the following sections.

Location ID	Sampling Method Trial	Low-Flow Depth Interval (ft bgs)	No. of Paired Sample Trials To Date	Recommendation
MW-38S	3V vs. LF	mid-screen (75 – 95)	12	Change sampling method from 3V to LF
MW-38D	3V vs. LF	mid-screen (163 – 183)	7	Change sampling method from 3V to LF
MW-57-185	3V vs. LF	150, 171	3	Change sampling method from 3V to LF
MW-60BR-245	3V vs. LF	175, 238	5	Continue sampling method trial
MW-70BR-225	3V vs. LF	220 - 229	3	Change sampling method from 3V to LF
MW-72BR-200	3V vs. LF	152, 195	5	Change sampling method from 3V to LF
TW-04	3V vs. LF	mid-screen (210 – 250)	3	Change sampling method from 3V to LF
TW-05	3V vs. LF	mid-screen (110 – 150)	3	Change sampling method from 3V to LF

Location ID	Sampling Method Trial	Low-Flow Depth Interval (ft bgs)	No. of Paired Sample Trials To Date	Recommendation
MW-40S	LF vs. HydraSleeve	mid-screen (115 – 135)	4	Change sampling method from LF to HydraSleeve
MW-40D	LF vs. HydraSleeve	mid-screen (240 – 260)	6	Continue using LF sampling method; discontinue HydraSleeve sampling method trial

Notes:
3V = three-volume purge method
LF = low-flow purge method
No. = number
ft bgs = feet below ground surface
ID = identification

4.1.3.1 Evaluation Methodology

For each monitoring well, the sampling method trial data were evaluated using the two evaluation components outlined below. Based on the evaluation results, a recommendation was made to either change the sampling method, keep the existing sampling method and discontinue the trial, or continue performing the sampling method trial to collect additional data.

Visual Evaluation of Historical Datasets

For each monitoring well, historical Cr(VI) and dissolved chromium datasets were examined for both sampling methods. The datasets were compared to see if the methods provided similar results and/or demonstrated similar variability.

Relative Percent Difference Calculations

Relative percent difference (RPD) calculations were performed for paired analytical results from each sampling method trial. RPDs were calculated for Cr(VI) and dissolved chromium using the following equation:

$$\text{RPD} = \left(\frac{\text{Absolute value of (sampling method \#1 concentration) – (sampling method \#2 concentration)}}{\text{Average of sampling method \#1 concentration and sampling method \#2 concentration}}\right) x\ 100$$

RPDs were compared to a threshold of 20%. However, if the concentration of either sample result within a sample pair was less than or equal to 5 times the reporting limit, then a control limit of two times the reporting limit was applied. These criteria were selected because they are the criteria used in the QAPP to compare parent and duplicate sample results. For consistency purposes, a reporting limit of 1 µg/L was used for Cr(VI) and dissolved chromium results at each monitoring well.

If RPDs were less than the 20% threshold, or if concentrations were within the control limit of two times the reporting limit, then the two sampling methods were considered comparable. If RPDs were greater than the 20% threshold, or if concentrations were outside the control limit of two times the reporting limit, then Cr(VI) concentrations from both sampling methods were compared to the calculated Cr(VI)

background concentration (32 µg/L; CH2M 2009b) to determine if either sampling method would provide different conclusions about the extent of the plume boundary. For example, if Cr(VI) concentrations from both sampling methods are consistently above or consistently below the background concentration, then either sampling method can be used to delineate the plume boundary. However, if Cr(VI) concentrations from one sampling method are above background and concentrations from the second sampling method are below background, then additional evaluation and/or data are needed to determine which sampling method is most appropriate for delineating the plume boundary.

4.1.3.2 Evaluation Results

Table 4-1 presents the paired sampling method trial analytical results for each monitoring well. Results of the sampling method trial evaluation and associated recommendations are summarized below.

Low-Flow vs. Three Volume Purge

- **MW-38S**: Twelve paired sampling method trials were performed.
  - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are consistent with the three-volume purge (3V) method.
  - For both Cr(VI) and dissolved chromium, concentrations are within the control limit of two times the reporting limit in 11 out of 12 trials (Cr[VI)] concentrations were just outside of the control limits in February 2017) .
  - Cr(VI) and dissolved chromium concentrations measured in samples collected using either sampling method are consistently below 4 µg/L and 5 µg/L, respectively. These concentrations are below the background concentration of 32 µg/L. Therefore, either sampling method can be used to delineate the Cr(VI) plume boundary.

    Recommendation: Change the sampling method from 3V to low-flow. This recommendation was initially proposed in the Fourth Quarter 2015 and Annual Interim Measures Performance Monitoring and Site-Wide Groundwater and Surface Water Monitoring Report (Arcadis 2016). This change is planned to be implemented during the next quarterly sampling event in Second Quarter 2019.
- **MW-38D**: Seven paired sampling method trials were performed.
  - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are consistent with the 3V method.
  - For both Cr(VI) and dissolved chromium, the RPDs are less than the 20% threshold in each of the seven trials.

    Recommendation: Change the sampling method from 3V to low-flow. This recommendation was initially proposed in the Fourth Quarter 2015 and Annual Interim Measures Performance Monitoring and Site-Wide Groundwater and Surface Water Monitoring Report (Arcadis 2016). This change is planned to be implemented during the next semiannual sampling event in Second Quarter 2019.

- **MW-57-185**: Three paired sampling method trials were performed at two different depth intervals – 150 and 171 feet bgs.
    - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are lower than those collected using the 3V method (by approximately about half); however, during the most recent sampling event in December 2018, concentrations from both methods were similar.
    - For both Cr(VI) and dissolved chromium, the RPDs are greater than the 20% threshold and/or concentrations are outside the control limit of two times the reporting limit in 2 out of the 3 trials for the 150 feet bgs depth interval and 1 out of 3 trials for the 171 feet bgs depth interval. During the most recent sampling event in December 2018, the RPDs were below the 20% threshold.
    - Cr(VI) and dissolved chromium concentrations for both sampling methods were consistently below 9 µg/L and 12 µg/L respectively, which are below the background concentration of 32 µg/L. Therefore, either sampling method can be used to delineate the Cr(VI) plume boundary.
    - Low-flow Cr(VI) and dissolved chromium concentrations at both depth intervals were similar. Cr(VI) concentrations ranged from 3 to 5.4 µg/L at the 150-foot depth interval and from 3.1 to 6.2 µg/L at the 171-foot depth interval.

  Recommendation: Change the sampling method from 3V to low-flow, targeting a depth interval of 150 feet bgs. This change is planned to be implemented during the next semiannual sampling event in Second Quarter 2019.

- **MW-60BR-245**: Five paired sampling method trials were performed at two different depth intervals: 175 and 238 feet bgs.
    - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are consistently lower than those measured in samples collected using the 3V method.
        - During the sampling method trials, low-flow Cr(VI) concentrations at both depth intervals ranged from non-detect to 20 µg/L, whereas 3V Cr(VI) concentrations ranged from 69 to 110 µg/L. Results from the December 2017 sampling method trial were not included in this evaluation because they are considered anomalous.
        - Although low-flow Cr(VI) and dissolved chromium concentrations are consistently lower than 3V concentrations during the sampling method trials (December 2017 through December 2018), low-flow concentrations are consistent with historical 3V concentrations prior to the start of the sampling method trials. Historical 3V Cr(VI) concentrations ranged from non-detect to 3.6 µg/L from September 2013 through September 2017 (except for December 2015 and May 2017, which had detections of 61 and 39 µg/L, respectively).
    - For both Cr(VI) and dissolved chromium, the RPDs are greater than the 20% threshold and/or concentrations are outside the control limit of two times the reporting limit in each the five trials for each of the depth intervals.
    - During the sampling method trials, Cr(VI) concentrations measured in samples collected using the 3V method were consistently above the background concentration of 32 µg/L (69 to 110 µg/L)

and Cr(VI) concentrations measured in samples collected using the low-flow method were consistently below the background concentration (non-detect to 20 µg/L). Therefore, the low-flow method may not effectively delineate the Cr(VI) plume boundary.

- Low-flow Cr(VI) and dissolved chromium concentrations at both depth intervals were similar. Cr(VI) concentrations ranged from non-detect to 17 µg/L at the 175-foot depth interval and from non-detect to 20 µg/L at the 238-foot depth interval.

  Recommendation: Continue the low-flow versus 3V method sampling method trials at the two depth intervals. Although there is a distinct difference between low-flow concentrations and 3V concentrations during the previous sampling method trials, low-flow concentrations at both depth intervals are consistent with historical 3V concentrations (i.e., concentrations observed prior to the start of the sampling method trials). This will be further evaluated.

- **MW-70BR-225**: Three paired sampling method trials were performed.
  - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are consistently lower than those measured in samples collected using the 3V method.
  - For both Cr(VI) and dissolved chromium, the RPDs are greater than the 20% threshold in 2 out of the 3 trials.
  - The difference between results from the low-flow and 3V methods does not result in a difference in interpretation of plume delineation. During the sampling method trials, Cr(VI) concentrations from low-flow and 3V samples ranged from 1,200 to 1,400 µg/L and 1,700 to 1,800 µg/L, respectively. Given that historical Cr(VI) concentrations at this location exceed the background concentration of 32 µg/L, either sampling method can be used evaluate changes in plume dynamics and either would indicate that the plume is delineated at this location.

    Recommendation: Change the sampling method from 3V to low-flow. This change is planned to be implemented during the next semiannual sampling event in Second Quarter 2019.

- **MW-72BR-200**: Five paired sampling method trials were performed at two different depth intervals – 152 and 195 feet bgs.
  - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are consistently lower than those measured in samples collected using the 3V method at each of the depth intervals.
  - For both Cr(VI) and dissolved chromium, concentrations are within the control limit of two times the reporting limit in each the five trials for each of the depth intervals.
  - Cr(VI) and dissolved chromium concentrations measured in samples collected using both sampling methods have consistently been less than 5 µg/L, and below the Cr(VI) background concentration of 32 µg/L. Therefore, either sampling method can be used to delineate the Cr(VI) plume boundary.
  - Low-flow Cr(VI) and dissolved chromium concentrations at both depth intervals were similar. Cr(VI) concentrations ranged from non-detect to 1.5 µg/L at the 152-foot depth interval and from non-detect to 1.6 µg/L at the 195-foot depth interval.

Recommendation: Change the sampling method from 3V to low-flow, targeting a depth interval of 152 feet bgs. This change is planned to be implemented during the next quarterly sampling event in Second Quarter 2019.

- **TW-04**: Three paired sampling method trials were performed.
  - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are consistently lower than those measured in samples collected using the 3V method.
  - For both Cr(VI) and dissolved chromium, concentrations are outside the control limit of two times the reporting limit in two out of the three trials.
  - Cr(VI) and dissolved chromium concentrations measured in samples collected using both sampling methods have consistently been less than 10 µg/L, and below the Cr(VI) background concentration of 32 µg/L. Therefore, either sampling method can be used to delineate the Cr(VI) plume boundary.

    Recommendation: Change the sampling method from 3V to low-flow. This change is planned to be implemented during the next semiannual sampling event in Second Quarter 2019.
- **TW-05**: Three paired sampling method trials were performed.
  - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method are generally lower than those measured in samples collected using the 3V method.
  - For Cr(VI), the RPDs are above the 20% threshold in all three trials. The RPDs for dissolved chromium are above the 20% threshold in one out of the three trials.
  - During the sampling method trials, the two methods provided comparable results; Cr(VI) concentrations in samples collected using the low-flow and 3V methods ranged from 8.8 to 10 µg/L and 11 to 14 µg/L, respectively. Given that historical Cr(VI) concentrations at this location are below the Cr(VI) background concentration at 32 µg/L, either sampling method can be used to delineate the Cr(VI) plume boundary.

    Recommendation: Change the sampling method from 3V to low-flow. This change will be implemented during the next semiannual sampling event in Second Quarter 2019.

Low-Flow vs. HydraSleeve

- MW-40S: Four paired sampling method trials were performed.
  - Visual evaluation shows that concentrations of Cr(VI) and dissolved chromium measured in samples collected by both low-flow and HydraSleeve methods in 2014 are generally comparable to those measured in samples collected using the 3V method between 2004 through 2013. However, during the 2015 and 2018 events, concentrations from both the low-flow and HydraSleeve methods were greater than historical concentrations. Cr(VI) concentrations from the 3V, low-flow, and HydraSleeve sampling methods ranged from 2.1 to 8.2 µg/L, 7.6 to 20 µg/L, and 7.0 to 19 µg/L, over the full monitoring periods, for each method, respectively.

  - Although Cr(VI) and dissolved chromium concentrations measured in samples collected using low-flow and HydraSleeve are generally comparable, RPDs are above the 20% threshold in 1 (dissolved chromium) to 2 (Cr[VI]) of the 4 trials.
  - Given that both historical and recent Cr(VI) concentrations at this location are below the background concentration at 32 µg/L, any of the three sampling methods can be used to delineate the Cr(VI) plume boundary and evaluate changes in plume dynamics.

    Recommendation: Change the sampling method from low-flow to HydraSleeve. This change is planned to be implemented during the next semiannual sampling event in Second Quarter 2019.

- **MW-40D**: Six paired sampling method trials were performed.
  - Visual evaluation of the historical Cr(VI) and dissolved chromium datasets shows that concentrations measured in samples collected using the low-flow method in 2014 through 2018 are consistent with concentrations measured in sampled collected using the 3V method between 2004 and 2014. However, concentrations measured in samples collected using the HydraSleeve method are consistently lower and variable (non-detect to greater than 100 µg/L).
  - For both Cr(VI) and dissolved chromium, the RPDs are greater than the 20% threshold and/or concentrations are outside the control limit of two times the reporting limit in in four out of the six trials.
  - During the sampling method trials, Cr(VI) concentrations measured in samples collected using the low-flow method ranged from 98 to 160 µg/L, whereas Cr(VI) concentrations measured in samples collected using the HydraSleeve method ranged from non-detect to 120 µg/L. Given that historical Cr(VI) concentrations at this location are above the Cr(VI) background concentration at 32 µg/L, the HydraSleeve sampling method may not accurately reflect the Cr(VI) plume boundary.

Recommendation: Continue using the low-flow sampling method and discontinue using the HydraSleeve sampling method. This change is planned to be implemented during the next semiannual sampling event in Second Quarter 2019. If PG&E determines that switching to the HydraSleeve sampling method would provide added safety and sustainability benefits (i.e., reduced time spent along the highway median and reduced volume of purge water), then additional sampling method trials at this location may be proposed placing the HydraSleeve at a different depth interval.

4.2 Surface Water Monitoring Results

4.2.1 Cr(VI) and Dissolved Chromium

Cr(VI) and dissolved chromium were not detected at concentrations higher than reporting limits at any surface water monitoring location during the Annual Reporting Period. Surface water sampling results from January through December 2018 are presented in Table 3-3.

4.2.2 Contaminants of Potential Concern and In Situ By-Products

Sampling results from January through December 2018 for surface water COPCs (dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen), in-situ by-products (dissolved arsenic, total iron, dissolved iron, and dissolved manganese), and other geochemical indicator parameters (barium and TSS) are presented in Table 3-3.

Maximum concentrations for each constituent detected during the Annual Reporting Period are summarized below (with associated location):

- Dissolved molybdenum: 5.8 µg/L (C-MAR-D)
- Dissolved selenium: 2.0 µg/L (RC-R22A-D)
- Nitrate/nitrite as nitrogen: 0.53 mg/L (C-TAZ-D)
- Dissolved arsenic: 2.8 µg/L (C-CON-S)
- Total iron: 3,200 µg/L (C-MAR-D)
- Dissolved iron: 100 µg/L (C-MAR-S)
- Dissolved manganese: 220 µg/L (C-MAR-D)
- Dissolved barium: 140 µg/L (C-MAR-D)
- TSS: 88 mg/L (C-MAR-D).

4.3 Annual Groundwater and Surface Water Monitoring Summary

A summary of groundwater and surface water results from the Annual Reporting Period is provided below.

- Cr(VI) and COPC (dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen) concentrations in groundwater were within historical ranges and/or consistent with historical concentration trends.
- Reducing conditions are prevalent in wells located near the Colorado River, where there is a higher level of organic material in the fluvial sediments compared to wells located farther west from the Colorado River completed in alluvial sediments with a lower organic carbon content.
- Assessment of the low-flow versus 3V sampling method trials supports a recommendation that the sampling method change from 3V to low-flow for monitoring wells MW-38S, MW-38D, MW-57-185, MW-70BR-225, MW-72BR-200, TW-04, and TW-05. Additional sampling method trials at a different depth interval is recommended for monitoring well MW-60BR-245.
- Assessment of the low-flow versus HydraSleeve sampling method trials supports a recommended that the sampling method change from low-flow to HydraSleeve for MW-40S, and that the low-flow method continue to be used at MW-40D (discontinuing the HydraSleeve method at this location).
- Cr(VI) and dissolved chromium concentrations were not detected at the Colorado River monitoring locations.

5 FOURTH QUARTER 2018 IM PERFORMANCE MONITORING PROGRAM EVALUATION

This section summarizes results of the Fourth Quarter 2018 PMP evaluation.

5.1 Distribution of Hexavalent Chromium in the Floodplain

Cr(VI) data collected as part of the Fourth Quarter 2018 GMP monitoring activities were used to generate maps, cross-sections, and concentration time series charts to demonstrate that Cr(VI) concentrations greater than 20 µg/L in the floodplain area are contained for removal and treatment.

Distribution of Cr(VI) in the upper-depth (shallow), mid-depth, and lower-depth (deep) intervals of the Alluvial Aquifer is shown in plan-view and cross-section view (cross-section A) on Figure 5-1. Figure 5-2 presents Cr(VI) concentrations for cross-section B, oriented parallel to the Colorado River. The locations of cross-sections A and B are shown on Figure 5-1. The figures demonstrate that Cr(VI) concentrations decrease from west to east along the floodplain (cross-section A) and that concentrations greater than 20 µg/L are contained within the floodplain area.

5.2 IM Extraction System Operation

During Fourth Quarter 2018, IM extraction well TW-03D was primarily operated at a target pumping rate of 135 gallons per minute (gpm) to support hydraulic control. Extraction well PE-01 was only operated for brief periods to support IM-3 system maintenance and sampling. Extraction wells TW-02S and TW-02D were not operated except for a brief period during sampling at TW-02D. The IM-3 system extracted and treated 11,585,167 gallons of groundwater during Fourth Quarter 2018, and an estimated 71.3 pounds (32.3 kilograms) of chromium were removed from the aquifer between October 1 and December 31, 2018 (Table 5-1). Note that groundwater extraction is reported on a different schedule than chromium removal reporting (i.e., November - December and October - December, respectively; Table 5-1). The operational runtime percentage for the IM-3 system during Fourth Quarter 2018 was 93.1 percent. Appendix G provides the operations log for the IM-3 system, including planned and unplanned downtime.

Extraction wells TW-03D and PE-01 (with mostly all the flow from TW-03D) operated at a combined average pumping rate of 131.9 gpm, including periods of planned and unplanned downtime. The average monthly pumping rates were 133.1 gpm (November 2018) and 130.7 gpm (December 2018). Table 5-1 shows the average pumping rates and total groundwater volumes pumped during Fourth Quarter 2018.

Chromium Concentrations in Wells Monitored for Conditional Shutdown of PE-01

During Fourth Quarter 2018, Cr(VI) and dissolved chromium concentrations in 41 out of 47 wells monitored were lower than the 2014 (or 2013 where appropriate) maximum concentrations. Cr(VI) concentrations detected at monitoring wells MW-31-135 (14 µg/L), MW-39-080 (1.2 µg/L), MW-39-100 (63 µg/L), MW-47-055 (21 µg/L), and TW-04 (8.4 µg/L) exceeded the screening concentrations from 2014 (2013 where appropriate) and dissolved chromium concentrations detected at wells MW-30-050 (2.9 µg/L), MW-31-135 (13 µg/L), and MW-39-100 (70 µg/L), and MW-47-055 (21 µg/L) exceeded their respective historical screening criteria. The DTSC was notified of the exceedances at the six locations via email on January 25, 2019. Shutdown of extraction well PE-01 continued through the end of Fourth

Quarter 2018. Table 5-2 presents the Cr(VI) and dissolved chromium concentrations and their associated 2013/2014 maximum concentrations.

5.3 IM Hydraulic Monitoring Results

Table 5-3 presents the Fourth Quarter 2018 average monthly and quarterly groundwater and river elevations, calculated from the pressure transducer data. Average daily groundwater and river elevations are provided as hydrographs in Appendix H. Groundwater elevations were adjusted for temperature and salinity differences among wells (i.e., adjusted to a common freshwater equivalent).

Hydraulic Gradient Evaluation: California Floodplain

Figures 5-3a, 5-3b, and 5-3c present the average Fourth Quarter 2018 groundwater elevations and associated groundwater contours for the shallow, mid-depth, and deep wells, respectively. Figure 5-4 presents the average groundwater elevations and associated groundwater contours for wells located in the floodplain along cross-section A. Due to complex vertical gradients present at portions of the Topock site, water levels for some wells are not considered in the contouring on Figures 5-3a, 5-3b, 5-3c, or 5-4.

During Fourth Quarter 2018, hydraulic gradients were measured for three gradient well pairs selected for performance monitoring of the IM-3 system (shown on Figure 1-4; note that PE-01 was not operated for hydraulic control):

- Northern Gradient Pair: MW-31-135 and MW-33-150
- Central Gradient Pair: MW-20-130 and MW-34-100
- Southern Gradient Pair: MW-20-130 and MW-27-085.

As discussed in Section 1.4.2.3, a landward hydraulic gradient of 0.001 ft/ft must be maintained to demonstrate compliance with the performance standard. Table 5-4 presents the monthly average hydraulic gradients measured for each of the gradient well pairs in Fourth Quarter 2018, as well as the overall average of all well pairs. The overall monthly average gradients for all well pairs were 0.0037 and 0.0030 ft/ft for November and December 2018, respectively. Landward gradients measured each month exceeded the 0.001 ft/ft requirement, as shown in Table 5-4. Figure 5-5 illustrates the measured hydraulic gradients during Fourth Quarter 2018 with the concurrent Colorado River elevations and IM-3 pumping rates.

Hydraulic Gradient Evaluation: Arizona Side of the Colorado River

During Fourth Quarter 2018, pressure transducer data were recorded in five wells located on the Arizona side of the Colorado River. The average quarterly groundwater elevations for monitoring wells MW-54-085, MW-54-140, MW-54-195, MW-55-045, and MW-55-120 are presented on Figures 5-3b and 5-3c, and are used for contouring where appropriate. Except for well MW-55-045, all wells in the MW-54 and MW-55 clusters are screened in the deep interval of the Alluvial Aquifer. Well MW-55-045 is screened across portions of the shallow and middle intervals (Figure 5-3b). Average quarterly water levels at MW-54-085, MW-55-045, and MW-55-120, as shown on Figures 5-3b and 5-3c, indicate that water level elevations in monitoring wells in Arizona are higher than those in wells across the river on the California floodplain. This indicates that the apparent hydraulic gradient on the Arizona side of the river is westward

and, as a result, groundwater flow would also be toward the west in that area. This is consistent with the site conceptual model and with the current numerical groundwater flow model.

Site-Wide Water Level Survey

On December 12, 2018, a site-wide water level survey was performed, which consisted of collecting manual groundwater level measurements at 26 shallow monitoring wells within an approximate 6-hour period. Groundwater elevations were adjusted for temperature and salinity differences among wells (i.e., adjusted to a common freshwater equivalent). Figure 5-6 presents a snapshot of groundwater elevations for the shallow-depth interval of the Alluvial Aquifer, representative of the water table, but exclusive of the shallow wells near the Colorado River that show the pumping depression created by IM-3 operation. Because groundwater levels at the site fluctuate continuously in response to changes in river state, the groundwater elevation contours shown on Figure 5-6 are affected by transient conditions during the period of measurement and may not be representative of the average groundwater gradient directions. The site-wide water level survey is planned to be discontinued in 2019.

5.4 IM Contingency Plan Monitoring Results

During Fourth Quarter 2018, Cr(VI) concentrations in the 24 IMCP monitoring wells were lower than the established trigger levels; therefore, implementation of the contingency plan was not needed. Cr(VI) concentrations for the IMCP wells and their associated trigger levels are presented in Table 5-5.

5.5 IM Chemical Performance Monitoring Results

Table 5-6 presents Fourth Quarter 2018 IM chemical performance monitoring results. Appendix I presents the chemical performance monitoring results from March 2005 through December 2018.

5.5.1 Stable Isotope Evaluation

Analysis of oxygen-18 (δ18O) and deuterium (δ2H) provides a method of tracking the mixing occurring in floodplain groundwater as a result of IM extraction. The lighter isotopic signatures (left side of Figure 5-7) are generally found in the Colorado River (R-28) and fluvial “non-plume” well samples, whereas the heaviest isotopic signatures are found in selected alluvial “plume” wells (e.g., MW-20-130 on the right side of the plot), which likely contain higher percentages of water that has flowed from the upland areas (Figure 5-7).

Previous reports evaluated the effects of IM pumping on the isotopic signature of floodplain wells. In 2015, isotopic data suggested that the isotopic signature in most plume wells has progressed towards a river water signature since IM pumping began. This is likely a result of the continuous landward gradient created by IM pumping, which has caused mixing of plume groundwater with river-influenced groundwater (CH2M 2015).

Figure 5-7 shows the water isotope results for plume samples (green points) compared with non-plume samples (purple points), including a comparison of 2018 data (solid symbols) with 2017 data (open symbols) to evaluate temporal changes in the isotopic signature. The comparison illustrates that several wells (including plume and non-plume wells) exhibit a lighter oxygen isotope signature in 2018 relative to 2017; however, these decreases appear to be more significant in δ18O than in δ2H, such that many of

the data points do not fall along an anticipated dilution curve, which would be expected to bisect the data running parallel to the global meteoric water line. Specific observations include the following:

- Several plume wells, including fluvial wells MW-34-100 and MW-36-100 and alluvial plume wells MW-20-130, MW-20-070, and MW-20-100, show a significant decrease in δ18O and δ2H consistent with dilution with a lighter water. In contrast, MW-31-060 and MW-25 exhibit a slightly heavier signature in 2018 relative to 2017.
- A number of non-plume wells also exhibit a lower δ18O signature in 2018 relative to 2017; however, many of these do not show a similar decrease in δ2H (e.g., alluvial wells MW-47-055, MW-35-060, MW-33-090, MW-33-150, and MW-49-365, and fluvial wells MW-36-090 and MW-34-055). Fluvial well MW-30-050 exhibits a decrease in both δ18O and δ2H that may be indicative of dilution. Exceptions (i.e., wells that exhibited a heavier signature in 2018) included MW-32-035, MW-39-080, and MW-31-135.
- It is possible that the shift in δ18O without a similar shift in δ2H may be more indicative of sample variability or measurement uncertainty rather than a true dilution effect. This possibility will be evaluated as a longer data record is obtained for these wells.

5.6 Projected River Levels during Next Quarter

Colorado River water level projections provide river level information that is useful for anticipating IM-3 extraction requirements for the upcoming quarter. The Colorado River stage near the site is measured at river monitoring location I-3. Water levels are directly influenced by releases from Davis Dam and, to a lesser degree, from Lake Havasu elevations, both of which are controlled by the United States Bureau of Reclamation (USBR). Total releases from Davis Dam follow a predictable annual cycle, with the largest monthly releases typically in spring and early summer and the smallest monthly releases in late fall/winter (November and December). Superimposed on this annual cycle is a diurnal cycle determined primarily by daily fluctuations in electric power demand. Releases within a given 24-hour period often fluctuate over a wider range of flows than that of monthly average flows over an entire year. Figure 5-8 shows the river stage measured at location I-3 superimposed on the projected I-3 river levels.

Projected river levels for future months are based on the USBR projections of Davis Dam discharge and Lake Havasu levels from the preceding month. For example, the projected river level for January 2019 is based on the December 2018 USBR projections of Davis Dam release and Lake Havasu level. Future projections of Colorado River stage, shown on Figure 5-8, are based on USBR long-range projections of Davis Dam releases and Lake Havasu levels from December 2018. There is more uncertainty in these projections at longer times in the future because water demand is based on various factors, including climatic factors.

Current USBR projections, presented in Table 5-7, show that the projected Davis Dam release for January 2019 is 7,300 cubic feet per second, and the predicted Colorado River elevation at the I-3 gauge is 452.93 feet above mean sea level.

5.7 Performance Monitoring Program Evaluation Summary

A summary of the Fourth Quarter 2018 PMP evaluation is provided below.

- Cr(VI) isoconcentration maps indicate that Cr(VI) concentrations greater than 20 µg/L in the floodplain area are hydraulically controlled.
- IM extraction well TW-03D was primarily operated to support hydraulic control. A total of 11,585,167 gallons of groundwater were extracted by the IM-3 system, and an estimated 71.3 pounds (32.3 kilograms) of chromium were removed from groundwater.
- Cr(VI) and dissolved chromium concentrations in monitoring wells located within 800 feet of extraction well TW-03D were lower than their established 2013/2014 maximum concentrations (i.e., notification levels), except at six wells. The DTSC was notified with results from the six wells and shutdown of extraction well PE-01 was allowed to continue through the end of the reporting period. The seasonal cycles of Colorado River levels are associated with small fluctuations in chromium concentrations, and the changes observed at these monitoring wells are consistent with past variations over the duration of GMP monitoring.
- Groundwater potentiometric surface maps and the gradient analysis from designated well pairs provide evidence of hydraulic containment of the Cr(VI) plume. The overall monthly average landward gradients in November and December 2018 were 3.7 and 3.0 times the required minimum magnitude (0.001 ft/ft), respectively.
- Cr(VI) and dissolved chromium concentrations in the IMCP monitoring wells were lower than their established trigger levels, indicating that chromium concentrations did not increase at areas of interest across the site.
- Isotopic results illustrate that several wells (including plume and non-plume wells) exhibit a lighter oxygen isotope signature in 2018 relative to 2017; however, these decreases appear to be more significant in $\delta^{18}O$ than in $\delta^{2}H$. This is likely a result of the continuous landward gradient created by IM pumping, which has caused mixing of plume groundwater with river-influenced groundwater.

6 ANNUAL IM PERFORMANCE MONITORING PROGRAM EVALUATION

This section summarizes results of the Annual Reporting Period PMP evaluation.

6.1 Distribution of Hexavalent Chromium in the Floodplain

Appendix F provides Cr(VI) concentration time series charts for monitoring wells in the floodplain and includes Cr(VI) concentration time series charts for six deep monitoring wells in the floodplain area (MW-34-100, MW-36-090, MW-36-100, MW-44-115, MW-44-125, and MW-46-175) that have historically been monitored for chromium encroachment. These six wells are located between the IM extraction wells and the Colorado River and show the distribution of Cr(VI) concentrations at the toe of the Cr(VI) plume. As shown by the concentration time series charts, Cr(VI) concentrations have decreased since initiation of the IM extraction system in 2005 and have remained relatively steady over the past few years. During the Annual Reporting Period, Cr(VI) concentrations at the six wells were below 20 µg/L (Appendices E and F). In general, wells showing marked decreases in Cr(VI) concentration are generally located in the floodplain area where IM pumping is removing chromium in groundwater. Wells with historical detections near or at reporting limits remained at these levels during Fourth Quarter 2018. Cr(VI) concentrations have remained steady or have decreased in many wells since IM pumping began in 2004 and 2005, respectively (Appendix F).

6.2 IM Extraction System Operation

During the Annual Reporting Period, IM extraction well TW-03D was primarily operated at a target pumping rate of 135 gpm to support hydraulic control. Extraction well PE-01 was only operated for brief periods to support IM-3 system maintenance and sampling. Extraction wells TW-02S and TW-02D were not operated except for a brief period during sampling at TW-02D. The IM-3 system extracted and treated 66,098,687 gallons of groundwater between January and December 2018, and an estimated 279 pounds (127 kilograms) of chromium were removed from the aquifer between January 1 and December 31, 2018 (Tables 5-1 and 6-1).

Extraction wells TW-03D and PE-01 (with mostly all the flow from TW-03D) operated at a combined average annual pumping rate of 125.8 gpm, including periods of planned and unplanned downtime. Figure 5-9 shows the monthly and cumulative groundwater volumes extracted, and the percentage of time that the extraction system was in operation during the Annual Reporting Period. Table 6-1 shows that pumping rates were relatively consistent from month to month with IM-3 operating close to design capacity.

6.2.1 Chromium Concentrations in Wells Monitored for Conditional Shutdown of PE-01

During the Annual Reporting Period, Cr(VI) and dissolved chromium concentrations in 38 out of 47 wells monitored were lower than the 2014 (or 2013 where appropriate) maximum concentrations. Cr(VI) and dissolved chromium exceedances of the PE-01 shutdown standards in 2018 included:

  - First Quarter 2018: No exceedances
- Second Quarter 2018 (four monitoring wells): MW-26, MW-39-100, MW-47-115, and TW-04
- Third Quarter 2018 (one monitoring well): PE-01
- Fourth Quarter 2018 (six monitoring wells): MW-30-050, MW-31-135, MW-39-080, MW-39-100, MW-47-055, and TW-04.

The DTSC was notified of the exceedances each quarter within 40 days after the end of the quarterly GMP sampling events. Extraction well PE-01 remained shut down throughout the Annual Reporting Period. Table 5-2 presents the Cr(VI) and dissolved chromium concentrations for subject wells during the Annual Reporting Period in comparison to the screening criteria.

6.3 IM Hydraulic Monitoring Results

6.3.1 Hydraulic Gradient Evaluation: California Floodplain

During the Annual Reporting Period, hydraulic gradients were measured for three gradient well pairs selected for performance monitoring of the IM-3 system (shown on Figure 1-4; note that PE-01 was not operated for hydraulic control throughout Annual Reporting Period):

- Northern Gradient Pair: MW-31-135 and MW-33-150
- Central Gradient Pair: MW-20-130 and MW-34-100
- Southern Gradient Pair: MW-20-130 and MW-27-085.

Table 6-2 presents the average monthly hydraulic gradients measured for each of the gradient well pairs, as well as the overall monthly averages of all well pairs, during the Annual Reporting Period. Landward gradients measured each month exceeded the 0.001 ft/ft requirement. Groundwater potentiometric maps of shallow, mid-depth, and deep wells from First Quarter 2018 (Arcadis 2018a), Second Quarter 2018 (Arcadis 2018b), Third Quarter 2018 (Arcadis 2018c), and Fourth Quarter 2018 (Figures 5-3a, 5-3b, and 5-3c) show the landward hydraulic gradient maintained throughout the year. Figure 5-5 further illustrates the measured hydraulic gradients during the Annual Reporting Period with the concurrent Colorado River elevations and IM-3 pumping rates.

6.3.2 Hydraulic Gradient Evaluation: Arizona Side of the Colorado River

During the Annual Reporting Period, potentiometric levels in monitoring wells in Arizona were higher than those in wells across the river on the California floodplain (Arcadis 2018a, 2018b, and 2018c; Figures 5-3a, 5-3b, and 5-3c). As stated in Section 5.3, this indicates that the apparent hydraulic gradient on the Arizona side of the river is westward, which is consistent with the site conceptual model and the current numerical groundwater flow model.

6.4 IM Contingency Plan Monitoring Results

During the Annual Reporting Period, Cr(VI) concentrations in the 24 IMCP monitoring wells were lower than the established trigger levels (Table 5-5); therefore, implementation of the contingency plan was not needed.

Trigger levels are re-evaluated annually to determine if any changes need to be made. During the Annual Reporting Period, Cr(VI) concentrations in the 24 IMCP monitoring wells remained below their respective trigger levels, which were established in August 2006 and approved in July 2008 (CH2M 2006; DTSC 2008c; the trigger level for MW-47-115 was updated and approved in June 2009). Wells with Cr(VI) concentrations greater than the IM performance standard of 20 µg/L show stable or decreasing trends; therefore, changes to trigger levels are not recommended at this time.

6.5 Performance Monitoring Program Evaluation Summary

A summary of the Annual Reporting Period PMP evaluation is provided below.

- Cr(VI) isoconcentration maps from First Quarter, Second Quarter, Third Quarter, and Fourth Quarter 2018 indicated that Cr(VI) concentrations greater than 20 µg/L in the floodplain area were hydraulically controlled. Cr(VI) concentrations in the floodplain are generally stable or decreasing, with notable decreases observed where groundwater is being extracted.
- Throughout 2018, IM extraction well TW-03D was primarily operated to support hydraulic control. A total of 66,098,687 gallons of groundwater were extracted by the IM-3 system, and an estimated 279 pounds (127 kilograms) of chromium were removed from groundwater.
- Cr(VI) and dissolved chromium concentrations in monitoring wells located within 800 feet of extraction well TW-03D were lower than their established 2014 (or 2013 where appropriate) maximum concentrations, except at nine wells. The DTSC was notified of the exceedances each quarter and shutdown of extraction well PE-01 was allowed to continue through the end of the Annual Reporting period. The seasonal cycles of Colorado River levels are associated with small fluctuations in chromium concentrations, and the changes observed at these monitoring wells are consistent with past variations over the duration of GMP monitoring.
- Groundwater potentiometric surface maps and the gradient analysis from designated well pairs throughout 2018 provide evidence of hydraulic containment of the Cr(VI) plume. The overall monthly average landward gradients throughout the Annual Reporting Period met the required minimum gradient of 0.001 ft/ft. The IM pumping rates, ranging between 108.4 and 133.7, were sufficient to meet this requirement and maintain hydraulic control of the Cr(VI) plume.
- Each quarter, Cr(VI) concentrations in the IMCP monitoring wells were lower than their established trigger levels, indicating that chromium concentrations did not increase at areas of interest across the site.

7 UPCOMING OPERATION AND MONITORING EVENTS

GMP, RMP, and PMP monitoring activities will continue under direction from the DTSC in First Quarter 2019. Monitoring activities and results will be reported in the First Quarter 2019 PMP-GMP Report (planned for submittal by April 30, 2019).

7.1 Groundwater Monitoring Program

7.1.1 Monthly Groundwater Monitoring

Monthly GMP monitoring events are planned for January, February, and March 2019 at extraction wells PE-01 and TW-03D.

7.1.2 Quarterly Groundwater Sampling

The quarterly GMP monitoring event is planned for February 2019. This event will consist of groundwater sampling and inspection of 20 monitoring wells. Any necessary corrective actions to monitoring wells will be performed in a timely manner.

If rainfall events occur in First Quarter 2019 that cause surface water flow in Bat Cave Wash, monitoring wells MW-09, MW-10, and MW-11 will be sampled.

7.1.3 Sampling Method Trials at Select Wells

Sampling method trials are proposed to continue at monitoring well MW-60BR-245, as noted in Section 4.1.3. The next sampling method trial is planned for First Quarter 2019 (during the quarterly GMP monitoring event).

7.2 Surface Water Monitoring Program

Two surface water monitoring events will be performed in First Quarter 2019. The first event is planned for February 2019 during low-flow conditions, and the second event is planned for March 2019. Both events will consist of surface water sampling at 16 locations.

7.3 IM Performance Monitoring Program

7.3.1 Chromium Monitoring

Chromium monitoring will be performed as part of the First Quarter 2019 monthly and quarterly GMP monitoring events. Cr(VI) chromium data will be collected from a total of 22 monitoring wells.

7.3.2 IM Extraction System Operation

During First Quarter 2019, the IM-3 system will continue operating and operations will be documented. IM extraction wells TW-03D and PE-01 (as needed) will be pumped at a target rate of 135 gpm, except during periods of planned and unplanned downtime, to maintain appropriate hydraulic gradients across

the Alluvial Aquifer. Extraction will be primarily from TW-03D, coupled with PE-01 only if needed to maintain gradient control during low river stages. If TW-03D and PE-01 cannot produce the target pumping rate of 135 gpm, then TW-02D and/or TW-02S may be pumped to supplement TW-03D and achieve total flow.

First Quarter 2019 GMP monitoring results from wells listed in the July 20, 2015 DTSC approval letter for conditional PE-01 shutdown (DTSC 2015) will be compared to the 2014 (or 2013 for wells sampled biennially) maximum Cr(VI) and dissolved chromium concentrations. Results that exceed the 2014 maximum concentrations will be reported to the DTSC within 40 days after the end of the quarterly GMP sampling event.

7.3.3 IM Hydraulic Monitoring

The IM hydraulic monitoring network will continue to be used to demonstrate compliance of the required 0.001 ft/ft landward hydraulic gradient. During the first 2 weeks of each month, pressure transducers will be downloaded from the 52 monitoring wells in the IM hydraulic monitoring network, five wells located on the Arizona side of the Colorado River, and two river monitoring locations. Pressure transducers at the six gradient control wells (MW-27-085, MW-31-135, MW-33-150, MW-34-100, MW-45-095, and MW-20-130) will continue to be downloaded via cellular telemetry at monthly or more frequent intervals, as needed, to verify that 0.001 ft/ft landward gradients are maintained.

7.3.4 IM Contingency Plan Monitoring

First Quarter 2019 GMP monitoring results from IMCP wells will be compared to their respective trigger levels. If any exceedances are observed, the DTSC will be notified in accordance with the Revised Contingency Plan Flow Chart (PG&E 2008).

7.4 Quarterly Notifications

Email notification will be sent to the DTSC in First Quarter 2019 providing Cr(VI) and dissolved chromium results for shoreline and in-channel surface water monitoring locations and monitoring wells MW-34-100, MW-44-115, MW-46-175, and MW-44-125.

7.5 Monitoring Well Installation

In accordance with the Basis of Design Report (CH2M 2015), new monitoring wells, extraction wells, and injection wells are currently being installed as part of the final groundwater remedy for the site. A summary of field activities and monitoring results associated with the installation of the new wells will be reported under separate cover as part of the monthly reporting process associated with the final groundwater remedy construction.

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TABLES

Table 1-1

Topock Monitoring Reporting Schedule

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Period	Reporting Period	Report Submittal Date	Anticipated Number of Monitoring Locations						
			Groundwater Monitoring Program (GMP)	Surface Water Monitoring Program (RMP)	Chromium Monitoring*	Monitoring for Conditional Shutdown of PE-01*	IM Hydraulic Monitoring	IM Contingency Plan Monitoring*	IM Chemical Performance Monitoring
First Quarter	January - March	April 30	22	16	22	4	59	3	0
Second Quarter	April - June	August 15	105	16	105	30	59	19	0
Third Quarter	July - October	December 15	22	16	22	4	59	3	0
Fourth Quarter	November - December	March 15	143 annual + 2 biennial	16	143 annual + 2 biennial	47	59	24	10 annual + 1 biennial

Notes:

1. On July 23, 2010, DTSC approved a revised reporting schedule that included a revised IM-3 monitoring period (i.e., chromium removed), as follows:
   First Quarter: January - February
   Second Quarter: March - May
   Third Quarter: June - September
   Fourth Quarter: October - December

* = Monitoring consists of collecting hexavalent chromium and/or dissolved chromium data from groundwater monitoring wells; these data are collected during the GMP monitoring event.

GMP = Groundwater Monitoring Program.

DTSC = Department of Toxic Substance Control.

IM = interim measure.

RMP = Surface Water Monitoring Program.

Table 1-2
GMP, RMP, and PMP Monitoring Summary
Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report
PG&E Topock Compressor Station, Needles, California

Location ID	Site Area	Monitoring Well Construction Details							Monitoring Programs & Frequency							Notes
											PMP Monitoring					
		Measuring Point Elevation (ft amsl)	Well Screen Interval (ft bgs)	Well Screen Lithology	Well Casing Diameter (inches)	Well Depth (ft bgs)	Aquifer Zone	Sampling Method	GMP Monitoring	RMP Monitoring	Chromium Monitoring	Monitoring for Conditional Shutdown of PE-01	IM Hydraulic Monitoring	IM Contingency Plan Monitoring	IM Chemical Performance Monitoring	
MONITORING WELLS																
MW-09	Bat Cave Wash	536.56	77 - 87	Alluvial	4 in PVC	89.4	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	Bat Cave Wash flow
MW-10	Bat Cave Wash	530.65	74 - 94	Alluvial	4 in PVC	96.9	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	Bat Cave Wash flow
MW-11	Bat Cave Wash	522.54	62.5 - 82.5	Alluvial	4 in PVC	86.1	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	Bat Cave Wash flow
MW-12	East of Station	484.01	27.5 - 47.5	Alluvial	4 in PVC	50.4	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-13	Bat Cave Wash	488.64	28.5 - 48.5	Alluvial	4 in PVC	52.0	Shallow	LF	Annual	--	Annual	--	--	--	--	
MW-14	East Mesa	570.99	111 - 131	Alluvial	4 in PVC	133.8	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-15	East of New Ponds	641.52	180.5 - 200.5	Alluvial	4 in PVC	203.0	Shallow	LF	Annual	--	Annual	--	--	--	--	
MW-16	Near New Ponds	657.31	198 - 218	Alluvial	4 in PVC	218.1	Shallow	LF	Biennial	--	Biennial	--	--	--	--	
MW-17	West of Mesa Area	589.96	130 - 150	Alluvial	4 in PVC	153.6	Shallow	LF	Biennial	--	Biennial	--	--	--	--	
MW-18	West Mesa	545.32	85 - 105	Alluvial	4 in PVC	106.7	Shallow	LF	Annual	--	Annual	--	--	--	--	
MW-19	Route 66	499.92	46 - 66	Alluvial	4 in PVC	65.8	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-20-070	MW-20 bench	500.07	50 - 70	Alluvial	4 in PVC	69.6	Shallow	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	Annual	
MW-20-100	MW-20 bench	500.58	89.5 - 99.5	Alluvial	4 in PVC	101.4	Middle	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	Annual	
MW-20-130	MW-20 bench	500.66	121 - 131	Alluvial	4 in PVC	132.3	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	Annual	Hydraulic Gradient Well
MW-21	Route 66	505.55	39 - 59	Alluvial	4 in PVC	58.5	Shallow	LF	Semiannual	--	Semiannual	--	--	Semiannual	--	Low recharge well; typically purges dry at 1 casing volume
MW-22	Floodplain	460.72	5.5 - 10.5	Fluvial	2 in PVC	12.4	Shallow	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-23-060	East Ravine	504.08	50 - 60	Bedrock	2 in Sch 40 PVC	60.2	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-23-080	East Ravine	504.13	75 - 80	Bedrock	2 in Sch 40 PVC	80.8	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-24A	MW-24 Bench	567.16	104 - 124	Alluvial	4 in PVC	127.5	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-24B	MW-24 Bench	564.76	193 - 213	Alluvial	4 in PVC	214.8	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-24BR	MW-24 Bench	563.95	378 - 437	Bedrock	4 in PVC	441.0	Bedrock	3V	Annual	--	Annual	--	--	--	--	Low recharge well; typically purges dry at 1 casing volume
MW-25	Near Bat Cave Wash	542.90	84.5 - 104.5	Alluvial	4 in PVC	106.5	Shallow	LF	Semiannual	--	Semiannual	--	Monthly	--	Annual	
MW-26	Route 66	502.22	51.5 - 71.5	Alluvial	2 in PVC	70.1	Shallow	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	Biennial	
MW-27-020	Floodplain	460.56	7 - 17	Fluvial	2 in PVC	14.4	Shallow	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-27-060	Floodplain	461.49	47.3 - 57.3	Fluvial	2 in PVC	59.0	Middle	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-27-085	Floodplain	460.99	77.5 - 87.5	Fluvial	2 in PVC	80.0	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	Hydraulic Gradient Well
MW-28-025	Floodplain	466.77	13 - 23	Fluvial	2 in PVC	21.1	Shallow	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	--	
MW-28-090	Floodplain	467.53	70 - 90	Fluvial	2 in PVC	98.4	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-29	Floodplain	485.21	29.5 - 39.5	Fluvial	2 in PVC	41.5	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-30-030	Floodplain	468.12	12 - 32	Fluvial	2 in PVC	26.9	Shallow	LF	Annual	--	Annual	Annual	--	--	--	
MW-30-050	Floodplain	468.81	40 - 50	Fluvial	4 in PVC	52.6	Middle	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-31-060	MW-20 Bench	496.81	41.5 - 61.5	Alluvial	4 in PVC	64.0	Shallow	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	Annual	
MW-31-135	MW-20 Bench	498.11	113 - 133	Alluvial	2 in PVC	135.4	Deep	LF	Annual	--	Annual	Annual	Monthly	--	--	Hydraulic Gradient Well
MW-32-020	Floodplain	461.51	10 - 20	Fluvial	2 in PVC	19.6	Shallow	LF	Annual	--	Annual	Annual	--	Annual	--	
MW-32-035	Floodplain	461.63	27.5 - 35	Fluvial	4 in PVC	37.2	Shallow	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	Annual	
MW-33-040	Floodplain	487.38	29 - 39	Fluvial	2 in PVC	41.8	Shallow	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-33-090	Floodplain	487.55	69 - 89	Alluvial	4 in PVC	88.3	Middle	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-33-150	Floodplain	487.77	132 - 152	Alluvial	2 in PVC	155.4	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	Hydraulic Gradient Well
MW-33-210	Floodplain	487.25	190 - 210	Alluvial	2 in PVC	223.0	Deep	LF	Semiannual	--	Semiannual	Semiannual	--	Semiannual	--	
MW-34-055	Floodplain	460.95	45 - 55	Fluvial	4 in PVC	56.6	Middle	LF	Annual	--	Annual	Annual	Monthly	--	Annual	
MW-34-080	Floodplain	461.20	73 - 83	Fluvial	4 in PVC	84.3	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	Annual	
MW-34-100	Floodplain	460.97	89.5 - 99.5	Fluvial	2 in PVC	117.0	Deep	LF	Quarterly	--	Quarterly	Quarterly	Monthly	Quarterly	Annual	Hydraulic Gradient Well
MW-35-060	Route 66	484.33	41 - 61	Alluvial	2 in PVC	56.8	Shallow	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-35-135	Route 66	484.24	116 - 136	Alluvial	2 in PVC	158.7	Deep	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-36-020	Floodplain	469.33	10 - 20	Fluvial	1 in PVC	20.3	Shallow	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-36-040	Floodplain	469.59	30 - 40	Fluvial	1 in PVC	40.3	Shallow	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-36-050	Floodplain	469.62	46 - 51	Fluvial	1 in PVC	108.0	Middle	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-36-070	Floodplain	469.27	60 - 70	Fluvial	1 in PVC	70.3	Middle	LF	Annual	--	Annual	Annual	Monthly	Annual	--	
MW-36-090	Floodplain	469.64	80 - 90	Fluvial	1 in PVC	90.3	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	--	
MW-36-100	Floodplain	469.65	88 - 98	Fluvial	2 in PVC	108.0	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	--	
MW-37D	Bat Cave Wash	486.19	180 - 200	Alluvial	2 in PVC	226.7	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-37S	Bat Cave Wash	485.97	64 - 84	Alluvial	2 in PVC	85.0	Middle	LF	Annual	--	Annual	--	--	--	--	
MW-38D	Bat Cave Wash	525.31	163 - 183	Alluvial	2 in PVC	190.9	Deep	LF, 3V	Semiannual	--	Semiannual	--	--	--	--	Sampling Method Trial
MW-38S	Bat Cave Wash	526.59	75 - 95	Alluvial	2 in PVC	98.1	Shallow	LF, 3V	Quarterly	--	Quarterly	--	--	--	--	Sampling Method Trial
MW-39-040	Floodplain	468.02	30 - 40	Fluvial	1 in PVC	42.1	Shallow	LF	Annual	--	Annual	Annual	Monthly	Annual	--	
MW-39-050	Floodplain	467.93	47 - 52	Fluvial	1 in PVC	54.6	Middle	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-39-060	Floodplain	468.00	49 - 59	Alluvial	1 in PVC	15.2	Middle	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-39-070	Floodplain	468.02	60 - 70	Alluvial	1 in PVC	71.7	Middle	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-39-080	Floodplain	467.92	70 - 80	Alluvial	1 in PVC	82.6	Deep	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-39-100	Floodplain	468.12	80 - 100	Alluvial	2 in PVC	117.7	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	--	
MW-40D	I-40 Median	566.08	240 - 260	Alluvial	2 in PVC	266.0	Deep	LF, H	Semiannual	--	Semiannual	--	--	--	--	Sampling Method Trial
MW-40S	I-40 Median	566.04	115 - 135	Alluvial	2 in PVC	134.0	Shallow	LF, H	Semiannual	--	Semiannual	--	--	--	--	Sampling Method Trial

Table 1-2
GMP, RMP, and PMP Monitoring Summary
Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report
PG&E Topock Compressor Station, Needles, California

Location ID	Site Area	Monitoring Well Construction Details							Monitoring Programs & Frequency							Notes
											PMP Monitoring					
		Measuring Point Elevation (ft amsl)	Well Screen Interval (ft bgs)	Well Screen Lithology	Well Casing Diameter (inches)	Well Depth (ft bgs)	Aquifer Zone	Sampling Method	GMP Monitoring	RMP Monitoring	Chromium Monitoring	Monitoring for Conditional Shutdown of PE-01	IM Hydraulic Monitoring	IM Contingency Plan Monitoring	IM Chemical Performance Monitoring	
MW-41D	Bat Cave Wash	479.42	271 - 291	Alluvial	2 in PVC	311.5	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-41M	Bat Cave Wash	479.84	170 - 190	Alluvial	2 in PVC	190.0	Deep	LF	Annual	--	Annual	--	--	--	--	
MW-41S	Bat Cave Wash	480.07	40 - 60	Alluvial	2 in PVC	60.0	Shallow	LF	Annual	--	Annual	--	--	--	--	
MW-42-030	Floodplain	463.74	9.8 - 29.8	Fluvial	2 in Sch 40 PVC	30.1	Shallow	LF	Annual	--	Annual	Annual	Monthly	--	--	
MW-42-055	Floodplain	463.85	42.5 - 52.5	Fluvial	2 in PVC	52.8	Middle	LF	Semiannual	--	Semiannual	Semiannual	--	Semiannual	--	
MW-42-065	Floodplain	463.37	56.2 - 66.2	Fluvial	2 in PVC	80.0	Middle	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-43-025	Floodplain	462.54	15 - 25	Fluvial	2 in PVC	25.0	Shallow	LF	Annual	--	Annual	--	Monthly	--	--	
MW-43-075	Floodplain	462.71	65 - 75	Fluvial	2 in PVC	75.0	Deep	LF	Annual	--	Annual	--	--	Annual	--	
MW-43-090	Floodplain	462.76	80 - 90	Fluvial	2 in PVC	97.0	Deep	LF	Annual	--	Annual	--	Monthly	Annual	--	
MW-44-070	Floodplain	471.84	61 - 71	Fluvial	2 in PVC	70.0	Middle	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-44-115	Floodplain	471.94	105 - 115	Alluvial	2 in PVC	113.5	Deep	LF	Quarterly	--	Quarterly	Quarterly	Monthly	Quarterly	--	
MW-44-125	Floodplain	472.11	116 - 125	Alluvial	2 in PVC	128.8	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-45-095a	Floodplain	468.27	83 - 93	Fluvial	2 in PVC	97.0	Deep	--	--	--	--	X (see Note 1)	Monthly	--	--	Pressure transducer location; Hydraulic Gradient Well
MW-46-175	Floodplain	482.16	165 - 175	Alluvial	2 in PVC	175.5	Deep	LF	Quarterly	--	Quarterly	Quarterly	Monthly	Quarterly	--	
MW-46-205	Floodplain	482.23	196.5 - 206.5	Alluvial	2 in PVC	206.5	Deep	LF	Semiannual	--	Semiannual	Semiannual	--	Semiannual	--	
MW-47-055	Floodplain	484.04	45 - 55	Alluvial	2 in PVC	55.0	Shallow	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-47-115	Floodplain	484.17	105 - 115	Alluvial	2 in PVC	115.0	Deep	LF	Semiannual	--	Semiannual	Semiannual	Monthly	Semiannual	--	
MW-48	East of Station	486.22	124 - 134	Bedrock	2 in PVC	138.0	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	Low recharge well; typically purges dry at 1 casing volume
MW-49-135	Floodplain	483.97	125 - 135	Alluvial	1.5 in PVC	135.0	Deep	LF	Annual	--	Annual	--	Monthly	--	--	
MW-49-275	Floodplain	483.95	255 - 275	Alluvial	2 in PVC	274.7	Deep	LF	Annual	--	Annual	--	--	--	--	
MW-49-365	Floodplain	484.01	346 - 366	Alluvial	2 in PVC	367.4	Deep	LF	Annual	--	Annual	--	--	--	--	
MW-50-095	Route 66	496.49	85 - 95	Alluvial	2 in PVC	95.0	Middle	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-50-200	Route 66	496.35	190 - 200	Alluvial	2 in PVC	204.5	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-51	Route 66	501.56	97 - 112	Alluvial	4 in PVC	113.3	Middle	LF	Semiannual	--	Semiannual	Semiannual	Monthly	--	--	
MW-52D	Floodplain	462.16	85 - 87	Fluvial	0.75 in MLABS	89.5	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-52M	Floodplain	462.16	66 - 68	Fluvial	0.75 in MLABS	70.5	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-52S	Floodplain	462.16	47 - 49	Fluvial	0.75 in MLABS	51.5	Middle	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-53D	Floodplain	461.32	123.5 - 125	Fluvial	0.75 in MLABS	---	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-53M	Floodplain	461.32	98.5 - 100	Fluvial	0.75 in MLABS	---	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-54-085	Arizona	466.10	77 - 87	Fluvial	2 in PVC	93.2	Deep	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-54-140	Arizona	465.98	128 - 138	Fluvial	2 in PVC	138.0	Deep	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-54-195	Arizona	466.32	185 - 195	Fluvial	2 in PVC	195.0	Deep	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-55-045	Arizona	465.84	37 - 47	Fluvial	2 in PVC	54.0	Middle	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-55-120	Arizona	465.82	108 - 118	Fluvial	2 in PVC	120.3	Deep	LF	Semiannual	--	Semiannual	--	Monthly	--	--	
MW-56D	Arizona	461.36	103.5 - 105.5	Fluvial	0.75 in MLABS	---	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-56M	Arizona	461.36	73.5 - 75.5	Fluvial	0.75 in MLABS	---	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-56S	Arizona	461.36	33.5 - 35.5	Fluvial	0.75 in MLABS	---	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-57-050	East Ravine	508.76	40 - 50	Bedrock	2 in Sch 40 PVC	50.0	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-57-070	East Ravine	509.37	55 - 70	Bedrock	2 in Sch 40 PVC	70.0	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-57-185	East Ravine	508.97	70 - 184	Bedrock	4 in Sch 40 PVC	184.7	Bedrock	LF, 3V	Semiannual	--	Semiannual	--	--	--	--	Sampling Method Trial
MW-58-065	East Ravine	523.26	54 - 64	Bedrock	2 in Sch 40 PVC	66.0	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-58BR	East Ravine	---	--	Bedrock	---	---	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-59-100	East Ravine	541.61	86 - 101	Alluvial	2 in Sch 40 PVC	101.0	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-60-125	East Ravine	555.47	103 - 123	Bedrock	2 in Sch 40 PVC	122.5	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-60BR-245	East Ravine	554.95	136 - 245	Bedrock	5 in	244.1	Bedrock	LF, 3V	Quarterly	--	Quarterly	--	--	--	--	Sampling Method Trial
MW-61-110	East Ravine	544.03	92 - 112	Bedrock	2 in Sch 40 PVC	112.5	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-62-065	East Ravine	503.56	44.5 - 64.5	Bedrock	2 in Sch 40 PVC	67.4	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-62-110	East Ravine	504.05	85 - 110	Bedrock	---	110.0	Bedrock	G	Quarterly	--	Quarterly	--	--	--	--	
MW-62-190	East Ravine	504.05	155 - 192	Bedrock	---	190.0	Bedrock	3V	Semiannual	--	Semiannual	--	--	--	--	
MW-63-065	East Ravine	504.47	46 - 66	Bedrock	2 in Sch 40 PVC	65.6	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-64BR	East Ravine	575.60	2 - 258	Bedrock	3 in	260.0	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-65-160	Topock Compressor Station	596.59	150 - 160	Alluvial	2 in PVC	160.1	Shallow	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-65-225	Topock Compressor Station	596.58	215 - 225	Alluvial	2 in PVC	225.1	Deep	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-66-165	Topock Compressor Station	586.16	142 - 162	Alluvial	2 in PVC	162.1	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-66-230	Topock Compressor Station	586.22	218 - 228	Alluvial	2 in PVC	228.1	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-66BR-270	Topock Compressor Station	586.15	248 - 271	Bedrock	5 in	270.6	Bedrock	3V	Semiannual	--	Semiannual	--	--	--	--	
MW-67-185	Topock Compressor Station	625.91	177 - 187	Alluvial	2 in	186.7	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-67-225	Topock Compressor Station	625.83	210 - 225	Alluvial	2 in PVC	225.0	Middle	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-67-260	Topock Compressor Station	625.81	250 - 260	Alluvial	2 in PVC	260.0	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-68-180	Topock Compressor Station	621.17	165 - 180	Alluvial	2 in PVC	180.1	Shallow	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-68-240	Topock Compressor Station	621.17	220 - 240	Alluvial	2 in PVC	240.1	Deep	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-68BR-280	Topock Compressor Station	620.64	257 - 279	Bedrock	5 in	278.2	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-69-195	Topock Compressor Station	631.36	176 - 196	Bedrock	2 in	195.5	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	

Table 1-2
GMP, RMP, and PMP Monitoring Summary
Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report
PG&E Topock Compressor Station, Needles, California

Location ID	Site Area	Monitoring Well Construction Details							Monitoring Programs & Frequency							Notes
											PMP Monitoring					
		Measuring Point Elevation (ft amsl)	Well Screen Interval (ft bgs)	Well Screen Lithology	Well Casing Diameter (inches)	Well Depth (ft bgs)	Aquifer Zone	Sampling Method	GMP Monitoring	RMP Monitoring	Chromium Monitoring	Monitoring for Conditional Shutdown of PE-01	IM Hydraulic Monitoring	IM Contingency Plan Monitoring	IM Chemical Performance Monitoring	
MW-70-105	East Ravine	541.47	85 - 105	Bedrock	2 in PVC	107.8	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-70BR-225	East Ravine	539.84	120 - 227	Bedrock	5 in	229.3	Bedrock	LF, 3V	Semiannual	--	Semiannual	--	--	--	--	Sampling Method Trial
MW-71-035	East Ravine	483.69	26 - 36	Alluvial	2 in	36.2	Shallow	LF	Semiannual	--	Semiannual	--	--	--	--	
MW-72-080	East Ravine	513.32	60 - 80	Bedrock	2 in	80.1	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-72BR-200	East Ravine	513.79	107 - 200	Bedrock	---	200.0	Bedrock	LF, 3V	Quarterly	--	Quarterly	--	--	--	--	Sampling Method Trial
MW-73-080	East Ravine	505.84	60.2 - 80.2	Bedrock	2 in	79.9	Bedrock	LF	Quarterly	--	Quarterly	--	--	--	--	
MW-74-240	East Ravine	672.34	220 - 240	Bedrock	2 in	239.7	Bedrock	LF	Semiannual	--	Semiannual	--	--	--	--	
OW-03D	West Mesa	558.63	242 - 262	Alluvial	2 in Sch 40 PVC	272.5	Deep	LF	Annual	--	Annual	--	--	--	--	
OW-03M	West Mesa	558.9	180 - 200	Alluvial	2 in Sch 40 PVC	200.3	Middle	LF	Annual	--	Annual	--	--	--	--	
OW-03S	West Mesa	558.58	86 - 116	Alluvial	2 in Sch 40 PVC	116.3	Shallow	LF	Annual	--	Annual	--	--	--	--	
PGE-07BR	MW-24 Bench	--	249 - 300	Bedrock	7 in	300.0	Bedrock	3V	Annual	--	Annual	--	--	--	--	Inactive supply well
PGE-8	Station	596.01	405-554	Bedrock	6.75 in Steel	564.0	Bedrock	3V	Annual	--	Annual	--	--	--	--	Inactive injection well
PT-2D	Floodplain	--	95 - 105	Alluvial	2 in in PVC	105	Deep	--	--	--	--	--	Monthly	--	--	
PT-5D	Floodplain	--	95 - 105	Alluvial	2 in in PVC	105	Deep	--	--	--	--	--	Monthly	--	--	
PT-6D	Floodplain	--	95 - 105	Alluvial	2 in in PVC	105	Deep	--	--	--	--	--	Monthly	--	--	
TEST AND EXTRACTON WELLS																
PE-01	Floodplain	457.52	79 - 89	Fluvial	6 in Sch 40	99.0	Deep	tap	Monthly	--	Monthly	Monthly	--	--	--	IM extraction well
TW-01	Plan B Test	620.55	169 - 269	Alluvial	5 in PVC	271.0	Shallow	3V	Semiannual	--	Semiannual	--	--	--	--	Inactive pilot test well
TW-02D	MW-20 bench	493.29	113 - 148	Alluvial	6 in Sch 80 PVC	150.0	Deep	tap	Quarterly	--	Quarterly	--	--	--	--	IM extraction well
TW-02S	MW-20 bench	499.05	42.5 - 92.5	Alluvial	6 in Sch 80 PVC	97.5	Shallow	tap	Annual	--	Annual	--	--	--	--	IM extraction well
TW-03D	MW-20 bench	498.09	111 - 156	Alluvial	8 in PVC	156.0	Deep	tap	Monthly	--	Monthly	--	--	--	--	IM extraction well
TW-04	Floodplain	484.11	210 - 250	Alluvial	4 in PVC	255.0	Deep	LF, 3V	Semiannual	--	Semiannual	Semiannual	--	--	--	Sampling Method Trial
TW-05	Route 66	496.30	110 - 150	Alluvial	4 in PVC	155.0	Deep	LF, 3V	Semiannual	--	Semiannual	--	--	--	--	Sampling Method Trial
WATER SUPPLY WELLS																
Park Moabi-3	Park Moabi	518.55	80 - 200	Alluvial	8 in Steel	252.0	Middle	tap	Annual	--	Annual	--	--	--	--	Active supply well
Park Moabi-4	Park Moabi	---	93 - 140	Alluvial	Steel	---	Middle	tap	Annual	--	Annual	--	--	--	--	Active supply well
SURFACE WATER MONITORING LOCATIONS																
C-BNS	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	
C-CON	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
C-I-3 (I-3)	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	Monthly	--	--	Deep and shallow depth intervals
C-MAR	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
C-NR1	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
C-NR3	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
C-NR4	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
C-R22A	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
C-R27	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
C-TAZ	In-Channel	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	Deep and shallow depth intervals
R-28	Shoreline	--	--	--	--	--	--		--	Quarterly	--	--	--	--	Annual	
R-19	Shoreline	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	
R-63	Shoreline	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	
RRB	Shoreline	--	--	--	--	--	--		--	Quarterly	--	--	Monthly	--	--	
SW-1	Other Surface Water Monitoring Location	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	
SW-2	Other Surface Water Monitoring Location	--	--	--	--	--	--		--	Quarterly	--	--	--	--	--	

Notes:
1. On June 27, 2014, DTSC approved discontinuation of groundwater sampling at monitoring well MW-45-095a. This location was originally included in the list of wells monitored for conditional shutdown of PE-01.

-- = not applicable.
3V = three volume.
amsl = above mean sea level.
bgs = below ground surface.
Deep = deep interval of Alluvial Aquifer.
DTSC = Department of Toxic Substance Control.
ft = feet.
G = grab sample.
GMP = Groundwater Monitoring Program.
H = HydraSleeve
ID = identification.
IM = interim measure.
LF = low flow (minimal drawdown).
Middle = mid-depth interval of Alluvial Aquifer.
PMP = Performance Monitoring Program.
PVC = polyvinyl chloride (pipe)
RMP = Surface Water Monitoring Program.
Shallow = shallow interval of Alluvial Aquifer.
Tap = sampled from tap of extraction well.

Table 3-1

Groundwater Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products			Selected Field Parameters		
Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-09	SA	02/23/2018		LF	150	150	3,240	4.2	5.1	12	1.6	ND (0.5)	31	-140	7.5	5.0
MW-09	SA	05/02/2018		LF	150	140	4,150	4.3	5.0	11	1.7	ND (0.5)	---	95	7.1	5.0
MW-09	SA	12/12/2018		LF	140	150	3,440	5.8	5.2	1.8	1.7	2.1	69	-45	7.4	0.0
MW-10	SA	02/23/2018		LF	160	160	2,930	22	6.3	11	---	---	250	-130	7.5	10
MW-10	SA	05/02/2018		LF	170	160	3,820	21	6.1	10	---	---	---	95	6.9	20
MW-10	SA	12/12/2018		LF	110	120	2,900	18	6.3	18	2.2	1.3	29	-79	7.5	5.0
MW-11	SA	02/23/2018		LF	57	56	2,530	4.7	5.2	5.3	1.4	ND (0.5)	ND (20)	28	7.5	5.0
MW-11	SA	05/02/2018		LF	57	53	2,980	5.2	4.6	5.0	1.3	ND (0.5)	---	100	6.4	11
MW-11	SA	05/02/2018	FD	LF	58	55	---	5.3	4.7	5.5	1.3	ND (0.5)	---	---	---	---
MW-11	SA	12/12/2018		LF	47	48	2,530	5.7	5.3	5.6	1.4	3.9 J	ND (20)	34	7.4	2.0
MW-11	SA	12/12/2018	FD	LF	47	50	---	5.6	4.7	5.4	1.3	5.0 J	ND (20)	---	---	---
MW-12	SA	05/01/2018		LF	1,500	1,600	8,440	8.0	29	16	---	---	---	93	7.7	15
MW-12	SA	12/11/2018		LF	1,500	1,500	6,930	12	36	5.0	40	2.1	180	180	8.1	11
MW-13	SA	12/04/2018		LF	22	22	2,490	11	3.1	---	2.0	32	ND (20)	42	7.6	6.0
MW-14	SA	05/01/2018		LF	13	14	3,200	12	2.1	3.8	0.73	ND (0.5)	---	140	7.2	38
MW-14	SA	12/11/2018		LF	13	15	2,910	13	2.2	3.5	0.7	ND (0.5)	ND (20)	73	7.4	5.0
MW-15	SA	12/11/2018		LF	16	17	2,390	4.0	4.1	---	---	ND (0.5)	ND (20)	45	7.4	2.0
MW-18	SA	12/06/2018		LF	19	18	1,580	6.6	3.5	---	---	ND (0.5)	ND (20)	110	7.9	3.0
MW-19	SA	04/27/2018		LF	370	380	2,800	---	---	---	---	---	---	91	7.6	6.0
MW-19	SA	12/10/2018		LF	670	780	2,280	24	5.6	---	---	1.1	120	160	7.8	18
MW-20-070	SA	04/27/2018		LF	1,700	1,700	1,930	31	5.6	9.4	---	---	---	-63	7.9	3.0
MW-20-070	SA	12/11/2018		LF	1,600	1,700	1,940	37	7.0	2.8	---	ND (0.5)	ND (20)	160	8.0	4.0
MW-20-070	SA	12/11/2018	FD	LF	1,600	1,800	---	36	7.2	4.7	---	ND (0.5)	ND (20)	---	---	---
MW-20-100	MA	04/27/2018		LF	1,800	1,800	2,340	3.6	6.3	8.7	---	---	---	-72	7.6	3.0
MW-20-100	MA	12/04/2018		LF	1,400	1,500	2,430	4.9	6.3	6.4	---	ND (0.5)	ND (20)	89	7.5	5.0
MW-20-130	DA	04/27/2018		LF	6,900	7,000	12,300	45	28	11	4.5	3.6	---	-81	7.7	7.0
MW-20-130	DA	12/04/2018		LF	5,800	6,100	11,800	39	33	8.8	4.6	3.0	21	77	7.2	1.0
MW-21	SA	05/02/2018		LF	ND (1.0)	1.0	15,500	59	25	1.5	---	---	---	51	6.9	71
MW-21	SA	05/02/2018	FD	LF	ND (1.0)	ND (1.0)	---	59	22	1.6	---	---	---	---	---	---
MW-21	SA	12/12/2018		LF	1.1	1.2	12,900	81	17	0.22	---	17	ND (20)	150	7.3	6.0
MW-22	SA	04/23/2018		LF	ND (1.0)	ND (5.0)	13,900	---	---	---	14	1,700	---	-98	7.1	22
MW-22	SA	12/04/2018		LF	ND (1.0)	ND (1.0)	28,700	31	ND (2.5)	---	13	5,700	10,000	-84	6.7	9.0
MW-22	SA	12/04/2018	FD	LF	ND (1.0)	ND (1.0)	---	31	ND (2.5)	---	15	6,100	11,000	---	---	---
MW-23-060	BR	04/26/2018		LF	39	37 J	17,800	---	---	---	3.9	4.2	---	-90	9.3	5.0
MW-23-060	BR	12/11/2018		LF	39	40	18,300	25	5.9	---	4.6	5.8	ND (100)	-4.4	9.2	5.0
MW-23-080	BR	04/26/2018		LF	ND (1.0)	1.5	18,000	---	---	---	5.5	5.2	---	-84	11	7.0
MW-23-080	BR	12/11/2018		LF	ND (1.0)	3.2	18,900	46	5.3	---	5.5	6.4	ND (100)	-30	10	8.0
MW-24A	SA	05/02/2018		LF	ND (0.2)	ND (1.0)	2,010	140	ND (0.5)	0.051	ND (0.1)	16	---	-110	8.0	5.0
MW-24A	SA	12/12/2018		LF	ND (0.2)	ND (1.0)	1,540	150	ND (0.5)	ND (0.1)	0.28	31	---	160	8.6	3.0
MW-24B	DA	05/02/2018		LF	200	200	22,900	62	2.0	1.4	3.1	100	---	-52	7.5	4.0
MW-24B	DA	12/12/2018		LF	160	150	20,100	62	ND (2.5)	0.96	3.3	120	---	150	8.0	4.0
MW-24BR	BR	12/13/2018		3V	ND (1.0)	ND (1.0)	14,800	57	ND (2.5)	ND (0.1)	0.41	170	180	64	8.6	4.0
MW-25	SA	05/01/2018		LF	68	65	2,690	3.3	8.5	12	1.3	ND (0.5)	---	85	7.3	11
MW-25	SA	12/10/2018		LF	100	100	2,000	8.0	9.0	11	1.2	ND (0.5)	ND (20)	-39	7.3	3.0
MW-25	SA	12/10/2018	FD	LF	100	100	---	7.9	8.2	10	1.2	ND (0.5)	22	---	---	---
MW-26	SA	05/01/2018		LF	2,300	2,400	4,760	31	41	20	1.9	ND (0.5)	---	180	7.0	7.0

Table 3-1

Groundwater Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	COPCs						In-Situ By-Products			Selected Field Parameters		
					Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-26	SA	12/07/2018		LF	2,200	2,300	3,850	32	39	16	1.8	ND (0.5)	70 J	170	7.5	5.0
MW-27-020	SA	12/05/2018		LF	ND (0.2)	ND (1.0)	1,080	6.2	ND (0.5)	ND (0.1)	0.95	18	23	34	8.0	4.0
MW-27-060	MA	12/05/2018		LF	ND (0.2)	ND (1.0)	1,110	4.3	ND (0.5)	ND (0.1)	11	310	590	-96	7.7	9.0
MW-27-085	DA	04/24/2018		LF	ND (1.0)	ND (1.0)	13,600	18	ND (0.5)	ND (0.05)	1.5	83	---	-25	7.3	6.0
MW-27-085	DA	12/05/2018		LF	ND (1.0)	ND (1.0)	9,500	19	ND (0.5)	ND (0.1)	1.5	63	55	-32	7.5	7.0
MW-28-025	SA	04/25/2018		LF	ND (0.2)	ND (1.0)	1,070	4.2	ND (0.5)	0.05	0.88	28	---	-74	7.6	1.0
MW-28-025	SA	04/25/2018	FD	LF	ND (0.2)	ND (1.0)	---	4.2	ND (0.5)	ND (0.05)	0.86	28	---	---	---	---
MW-28-025	SA	12/14/2018		LF	ND (0.2)	ND (1.0)	1,320	4.5	1.1	ND (0.1)	0.66	2.4	ND (20)	110	7.1	2.0
MW-28-090	DA	04/25/2018		LF	ND (0.2)	ND (1.0)	6,250	23	ND (0.5)	ND (0.05)	1.8	190	---	-95	7.3	7.0
MW-28-090	DA	12/14/2018		LF	ND (0.2)	ND (1.0)	4,690	23	ND (0.5)	ND (0.1)	3.0	400	1,000	-64	7.2	2.0
MW-29	SA	04/25/2018		LF	ND (0.2)	ND (1.0)	3,500	19	ND (0.5)	ND (0.05)	9.8	360	---	-180	7.2	4.0
MW-29	SA	12/10/2018		LF	ND (0.2)	ND (1.0)	1,760	13	ND (0.5)	ND (0.1)	7.8	230	1,100	-140	7.1	5.0
MW-30-030	SA	12/06/2018		LF	ND (0.2)	ND (1.0)	9,970	82	1.7	ND (0.1)	1.6	330	820 J	-130	7.8	15
MW-30-050	MA	12/06/2018		LF	ND (0.2)	2.8	1,100	4.4	ND (0.5)	ND (0.1)	2.8	220	68 J	-77	7.4	2.0
MW-30-050	MA	12/06/2018	FD	LF	ND (0.2)	2.9	---	4.3	ND (0.5)	ND (0.1)	2.8	220	64 J	---	---	---
MW-31-060	SA	04/27/2018		LF	380	390	3,580	---	---	---	1.1	ND (0.5)	---	-76	7.7	5.0
MW-31-060	SA	12/10/2018		LF	390	400	3,530	18	2.6	3.3	1.1	0.95	61	160	7.5	12
MW-31-135	DA	12/10/2018		LF	14	13	12,700	29	1.1	---	3.6	1.5	61	-96	7.6	5.0
MW-32-020	SA	12/04/2018		LF	ND (1.0)	ND (1.0)	24,100	200	2.9	---	2.5	180	5,200	-130	7.2	4.0
MW-32-035	SA	04/23/2018		LF	ND (1.0)	ND (1.0)	11,400	---	---	---	5.9	1,200	---	-92	7.5	24
MW-32-035	SA	12/04/2018		LF	ND (1.0)	ND (1.0)	9,510	14	ND (0.5)	ND (0.1)	19	880	7,200	-150	7.1	4.0
MW-33-040	SA	04/25/2018		LF	ND (1.0)	1.2	10,100	130	ND (0.5)	ND (0.05)	11	18	---	52	7.6	6.0
MW-33-040	SA	12/07/2018		LF	ND (1.0)	ND (1.0)	21,400	530	1.5	0.24	11	ND (0.5)	ND (100 J)	28	7.7	8.0
MW-33-090	MA	04/24/2018		LF	3.3	3.8	12,300	9.8	ND (0.5)	0.99 J	1.1	3.0	---	58	7.2	15
MW-33-090	MA	12/07/2018		LF	1.2	1.7	10,300	11	ND (0.5)	0.71	0.98	12	110 J	18	7.3	7.0
MW-33-090	MA	12/07/2018	FD	LF	9.3	10	---	13	1.7	2.0	1.6	ND (0.5)	22 J	---	---	---
MW-33-150	DA	04/25/2018		LF	5.2	5.0	15,200	47	0.79	1.3	1.4	23	---	-96	7.5	2.0
MW-33-150	DA	12/07/2018		LF	3.9	6.2	15,600	50	0.9	0.91	1.4	3.6	58 J	84	7.5	9.0
MW-33-210	DA	04/25/2018		LF	6.0	5.9	19,700	20	ND (2.5)	1.4	1.2	7.2	---	-94	7.5	3.0
MW-33-210	DA	12/07/2018		LF	6.7	10	20,400	20	ND (2.5)	1.6	1.1	10	ND (100 J)	90	7.4	21
MW-34-055	MA	12/05/2018		LF	ND (0.2)	ND (1.0)	1,060	5.4	ND (0.5)	ND (0.1)	2.2	79	54	-100	7.6	3.0
MW-34-055	MA	12/05/2018	FD	LF	ND (0.2)	ND (1.0)	---	5.1	ND (0.5)	ND (0.1)	2.2	76	57	---	---	---
MW-34-080	DA	04/24/2018		LF	ND (1.0)	ND (1.0)	8,550	---	---	ND (0.05)	1.5	48	---	-84	7.3	---
MW-34-080	DA	12/05/2018		LF	ND (1.0)	ND (1.0)	9,000	14	ND (0.5)	ND (0.1)	1.5	62	140	-40	7.2	4.0
MW-34-100	DA	02/20/2018		LF	ND (1.0)	1.5	12,200	49	ND (0.5)	ND (0.05)	1.2	120	---	29	7.7	1.0
MW-34-100	DA	04/24/2018		LF	ND (1.0)	1.1	11,800	47	ND (0.5)	ND (0.05)	1.5	150	---	7.5	7.5	5.0
MW-34-100	DA	04/24/2018	FD	LF	ND (1.0)	1.3	---	44	ND (0.5)	ND (0.05)	1.4	150	---	---	---	---
MW-34-100	DA	10/01/2018		LF	ND (1.0)	ND (1.0)	7,810	49	ND (0.5)	3.6	1.6	200	---	-91	7.8	2.0
MW-34-100	DA	12/05/2018		LF	ND (1.0)	ND (1.0)	11,800	61	ND (0.5)	ND (0.1)	1.6	160	83	-68	7.3	4.0
MW-35-060	SA	04/27/2018		LF	22	24	7,780	10	ND (2.5)	2.2	1.1	ND (0.5)	---	56	7.3	27
MW-35-060	SA	12/10/2018		LF	20	20	7,870	9.8 J	1.4	2.3	1.1	ND (0.5)	71	-41	7.5	7.0
MW-35-135	DA	04/27/2018		LF	26	25	14,300	19	ND (2.5)	2.7	0.83	1.5	---	47	7.5	10
MW-35-135	DA	12/10/2018		LF	25	25	10,800	24	1.4	2.3	0.93	7.1	200	-110	7.6	5.0
MW-36-020	SA	12/06/2018		LF	ND (0.2)	ND (1.0)	9,190	29	ND (0.5)	---	2.2	140	630 J	-62	7.3	3.0
MW-36-040	SA	12/06/2018		LF	ND (0.2)	ND (1.0)	1,140	3.5	ND (0.5)	ND (0.1)	4.7	110	400 J	-140	7.9	8.0
MW-36-050	MA	12/06/2018		LF	ND (0.2)	ND (1.0)	1,080	3.6	ND (0.5)	---	5.2	240	130 J	-110	7.5	2.0

Table 3-1

Groundwater Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	COPCs						In-Situ By-Products			Selected Field Parameters		
					Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-36-070	MA	12/06/2018		LF	ND (0.2)	ND (1.0)	1,130	5.2	ND (0.5)	---	4.8	1,600	570 J	9.1	7.8	2.0
MW-36-090	DA	04/24/2018		LF	ND (0.2)	ND (1.0)	4,880	---	---	---	3.9	83	---	-78	7.4	1.0
MW-36-090	DA	12/06/2018		LF	ND (0.2)	ND (1.0)	5,230	12	ND (0.5)	---	3.7	93	ND (20 J)	-140	7.4	2.0
MW-36-090	DA	12/06/2018	FD	LF	ND (0.2)	ND (1.0)	---	11	ND (0.5)	---	3.8	89	24 J	---	---	---
MW-36-100	DA	04/24/2018		LF	6.6	11	8,070	22	ND (0.5)	ND (0.05)	4.3	330	---	-42	7.4	12
MW-36-100	DA	12/06/2018		LF	3.3	6.8	7,460	19	ND (0.5)	ND (0.1)	3.4	390	200 J	-85	7.3	2.0
MW-37D	DA	05/03/2018		LF	7.4	7.1	11,600	53	ND (0.5)	0.44	---	---	---	48	7.6	4.0
MW-37D	DA	12/06/2018		LF	5.1	5.0	1,400	62	ND (0.5)	0.48	---	3.8	ND (20)	19	7.6	4.0
MW-37S	MA	12/06/2018		LF	12	11	7,160	15	0.76	---	1.7	ND (0.5)	ND (20)	21	7.7	26
MW-38D	DA	05/02/2018		3V	15	14	26,200	88	ND (0.5)	ND (0.05)	7.4	38	---	-62	7.5	14
MW-38D	DA	05/02/2018		LF	15	14	25,900	85	ND (0.5)	ND (0.05)	7.2	29	---	-58	7.5	24
MW-38D	DA	12/12/2018		3V	20	20	23,800	91	ND (0.5)	ND (0.1)	7.9	34	ND (100)	-68	8.4	5.0
MW-38D	DA	12/12/2018		LF	21	21	23,900	92	ND (0.5)	ND (0.1)	7.9	43	ND (100)	-89	8.1	2.0
MW-38S	SA	02/23/2018		3V	2.8	2.4	1,760	32	2.3	3.7 J	6.8	37	---	-51	8.0	5.0
MW-38S	SA	02/23/2018		LF	2.8	2.5	1,810	34	2.5	3.3	6.9	36	---	-31	8.0	6.0
MW-38S	SA	05/02/2018		3V	1.1	1.3	1,980	32	3.2	4.7	6.4	46	---	23	7.7	2.0
MW-38S	SA	05/02/2018		LF	1.8	2.0	2,290	31	3.7	4.5	6.3	37	---	22	7.3	5.0
MW-38S	SA	09/27/2018		3V	2.7	2.8	1,850	30	3.2	5.0	6.2	50	---	57	7.9	2.0
MW-38S	SA	12/12/2018		3V	3.9	4.3	1,810	31	3.4	3.5	6.4	44	ND (20)	-84	8.0	1.0
MW-38S	SA	12/12/2018		LF	4.2	4.7	1,880	30	3.3	0.18	6.0	40	22	-84	8.0	7.0
MW-38S-SMT	SA	09/27/2018		LF	3.0	3.3	1,890	29	3.4	4.8	5.8	47	---	67	7.9	3.0
MW-39-040	SA	12/06/2018		LF	ND (0.2)	ND (1.0)	1,230	---	---	---	17	90	---	-130	8.1	7.0
MW-39-050	MA	12/06/2018		LF	ND (0.2)	ND (1.0)	1,130	4.2	ND (0.5)	---	1.9	190	ND (20 J)	-90	7.6	1.0
MW-39-060	MA	12/06/2018		LF	ND (0.2)	ND (1.0)	1,150	5.1	ND (0.5)	ND (0.1)	3.0	110	ND (20 J)	-60	7.6	45
MW-39-070	MA	12/06/2018		LF	ND (0.2)	ND (1.0)	2,050	20	ND (0.5)	---	---	3.0	ND (20 J)	-33	7.7	4.0
MW-39-070	MA	12/06/2018	FD	LF	ND (0.2)	ND (1.0)	---	22	ND (0.5)	---	---	3.3	ND (20 J)	---	---	---
MW-39-080	DA	12/06/2018		LF	1.2	1.2	5,530	31	ND (0.5)	---	---	2.5	ND (20 J)	-95	7.4	2.0
MW-39-100	DA	04/24/2018		LF	57	54	12,900	7.1	ND (0.5)	ND (0.05)	2.3	5.1	---	-87	7.1	9.0
MW-39-100	DA	12/06/2018		LF	63	70	13,500	8.0	ND (0.5)	ND (0.1)	2.4	9.5	ND (20 J)	41	7.1	2.0
MW-40D	DA	04/25/2018		H	25	31	20,100	45	ND (2.5)	0.55	4.3	33	---	-91	6.8	12
MW-40D	DA	04/25/2018		LF	120	120	20,400	50	1.8	2.7	4.4	5.1	---	-6.2	7.2	4.0
MW-40D	DA	12/12/2018		H	ND (1.0)	ND (1.0)	---	42	ND (0.5)	ND (0.1)	4.0	31	69	---	---	---
MW-40D	DA	12/12/2018		LF	140	140	16,500	54	2.5	10	4.8	ND (0.5)	ND (20)	44	7.4	1.0
MW-40S	SA	04/25/2018		H	18	17	2,220	26	5.7	14	4.0	ND (0.5)	---	100	7.0	11
MW-40S	SA	04/25/2018		LF	20	20	2,260	27	6.1	9.5	3.9	0.5	---	86	7.5	7.0
MW-40S	SA	12/12/2018		H	17	29	---	30	6.6	8.1	3.4	5.0	---	---	---	---
MW-40S	SA	12/12/2018		LF	11	11	2,720	13	3.4	3.5	1.9	ND (0.5)	---	50	7.5	8.0
MW-41D	DA	05/04/2018		LF	ND (1.0)	ND (1.0)	24,000	93	ND (0.5)	0.44	2.2	73	---	-26	7.3	5.0
MW-41D	DA	12/13/2018		LF	ND (1.0)	ND (5.0)	19,700	84	ND (2.5)	0.54	2.3	86	ND (100)	130	8.0	3.0
MW-41M	DA	12/11/2018		LF	8.4	14	15,600	27	0.72	0.52	2.2	3.0	38	-40	7.1	3.0
MW-41S	SA	12/07/2018		LF	9.4	9.8	6,760	13	1.7	2.1	1.6	ND (0.5)	22 J	29	7.6	19
MW-42-030	SA	12/05/2018		LF	ND (1.0)	ND (1.0)	3,910	29	ND (0.5)	ND (0.1)	2.6	65	---	-160	7.8	3.0
MW-42-030	SA	12/05/2018	FD	LF	ND (1.0)	ND (1.0)	---	29	ND (0.5)	ND (0.1)	2.4	65	---	---	---	---
MW-42-055	MA	04/24/2018		LF	ND (0.2)	ND (1.0)	1,310	---	---	---	25	17	---	-28	8.7	6.0
MW-42-055	MA	12/05/2018		LF	ND (0.2)	ND (1.0)	1,130	3.9	ND (0.5)	---	25	21	43	7.9	8.2	7.0
MW-42-065	MA	04/24/2018		LF	ND (0.2)	ND (1.0)	2,100	---	---	---	12	170	---	-61	7.7	6.0

Table 3-1

Groundwater Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	COPCs						In-Situ By-Products			Selected Field Parameters		
					Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-42-065	MA	12/05/2018		LF	ND (0.2)	ND (1.0)	1,610	9.4	ND (0.5)	---	8.4	550	30	10	7.7	9.0
MW-43-025	SA	12/05/2018		LF	ND (0.2)	ND (1.0)	1,570	6.8	ND (0.5)	---	25	340	3,500 J	-170	7.4	9.0
MW-43-075	DA	12/05/2018		LF	ND (1.0)	ND (1.0)	12,200	17	ND (0.5)	---	12	730	5,500	-130	7.3	4.0
MW-43-090	DA	12/05/2018		LF	ND (1.0)	ND (1.0)	18,800	29	ND (0.5)	---	3.2	670	1,800	-86	7.3	5.0
MW-44-070	MA	04/24/2018		LF	ND (0.2)	ND (1.0)	2,480	---	---	---	3.1	150	---	-84	8.0	13
MW-44-070	MA	12/05/2018		LF	ND (0.2)	ND (1.0)	1,610	8.7	ND (0.5)	---	3.3	170	420	2.8	7.5	9.0
MW-44-115	DA	02/20/2018		LF	13	12	11,900	84	ND (0.5)	0.084	5.7	5.7	---	42	8.0	3.0
MW-44-115	DA	02/20/2018	FD	LF	13	12	---	83	ND (0.5)	0.061	5.6	6.0	---	---	---	---
MW-44-115	DA	04/24/2018		LF	8.9	9.5	11,300	74	ND (0.5)	0.13	5.3	9.7	---	68	7.2	9.0
MW-44-115	DA	10/01/2018		LF	6.4	7.0	9,180	75	ND (0.5)	ND (0.05)	5.4	17	---	-10	8.2	10
MW-44-115	DA	12/05/2018		LF	6.4	5.8	11,200	68	ND (0.5)	ND (0.1)	5.2	14	ND (20)	-6.1	7.6	9.0
MW-44-125	DA	04/24/2018		LF	ND (0.2)	3.1	2,730	12	ND (0.5)	ND (0.05)	2.8	170	---	-91	7.9	5.0
MW-44-125	DA	12/05/2018		LF	ND (1.0)	ND (1.0)	1,790	170	ND (0.5)	ND (0.1)	4.5	280	170	-87	7.6	7.0
MW-44-125	DA	12/05/2018	FD	LF	ND (1.0)	ND (1.0)	---	170	ND (0.5)	ND (0.1)	4.4	260	180	---	---	---
MW-46-175	DA	02/20/2018		LF	13	12	19,700	190	0.85	1.2	---	---	---	51	8.4	2.0
MW-46-175	DA	04/25/2018		LF	7.4	8.3	23,400	170	ND (2.5)	1.1	---	---	---	36	8.5	10
MW-46-175	DA	10/02/2018		LF	6.5	7.0	15,500	190	ND (2.5)	1.0	---	---	---	-53	8.7	4.0
MW-46-175	DA	10/02/2018	FD	LF	6.5	7.0	---	180	ND (2.5)	1.0	---	---	---	---	---	---
MW-46-175	DA	12/13/2018		LF	8.2	12	19,300	190	ND (2.5)	0.91	---	25	ND (100)	3.4	8.4	2.0
MW-46-205	DA	04/25/2018		LF	ND (1.0)	ND (1.0)	26,600	---	---	---	---	---	---	89	8.4	3.0
MW-46-205	DA	12/13/2018		LF	ND (1.0)	ND (1.0)	22,500	370	ND (2.5)	---	---	9.8	ND (100)	-12	7.9	2.0
MW-47-055	SA	04/26/2018		LF	15	15	5,850	---	---	---	1.0	ND (0.5)	---	45	7.3	9.0
MW-47-055	SA	04/26/2018	FD	LF	14	14	---	---	---	---	0.98	ND (0.5)	---	---	---	---
MW-47-055	SA	12/10/2018		LF	21	21	5,030	7.4	1.6	---	1.3	ND (0.5)	21	-59	7.5	10
MW-47-115	DA	04/25/2018		LF	23	23	13,400	---	---	---	---	---	---	-89	7.7	10
MW-47-115	DA	12/10/2018		LF	15	15	14,100	26	1.3	---	---	12	36 J	-160	7.3	4.0
MW-47-115	DA	12/10/2018	FD	LF	15	15	---	25	1.2	---	---	12	88 J	---	---	---
MW-48	BR	05/03/2018		LF	ND (1.0)	ND (1.0)	21,100	---	---	---	---	---	---	200	7.6	9.0
MW-48	BR	12/13/2018		LF	ND (1.0)	ND (5.0)	18,200	10	ND (2.5)	---	---	19	ND (100)	180	7.6	10
MW-49-135	DA	12/10/2018		LF	2.2	2.1	14,600	42	1.3	---	2.1	280 J	28	8.9	7.4	7.0
MW-49-275	DA	12/10/2018		LF	ND (1.0)	8.7	27,000	300	ND (0.5)	---	---	430	150	-36	7.6	2.0
MW-49-365	DA	12/10/2018		LF	ND (5.0)	27	39,400	220	ND (2.5)	---	---	310	410	-160	7.4	1.0
MW-50-095	MA	04/27/2018		LF	11	10	6,980	---	---	---	---	---	---	79	7.7	46
MW-50-095	MA	12/10/2018		LF	13	14	5,800	17	0.91	---	---	1.0	77	-140	7.6	6.0
MW-50-200	DA	04/27/2018		LF	6,500	6,800	28,700	---	---	---	---	---	---	85	7.6	10
MW-50-200	DA	12/10/2018		LF	3,100	3,700	21,100	48	2.5	---	---	3.7	ND (100)	-120	7.6	8.0
MW-51	MA	05/01/2018		LF	3,500	3,700	15,300	47	15	8.9	4.0	4.5	---	120	7.1	2.0
MW-51	MA	12/10/2018		LF	3,300	3,800	13,300	54	15	6.9	4.0	2.4	62	180	7.4	7.0
MW-52D	DA	04/23/2018		LF	ND (1.0)	ND (5.0)	4,220	---	---	---	4.1	260	---	120	1.0	1.0
MW-52D	DA	12/04/2018		LF	ND (1.0)	ND (1.0)	22,700	69	ND (0.5)	---	2.0	310	930	-50	7.7	2.0
MW-52M	DA	04/23/2018		LF	ND (1.0)	ND (5.0)	1,600	---	---	---	0.98	160	---	51	5.0	1.0
MW-52M	DA	12/04/2018		LF	ND (1.0)	ND (1.0)	17,200	27	ND (0.5)	---	0.41	250	1,300	-51	7.1	4.0
MW-52S	MA	04/24/2018		LF	ND (1.0)	ND (1.0)	21,700	---	---	---	3.0	230	---	-91	8.0	1.0
MW-52S	MA	12/04/2018		LF	ND (1.0)	ND (1.0)	14,300	8.7	0.86 J	---	0.67	820	12,000	-100	7.0	5.0
MW-53D	DA	04/23/2018		LF	ND (1.0)	ND (1.0)	2,810	---	---	---	2.9	1,400	---	110	2.9	1.0
MW-53D	DA	12/04/2018		LF	ND (1.0)	ND (1.0)	27,700	190	ND (2.5)	---	3.3	1,400	330	-180	7.5	1.0

Table 3-1

Groundwater Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	COPCs						In-Situ By-Products			Selected Field Parameters		
					Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-53M	DA	04/23/2018		LF	ND (1.0)	ND (1.0)	3,150	---	---	---	4.8	400	---	140	3.1	2.0
MW-53M	DA	12/04/2018		LF	ND (1.0)	ND (1.0)	20,000	67	ND (0.5)	---	0.57	470	510	-180	7.5	1.0
MW-54-085	DA	05/04/2018	(a)	LF	ND (0.1)	ND (0.2)	8,970	---	---	---	4.34	556	---	-89	7.7	8.0
MW-54-085	DA	12/13/2018	(a)	LF	ND (0.1 J)	ND (2.0)	10,400	ND (5.0)	ND (3.0)	---	ND (2.0)	804	---	-140	7.4	7.0
MW-54-140	DA	05/04/2018	(a)	LF	ND (0.5)	ND (0.2)	16,000	---	---	---	3.14	103	---	44	7.4	8.0
MW-54-140	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)	13,400	ND (5.0)	ND (3.0)	---	ND (2.0)	ND (2.0)	---	-160	7.8	5.0
MW-54-195	DA	05/04/2018	(a)	LF	ND (0.5)	ND (0.2)	19,300	---	---	---	1.01	232	---	-260	8.1	9.0
MW-54-195	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)	20,300	116	ND (3.0)	---	ND (2.0)	266	---	-190	7.3	7.0
MW-55-045	MA	05/03/2018	(a)	LF	ND (0.1)	ND (0.2)	1,750	---	---	---	---	---	---	-100	7.6	18
MW-55-045	MA	12/13/2018	(a)	LF	ND (0.1 J)	ND (0.2)	1,520	42.1	ND (0.3)	---	---	802	---	-110	7.3	9.0
MW-55-120	DA	05/03/2018	(a)	LF	8.0	8.35	9,790	---	---	---	---	---	---	54	7.9	5.0
MW-55-120	DA	12/13/2018	(a)	LF	8.29 J	ND (2.0)	8,270	ND (5.0)	ND (3.0)	---	---	ND (2.0)	---	20	7.5	3.0
MW-56D	DA	05/02/2018	(a)	LF	ND (0.5)	ND (0.2)	24,700	---	---	---	---	---	---	-49	6.8	2.0
MW-56D	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)	22,100	ND (5.0)	ND (3.0)	---	---	624	---	-110	7.2	1.0
MW-56D	DA	12/13/2018	FD(a)	LF	ND (0.5 J)	ND (2.0)	---	ND (5.0)	ND (3.0)	---	---	631	---	---	---	---
MW-56M	DA	05/02/2018	(a)	LF	ND (0.5)	ND (0.2)	19,600	---	---	---	---	---	---	-89	6.4	7.0
MW-56M	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)	12,300	ND (5.0)	ND (3.0)	---	---	651	---	-64	7.1	1.0
MW-56S	SA	05/02/2018	(a)	LF	ND (0.1)	ND (0.2)	7,230	---	---	---	---	---	---	-100	7.2	7.0
MW-56S	SA	12/13/2018	(a)	LF	ND (0.1 J)	ND (2.0)	6,270	ND (5.0)	ND (3.0)	---	---	655	---	-130	7.1	2.0
MW-57-070	BR	05/03/2018		LF	340	360	3,300	5.0	3.5	8.8	1.2	1.6	---	150	7.1	19
MW-57-070	BR	12/07/2018		LF	410	420	2,840	3.4	3.6	7.1	1.3	ND (0.5)	51 J	87	6.9	4.0
MW-57-185	BR	05/03/2018		3V	7.7	7.5	22,300	91	ND (0.5)	ND (0.05)	13	240	---	-46	9.0	2.0
MW-57-185	BR	12/07/2018		3V	6.4	5.7	20,100	86	ND (0.5)	0.21	9.6	110	ND (100 J)	-24	9.7	2.0
MW-57-185_D	BR	05/03/2018		LF	4.8	4.7	22,000	86	ND (0.5)	ND (0.05)	4.2	12	---	25	9.9	19
MW-57-185_D	BR	12/07/2018		LF	6.2	5.9	20,000	87	ND (0.5)	ND (0.1)	6.7	17	ND (100 J)	-35	9.7	9.0
MW-57-185_S	BR	05/03/2018		LF	5.3	5.2	21,900	84	ND (0.5)	ND (0.05)	3.3	6.2	---	51	10	12
MW-57-185_S	BR	12/07/2018		LF	5.4	6.0	20,000	88	ND (0.5)	ND (0.1)	4.1	ND (0.5)	ND (100 J)	-24	9.4	8.0
MW-58BR	BR	02/19/2018		LF	13	11	8,390	24	2.1	1.0	1.7	290	---	140	7.6	1.0
MW-58BR	BR	05/03/2018		LF	9.3	9.2	10,000	26	1.9	0.87	1.7	280	---	88	7.4	7.0
MW-58BR	BR	09/27/2018		LF	9.7	9.6	10,100	24	1.8	0.94	1.8	300	---	-16	7.5	2.0
MW-58BR	BR	12/13/2018		LF	10	11	9,190	26	2.1	0.78	1.9	320	ND (20)	38	7.5	1.0
MW-59-100	SA	05/03/2018		LF	2,800	3,000	15,500	7.3	2.8	2.5	2.2	1.4	---	100	6.5	12
MW-59-100	SA	12/07/2018		LF	3,100	3,300	10,100	6.6	4.1	1.4	2.0	24 J	200 J	170	7.0	40
MW-59-100	SA	12/07/2018	FD	LF	3,100	3,100	---	6.1	3.7	1.4	2.0	16 J	160 J	---	---	---
MW-60-125	BR	05/02/2018		LF	510	470	9,090	21 J	4.4	3.0	1.7	2.9	---	-79	7.5	40
MW-60-125	BR	12/06/2018		LF	980	950	9,790	19	5.9	1.8	1.3	4.8	ND (20)	44	7.4	25
MW-60BR-245	BR	02/21/2018		3V	69	59	19,500	57	2.8	0.17	7.6	11	---	45	8.0	2.0
MW-60BR-245	BR	05/02/2018		3V	73	67	18,200	57	2.6	0.16	8.2	9.6	---	-80	8.2	6.0
MW-60BR-245	BR	09/25/2018		3V	76	81	19,900	58	3.6	0.21	9.1	11	---	70	7.8	2.0
MW-60BR-245	BR	12/06/2018		3V	110	120	18,200	57	2.5	0.29	8.2	12	ND (20 J)	31	8.0	2.0
MW-60BR-245_D	BR	02/21/2018		LF	4.1	39	19,000	56	2.7	0.21	4.6	22	---	96	8.0	1.0
MW-60BR-245_D	BR	05/02/2018		LF	1.2	1.7	18,200	60	2.0	ND (0.05)	5.2	21	---	-80	8.1	6.0
MW-60BR-245_D	BR	09/25/2018		LF	6.4	6.2	19,700	57	ND (2.5)	ND (0.05)	5.3	26	---	45	7.8	2.0
MW-60BR-245_D	BR	12/06/2018		LF	20	21	18,300	63	2.5	0.17	7.3	22	ND (20 J)	39	8.1	2.0
MW-60BR-245_S	BR	02/21/2018		LF	ND (1.0)	7.7	18,900	58	2.6	0.19	4.0	21	---	100	8.0	2.0
MW-60BR-245_S	BR	05/02/2018		LF	1.1	1.5	18,200	61	2.3	0.063	4.9	20	---	-80	8.2	6.0

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PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products			Selected Field Parameters		
Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-60BR-245_S	BR	09/25/2018		LF	ND (1.0)	ND (1.0)	19,700	57	2.2	ND (0.05)	4.7	26	---	25	7.8	2.0
MW-60BR-245_S	BR	12/06/2018		LF	17	17	18,100	64	2.9 J	0.18	6.6	23	ND (100)	45	8.1	3.0
MW-61-110	BR	05/04/2018		LF	330	340	19,200	25	1.1 J	0.53	3.2	130	---	-43	7.0	4.0
MW-61-110	BR	12/13/2018		LF	430	460	17,400	23	ND (2.5)	0.8	4.0	220	ND (100)	13	7.3	13
MW-61-110	BR	12/13/2018	FD	LF	460	470	---	24	ND (2.5)	0.81	4.0	220	ND (100)	---	---	---
MW-62-065	BR	02/19/2018		LF	560	510	6,740	14	4.0	4.6	1.6	1.5	---	130	7.4	5.0
MW-62-065	BR	02/19/2018	FD	LF	550	530	---	14	3.8	4.7	1.6	1.8	---	---	---	---
MW-62-065	BR	05/01/2018		LF	520	530	6,650	15	3.8	4.1	1.4	4.3	---	-70	7.9	25
MW-62-065	BR	09/26/2018		LF	540	570	7,030	13	4.7	5.0	1.7	ND (0.5)	---	82	7.3	5.0
MW-62-065	BR	12/07/2018		LF	540	610	6,420	14	4.4	4.5	1.4	1.3	54 J	170	7.5	15
MW-62-110	BR	02/21/2018		Tap	ND (1.0)	ND (1.0)	12,500	66	ND (2.5)	ND (0.05)	6.7	120	---	64	8.0	10
MW-62-110	BR	05/03/2018		G	ND (1.0)	ND (1.0)	16,600	70	ND (0.5)	ND (0.05)	4.4	160	---	54	7.3	5.0
MW-62-110	BR	09/26/2018		3V	ND (1.0)	ND (1.0)	14,900	59	ND (2.5)	ND (0.05)	3.2	170	---	-130	7.4	3.0
MW-62-110	BR	12/13/2018		G	0.32	3.0	10,900	42	ND (2.5)	ND (0.1)	31	250	ND (53 J)	-91	7.4	2.0
MW-62-190	BR	05/03/2018		G	ND (1.0)	ND (1.0)	22,300	48	ND (0.5)	ND (0.05)	1.4	820	---	-36	7.3	6.0
MW-62-190	BR	12/13/2018		LF	ND (1.0)	ND (1.0)	20,100	36	ND (2.5)	ND (0.1)	8.6	1,100	ND (100)	-150	7.5	2.0
MW-63-065	BR	02/21/2018		LF	0.53	1.6	7,590	20	0.69	0.87	1.5	35	---	110	7.2	7.0
MW-63-065	BR	04/26/2018		LF	0.85	1.3	8,160	18	0.78	0.97	1.5	14	---	64	6.9	15
MW-63-065	BR	09/24/2018		LF	1.0	1.4	7,130	16 J	1.0	1.0	1.6	ND (0.5)	---	78	7.0	5.0
MW-63-065	BR	09/24/2018	FD	LF	1.0	1.5	---	17 J	1.2	1.1	1.5	ND (0.5)	---	---	---	---
MW-63-065	BR	12/12/2018		LF	0.95	1.7	6,780	19	0.78	1.0	1.5	10	ND (20)	42	7.0	46
MW-64BR	BR	02/19/2018		LF	ND (1.0)	ND (1.0)	13,600	67	ND (0.5)	ND (0.05)	4.3	1,100	---	110	7.5	5.0
MW-64BR	BR	02/19/2018	FD	LF	ND (1.0)	ND (1.0)	---	66	ND (0.5)	ND (0.05)	4.1	1,100	---	---	---	---
MW-64BR	BR	05/02/2018		LF	ND (1.0)	ND (1.0)	17,800	65	ND (0.5)	ND (0.05)	3.5	850	---	-91	6.9	23
MW-64BR	BR	09/24/2018		LF	ND (1.0)	ND (1.0)	15,600	65	ND (0.5)	ND (0.05)	4.0	920	---	-110	7.2	4.0
MW-64BR	BR	12/13/2018		LF	ND (1.0)	ND (1.0)	14,100	68	ND (2.5)	ND (0.1)	4.0	980	92	-50	7.3	32
MW-65-160	SA	02/22/2018		LF	190	170	4,090	62	8.5	12	0.8	48	---	12	7.2	2.0
MW-65-160	SA	04/30/2018		LF	160	170	4,920	53	8.5	11	0.85	21	---	66	7.1	7.0
MW-65-160	SA	09/27/2018		LF	170	170	4,150	54	8.9	14	0.75	47	---	110	7.1	7.0
MW-65-160	SA	12/05/2018		LF	160	220	4,090	150	11	7.7	0.75	180	250	49	7.3	11
MW-65-225	DA	02/22/2018		LF	510	520	8,650	29	7.7	9.2	2.1	6.3	---	14	7.3	9.0
MW-65-225	DA	04/30/2018		LF	110	100	21,700	54	1.4	1.9	2.9	56	---	82	7.3	27
MW-65-225	DA	09/27/2018		LF	180	170	17,500	47	2.5 J	2.9	3.1	27	---	63	7.2	4.0
MW-65-225	DA	09/27/2018	FD	LF	180	170	---	47	2.0	2.5	2.9	26	---	---	---	---
MW-65-225	DA	12/05/2018		LF	220	220	15,100	46	3.3	1.9	2.6	57	ND (20)	37	7.4	31
MW-66-165	SA	04/30/2018		LF	540	540	4,330	6.9	31	24	1.2	ND (0.5)	---	-92	7.4	45
MW-66-165	SA	12/05/2018		LF	480	500	4,060	5.9	24	16	1.3	ND (0.5)	23	55	7.3	13
MW-66-230	DA	04/30/2018		LF	6,700	6,900	18,500	83	17	22	6.4	4.5	---	-100	7.7	3.0
MW-66-230	DA	04/30/2018	FD	LF	6,800	6,900	---	82	17	23	6.0	4.3	---	---	---	---
MW-66-230	DA	12/05/2018		LF	6,100	6,200	20,500	74	9.5	6.3	12	19	ND (100)	35	7.9	32
MW-66BR-270	BR	05/02/2018		3V	ND (1.0)	ND (1.0)	19,700	3.1	ND (0.5)	ND (0.05)	ND (0.1)	620	---	-90	7.8	71
MW-66BR-270	BR	12/07/2018		3V	ND (1.0)	ND (1.0)	19,100	3.5	ND (0.5)	ND (0.1)	ND (0.1)	300	660 J	-99	7.9	32
MW-67-185	SA	04/30/2018		LF	1,800	1,700	9,420	7.6	350	77	0.96	ND (0.5)	---	140	6.9	20
MW-67-185	SA	12/05/2018		LF	1,800	2,000	8,220	9.7	410	47	0.91	ND (0.5)	ND (20)	160	7.5	19
MW-67-225	MA	04/30/2018		LF	2,800	2,800	8,670	48	89	27	3.5	7.4	---	110	7.3	35
MW-67-225	MA	12/05/2018		LF	2,900	3,000	6,320	62	83	17	2.9	6.6	150	170	7.9	44

Table 3-1

Groundwater Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products			Selected Field Parameters		
Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-67-260	DA	04/30/2018		LF	820	830	21,900	80	0.96	0.46	9.1	130	---	-25	7.6	7.0
MW-67-260	DA	12/05/2018		LF	660	710 J	18,600	75 J	ND (2.5)	0.31	8.9	120	ND (100)	150	9.6	7.0
MW-68-180	SA	02/22/2018		LF	24,000	24,000	4,580	42	13	20	2.7	1.0	89	29	7.7	7.0
MW-68-180	SA	05/01/2018		LF	5,600	6,100	4,570	35	11	11	3.2	ND (0.5)	---	100	7.3	35
MW-68-180	SA	09/27/2018		LF	8,500	8,900	3,830	33	9.5	11	3.2	3.1	---	140	7.3	29
MW-68-180	SA	12/07/2018		LF	22,000	24,000	4,020	41	17	6.9	2.8	ND (0.5)	ND (20 J)	-30	7.5	47
MW-68-240	DA	02/22/2018		LF	2,100	2,000	18,500	23	4.0	4.0	1.7	24	ND (20)	23	7.4	6.0
MW-68-240	DA	05/01/2018		LF	2,000	2,100	19,600	24	4.1 J	4.6	1.9	28	---	160	7.0	2.0
MW-68-240	DA	12/05/2018		LF	2,000	1,900	17,200	23	3.9	2.3	1.7	28	ND (100)	170	7.5	25
MW-68BR-280	BR	02/22/2018		LF	ND (1.0)	ND (1.0)	23,000	41	ND (0.5)	0.052	0.89	22	320	-88	9.9	2.0
MW-68BR-280	BR	05/01/2018		LF	ND (1.0)	ND (5.0)	27,800	55	ND (2.5)	ND (0.05)	1.5	48	---	-160	8.6	14
MW-68BR-280	BR	12/05/2018		LF	ND (1.0)	ND (1.0)	21,700	26	ND (2.5)	ND (0.1)	1.4	120	150	140	9.5	6.0
MW-69-195	BR	02/22/2018		LF	120	110	3,540	67	11	14	2.1	3.3	---	60	7.4	4.0
MW-69-195	BR	05/01/2018		LF	210	210	3,920	60	14	18	2.0	ND (0.5)	---	140	7.0	4.0
MW-69-195	BR	09/27/2018		LF	460	450	3,710	65	12	21	2.1	ND (0.5)	---	140	7.1	6.0
MW-69-195	BR	12/07/2018		LF	460	470	3,560	68	14	18	2.1	1.7	ND (20 J)	28	7.3	19
MW-70-105	BR	05/03/2018		LF	160	150	3,510	71	4.9	4.4	4.0	1.5	---	-74	7.9	10
MW-70-105	BR	12/13/2018		LF	120	130	3,480	82	5.1	3.7	4.1	10	34	160	8.0	30
MW-70BR-225	BR	05/03/2018		3V	1,800	1,800	14,100	19	2.5	3.6	1.9	1.2	---	-82	7.6	2.0
MW-70BR-225	BR	05/03/2018		LF	1,300	1,300	13,200	20	2.4	3.1	1.5	12	---	-77	7.1	10
MW-70BR-225	BR	12/13/2018		3V	1,800	1,900	14,000	19	ND (2.5)	3.7	2.1	1.3	ND (20)	170	7.5	2.0
MW-70BR-225	BR	12/13/2018		LF	1,200	1,400	12,500	23	ND (2.5)	3.1	1.5	12	ND (20)	190	7.5	4.0
MW-71-035	SA	05/02/2018		LF	ND (1.0)	ND (1.0)	19,600	21	ND (0.5)	ND (0.05)	2.7	1,800	---	-33	6.5	116
MW-71-035	SA	12/11/2018		LF	ND (1.0)	ND (1.0)	16,500	17	ND (0.5)	ND (0.1)	3.4 J	1,600	550 J	180	6.7	42
MW-71-035	SA	12/11/2018	FD	LF	ND (1.0)	1.0	---	16	ND (0.5)	ND (0.1)	2.6 J	1,600	1,400 J	---	---	---
MW-72-080	BR	02/20/2018		LF	90	78	16,500	77	1.0	0.63	11	53	---	120	7.8	8.0
MW-72-080	BR	04/26/2018		LF	68	62	16,500	75	ND (2.5)	0.5	11	69	---	-81	8.4	3.0
MW-72-080	BR	09/26/2018		LF	91	100	18,400	79	ND (2.5)	0.68	12	45	---	-2.0	7.5	2.0
MW-72-080	BR	12/06/2018		LF	82	73	13,900	84	0.98	0.5	11	42	38	82	7.7	50
MW-72BR-200	BR	02/20/2018		3V	4.5	4.4	17,300	80	ND (0.5)	0.11	15	13	---	100	8.3	1.0
MW-72BR-200	BR	04/26/2018		3V	3.3	2.6	19,600	67	ND (2.5)	0.15	14	57	---	-190	7.9	7.0
MW-72BR-200	BR	09/26/2018		3V	3.0	2.9	17,900	76	ND (2.5)	0.14	16	15	---	-230	7.9	2.0
MW-72BR-200	BR	12/06/2018		3V	4.9	3.3	14,000	73	ND (0.5)	0.14	14	94	29	-37	7.5	10
MW-72BR-200_D	BR	02/20/2018		LF	1.6	2.1	17,100	78	ND (2.5)	0.093	15	27	---	90	8.3	2.0
MW-72BR-200_D	BR	04/26/2018		LF	ND (1.0)	ND (1.0)	20,800	75	ND (2.5)	0.058	13	110	---	-170	8.1	5.0
MW-72BR-200_D	BR	09/26/2018		LF	ND (1.0)	ND (1.0)	17,900	67	ND (2.5)	0.081	10	260	---	-230	7.8	3.0
MW-72BR-200_D	BR	12/06/2018		LF	ND (1.0)	ND (1.0)	16,100	82	ND (0.5)	ND (0.1)	13	130	ND (100)	81	9.5	18
MW-72BR-200_S	BR	02/20/2018		LF	ND (1.0)	1.1	16,800	74	ND (0.5)	ND (0.05)	13	59	---	22	8.2	5.0
MW-72BR-200_S	BR	04/26/2018		LF	ND (1.0)	2.0	20,900	73	ND (2.5)	0.058	14	34	---	-230	8.2	13
MW-72BR-200_S	BR	09/26/2018		LF	ND (1.0)	ND (1.0)	17,800	82	ND (2.5)	0.44	15	56	---	-200	7.9	28
MW-72BR-200_S	BR	12/06/2018		LF	ND (1.0)	ND (1.0)	16,100	82	ND (0.5)	ND (0.1)	14	83	ND (100)	86	8.0	20
MW-73-080	BR	02/20/2018		LF	22	21	11,900	27	4.2	3.4	1.7	4.9	---	110	7.4	6.0
MW-73-080	BR	05/01/2018		LF	57	58	15,400	25	4.4	3.7	1.5	24	---	58	6.2	13
MW-73-080	BR	09/24/2018		LF	36	39	13,200	27	3.9	3.0 J	1.4	24	---	71	7.1	14
MW-73-080	BR	12/06/2018		LF	29	26	11,700	29	4.5	2.3	1.6	5.2	72	120	7.4	35
MW-74-240	BR	05/02/2018		LF	0.46	ND (1.0)	1,170	23	2.3	2.2	8.1	4.3	---	36	8.6	67

Table 3-1

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Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products			Selected Field Parameters		
Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-74-240	BR	12/07/2018		LF	0.33	ND (1.0)	904	23	1.9	1.6	9.0	6.5	58 J	22	8.4	130
OW-03D	DA	12/04/2018		LF	7.6	7.9	10,400	25	0.65 J	---	---	8.6	ND (20)	170	7.9	3.0
OW-03M	MA	12/04/2018		LF	15	16	7,760	16	0.66	---	---	34	160	170	8.2	14
OW-03S	SA	12/04/2018		LF	17	18	1,520	6.0	6.0	---	---	1.2	31	150	8.1	12
PE-01	DA	01/04/2018		Tap	ND (0.2)	ND (1.0)	1,330	---	---	0.097	---	280	1,200	-140	8.0	8.0
PE-01	DA	02/07/2018		Tap	0.7	ND (1.0)	4,380	---	---	0.25	---	74	ND (20)	-91	7.0	8.13
PE-01	DA	03/07/2018		Tap	2.3	2.0	4,360	---	---	0.28	---	5.1	ND (20)	-75	6.3	6.71
PE-01	DA	04/03/2018		Tap	ND (0.2)	ND (1.0)	2,230	---	---	0.057	---	530	36	55	8.1	2.0
PE-01	DA	05/04/2018		Tap	ND (0.2)	1.8	7,520	---	---	ND (0.05)	---	310	25	180	7.1	7.0
PE-01	DA	06/07/2018		Tap	ND (0.2)	ND (1.0)	---	---	---	ND (0.05)	---	440	ND (20)	---	---	1.0
PE-01	DA	07/03/2018		Tap	ND (0.2)	ND (1.0)	2,700	---	---	ND (0.05)	---	500	1,200	96	7.7	1.0
PE-01	DA	08/01/2018		Tap	ND (0.2)	ND (1.0)	2,720	---	---	ND (0.05)	---	370	93	92	7.9	4.0
PE-01	DA	09/06/2018		Tap	ND (0.2)	ND (1.0)	3,350	---	---	ND (0.05)	---	470	1,300	-26	7.9	1.0
PE-01	DA	10/02/2018		Tap	7.6	5.6	---	---	---	0.33	---	30	ND (20)	---	---	---
PE-01	DA	11/07/2018		Tap	ND (0.2)	ND (1.0)	3,630	---	---	ND (0.05)	---	590	ND (20)	240	6.6	1.0
PE-01	DA	12/04/2018		Tap	0.68	2.9	5,110	---	---	0.36	---	310	ND (20)	1700	7.5	1.0
PGE-07BR	BR	12/13/2018		3V	ND (1.0)	ND (5.0)	21,200	5.2	ND (2.5)	---	---	3,600	50,000	-72	7.9	76
PGE-08	BR	12/11/2018		3V	ND (1.0)	ND (1.0)	21,900	120	ND (0.5)	ND (0.1)	---	590	ND (100)	-100	8.5	5.0
PM-03	MA	12/17/2018		Tap	9.3	10	---	6.2	1.5	3.4	---	ND (0.5)	ND (20)	---	---	---
PM-04	MA	12/17/2018		Tap	17	19	---	5.8	1.5	2.3	---	ND (0.5)	ND (20)	---	---	---
TW-01	SA	05/01/2018		3V	2,400	3,100	8,160	15	14	16	---	---	---	-58	7.5	3.0
TW-01	SA	12/05/2018		3V	2,100	2,100	8,400	15	13	8.5	---	ND (0.5)	ND (20)	170	7.5	1.0
TW-02D	DA	02/23/2018		LF	140	140	5,530	12	1.8	---	---	23	---	15	7.7	8.0
TW-02D	DA	02/23/2018	FD	LF	150	140	---	12	1.5	---	---	20	---	---	---	---
TW-02D	DA	05/04/2018		Tap	150	150	5,720	10	2.2	---	---	3.2 J	---	160	7.1	5.0
TW-02D	DA	05/04/2018	FD	Tap	150	140	---	11	2.3	---	---	5.7 J	---	---	---	---
TW-02D	DA	09/26/2018		Tap	ND (0.2)	ND (1.0)	3,780	12	1.3	---	---	84	---	180	6.9	6.0
TW-02D	DA	09/26/2018	FD	Tap	ND (0.2)	ND (1.0)	---	12	1.5	---	---	86	---	---	---	---
TW-02D	DA	12/04/2018		Tap	140	110	6,550	9.9	2.5	---	---	7.1	42	4.1	7.4	2.0
TW-02S	SA	12/04/2018		Tap	81	86	6,990	11	2.6	1.9	---	90	37	140	7.5	2.0
TW-03D	DA	01/04/2018		Tap	550	590	7,200	---	---	2.8	---	12	ND (20)	-130	7.9	5.0
TW-03D	DA	02/07/2018		Tap	550	540	7,870	---	---	2.5	---	13	ND (20)	-99	7.1	12.7
TW-03D	DA	03/07/2018		Tap	530	520	7,920	---	---	2.8	---	13	ND (20)	-100	6.7	5.42
TW-03D	DA	04/03/2018		Tap	570	550	9,160	---	---	2.0	---	19	ND (20)	110	7.5	3.0
TW-03D	DA	05/04/2018		Tap	490	490	9,060	---	---	2.7	---	13	40	170	7.0	8.0
TW-03D	DA	06/07/2018		Tap	470	480	6,410	---	---	2.7	---	14	ND (20)	93	7.5	1.0
TW-03D	DA	07/03/2018		Tap	480	500	6,400	---	---	2.7	---	17	48	100	7.6	1.0
TW-03D	DA	08/01/2018		Tap	480	480	7,670	---	---	2.7 J	---	13	ND (20)	89	7.8	4.0
TW-03D	DA	09/06/2018		Tap	500	510	6,480	---	---	2.7	---	34	ND (20)	91	8.1	1.0
TW-03D	DA	10/02/2018		Tap	480	500	6,470	---	---	2.6	---	12	ND (20)	47	8.6	1.0
TW-03D	DA	11/07/2018		Tap	490	510	9,240	---	---	2.7	---	15	ND (20)	240	6.7	1.0
TW-03D	DA	12/04/2018		Tap	480	490	9,850	---	---	2.0	---	15	ND (20)	170	7.6	1.0
TW-04	DA	04/26/2018		3V	8.9	9.4	21,900	59	ND (2.5)	---	---	45	---	-89	7.8	3.0
TW-04	DA	04/26/2018		LF	ND (1.0)	ND (5.0)	22,100	68	ND (2.5)	---	---	160	---	-71	7.8	32
TW-04	DA	12/11/2018		3V	8.2	8.1	22,700	75	ND (2.5)	---	---	41	---	48	7.6	3.0
TW-04	DA	12/11/2018		LF	4.2	5.0	24,100	120	1.1	---	---	48	---	31	8.0	32

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Location ID	Aquifer Zone	Sample Date	Sample Type	Sample Method	COPCs						In-Situ By-Products			Selected Field Parameters		
					Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Manganese (µg/L)	Dissolved Iron (µg/L)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
TW-04	DA	12/11/2018	FD	3V	8.4	8.1	---	77	1.0	---	---	45	---	---	---	---
TW-05	DA	05/01/2018		3V	11	11	12,200	31	ND (2.5)	---	---	1.8	---	-74	8.1	6.0
TW-05	DA	05/01/2018		LF	8.8	9.1	12,000	30	ND (0.5)	---	---	5.0	---	-73	8.1	20
TW-05	DA	12/04/2018		3V	14	14	14,100	28	0.92	---	---	4.9	---	170	7.9	1.0
TW-05	DA	12/04/2018		LF	9.5	9.3	13,500	33	ND (0.5)	---	---	5.5	---	200	7.6	10

Notes:

(a) Samples collected in Arizona and analyzed at a laboratory approved by the Arizona Department of Heath Services.

1. Beginning February 1, 2008, hexavalent chromium samples are field-filtered per DTSC-approved change from analysis Method SW7199 to E218.6.
2. The following analytical methods were used:
   Hexavalent chromium = USEPA Method 218.6
   Dissolved chromium, dissolved arsenic, dissolved manganese, dissolved molybdenum, dissolved selenium = Method SW6020
   PE-01/TW-03D: dissolved chromium, dissolved manganese = USEPA Method 200.8
   Dissolved Iron = Method SW 6010B or USEPA Method 200.7
   Specific conductance = USEPA Method 120.1
   Nitrate/Nitrate as Nitrogen = SM 4500-NO3 F
3. Monitoring wells MW-57-050 and MW-58-065 were dry during the Fourth Quarter 2018 sampling event.
4. Monitoring locations sampled in Fourth Quarter 2018 are highlighted in grey.

-- = not applicable.
µg/L = micrograms per liter.
µS/cm = microSiemens per centimeter.
3V = three volume purge.
BR = bedrock.
COPC = constituent of potential concern.
DA = deep interval of Alluvial Aquifer.
DTSC = Department of Toxic Substance Control.
FD = field duplicate.
G = Grab sample.
H = HydraSleeve.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
LF = Low Flow (minimal drawdown)
MA = mid-depth interval of Alluvial Aquifer.
mV = millivolts.
ND = not detected at listed reporting limit.
NTU = nephelometric turbidity units.
ORP = oxidation-reduction potential.
SA = shallow interval of Alluvial Aquifer.
SU = standard units.
Tap = sampled from tap of extraction well.
USEPA = United States Environmental Protection Agency.

Table 3-2

Title 22 Metals Groundwater Sampling Results, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

				California MCL:	6	10	1,000	4	5	NE	50	1,000*	15	2	NE	100	50	100*	2	NE	5,000*
Location ID	Aquifer Zone	Sample Date		Sample Method	Dissolved Antimony (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Barium (µg/L)	Dissolved Beryllium (µg/L)	Dissolved Cadmium (µg/L)	Dissolved Cobalt (µg/L)	Dissolved Chromium (µg/L)	Dissolved Copper (µg/L)	Dissolved Lead (µg/L)	Dissolved Mercury (µg/L)	Dissolved Molybdenum (µg/L)	Dissolved Nickel (µg/L)	Dissolved Selenium (µg/L)	Dissolved Silver (µg/L)	Dissolved Thallium (µg/L)	Dissolved Vanadium (µg/L)	Dissolved Zinc (µg/L)
MW-10	SA	12/12/2018		LF	ND (0.5)	2.2	49	ND (0.5)	ND (0.5)	ND (0.5)	**120**	ND (1.0)	ND (1.0)	ND (0.2)	18	3.7	6.3	ND (0.5)	ND (0.5)	16	ND (10)
MW-12	SA	12/11/2018		LF	ND (0.5)	**40**	45	ND (2.5)	ND (0.5)	ND (0.5)	**1,500**	ND (1.0)	ND (1.0)	ND (0.2)	12	ND (1.0)	36	ND (0.5)	ND (0.5)	18	ND (10)
MW-14	SA	12/11/2018		LF	ND (0.5)	0.7	180	ND (0.5)	ND (0.5)	ND (0.5)	15	ND (1.0)	ND (1.0)	ND (0.2)	13	2.3	2.2	ND (0.5)	ND (0.5)	2.4	ND (10)
MW-22	SA	12/4/2018		LF	ND (2.5)	13	95	ND (2.5)	ND (2.5)	2.3	ND (1.0)	ND (1.0)	ND (5.0)	ND (0.2)	31	2.2	ND (2.5)	ND (2.5)	ND (2.5)	ND (1.0)	ND (10)
MW-22	SA	12/4/2018	FD	LF	ND (2.5)	15	93	ND (2.5)	ND (2.5)	2.6	ND (1.0)	ND (1.0)	ND (5.0)	ND (0.2)	31	2.1	ND (2.5)	ND (2.5)	ND (2.5)	ND (1.0)	ND (10)
MW-24A	SA	12/12/2018		LF	ND (0.5)	0.28	24	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.2)	150	1.3	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (10)
MW-24B	DA	12/12/2018		LF	ND (0.5)	3.3	69	ND (2.5)	ND (0.5)	ND (0.5)	**150**	ND (1.0)	ND (1.0)	ND (0.2)	62	ND (1.0)	ND (2.5)	ND (0.5)	ND (0.5)	3.8	ND (10)
MW-26	SA	12/7/2018		LF	ND (0.5)	1.8	34	ND (0.5)	ND (0.5)	ND (0.5)	**2,300**	ND (1.0)	ND (1.0)	ND (0.2)	32	5.5	39	ND (0.5)	ND (0.5)	7.8	ND (10)
MW-35-060	SA	12/10/2018		LF	ND (0.5)	1.1	73	ND (0.5)	ND (0.5)	ND (0.5)	20	ND (1.0 J)	ND (1.0)	ND (0.2)	9.8 J	ND (1.0)	1.4	ND (0.5)	ND (0.5)	2.4	ND (10 J)
MW-35-135	DA	12/10/2018		LF	ND (0.5)	0.93	37	ND (2.5)	ND (0.5)	ND (0.5)	25	ND (1.0)	ND (1.0)	ND (0.2)	24	1.9	1.4	ND (0.5)	ND (0.5)	1.6	ND (10)
MW-59-100	SA	12/7/2018		LF	ND (0.5)	2.0	70	ND (2.5)	ND (0.5)	ND (0.5)	**3,300**	ND (1.0)	ND (1.0)	ND (0.2)	6.6	6.0	4.1	ND (0.5)	ND (0.5)	ND (1.0)	ND (10)
MW-59-100	SA	12/7/2018	FD	LF	ND (0.5)	2.0	68	ND (2.5)	ND (0.5)	ND (0.5)	**3,100**	ND (1.0)	ND (1.0)	ND (0.2)	6.1	5.8	3.7	ND (0.5)	ND (0.5)	ND (1.0)	ND (10)

Notes:

1. Title 22 metals are the metals listed in California Code of Regulations, Title 22, Section 66261.24(a)(2)(A).
2. Metals were analyzed by USEPA Methods SW6020 or SW7470A (mercury).
3. The MCLs listed are the California primary drinking water standards, except where noted. The MCLs are intended to apply to total fraction.
4. Bold values exceed the California MCLs.

* = Secondary USEPA MCL.
-- = not applicable.
µg/L = micrograms per liter.
DA = deep interval of Alluvial Aquifer.
FD = field duplicate.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
LF = Low Flow (minimal drawdown)
MCL = maximum contaminant level.
ND = not detected at listed reporting limit.
NE = not established.
SA = shallow interval of Alluvial Aquifer.
USEPA = United States Environmental Protection Agency.

Table 3-3

Surface Water Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products				Geochemical Indicators	
Location ID	Sample Date	Sample Type	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Field pH (SU)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (µg/L)	Iron (µg/L)	Dissolved Manganese (µg/L)	Dissolved Barium (µg/L)	Total Suspended Solids (mg/L)
IN-CHANNEL LOCATIONS															
C-BNS	01/03/2018		ND (0.2)	ND (1.0)	8.3	890	5.0	1.8	0.39	2.3	25	20	3.0	130	ND (10)
C-BNS	02/21/2018		ND (0.2)	ND (1.0)	8.5	970	4.8	1.6	0.49	2.1	ND (20)	38 J	ND (0.5)	110	ND (10)
C-BNS	06/12/2018		ND (0.2)	ND (1.0)	8.2	900	4.8	1.8	0.41	2.4	ND (20)	44	ND (0.5)	110	ND (10)
C-BNS	09/12/2018		ND (0.2)	ND (1.0)	8.1	880	4.6	1.7	0.37	2.6	ND (20)	36	1.2	110	ND (10)
C-BNS	12/11/2018		ND (0.2)	ND (1.0)	7.8	970	5.0	1.7	0.31	2.3	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-CON-D	01/04/2018		ND (0.2)	ND (1.0)	8.3	950	5.3	1.6	0.44	2.3	ND (20)	20	ND (0.5)	130	ND (10)
C-CON-D	02/22/2018		ND (0.2)	ND (1.0)	8.6	960	5.2	1.7	0.44	2.4	ND (20)	24	ND (0.5)	120	ND (10)
C-CON-D	06/13/2018		ND (0.2)	ND (1.0)	8.1	900	4.8	1.8	0.38 J	2.4	ND (20)	22	ND (0.5)	110	ND (10)
C-CON-D	09/13/2018		ND (0.2)	ND (1.0)	7.6	850	4.5	1.5	0.41	2.6	ND (20)	34	1.7	110	ND (10)
C-CON-D	12/12/2018		ND (0.2)	ND (1.0)	7.7	920	4.6	1.5	0.22	2.4	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-CON-D	12/12/2018	FD	ND (0.2)	ND (1.0)	--	920	4.5	1.5	0.23	2.5	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-CON-S	01/04/2018		ND (0.2)	ND (1.0)	8.3	940	5.2	1.7	0.38	2.3	ND (20)	22	ND (0.5)	120	ND (10)
C-CON-S	02/22/2018		ND (0.2)	ND (1.0)	8.6	970	5.0	1.7	0.44	2.1	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-CON-S	06/13/2018		ND (0.2)	ND (1.0)	8.1	890	4.7	1.8	0.37	2.4	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-CON-S	09/13/2018		ND (0.2)	ND (1.0)	8.1	860	4.8	1.4	0.52 J	2.8	ND (20)	31	1.8	110	ND (10)
C-CON-S	09/13/2018	FD	ND (0.2)	ND (1.0)	--	860	4.6	1.4	0.38 J	2.6	ND (20)	29	1.8	110	ND (10)
C-CON-S	12/12/2018		ND (0.2)	ND (1.0)	7.7	920	4.5	1.4	0.47	2.5	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-I-3-D	01/03/2018		ND (0.2)	ND (1.0)	8.1	890	5.0	1.5	0.38	2.2	ND (20)	22	1.2	130	ND (10)
C-I-3-D	02/21/2018		ND (0.2)	ND (1.0)	8.4	960	4.9	1.6	0.50	2.2	ND (20)	29	0.65	120	ND (10)
C-I-3-D	06/12/2018		ND (0.2)	ND (1.0)	8.1	910	4.6	1.7	0.42	2.3	ND (20)	42	ND (0.5)	110	ND (10)
C-I-3-D	09/12/2018		ND (0.2)	ND (1.0)	8.1	880	4.7	1.5	0.41	2.7	ND (20)	33	1.1	110	ND (10)
C-I-3-D	12/11/2018		ND (0.2)	ND (1.0)	7.8	930	5.2	1.7	0.27	2.4	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-I-3-S	01/03/2018		ND (0.2)	ND (1.0)	8.2	910	5.0	1.7	0.39	2.2	ND (20)	21	1.3	120	ND (10)
C-I-3-S	02/21/2018		ND (0.2)	ND (1.0)	8.4	970	5.0	1.8	0.47	2.3	35	37	ND (0.5)	120	ND (10)
C-I-3-S	06/12/2018		ND (0.2)	ND (1.0)	8.1	910	4.6	1.7	0.43	2.3	ND (20)	63	ND (0.5)	110	ND (10)
C-I-3-S	09/12/2018		ND (0.2)	ND (1.0)	8.1	890	4.4	1.5	0.38	2.5	ND (20)	33	1.0	110	ND (10)
C-I-3-S	12/11/2018		ND (0.2)	ND (1.0)	7.9	920	5.1	1.7	0.27	2.3	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-MAR-D	01/04/2018		ND (0.2)	ND (1.0)	8.0	1,100	5.7	1.4	0.35	2.4	45	550	24	140	14
C-MAR-D	02/22/2018		ND (0.2)	ND (1.0)	8.8	970	5.1	1.7	0.45	2.3	28	33	ND (0.5)	120	ND (10)
C-MAR-D	02/22/2018	FD	ND (0.2)	ND (1.0)	--	960	5.0	1.5	0.47	2.3	ND (20)	41	0.76	120	ND (10)
C-MAR-D	06/13/2018		ND (0.2)	ND (1.0)	8.0	890	5.1	1.7	0.37	2.5	ND (20)	170	ND (0.5)	120	ND (10)
C-MAR-D	06/13/2018	FD	ND (0.2)	ND (1.0)	--	890	4.7	1.5	0.39	2.3	ND (20)	200	ND (0.5)	110	ND (10)
C-MAR-D	09/13/2018		ND (0.2)	ND (1.0)	8.1	850	4.6	1.6	0.34	2.7	39	1,100	14	110	36
C-MAR-D	12/12/2018		ND (0.2)	ND (1.0)	7.3	1,400	5.8	1.2	0.18	2.5	52	3,200	220	140	88
C-MAR-S	01/04/2018		ND (0.2)	ND (1.0)	8.1	1,000	5.5	1.4	0.35	2.3	89	390	20	130	13
C-MAR-S	02/22/2018		ND (0.2)	ND (1.0)	8.7	960	5.0	1.6	0.42	2.4	28	45	ND (0.5)	120	ND (10)
C-MAR-S	06/13/2018		ND (0.2)	ND (1.0)	8.0	890	5.0	1.8	0.40	2.4	ND (20)	190	ND (0.5)	120	ND (10)
C-MAR-S	09/13/2018		ND (0.2)	ND (1.0)	8.2	870	4.7	1.4	0.52	2.5	ND (20)	360	11	110	21
C-MAR-S	12/12/2018		ND (0.2)	ND (1.0)	7.4	1,200	5.1	1.6	0.22	2.5	100	2,600	86	130	51
C-MAR-S	12/12/2018	FD	ND (0.2)	ND (1.0)	--	1,200	5.2	1.7	0.20	2.6	97	2,300	87	130	45

Table 3-3

Surface Water Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products				Geochemical Indicators	
Location ID	Sample Date	Sample Type	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Field pH (SU)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (µg/L)	Iron (µg/L)	Dissolved Manganese (µg/L)	Dissolved Barium (µg/L)	Total Suspended Solids (mg/L)
C-NR1-D	01/04/2018		ND (0.2)	ND (1.0)	8.3	940	5.0	1.6	0.38	2.2	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-NR1-D	01/04/2018	FD	ND (0.2)	ND (1.0)	--	910	4.9	1.4	0.36	2.2	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-NR1-D	02/22/2018		ND (0.2)	ND (1.0)	8.5	970	5.0	1.5	0.46	2.2	ND (20)	26	ND (0.5)	110	ND (10)
C-NR1-D	06/13/2018		ND (0.2)	ND (1.0)	8.2	900	4.8	1.7	0.36	2.3	ND (20)	22 J	ND (0.5)	110	ND (10)
C-NR1-D	09/13/2018		ND (0.2)	ND (1.0)	8.1	860	4.6	1.5	0.36	2.6	ND (20)	32	1.8	110	ND (10)
C-NR1-D	09/13/2018	FD	ND (0.2)	ND (1.0)	--	850	4.7	1.5	0.38	2.6	ND (20)	41	1.8	110	ND (10)
C-NR1-D	12/12/2018		ND (0.2)	ND (1.0)	7.7	920	4.7	1.6	0.26	2.4	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-NR1-S	01/04/2018		ND (0.2)	ND (1.0)	8.4	940	5.1	1.7	0.37	2.3	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-NR1-S	02/22/2018		ND (0.2)	ND (1.0)	8.6	980	4.9	1.9	0.49	2.2	ND (20)	23	ND (0.5)	120	ND (10)
C-NR1-S	06/13/2018		ND (0.2)	ND (1.0)	8.2	900	4.7	1.7	0.36	2.3	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-NR1-S	09/13/2018		ND (0.2)	ND (1.0)	8.1	850	4.4	1.7	0.37	2.5	ND (20)	33	2.1	110	ND (10)
C-NR1-S	12/12/2018		ND (0.2)	ND (1.0)	7.7	930	4.9	1.6	0.24	2.7	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-NR3-D	01/04/2018		ND (0.2)	ND (1.0)	8.3	930	5.1	1.5	0.36	2.3	20	23	ND (0.5)	120	ND (10)
C-NR3-D	02/22/2018		ND (0.2)	ND (1.0)	8.4	980	5.0	1.8	0.41	2.1	ND (20)	24	ND (0.5)	120	ND (10)
C-NR3-D	06/13/2018		ND (0.2)	ND (1.0)	8.1	890	4.6	1.7	0.40	2.1	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-NR3-D	09/13/2018		ND (0.2)	ND (1.0)	8.1	860	4.7	1.5	0.36	2.7	ND (20)	30	2.1	110	ND (10)
C-NR3-D	12/12/2018		ND (0.2)	ND (1.0)	7.7	920	4.8	1.4	0.29	2.4	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-NR3-S	01/04/2018		ND (0.2)	ND (1.0)	8.3	940	5.4	1.6	0.34	2.5	ND (20)	29	0.5	130	ND (10)
C-NR3-S	02/22/2018		ND (0.2)	ND (1.0)	8.5	980	4.9	1.5	0.45	2.3	ND (20)	48	ND (0.5)	120	ND (10)
C-NR3-S	06/13/2018		ND (0.2)	ND (1.0)	8.1	900	4.7	1.6	0.35	2.2	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-NR3-S	09/13/2018		ND (0.2)	ND (1.0)	8.1	860	4.7	1.7	0.35	2.7	ND (20)	37	2.0	110	ND (10)
C-NR3-S	12/12/2018		ND (0.2)	ND (1.0)	7.7	920	4.7	1.6	0.29	2.4	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-NR4-D	01/04/2018		ND (0.2)	ND (1.0)	8.3	930	4.9	1.6	0.38	2.2	ND (20)	21	ND (0.5)	120	ND (10)
C-NR4-D	02/22/2018		ND (0.2)	ND (1.0)	8.5	980	4.8	1.3	0.45	2.1	ND (20)	20	3.7	110	ND (10)
C-NR4-D	06/13/2018		ND (0.2)	ND (1.0)	8.1	920	4.7	1.6	0.41	2.3	ND (20)	24	ND (0.5)	110	ND (10)
C-NR4-D	09/13/2018		ND (0.2)	ND (1.0)	8.1	870	4.7	1.4	0.35	2.7	ND (20)	28	2.9	110	ND (10)
C-NR4-D	12/12/2018		ND (0.2)	ND (1.0)	7.7	930	4.7	1.6	0.30	2.5	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-NR4-S	01/04/2018		ND (0.2)	ND (1.0)	8.3	930	5.0	1.6	0.42	2.2	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-NR4-S	02/22/2018		ND (0.2)	ND (1.0)	8.5	980	4.8	1.5	0.45	2.2	ND (20)	ND (20)	5.7 J	110	ND (10)
C-NR4-S	02/22/2018	FD	ND (0.2)	ND (1.0)	--	980	5.1	1.7	0.44	2.2	ND (20)	27	4.2 J	120	ND (10)
C-NR4-S	06/13/2018		ND (0.2)	ND (1.0)	8.1	900	4.8	1.7	0.42	2.3	ND (20)	27	ND (0.5)	110	ND (10)
C-NR4-S	09/13/2018		ND (0.2)	ND (1.0)	8.1	860	4.4	1.5	0.42	2.6	ND (20)	24	2.4	110	ND (10)
C-NR4-S	09/13/2018	FD	ND (0.2)	ND (1.0)	--	860	4.7	1.7	0.42	2.6	ND (20)	27	2.2	110	ND (10)
C-NR4-S	12/12/2018		ND (0.2)	ND (1.0)	7.7	930	4.8	1.8	0.30	2.5	ND (20)	ND (20)	ND (0.5)	110	ND (10)
C-R22A-D	01/03/2018		ND (0.2)	ND (1.0)	8.2	910	5.2	1.5	0.36	2.3	ND (20)	31	3.9	130	ND (10)
C-R22A-D	02/21/2018		ND (0.2)	ND (1.0)	8.4	970	4.8	1.7	0.51	2.2	30	55	ND (0.5)	120	ND (10)
C-R22A-D	06/12/2018		ND (0.2)	ND (1.0)	8.2	920	5.0	2.0	0.41	2.4	ND (20)	34	ND (0.5)	120	ND (10)
C-R22A-D	09/12/2018		ND (0.2)	ND (1.0)	8.1	860	4.9	1.6	0.35	2.7	23	34	1.0	110	ND (10)
C-R22A-D	12/11/2018		ND (0.2)	ND (1.0)	7.8	940	5.5	1.5	0.27	2.3	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-R22A-S	01/03/2018		ND (0.2)	ND (1.0)	8.2	920	5.1	1.9	0.40	2.2	ND (20)	21	3.7	120	ND (10)
C-R22A-S	02/21/2018		ND (0.2)	ND (1.0)	8.4	960	4.8	1.8	0.49	2.2	ND (20)	51	ND (0.5)	120	ND (10)
C-R22A-S	06/12/2018		ND (0.2)	ND (1.0)	8.2	910	4.8	1.7	0.4	2.4	ND (20)	44	ND (0.5)	110	ND (10)

Table 3-3

Surface Water Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products				Geochemical Indicators	
Location ID	Sample Date	Sample Type	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Field pH (SU)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (µg/L)	Iron (µg/L)	Dissolved Manganese (µg/L)	Dissolved Barium (µg/L)	Total Suspended Solids (mg/L)
C-R22A-S	09/12/2018		ND (0.2)	ND (1.0)	8.1	870	4.5	1.4	0.41	2.6	ND (20)	34	1.1	110	ND (10)
C-R22A-S	12/11/2018		ND (0.2)	ND (1.0)	7.8	930	5.3	1.7	0.28	2.4	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-R22A-S	12/11/2018	FD	ND (0.2)	ND (1.0)	--	950	5.1	1.7	0.28	2.1	ND (20)	24	ND (0.5)	120	ND (10)
C-R27-D	01/03/2018		ND (0.2)	ND (1.0)	8.3	930	5.1	1.7	0.35	2.3	ND (20)	ND (20)	2.9	120	ND (10)
C-R27-D	01/03/2018	FD	ND (0.2)	ND (1.0)	--	910	5.1	1.7	0.36	2.2	ND (20)	27	2.8	130	ND (10)
C-R27-D	02/21/2018		ND (0.2)	ND (1.0)	8.6	960	4.7	1.5	0.49	2.1	34	43	ND (0.5)	110	ND (10)
C-R27-D	06/12/2018		ND (0.2)	ND (1.0)	8.2	920	4.8	1.9	0.38	2.4	ND (20)	45	ND (0.5)	110	ND (10)
C-R27-D	09/12/2018		ND (0.2)	ND (1.0)	8.1	870	4.6	1.5	0.45	2.6	ND (20)	32	1.3	110	ND (10)
C-R27-D	12/11/2018		ND (0.2)	ND (1.0)	7.8	930	4.9	1.8	0.28	2.1	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-R27-S	01/03/2018		ND (0.2)	ND (1.0)	8.3	920	5.0	1.4	0.33	2.2	ND (20)	21	2.6	120	ND (10)
C-R27-S	02/21/2018		ND (0.2)	ND (1.0)	8.5	970	4.8	1.6	0.46	2.1	ND (20)	50	ND (0.5)	110	ND (10)
C-R27-S	06/12/2018		ND (0.2)	ND (1.0)	8.2	920	4.7	1.7	0.36	2.3	ND (20)	38	ND (0.5)	110	ND (10)
C-R27-S	09/12/2018		ND (0.2)	ND (1.0)	8.1	880	4.8	1.5	0.44	2.6	52	32	1.4	110	ND (10)
C-R27-S	12/11/2018		ND (0.2)	ND (1.0)	7.8	940	5.3	1.8	0.27	2.3	ND (20)	ND (20)	ND (0.5)	120	ND (10)
C-TAZ-D	01/03/2018		ND (0.2)	ND (1.0)	7.9	920	5.1	1.9	0.34	2.2	ND (20)	ND (20)	1.9	120	ND (10)
C-TAZ-D	02/21/2018		ND (0.2)	ND (1.0)	8.4	970	4.8	1.7	0.53	2.2	ND (20)	83	ND (0.5)	120	ND (10)
C-TAZ-D	06/12/2018		ND (0.2)	ND (1.0)	7.8	920	4.7	1.8	0.41	2.3	ND (20)	25	ND (0.5)	110	ND (10)
C-TAZ-D	09/12/2018		ND (0.2)	ND (1.0)	8.0	880	4.5	1.5	0.40	2.6	39	36	0.78	110	ND (10)
C-TAZ-D	12/11/2018		ND (0.2)	ND (1.0)	7.8	950	5.5	1.8	0.29	2.4	ND (20)	ND (20)	ND (0.5)	120 J	ND (10)
C-TAZ-S	01/03/2018		ND (0.2)	ND (1.0)	8.1	910	5.2	1.9	0.34	2.2	ND (20)	ND (20)	1.6	130	ND (10)
C-TAZ-S	02/21/2018		ND (0.2)	ND (1.0)	8.4	970	4.7	1.8	0.51	2.2	ND (20)	43	ND (0.5)	110	ND (10)
C-TAZ-S	02/21/2018	FD	ND (0.2)	ND (1.0)	--	970	4.8	1.6	0.48	2.2	ND (20)	58	ND (0.5)	120	ND (10)
C-TAZ-S	06/12/2018		ND (0.2)	ND (1.0)	8.0	920	5.1	1.7	0.43	2.5	ND (20)	20	ND (0.5)	120	ND (10)
C-TAZ-S	09/12/2018		ND (0.2)	ND (1.0)	8.1	880	4.7	1.6	0.37	2.5	ND (20)	27	1.2	110	ND (10)
C-TAZ-S	12/11/2018		ND (0.2)	ND (1.0)	7.8	920	5.4	1.5	0.27	2.3	ND (20)	20	ND (0.5)	120	ND (10)
SHORELINE LOCATIONS															
R-19	01/04/2018		ND (0.2)	ND (1.0)	8.3	960	5.2	1.5	0.35	2.3	ND (20)	22	1.7	130	ND (10)
R-19	02/22/2018		ND (0.2)	ND (1.0)	8.7	960	5.0	1.6	0.47	2.2	ND (20)	23	3.3	120	ND (10)
R-19	06/13/2018		ND (0.2)	ND (1.0)	8.1	890	5.0	1.7	0.41	2.5	ND (20)	24	ND (0.5)	120	ND (10)
R-19	09/13/2018		ND (0.2)	ND (1.0)	8.2	860	4.3	1.5	0.39	2.4	ND (20)	58	1.5	110	ND (10)
R-19	09/13/2018	FD	ND (0.2)	ND (1.0)	--	870	4.7	1.7	0.44	2.7	ND (20)	32	1.7	110	ND (10)
R-19	12/12/2018		ND (0.2)	ND (1.0)	7.6	930	4.7	1.9	0.22	2.6	ND (20)	ND (20)	1.4	110	ND (10)
R-28	01/03/2018		ND (0.2)	ND (1.0)	8.3	940	5.0	1.9	0.34	2.3	ND (20)	49	3.9	130	ND (10)
R-28	02/21/2018		ND (0.2)	ND (1.0)	8.6	960	5.0	1.9	0.48	2.2	ND (20)	36	ND (0.5)	120	ND (10)
R-28	06/12/2018		ND (0.2)	ND (1.0)	8.2	920	4.6	1.5	0.36	2.4	ND (20)	76	ND (0.5)	110	ND (10)
R-28	09/12/2018		ND (0.2)	ND (1.0)	8.1	880	4.7	1.5	0.36	2.6	ND (20)	33	1.3	110	ND (10)
R-28	12/11/2018		ND (0.2)	ND (1.0)	7.8	960	5.2	1.4	0.29	2.2	ND (20)	28	1.0	120	ND (10)
R-28	12/11/2018	FD	ND (0.2)	ND (1.0)	--	950	5.0	1.6	0.28	2.3	27	27	0.8	120	ND (10)
R63	01/03/2018		ND (0.2)	ND (1.0)	8.2	950	5.0	1.6	0.32	2.2	ND (20)	37	4.4	130	ND (10)
R63	02/21/2018		ND (0.2)	ND (1.0)	8.5	960	4.9	1.5	0.48	2.2	ND (20)	64	ND (0.5)	120	ND (10)
R63	06/12/2018		ND (0.2)	ND (1.0)	8.2	920	4.8	1.6	0.43	2.4	ND (20)	57	ND (0.5)	110	ND (10)
R63	06/12/2018	FD	ND (0.2)	ND (1.0)	--	910	4.9	1.7	0.36	2.4	ND (20)	30	ND (0.5)	120	ND (10)

Table 3-3

Surface Water Sampling Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

								COPCs			In-Situ By-Products				Geochemical Indicators	
Location ID	Sample Date	Sample Type	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Field pH (SU)	Specific Conductance (µS/cm)	Dissolved Molybdenum (µg/L)	Dissolved Selenium (µg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (µg/L)	Iron (µg/L)	Dissolved Manganese (µg/L)	Dissolved Barium (µg/L)	Total Suspended Solids (mg/L)
R63	09/12/2018		ND (0.2)	ND (1.0)	8.0	880	4.6	1.7	0.38	2.6	ND (20)	39	1.3	110	ND (10)
R63	12/11/2018		ND (0.2)	ND (1.0)	7.8	930	5.1	1.8	0.28	2.2	ND (20)	ND (20)	ND (0.5)	120	ND (10)
RRB	01/04/2018		ND (0.2)	ND (1.0)	8.3	980	5.2	1.6	0.36	2.3	24	110	23	130	18
RRB	02/22/2018		ND (0.2)	ND (1.0)	8.6	960	5.0	1.7	0.45	2.3	21	41	ND (0.5)	120	ND (10)
RRB	06/13/2018		ND (0.2)	ND (1.0)	8.1	890	4.7	1.6	0.42	2.2	ND (20)	23	ND (0.5)	110	ND (10)
OTHER SURFACE WATER LOCATIONS															
SW-1	01/03/2018		ND (0.2)	ND (1.0)	8.1	1,000	--	--	--	--	--	--	--	--	--
SW-1	01/03/2018	FD	ND (0.2)	ND (1.0)	--	1,000	--	--	--	--	--	--	--	--	--
SW-1	02/21/2018		ND (0.2)	ND (1.0)	7.7	1,100	--	--	--	--	--	--	--	--	--
SW-1	06/12/2018		ND (0.2)	ND (1.0)	7.7	960	--	--	--	--	--	--	--	--	--
SW-1	09/12/2018		ND (0.2)	ND (1.0)	7.9	910	--	--	--	--	--	--	--	--	--
SW-1	12/11/2018		ND (0.2)	ND (1.0)	7.4	980	--	--	--	--	--	--	--	--	--
SW-2	01/03/2018		ND (0.2)	ND (1.0)	7.9	990	--	--	--	--	--	--	--	--	--
SW-2	02/21/2018		ND (0.2)	ND (1.0)	7.8	990	--	--	--	--	--	--	--	--	--
SW-2	06/12/2018		ND (0.2)	ND (1.0)	7.6	980	--	--	--	--	--	--	--	--	--

Notes:

1. Beginning February 1, 2008, hexavalent chromium samples are field-filtered per DTSC-approved change from analysis Method SW7199 to E218.6.
2. The following analytical methods were used:
   Hexavalent chromium = USEPA 218.6
   Dissolved chromium, dissolved arsenic, dissolved barium, dissolved manganese, dissolved molybdenum, dissolved selenium = SW6020
   Dissolved iron, total iron = SW6010B
   Specific conductance = USEPA 120.1
   Dissolved selenium = SW6020A
   Nitrate/Nitrate as Nitrogen = SM 4500-NO3 F
   Total suspended solids = SM 2540D
3. Monitoring locations sampled in Fourth Quarter 2018 are highlighted in grey.

-- = not applicable.
µg/L = micrograms per liter.
µS/cm = microSiemens per centimeter.
COPC = constituent of potential concern.
DTSC = Department of Toxic Substance Control.
FD = field duplicate.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
mg/L = milligrams per liter
ND = not detected at listed reporting limit.
SU = standard units.
USEPA = United States Environmental Protection Agency.

Table 4-1

Sample Method Trial Evaluation Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Sampling Date	Sampling Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-38S	12/1/2015	3V	ND (0.2)	ND (1)
	12/1/2015	LF	ND (0.2)	ND (1)
		Control Limit	0.0 - 2.2	0.0 - 3.0
	2/24/2016	3V	ND (0.2)	ND (1)
	2/24/2016	LF	ND (0.2)	ND (1)
		Control Limit	0.0 - 2.2	0.0 - 3.0
	5/3/2016	3V	ND (0.2)	ND (1)
	5/3/2016	LF	ND (0.2)	ND (1)
		Control Limit	0.0 - 2.2	0.0 - 3.0
	9/29/2016	3V	0.99	2.3
	9/29/2016	LF	ND (0.2)	1.4
		Control Limit	0.0 - 2.6	0.0 - 3.9
	12/7/2016	3V	2.7	2.3
	12/7/2016	LF	2.2	2.1
		Control Limit	0.5 - 4.5	0.2 - 4.2
	2/9/2017	3V	3.8	3.6
	2/9/2017	LF	0.57	ND (1)
		Control Limit	0.2 - 4.2	0.3 - 4.3
	5/3/2017	3V	1.2	1.2
	5/3/2017	LF	0.34	ND (1)
		Control Limit	0.0 - 2.8	0.0 - 3.1
	9/26/2017	3V	3.8 J	4.2
	9/26/2017	LF	3.1	3.6
		Control Limit	1.5 - 5.5	1.9 - 5.9
	12/7/2017	3V	2.9	3.1
	12/7/2017	LF	2.3	2.5
		Control Limit	0.6 - 4.6	0.8 - 4.8
	2/23/2018	3V	2.8	2.4
	2/23/2018	LF	2.8	2.5
		Control Limit	0.8 - 4.8	0.5 - 4.5
	5/2/2018	3V	1.1	1.3
	5/2/2018	LF	1.8	2
		Control Limit	0.0 - 3.5	0.0 - 3.7
	12/12/2018	3V	3.9	4.3
	12/12/2018	LF	4.2	4.7
		Control Limit	2.1 - 6.1	2.5 - 6.5

Table 4-1

Sample Method Trial Evaluation Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Sampling Date	Sampling Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-38D	12/1/2015	3V	20	23
	12/1/2015	LF	19	19
		RPD	5%	19%
	5/3/2016	3V	18	17
	5/3/2016	LF	19	18
		RPD	5%	6%
	12/7/2016	3V	21	21
	12/7/2016	LF	20	21
		RPD	5%	0%
	5/3/2017	3V	17	15
	5/3/2017	LF	16	14
		RPD	6%	7%
	12/7/2017	3V	21	18
	12/7/2017	LF	20	18
		RPD	5%	0%
	5/2/2018	3V	15	14
	5/2/2018	LF	15	14
		RPD	0%	0%
	12/12/2018	3V	20	20
	12/12/2018	LF	21	21
		RPD	5%	5%
MW-57-185	12/11/2017	3V	8.2	7.4
	12/11/2017	LF - 150 ft	3	3.3
		Control Limit	3.6 - 7.6	3.4 - 7.4
	12/11/2017	3V	8.2	7.4
	12/11/2017	LF - 171 ft	3.1	2.7
		Control Limit	3.7 - 7.7	3.1 - 7.1
	5/3/2018	3V	7.7	7.5
	5/3/2018	LF - 150 ft	5.3	5.2
		RPD	37%	36%
	5/3/2018	3V	7.7	7.5
	5/3/2018	LF - 171 ft	4.8	4.7
		Control Limit	4.3 - 8.3	4.1 - 8.1
	12/7/2018	3V	6.4	5.7
	12/7/2018	LF - 150 ft	5.4	6
		RPD	17%	5%
	12/7/2018	3V	6.4	5.7
	12/7/2018	LF - 171 ft	6.2	5.9
		RPD	3%	3%

Table 4-1

Sample Method Trial Evaluation Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Sampling Date	Sampling Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-60BR-245	12/14/2017	3V	690	830
	12/13/2017	LF - 175 ft	2.3	12
		Control Limit/RPD	344 - 348	194%
	12/14/2017	3V	690	830
	12/13/2017	LF - 238 ft	ND (1)	1.4
		Control Limit	344 - 348	414 - 418
	2/21/2018	3V	69	59
	2/21/2018	LF - 175 ft	ND (1)	7.7
		Control Limit/RPD	33 - 37	154%
	2/21/2018	3V	69	59
	2/21/2018	LF - 238 ft	4.1	39
		Control Limit/RPD	35 - 39	41%
	5/2/2018	3V	73	67
	5/2/2018	LF - 175 ft	1.1	1.5
		Control Limit	35 - 39	32 - 36
	5/2/2018	3V	73	67
	5/2/2018	LF - 238 ft	1.2	1.7
		Control Limit	35 - 39	32 - 36
	9/25/2018	3V	76	81
	9/25/2018	LF - 175 ft	ND (1)	ND (1)
		Control Limit	37 - 41	39 - 43
	9/25/2018	3V	76	81
	9/25/2018	LF - 238 ft	6.4	6.2
		RPD	169%	172%
	12/6/2018	3V	110	120
	12/6/2018	LF - 175 ft	17	17
		RPD	146%	150%
	12/6/2018	3V	110	120
	12/6/2018	LF - 238 ft	20	21
		RPD	138%	140%
MW-70BR-225	12/11/2017	3V	1700	1800
	12/11/2017	LF	1400	1600
		RPD	19%	12%
	5/3/2018	3V	1800	1800
	5/3/2018	LF	1300	1300
		RPD	32%	32%
	12/13/2018	3V	1800	1900
	12/13/2018	LF	1200	1400
		RPD	40%	30%

Table 4-1

Sample Method Trial Evaluation Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Sampling Date	Sampling Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-72BR-200	12/6/2017	3V	4.2	3.8
	12/6/2017	LF - 152 ft	1.5	1.7
		Control Limit	0.9 - 4.9	0.8 - 4.8
	12/6/2017	3V	4.2	3.8
	12/6/2017	LF - 195 ft	ND (1)	ND (1)
		Control Limit	0.6 - 4.6	0.4 - 4.4
	2/20/2018	3V	4.5	4.4
	2/20/2018	LF - 152 ft	ND (1)	1.1
		Control Limit	0.8 - 4.8	0.8 - 4.8
	2/20/2018	3V	4.5	4.4
	2/20/2018	LF - 195 ft	1.6	2.1
		Control Limit	1.1 - 5.1	1.3 - 5.3
	4/26/2018	3V	3.3	2.6
	4/26/2018	LF - 152 ft	ND (1)	2
		Control Limit	0.2 - 4.2	0.3 - 4.3
	4/26/2018	3V	3.3	2.6
	4/26/2018	LF - 195 ft	ND (1)	ND (1)
		Control Limit	0.2 - 4.2	0 .0 - 3.8
	9/26/2018	3V	3	2.9
	9/26/2018	LF - 152 ft	ND (1)	ND (1)
		Control Limit	0.0 - 4.0	0.0 - 4.0
	9/26/2018	3V	3	2.9
	9/26/2018	LF - 195 ft	ND (1)	ND (1)
		Control Limit	0.0 - 4.0	0.0 - 4.0
	12/6/2018	3V	4.9	3.3
	12/6/2018	LF - 152 ft	ND (1)	ND (1)
		Control Limit	1.0 - 5.0	0.2 - 4.2
	12/6/2018	3V	4.9	3.3
	12/6/2018	LF - 195 ft	ND (1)	ND (1)
		Control Limit	1.0 - 5.0	0.2 - 4.2
TW-04	4/26/2018	3V	8.9	9.4
	4/26/2018	LF	ND (1)	ND (5)
		Control Limit	3.0 - 7.0	5.2 - 9.2
	12/14/2017	3V	8.2	8.3
	12/14/2017	LF	2.8	4
		Control Limit	3.5 - 7.5	4.2 - 8.2
	12/11/2018	3V	8.2	8.1
	12/11/2018	LF	4.2	5
		Control Limit	4.2 - 8.2	4.6 - 8.6

Table 4-1

Sample Method Trial Evaluation Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Sampling Date	Sampling Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
TW-05	12/4/2018	3V	14	14
	12/4/2018	LF	9.5	9.3
		RPD	38%	40%
	12/14/2017	3V	14	12
	12/14/2017	LF	10	13
		RPD	33%	8%
	5/1/2018	3V	11	11
	5/1/2018	LF	8.8	9.1
		RPD	22%	19%
MW-40S	12/4/2014	LF	7.6	7.1
	12/4/2014	H	7	6.7
		RPD	8%	6%
	12/7/2015	LF	8.1	11
	12/7/2015	H	19	9.1
		RPD	80%	19%
	4/25/2018	LF	20	20
	4/25/2018	H	18	17
		RPD	11%	16%
	12/12/2018	LF	11	11
	12/12/2018	H	17	29
		RPD	43%	90%
MW-40D	12/4/2014	LF	160	140
	12/4/2014	H	73	67
		RPD	75%	71%
	5/12/2015	LF	120	110
	5/12/2015	H	ND (1)	ND (1)
		Control Limit	59 - 63	54 - 58
	12/7/2015	LF	98	87
	12/7/2015	H	82	78
		RPD	18%	11%
	5/4/2016	LF	130	110
	5/4/2016	H	120	110
		RPD	8%	0%
	4/25/2018	LF	120	120
	4/25/2018	H	25	31
		RPD	131%	118%
	12/12/2018	LF	140	140
	12/12/2018	H	ND (1)	ND (1)
		Control Limit	69 - 73	69 - 73

Table 4-1

Sample Method Trial Evaluation Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Notes:

1. Values highlighted in blue are not detected at the listed reporting limit.

2. Values highlighted in green are above a 20% threshold for RPD evaluation. If the concentration of either sample result within a sample pair is less than or equal to 5 times the reporting limit, then a control limit of two times the reporting limit is applied. For consistency purposes, a reporting limit of 1 µg/L was used for hexavalent chromium and dissolved chromium results at each monitoring well.

-- = not applicable.
µg/L = micrograms per liter.
3V = three volume purge.
ft = feet.
H = HydraSleeve.
ID = identification.
J = concentration estimated by laboratory or data validation.
LF = low-flow.
ND = not detected at the listed reporting limit.
RPD = relative percent difference.

Table 5-1

Pumping Rate and Extracted Volume for IM-3 System, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Extraction Well ID	November 2018		December 2018		Fourth Quarter 2018		Annual 2018	
	Average Pumping Rate[a] (gpm)	Volume Pumped (gal)	Average Pumping Rate[a] (gpm)	Volume Pumped (gal)	Average Pumping Rate[a] (gpm)	Volume Pumped (gal)	Average Pumping Rate[a] (gpm)	Volume Pumped (gal)
TW-02S	0.00	0	0.00	0	0.00	0	0.00	0
TW-02D	0.00	0	0.00	141	0.00	141	0.00	257
TW-03D	133.1	5,749,885	130.7	5,834,585	131.9	11,584,470	125.78	66,094,419
PE-01	0.00	138	0.01	418	0.01	556	0.01	4,011
TOTAL	**133.1**	**5,750,023**	**130.7**	**5,835,144**	**131.9**	**11,585,167**	**125.8**	**66,098,687**

Chromium Removed This Quarter (kg)	32.3
Chromium Removed This Year (kg)	127
Chromium Removed Project to Date (kg)	4,260
Chromium Removed This Quarter (lb)	71.3
Chromium Removed This Year (lb)	279
Chromium Removed Project to Date (lb)	9,380

Notes:

[a] The "Average Pumping Rate" is the overall average during the reporting period, including system downtime, based on flow meter readings.

1. Chromium removed includes the period of October 1, 2018 through December 31, 2018.

gal = gallons.

gpm = gallons per minute.

ID = identification.

IM = Interim Measure.

kg = kilograms.

lb = pounds.

Table 5-2

Wells Monitored for Conditional Shutdown of PE-01, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Q4 2018 Sample Date	Q4 2018 Sample Method	Hexavalent Chromium					Dissolved Chromium					Q4 2018 Result Exceeded 2014 Maximum Concentration?
			2014 Maximum Concentration (µg/L)	Q1 2018 Result (µg/L)	Q2 2018 Result (µg/L)	Q3 2018 Result (µg/L)	Q4 2018 Result (µg/L)	2014 Maximum Concentration (µg/L)	Q1 2018 Result (µg/L)	Q2 2018 Result (µg/L)	Q3 2018 Result (µg/L)	Q4 2018 Result (µg/L)	
WELLS IN SHALLOW ZONE OF ALLUVIAL AQUIFER													
MW-20-070	12/11/2018	LF	2,200	NS	1,700	NS	1,600	2,400	NS	1,700	NS	1,800	No
MW-26	12/7/2018	LF	2,400	NS	2,300	NS	2,200	2,300	NS	**2,400**	NS	2,300	No
MW-27-020	12/5/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-28-025	12/14/2018	LF	ND (0.20)	NS	ND (0.2)	NS	ND (0.2)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-30-030	12/6/2018	LF	0.21	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-31-060	12/10/2018	LF	600	NS	380	NS	390	660	NS	390	NS	400	No
MW-32-020	12/4/2018	LF	ND (1.0)	NS	NS	NS	ND (1.0)	ND (5.0)	NS	NS	NS	ND (1.0)	No
MW-32-035	12/4/2018	LF	ND (1.0)	NS	ND (1)	NS	ND (1.0)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-33-040	12/7/2018	LF	0.28	NS	ND (1)	NS	ND (1.0)	ND (1.0)	NS	1.2	NS	ND (1.0)	No
MW-36-020	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-36-040	12/6/2018	LF	0.34	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-39-040	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-42-030	12/5/2018	LF	0.54	NS	NS	NS	ND (1.0)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-47-055	12/10/2018	LF	16	NS	15	NS	**21**	16	NS	15	NS	**21**	**Yes**
WELLS IN MIDDLE ZONE OF ALLUVIAL AQUIFER													
MW-20-100	12/4/2018	LF	2,900	NS	1,800	NS	1,400	2,900	NS	1,800	NS	1,500	No
MW-27-060	12/5/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-30-050	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	**2.9**	**Yes**
MW-33-090	12/7/2018	LF	13.3	NS	3.3	NS	9.3	15.5	NS	3.8	NS	10	No
MW-34-055	12/5/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-36-050	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-36-070	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-39-050	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-39-060	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-39-070	12/6/2018	LF	ND (0.20)	NS	NS	NS	ND (0.2)	ND (1.0)	NS	NS	NS	ND (1.0)	No
MW-42-055	12/5/2018	LF	0.35	NS	ND (0.2)	NS	ND (0.2)	2.8	NS	ND (1)	NS	ND (1.0)	No
MW-42-065	12/5/2018	LF	ND (0.20)	NS	ND (0.2)	NS	ND (0.2)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-44-070	12/5/2018	LF	ND (0.20)	NS	ND (0.2)	NS	ND (0.2)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-51	12/10/2018	LF	4,800	NS	3,500	NS	3,300	4,800	NS	3,700	NS	3,800	No
WELLS IN DEEP ZONE OF ALLUVIAL AQUIFER													
MW-20-130	12/4/2018	LF	9,100	NS	6,900	NS	5,800	9,000	NS	7,000	NS	6,100	No
MW-27-085	12/5/2018	LF	ND (1.0)	NS	ND (1)	NS	ND (1.0)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-28-090	12/14/2018	LF	ND (0.20)	NS	ND (0.2)	NS	ND (0.2)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-31-135	12/10/2018	LF	12	NS	NS	NS	**14**	12	NS	NS	NS	**13**	**Yes**
MW-33-150	12/7/2018	LF	12	NS	5.2	NS	3.9	10.8	NS	5	NS	6.2	No
MW-33-210	12/7/2018	LF	13	NS	6	NS	6.7	13.5	NS	5.9	NS	10	No
MW-34-080	12/5/2018	LF	ND (0.20)	NS	ND (1)	NS	ND (1.0)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-34-100	12/5/2018	LF	263	ND (1)	ND (1)	ND (1)	ND (1.0)	270	1.5	1.3	ND (1)	ND (1.0)	No
MW-36-090	12/6/2018	LF	ND (0.20)	NS	ND (0.2)	NS	ND (0.2)	ND (1.0)	NS	ND (1)	NS	ND (1.0)	No
MW-36-100	12/6/2018	LF	65	NS	6.6	NS	3.3	62	NS	11	NS	6.8	No
MW-39-080	12/6/2018	LF	ND (0.20)	NS	NS	NS	**1.2**	ND (1.0)	NS	NS	NS	1.2	**Yes**
MW-39-100	12/6/2018	LF	57	NS	57	NS	**63**	49	NS	**54**	NS	**70**	**Yes**
MW-44-115	12/5/2018	LF	41.6	13	8.9	6.4	6.4	42.9	12	9.5	7	5.8	No

Table 5-2

Wells Monitored for Conditional Shutdown of PE-01, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Q4 2018 Sample Date	Q4 2018 Sample Method	Hexavalent Chromium					Dissolved Chromium					Q4 2018 Result Exceeded 2014 Maximum Concentration?
			2014 Maximum Concentration (µg/L)	Q1 2018 Result (µg/L)	Q2 2018 Result (µg/L)	Q3 2018 Result (µg/L)	Q4 2018 Result (µg/L)	2014 Maximum Concentration (µg/L)	Q1 2018 Result (µg/L)	Q2 2018 Result (µg/L)	Q3 2018 Result (µg/L)	Q4 2018 Result (µg/L)	
MW-44-125	12/5/2018	LF	4.0 J	NS	ND (0.2)	NS	ND (1.0)	5.9	NS	3.1	NS	ND (1.0)	No
MW-45-095a	--	--	13.7*	NS	NS	NS	NS	14.2*	NS	NS	NS	NS	--
MW-46-175	12/13/2018	LF	46.3	13	7.4	6.5	8.2	46.1	12	8.3	7	12	No
MW-46-205	12/13/2018	LF	5.5	NS	ND (1)	NS	ND (1.0)	4.8	NS	ND (1)	NS	ND (1.0)	No
MW-47-115	12/10/2018	LF	24	NS	23	NS	15	20	NS	**23**	NS	15	No
PE-01	11/7/2018 12/4/2017	Tap	5.6	ND (0.2) 0.7 2.3	ND (0.2) ND (0.2) ND (0.2)	ND (0.2) ND (0.2) ND (0.2) **7.6**	ND (0.2) 0.68	6	ND (1) ND (1) 2.0	ND (1) 1.8 ND (1)	ND (1) ND (1) ND (1) 5.6	ND (1.0) 2.9	No
TW-04	12/11/2018	3V	7.4*	NS	**8.9**	NS	**8.4**	20	NS	**23**	NS	8.1	**Yes**

Notes:

1. Monitoring wells presented in the table are located within approximately 800 feet of TW-03D, as stated in DTSC 2015.
2. * = Result is the maximum concentration from 2013.
3. Values shown in parentheses are the reporting limit.
4. If a field duplicate sample was collected, the maximum concentration between the primary and field duplicate sample is presented.
5. On June 27, 2014, DTSC approved discontinuation of groundwater sampling at monitoring well MW-45-095a.
6. **Bold** values exceeded the 2013 and/or 2014 maximum concentration for hexavalent chromium and/or dissolved chromium.
7. Monitoring results from Fourth Quarter 2018 are highlighted in grey.

-- = not applicable.
µg/L = micrograms per liter.
3V = three volume.
DTSC = Department of Toxic Substance Control.
ID = identification.
LF = low flow (minimal drawdown).
ND = not detected at listed reporting limit.
NS = not sampled.
Q1 = first quarter.
Q2 = second quarter.
Q3 = third quarter.
Q4 = fourth quarter.
Tap = sampled from tap of extraction well.

References:

DTSC. 2015. Letter from Aaron Yue/DTSC to Yvonne Meeks/PG&E. "Conditional Approval of Proposal to Modify Interim Measures 3 (IM3) Extraction Well Pumping at Pacific Gas and Electric Company, Topock Compressor Station (PG&E), Needles, California (USEPA ID No. CAT080011729)." July 20.

Table 5-3

Groundwater Elevation Results, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Groundwater Elevation (ft amsl)			
	November Average	December Average	Quarterly Average	Days in Quarterly Average
WELLS IN SHALLOW ZONE OF ALLUVIAL AQUIFER				
MW-20-070	453.14	452.27	452.70	61
MW-22	454.54	453.86	454.19	61
MW-25	454.95	454.45	454.70	61
MW-26	454.69	454.12	454.40	61
MW-27-020	454.49	453.14	453.73	55
MW-28-025	454.49	453.02	453.74	61
MW-31-060	454.17	453.16	453.65	61
MW-32-035	454.43	453.04	453.72	61
MW-33-040	454.75	454.38	454.56	61
MW-35-060	455.03	453.75	454.38	61
MW-36-020	INC	452.95	INC	33
MW-36-040	454.26	INC	INC	34
MW-39-040	453.98	452.71	453.34	61
MW-42-030	454.24	INC	INC	34
MW-43-025	454.51	453.01	453.75	61
MW-47-055	454.87	453.76	454.30	61
WELLS IN MIDDLE ZONE OF ALLUVIAL AQUIFER				
MW-20-100	452.54	451.64	452.08	61
MW-27-060	454.58	453.30	453.93	61
MW-30-050	453.72	452.78	453.24	61
MW-33-090	454.68	453.31	453.98	61
MW-34-055	454.49	453.01	453.74	61
MW-36-050	454.25	452.84	453.54	61
MW-36-070	453.82	452.74	453.27	61
MW-39-050	453.96	452.89	453.41	61
MW-39-060	453.84	452.57	453.19	61
MW-39-070	453.21	451.72	452.46	61
MW-42-065	454.19	452.92	453.54	61
MW-44-070	454.37	452.85	453.60	61
MW-50-095	454.59	453.69	454.13	61
MW-51	454.33	INC	INC	33
MW-55-045	455.93	455.36	455.64	61
WELLS IN DEEP ZONE OF ALLUVIAL AQUIFER				
MW-20-130	451.93	451.02	451.47	61
MW-27-085	454.50	453.07	453.77	61
MW-28-090	454.43	452.99	453.70	61
MW-31-135	453.36	452.42	452.88	61
MW-33-150	454.81	453.55	454.17	61
MW-34-080	INC	453.13	INC	33
MW-34-100	454.42	453.13	453.77	61
MW-35-135	454.82	453.81	454.31	61
MW-36-090	453.66	452.51	453.08	61
MW-36-100	453.95	452.68	453.30	61
MW-39-080	453.17	452.03	452.59	61
MW-39-100	453.87	452.51	453.18	61

Table 5-3

Groundwater Elevation Results, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Groundwater Elevation (ft amsl)			
	November Average	December Average	Quarterly Average	Days in Quarterly Average
MW-43-090	454.69	453.14	453.90	61
MW-44-115	453.93	452.65	453.28	61
MW-44-125	454.37	453.04	453.69	61
MW-45-095a	454.10	452.72	453.40	61
MW-46-175	454.54	453.37	453.94	61
MW-47-115	454.51	453.47	453.98	61
MW-49-135	454.87	453.68	454.26	61
MW-54-085	454.83	453.37	454.09	61
MW-54-140	454.45	453.29	453.86	61
MW-54-195	453.90	452.83	453.35	61
MW-55-120	455.98	455.51	455.74	61
PT-2D	452.78	451.83	452.25	55
PT-5D	453.66	452.47	453.05	61
PT-6D	INC	452.23	INC	28
SURFACE WATER MONITORING LOCATIONS				
I-3	455.02	453.35	454.17	61
RRB	INC	INC	INC	0

Notes:

ft amsl = feet above mean sea level.

INC = data are incomplete; less than 75 percent of data were available during the reporting period due to rejection, field equipment malfunction, or inaccessibility.

ID = identification.

Table 5-4

Average Hydraulic Gradients Measured at Well Pairs, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Well Pair	Reporting Period	Mean Landward Hydraulic Gradient (feet/foot)	Days in Monthly Average	PE-01 Run for Gradient Control?
Overall Average	November	0.0037	--	no
	December	0.0030	--	no
Northern Gradient Pair MW-31-135 / MW-33-150	November	0.0031	30	no
	December	0.0024	31	no
Central Gradient Pair (used when PE-01 is run for gradient control) MW-45-095 / MW-34-100	November	--	--	no
	December	--	--	no
Central Gradient Pair (used when PE-01 is not run for gradient control) MW-20-130 / MW-34-100	November	0.0044	30	no
	December	0.0037	31	no
Southern Gradient Pair (used when PE-01 is run for gradient control) MW-45-095 / MW-27-085	November	--	--	no
	December	--	--	no
Southern Gradient Pair (used when PE-01 is not run for gradient control) MW-20-130 / MW-27-085	November	0.0037	30	no
	December	0.0030	31	no

Notes:

1. The target mean landward hydraulic gradient for the selected well pairs is 0.001 feet/foot.
2. "Days in Monthly Average" refers to the number of days the pressure transducers in both wells were operating correctly.
3. Beginning in August 2017, MW-20-130 was approved for gradient compliance (instead of MW-45-95) at the central and southern well pairs during months when PE-01 is not run for gradient control.
4. MW-45-095 is also known as MW-45-095a.

-- = monthly gradient not applicable for gradient compliance.

Table 5-5

Interim Measure Contigency Plan Trigger Levels and Results, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Q4 2018 Sample Date	Q4 2018 Sample Method	Trigger Level	Hexavalent Chromium				Q4 2018 Result Exceeded Trigger Level?
				Hexavalent Chromium (µg/L)	Q1 2018 Result	Q2 2018 Result	Q3 2018 Result	Q4 2018 Result	
MW-21	SA	12/12/2018	LF	20	NS	ND (1)	NS	1.1	No
MW-27-085	DA	12/5/2018	LF	20	NS	ND (1)	NS	ND (1.0)	No
MW-28-090	DA	12/14/2018	LF	20	NS	ND (0.2)	NS	ND (0.2)	No
MW-32-020	SA	12/4/2018	LF	20	NS	NS	NS	ND (1.0)	No
MW-32-035	SA	12/4/2018	LF	20	NS	ND (1)	NS	ND (1.0)	No
MW-33-040	SA	12/7/2018	LF	20	NS	ND (1)	NS	ND (1.0)	No
MW-33-090	MA	12/7/2018	LF	25	NS	3.3	NS	9.3	No
MW-33-150	DA	12/7/2018	LF	20	NS	5.2	NS	3.9	No
MW-33-210	DA	12/7/2018	LF	20	NS	6	NS	6.7	No
MW-34-080	DA	12/5/2018	LF	20	NS	ND (1)	NS	ND (1.0)	No
MW-34-100	DA	12/5/2018	LF	750	ND (1)	ND (1)	ND (1)	ND (1.0)	No
MW-36-070	MA	12/6/2018	LF	20	NS	NS	NS	ND (0.2)	No
MW-39-040	SA	12/6/2018	LF	20	NS	NS	NS	ND (0.2)	No
MW-42-055	MA	12/5/2018	LF	20	NS	ND (0.2)	NS	ND (0.2)	No
MW-42-065	MA	12/5/2018	LF	20	NS	ND (0.2)	NS	ND (0.2)	No
MW-43-075	DA	12/5/2018	LF	20	NS	NS	NS	ND (1.0)	No
MW-43-090	DA	12/5/2018	LF	20	NS	NS	NS	ND (1.0)	No
MW-44-070	MA	12/5/2018	LF	20	NS	ND (0.2)	NS	ND (0.2)	No
MW-44-115	DA	12/5/2018	LF	1,200	13	8.9	6.4	6.4	No
MW-44-125	DA	12/5/2018	LF	475	NS	ND (0.2)	NS	ND (1.0)	No
MW-46-175	DA	12/13/2018	LF	225	13	7.4	6.5	8.2	No
MW-46-205	DA	12/13/2018	LF	20	NS	ND (1)	NS	ND (1.0)	No
MW-47-055	SA	12/10/2018	LF	150	NS	15	NS	21	No
MW-47-115	DA	12/10/2018	LF	31	NS	23	NS	15	No

Notes:

1. If a field duplicate sample was collected, the maximum concentration between the primary and field duplicate sample is presented.
2. Monitoring results from Fourth Quarter 2018 are highlighted in grey.
3. None of the results from the 2018 Annual Reporting Period exceeded their respective trigger level.

-- = not applicable or not sampled.
µg/L = micrograms per liter.
DA = deep interval of Alluvial Aquifer.
ID = identification.
LF = Low Flow (minimal drawdown).
MA = mid-depth interval of Alluvial Aquifer.
ND = not detected at listed reporting limit.
NS = not sampled.
Q1 = first quarter.
Q2 = second quarter.
Q3 = third quarter.
Q4 = fourth quarter.
SA = shallow interval of Alluvial Aquifer.

Table 5-6

Annual Chemical Performance Monitoring Sampling Results, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-20-070	SA	12/11/2018		LF	0.47	ND (0.5)	63	370	-61.33	16	2.8	-8.17	5.9	320	240	100	1,100
MW-20-070	SA	12/11/2018	FD	LF	0.47	ND (0.5)	65	360	-62.93	16	4.7	-8.33	6.0	340	240	100	1,100
MW-20-100	MA	12/04/2018		LF	0.9	0.66	110	450	-63.4	19	6.4	-8.31	6.8	340	240	130	1,300
MW-20-130	DA	12/04/2018		LF	2.3	ND (2.5)	280	3,000	-59.85	18	8.8	-7.2	27	2,200	990	85	6,400
MW-25	SA	12/10/2018		LF	0.34	ND (2.5)	120	380	-64.42	26	11	-8.75	8.9	230	210	120	1,100
MW-25	SA	12/10/2018	FD	LF	0.33	ND (2.5)	120	370	-64.54	25	10	-9.09	8.7	230	210	120	1,100
MW-26	SA	12/07/2018		LF	1.0	ND (2.5)	150	820	-64.04	35	16	-8.21	13	630	490	120	2,300
MW-31-060	SA	12/10/2018		LF	0.49	ND (2.5)	150	910	-65.9	26	3.3	-8.82	7.2	560	220	89	1,900
MW-32-035	SA	12/04/2018		3V	0.91	ND (2.5)	400	2,200	-88.68	170	ND (0.1)	-10.99	16	1,500	960	570	5,500
MW-34-055	MA	12/05/2018		LF	ND (0.12)	ND (0.5)	74	88	-98.79	24	ND (0.1)	-12.29	5.1	99	230	150	670
MW-34-055	MA	12/05/2018	FD	LF	ND (0.11)	ND (0.5)	73	87	-98.78	23	ND (0.1)	-12.29	5.1	98	230	150	660
MW-34-080	DA	12/05/2018		LF	1.0	ND (2.5)	280	2,300	-84.72	82	ND (0.1)	-11.14	17	1,600	640	280	4,900
MW-34-100	DA	12/05/2018		LF	1.7	ND (1.0)	170	3,100	-86.28	27	ND (0.1)	-11.24	24	2,400	950	180	6,100
R-28	--	12/11/2018		G	ND (0.13)	ND (0.5)	71	88	-97.19	25	0.29	-12.38	4.7	94	210	130	580
R-28	--	12/11/2018	FD	G	ND (0.13)	ND (0.5)	71	87	-98.12	25	0.28	-12.49	4.7	94	210	130	600

Notes:

1. The following analytical methods were used:
   Dissolved boron, dissolved calcium, dissolved potassium, dissolved sodium = Method SW 6010B
   Bromide, chloride, sulfate = USEPA Method 300.0
   Dissolved magnesium = Method SW 6020
   Nitrate/nitrite as nitrogen = SM 4500-NO3 F
   Total alkalinity = SM 2320B
   Total dissolved solids = SM 2540C

-- = not applicable.
‰ = parts per thousand.
$CaCO_3$ = calcium carbonate.
DA = deep interval of Alluvial Aquifer.
FD = field duplicate.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
LF = Low Flow (minimal drawdown).
MA = mid-depth interval of Alluvial Aquifer.
mg/L = milligrams per liter.
ND = not detected at listed reporting limit.
SA = shallow interval of Alluvial Aquifer.
USEPA = United States Environmental Protection Agency.

Table 5-7

Predicted and Actual Monthly Average Davis Dam Discharge and Colorado River Elevation at I-3

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Month, Year	Davis Dam Release			Colorado River Elevation at I-3		
	Projected (cfs)	Actual (cfs)	Difference (cfs)	Predicted (ft amsl)	Actual (ft amsl)	Difference (feet)
January 2013	8,300	8,299	1	453.20	453.28	0.04
February 2013	10,600	10,972	-372	454.30	454.63	0.40
March 2013	15,200	15,545	-345	456.00	456.29	0.30
April 2013	17,600	17,090	510	456.90	456.74	0.10
May 2013	15,800	15,592	208	456.40	456.44	0.00
June 2013	15,700	15,588	112	456.50	456.47	0.00
July 2013	14,400	13,165	1,235	456.00	455.79	0.20
August 2013	13,100	12,185	915	455.40	455.43	0.00
September 2013	11,700	11,446	254	454.80	455.02	0.20
October 2013	12,300	12,497	-197	454.90	455.09	0.20
November 2013	9,700	8,918	782	454.00	453.98	0.00
December 2013	6,400	7,636	-1,236	452.40	452.81	0.40
January 2014	8,300	8,970	-670	452.80	453.27	0.50
February 2014	11,600	11,850	-250	454.30	454.67	0.30
March 2014	16,600	17,473	-873	456.40	456.70	0.30
April 2014	18,200	17,718	482	457.10	457.08	0.00
May 2014	16,700	16,622	78	456.80	456.68	0.10
June 2014	15,900	15,917	-17	456.60	456.64	0.10
July 2014	15,100	14,640	460	456.30	456.24	0.00
August 2014	12,300	11,336	964	455.20	455.26	0.10
September 2014	13,100	12,211	889	455.30	455.30	0.00
October 2014	10,700	10,434	266	454.30	454.81	0.50
November 2014	10,700	10,575	125	454.30	454.22	0.10
December 2014	6,400	7,235	-835	452.40	452.93	0.50
January 2015	10,600	10,740	-140	454.30	454.39	0.09
February 2015	10,500	11,252	-752	454.20	454.52	0.32
March 2015	14,900	15,658	-758	455.90	456.29	0.39
April 2015	18,000	17,170	830	457.10	456.82	0.28
May 2015	16,000	13,890	2110	456.50	456.06	0.50
June 2015	14,500	13,616	884	456.10	455.94	0.16
July 2015	13,400	12,411	989	455.60	455.50	0.10
August 2015	12,100	12,627	-527	455.10	455.45	0.40
September 2015	13,300	12,734	566	455.40	INC	NA
October 2015	11,300	10,653	647	454.70	454.80	0.1
November 2015	10,000	10,066	-66	454.16	453.87	0.29
December 2015	6,200	8,556	-2,356	453.30	453.48	-0.18
January 2016	9,400	9,000	400	453.44	454.05	-0.60
February 2016	11,300	11,700	-400	454.37	454.95	-0.57
March 2016	15,800	15,000	800	455.86	456.51	-0.65
April 2016	15,400	16,400	-1,000	456.77	457.17	-0.40
May 2016	15,800	14,700	1,100	455.98	456.76	-0.78
June 2016	14,400	14,100	300	456.01	456.64	-0.62
July 2016	13,300	13,100	200	455.73	456.38	-0.65
August 2016	11,500	11,600	-100	455.02	455.70	-0.69
September 2016	12,200	11,900	300	455.19	455.83	-0.63
October 2016	10,400	10,400	0	454.25	455.23	-0.98
November 2016	9,900	9,600	300	453.70	454.40	-0.70
December 2016	8,300	7,800	500	453.37	453.55	-0.18
January 2017	8,000	6,600	1,400	453.22	453.36	-0.14
February 2017	9,500	8,700	800	453.91	454.15	-0.24
March 2017	13,900	13,700	200	455.53	456.10	-0.57
April 2017	15,900	16,100	-200	456.40	456.97	-0.57
May 2017	14,000	13,800	200	455.74	456.39	-0.66
June 2017	13,600	14,300	-700	455.95	456.46	-0.51
July 2017	13,300	13,300	0	455.62	456.22	-0.59

Table 5-7

Predicted and Actual Monthly Average Davis Dam Discharge and Colorado River Elevation at I-3

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Month, Year	Davis Dam Release			Colorado River Elevation at I-3		
	Projected (cfs)	Actual (cfs)	Difference (cfs)	Predicted (ft amsl)	Actual (ft amsl)	Difference (feet)
August 2017	11,500	11,500	0	454.91	455.59	-0.68
September 2017	12,700	11,100	1,600	454.39	455.32	-0.93
October 2017	12,000	10,900	1,100	454.01	455.15	-1.14
November 2017	10,400	10,000	400	454.25	454.70	-0.45
December 2017	8,800	9,000	-200	453.51	454.09	-0.58
January 2018	8,100	7,100	1,000	452.50	453.05	-0.55
February 2018	11,100	11,000	100	454.40	454.82	-0.42
March 2018	14,400	13,600	800	455.38	455.94	-0.56
April 2018	16,000	16,800	-800	456.25	457.09	-0.84
May 2018	15,900	16,300	-400	456.80	457.06	-0.26
June 2018	15,600	15,300	300	456.40	456.88	-0.48
July 2018	13,700	13,400	300	455.60	456.33	-0.73
August 2018	12,000	11,900	100	454.91	455.58	-0.67
September 2018	13,400	13,700	-300	464.03	456.29	7.74
October 2018	11,200	10,300	900	454.54	455.16	-0.62
November 2018	10,500	10,300	200	454.40	455.02	-0.62
December 2018	7,300	6,300	1000	452.94	453.33	-0.39
January 2019	7,300	--	--	452.93	--	--

Notes:

1. Projected river level for each month is calculated based on the preceding month's U.S. Bureau of Reclamation (USBR) projections of Davis Dam release and stage in Lake Havasu.

2. Projected and actual Davis Dam releases are reported monthly by the USBR, available online at https://www.usbr.gov/uc/water/crsp/studies/24Month_01.pdf.

-- = not applicable.
cfs = cubic feet per second.
ft amsl = feet above mean sea level.
INC = incomplete data set for Colorado River elevation at I-3.
NA = difference in predicted and actual river elevation not available due to incomplete dataset.

Table 6-1

Summary of Pumping Rates and Extracted Volumes for IM-3 System, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Month	Average Monthly Pump Rate (gpm)	Groundwater Volume Pumped (gallons)				Total Groundwater Volume Pumped (gallons)
		TW-02S	TW-02D	TW-03D	PE-01	
January 2018	133.3	--	38	5,950,063	530	5,950,631
February 2018	130.9	--	36	5,275,611	477	5,276,124
March 2018	129.1	--	--	5,764,831	285	5,765,116
April 2018	111.6	--	--	4,819,173	183	4,819,356
May 2018	128.9	--	42	5,755,987	298	5,756,327
June 2018	119.0	--	--	5,140,616	367	5,140,983
July 2018	119.1	--	--	5,314,470	198	5,314,668
August 2018	108.4	--	--	4,839,984	367	4,840,351
September 2018	133.6	--	--	5,771,467	382	5,771,849
October 2018	131.7	--	--	5,877,747	368	5,878,115
November 2018	133.70	--	--	5,749,885	138	5,750,023
December 2018	130.70	--	141	5,834,585	418	5,835,144
TOTAL	**125.8**	**--**	**257**	**66,094,419**	**4,011**	**66,098,687**

Notes:

1. The target pump rate was 135 gpm.
2. Extraction wells PE-01 and TW-02D were only pumped to collect samples. TW-02S was not pumped during 2018.

-- = not applicable.

gpm = gallons per minute.

IM = Interim Measure.

Table 6-2

Hydraulic Gradients Measured at Well Pairs, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report

PG&E Topock Compressor Station, Needles, California

Month	Mean Landward Hydraulic Gradient (feet/foot)			
	Overall Average	Northern Gradient Pair MW-31-135 / MW-33-150	Central Gradient Pair MW-20-130 / MW-34-100	Southern Gradient Pair MW-20-130 / MW-27-085
January 2018	0.0033	0.0026	0.0041	0.0033
February 2018	0.0040	0.0029	0.0050	0.0041
March 2018	0.0043	0.0030	0.0054	0.0045
April 2018	0.0040	0.0026	0.0051	0.0042
May 2018	0.0042	0.0029	0.0053	0.0044
June 2018	0.0036	0.0024	0.0046	0.0037
July 2018	0.0033	0.0027	0.0041	0.0033
August 2018	0.0030	0.0025	0.0035	0.0029
September 2018	0.0040	0.0031	0.0048	0.0041
October 2018	0.0035	0.0029	0.0041	0.0035
November 2018	0.0037	0.0031	0.0044	0.0037
December 2018	0.0030	0.0024	0.0037	0.0030

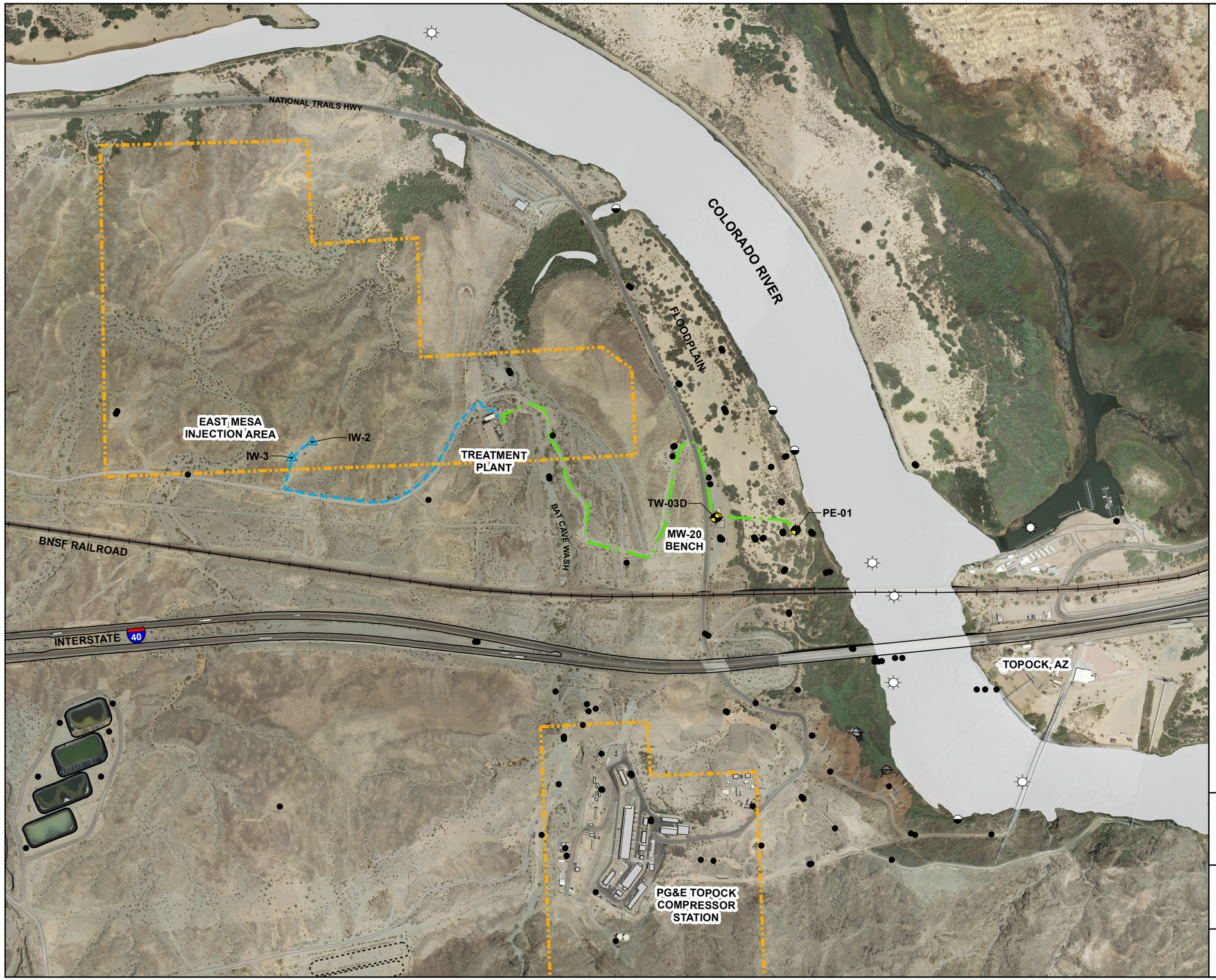
Notes:

1. The target mean landward hydraulic gradient for the selected well pairs is 0.001 feet/foot.

2. Beginning in August 2017, MW-20-130 was approved for gradient compliance (instead of MW-45-95) at the central and southern well pairs during months when PE-01 is not run for gradient control. PE-01 was not run for gradient control during the 2018 Annual Reporting Period.

3. The target mean landward hydraulic gradient was met throughout the 2018 Annual Reporting Period.

FIGURES





LEGEND

- IM-3 Extraction Well (Active)
- IM-3 Injection Well
- Monitoring Well in Site-Wide Groundwater Monitoring Program (GMP)
- Shoreline Surface Water Monitoring Location
- River Channel Surface Water Monitoring Location
- Other Surface Water Monitoring Location
- Groundwater Extraction/Influent Pipeline
- Treatment Plant Effluent Pipeline
- Property Line

Notes:
1. Location map shows Interim Measure No. 3 (IM-3) active facilities as of current report.
2. See Figures 1-2 and 1-3 for complete monitoring locations and identifications.

0 500 1,000
Feet

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

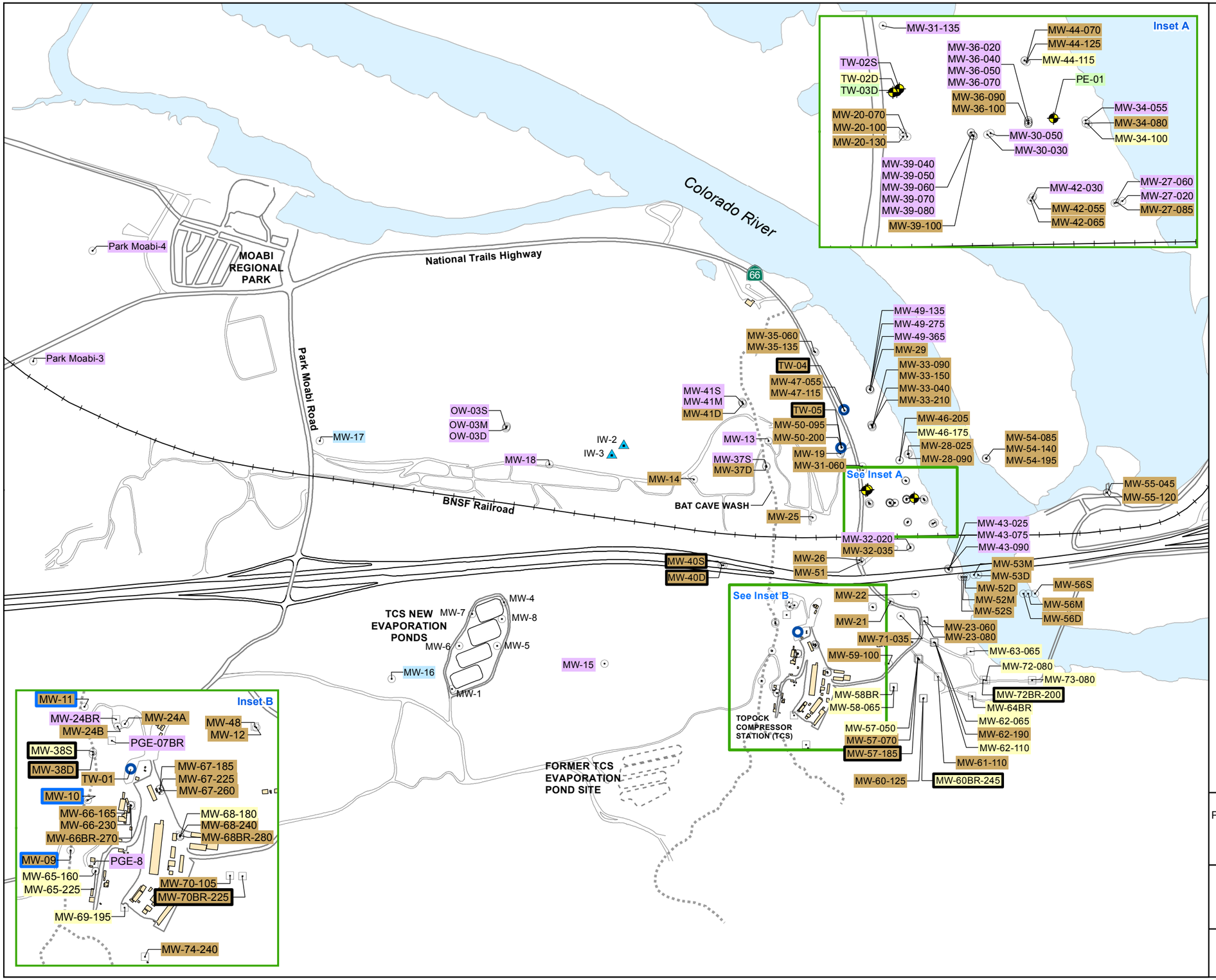
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

LOCATIONS OF IM-3 FACILITIES AND MONITORING LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1-1

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE1-1_IM3_GMP_LOCS_2018Q4.MXD 1/10/2019 2:48:35 PM



LEGEND

- Groundwater Monitoring Well Completed in Bedrock
- Injection Well
- Groundwater Monitoring Well Completed in Alluvial Aquifer
- Test Well or Supply Well (Inactive)
- Extraction Well (TW-03D and PE-01 are primary extraction wells; TW-02S and TW-02D are backup extraction wells)

Sampling Frequency for Groundwater Monitoring Program (GMP)

- MW-17 Biennial sampling
- MW-13 Annual sampling
- MW-09 Collect additional sample in quarter following a runoff event with flow through Bat Cave Wash culverts.
- TW-05 Monitoring well currently being evaluated in Sampling Method Trail.
- MW-21 Semiannual sampling
- MW-38S Quarterly sampling
- TW-3D Monthly sampling

Notes:
1. GMP = Groundwater Monitoring Program
2. TCS = Topock Compressor Station

0 500 1,000
Feet

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

MONITORING LOCATIONS AND SAMPLING FREQUENCY FOR GMP

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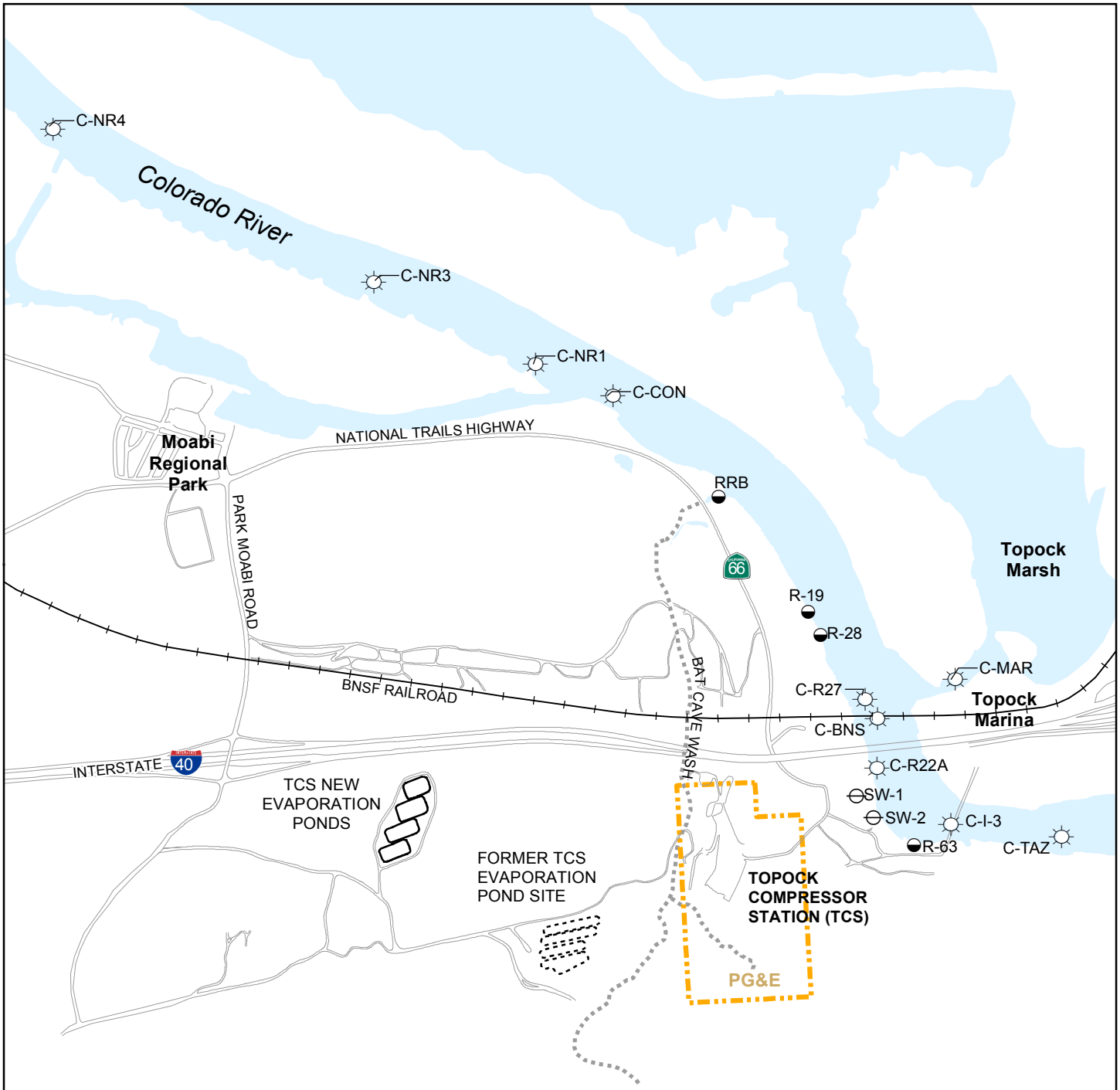
FIGURE 1-2

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE1-2_GMP_SAMPLING_FREQUENCY_2018Q4.MXD 1/10/2019 2:51:24 PM



LEGEND

- Shoreline Surface Water Monitoring Location
- River Channel Surface Water Monitoring Location
- Other Surface Water Monitoring Location
- PG&E Property Line

0 600 1,200

Feet

Notes:

1. Shoreline, river channel, and other surface water monitoring locations are sampled quarterly and twice per quarter during periods of low river stage (typically November - January).
2. Location for SW-2 is approximate. GPS coverage was not available.
3. RMP = Surface Water Monitoring Program
4. TCS = Topock Compressor Station

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

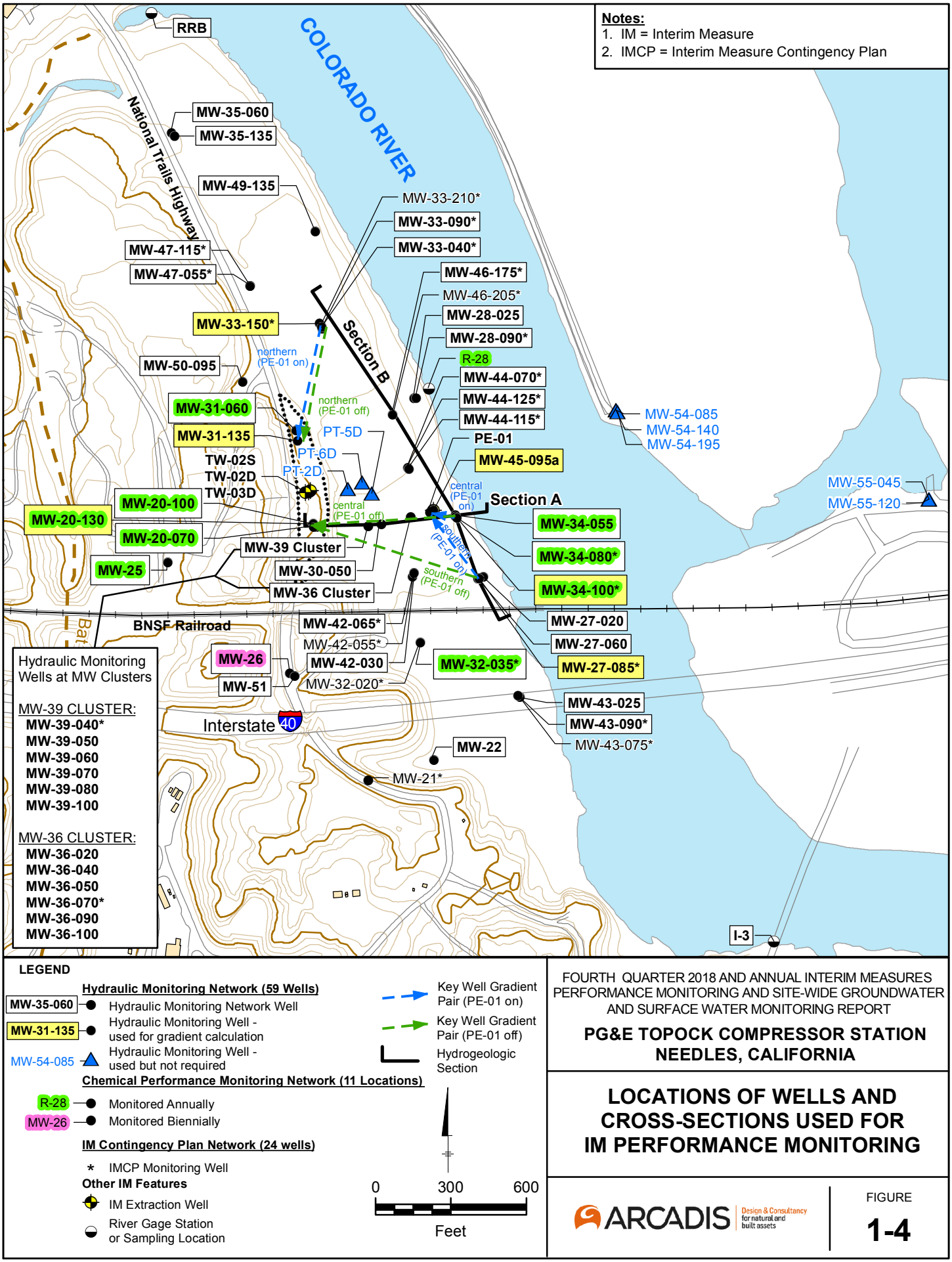
MONITORING LOCATIONS AND SAMPLING FREQUENCY FOR RMP

ARCADIS Design & Consultancy for natural and built assets

FIGURE

1-3

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE1-3_GMP_RIVER_SWLOCS_2018Q4.MXD 1/10/2019 2:52:45 PM



FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

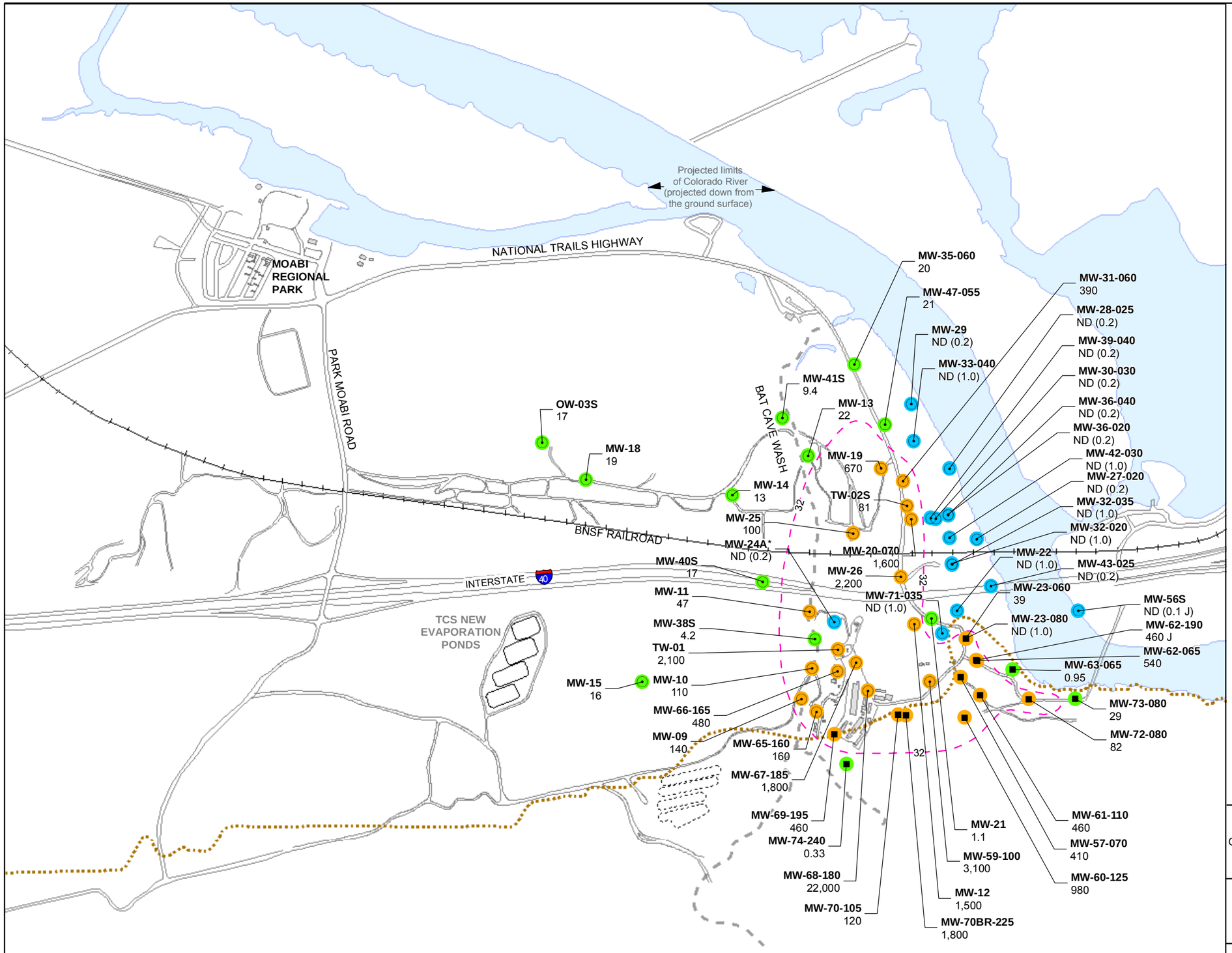
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

LOCATIONS OF WELLS AND CROSS-SECTIONS USED FOR IM PERFORMANCE MONITORING

ARCADIS Design & Consultancy for natural and built assets

FIGURE **1-4**

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE1-4_IMP_XSECTION_2018Q4.MXD 1/10/2019 2:59:37 PM



LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event

Cr(VI) Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 32 µg/L
- Concentration ≥ 32 µg/L
- Approximate boundary of "shallow" wells with Cr(VI) concentrations ≥ 32 µg/L
- Approximate bedrock contact at 455 feet above mean sea level.

MW-35-060 — Sampling Location
20 — Groundwater Cr(VI) Concentration (µg/L)

Notes:
1. ND = Cr(VI) not detected at analytical reporting limit.
2. µg/L = micrograms per liter
3. Cr(VI) = Hexavalent Chromium
4. TCS = Topock Compressor Station
5. ≥ = greater than or equal to
6. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
7. 32 µg/L is used as the background Cr(VI) concentration in groundwater for remedial activities.
8. * = Wells with sampled values less than 32 µg/L shown within footprint of 32 µg/L boundary.
9. Results plotted are maximum concentration from primary and duplicate samples.
10. The 32 µg/L boundary for Cr(VI) is estimated based on available groundwater sampling, hydrogeologic and geochemical data.
11. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

0 500 1,000
Feet

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

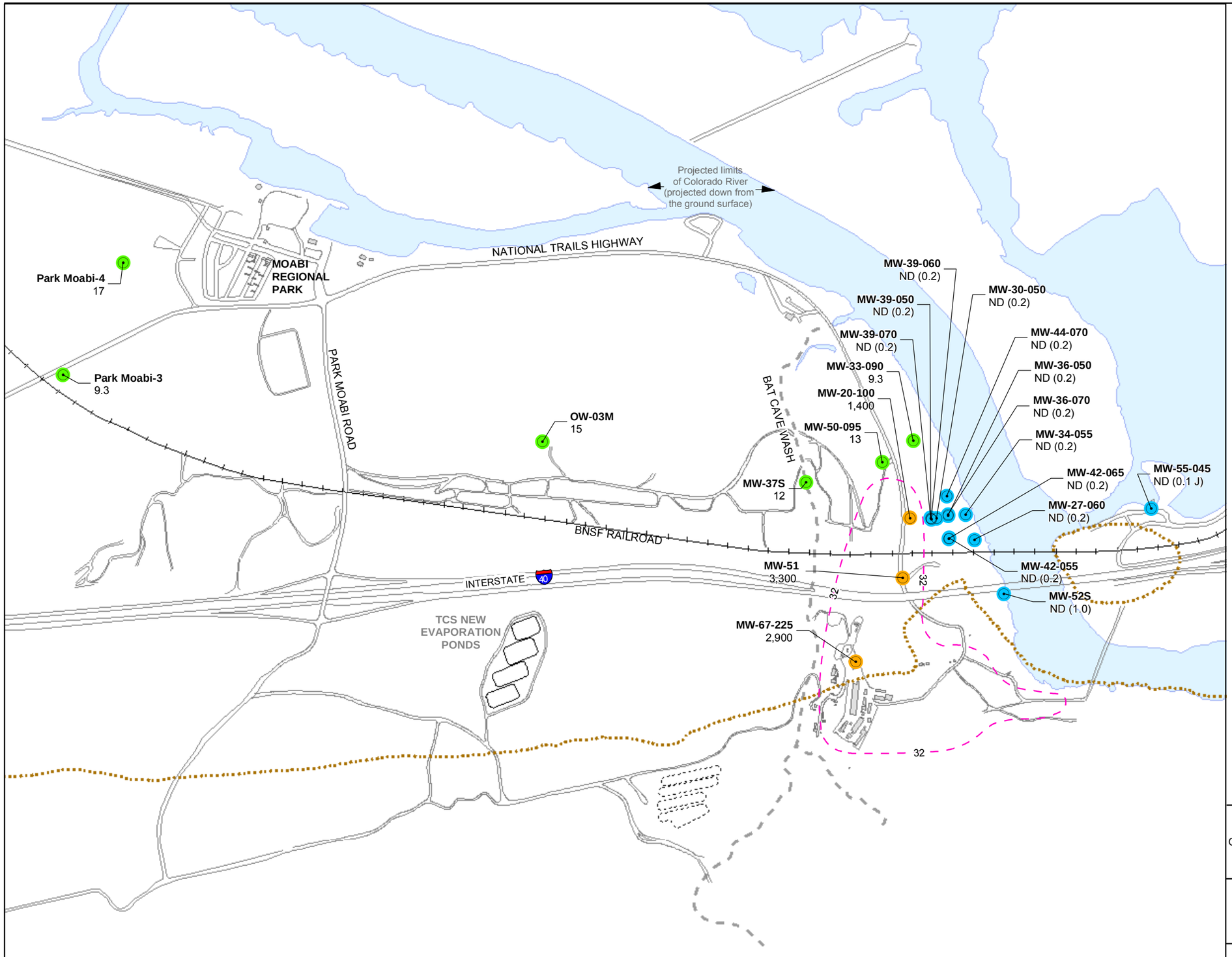
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Cr(VI) SAMPLING RESULTS, SHALLOW WELLS IN ALLUVIAL AQUIFER AND BEDROCK, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3-1a

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE3-1A_CRVI_SHALLOW_2018Q4.MXD KSINSABAUGH 3/12/2019 8:44:24 PM



LEGEND

- ■ Bedrock well sampled during sampling event; --
- ⊙ Alluvial Aquifer well sampled during sampling event

Cr(VI) Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 32 µg/L
- Concentration ≥ 32 µg/L
- Approximate boundary of "mid-depth" wells with Cr(VI) concentrations ≥ 32 µg/L
- Approximate bedrock contact at 425 feet above mean sea level.

MW-57-185 — Sampling Location
6.4 — Groundwater Cr(VI) Concentration (µg/L)

Notes:
1. "ND" = Cr(VI) not detected at analytical reporting limit.
2. µg/L = micrograms per liter
3. Cr(VI) = Hexavalent Chromium
4. TCS = Topock Compressor Station
5. ≥ = greater than or equal to
6. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
7. 32 µg/L is used as the background Cr(VI) concentration in groundwater for remedial activities.
8. * = Wells with sampled values less than 32 µg/L shown within footprint of 32 µg/L boundary.
9. Results plotted are maximum concentration from primary and duplicate samples.
10. The 32 µg/L boundary for Cr(VI) is estimated based on available groundwater sampling, hydrogeologic and geochemical data.
11. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

0 500 1,000
Feet

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

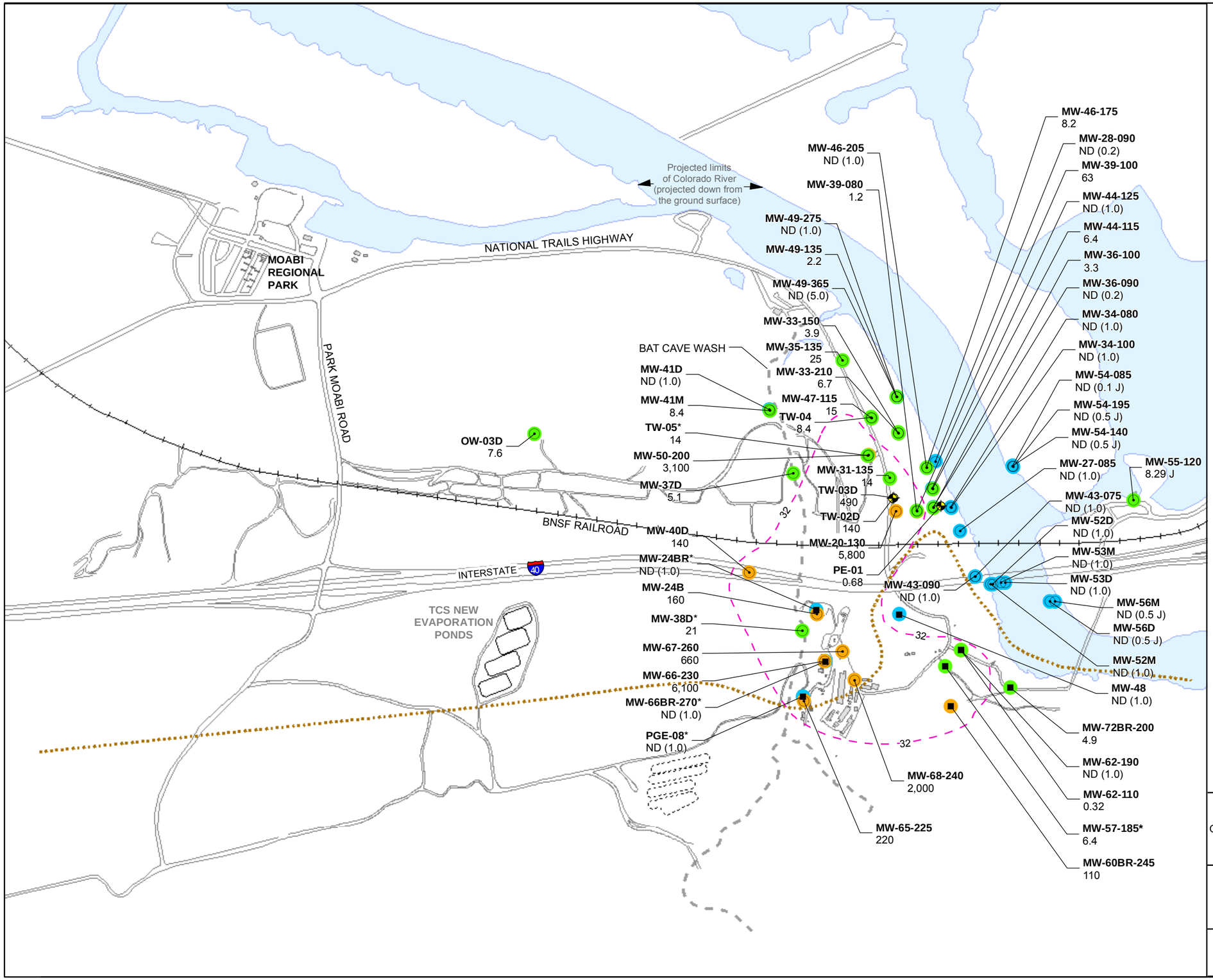
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

Cr(VI) SAMPLING RESULTS, MID-DEPTH WELLS IN ALLUVIAL AQUIFER AND BEDROCK, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3-1b

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE3-1B_CRVI_MID-DEPTH_2018Q4.MXD KSINSABAUGH 3/11/2019 5:47:09 PM



LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event
- Extraction well sampled during sampling event

Cr(VI) Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 32 µg/L
- Concentration ≥ 32 µg/L
- Approximate boundary of "deep" wells with Cr(VI) concentrations ≥ 32 µg/L
- Approximate bedrock contact at 395 feet above mean sea level.

MW-23-060 — Sampling Location
39 — Groundwater Cr(VI) Concentration (µg/L)

Notes:
1. ND = Cr(VI) not detected at analytical reporting limit.
2. µg/L = micrograms per liter
3. Cr(VI) = Hexavalent Chromium
4. TCS = Topock Compressor Station
5. ≥ = greater than or equal to
6. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
7. 32 µg/L is used as the background Cr(VI) concentration in groundwater for remedial activities.
8. * = Wells with sampled values less than 32 µg/L shown within footprint of 32 µg/L boundary.
9. Results plotted are maximum concentration from primary and duplicate samples.
10. The 32 µg/L boundary for Cr(VI) is estimated based on available groundwater sampling, hydrogeologic and geochemical data.
11. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

0 500 1,000
Feet

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

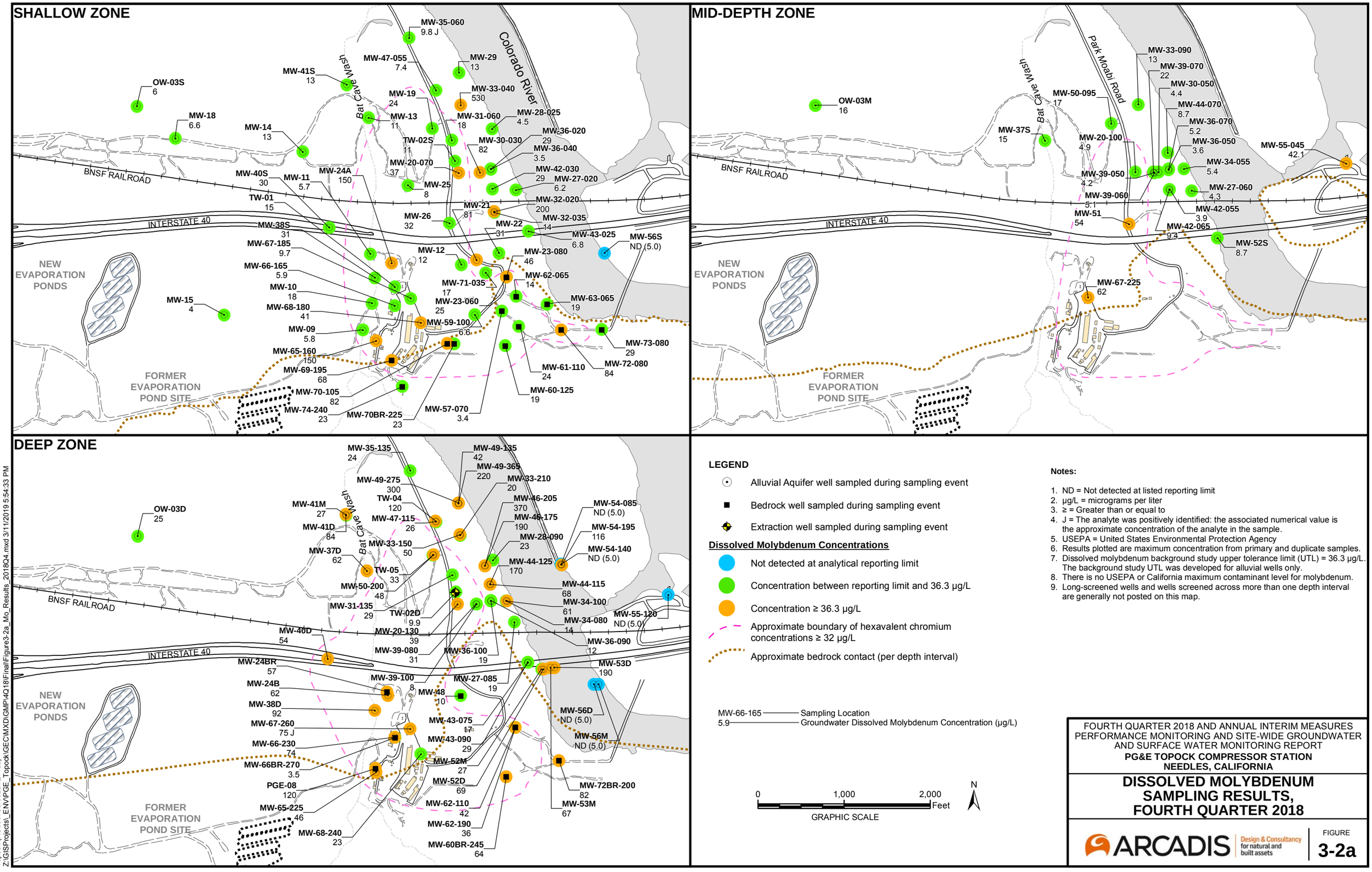
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

Cr(VI) SAMPLING RESULTS, DEEP WELLS IN ALLUVIAL AQUIFER AND BEDROCK, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3-1c

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE3-1C_CRVI_DEEP_2018Q4.MXD KSINSABAUGH 3/12/2019 8:15:11 PM



LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event
- Extraction well sampled during sampling event

Dissolved Molybdenum Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 36.3 µg/L
- Concentration ≥ 36.3 µg/L
- Approximate boundary of hexavalent chromium concentrations ≥ 32 µg/L
- Approximate bedrock contact (per depth interval)

MW-66-165 ——— Sampling Location
5.9 ——— Groundwater Dissolved Molybdenum Concentration (µg/L)

0 1,000 2,000 Feet
GRAPHIC SCALE

N

Notes:

1. ND = Not detected at listed reporting limit
2. µg/L = micrograms per liter
3. ≥ = Greater than or equal to
4. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
5. USEPA = United States Environmental Protection Agency
6. Results plotted are maximum concentration from primary and duplicate samples.
7. Dissolved molybdenum background study upper tolerance limit (UTL) = 36.3 µg/L. The background study UTL was developed for alluvial wells only.
8. There is no USEPA or California maximum contaminant level for molybdenum.
9. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

DISSOLVED MOLYBDENUM SAMPLING RESULTS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE **3-2a**

City: Citrix Div/Group: IM Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
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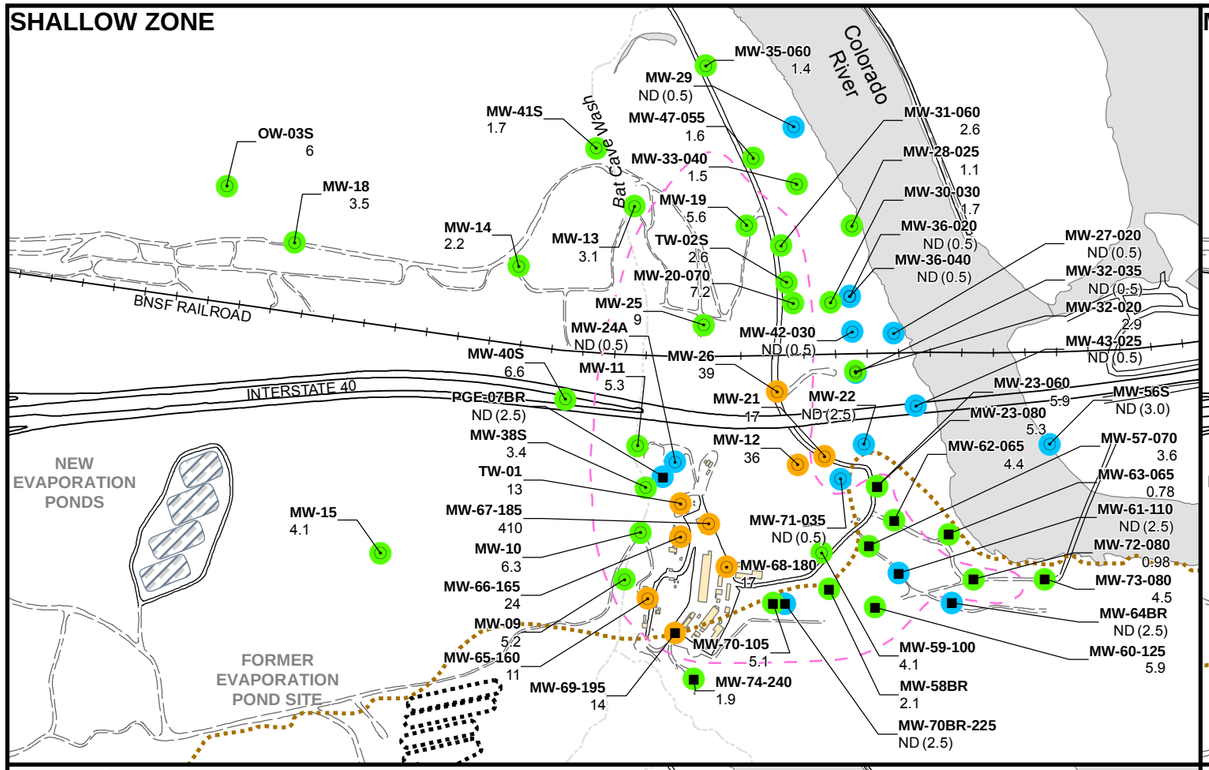
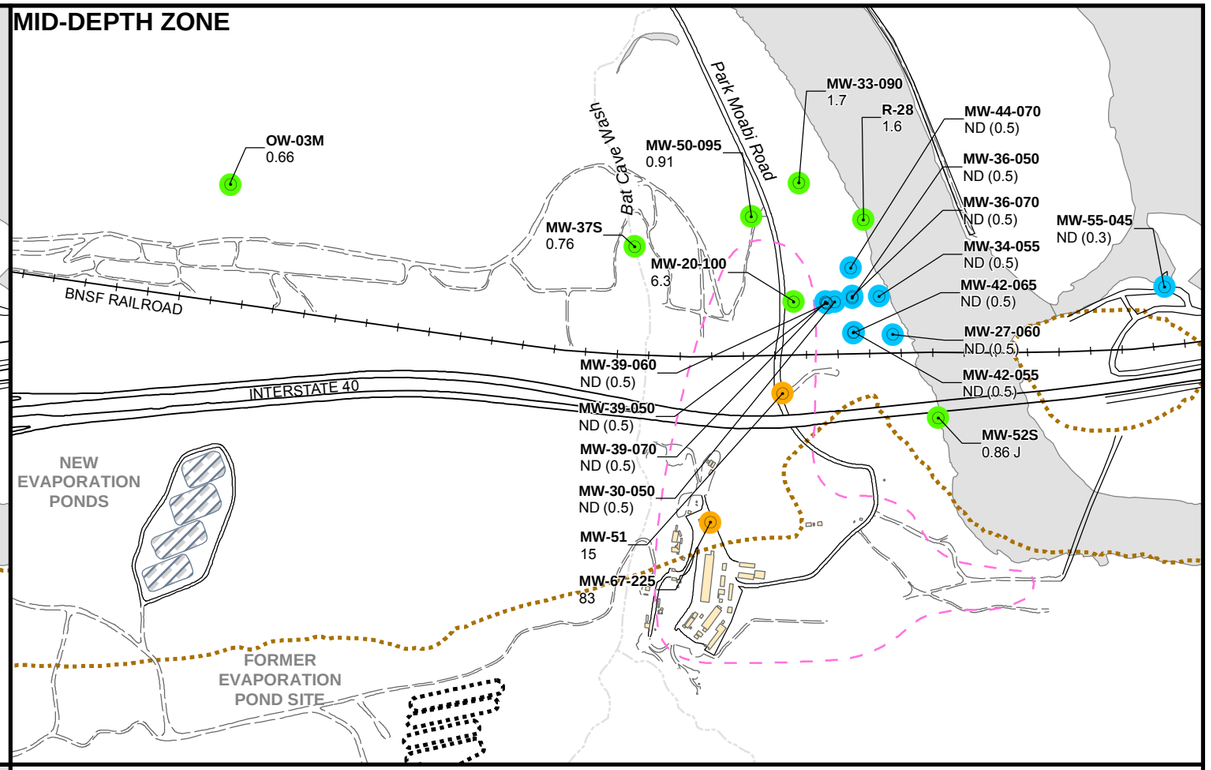
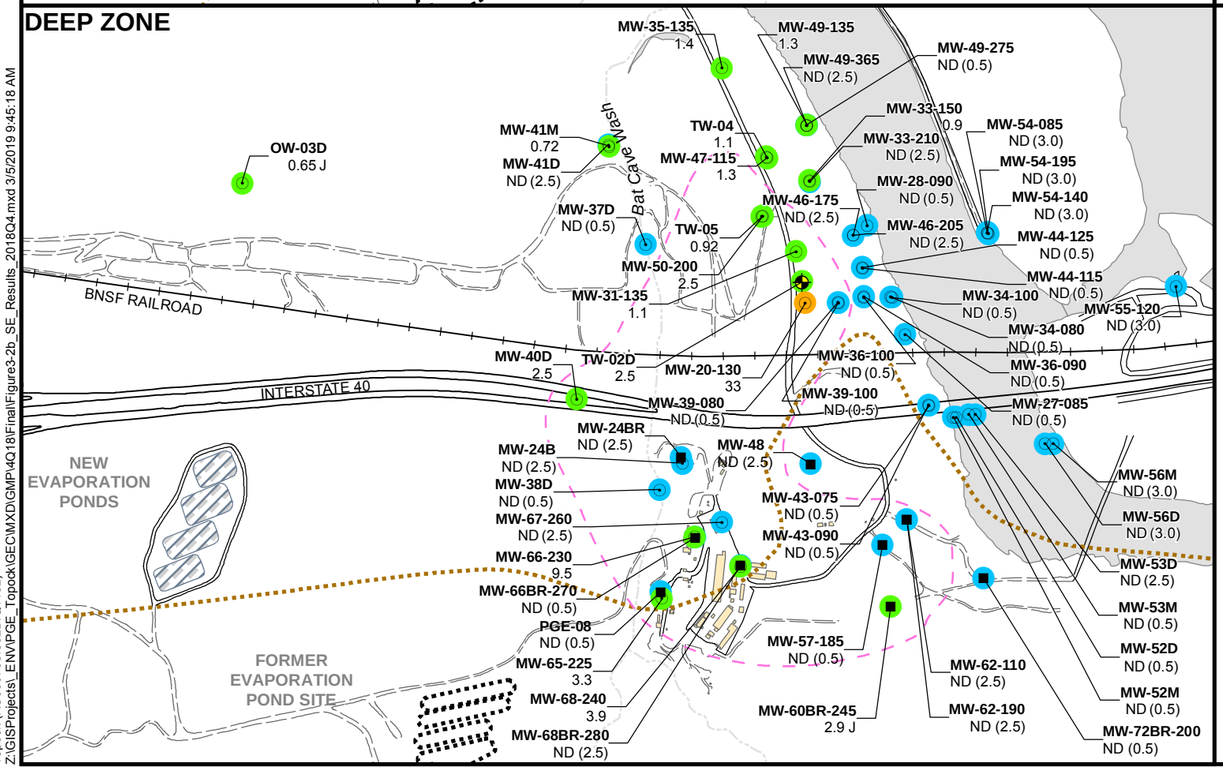


MID-DEPTH ZONE



DEEP ZONE



LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event
- Extraction well sampled during sampling event

Dissolved Selenium Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 10.3 µg/L
- Concentration ≥ 10.3 µg/L
- Approximate boundary of hexavalent chromium concentrations ≥ 32 µg/L
- Approximate bedrock contact (per depth interval)

MW-66-165 ——— Sampling Location
24 ——— Groundwater Dissolved Selenium Concentration (µg/L)

0 1,000 2,000 Feet
GRAPHIC SCALE

N

Notes:

1. ND = Not detected at listed reporting limit
2. µg/L = micrograms per liter
3. ≥ = Greater than or equal to
4. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
5. USEPA = United States Environmental Protection Agency
6. Results plotted are maximum concentration from primary and duplicate samples.
7. Dissolved selenium background study upper tolerance limit (UTL) = 10.3 µg/L. The background study UTL was developed for alluvial wells only.
8. USEPA and California maximum contaminant level (MCL) = 50 ug/L. Comparison to the MCL is not shown on the figure.
9. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

DISSOLVED SELENIUM SAMPLING RESULTS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE **3-2b**

City: Citrix Div/Group: IM Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
Topock (RC000753.8022D.Q4182)
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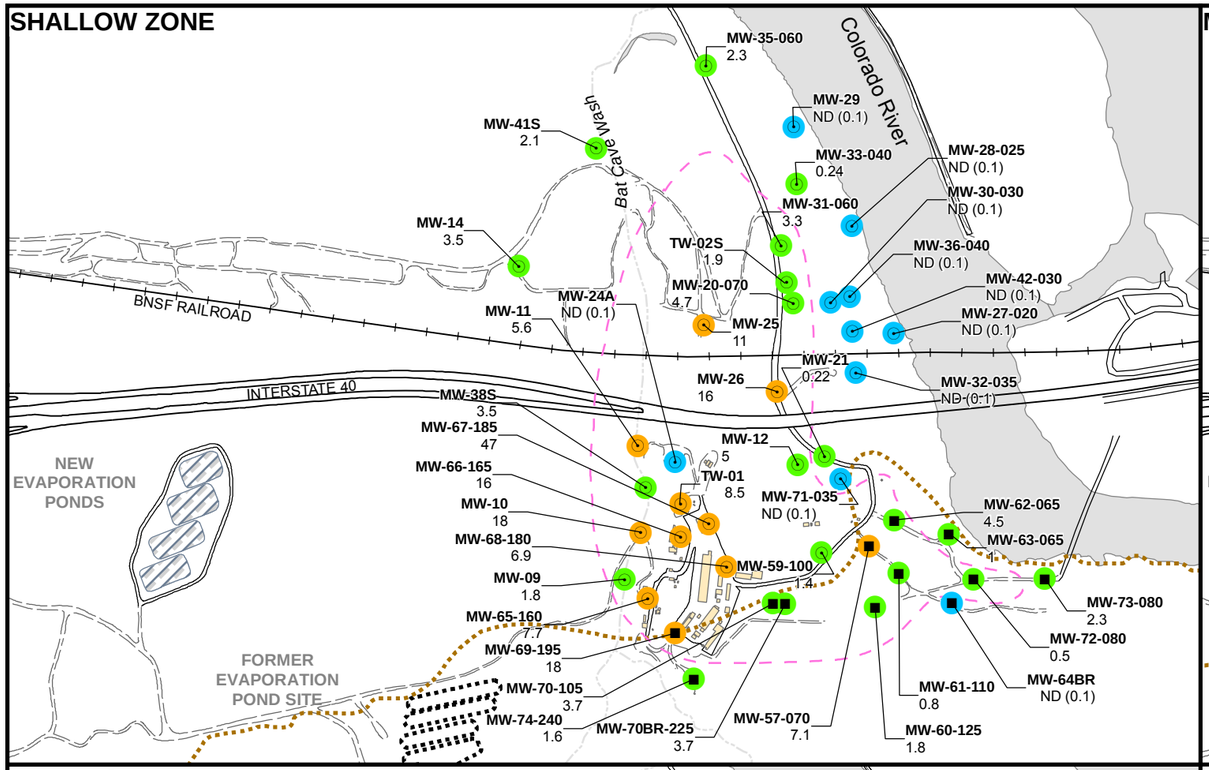
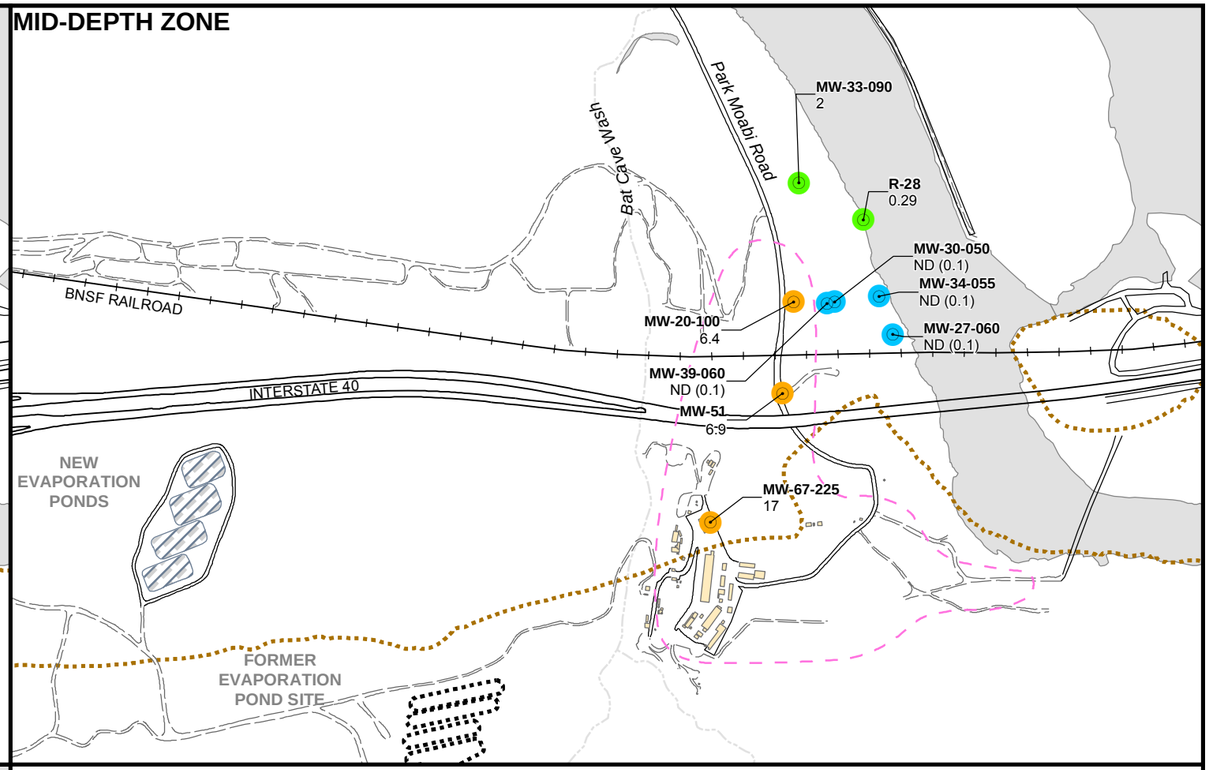
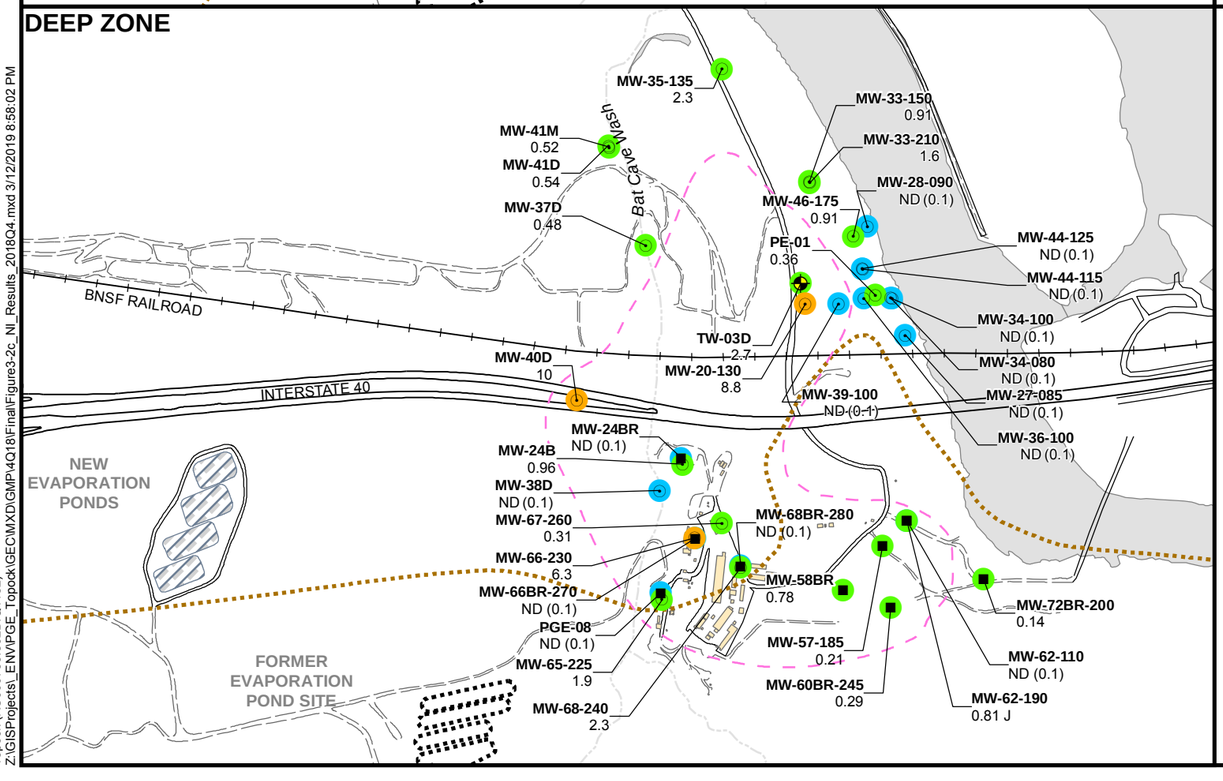


MID-DEPTH ZONE



DEEP ZONE



LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event
- Extraction well sampled during sampling event

Nitrate / Nitrite as Nitrogen Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 5.03 mg/L
- Concentration ≥ 5.03 mg/L
- Approximate boundary of hexavalent chromium concentrations ≥ 32 µg/L
- Approximate bedrock contact (per depth interval)

MW-68-240 ——— Sampling Location
2.3 ——— Groundwater Nitrate/Nitrite as Nitrogen Concentration (mg/L)

0 1,000 2,000 Feet
GRAPHIC SCALE

N

Notes:

1. ND = Not detected at listed reporting limit
2. mg/L = milligrams per liter
3. µg/L = micrograms per liter
4. ≥ = Greater than or equal to
5. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
6. Results plotted are maximum concentration from primary and duplicate samples.
7. Nitrate/nitrite as nitrogen background study upper tolerance limit (UTL) = 5.03 mg/L. The background study UTL was developed for alluvial wells only.
8. The United States Environmental Protection Agency maximum contaminant level (MCL) for nitrate as nitrogen = 10 mg/L. Comparison to the MCL is not shown on the figure.
9. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

NITRATE / NITRITE AS NITROGEN SAMPLING RESULTS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE **3-2c**

City: Citrix Div/Group: IM Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
Topock (RC000753.8020.Q4182)
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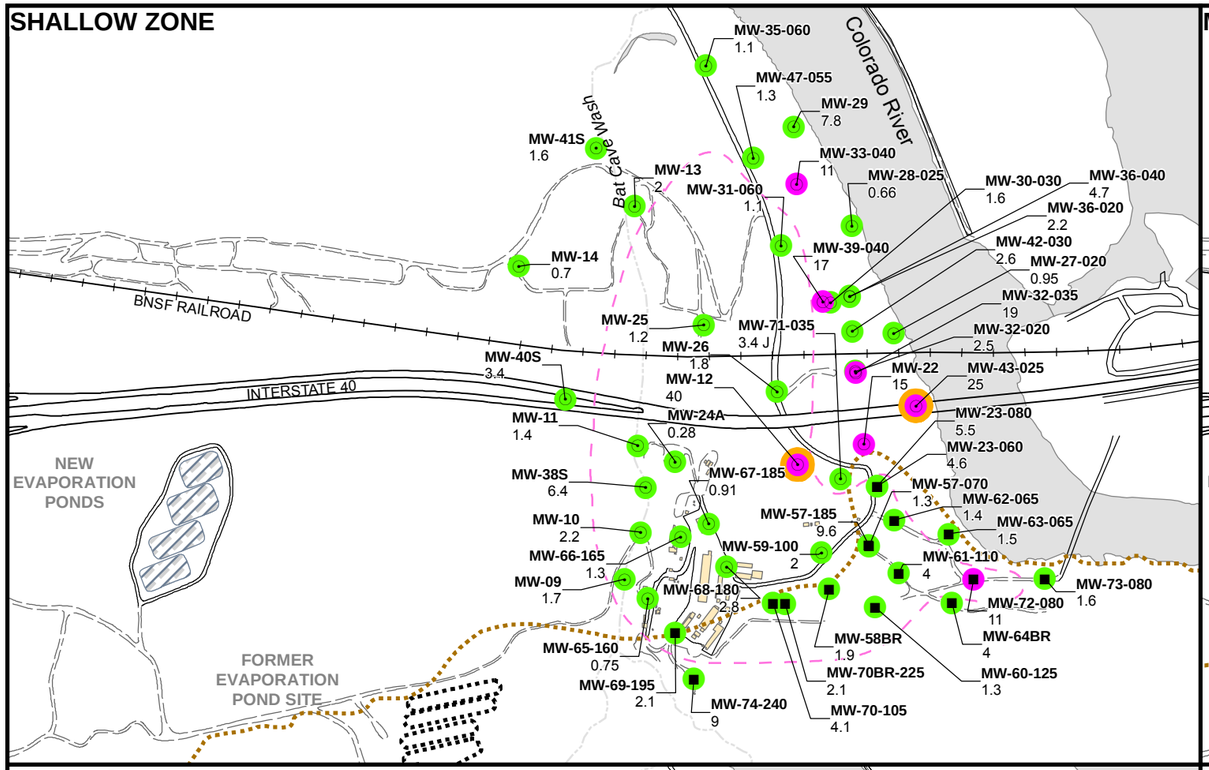
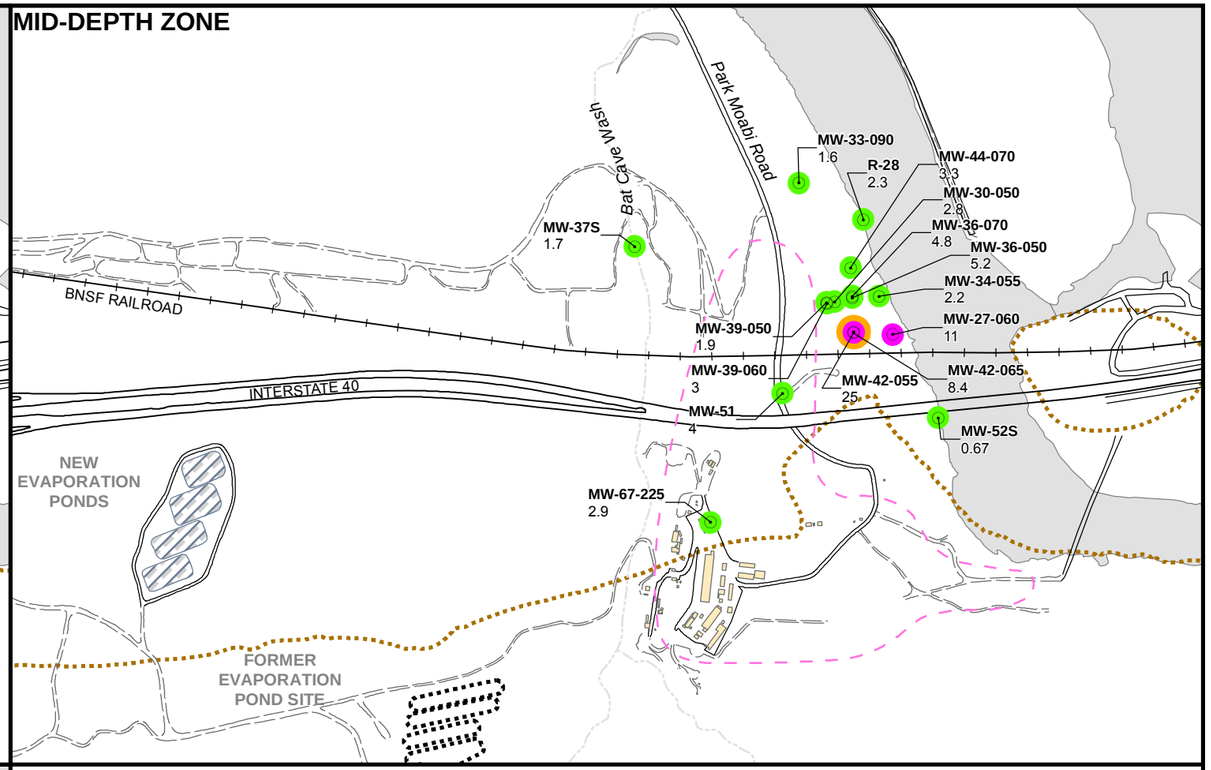
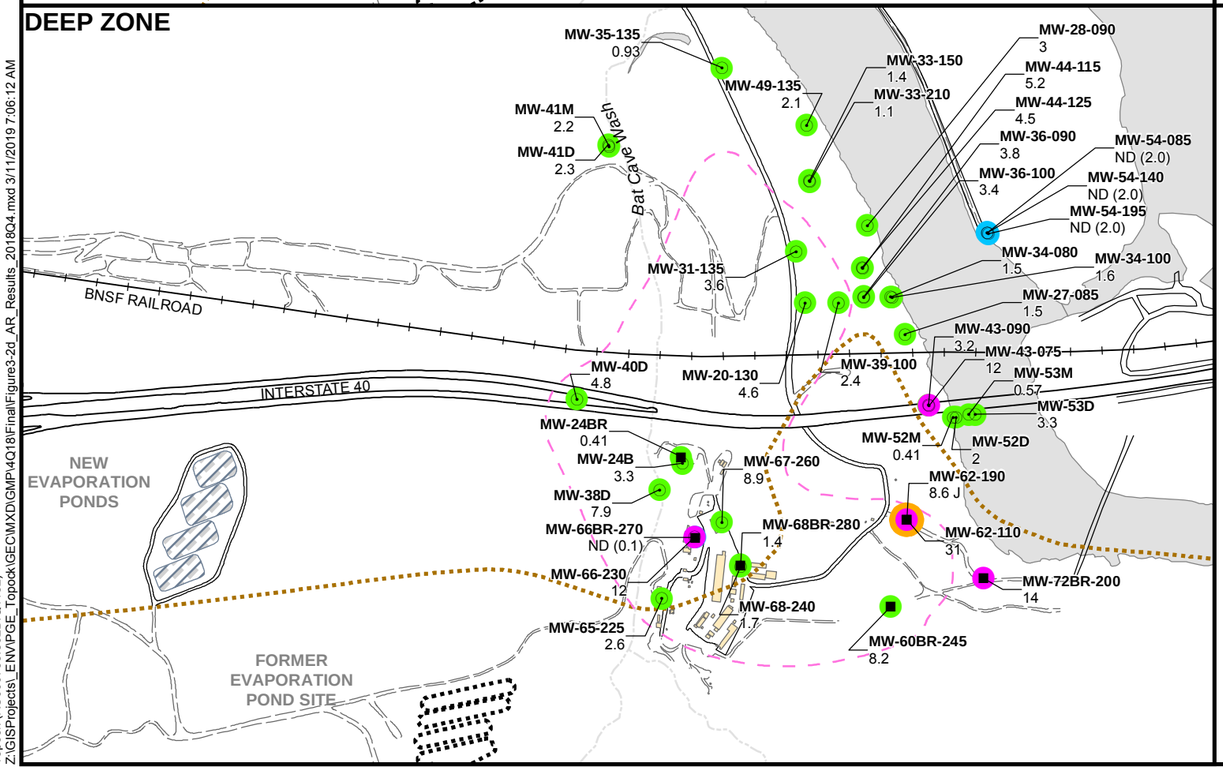


MID-DEPTH ZONE



DEEP ZONE



LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event
- Extraction well sampled during sampling event

Dissolved Arsenic Concentrations

- Not detected at analytical reporting limit
- Concentration ≤ 10.0 µg/L
- Concentration > 10.0 µg/L and < 24.3 µg/L
- Concentration ≥ 24.3 µg/L
- Approximate boundary of hexavalent chromium concentrations ≥ 32 µg/L
- Approximate bedrock contact (per depth interval)

MW-66-225 ——— Sampling Location
2.6 ——— Groundwater Dissolved Arsenic Concentration (µg/L)

0 1,000 2,000 Feet
GRAPHIC SCALE

N

Notes:

1. ND = Not detected at listed reporting limit
2. µg/L = micrograms per liter
3. ≤ = Less than or equal to
4. ≥ = Greater than or equal to
5. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
6. United States Environmental Protection Agency and California maximum containment level = 10.0 µg/L.
7. Results plotted are maximum concentration from primary and duplicate samples.
8. Dissolved arsenic background study upper tolerance limit (UTL) = 24.3 µg/L. The background study UTL was developed for alluvial wells only.
9. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

DISSOLVED ARSENIC SAMPLING RESULTS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3-2d

City: Citrix Div/Group: IM Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
Topock (RC000753.8020.04182)
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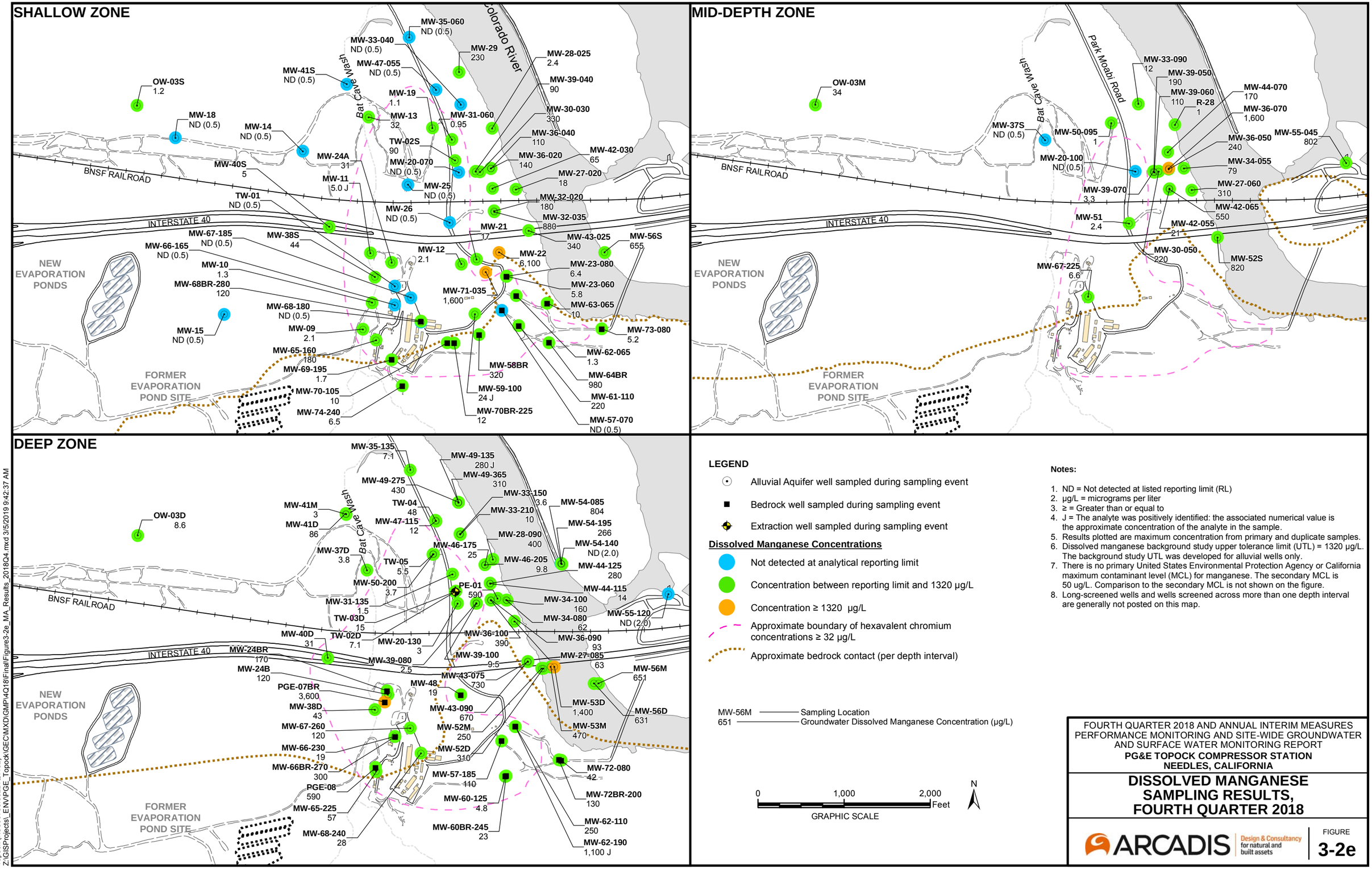

LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event
- Extraction well sampled during sampling event

Dissolved Manganese Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 1320 µg/L
- Concentration ≥ 1320 µg/L
- Approximate boundary of hexavalent chromium concentrations ≥ 32 µg/L
- Approximate bedrock contact (per depth interval)

MW-56M ——— Sampling Location
651 ——— Groundwater Dissolved Manganese Concentration (µg/L)

0 1,000 2,000 Feet
GRAPHIC SCALE

N

Notes:

1. ND = Not detected at listed reporting limit (RL)
2. µg/L = micrograms per liter
3. ≥ = Greater than or equal to
4. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
5. Results plotted are maximum concentration from primary and duplicate samples.
6. Dissolved manganese background study upper tolerance limit (UTL) = 1320 µg/L. The background study UTL was developed for alluvial wells only.
7. There is no primary United States Environmental Protection Agency or California maximum contaminant level (MCL) for manganese. The secondary MCL is 50 ug/L. Comparison to the secondary MCL is not shown on the figure.
8. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

DISSOLVED MANGANESE SAMPLING RESULTS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE **3-2e**

City: Citrix Div/Group: IM Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
Topock (RC000753.802D.Q4182)
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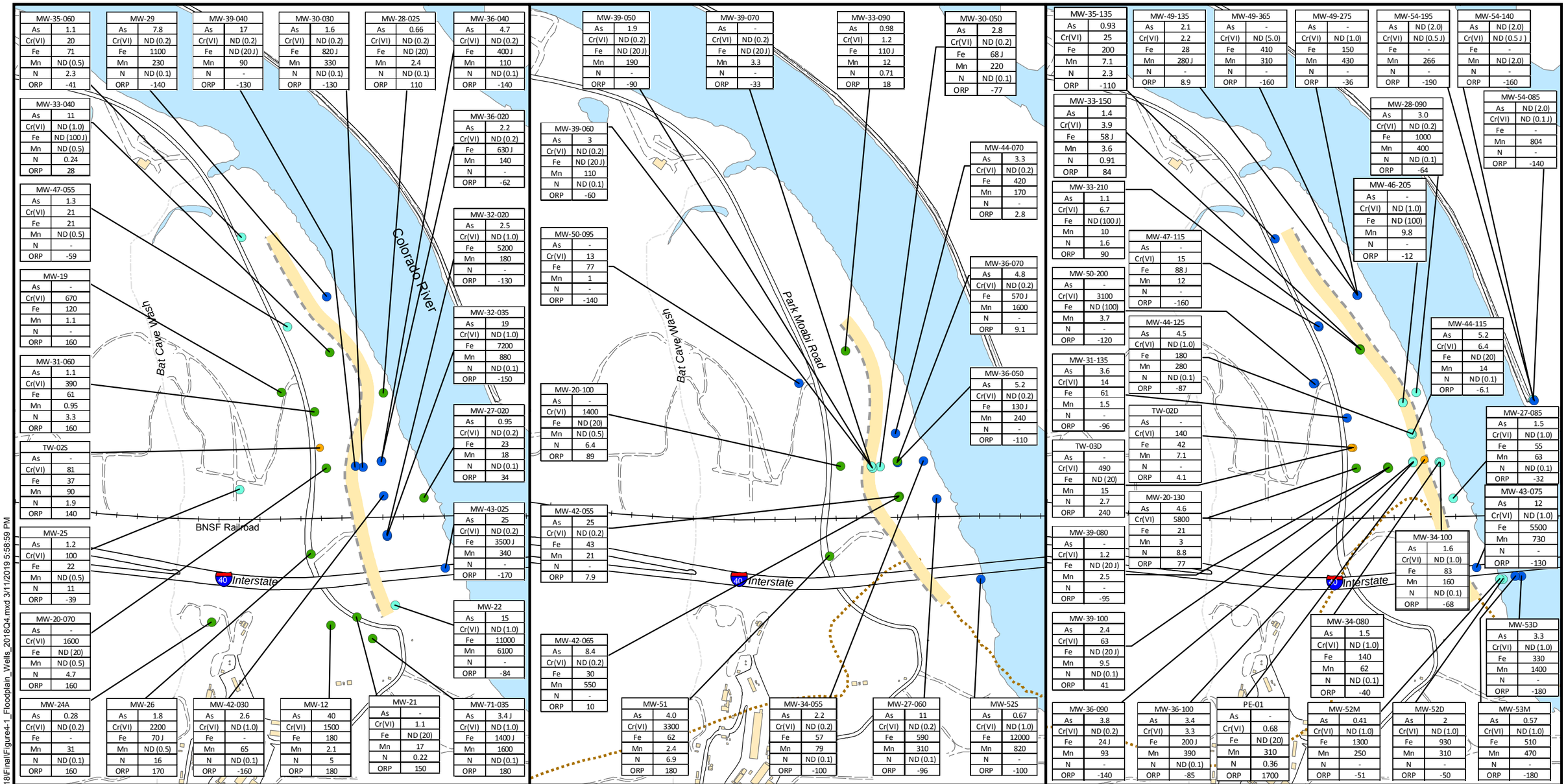

LEGEND

- Approximate limit of reducing groundwater based upon a combination of redox indicator parameters and historical data trends
- Groundwater ORP < -90mV
- -90 mV< Groundwater ORP < 1 mV
- Groundwater ORP > 1 mV
- IM-3 Extraction Wells (TW-02S, TW-02D, TW-03D, and PE-01)

<BOL>Notes:</BOL>
1. ND = Not detected at listed reporting limit.
2. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
3. mg/L - milligrams per liter
4. mV = millivolts
5. µg/L = micrograms per liter
6. < = Less than
7. > = Greater than

Location ID	
As	Dissolved arsenic (µg/L)
Cr(VI)	Hexavalent chromium (µg/L)
Fe	Dissolved iron (µg/L)
Mn	Dissolved manganese (µg/L)
N	Nitrate/nitrite as nitrogen (mg/L)
ORP	Oxidation reduction potential (mV)

0 400 800 Feet

GRAPHIC SCALE

N

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

DISTRIBUTION OF CR(VI), GEOCHEMICAL INDICATOR PARAMETERS, AND IN-SITU BY-PRODUCTS IN FLOODPLAIN WELLS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4-1

City: Citrix Div/Group: IM Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
Topock (RC000753.802D.04182)
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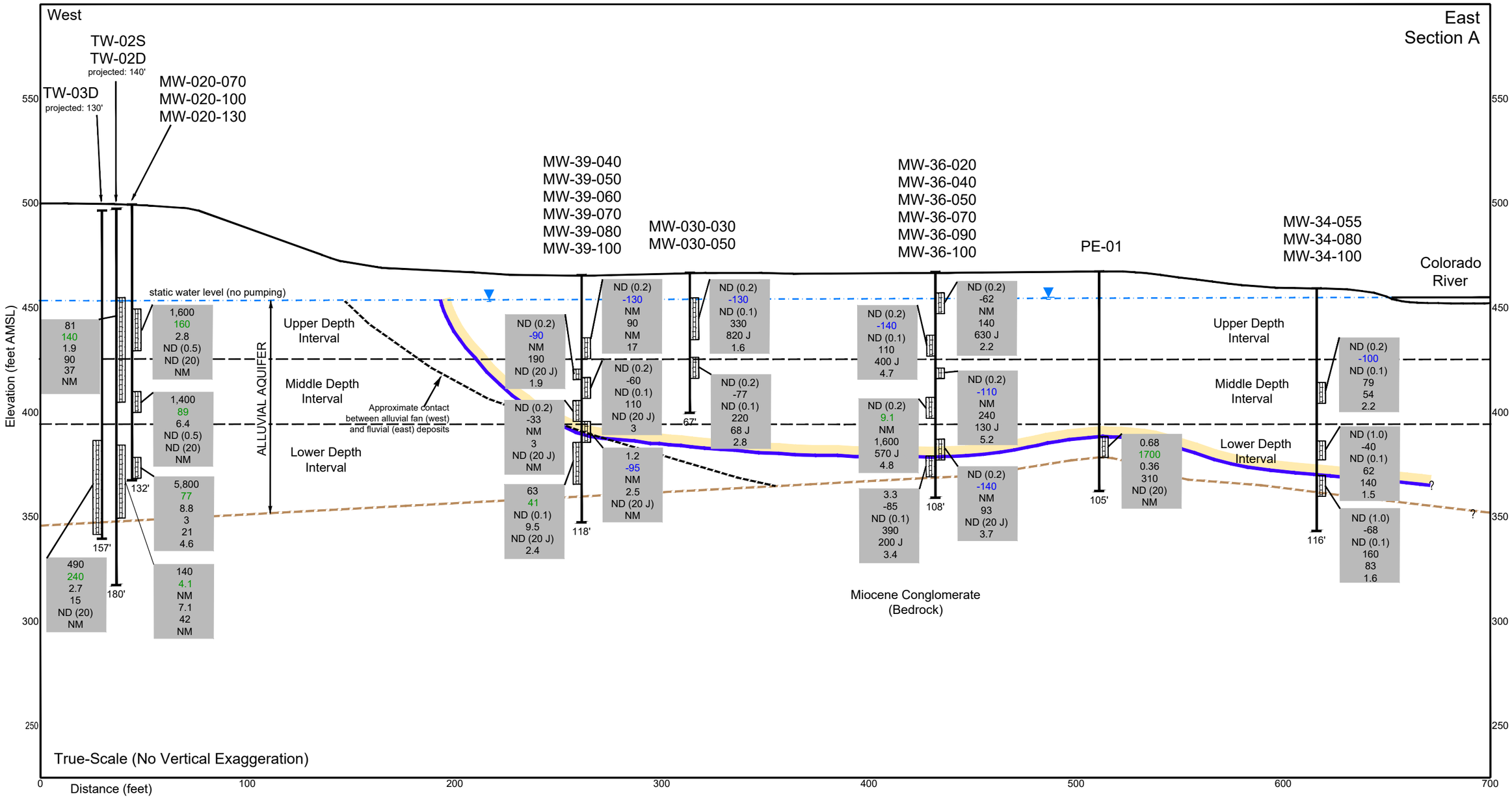

Legend

water level

well screen

boring depth (feet)

Groundwater Results

550	Hexavalent chromium, micrograms per liter (µg/L)
100	Oxidation reduction potential (ORP), millivolts (mV)
3	Nitrate/Nitrite as nitrogen, milligrams per liter (mg/L)
12	Dissolved manganese (Mn), (µg/L)
ND (20)	Dissolved iron (Fe), (µg/L)
NM	Dissolved arsenic (As), (µg/L)

Approximate limit of reducing water; based on a combination of redox indicator parameters and historical data trends.

Notes:
> = greater than
< = less than
J = concentration or reporting limit estimated by laboratory or data validation
ND = not detected at listed reporting limit
NM = not measured
Groundwater ORP < -90 mV
-90 mV < Groundwater ORP < 1 mV
Groundwater ORP > 1 mV

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

DISTRIBUTION OF CR(VI), GEOCHEMICAL INDICATOR PARAMETERS, AND IN-SITU BY-PRODUCTS IN FLOODPLAIN WELLS CROSS-SECTION A, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4-2

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\PACIFIC GAS & ELECTRIC\TOPOCK GW MONITORING REPORTING\2019\RC000753.802D\01-DWG\RC000753.802B_FIGURE_4-2.dwg LAYOUT: 4-2 SAVED: 3/12/2019 8:56 AM ACADVER: 23.0S (LMS TECH) PAGESETUP: C-LB-PDF-GMS PLOTSTYLETABLE:
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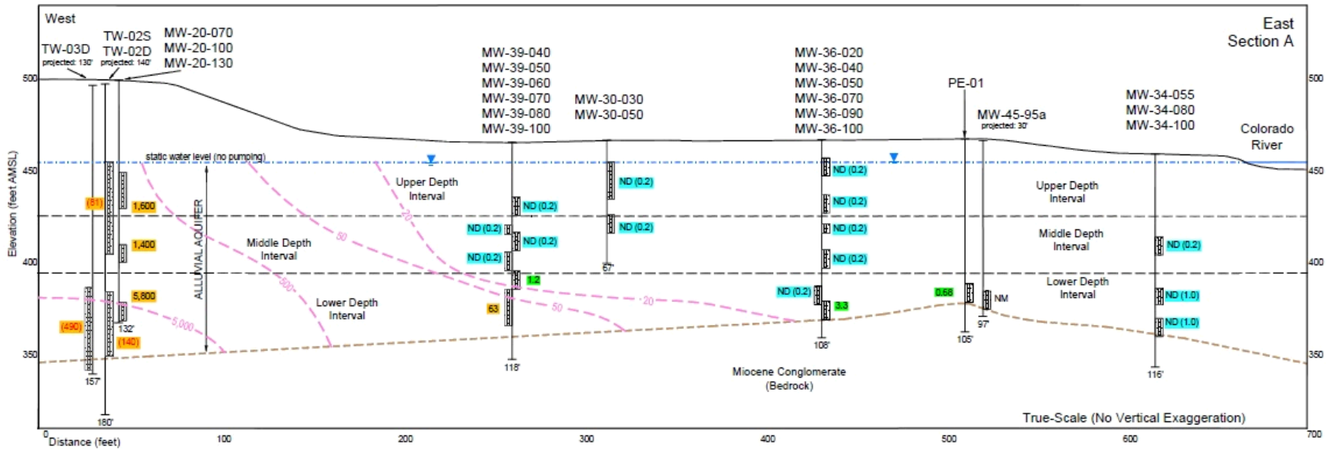
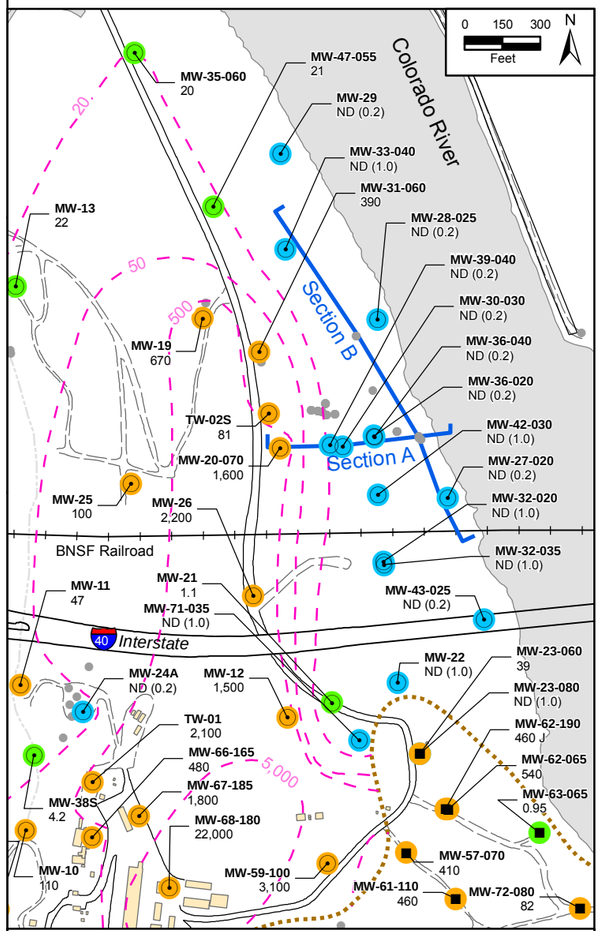
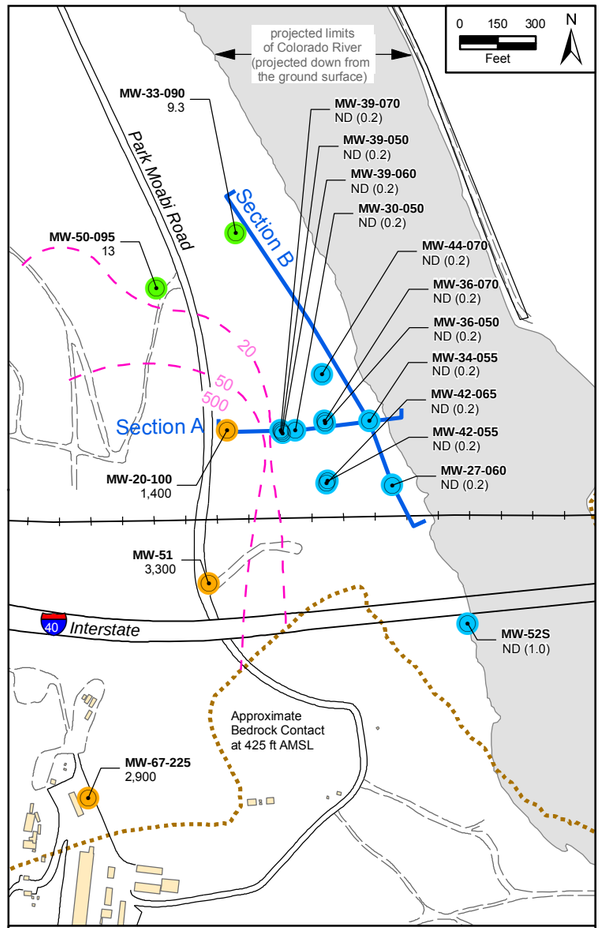
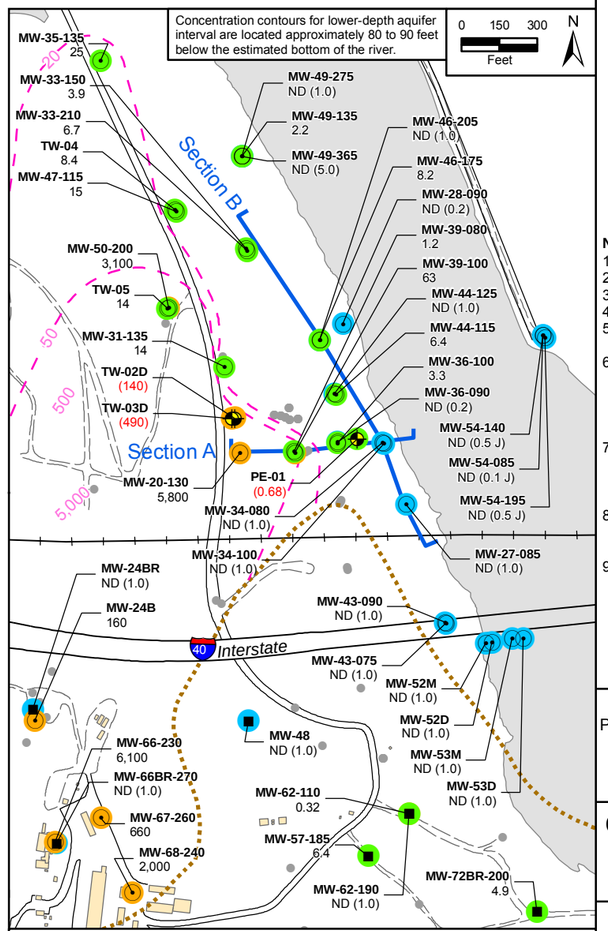




Shallow Wells (Upper Depth Interval)



Mid-Depth Wells (Middle Depth Interval)



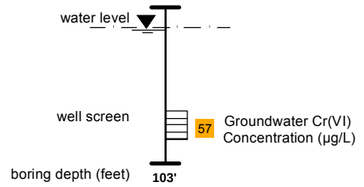
Deep Wells (Lower Depth Interval)

LEGEND

- Alluvial Aquifer well sampled during sampling event
- Bedrock well sampled during sampling event
- Extraction well sampled during sampling event
- Well not sampled during sampling event

Cr(VI) Concentrations

- Not detected at analytical reporting limit
- Concentration between reporting limit and 32 µg/L
- Concentration ≥ 32 µg/L
- Inferred Cr(VI) concentration contour within Alluvial Aquifer depth interval
- Approximate bedrock contact (per depth interval)
- Hydrogeologic Section



MW-11 — Sampling Location
47 — Groundwater Cr(VI) Concentration (µg/L)
(140) — Groundwater Cr(VI) Concentration (µg/L) not used for contouring

Notes:

1. ND = Cr(VI) not detected at analytical reporting limit.
2. µg/L = micrograms per liter
3. ≥ = greater than or equal to
4. Cr(VI) = Hexavalent Chromium
5. J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
6. The Cr(VI) concentration contours of 20 and 50 µg/L are shown in accordance with Department of Toxic Substances Control's 2005 Interim Measure performance monitoring directive, which was established for containment of Cr(VI) concentrations greater than 20 µg/L in the floodplain portion of the Alluvial Aquifer.
7. The 20 and 50 µg/L contours for Cr(VI) are estimated based on available groundwater sampling, hydrogeologic and geochemical data. There are no data confirming the existence of Cr(VI) under the Colorado River.
8. Extraction wells PE-01, TW-02S, TW-02D, and TW-03D are not included in contouring. These wells draw water from a larger area and do not represent Cr(VI) concentrations at their specific locations.
9. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

CR(VI) CONCENTRATIONS IN ALLUVIAL AQUIFER AND BEDROCK, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE 5-1

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE5-1_GMP_CR6_2018Q4_MAX.MXD 3/12/2019 8:42:11 PM

DIV/GROUP:IMDV DB:G.STOWELL PM:(Reqd) LYR:ON=*:OFF=*REF* ACADVER: 23.0S (LMS TECH) PAGESETUP: C:\LB-PDF-GMS PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/10/2019 4:23 PM BY: STOWELL, GARY
C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\PACIFIC GAS & ELECTRIC\TOPOCK GW MONITORING REPORTING\2019\RC000753.802D01-DWG\RC000753.802B XSect B 2Q18.dwg LAYOUT: 5-2 SAVED: 3/10/2019 4:23 PM
XREFS: IMAGES:

North

South
Section B

Cross-Section Parallel to the Colorado River

BNSF
Railroad

MW-33-040
MW-33-090
MW-33-150
MW-33-210

MW-46-175
MW-46-205

MW-28-025
MW-28-090
projected: 110'

MW-44-070
MW-44-115
MW-44-125

MW-34-055
MW-34-080
MW-34-100

MW-27-020
MW-27-060
MW-27-085

Elevation (feet AMSL)

700
600
500
400
300
200
100
0

water table (average 455' AMSL)

Upper Depth Interval
Middle Depth Interval
Lower Depth Interval

ALLUVIAL AQUIFER

Oldest Alluvium

Fluvial Deposits

Approximate geologic contact between alluvial fan and (0.2) fluvial deposits

ND (1)
9.3
3.9
6.7
237'

ND (0.2)
ND (0.2)
8.2
ND (1)
216'

ND (0.2)
6.4
ND (1)
134'

Upper Depth Interval
ND (0.2)
Middle Depth Interval
ND (0.2)
ND (1)
ND (1)
Lower Depth Interval
116'

ND (0.2)
ND (0.2)
ND (1)
107'

Miocene Conglomerate
(Bedrock)

True-Scale (No Vertical Exaggeration)

-100 0 100 200 300 400 500 600 700 800 900 1,000 1,100 1,200 1,300 1,400
Distance (feet)

Notes:
AMSL = above mean sea level.
µg/L = micrograms per liter.
ND = not detected at listed reporting limit
≥ = greater than or equal to
Cr(VI) = hexavalent chromium

1. See Figure 5-1 for location of this cross-section.

Legend

water level
well screen
boring depth (feet)
103'
14
Groundwater Cr(VI) Concentration (µg/L)

20
Inferred hexavalent chromium contours (µg/L) in Alluvial Aquifer.

Cr(VI) Concentrations

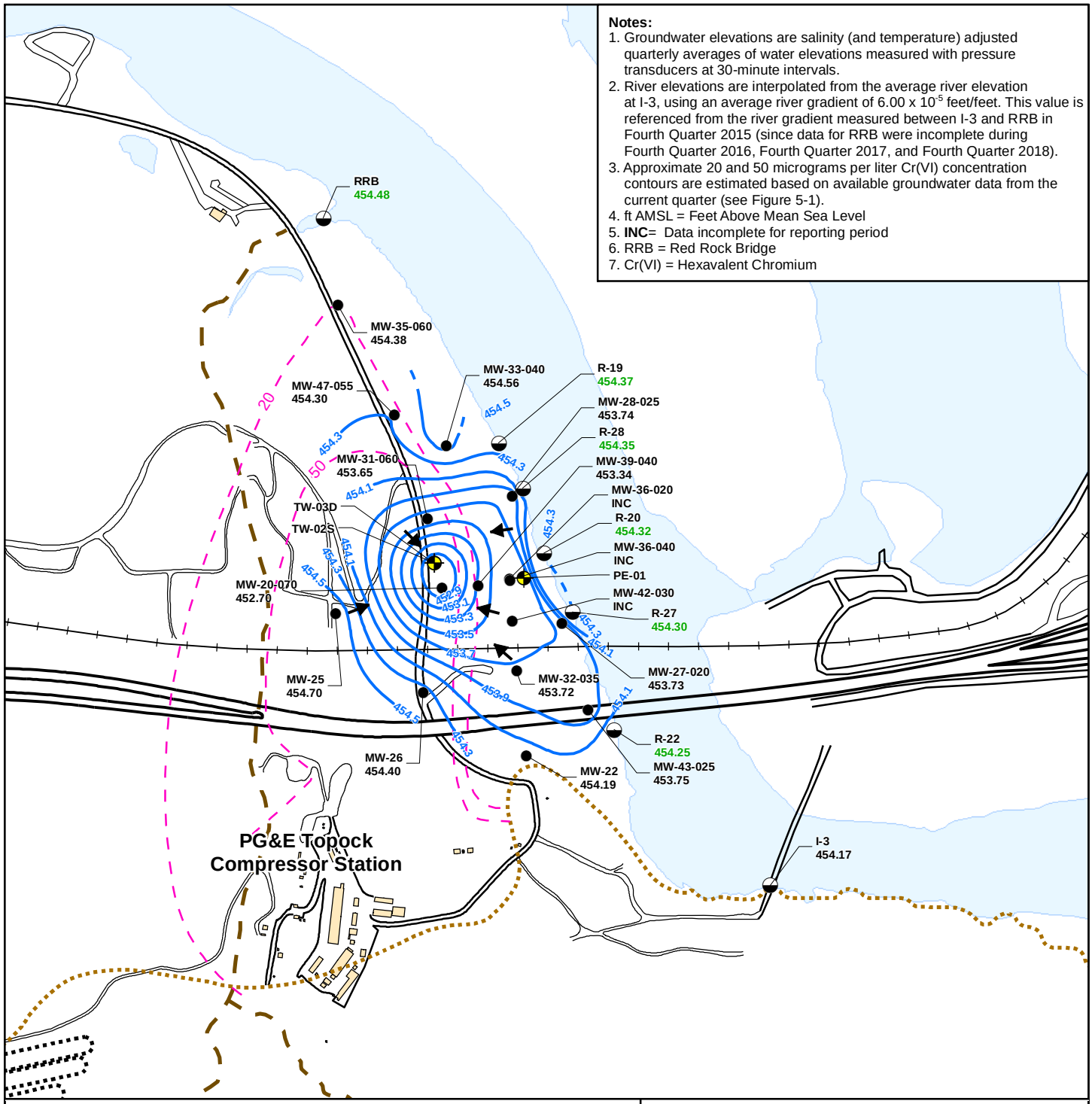
- Not detected at analytical reporting limit
- Concentration between reporting limit and 32 µg/L
- Concentration ≥ 32 µg/L

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Cr(VI) CONCENTRATIONS FLOODPLAIN CROSS-SECTION B, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5-2



FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

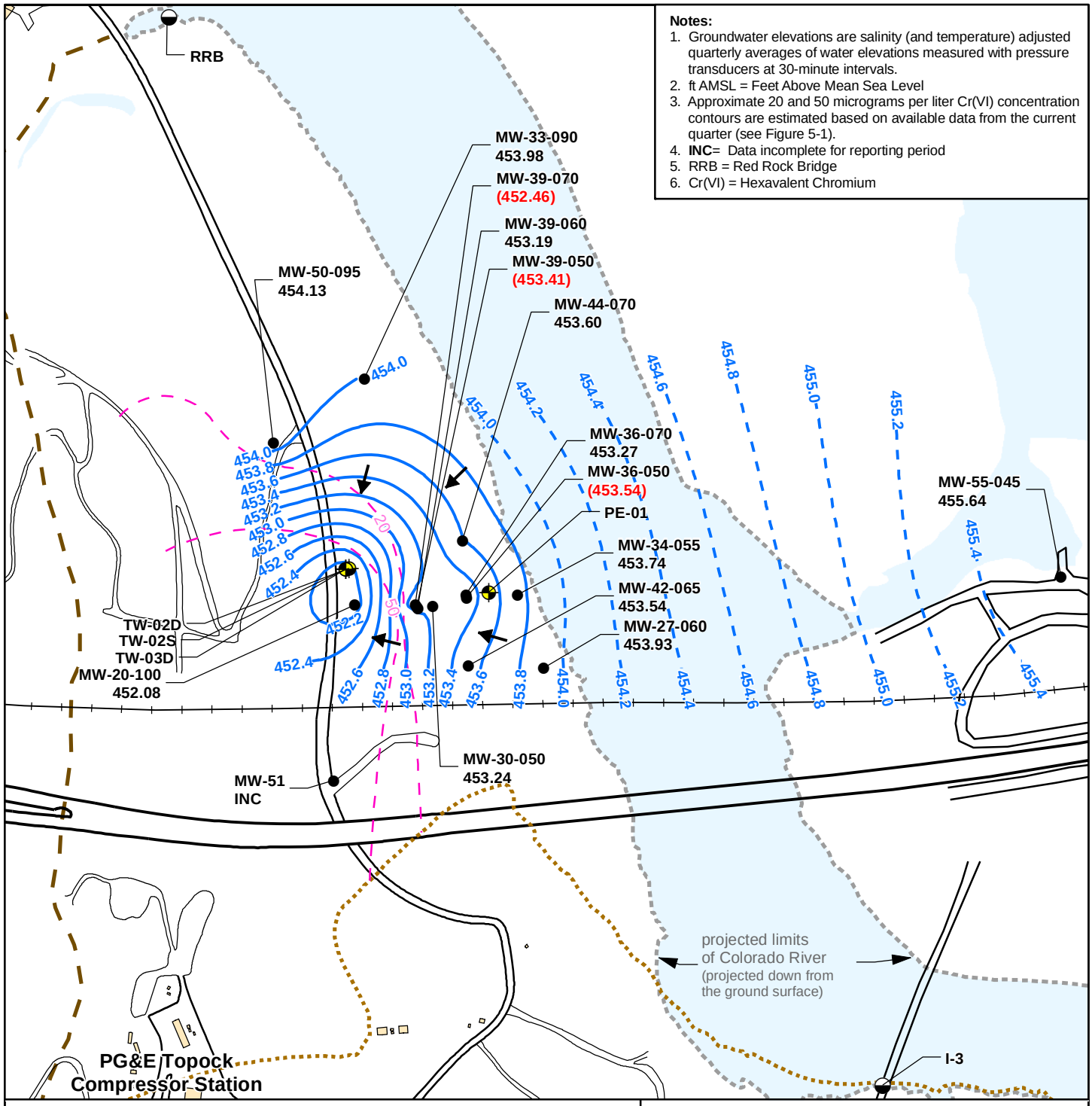
AVERAGE GROUNDWATER ELEVATIONS IN SHALLOW WELLS AND RIVER ELEVATIONS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE

5-3a

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE5-3A_2018Q4_GWE_SHALLOW.MXD 3/12/2019 8:43:22 PM



Notes:

1. Groundwater elevations are salinity (and temperature) adjusted quarterly averages of water elevations measured with pressure transducers at 30-minute intervals.
2. ft AMSL = Feet Above Mean Sea Level
3. Approximate 20 and 50 micrograms per liter Cr(VI) concentration contours are estimated based on available data from the current quarter (see Figure 5-1).
4. **INC**= Data incomplete for reporting period
5. RRB = Red Rock Bridge
6. Cr(VI) = Hexavalent Chromium

LEGEND

- Extraction Well
- River Location
- Monitoring Well
- Bedrock Contact at 425 ft AMSL Elevation
- Interpreted Groundwater Flow Direction
- Groundwater Elevation Contour 0.2 ft (dashed where inferred)
- Inferred Cr(VI) concentration (micrograms per liter) contour

0 500 1,000
Feet

MW-30-050 — Gauging Location
453.24 — Average Groundwater Elevation (ft AMSL)
(452.46) — Elevation in red parentheses not used for contouring

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

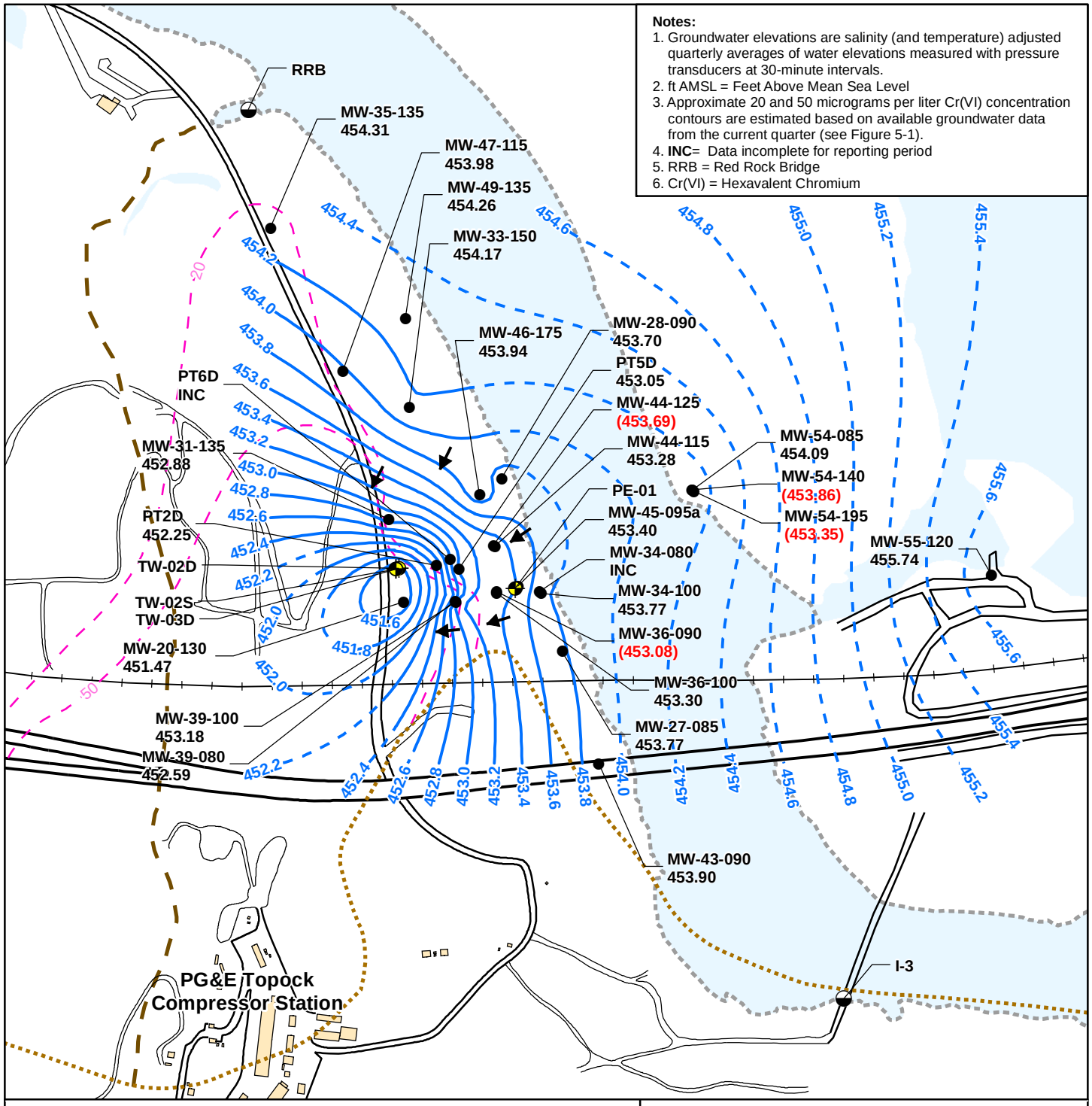
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

AVERAGE GROUNDWATER ELEVATIONS IN MID-DEPTH WELLS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5-3b

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE5-3B_2018Q4_GWE_MIDDEPTH.MXD 3/11/2019 7:30:35 AM



FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

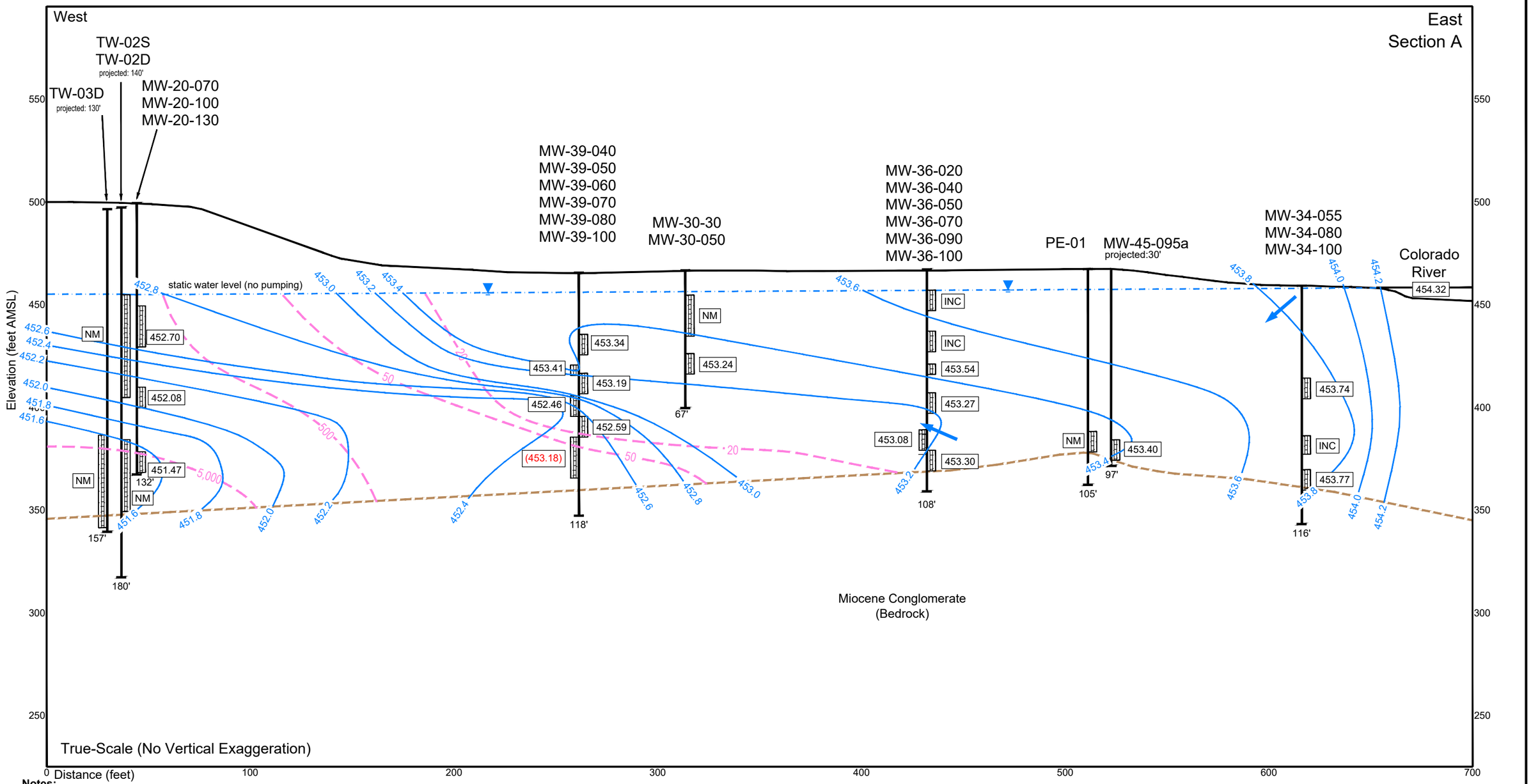
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

AVERAGE GROUNDWATER ELEVATIONS IN DEEP WELLS, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE **5-3c**

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE5-3C_2018Q4_GWE_DEEP.MXD 3/11/2019 6:06:27 PM



Notes:

1. Results show average groundwater elevations for November and December 2018 measured with pressure transducers at 30-minute intervals.
2. Groundwater elevations are adjusted for salinity and temperature.
3. Colorado River elevation shown as interpolated Fourth Quarter 2018 average from R-20 river monitoring location.
4. The hexavalent chromium contour lines are from Figure 5-1.
5. Groundwater elevations shown in red parenthesis are not used for contouring.

AMSL = above mean sea level.
NM = well not measured or used in contouring.
ppb = concentration in parts per billion
INC = quarterly pressure transducer data incomplete due to malfunction, inaccessibility, or low water level conditions

Legend

MW-030-050
Inferred water table
well screen and associated average groundwater elevation (feet AMSL)
456.02
boring depth (feet)
67'

20
Inferred hexavalent chromium contour (ppb) in Alluvial Aquifer based on Current Quarter

453.4
Inferred groundwater head contour

Interpreted groundwater flow direction

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

AVERAGE GROUNDWATER ELEVATIONS FOR WELLS IN FLOODPLAIN CROSS-SECTION A, FOURTH QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5-4

DIV/GROUP:IMDV DB:G.STOWELL PM:(Reqd) LYR:ON=*;OFF=*REF* ACADVER: 23.0S (LMS TECH) PAGESETUP: C:\LB-PDF-GMS PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/12/2019 9:08 AM BY: STOWELL, GARY
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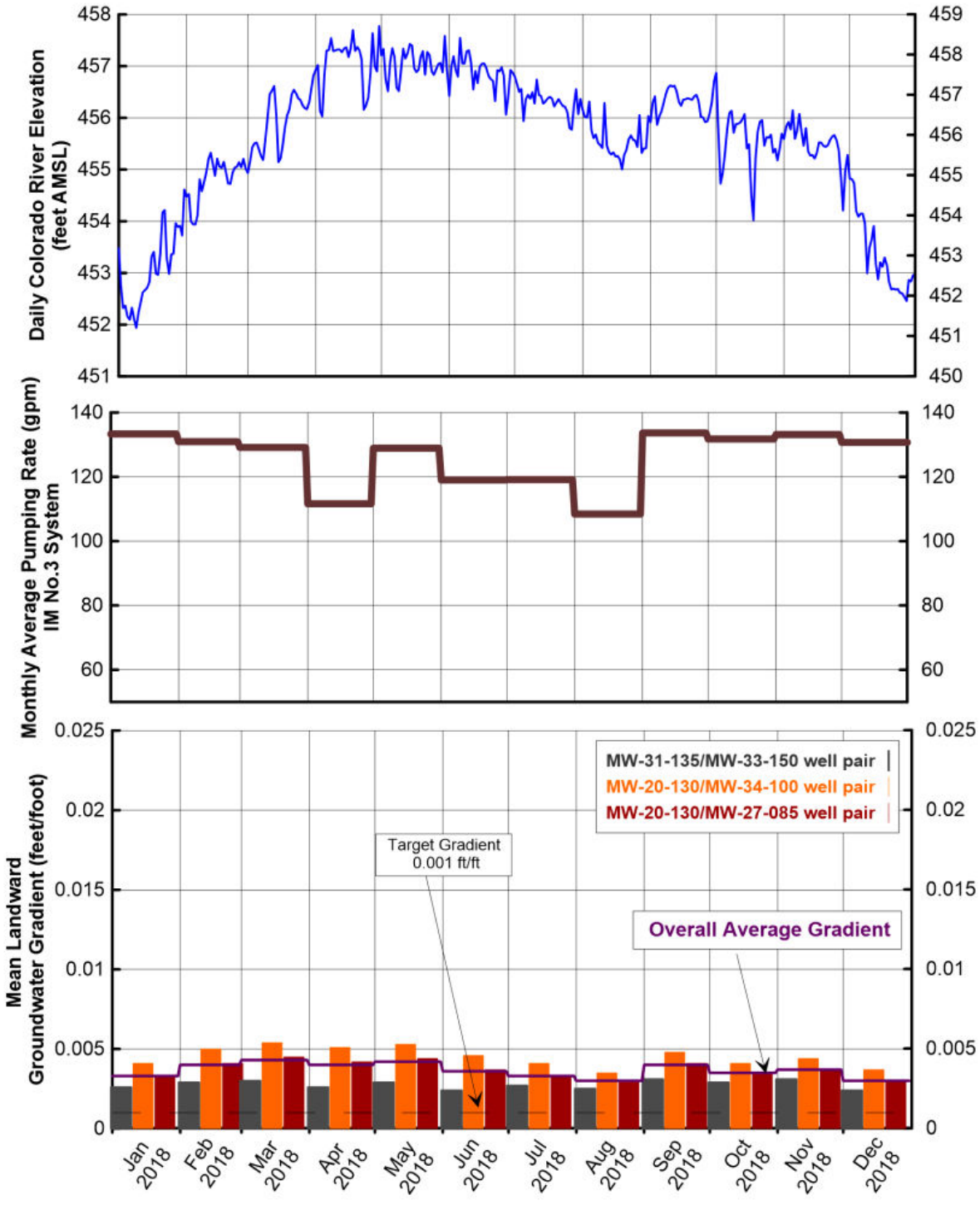


Notes:

1. For Interim Measure (IM) pumping, the target landward gradient for well pairs is 0.001 feet/foot.
2. Pumping rate plotted is the combined rate of extraction wells TW-03D and PE-01 in operation each month.
3. Beginning August 2017, MW-20-130 approved for gradient compliance (instead of MW-45-095) at central and southern well pairs during months when PE-01 is not run for gradient control.
4. AMSL = above mean sea level.
5. gpm = gallons per minute

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

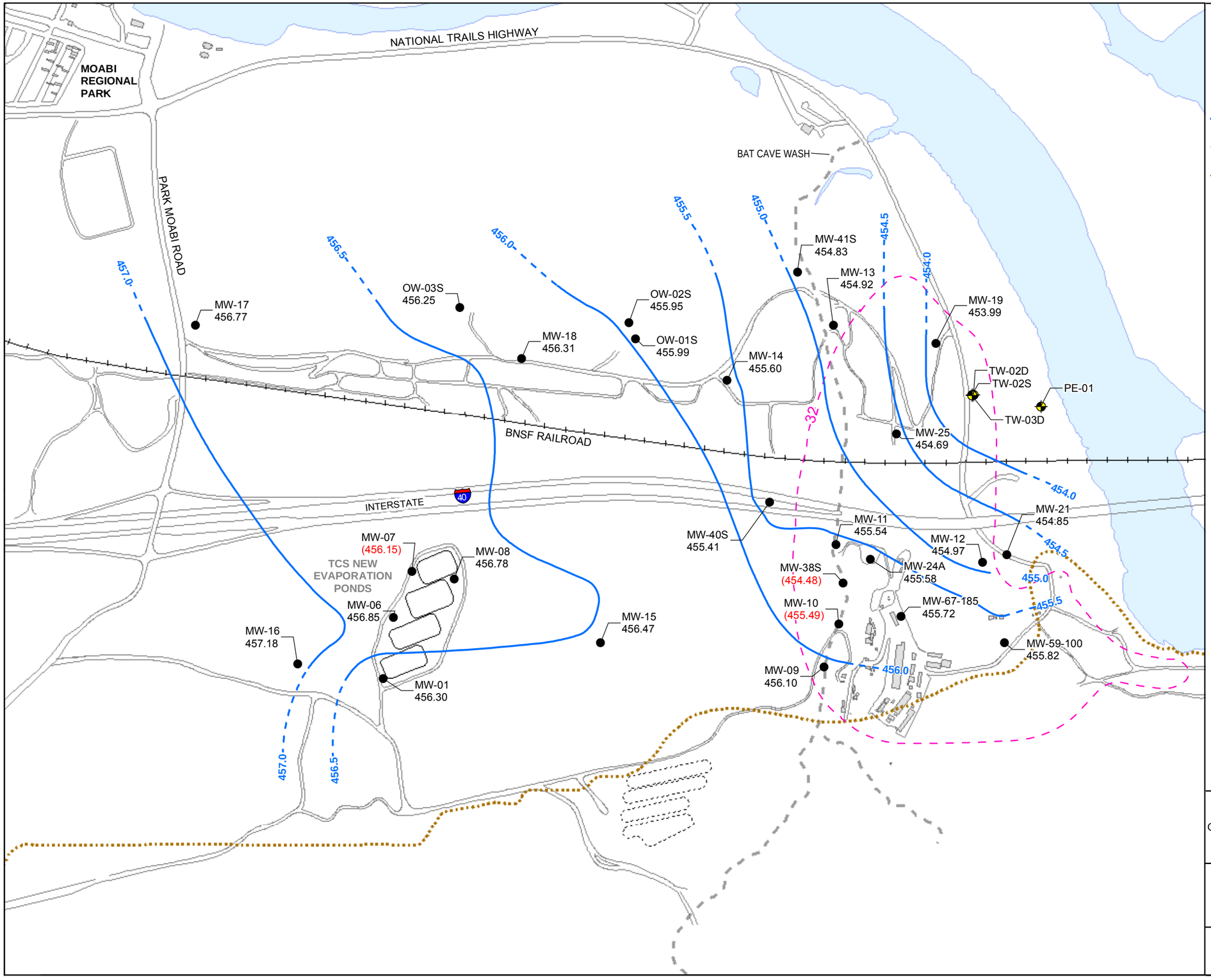
MEASURED HYDRAULIC GRADIENTS, RIVER ELEVATION, AND PUMPING RATE, 2018 ANNUAL REPORTING PERIOD

ARCADIS Design & Consultancy for natural and built assets

FIGURE

5-5

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE5-5_RIVER_GRADIENTS_2018Q4.MXD 3/1/2019 12:19:58 PM



LEGEND

- Alluvial Aquifer Monitoring Well
- Extraction Well
- Groundwater Elevation Contour 0.5 ft (dashed where inferred)
- Approximate boundary of "shallow" wells with Cr(VI) concentrations ≥ 32 µg/L
- Approximate bedrock contact at 455 feet above mean sea level.

MW-19 — Monitoring Well Location
453.99 — Groundwater Elevation (ft AMSL)
(452.46) — Groundwater Elevation not used for contouring (ft AMSL)

Notes:
1. Extraction wells TW-03D and PE-01 are pumping from lower portion of the aquifer.
2. Groundwater gradients shown on this figure show transient conditions in the aquifer at the time of measurement and may not reflect the expected average groundwater flow directions.
3. AMSL = Above Mean Sea Level
4. ft = Feet

0 500 1,000
Feet

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

GROUNDWATER ELEVATION MAP SHALLOW ZONE OF THE ALLUVIAL AQUIFER (WATER TABLE), DECEMBER 12, 2018

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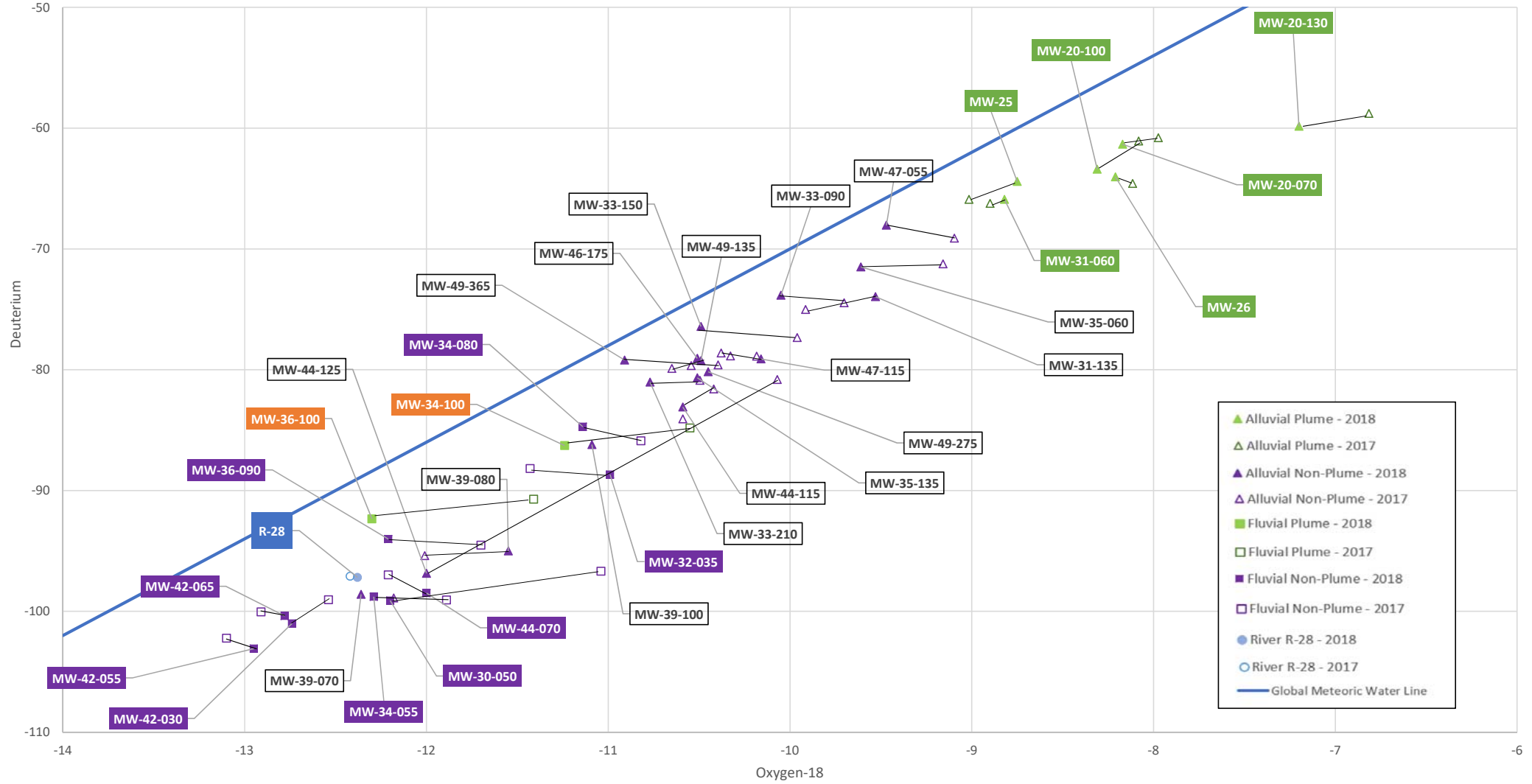
FIGURE 5-6

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE5-6_GWE MAP_SHALLOW_2018Q4.MXD KSINSABAUGH 3/11/2019 7:32:46 AM



Notes:

1. Oxygen-18 and deuterium are presented in parts per thousand.

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

STABLE ISOTOPES OF OXYGEN AND DEUTERIUM, FOURTH QUARTER 2018

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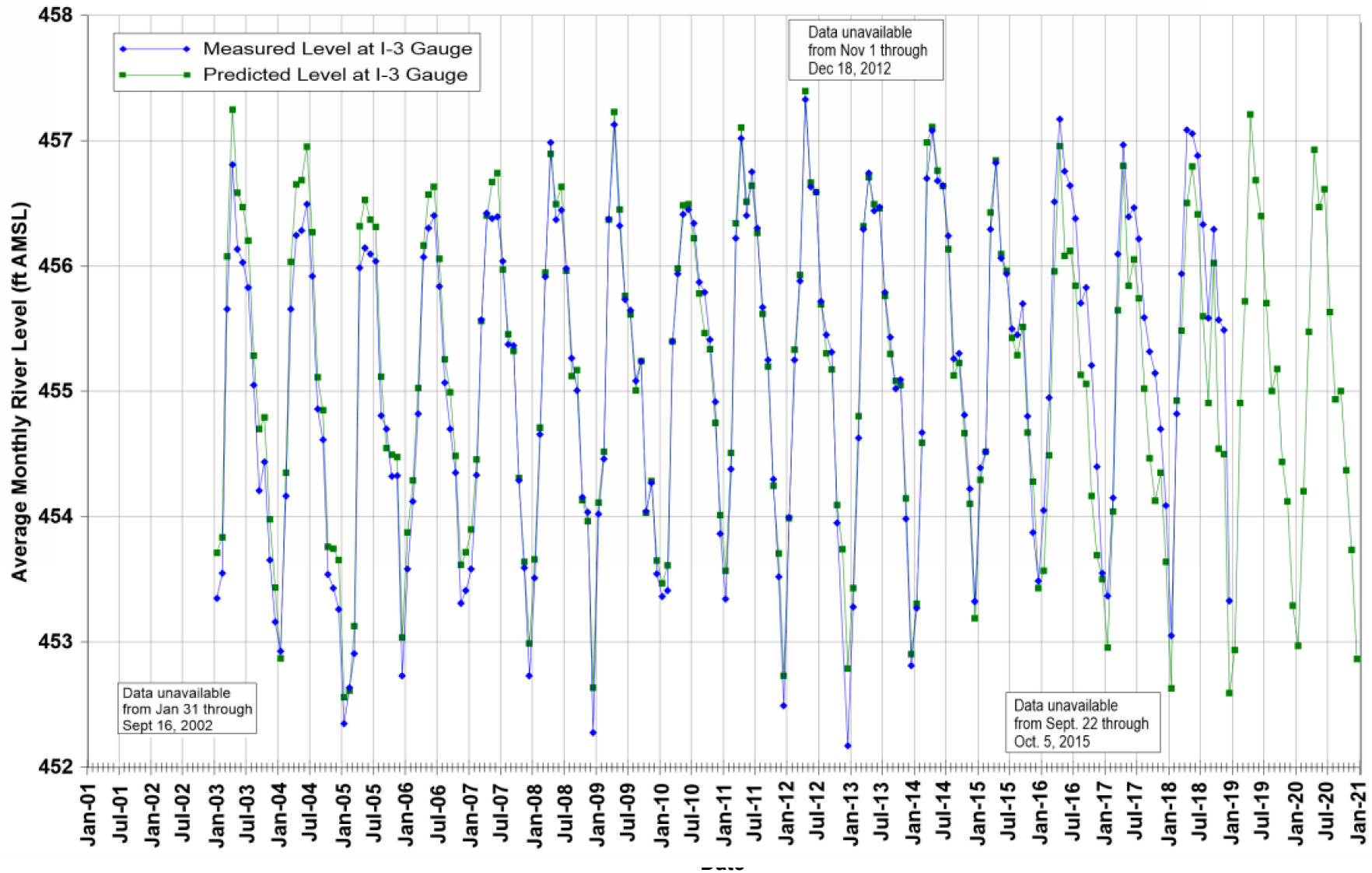
FIGURE

5-7



Notes:
Projected river level for each month in the past is calculated based on the preceding months United States Bureau of Reclamation (USBR) projections of Davis Dam release and stage in Lake Havasu. Future projections of river level at 1-3 are based upon USBR projections presented in the January 24-Month Study (Report dated January 14, 2019). These data are reported monthly by the US Department of Interior, at https://www.usbr.gov/uc/water/crsp/studies/24Month_ 01.pdf

ft AMSL = feet above mean sea level

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

PAST AND PREDICTED FUTURE RIVER LEVELS AT TOPOCK COMPRESSOR STATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5-8

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\4Q18\FINAL\FIGURE5-6_PREDICTED_RIVER_LEVELS_2018Q4.MXD 3/1/2019 12:15:23 PM

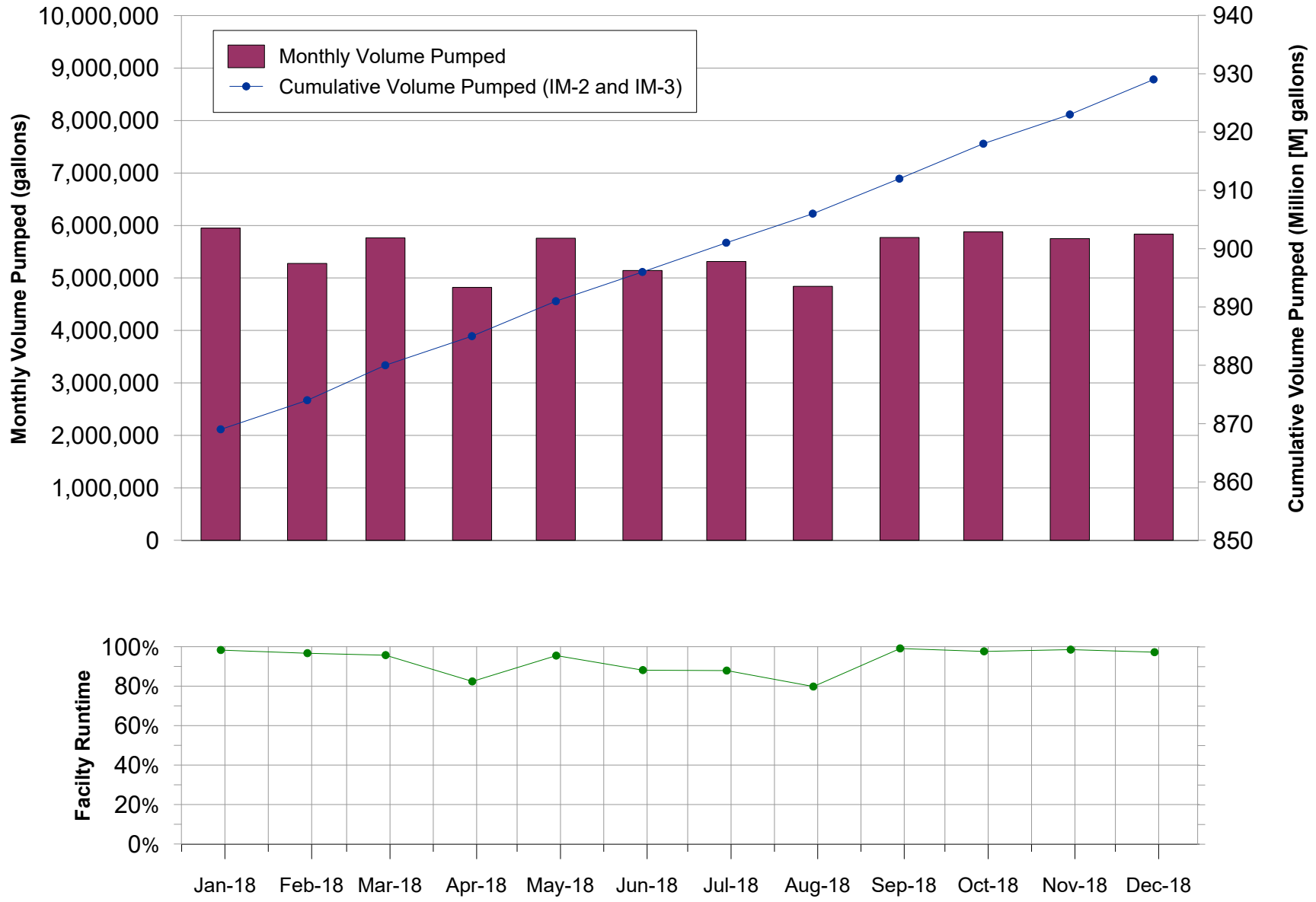


FIGURE 5-9
MONTHLY COMBINED PUMPING VOLUMES AND PERCENT UPTIME, 2018 ANNUAL REPORTING PERIOD
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

APPENDIX A

Lab Reports, Fourth Quarter 2018 (provided on CD with Hard Copy Submittal)

APPENDIX B

Well Inspection and Maintenance Log, Fourth Quarter 2018

Appendix B

Well Inspection and Maintenance Log, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Well/Piezometer	Inspection Date	Survey Mark Present? (Yes/No)	Standing or Ponded Water? (Yes/No)	Lock in Place? (Yes/No)	Evidence of Well Subsidence? (Yes/No)	Well Labeled on Casing or Pad? (Yes/No)	Traffic Poles Intact? (Yes/No)	Concrete Pad Intact? (Yes/No)	Erosion Around Wellhead? (Yes/No)	Steel Casing Intact? (Yes/No)	PVC Cap Present? (Yes/No)	Standing Water in Annulus? (Yes/No)	Well Casing Intact? (Yes/No)	Photo Taken? (Yes/No)	Action Completed?
MW-09	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-10	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-11	12/12/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-12	12/11/2018	Yes	No	Yes	No	Yes	Yes	--	No	Yes	Yes	No	Yes	Yes	--
MW-13	12/04/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-14	12/11/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-15	12/11/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-18	12/06/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-19	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-20-070	12/11/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-20-100	12/04/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-20-130	12/04/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-21	12/11/2018	Yes	No	--	No	Yes	--	--	No	--	Yes	No	Yes	Yes	--
MW-22	12/04/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-23-060	12/11/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-23-080	12/11/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-24A	12/12/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-24B	12/12/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-24BR	12/12/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	--	No	Yes	Yes	--
MW-25	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-26	12/07/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-27-020	12/05/2018	Yes	No	Yes	No	Yes	--	--	No	Yes	Yes	No	Yes	Yes	--
MW-27-060	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-27-085	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-28-025	12/14/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-28-090	12/14/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-29	12/10/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-30-030	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-30-050	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-31-060	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-31-135	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-32-020	12/04/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-32-035	12/04/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-33-040	12/07/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	Yes	Yes	Yes	--
MW-33-090	12/07/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-33-150	12/07/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-33-210	12/07/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-34-055	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-34-080	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-34-100	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-35-060	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-35-135	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-36-020	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-36-040	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-36-050	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-36-070	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-36-090	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-36-100	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-37D	12/06/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-37S	12/06/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-38D	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-38S	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-39-040	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-39-050	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-39-060	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-39-070	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-39-080	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-39-100	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-40D	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--

Appendix B

Well Inspection and Maintenance Log, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Well/Piezometer	Inspection Date	Survey Mark Present? (Yes/No)	Standing or Ponded Water? (Yes/No)	Lock in Place? (Yes/No)	Evidence of Well Subsidence? (Yes/No)	Well Labeled on Casing or Pad? (Yes/No)	Traffic Poles Intact? (Yes/No)	Concrete Pad Intact? (Yes/No)	Erosion Around Wellhead? (Yes/No)	Steel Casing Intact? (Yes/No)	PVC Cap Present? (Yes/No)	Standing Water in Annulus? (Yes/No)	Well Casing Intact? (Yes/No)	Photo Taken? (Yes/No)	Action Completed?
MW-40S	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-41D	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-41M	12/11/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-41S	12/07/2018	Yes	--	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-42-030	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-42-055	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-42-065	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-43-025	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-43-075	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-43-090	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-44-070	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-44-115	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-44-125	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	Yes	Yes	Yes	--
MW-46-175	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-46-205	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-47-055	12/10/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-47-115	12/10/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-48	12/11/2018	Yes	No	Yes	No	Yes	Yes	--	No	Yes	Yes	No	Yes	Yes	--
MW-49-135	12/10/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-49-275	12/10/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-49-365	12/10/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-50-095	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-50-200	12/10/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-51	12/10/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-52D	12/04/2018	Yes	No	No	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-52M	12/04/2018	Yes	No	No	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-52S	12/04/2018	Yes	No	No	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-53D	12/04/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-53M	12/04/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-54-085	12/13/2018	Yes	No	--	No	No	--	Yes	No	No	Yes	No	Yes	Yes	--
MW-54-140	12/13/2018	Yes	No	--	No	No	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-54-195	12/13/2018	Yes	No	No	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-55-045	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-55-120	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-56D	12/13/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-56M	12/13/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-56S	12/13/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-57-050	12/07/2018	Yes	No	No	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-57-070	12/07/2018	Yes	No	No	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-57-185	12/07/2018	Yes	No	No	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-58-065	12/13/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-58BR	12/13/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-59-100	12/07/2018	Yes	No	--	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-60-125	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-60BR-245	12/06/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-61-110	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-62-065	12/07/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-62-110	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-62-190	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-63-065	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-64BR	12/13/2018	Yes	No	Yes	No	Yes	No	Yes	No	--	Yes	No	Yes	Yes	--
MW-65-160	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-65-225	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	--	--	Yes	No	Yes	Yes	--
MW-66-165	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-66-230	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-66BR-270	12/05/2018	--	No	Yes	No	Yes	--	Yes	No	Yes	--	No	Yes	Yes	--
MW-67-185	12/05/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-67-225	12/05/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-67-260	12/05/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--

Appendix B

Well Inspection and Maintenance Log, Fourth Quarter 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Well/Piezometer	Inspection Date	Survey Mark Present? (Yes/No)	Standing or Ponded Water? (Yes/No)	Lock in Place? (Yes/No)	Evidence of Well Subsidence? (Yes/No)	Well Labeled on Casing or Pad? (Yes/No)	Traffic Poles Intact? (Yes/No)	Concrete Pad Intact? (Yes/No)	Erosion Around Wellhead? (Yes/No)	Steel Casing Intact? (Yes/No)	PVC Cap Present? (Yes/No)	Standing Water in Annulus? (Yes/No)	Well Casing Intact? (Yes/No)	Photo Taken? (Yes/No)	Action Completed?
MW-68-180	12/07/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-68-240	12/05/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-68BR-280	12/05/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-69-195	12/07/2018	Yes	No	Yes	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-70-105	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-70BR-225	12/13/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-71-035	12/10/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
MW-72-080	12/06/2018	--	No	--	No	Yes	--	--	No	--	Yes	No	Yes	Yes	--
MW-72BR-200	12/06/2018	--	No	--	No	No	--	--	No	--	Yes	No	Yes	Yes	--
MW-73-080	12/06/2018	--	No	--	No	Yes	--	--	No	--	Yes	Yes	Yes	Yes	--
MW-74-240	12/05/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	--	Yes	No	Yes	Yes	--
OW-03D	12/04/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
OW-03M	12/04/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
OW-03S	12/04/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
PE-01	11/08/2018	--	--	--	--	Yes	--	Yes	--	Yes	--	--	--	--	--
PE-01	12/04/2018	--	No	--	No	Yes	--	Yes	No	Yes	--	--	Yes	No	--
PGE-07BR	12/12/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	--	Yes	Yes	--
PGE-8	12/11/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
TW-01	12/05/2018	Yes	No	--	No	Yes	--	Yes	No	--	Yes	No	Yes	Yes	--
TW-02D	12/04/2018	--	--	--	No	Yes	--	Yes	No	Yes	--	--	Yes	No	--
TW-02S	12/04/2018	--	--	--	No	Yes	--	Yes	No	Yes	--	--	Yes	No	--
TW-03D	10/02/2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TW-03D	11/08/2018	--	--	--	--	Yes	--	Yes	--	Yes	--	--	--	No	--
TW-03D	12/04/2018	--	--	--	--	Yes	--	Yes	No	Yes	--	No	Yes	No	--
TW-04	12/11/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
TW-05	12/04/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--

Notes:

-- = not applicable

APPENDIX C

Field Forms, 2018 Annual Reporting Period (provided on CD with Hard Copy Submittal)

APPENDIX D

Field Water Quality Parameters, 2018 Annual Reporting Period

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
C-BNS	--	02/21/18	SW	12.40	8.5	1,010	140	1	650	0.50
C-BNS	--	01/03/18	SW	13.00	8.3	1,060	200	2	680	0.53
C-BNS	--	06/12/18	SW	21.70	8.2	951	110	2	610	0.47
C-BNS	--	09/12/18	SW	22.80	8.1	983	91	2	630	0.46
C-BNS	--	12/11/18	SW	14.40	7.8	991	80	2	640	0.49
C-CON-D	--	02/22/18	SW	12.60	8.6	1,000	130	2	650	0.50
C-CON-D	--	01/04/18	SW	12.30	8.3	1,050	140	2	680	0.52
C-CON-D	--	06/13/18	SW	20.90	8.1	950	100	3	610	0.47
C-CON-D	--	09/13/18	SW	22.10	7.6	980	94	3	630	0.48
C-CON-D	--	12/12/18	SW	13.70	7.7	984	77	2	630	0.49
C-CON-S	--	02/22/18	SW	12.70	8.6	1,000	150	1	650	0.50
C-CON-S	--	01/04/18	SW	12.40	8.3	1,040	140	1	670	0.52
C-CON-S	--	06/13/18	SW	21.00	8.1	952	99	2	610	0.47
C-CON-S	--	09/13/18	SW	22.10	8.1	981	92	2	630	0.48
C-CON-S	--	12/12/18	SW	13.70	7.7	986	78	2	630	0.49
C-I-3-D	--	02/21/18	SW	12.10	8.4	1,010	150	2	650	0.50
C-I-3-D	--	01/03/18	SW	11.80	8.1	1,060	240	2	680	0.53
C-I-3-D	--	06/12/18	SW	21.30	8.1	951	120	3	670	0.47
C-I-3-D	--	09/12/18	SW	22.40	8.1	982	90	3	630	0.48
C-I-3-D	--	12/11/18	SW	14.10	7.8	984	76	2	630	0.49
C-I-3-S	--	02/21/18	SW	12.10	8.4	1,000	150	2	650	0.50
C-I-3-S	--	01/03/18	SW	11.90	8.2	1,060	240	1	680	0.53
C-I-3-S	--	06/12/18	SW	21.00	8.1	951	120	2	610	0.47
C-I-3-S	--	09/12/18	SW	22.40	8.1	988	91	2	630	0.48
C-I-3-S	--	12/11/18	SW	14.00	7.9	985	78	2	630	0.49
C-MAR-D	--	02/22/18	SW	12.40	8.8	1,000	150	3	650	0.50
C-MAR-D	--	01/04/18	SW	10.30	8	1,190	180	9	770	0.60
C-MAR-D	--	06/13/18	SW	21.10	8	954	130	7	610	0.47
C-MAR-D	--	09/13/18	SW	22.40	8.1	980	88	8	630	0.48
C-MAR-D	--	12/12/18	SW	12.70	7.3	1,590	69	9	1,040	0.82
C-MAR-S	--	02/22/18	SW	12.50	8.7	1,000	150	2	650	0.50
C-MAR-S	--	01/04/18	SW	10.70	8.1	1,180	190	5	760	0.59
C-MAR-S	--	06/13/18	SW	21.10	8	954	100	3	610	0.47
C-MAR-S	--	09/13/18	SW	22.70	8.2	982	88	4	630	0.48
C-MAR-S	--	12/12/18	SW	13.10	7.4	1,150	66	7	740	0.58
C-NR1-D	--	02/22/18	SW	12.50	8.5	1,000	140	2	650	0.50
C-NR1-D	--	01/04/18	SW	12.50	8.3	1,040	140	1	670	0.52
C-NR1-D	--	06/13/18	SW	21.10	8.2	950	100	2	610	0.47
C-NR1-D	--	09/13/18	SW	22.30	8.1	981	88	3	630	0.48
C-NR1-D	--	12/12/18	SW	13.80	7.7	984	77	2	630	0.49
C-NR1-S	--	02/22/18	SW	12.70	8.6	1,000	140	1	650	0.50
C-NR1-S	--	01/04/18	SW	12.70	8.4	1,050	150	1	670	0.52
C-NR1-S	--	06/13/18	SW	21.60	8.2	950	97	2	610	0.47
C-NR1-S	--	09/13/18	SW	22.30	8.1	981	88	2	630	0.48
C-NR1-S	--	12/12/18	SW	13.80	7.7	984	77	2	630	0.49
C-NR3-D	--	02/22/18	SW	12.90	8.4	1,010	180	2	650	0.50
C-NR3-D	--	01/04/18	SW	12.90	8.3	1,050	150	2	680	0.52
C-NR3-D	--	06/13/18	SW	21.10	8.1	950	100	2	610	0.47
C-NR3-D	--	09/13/18	SW	22.50	8.1	981	76	3	630	0.48
C-NR3-D	--	12/12/18	SW	14.00	7.7	984	76	2	630	0.49
C-NR3-S	--	02/22/18	SW	12.80	8.5	1,010	180	2	650	0.50
C-NR3-S	--	01/04/18	SW	12.70	8.3	1,050	130	1	--	0.52
C-NR3-S	--	06/13/18	SW	21.20	8.1	950	99	2	610	0.47
C-NR3-S	--	09/13/18	SW	22.50	8.1	981	80	2	630	0.48
C-NR3-S	--	12/12/18	SW	14.00	7.7	984	76	2	630	0.49

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
C-NR4-D	--	02/22/18	SW	12.90	8.5	1,000	180	2	650	0.50
C-NR4-D	--	01/04/18	SW	12.80	8.3	1,050	140	2	680	0.52
C-NR4-D	--	06/13/18	SW	21.10	8.1	949	100	2	610	0.47
C-NR4-D	--	09/13/18	SW	22.60	8.1	982	86	2	630	0.48
C-NR4-D	--	12/12/18	SW	14.10	7.7	984	76	2	630	0.49
C-NR4-S	--	02/22/18	SW	12.90	8.5	1,000	180	2	650	0.50
C-NR4-S	--	01/04/18	SW	12.80	8.3	1,050	140	1	680	0.52
C-NR4-S	--	06/13/18	SW	21.10	8.1	950	97	2	610	0.47
C-NR4-S	--	09/13/18	SW	22.60	8.1	982	86	2	630	0.48
C-NR4-S	--	12/12/18	SW	14.00	7.7	983	76	2	630	0.49
C-R22A-D	--	02/21/18	SW	12.10	8.4	1,010	150	2	650	0.50
C-R22A-D	--	01/03/18	SW	12.80	8.2	1,070	220	2	530	0.69
C-R22A-D	--	06/12/18	SW	22.10	8.2	953	110	3	610	0.47
C-R22A-D	--	09/12/18	SW	23.00	8.1	983	89	3	630	0.48
C-R22A-D	--	12/11/18	SW	14.20	7.8	999	80	2	650	0.50
C-R22A-S	--	02/21/18	SW	12.30	8.4	1,010	150	2	650	0.50
C-R22A-S	--	01/03/18	SW	12.50	8.2	1,070	210	2	690	0.54
C-R22A-S	--	06/12/18	SW	22.00	8.2	953	110	2	610	0.47
C-R22A-S	--	09/12/18	SW	22.90	8.1	982	91	2	630	0.49
C-R22A-S	--	12/11/18	SW	14.20	7.8	999	80	2	650	0.50
C-R27-D	--	02/21/18	SW	12.40	8.6	1,000	150	2	650	0.50
C-R27-D	--	01/03/18	SW	13.00	8.3	1,070	200	2	680	0.53
C-R27-D	--	06/12/18	SW	22.00	8.2	951	110	2	610	0.47
C-R27-D	--	09/12/18	SW	23.00	8.1	983	90	3	630	0.48
C-R27-D	--	12/11/18	SW	14.40	7.8	990	80	2	640	0.49
C-R27-S	--	02/21/18	SW	12.40	8.5	1,000	150	2	650	0.50
C-R27-S	--	01/03/18	SW	12.90	8.3	1,070	190	2	680	0.53
C-R27-S	--	06/12/18	SW	22.00	8.2	952	100	2	610	0.47
C-R27-S	--	09/12/18	SW	23.00	8.1	982	92	2	630	0.48
C-R27-S	--	12/11/18	SW	14.50	7.8	990	79	2	640	0.49
C-TAZ-D	--	02/21/18	SW	11.90	8.4	1,000	150	2	650	0.50
C-TAZ-D	--	01/03/18	SW	11.60	7.9	1,060	230	2	680	0.53
C-TAZ-D	--	06/12/18	SW	21.00	7.8	956	170	3	620	0.47
C-TAZ-D	--	09/12/18	SW	22.40	8	980	84	3	630	0.48
C-TAZ-D	--	12/11/18	SW	13.90	7.8	994	56	3	640	0.49
C-TAZ-S	--	02/21/18	SW	12.10	8.4	1,000	140	1	650	0.50
C-TAZ-S	--	01/03/18	SW	11.70	8.1	1,060	240	2	680	0.53
C-TAZ-S	--	06/12/18	SW	21.10	8	955	130	2	610	0.47
C-TAZ-S	--	09/12/18	SW	23.90	8.1	975	89	2	630	0.48
C-TAZ-S	--	12/11/18	SW	14.00	7.8	987	74	2	640	0.49
MW-09	SA	02/23/18	GW	30.30	7.5	3,240	-140	5	2,100	1.67
MW-09	SA	05/02/18	GW	29.10	7.1	4,150	95	5	2,720	2.25
MW-09	SA	12/12/18	GW	30.20	7.4	3,440	-45	--	2,340	1.88
MW-10	SA	02/23/18	GW	30.00	7.5	2,930	-130	10	1,901	1.51
MW-10	SA	05/02/18	GW	29.70	6.9	3,820	95	20	2,500	2.06
MW-10	SA	12/12/18	GW	30.20	7.5	2,900	-79	5	1,910	1.51
MW-11	SA	02/23/18	GW	28.30	7.5	2,530	28	5	1,640	1.30
MW-11	SA	05/02/18	GW	29.70	6.4	2,980	100	11	1,940	1.57
MW-11	SA	12/12/18	GW	29.70	7.4	2,530	34	2	1,660	1.34
MW-12	SA	05/01/18	GW	28.70	7.7	8,440	93	15	5,300	4.47
MW-12	SA	12/11/18	GW	27.50	8.1	6,930	180	11	4,530	3.78
MW-13	SA	12/04/18	GW	28.80	7.6	2,490	42	6	1,610	1.27
MW-14	SA	05/01/18	GW	30.60	7.2	3,200	140	38	2,070	1.65
MW-14	SA	12/11/18	GW	31.10	7.4	2,910	73	5	1,870	1.50
MW-15	SA	12/11/18	GW	24.90	7.4	2,390	45	2	1,540	1.23

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
MW-18	SA	12/06/18	GW	30.50	7.9	1,580	110	3	1,020	0.79
MW-19	SA	04/27/18	GW	29.40	7.6	2,800	91	6	1,820	1.47
MW-19	SA	12/10/18	GW	29.40	7.8	2,280	160	18	1,480	1.16
MW-20-070	SA	04/27/18	GW	29.60	7.9	1,930	-63	3	1,250	0.97
MW-20-070	SA	12/11/18	GW	28.50	8	1,940	160	4	1,260	0.98
MW-20-100	MA	04/27/18	GW	30.20	7.6	2,340	-72	3	1,520	1.19
MW-20-100	MA	12/04/18	GW	27.10	7.5	2,430	89	5	1,530	1.25
MW-20-130	DA	04/27/18	GW	30.20	7.7	12,300	-81	7	7,970	6.97
MW-20-130	DA	12/04/18	GW	29.20	7.2	11,800	77	1	7,680	6.71
MW-21	SA	05/02/18	GW	25.50	6.9	15,500	51	71	8,520	7.47
MW-21	SA	12/12/18	GW	26.90	7.3	12,900	150	6	8,390	7.40
MW-22	SA	04/23/18	GW	29.80	7.1	13,900	-98	22	--	8.16
MW-22	SA	12/04/18	GW	25.10	6.7	28,700	-84	9	18,720	17.73
MW-23-060	BR	04/26/18	GW	31.40	9.3	17,800	-90	5	11,540	10.40
MW-23-060	BR	12/11/18	GW	27.60	9.2	18,300	-4.4	5	11,800	10.70
MW-23-080	BR	04/26/18	GW	30.50	11	18,000	-84	7	11,700	10.55
MW-23-080	BR	12/11/18	GW	27.20	10	18,900	-30	8	12,200	11.40
MW-24A	SA	05/02/18	GW	31.40	8	2,010	-110	5	1,300	1.02
MW-24A	SA	12/12/18	GW	31.80	8.6	1,540	160	3	1,000	0.76
MW-24B	DA	05/02/18	GW	29.20	7.5	22,900	-52	4	14,900	13.69
MW-24B	DA	12/12/18	GW	29.00	8	20,100	150	4	1,306,000	11.92
MW-24BR	BR	12/13/18	GW	35.30	8.6	14,800	64	4	9,410	8.34
MW-25	SA	05/01/18	GW	30.00	7.3	2,690	85	11	1,760	1.41
MW-25	SA	12/10/18	GW	30.60	7.3	2,000	-39	3	1,300	1.01
MW-26	SA	05/01/18	GW	29.00	7	4,760	180	7	3,020	2.44
MW-26	SA	12/07/18	GW	28.00	7.5	3,850	170	5	2,500	2.02
MW-27-020	SA	12/05/18	GW	19.40	8	1,080	34	4	680	0.54
MW-27-060	MA	12/05/18	GW	17.40	7.7	1,110	-96	9	700	0.59
MW-27-085	DA	04/24/18	GW	23.00	7.3	13,600	-25	6	8,770	7.89
MW-27-085	DA	12/05/18	GW	17.10	7.5	9,500	-32	7	6,260	5.45
MW-28-025	SA	04/25/18	GW	23.80	7.6	1,070	-74	1	700	0.53
MW-28-025	SA	12/14/18	GW	22.40	7.1	1,320	110	2	860	0.67
MW-28-090	DA	04/25/18	GW	21.20	7.3	6,250	-95	7	4,010	3.41
MW-28-090	DA	12/14/18	GW	19.10	7.2	4,690	-64	2	3,030	2.51
MW-29	SA	04/25/18	GW	25.6	7.2	3500	-180	4	2270	1.84
MW-29	SA	12/10/18	GW	24.3	7.1	1760	-140	5	1130	0.88
MW-30-030	SA	12/06/18	GW	22.3	7.8	9970	-130	15	6490	5.63
MW-30-050	MA	12/06/18	GW	20.9	7.4	1100	-77	2	700	0.54
MW-31-060	SA	04/27/18	GW	30.3	7.7	3580	-76	5	2320	1.36
MW-31-060	SA	12/10/18	GW	28.9	7.5	3530	160	12	2290	1.83
MW-31-135	DA	12/10/18	GW	28.9	7.6	12700	-96	5	8230	7.22
MW-32-020	SA	12/04/18	GW	25.7	7.2	24100	-130	4	15600	14.7
MW-32-035	SA	04/23/18	GW	27.3	7.5	11400	-92	24	7440	6.58
MW-32-035	SA	12/04/18	GW	25.2	7.1	9510	-150	4	6190	5.34
MW-33-040	SA	04/25/18	GW	208	7.6	10100	52	6	6570	5.79
MW-33-040	SA	12/07/18	GW	24.4	7.7	21400	28	8	13900	12.8
MW-33-090	MA	04/24/18	GW	28	7.2	12300	58	15	7980	7.12
MW-33-090	MA	12/07/18	GW	24.4	7.3	10300	18	7	6680	5.8
MW-33-150	DA	04/25/18	GW	27.2	7.5	15200	-96	2	9850	8.8
MW-33-150	DA	12/07/18	GW	25.2	7.5	15600	84	9	10100	9.11
MW-33-210	DA	04/25/18	GW	30.7	7.5	19700	-94	3	12820	11.65
MW-33-210	DA	12/07/18	GW	25.1	7.4	20400	90	21	13100	12.1
MW-34-055	MA	12/05/18	GW	19.1	7.6	1060	-100	3	680	0.53
MW-34-080	DA	04/24/18	GW	19.7	7.3	8550	-84	---	5560	4.78
MW-34-080	DA	12/05/18	GW	19.3	7.2	9000	-40	4	5850	5.05

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
MW-34-100	DA	02/20/18	GW	19.5	7.7	12200	29	1	7960	7.04
MW-34-100	DA	04/24/18	GW	21.1	7.5	11800	7.5	5	7680	6.83
MW-34-100	DA	10/01/18	GW	21.4	7.8	7810	-91	2	5510	4.71
MW-34-100	DA	12/05/18	GW	19.3	7.3	11800	-68	4	7660	6.74
MW-35-060	SA	04/27/18	GW	28.8	7.3	7780	56	27	5050	4.36
MW-35-060	SA	12/10/18	GW	26.1	7.5	7870	-41	7	5260	4.49
MW-35-135	DA	04/27/18	GW	28.1	7.5	14300	47	10	9290	8.41
MW-35-135	DA	12/10/18	GW	27.5	7.6	10800	-110	5	7160	6.24
MW-36-020	SA	12/06/18	GW	21.7	7.3	9190	-62	3	3350	2.78
MW-36-040	SA	12/06/18	GW	20.6	7.9	1140	-140	8	740	0.57
MW-36-050	MA	12/06/18	GW	20.2	7.5	1080	-110	2	690	0.53
MW-36-070	MA	12/06/18	GW	20.4	7.8	1130	9.1	2	730	0.56
MW-36-090	DA	04/24/18	GW	24.1	7.4	4880	-78	1	3170	2.61
MW-36-090	DA	12/06/18	GW	20.4	7.4	5230	-140	2	3400	2.83
MW-36-100	DA	04/24/18	GW	24.4	7.4	8070	-42	12	5260	4.65
MW-36-100	DA	12/06/18	GW	20.4	7.3	7460	-85	2	4840	4.12
MW-37D	DA	05/03/18	GW	30.5	7.6	11600	48	4	12100	11.2
MW-37D	DA	12/06/18	GW	29.2	7.6	1400	19	4	9370	8.31
MW-37S	MA	12/06/18	GW	29.1	7.7	7160	21	26	4650	3.91
MW-38D	DA	05/02/18	GW	31.2	7.5	26200	-62	14	16920	15.75
MW-38D	DA	12/12/18	GW	29.7	8.4	23800	-68	5	15400	14.3
MW-38D	DA	05/02/18	GW	29.5	7.5	25900	-58	24	16800	15.65
MW-38D	DA	12/12/18	GW	31.1	8.1	23900	-89	2	15500	14.3
MW-38S	SA	02/23/18	GW	29.6	8	1760	-51	5	1130	0.85
MW-38S	SA	05/02/18	GW	29.3	7.7	1980	23	2	1290	1
MW-38S	SA	09/27/18	GW	30.3	7.9	1850	57	2	1200	0.94
MW-38S	SA	12/12/18	GW	30.6	8	1810	-84	1	1230	0.93
MW-38S	SA	02/23/18	GW	30.2	8	1810	-31	6	1170	0.91
MW-38S	SA	05/02/18	GW	29.6	7.3	2290	22	5	1660	1.13
MW-38S	SA	12/12/18	GW	30.5	8	1880	-84	7	1220	0.92
MW-38S-SMT	SA	09/27/18	GW	31.3	7.9	1890	67	3	1220	0.95
MW-39-040	SA	12/06/18	GW	21.1	8.1	1230	-130	7	800	0.62
MW-39-050	MA	12/06/18	GW	21.5	7.6	1130	-90	1	730	0.55
MW-39-060	MA	12/06/18	GW	21.2	7.6	1150	-60	45	750	0.58
MW-39-070	MA	12/06/18	GW	21	7.7	2050	-33	4	1120	0.88
MW-39-080	DA	12/06/18	GW	21.4	7.4	5530	-95	2	3610	3.02
MW-39-100	DA	04/24/18	GW	24.6	7.1	12900	-87	9	8490	7.49
MW-39-100	DA	12/06/18	GW	22.5	7.1	13500	41	2	8790	7.82
MW-40D	DA	04/25/18	GW	32.6	7.2	20400	-6.2	4	---	12.4
MW-40D	DA	12/12/18	GW	31	7.4	16500	44	1	10710	9.59
MW-40D	DA	04/25/18	GW	32.1	6.8	20100	-91	12	13060	12.18
MW-40S	SA	04/25/18	GW	30.5	7.5	2260	86	7	1460	1.17
MW-40S	SA	12/12/18	GW	31.6	7.5	2720	50	8	1730	1.39
MW-40S	SA	04/25/18	GW	31.1	7	2220	100	11	1440	1.15
MW-41D	DA	05/04/18	GW	27.2	7.3	24000	-26	5	15700	14.6
MW-41D	DA	12/13/18	GW	26.6	8	19700	130	3	12820	11.71
MW-41M	DA	12/11/18	GW	27.5	7.1	15600	-40	3	10100	9.04
MW-41S	SA	12/07/18	GW	28.4	7.6	6760	29	19	4400	3.68
MW-42-030	SA	12/05/18	GW	23.8	7.8	3910	-160	3	2520	2.01
MW-42-055	MA	04/24/18	GW	22.6	8.7	1310	-28	6	860	0.67
MW-42-055	MA	12/05/18	GW	20.8	8.2	1130	7.9	7	680	0.53
MW-42-065	MA	04/24/18	GW	22.5	7.7	2100	-61	6	1370	1.08
MW-42-065	MA	12/05/18	GW	21.1	7.7	1610	10	9	1000	0.78
MW-43-025	SA	12/05/18	GW	21.9	7.4	1570	-170	9	1010	0.79
MW-43-075	DA	12/05/18	GW	21.1	7.3	12200	-130	4	7920	6.99

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
MW-43-090	DA	12/05/18	GW	21.3	7.3	18800	-86	5	12200	11.15
MW-44-070	MA	04/24/18	GW	21.4	8	2480	-84	13	1580	1.29
MW-44-070	MA	12/05/18	GW	19.8	7.5	1610	2.8	9	1040	0.81
MW-44-115	DA	02/20/18	GW	19.9	8	11900	42	3	7690	6.78
MW-44-115	DA	04/24/18	GW	21.1	7.2	11300	68	9	7280	6.4
MW-44-115	DA	10/01/18	GW	21.2	8.2	9180	-10	10	6000	5.2
MW-44-115	DA	12/05/18	GW	19.9	7.6	11200	-6.1	9	7280	6.39
MW-44-125	DA	04/24/18	GW	23.2	7.9	2730	-91	5	1780	1.44
MW-44-125	DA	12/05/18	GW	20.1	7.6	1790	-87	7	1160	0.91
MW-46-175	DA	02/20/18	GW	20.3	8.4	19700	51	2	12830	11.79
MW-46-175	DA	04/25/18	GW	23.4	8.5	23400	36	10	15180	14.32
MW-46-175	DA	10/02/18	GW	21.2	8.7	15500	-53	4	10060	9.05
MW-46-175	DA	12/13/18	GW	20.7	8.4	19300	3.4	2	12500	11.4
MW-46-205	DA	04/25/18	GW	25	8.4	26600	89	3	17260	16.5
MW-46-205	DA	12/13/18	GW	20.8	7.9	22500	-12	2	14590	13.58
MW-47-055	SA	04/26/18	GW	28.9	7.3	5850	45	9	3800	3.21
MW-47-055	SA	12/10/18	GW	28	7.5	5030	-59	10	2690	2.19
MW-47-115	DA	04/25/18	GW	28.7	7.7	13400	-89	10	8680	7.64
MW-47-115	DA	12/10/18	GW	26.5	7.3	14100	-160	4	8930	7.86
MW-48	BR	05/03/18	GW	27.9	7.6	21100	200	9	13700	12.58
MW-48	BR	12/13/18	GW	23.4	7.6	18200	180	10	11830	10.77
MW-49-135	DA	12/10/18	GW	24.7	7.4	14600	8.9	7	9500	8.48
MW-49-275	DA	12/10/18	GW	24.5	7.6	27000	-36	2	17530	16.53
MW-49-365	DA	12/10/18	GW	24	7.4	39400	-160	1	25490	24.93
MW-50-095	MA	04/27/18	GW	29.5	7.7	6980	79	46	4540	3.89
MW-50-095	MA	12/10/18	GW	28.9	7.6	5800	-140	6	3770	3.13
MW-50-200	DA	04/27/18	GW	30	7.6	28700	85	10	18650	17.97
MW-50-200	DA	12/10/18	GW	29.1	7.6	21100	-120	8	13740	12.59
MW-51	MA	05/01/18	GW	29.3	7.1	15300	120	2	10000	8.89
MW-51	MA	12/10/18	GW	28.6	7.4	13300	180	7	8640	7.66
MW-52D	DA	04/23/18	GW	34.6	1	4220	120	1	30	0.02
MW-52D	DA	12/04/18	GW	19.5	7.7	22700	-50	2	14700	13.7
MW-52M	DA	04/23/18	GW	25.9	5	1600	51	1	950	0.69
MW-52M	DA	12/04/18	GW	19.7	7.1	17200	-51	4	11200	10.1
MW-52S	MA	04/24/18	GW	23.4	8	21700	-91	1	14070	12.99
MW-52S	MA	12/04/18	GW	19.2	7	14300	-100	5	9190	8.18
MW-53D	DA	04/23/18	GW	27.7	2.9	2810	110	1	1820	1.47
MW-53D	DA	12/04/18	GW	19.8	7.5	27700	-180	1	18010	17.08
MW-53M	DA	04/23/18	GW	24.5	3.1	3150	140	2	2070	1.68
MW-53M	DA	12/04/18	GW	19.7	7.5	20000	-180	1	12120	11.85
MW-54-085	DA	05/04/18	GW	28	7.7	8970	-89	8	5820	4.98
MW-54-085	DA	12/13/18	GW	26.4	7.4	10400	-140	7	6770	5.78
MW-54-140	DA	05/04/18	GW	27.9	7.4	16000	44	8	10410	9.51
MW-54-140	DA	12/13/18	GW	26.4	7.8	13400	-160	5	8600	7.6
MW-54-195	DA	05/04/18	GW	27.2	8.1	19300	-260	9	12570	11.46
MW-54-195	DA	12/13/18	GW	26.2	7.3	20300	-190	7	13240	12.18
MW-55-045	MA	05/03/18	GW	28.5	7.6	1750	-100	18	1130	0.89
MW-55-045	MA	12/13/18	GW	26.3	7.3	1520	-110	9	960	0.74
MW-55-120	DA	05/03/18	GW	29.1	7.9	9790	54	5	6360	5.59
MW-55-120	DA	12/13/18	GW	28.4	7.5	8270	20	3	5520	4.5
MW-56D	DA	05/02/18	GW	21	6.8	24700	-49	2	15990	15.02
MW-56D	DA	12/13/18	GW	22.8	7.2	22100	-110	1	14000	12.9
MW-56M	DA	05/02/18	GW	23.3	6.4	19600	-89	7	11840	8.04
MW-56M	DA	12/13/18	GW	23.5	7.1	12300	-64	1	8590	7.58
MW-56S	SA	05/02/18	GW	23.7	7.2	7230	-100	7	4060	3.92

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
MW-56S	SA	12/13/18	GW	22.8	7.1	6270	-130	2	4090	3.45
MW-57-070	BR	05/03/18	GW	31.8	7.1	3300	150	19	2090	1.66
MW-57-070	BR	12/07/18	GW	30.6	6.9	2840	87	4	1870	1.46
MW-57-185	BR	05/03/18	GW	29	9	22300	-46	2	14600	13.4
MW-57-185	BR	12/07/18	GW	29.5	9.7	20100	-24	2	13030	11.89
MW-57-185_D	BR	05/03/18	GW	27.5	9.9	22000	25	19	14310	13.21
MW-57-185_D	BR	12/07/18	GW	28.9	9.7	20000	-35	9	12990	11.84
MW-57-185_S	BR	05/03/18	GW	27	10	21900	51	12	14210	13.15
MW-57-185_S	BR	12/07/18	GW	28.3	9.4	20000	-24	8	12960	11.84
MW-58BR	BR	02/19/18	GW	27.1	7.6	8390	140	1	5450	4.69
MW-58BR	BR	05/03/18	GW	27.7	7.4	10000	88	7	6510	5.62
MW-58BR	BR	09/27/18	GW	29.4	7.5	10100	-16	2	6550	5.66
MW-58BR	BR	12/13/18	GW	26.4	7.5	9190	38	1	5990	5.12
MW-59-100	SA	05/03/18	GW	30.5	6.5	15500	100	12	10030	9.19
MW-59-100	SA	12/07/18	GW	27.5	7	10100	170	40	6530	5.63
MW-60-125	BR	05/02/18	GW	29.5	7.5	9090	-79	40	5890	5.06
MW-60-125	BR	12/06/18	GW	30.5	7.4	9790	44	25	6950	5.45
MW-60BR-245	BR	02/21/18	GW	30.7	8	19500	45	2	12640	11.47
MW-60BR-245	BR	05/02/18	GW	28.3	8.2	18200	-80	6	11850	10.68
MW-60BR-245	BR	09/25/18	GW	31.5	7.8	19900	70	2	12880	11.67
MW-60BR-245	BR	12/06/18	GW	30.8	8	18200	31	2	11820	10.67
MW-60BR-245_D	BR	02/21/18	GW	26.9	8	19000	96	1	12350	11.24
MW-60BR-245_D	BR	05/02/18	GW	25.1	8.1	18200	-80	6	11810	10.73
MW-60BR-245_D	BR	09/25/18	GW	29	7.8	19700	45	2	12790	11.66
MW-60BR-245_D	BR	12/06/18	GW	27.2	8.1	18300	39	2	11930	10.84
MW-60BR-245_S	BR	02/21/18	GW	25.5	8	18900	100	2	12250	11.18
MW-60BR-245_S	BR	05/02/18	GW	26.1	8.2	18200	-80	6	11820	10.73
MW-60BR-245_S	BR	09/25/18	GW	28.8	7.8	19700	25	2	12680	11.57
MW-60BR-245_S	BR	12/06/18	GW	27	8.1	18100	45	3	11740	10.65
MW-61-110	BR	05/04/18	GW	28.2	7	19200	-43	4	12550	11.46
MW-61-110	BR	12/13/18	GW	30.4	7.3	17400	13	13	11330	10.21
MW-62-065	BR	02/19/18	GW	29	7.4	6740	130	5	4380	3.66
MW-62-065	BR	05/01/18	GW	29.1	7.9	6650	-70	25	4320	3.61
MW-62-065	BR	09/26/18	GW	32.4	7.3	7030	82	5	4580	3.77
MW-62-065	BR	12/07/18	GW	27.5	7.5	6420	170	15	4170	3.49
MW-62-110	BR	02/21/18	GW	25	8	12500	64	10	8110	7.15
MW-62-110	BR	05/03/18	GW	29.1	7.3	16600	54	5	10780	9.66
MW-62-110	BR	09/26/18	GW	32.1	7.4	14900	-130	3	9680	8.58
MW-62-110	BR	12/13/18	GW	25.9	7.4	10900	-91	2	7080	6.18
MW-62-190	BR	05/03/18	GW	28.8	7.3	22300	-36	6	14510	13.38
MW-62-190	BR	12/13/18	GW	26.6	7.5	20100	-150	2	13110	12.01
MW-63-065	BR	02/21/18	GW	26.7	7.2	7590	110	7	4910	4.16
MW-63-065	BR	04/26/18	GW	27.5	6.9	8160	64	15	5310	4.6
MW-63-065	BR	09/24/18	GW	28.2	7	7130	78	5	4600	3.9
MW-63-065	BR	12/12/18	GW	27.1	7	6780	42	46	4400	3.7
MW-64BR	BR	02/19/18	GW	21.9	7.5	13600	110	5	8830	7.87
MW-64BR	BR	05/02/18	GW	27.7	6.9	17800	-91	23	11560	10.64
MW-64BR	BR	09/24/18	GW	31.5	7.2	15600	-110	4	10060	8.92
MW-64BR	BR	12/13/18	GW	24.7	7.3	14100	-50	32	9210	8.19
MW-65-160	SA	02/22/18	GW	25.6	7.2	4090	12	2	2650	2.16
MW-65-160	SA	04/30/18	GW	29.1	7.1	4920	66	7	3190	2.67
MW-65-160	SA	09/27/18	GW	29.3	7.1	4150	110	7	2700	2.18
MW-65-160	SA	12/05/18	GW	26.2	7.3	4090	49	11	2650	2.15
MW-65-225	DA	02/22/18	GW	27	7.3	8650	14	9	5650	4.82
MW-65-225	DA	04/30/18	GW	30.2	7.3	21700	82	27	14070	13.22

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
MW-65-225	DA	09/27/18	GW	31.7	7.2	17500	63	4	11290	10.14
MW-65-225	DA	12/05/18	GW	30.5	7.4	15100	37	31	9790	8.72
MW-66-165	SA	04/30/18	GW	33.9	7.4	4330	-92	45	2820	2.27
MW-66-165	SA	12/05/18	GW	31.1	7.3	4060	55	13	2600	2.13
MW-66-230	DA	04/30/18	GW	30.3	7.7	18500	-100	3	11990	10.85
MW-66-230	DA	12/05/18	GW	31.5	7.9	20500	35	32	13290	12.12
MW-66BR-270	BR	05/02/18	GW	29.4	7.8	19700	-90	71	13110	12.01
MW-66BR-270	BR	12/07/18	GW	23.6	7.9	19100	-99	32	12390	11.34
MW-67-185	SA	04/30/18	GW	34.1	6.9	9420	140	20	6100	5.25
MW-67-185	SA	12/05/18	GW	33.5	7.5	8220	160	19	5330	4.5
MW-67-225	MA	04/30/18	GW	33.6	7.3	8670	110	35	5550	4.77
MW-67-225	MA	12/05/18	GW	29.7	7.9	6320	170	44	4100	3.42
MW-67-260	DA	04/30/18	GW	32.5	7.6	21900	-25	7	14240	13.11
MW-67-260	DA	12/05/18	GW	31.1	9.6	18600	150	7	12050	10.9
MW-68-180	SA	02/22/18	GW	27.4	7.7	4580	29	7	2960	2942
MW-68-180	SA	05/01/18	GW	28.4	7.3	4570	100	35	3000	2.54
MW-68-180	SA	09/27/18	GW	29.5	7.3	3830	140	29	2550	2.02
MW-68-180	SA	12/07/18	GW	27.7	7.5	4020	-30	47	2650	2.12
MW-68-240	DA	02/22/18	GW	32.5	7.4	18500	23	6	12010	10.83
MW-68-240	DA	05/01/18	GW	32.6	7	19600	160	2	12810	11.7
MW-68-240	DA	12/05/18	GW	31.9	7.5	17200	170	25	11170	10.02
MW-68BR-280	BR	02/22/18	GW	26.5	9.9	23000	-88	2	14990	13.91
MW-68BR-280	BR	05/01/18	GW	29.5	8.6	27800	-160	14	18010	17.31
MW-68BR-280	BR	12/05/18	GW	27.4	9.5	21700	140	6	14160	13.01
MW-69-195	BR	02/22/18	GW	32.2	7.4	3540	60	4	2290	1.83
MW-69-195	BR	05/01/18	GW	31.6	7	3920	140	4	2550	2.07
MW-69-195	BR	09/27/18	GW	32.6	7.1	3710	140	6	2410	1.94
MW-69-195	BR	12/07/18	GW	31.6	7.3	3560	28	19	2320	1.86
MW-70-105	BR	05/03/18	GW	33	7.9	3510	-74	10	2280	1.82
MW-70-105	BR	12/13/18	GW	32.1	8	3480	160	30	2250	1.81
MW-70BR-225	BR	05/03/18	GW	29.5	7.6	14100	-82	2	9160	8.1
MW-70BR-225	BR	12/13/18	GW	30.1	7.5	14000	170	2	9120	8.04
MW-70BR-225	BR	05/03/18	GW	28.4	7.1	13200	-77	10	8570	7.55
MW-70BR-225	BR	12/13/18	GW	20.6	7.5	12500	190	4	8110	7.19
MW-71-035	SA	05/02/18	GW	26.5	6.5	19600	-33	116	12770	11.67
MW-71-035	SA	12/11/18	GW	22	6.7	16500	180	42	10700	9.67
MW-72-080	BR	02/20/18	GW	26.7	7.8	16500	120	8	10660	9.59
MW-72-080	BR	04/26/18	GW	28.7	8.4	16500	-81	3	10760	9.66
MW-72-080	BR	09/26/18	GW	28.3	7.5	18400	-2	2	11940	10.82
MW-72-080	BR	12/06/18	GW	28.9	7.7	13900	82	50	8920	7.89
MW-72BR-200	BR	02/20/18	GW	27.6	8.3	17300	100	1	11270	10.17
MW-72BR-200	BR	04/26/18	GW	28.6	7.9	19600	-190	7	12710	11.82
MW-72BR-200	BR	09/26/18	GW	27.4	7.9	17900	-230	2	11600	10.55
MW-72BR-200	BR	12/06/18	GW	27.8	7.5	14000	-37	10	9050	8.03
MW-72BR-200_D	BR	02/20/18	GW	25.5	8.3	17100	90	2	11080	10.03
MW-72BR-200_D	BR	04/26/18	GW	29	8.1	20800	-170	5	13530	12.65
MW-72BR-200_D	BR	09/26/18	GW	27.8	7.8	17900	-230	3	11630	10.52
MW-72BR-200_D	BR	12/06/18	GW	25.9	9.5	16100	81	18	10470	9.42
MW-72BR-200_S	BR	02/20/18	GW	24.4	8.2	16800	22	5	10920	9.85
MW-72BR-200_S	BR	04/26/18	GW	28.2	8.2	20900	-230	13	13560	12.68
MW-72BR-200_S	BR	09/26/18	GW	27.7	7.9	17800	-200	28	11570	10.48
MW-72BR-200_S	BR	12/06/18	GW	25.1	8	16100	86	20	10440	9.4
MW-73-080	BR	02/20/18	GW	25.1	7.4	11900	110	6	7770	6.82
MW-73-080	BR	05/01/18	GW	27.5	6.2	15400	58	13	10040	9.15
MW-73-080	BR	09/24/18	GW	29.5	7.1	13200	71	14	8610	7.49

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
MW-73-080	BR	12/06/18	GW	27.4	7.4	11700	120	35	7620	6.66
MW-74-240	BR	05/02/18	GW	27.4	8.6	1170	36	67	770	0.6
MW-74-240	BR	12/07/18	GW	24.6	8.4	904	22	130	590	0.44
OW-03D	DA	12/04/18	GW	21.9	7.9	10400	170	3	6770	5.9
OW-03M	MA	12/04/18	GW	18.3	8.2	7760	170	14	5060	4.31
OW-03S	SA	12/04/18	GW	29.3	8.1	1520	150	12	980	0.76
PE-01	DA	01/04/18	GW	18.6	8	1330	-140	8	860	0.67
PE-01	DA	02/07/18	GW	16.6	7	4380	-91	8.13	2846	2.35
PE-01	DA	03/07/18	GW	17.6	6.3	4360	-75	6.71	2830	2.33
PE-01	DA	04/03/18	GW	15.2	8.1	2230	55	2	---	1.15
PE-01	DA	05/04/18	GW	29.4	7.1	7520	180	7	4880	4.12
PE-01	DA	06/07/18	GW	---	---	---	---	1	---	---
PE-01	DA	07/03/18	GW	25.1	7.7	2700	96	1	1510	1.17
PE-01	DA	08/01/18	GW	28.7	7.9	2720	92	4	1760	1.38
PE-01	DA	09/06/18	GW	31.1	7.9	3350	-26	1	2180	1.74
PE-01	DA	11/07/18	GW	23.7	6.6	3630	240	1	2320	2.07
PE-01	DA	12/04/18	GW	20.3	7.5	5110	1700	1	---	---
PGE-07BR	BR	12/13/18	GW	31.4	7.9	21200	-72	76	13790	12.61
PGE-8	BR	12/11/18	GW	29.2	8.5	21900	-100	5	14100	13
R-19	--	02/22/18	SW	12.5	8.7	1000	150	2	650	0.5
R-19	--	01/04/18	SW	11.9	8.3	1070	190	2	690	0.53
R-19	--	06/13/18	SW	21.4	8.1	953	100	3	610	0.47
R-19	--	09/13/18	SW	22.6	8.2	98	80	2	630	0.48
R-19	--	12/12/18	SW	13.4	7.6	1000	74	2	650	0.5
R-28	--	02/21/18	SW	12.6	8.6	1010	140	2	650	0.5
R-28	--	01/03/18	SW	12.6	8.3	1070	190	2	690	0.53
R-28	--	06/12/18	SW	22.8	8.2	952	100	2	610	0.47
R-28	--	09/12/18	SW	23.7	8.1	984	87	2	630	0.48
R-28	--	12/11/18	SW	14.5	7.8	1010	77	2	650	0.5
R63	--	02/21/18	SW	12.2	8.5	1010	140	2	650	0.5
R63	--	01/03/18	SW	11.8	8.2	1080	230	3	700	0.54
R63	--	06/12/18	SW	22.1	8.2	952	110	3	610	0.47
R63	--	09/12/18	SW	23.2	8	986	88	2	640	0.49
R63	--	12/11/18	SW	14	7.8	999	80	2	650	0.49
RRB	--	02/22/18	SW	12.6	8.6	1000	130	2	650	0.5
RRB	--	01/04/18	SW	12.1	8.3	1080	170	2	700	0.54
RRB	--	06/13/18	SW	21.3	8.1	952	100	3	610	0.47
SW-1	--	02/21/18	SW	12.6	7.7	1230	130	4	790	0.61
SW-1	--	01/03/18	SW	12.4	8.1	1170	180	5	750	0.58
SW-1	--	06/12/18	SW	22.1	7.7	1010	110	3	650	0.49
SW-1	--	09/12/18	SW	23.9	7.9	1040	100	9	670	0.51
SW-1	--	12/11/18	SW	13.8	7.4	1080	82	5	700	0.54
SW-2	--	02/21/18	SW	10.6	7.8	1050	130	5	680	0.52
SW-2	--	01/03/18	SW	11.8	7.9	1130	170	9	730	0.56
SW-2	--	06/12/18	SW	22.1	7.6	1020	110	3	660	0.5
SW-2	--	09/12/18	SW	23.2	7.9	1030	93	6	660	0.5
SW-2	--	12/11/18	SW	12.8	7	1030	85	4	660	0.51
TW-01	SA	05/01/18	GW	27.9	7.5	8160	-58	3	5320	4.54
TW-01	SA	12/05/18	GW	29.7	7.5	8400	170	1	5520	4.68
TW-02D	DA	02/23/18	GW	20.4	7.7	5530	15	8	3590	3
TW-02D	DA	05/04/18	GW	26.5	7.1	5720	160	5	3710	3.09
TW-02D	DA	09/26/18	GW	28.5	6.9	3780	180	6	2460	1.98
TW-02D	DA	12/04/18	GW	18.6	7.4	6550	4.1	2	---	---
TW-02S	SA	12/04/18	GW	17.1	7.5	6990	140	2	---	---
TW-03D	DA	01/04/18	GW	23.3	7.9	7200	-130	5	4670	3.96

Appendix D

Field Water Quality Parameters, 2018 Annual Reporting Period

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Matrix	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	ORP (mV)	Turbidity (NTU)	Total Dissolved Solids (mg/L)	Salinity
TW-03D	DA	02/07/18	GW	15.4	7.1	7870	-99	12.7	5114	4.38
TW-03D	DA	03/07/18	GW	23.3	6.7	7920	-100	5.42	5159	4.42
TW-03D	DA	04/03/18	GW	17.6	7.5	9160	110	3	6060	5.26
TW-03D	DA	05/04/18	GW	25.4	7	9060	170	8	5880	5.06
TW-03D	DA	06/07/18	GW	29.7	7.5	6410	93	1	4170	3.45
TW-03D	DA	07/03/18	GW	23.1	7.6	6400	100	1	4210	3.49
TW-03D	DA	08/01/18	GW	28.1	7.8	7670	89	4	4980	4.21
TW-03D	DA	09/06/18	GW	26.9	8.1	6480	91	1	4210	3.62
TW-03D	DA	10/02/18	GW	26.1	8.6	6470	47	1	4270	3.58
TW-03D	DA	11/07/18	GW	23	6.7	9240	240	1	5910	5.4
TW-03D	DA	12/04/18	GW	20.3	7.6	9850	170	1	---	---
TW-04	DA	04/26/18	GW	30.1	7.8	21900	-89	3	14220	13.05
TW-04	DA	12/11/18	GW	28.6	7.6	22700	48	3	14700	13.59
TW-04	DA	04/26/18	GW	28	7.8	22100	-71	32	14360	13.24
TW-04	DA	12/11/18	GW	27.4	8	24100	31	32	15650	14.58
TW-05	DA	05/01/18	GW	28.1	8.1	12200	-74	6	7870	6.89
TW-05	DA	12/04/18	GW	29.3	7.9	14100	170	1	9140	8.13
TW-05	DA	05/01/18	GW	28.1	8.1	12000	-73	20	7790	6.82
TW-05	DA	12/04/18	GW	24.9	7.6	13500	200	10	8780	7.78

Notes:

1. All field measurements were collected during groundwater and surface water sampling using a YSI multi-parameter water quality meter or an in-situ multi-parameter water quality meter.

-- = not applicable.
°C = degrees Celsius.
µS/cm = microSiemens per centimeter.
BR = bedrock.
DA = deep interval of Alluvial Aquifer.
GW = groundwater.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
LF = Low Flow (minimal drawdown).
MA = mid-depth interval of Alluvial Aquifer.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
ORP = oxidation-reduction potential.
SA = shallow interval of Alluvial Aquifer.
SU = standard units.
SW = surface water.

APPENDIX E

Historical Cr(VI) and Dissolved Chromium Concentrations, January 2017 through December 2018

Appendix E

Historical Cr(VI) and Dissolved Chromium Concentrations, January 2017 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-09	SA	2/9/2017		LF	160	150
MW-09	SA	5/3/2017		LF	160	140
MW-09	SA	12/7/2017		LF	150	140
MW-09	SA	2/23/2018		LF	150	150
MW-09	SA	5/2/2018		LF	150	140
MW-09	SA	12/12/2018		LF	140	150
MW-10	SA	2/9/2017		LF	160	150
MW-10	SA	5/3/2017		LF	190	200
MW-10	SA	12/7/2017		LF	130	130
MW-10	SA	12/7/2017	FD	LF	130	120
MW-10	SA	2/23/2018		LF	160	160
MW-10	SA	5/2/2018		LF	170	160
MW-10	SA	12/12/2018		LF	110	120
MW-11	SA	2/9/2017		LF	60	60
MW-11	SA	5/3/2017		LF	67	61
MW-11	SA	12/7/2017		LF	64	61
MW-11	SA	2/23/2018		LF	57	56
MW-11	SA	5/2/2018		LF	57	53
MW-11	SA	5/2/2018	FD	LF	58	55
MW-11	SA	12/12/2018		LF	47	48
MW-11	SA	12/12/2018	FD	LF	47	50
MW-12	SA	5/1/2017		LF	1,900	2,000
MW-12	SA	12/11/2017		LF	1,800	2,100
MW-12	SA	5/1/2018		LF	1,500	1,600
MW-12	SA	12/11/2018		LF	1,500	1,500
MW-14	SA	5/1/2017		LF	13	13
MW-14	SA	5/1/2017	FD	3V	13	13
MW-14	SA	12/13/2017		LF	12	13
MW-14	SA	5/1/2018		LF	13	14
MW-14	SA	12/11/2018		LF	13	15
MW-19	SA	4/28/2017		LF	440	430
MW-19	SA	12/8/2017		LF	340	340
MW-19	SA	4/27/2018		LF	370	380
MW-19	SA	12/10/2018		LF	670	780
MW-20-070	SA	4/27/2017		LF	1,800	1,900
MW-20-070	SA	12/7/2017		LF	1,800	1,900
MW-20-070	SA	4/27/2018		LF	1,700	1,700
MW-20-070	SA	12/11/2018		LF	1,600	1,700
MW-20-070	SA	12/11/2018	FD	LF	1,600	1,800
MW-20-100	MA	4/27/2017		LF	2,000	2,100
MW-20-100	MA	12/8/2017		LF	1,500	1,400
MW-20-100	MA	12/8/2017	FD	LF	1,500	1,400

Appendix E

Historical Cr(VI) and Dissolved Chromium Concentrations, January 2017 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-20-100	MA	4/27/2018		LF	1,800	1,800
MW-20-100	MA	12/4/2018		LF	1,400	1,500
MW-20-130	DA	4/27/2017		LF	7,300	8,000
MW-20-130	DA	4/27/2017	FD	LF	7,400	7,600
MW-20-130	DA	12/7/2017		LF	4,100	4,400
MW-20-130	DA	4/27/2018		LF	6,900	7,000
MW-20-130	DA	12/4/2018		LF	5,800	6,100
MW-21	SA	5/3/2017		3V	2.1	2.7
MW-21	SA	12/12/2017		LF	2.3	2.7
MW-21	SA	5/2/2018		LF	ND (1.0)	1.0
MW-21	SA	5/2/2018	FD	LF	ND (1.0)	ND (1.0)
MW-21	SA	12/12/2018		LF	1.1	1.2
MW-22	SA	4/28/2017		LF	ND (1.0)	ND (1.0)
MW-22	SA	12/6/2017		LF	ND (1.0)	ND (1.0)
MW-22	SA	4/23/2018		LF	ND (1.0)	ND (5.0)
MW-22	SA	12/4/2018		LF	ND (1.0)	ND (1.0)
MW-22	SA	12/4/2018	FD	LF	ND (1.0)	ND (1.0)
MW-23-060	BR	4/28/2017		LF	38	34
MW-23-060	BR	12/8/2017		LF	40	35
MW-23-060	BR	4/26/2018		LF	39	37 J
MW-23-060	BR	12/11/2018		LF	39	40
MW-23-080	BR	4/28/2017		LF	1.2	ND (1.0)
MW-23-080	BR	12/8/2017		LF	1.5	1.9
MW-23-080	BR	4/26/2018		LF	ND (1.0)	1.5
MW-23-080	BR	12/11/2018		LF	ND (1.0)	3.2
MW-24A	SA	5/3/2017		LF	ND (0.2)	ND (1.0)
MW-24A	SA	12/7/2017		LF	ND (0.2)	2.7 J
MW-24A	SA	12/7/2017	FD	LF	ND (0.2)	8.7 J
MW-24A	SA	5/2/2018		LF	ND (0.2)	ND (1.0)
MW-24A	SA	12/12/2018		LF	ND (0.2)	ND (1.0)
MW-24B	DA	5/3/2017		LF	230	220
MW-24B	DA	5/3/2017	FD	LF	230	210
MW-24B	DA	12/7/2017		LF	250	250
MW-24B	DA	5/2/2018		LF	200	200
MW-24B	DA	12/12/2018		LF	160	150
MW-25	SA	5/1/2017		LF	76	74
MW-25	SA	12/8/2017		LF	91	90
MW-25	SA	5/1/2018		LF	68	65
MW-25	SA	12/10/2018		LF	100	100
MW-25	SA	12/10/2018	FD	LF	100	100
MW-26	SA	4/26/2017		LF	2,300	2,600
MW-26	SA	12/11/2017		LF	2,300	2,600

Appendix E

Historical Cr(VI) and Dissolved Chromium Concentrations, January 2017 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-26	SA	12/11/2017	FD	LF	2,400	2,500
MW-26	SA	5/1/2018		LF	2,300	2,400
MW-26	SA	12/7/2018		LF	2,200	2,300
MW-27-085	DA	4/28/2017		LF	ND (1.0)	ND (1.0)
MW-27-085	DA	4/28/2017	FD	LF	ND (1.0)	ND (1.0)
MW-27-085	DA	12/4/2017		LF	ND (1.0)	ND (1.0)
MW-27-085	DA	4/24/2018		LF	ND (1.0)	ND (1.0)
MW-27-085	DA	12/5/2018		LF	ND (1.0)	ND (1.0)
MW-28-025	SA	4/26/2017		LF	ND (0.2)	ND (1.0)
MW-28-025	SA	12/7/2017		LF	ND (0.2)	ND (1.0)
MW-28-025	SA	4/25/2018		LF	ND (0.2)	ND (1.0)
MW-28-025	SA	4/25/2018	FD	LF	ND (0.2)	ND (1.0)
MW-28-025	SA	12/14/2018		LF	ND (0.2)	ND (1.0)
MW-28-090	DA	4/26/2017		LF	ND (0.2)	1.2
MW-28-090	DA	12/7/2017		LF	ND (0.2)	ND (1.0)
MW-28-090	DA	4/25/2018		LF	ND (0.2)	ND (1.0)
MW-28-090	DA	12/14/2018		LF	ND (0.2)	ND (1.0)
MW-29	SA	4/26/2017		LF	ND (0.2)	ND (1.0)
MW-29	SA	12/7/2017		LF	ND (0.2)	ND (1.0)
MW-29	SA	4/25/2018		LF	ND (0.2)	ND (1.0)
MW-29	SA	12/10/2018		LF	ND (0.2)	ND (1.0)
MW-31-060	SA	4/27/2017		LF	390	430
MW-31-060	SA	4/27/2017	FD	LF	400	430
MW-31-060	SA	12/12/2017		LF	390	410
MW-31-060	SA	4/27/2018		LF	380	390
MW-31-060	SA	12/10/2018		LF	390	400
MW-32-035	SA	4/27/2017		LF	ND (1.0)	ND (1.0)
MW-32-035	SA	12/4/2017		LF	ND (1.0)	ND (1.0)
MW-32-035	SA	4/23/2018		LF	ND (1.0)	ND (1.0)
MW-32-035	SA	12/4/2018		LF	ND (1.0)	ND (1.0)
MW-33-040	SA	4/26/2017		LF	ND (0.2)	ND (1.0)
MW-33-040	SA	12/7/2017		LF	ND (1.0)	1.7
MW-33-040	SA	4/25/2018		LF	ND (1.0)	1.2
MW-33-040	SA	12/7/2018		LF	ND (1.0)	ND (1.0)
MW-33-090	MA	4/26/2017		LF	5.0	4.9
MW-33-090	MA	12/7/2017		LF	5.5	5.0
MW-33-090	MA	4/24/2018		LF	3.3	3.8
MW-33-090	MA	12/7/2018		LF	1.2	1.7
MW-33-090	MA	12/7/2018	FD	LF	9.3	10
MW-33-150	DA	4/26/2017		LF	6.2	5.6
MW-33-150	DA	4/26/2017	FD	LF	5.9	5.5
MW-33-150	DA	12/7/2017		LF	7.0	7.2

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Historical Cr(VI) and Dissolved Chromium Concentrations, January 2017 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-33-150	DA	4/25/2018		LF	5.2	5.0
MW-33-150	DA	12/7/2018		LF	3.9	6.2
MW-33-210	DA	4/26/2017		LF	9.5	8.3
MW-33-210	DA	12/7/2017		LF	14	15
MW-33-210	DA	4/25/2018		LF	6.0	5.9
MW-33-210	DA	12/7/2018		LF	6.7	10
MW-34-080	DA	4/27/2017		LF	ND (0.2)	ND (1.0)
MW-34-080	DA	12/6/2017		LF	ND (0.2)	ND (1.0)
MW-34-080	DA	4/24/2018		LF	ND (1.0)	ND (1.0)
MW-34-080	DA	12/5/2018		LF	ND (1.0)	ND (1.0)
MW-34-100	DA	2/6/2017		LF	45	43
MW-34-100	DA	2/6/2017	FD	LF	44	40
MW-34-100	DA	4/27/2017		LF	0.67	1.8
MW-34-100	DA	10/2/2017		LF	ND (1.0)	ND (1.0)
MW-34-100	DA	12/6/2017		LF	ND (1.0)	ND (1.0)
MW-34-100	DA	2/20/2018		LF	ND (1.0)	1.5
MW-34-100	DA	4/24/2018		LF	ND (1.0)	1.1
MW-34-100	DA	4/24/2018	FD	LF	ND (1.0)	1.3
MW-34-100	DA	10/1/2018		LF	ND (1.0)	ND (1.0)
MW-34-100	DA	12/5/2018		LF	ND (1.0)	ND (1.0)
MW-35-060	SA	5/1/2017		LF	21	20
MW-35-060	SA	12/8/2017		LF	21	20
MW-35-060	SA	4/27/2018		LF	22	24
MW-35-060	SA	12/10/2018		LF	20	20
MW-35-135	DA	5/1/2017		LF	25	22
MW-35-135	DA	12/8/2017		LF	29	29
MW-35-135	DA	4/27/2018		LF	26	25
MW-35-135	DA	12/10/2018		LF	25	25
MW-36-090	DA	4/27/2017		LF	ND (0.2)	ND (1.0)
MW-36-090	DA	12/6/2017		LF	ND (0.2)	ND (1.0)
MW-36-090	DA	4/24/2018		LF	ND (0.2)	ND (1.0)
MW-36-090	DA	12/6/2018		LF	ND (0.2)	ND (1.0)
MW-36-090	DA	12/6/2018	FD	LF	ND (0.2)	ND (1.0)
MW-36-100	DA	4/27/2017		LF	32	32
MW-36-100	DA	4/27/2017	FD	LF	31	33
MW-36-100	DA	12/6/2017		LF	12	14
MW-36-100	DA	12/6/2017	FD	LF	12	15
MW-36-100	DA	4/24/2018		LF	6.6	11
MW-36-100	DA	12/6/2018		LF	3.3	6.8
MW-37D	DA	5/1/2017		LF	6.6	6.3
MW-37D	DA	12/8/2017		LF	5.0	6.4
MW-37D	DA	5/3/2018		LF	7.4	7.1

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Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-37D	DA	12/6/2018		LF	5.1	5.0
MW-38D	DA	5/3/2017		3V	17	15
MW-38D	DA	5/3/2017		LF	16	14
MW-38D	DA	12/7/2017		3V	21	18
MW-38D	DA	12/7/2017		LF	20	18
MW-38D	DA	5/2/2018		3V	15	14
MW-38D	DA	5/2/2018		LF	15	14
MW-38D	DA	12/12/2018		3V	20	20
MW-38D	DA	12/12/2018		LF	21	21
MW-38S	SA	2/9/2017		3V	3.8	3.6
MW-38S	SA	2/9/2017		LF	0.57	ND (1.0)
MW-38S	SA	5/3/2017		3V	1.2	1.2
MW-38S	SA	5/3/2017		LF	0.34	ND (1.0)
MW-38S	SA	9/26/2017		3V	3.8 J	4.2
MW-38S	SA	9/26/2017		LF	3.1	3.6
MW-38S	SA	9/26/2017	FD	LF	3.1 J	3.6
MW-38S	SA	12/7/2017		3V	2.9	3.1
MW-38S	SA	12/7/2017		LF	2.3	2.5
MW-38S	SA	2/23/2018		3V	2.8	2.4
MW-38S	SA	2/23/2018		LF	2.8	2.5
MW-38S	SA	5/2/2018		3V	1.1	1.3
MW-38S	SA	5/2/2018		LF	1.8	2.0
MW-38S	SA	9/27/2018		3V	2.7	2.8
MW-38S	SA	12/12/2018		3V	3.9	4.3
MW-38S	SA	12/12/2018		LF	4.2	4.7
MW-38S-SMT	SA	9/27/2018		LF	3.0	3.3
MW-39-100	DA	4/27/2017		LF	71	67
MW-39-100	DA	12/5/2017		LF	71	66
MW-39-100	DA	4/24/2018		LF	57	54
MW-39-100	DA	12/6/2018		LF	63	70
MW-40D	DA	4/25/2018		H	25	31
MW-40D	DA	4/25/2018		LF	120	120
MW-40D	DA	12/12/2018		H	ND (1.0)	ND (1.0)
MW-40D	DA	12/12/2018		LF	140	140
MW-40S	SA	4/25/2018		H	18	17
MW-40S	SA	4/25/2018		LF	20	20
MW-40S	SA	12/12/2018		H	17	29
MW-40S	SA	12/12/2018		LF	11	11
MW-41D	DA	5/1/2017		LF	ND (1.0)	ND (5.0)
MW-41D	DA	12/13/2017		LF	ND (1.0)	ND (1.0)
MW-41D	DA	12/13/2017	FD	LF	ND (1.0)	1.2
MW-41D	DA	5/4/2018		LF	ND (1.0)	ND (1.0)

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Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-41D	DA	12/13/2018		LF	ND (1.0)	ND (5.0)
MW-42-055	MA	4/28/2017		LF	ND (0.2)	1.3
MW-42-055	MA	12/4/2017		LF	ND (0.2)	1.3
MW-42-055	MA	4/24/2018		LF	ND (0.2)	ND (1.0)
MW-42-055	MA	12/5/2018		LF	ND (0.2)	ND (1.0)
MW-42-065	MA	4/28/2017		LF	ND (0.2)	ND (1.0)
MW-42-065	MA	12/4/2017		LF	ND (0.2)	ND (1.0)
MW-42-065	MA	4/24/2018		LF	ND (0.2)	ND (1.0)
MW-42-065	MA	12/5/2018		LF	ND (0.2)	ND (1.0)
MW-44-070	MA	4/27/2017		3V	ND (0.2)	ND (1.0)
MW-44-070	MA	12/6/2017		LF	ND (0.2)	ND (1.0)
MW-44-070	MA	4/24/2018		LF	ND (0.2)	ND (1.0)
MW-44-070	MA	12/5/2018		LF	ND (0.2)	ND (1.0)
MW-44-115	DA	2/6/2017		LF	18	16
MW-44-115	DA	4/27/2017		LF	21	19
MW-44-115	DA	10/2/2017		LF	15	13
MW-44-115	DA	12/6/2017		LF	14	13
MW-44-115	DA	2/20/2018		LF	13	12
MW-44-115	DA	2/20/2018	FD	LF	13	12
MW-44-115	DA	4/24/2018		LF	8.9	9.5
MW-44-115	DA	10/1/2018		LF	6.4	7.0
MW-44-115	DA	12/5/2018		LF	6.4	5.8
MW-44-125	DA	4/27/2017		LF	ND (0.2)	ND (1.0)
MW-44-125	DA	12/6/2017		LF	2.9	4.8
MW-44-125	DA	4/24/2018		LF	ND (0.2)	3.1
MW-44-125	DA	12/5/2018		LF	ND (1.0)	ND (1.0)
MW-44-125	DA	12/5/2018	FD	LF	ND (1.0)	ND (1.0)
MW-46-175	DA	2/7/2017		LF	21	18
MW-46-175	DA	4/26/2017		LF	10	9.7
MW-46-175	DA	10/2/2017		LF	7.9	7.2
MW-46-175	DA	12/7/2017		LF	11	11
MW-46-175	DA	2/20/2018		LF	13	12
MW-46-175	DA	4/25/2018		LF	7.4	8.3
MW-46-175	DA	10/2/2018		LF	6.5	7.0
MW-46-175	DA	10/2/2018	FD	LF	6.5	7.0
MW-46-175	DA	12/13/2018		LF	8.2	12
MW-46-205	DA	4/26/2017		LF	1.2	1.1
MW-46-205	DA	12/7/2017		3V	ND (1.0)	ND (1.0)
MW-46-205	DA	4/25/2018		LF	ND (1.0)	ND (1.0)
MW-46-205	DA	12/13/2018		LF	ND (1.0)	ND (1.0)
MW-47-055	SA	4/26/2017		LF	15	15
MW-47-055	SA	4/26/2017	FD	LF	15	15

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-47-055	SA	12/7/2017		LF	18	20
MW-47-055	SA	12/7/2017	FD	LF	19	20
MW-47-055	SA	4/26/2018		LF	15	15
MW-47-055	SA	4/26/2018	FD	LF	14	14
MW-47-055	SA	12/10/2018		LF	21	21
MW-47-115	DA	4/26/2017		LF	23	22
MW-47-115	DA	12/7/2017		LF	18	16
MW-47-115	DA	4/25/2018		LF	23	23
MW-47-115	DA	12/10/2018		LF	15	15
MW-47-115	DA	12/10/2018	FD	LF	15	15
MW-48	BR	5/3/2017		G	ND (1.0)	ND (1.0)
MW-48	BR	12/13/2017		LF	ND (1.0)	ND (1.0)
MW-48	BR	5/3/2018		LF	ND (1.0)	ND (1.0)
MW-48	BR	12/13/2018		LF	ND (1.0)	ND (5.0)
MW-50-095	MA	4/28/2017		LF	10	10
MW-50-095	MA	12/8/2017		LF	13	14
MW-50-095	MA	4/27/2018		LF	11	10
MW-50-095	MA	12/10/2018		LF	13	14
MW-50-200	DA	4/28/2017		LF	7,000	7,400
MW-50-200	DA	12/8/2017		LF	4,100	4,300
MW-50-200	DA	4/27/2018		LF	6,500	6,800
MW-50-200	DA	12/10/2018		LF	3,100	3,700
MW-51	MA	4/26/2017		LF	4,000	4,100
MW-51	MA	4/26/2017	FD	LF	4,000	4,200
MW-51	MA	12/11/2017		LF	3,700	4,100
MW-51	MA	5/1/2018		LF	3,500	3,700
MW-51	MA	12/10/2018		LF	3,300	3,800
MW-52D	DA	4/27/2017		LF	ND (1.0)	ND (5.0)
MW-52D	DA	12/5/2017		LF	ND (1.0)	ND (1.0)
MW-52D	DA	4/23/2018		LF	ND (1.0)	ND (5.0)
MW-52D	DA	12/4/2018		LF	ND (1.0)	ND (1.0)
MW-52M	DA	4/27/2017		LF	ND (1.0)	ND (1.0)
MW-52M	DA	12/5/2017		LF	ND (1.0)	ND (1.0)
MW-52M	DA	12/5/2017	FD	LF	ND (1.0)	ND (1.0)
MW-52M	DA	4/23/2018		LF	ND (1.0)	ND (5.0)
MW-52M	DA	12/4/2018		LF	ND (1.0)	ND (1.0)
MW-52S	MA	4/27/2017		LF	ND (1.0)	ND (1.0)
MW-52S	MA	12/5/2017		LF	ND (1.0)	ND (1.0)
MW-52S	MA	4/24/2018		LF	ND (1.0)	ND (1.0)
MW-52S	MA	12/4/2018		LF	ND (1.0)	ND (1.0)
MW-53D	DA	4/27/2017		LF	ND (1.0)	ND (1.0)
MW-53D	DA	4/27/2017	FD	LF	ND (1.0)	ND (5.0)

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-53D	DA	12/5/2017		LF	ND (1.0)	ND (5.0)
MW-53D	DA	4/23/2018		LF	ND (1.0)	ND (1.0)
MW-53D	DA	12/4/2018		LF	ND (1.0)	ND (1.0)
MW-53M	DA	4/27/2017		LF	ND (1.0)	ND (5.0)
MW-53M	DA	12/5/2017		LF	ND (0.2)	ND (1.0)
MW-53M	DA	4/23/2018		LF	ND (1.0)	ND (1.0)
MW-53M	DA	12/4/2018		LF	ND (1.0)	ND (1.0)
MW-54-085	DA	5/4/2017	(a)	LF	ND (0.2) (b)	ND (1.0) (b)
MW-54-085	DA	12/13/2017	(a)	LF	4.96	ND (1.0)
MW-54-085	DA	5/4/2018	(a)	LF	ND (0.1)	ND (0.2)
MW-54-085	DA	12/13/2018	(a)	LF	ND (0.1 J)	ND (2.0)
MW-54-140	DA	5/4/2017	(a)	LF	ND (0.2) (b)	ND (1.0) (b)
MW-54-140	DA	12/13/2017	(a)	LF	4.92	ND (1.0)
MW-54-140	DA	5/4/2018	(a)	LF	4.95	ND (0.2)
MW-54-140	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)
MW-54-195	DA	5/4/2017	(a)	3V	ND (1.0) (b)	ND (1.0) (b)
MW-54-195	DA	12/13/2017	(a)	LF	4.97	1.2
MW-54-195	DA	5/4/2018	(a)	LF	5.09	ND (0.2)
MW-54-195	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)
MW-55-045	MA	5/2/2017	(a)	LF	ND (0.2) (b)	ND (1.0) (b)
MW-55-045	MA	12/13/2017	(a)	LF	ND (0.2)	ND (1.0)
MW-55-045	MA	5/3/2018	(a)	LF	ND (0.1)	ND (0.2)
MW-55-045	MA	12/13/2018	(a)	LF	ND (0.1 J)	ND (0.2)
MW-55-120	DA	2/10/2017	(a)	LF	7.5	8.3
MW-55-120	DA	2/10/2017	FD(a)	LF	7.33	8.28
MW-55-120	DA	5/2/2017	(a)	LF	8.1	8.2
MW-55-120	DA	12/13/2017	(a)	LF	7.11	9.03
MW-55-120	DA	5/3/2018	(a)	LF	8.0	8.35
MW-55-120	DA	12/13/2018	(a)	LF	8.29 J	ND (2.0)
MW-56D	DA	5/4/2017	(a)	LF	ND (1.0) (b)	ND (1.0) (b)
MW-56D	DA	12/13/2017	(a)	LF	4.93	ND (1.0)
MW-56D	DA	5/2/2018	(a)	LF	5.03	ND (0.2)
MW-56D	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)
MW-56D	DA	12/13/2018	FD(a)	LF	ND (0.5 J)	ND (2.0)
MW-56M	DA	5/4/2017	(a)	LF	ND (1.0) (b)	ND (1.0) (b)
MW-56M	DA	12/13/2017	(a)	LF	4.83	ND (1.0)
MW-56M	DA	5/2/2018	(a)	LF	4.99	ND (0.2)
MW-56M	DA	12/13/2018	(a)	LF	ND (0.5 J)	ND (2.0)
MW-56S	SA	5/4/2017	(a)	LF	ND (0.2) (b)	ND (1.0) (b)
MW-56S	SA	12/13/2017	(a)	LF	ND (0.2)	ND (1.0)
MW-56S	SA	5/2/2018	(a)	LF	ND (0.1)	ND (0.2)
MW-56S	SA	12/13/2018	(a)	LF	ND (0.1 J)	ND (2.0)

Appendix E

Historical Cr(VI) and Dissolved Chromium Concentrations, January 2017 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-57-070	BR	5/1/2017		LF	350	340
MW-57-070	BR	12/11/2017		LF	420	430
MW-57-070	BR	5/3/2018		LF	340	360
MW-57-070	BR	12/7/2018		LF	410	420
MW-57-185	BR	5/1/2017		3V	5.9	5.2
MW-57-185	BR	12/11/2017		3V	8.2	7.4
MW-57-185	BR	12/11/2017		LF	3.1	3.3
MW-57-185	BR	5/3/2018		3V	7.7	7.5
MW-57-185	BR	12/7/2018		3V	6.4	5.7
MW-57-185_D	BR	5/3/2018		LF	4.8	4.7
MW-57-185_D	BR	12/7/2018		LF	6.2	5.9
MW-57-185_S	BR	5/3/2018		LF	5.3	5.2
MW-57-185_S	BR	12/7/2018		LF	5.4	6.0
MW-58BR	BR	2/7/2017		LF	4.3	4.0
MW-58BR	BR	5/2/2017		LF	5.4	5.2
MW-58BR	BR	9/27/2017		LF	42	39
MW-58BR	BR	12/11/2017		LF	39	41
MW-58BR	BR	2/19/2018		LF	13	11
MW-58BR	BR	5/3/2018		LF	9.3	9.2
MW-58BR	BR	9/27/2018		LF	9.7	9.6
MW-58BR	BR	12/13/2018		LF	10	11
MW-59-100	SA	5/1/2017		LF	2,500	2,600
MW-59-100	SA	12/7/2017		LF	3,600	3,900
MW-59-100	SA	5/3/2018		LF	2,800	3,000
MW-59-100	SA	12/7/2018		LF	3,100	3,300
MW-59-100	SA	12/7/2018	FD	LF	3,100	3,100
MW-60-125	BR	5/2/2017		LF	830	830
MW-60-125	BR	12/6/2017		LF	770	730
MW-60-125	BR	5/2/2018		LF	510	470
MW-60-125	BR	12/6/2018		LF	980	950
MW-60BR-245	BR	2/8/2017		3V	ND (1.0)	ND (1.0)
MW-60BR-245	BR	5/3/2017		3V	39	36
MW-60BR-245	BR	9/26/2017		3V	ND (1.0)	ND (1.0)
MW-60BR-245	BR	12/13/2017		LF	2.3	12
MW-60BR-245	BR	12/14/2017		3V	690	830
MW-60BR-245	BR	2/21/2018		3V	69	59
MW-60BR-245	BR	5/2/2018		3V	73	67
MW-60BR-245	BR	9/25/2018		3V	76	81
MW-60BR-245	BR	12/6/2018		3V	110	120
MW-60BR-245_D	BR	2/21/2018		LF	4.1	39
MW-60BR-245_D	BR	5/2/2018		LF	1.2	1.7
MW-60BR-245_D	BR	9/25/2018		LF	6.4	6.2

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-60BR-245_D	BR	12/6/2018		LF	20	21
MW-60BR-245_S	BR	2/21/2018		LF	ND (1.0)	7.7
MW-60BR-245_S	BR	5/2/2018		LF	1.1	1.5
MW-60BR-245_S	BR	9/25/2018		LF	ND (1.0)	ND (1.0)
MW-60BR-245_S	BR	12/6/2018		LF	17	17
MW-61-110	BR	5/2/2017		3V	370	340
MW-61-110	BR	12/6/2017		LF	410	380
MW-61-110	BR	5/4/2018		LF	330	340
MW-61-110	BR	12/13/2018		LF	430	460
MW-61-110	BR	12/13/2018	FD	LF	460	470
MW-62-065	BR	2/9/2017		3V	550	560
MW-62-065	BR	5/2/2017		LF	580	590
MW-62-065	BR	9/25/2017		LF	430	520
MW-62-065	BR	9/25/2017	FD	LF	450	500
MW-62-065	BR	12/6/2017		LF	510	500
MW-62-065	BR	2/19/2018		LF	560	510
MW-62-065	BR	2/19/2018	FD	LF	550	530
MW-62-065	BR	5/1/2018		LF	520	530
MW-62-065	BR	9/26/2018		LF	540	570
MW-62-065	BR	12/7/2018		LF	540	610
MW-62-110	BR	2/8/2017		3V	0.45	ND (1.0)
MW-62-110	BR	5/3/2017		Tap	ND (1.0)	1.7
MW-62-110	BR	9/27/2017		Tap	ND (1.0)	ND (1.0)
MW-62-110	BR	12/7/2017		Tap	ND (1.0)	3.0
MW-62-110	BR	2/21/2018		Tap	ND (1.0)	ND (1.0)
MW-62-110	BR	5/3/2018		G	ND (1.0)	ND (1.0)
MW-62-110	BR	9/26/2018		3V	ND (1.0)	ND (1.0)
MW-62-110	BR	12/13/2018		G	0.32	3.0
MW-62-190	BR	5/3/2017		Tap	ND (1.0)	ND (1.0)
MW-62-190	BR	12/7/2017		Tap	ND (1.0)	ND (1.0)
MW-62-190	BR	12/7/2017	FD	Tap	ND (1.0)	ND (1.0)
MW-62-190	BR	5/3/2018		G	ND (1.0)	ND (1.0)
MW-62-190	BR	12/13/2018		LF	ND (1.0)	ND (1.0)
MW-63-065	BR	2/9/2017		3V	1.2	1.7
MW-63-065	BR	5/2/2017		LF	1.1	1.5
MW-63-065	BR	9/28/2017		LF	1.2	3.3
MW-63-065	BR	12/12/2017		LF	1.2	2.6
MW-63-065	BR	2/21/2018		LF	0.53	1.6
MW-63-065	BR	4/26/2018		LF	0.85	1.3
MW-63-065	BR	9/24/2018		LF	1.0	1.4
MW-63-065	BR	9/24/2018	FD	LF	1.0	1.5
MW-63-065	BR	12/12/2018		LF	0.95	1.7

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-64BR	BR	2/7/2017		LF	ND (1.0)	ND (1.0)
MW-64BR	BR	5/2/2017		LF	ND (1.0)	ND (1.0)
MW-64BR	BR	9/25/2017		LF	ND (1.0)	ND (1.0)
MW-64BR	BR	12/6/2017		LF	ND (1.0)	ND (1.0)
MW-64BR	BR	2/19/2018		LF	ND (1.0)	ND (1.0)
MW-64BR	BR	2/19/2018	FD	LF	ND (1.0)	ND (1.0)
MW-64BR	BR	5/2/2018		LF	ND (1.0)	ND (1.0)
MW-64BR	BR	9/24/2018		LF	ND (1.0)	ND (1.0)
MW-64BR	BR	12/13/2018		LF	ND (1.0)	ND (1.0)
MW-65-160	SA	2/8/2017		LF	170	170
MW-65-160	SA	5/4/2017		LF	99	99
MW-65-160	SA	9/26/2017		LF	120	150
MW-65-160	SA	12/5/2017		LF	160	190
MW-65-160	SA	2/22/2018		LF	190	170
MW-65-160	SA	4/30/2018		LF	160	170
MW-65-160	SA	9/27/2018		LF	170	170
MW-65-160	SA	12/5/2018		LF	160	220
MW-65-225	DA	2/8/2017		LF	530	550
MW-65-225	DA	5/4/2017		LF	530	540
MW-65-225	DA	5/4/2017	FD	LF	520	520
MW-65-225	DA	9/26/2017		LF	480	520
MW-65-225	DA	12/5/2017		LF	210	220
MW-65-225	DA	2/22/2018		LF	510	520
MW-65-225	DA	4/30/2018		LF	110	100
MW-65-225	DA	9/27/2018		LF	180	170
MW-65-225	DA	9/27/2018	FD	LF	180	170
MW-65-225	DA	12/5/2018		LF	220	220
MW-66-165	SA	4/25/2017		LF	430	460
MW-66-165	SA	12/5/2017		LF	500	520
MW-66-165	SA	4/30/2018		LF	540	540
MW-66-165	SA	12/5/2018		LF	480	500
MW-66-230	DA	4/25/2017		LF	6,800	7,100
MW-66-230	DA	12/5/2017		LF	6,500	6,900
MW-66-230	DA	4/30/2018		LF	6,700	6,900
MW-66-230	DA	4/30/2018	FD	LF	6,800	6,900
MW-66-230	DA	12/5/2018		LF	6,100	6,200
MW-66BR-270	BR	5/4/2017		3V	ND (0.2)	ND (1.0)
MW-66BR-270	BR	12/14/2017		3V	ND (0.2)	ND (1.0)
MW-66BR-270	BR	5/2/2018		3V	ND (1.0)	ND (1.0)
MW-66BR-270	BR	12/7/2018		3V	ND (1.0)	ND (1.0)
MW-67-185	SA	5/3/2017		LF	1,600	1,700
MW-67-185	SA	12/4/2017		LF	1,500	1,700

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-67-185	SA	4/30/2018		LF	1,800	1,700
MW-67-185	SA	12/5/2018		LF	1,800	2,000
MW-67-225	MA	5/4/2017		LF	2,700	3,000
MW-67-225	MA	12/4/2017		LF	3,100	3,100
MW-67-225	MA	4/30/2018		LF	2,800	2,800
MW-67-225	MA	12/5/2018		LF	2,900	3,000
MW-67-260	DA	5/3/2017		LF	440	400
MW-67-260	DA	12/4/2017		LF	590	630
MW-67-260	DA	4/30/2018		LF	820	830
MW-67-260	DA	12/5/2018		LF	660	710 J
MW-68-180	SA	2/8/2017		LF	35,000	37,000
MW-68-180	SA	2/8/2017	FD	LF	36,000	37,000
MW-68-180	SA	5/3/2017		LF	12,000	12,000
MW-68-180	SA	9/26/2017		LF	20,000	24,000
MW-68-180	SA	2/22/2018		LF	24,000	24,000
MW-68-180	SA	5/1/2018		LF	5,600	6,100
MW-68-180	SA	9/27/2018		LF	8,500	8,900
MW-68-180	SA	12/7/2018		LF	22,000	24,000
MW-68-240	DA	5/3/2017		LF	2,100	2,200
MW-68-240	DA	2/22/2018		LF	2,100	2,000
MW-68-240	DA	5/1/2018		LF	2,000	2,100
MW-68-240	DA	12/5/2018		LF	2,000	1,900
MW-68BR-280	BR	5/4/2017		3V	ND (1.0)	ND (5.0)
MW-68BR-280	BR	5/4/2017	FD	3V	ND (1.0)	ND (5.0)
MW-68BR-280	BR	2/22/2018		LF	ND (1.0)	ND (1.0)
MW-68BR-280	BR	5/1/2018		LF	ND (1.0)	ND (5.0)
MW-68BR-280	BR	12/5/2018		LF	ND (1.0)	ND (1.0)
MW-69-195	BR	2/9/2017		LF	180	160
MW-69-195	BR	5/3/2017		LF	270	270
MW-69-195	BR	9/26/2017		LF	350	360
MW-69-195	BR	12/4/2017		LF	470	440
MW-69-195	BR	2/22/2018		LF	120	110
MW-69-195	BR	5/1/2018		LF	210	210
MW-69-195	BR	9/27/2018		LF	460	450
MW-69-195	BR	12/7/2018		LF	460	470
MW-70-105	BR	5/2/2017		LF	130	120
MW-70-105	BR	12/11/2017		LF	160	150
MW-70-105	BR	5/3/2018		LF	160	150
MW-70-105	BR	12/13/2018		LF	120	130
MW-70BR-225	BR	5/2/2017		3V	1,800	1,800
MW-70BR-225	BR	12/11/2017		3V	1,700	1,800
MW-70BR-225	BR	12/11/2017		LF	1,400	1,600

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-70BR-225	BR	5/3/2018		3V	1,800	1,800
MW-70BR-225	BR	5/3/2018		LF	1,300	1,300
MW-70BR-225	BR	12/13/2018		3V	1,800	1,900
MW-70BR-225	BR	12/13/2018		LF	1,200	1,400
MW-71-035	SA	5/3/2017		LF	ND (1.0)	ND (1.0)
MW-71-035	SA	12/12/2017		LF	ND (1.0)	1.5
MW-71-035	SA	5/2/2018		LF	ND (1.0)	ND (1.0)
MW-71-035	SA	12/11/2018		LF	ND (1.0)	ND (1.0)
MW-71-035	SA	12/11/2018	FD	LF	ND (1.0)	1.0
MW-72-080	BR	2/7/2017		3V	120	110
MW-72-080	BR	5/2/2017		LF	71	61
MW-72-080	BR	9/28/2017		LF	110	99
MW-72-080	BR	9/28/2017	FD	Tap	110	97
MW-72-080	BR	12/7/2017		LF	94	95
MW-72-080	BR	2/20/2018		LF	90	78
MW-72-080	BR	4/26/2018		LF	68	62
MW-72-080	BR	9/26/2018		LF	91	100
MW-72-080	BR	12/6/2018		LF	82	73
MW-72BR-200	BR	2/8/2017		3V	6.1	6.7
MW-72BR-200	BR	5/2/2017		3V	2.9	2.6
MW-72BR-200	BR	9/27/2017		3V	3.8	3.6
MW-72BR-200	BR	12/6/2017		3V	4.2	3.8
MW-72BR-200	BR	12/6/2017		LF	1.5	1.7
MW-72BR-200	BR	2/20/2018		3V	4.5	4.4
MW-72BR-200	BR	4/26/2018		3V	3.3	2.6
MW-72BR-200	BR	9/26/2018		3V	3.0	2.9
MW-72BR-200	BR	12/6/2018		3V	4.9	3.3
MW-72BR-200_D	BR	2/20/2018		LF	1.6	2.1
MW-72BR-200_D	BR	4/26/2018		LF	ND (1.0)	ND (1.0)
MW-72BR-200_D	BR	9/26/2018		LF	ND (1.0)	ND (1.0)
MW-72BR-200_D	BR	12/6/2018		LF	ND (1.0)	ND (1.0)
MW-72BR-200_S	BR	2/20/2018		LF	ND (1.0)	1.1
MW-72BR-200_S	BR	4/26/2018		LF	ND (1.0)	2.0
MW-72BR-200_S	BR	9/26/2018		LF	ND (1.0)	ND (1.0)
MW-72BR-200_S	BR	12/6/2018		LF	ND (1.0)	ND (1.0)
MW-73-080	BR	2/8/2017		3V	31	29
MW-73-080	BR	5/2/2017		LF	30	27
MW-73-080	BR	9/27/2017		LF	41	41
MW-73-080	BR	12/6/2017		LF	28	29
MW-73-080	BR	2/20/2018		LF	22	21
MW-73-080	BR	5/1/2018		LF	57	58

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-73-080	BR	9/24/2018		LF	36	39
MW-73-080	BR	12/6/2018		LF	29	26
MW-74-240	BR	4/27/2017		LF	ND (0.2)	ND (1.0)
MW-74-240	BR	12/6/2017		LF	ND (0.2)	5.3
MW-74-240	BR	5/2/2018		LF	0.46	ND (1.0)
MW-74-240	BR	12/7/2018		LF	0.33	ND (1.0)
PE-01	DA	1/4/2017		Tap	ND (0.2)	ND (1.0)
PE-01	DA	2/7/2017		Tap	1.9	1.8
PE-01	DA	2/7/2017	FD	Tap	1.9	1.9
PE-01	DA	3/8/2017		Tap	1.7	2.1
PE-01	DA	4/25/2017		Tap	0.53	ND (1.0)
PE-01	DA	5/4/2017		Tap	ND (0.2)	ND (1.0)
PE-01	DA	6/7/2017		Tap	ND (0.2)	ND (1.0)
PE-01	DA	7/18/2017		Tap	ND (0.2)	ND (1.0)
PE-01	DA	8/2/2017		Tap	ND (0.2)	ND (1.0)
PE-01	DA	9/7/2017		Tap	9.0	4.5
PE-01	DA	10/3/2017		Tap	ND (0.2)	ND (1.0)
PE-01	DA	11/2/2017		Tap	0.52	ND (1.0)
PE-01	DA	12/7/2017		Tap	ND (0.2)	ND (1.0)
PE-01	DA	1/4/2018		Tap	ND (0.2)	ND (1.0)
PE-01	DA	2/7/2018		Tap	0.7	ND (1.0)
PE-01	DA	3/7/2018		Tap	2.3	2.0
PE-01	DA	4/3/2018		Tap	ND (0.2)	ND (1.0)
PE-01	DA	5/4/2018		Tap	ND (0.2)	1.8
PE-01	DA	6/7/2018		Tap	ND (0.2)	ND (1.0)
PE-01	DA	7/3/2018		Tap	ND (0.2)	ND (1.0)
PE-01	DA	8/1/2018		Tap	ND (0.2)	ND (1.0)
PE-01	DA	9/6/2018		Tap	ND (0.2)	ND (1.0)
PE-01	DA	10/2/2018		Tap	7.6	5.6
PE-01	DA	11/7/2018		Tap	ND (0.2)	ND (1.0)
PE-01	DA	12/4/2018		Tap	0.68	2.9
TW-01	SA	5/3/2017		LF	2,200	2,400
TW-01	SA	12/13/2017		3V	2,200	2,300
TW-01	SA	12/13/2017	FD	LF	2,200	2,400
TW-01	SA	5/1/2018		3V	2,400	3,100
TW-01	SA	12/5/2018		3V	2,100	2,100
TW-02D	DA	3/8/2017		Tap	0.44	110
TW-02D	DA	4/28/2017		Tap	530	540
TW-02D	DA	4/28/2017	FD	Tap	520	530
TW-02D	DA	10/24/2017		Tap	200	190
TW-02D	DA	12/7/2017		Tap	110	93
TW-02D	DA	2/23/2018		LF	140	140

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
TW-02D	DA	2/23/2018	FD	LF	150	140
TW-02D	DA	5/4/2018		Tap	150	150
TW-02D	DA	5/4/2018	FD	Tap	150	140
TW-02D	DA	9/26/2018		Tap	ND (0.2)	ND (1.0)
TW-02D	DA	9/26/2018	FD	Tap	ND (0.2)	ND (1.0)
TW-02D	DA	12/4/2018		Tap	140	110
TW-03D	DA	1/4/2017		Tap	620	620
TW-03D	DA	2/7/2017		Tap	600	630
TW-03D	DA	3/8/2017		Tap	560	630
TW-03D	DA	3/8/2017	FD	Tap	570	580
TW-03D	DA	4/25/2017		Tap	560	570
TW-03D	DA	5/4/2017		Tap	550	540
TW-03D	DA	6/7/2017		Tap	550	550
TW-03D	DA	7/18/2017		Tap	560	570
TW-03D	DA	8/2/2017		Tap	540	520
TW-03D	DA	9/7/2017		Tap	550	540
TW-03D	DA	10/3/2017		Tap	560	580
TW-03D	DA	11/2/2017		Tap	550	570
TW-03D	DA	12/7/2017		Tap	550	570
TW-03D	DA	1/4/2018		Tap	550	590
TW-03D	DA	2/7/2018		Tap	550	540
TW-03D	DA	3/7/2018		Tap	530	520
TW-03D	DA	4/3/2018		Tap	570	550
TW-03D	DA	5/4/2018		Tap	490	490
TW-03D	DA	6/7/2018		Tap	470	480
TW-03D	DA	7/3/2018		Tap	480	500
TW-03D	DA	8/1/2018		Tap	480	480
TW-03D	DA	9/6/2018		Tap	500	510
TW-03D	DA	10/2/2018		Tap	480	500
TW-03D	DA	11/7/2018		Tap	490	510
TW-03D	DA	12/4/2018		Tap	480	490
TW-04	DA	12/14/2017		3V	8.2	8.3
TW-04	DA	12/14/2017		LF	2.8	4.0
TW-04	DA	4/26/2018		3V	8.9	9.4
TW-04	DA	4/26/2018		LF	ND (1.0)	ND (5.0)
TW-04	DA	12/11/2018		3V	8.2	8.1
TW-04	DA	12/11/2018		LF	4.2	5.0
TW-04	DA	12/11/2018	FD	3V	8.4	8.1
TW-05	DA	12/14/2017		3V	14	12
TW-05	DA	12/14/2017		LF	10	13

Appendix E

Historical Cr(VI) and Dissolved Chromium Concentrations, January 2017 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
TW-05	DA	5/1/2018	3V	11	11
TW-05	DA	5/1/2018	LF	8.8	9.1
TW-05	DA	12/4/2018	3V	14	14
TW-05	DA	12/4/2018	LF	9.5	9.3

Notes:

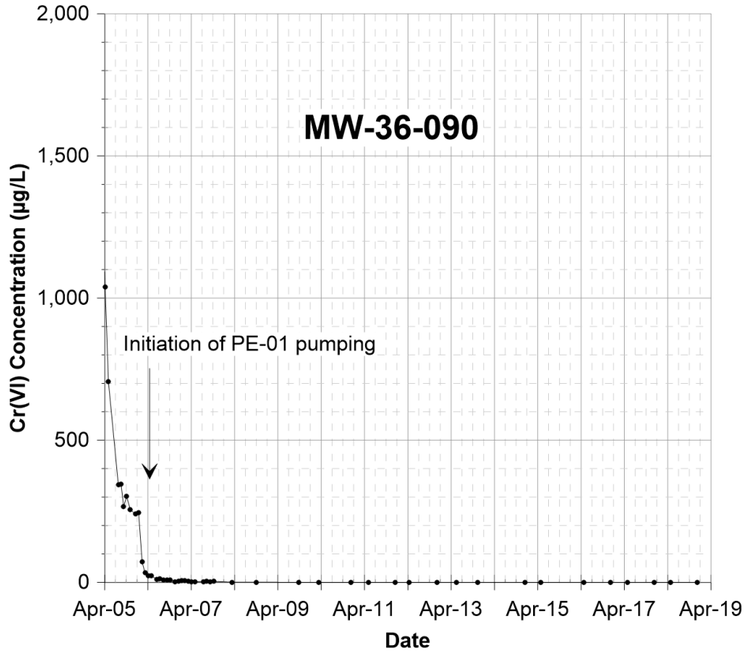
(a) = data were analyzed by an Arizona certified laboratory.

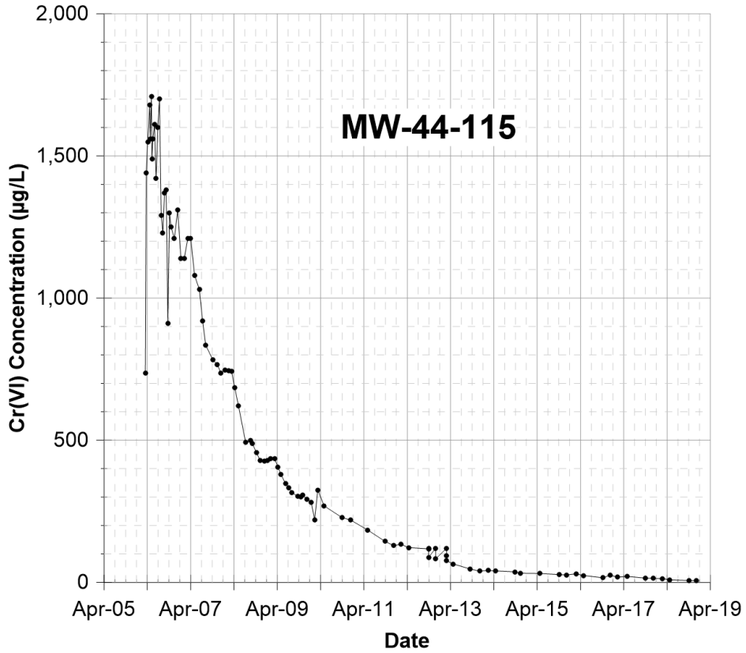
1. Beginning February 1, 2008, hexavalent chromium samples are field-filtered per DTSC-approved change from analysis Method SW7199 to E218.6.

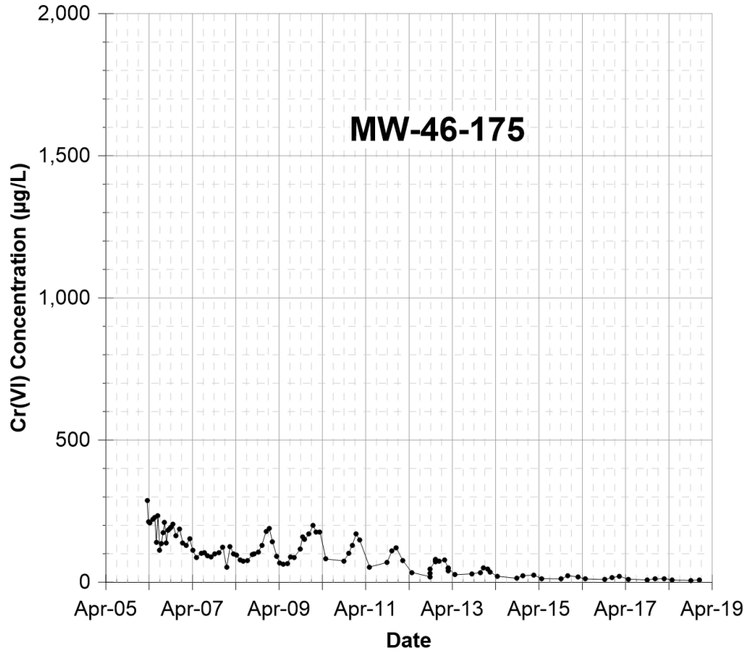
-- = not applicable.
µg/L = micrograms per liter.
3V = three volume.
BR = bedrock.
DA = deep interval of Alluvial Aquifer.
DTSC = Department of Toxic Substance Control.
FD = field duplicate.
G = Grab sample.
H = HydraSleeve.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
LF = Low Flow (minimal drawdown)
MA = mid-depth interval of Alluvial Aquifer.
ND = not detected at listed reporting limit.
SA = shallow interval of Alluvial Aquifer.
Tap = sampled from tap of extraction well.

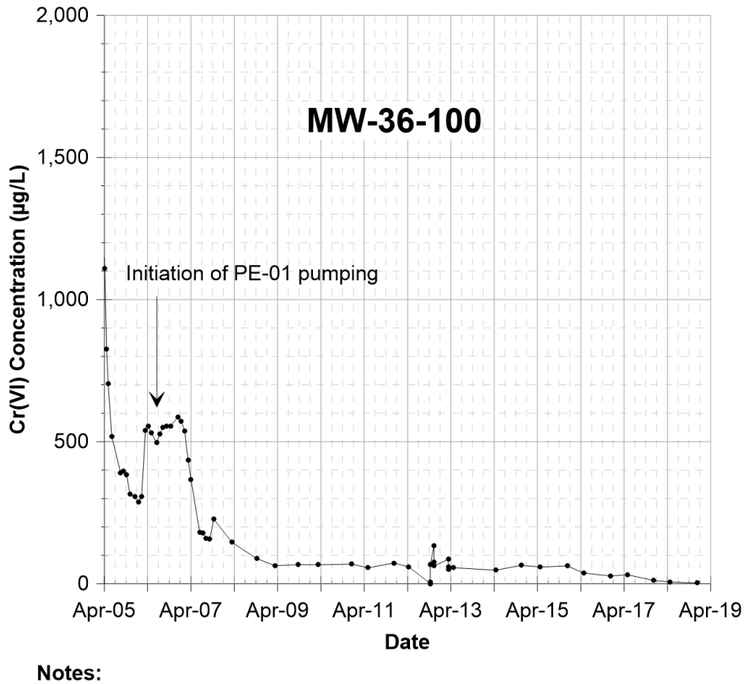
APPENDIX F

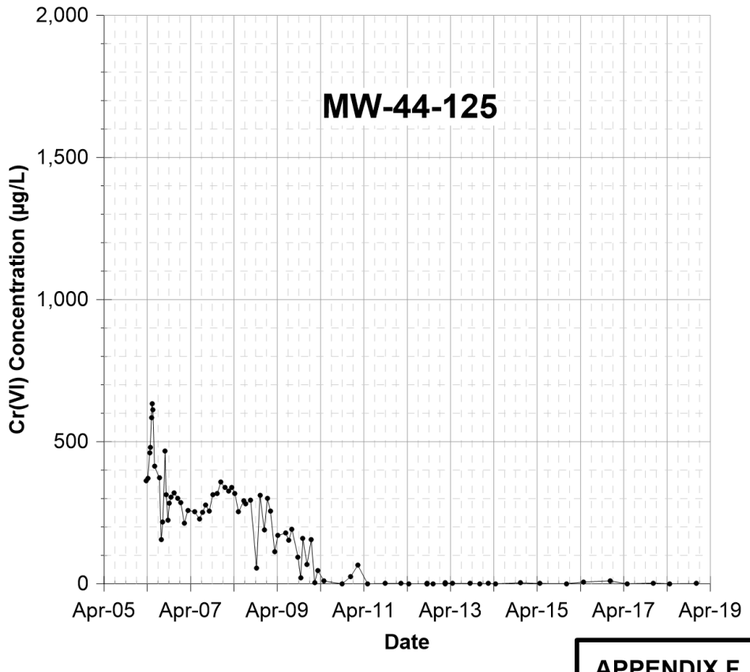
Concentration Time Series Charts, Fourth Quarter 2018

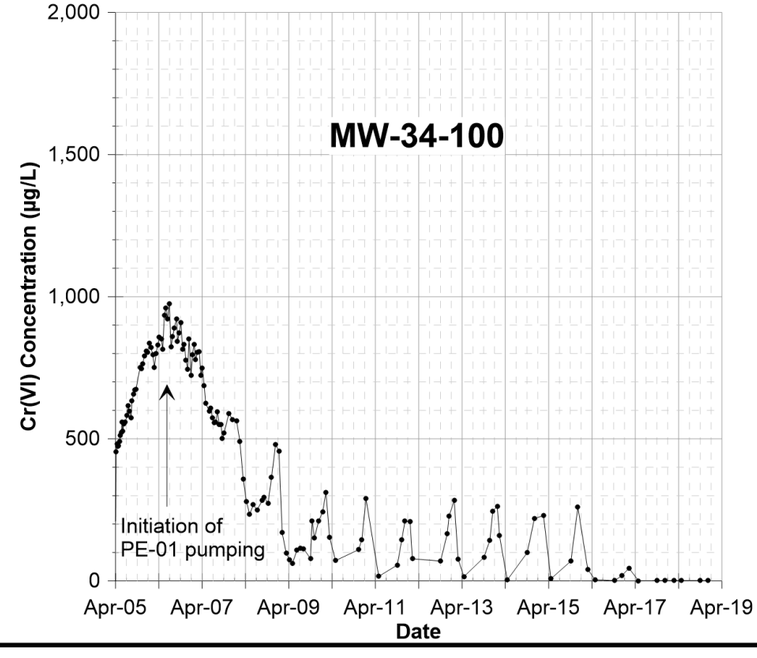












Notes:

1. Hexavalent chromium [Cr(VI)] results in micrograms per liter (µg/L), equivalent to parts per billion (ppb).
2. Results plotted are maximum concentrations from primary and duplicate samples; see Table 3-1 for complete results.
3. MW-36 wells selected to monitor effects of PE-01 pumping on plume west of PE-01. MW-44 wells, MW-46-175, and MW-34-100 selected to monitor concentrations within the plume.

APPENDIX F
Cr(VI) CONCENTRATION TRENDS IN SELECTED PERFORMANCE MONITORING WELLS, APRIL 2005 THROUGH DECEMBER 2018

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

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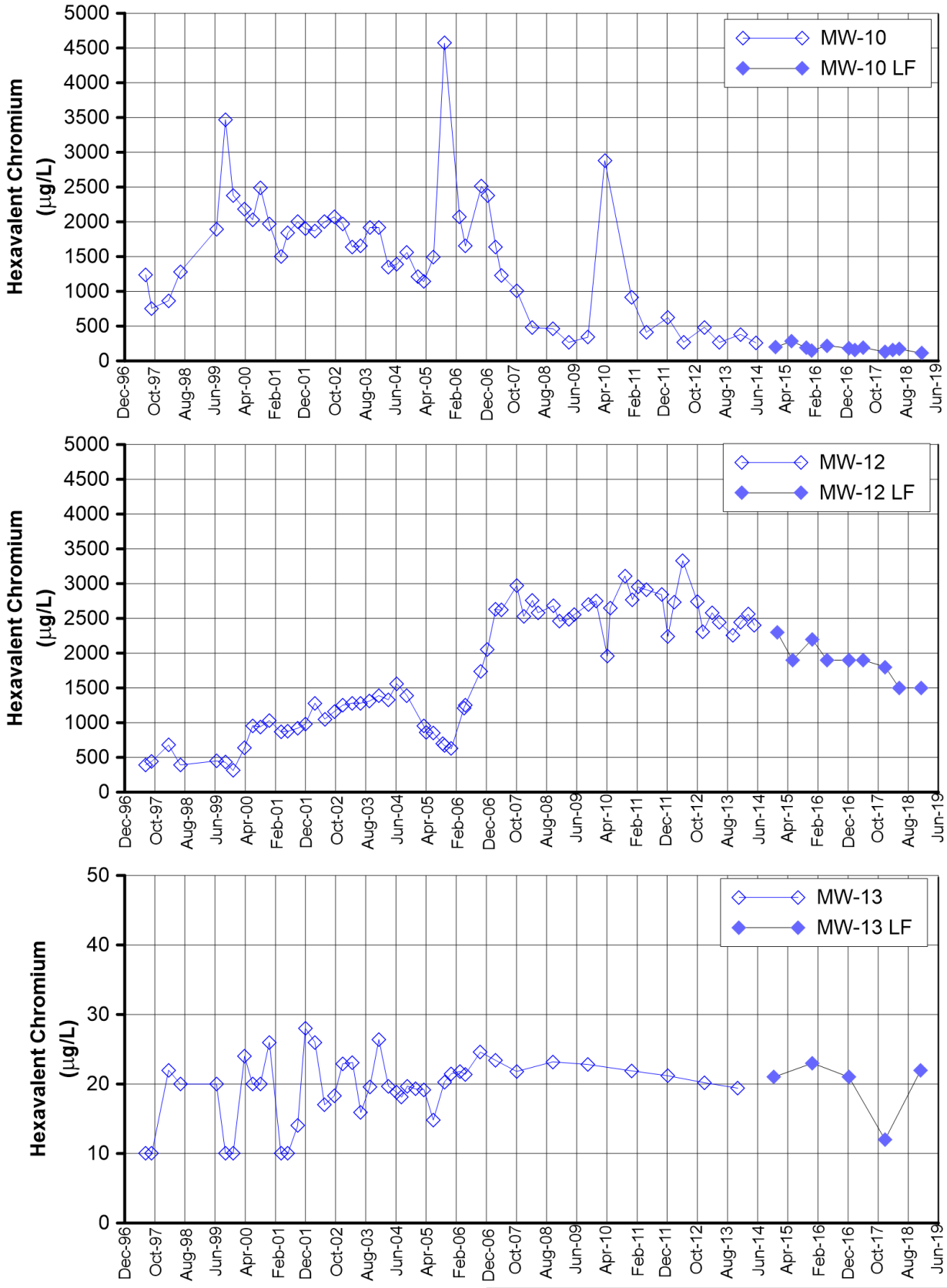

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-1
HEXAVALENT CHROMIUM
IN MW-10, MW-12, AND MW-13
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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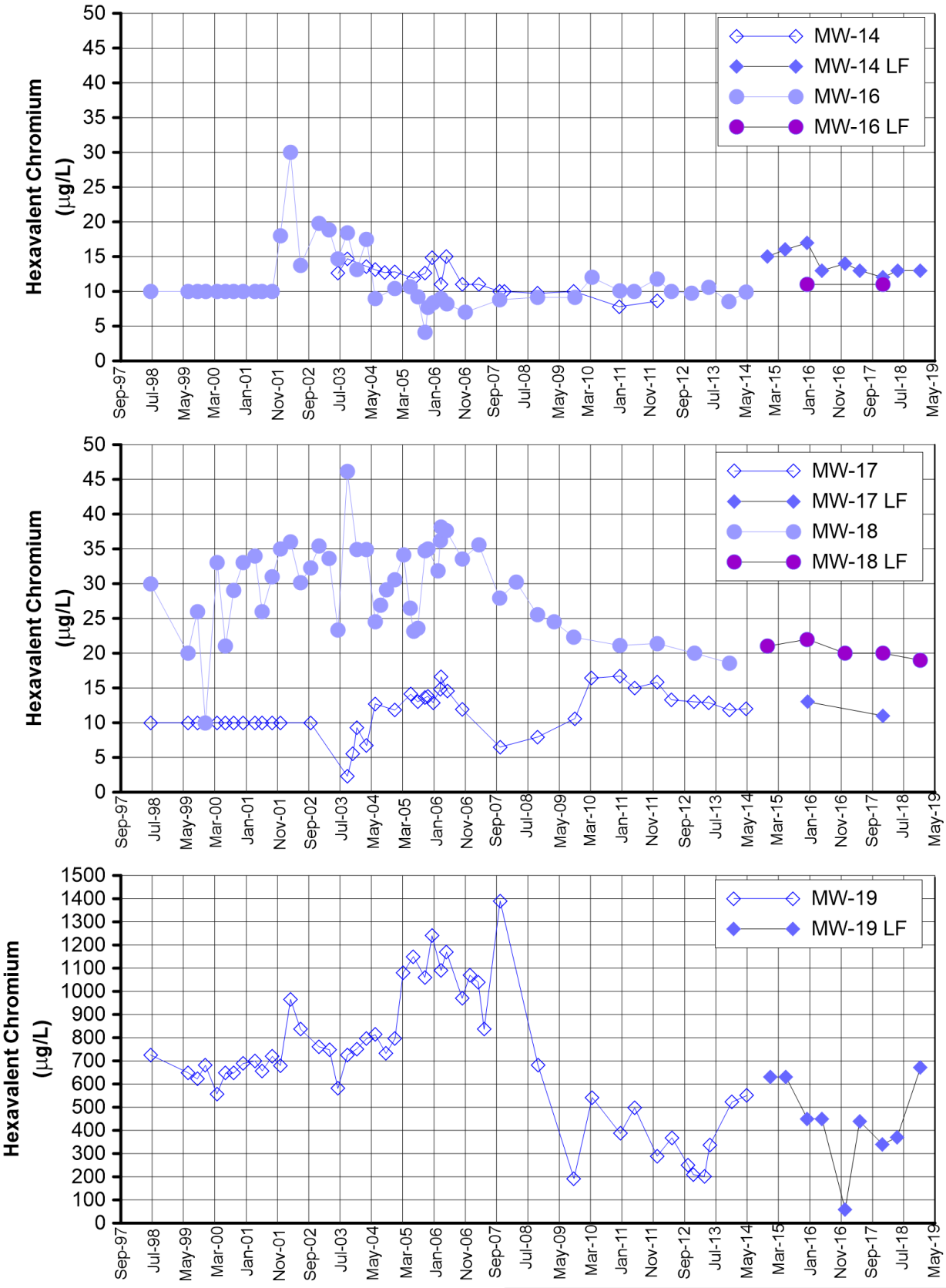

Notes:

1. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-2
HEXAVALENT CHROMIUM
IN MW-14, MW-16, MW-17, MW-18, AND MW-19
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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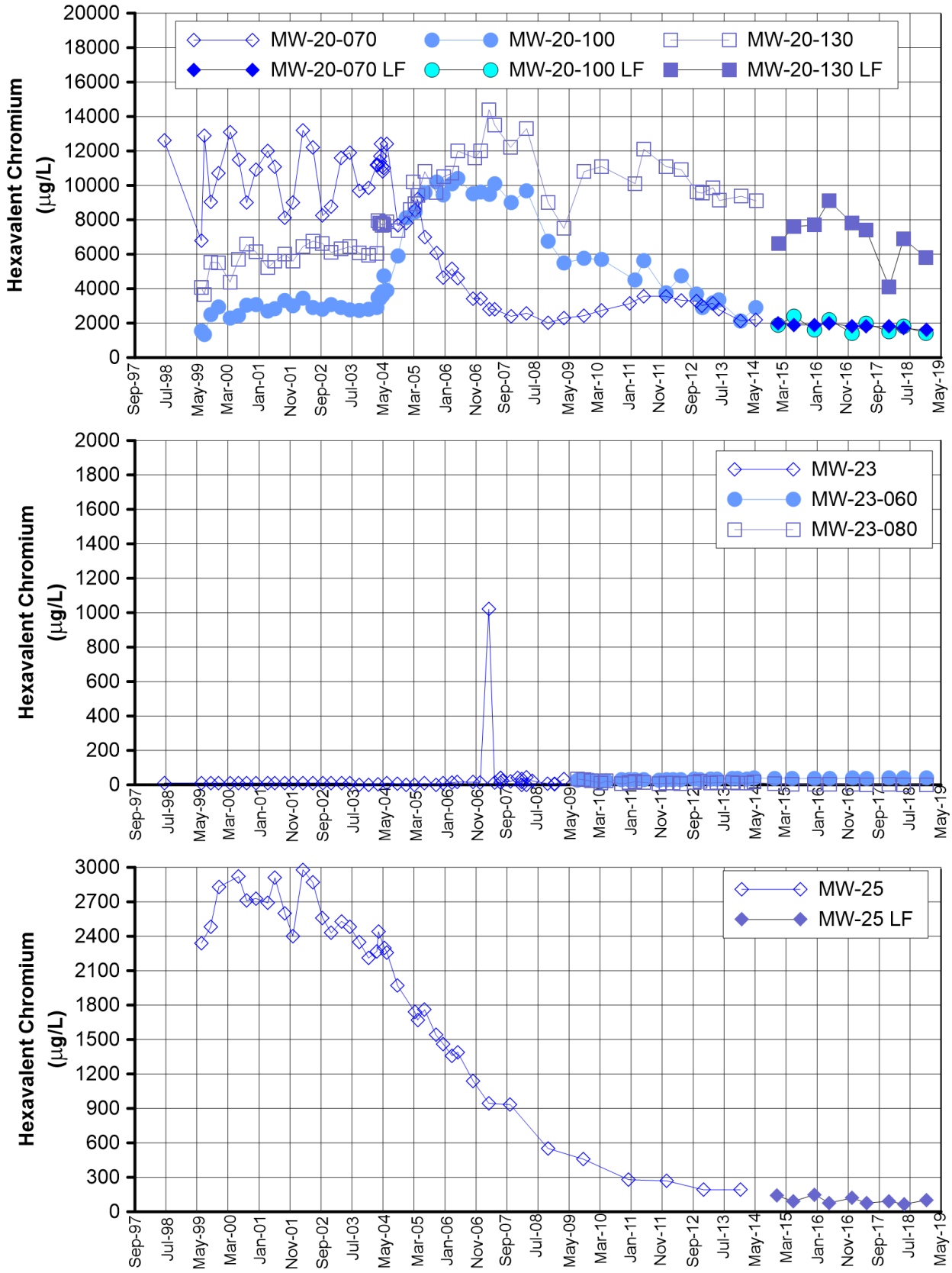

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-3
HEXAVALENT CHROMIUM
IN MW-20 AND MW-23 CLUSTERS AND MW-25
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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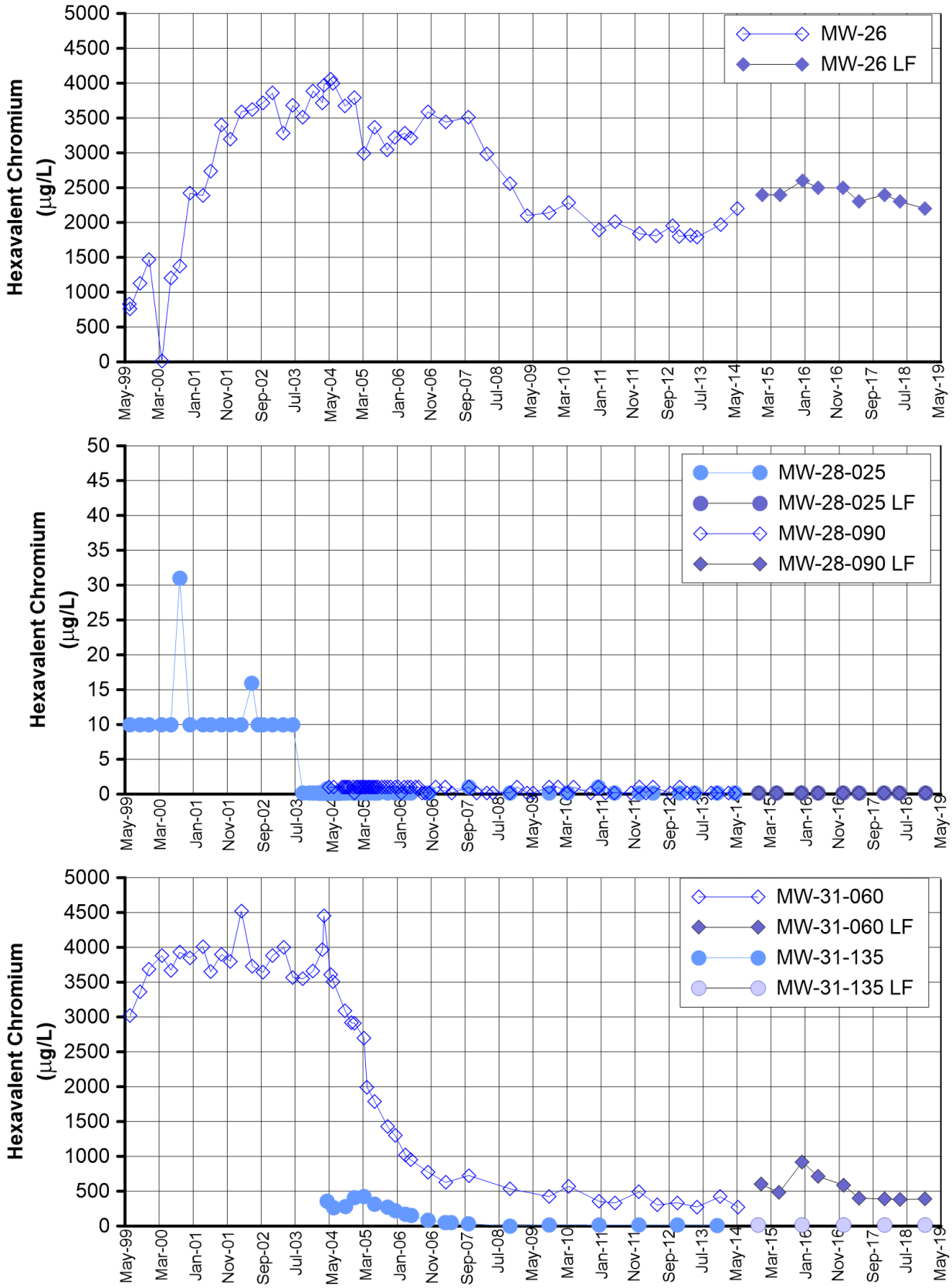

Notes:
1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).
2) The trigger level for MW-28-090 is 20 µg/L.

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-4
HEXAVALENT CHROMIUM
IN MW-26, MW-28, AND MW-31 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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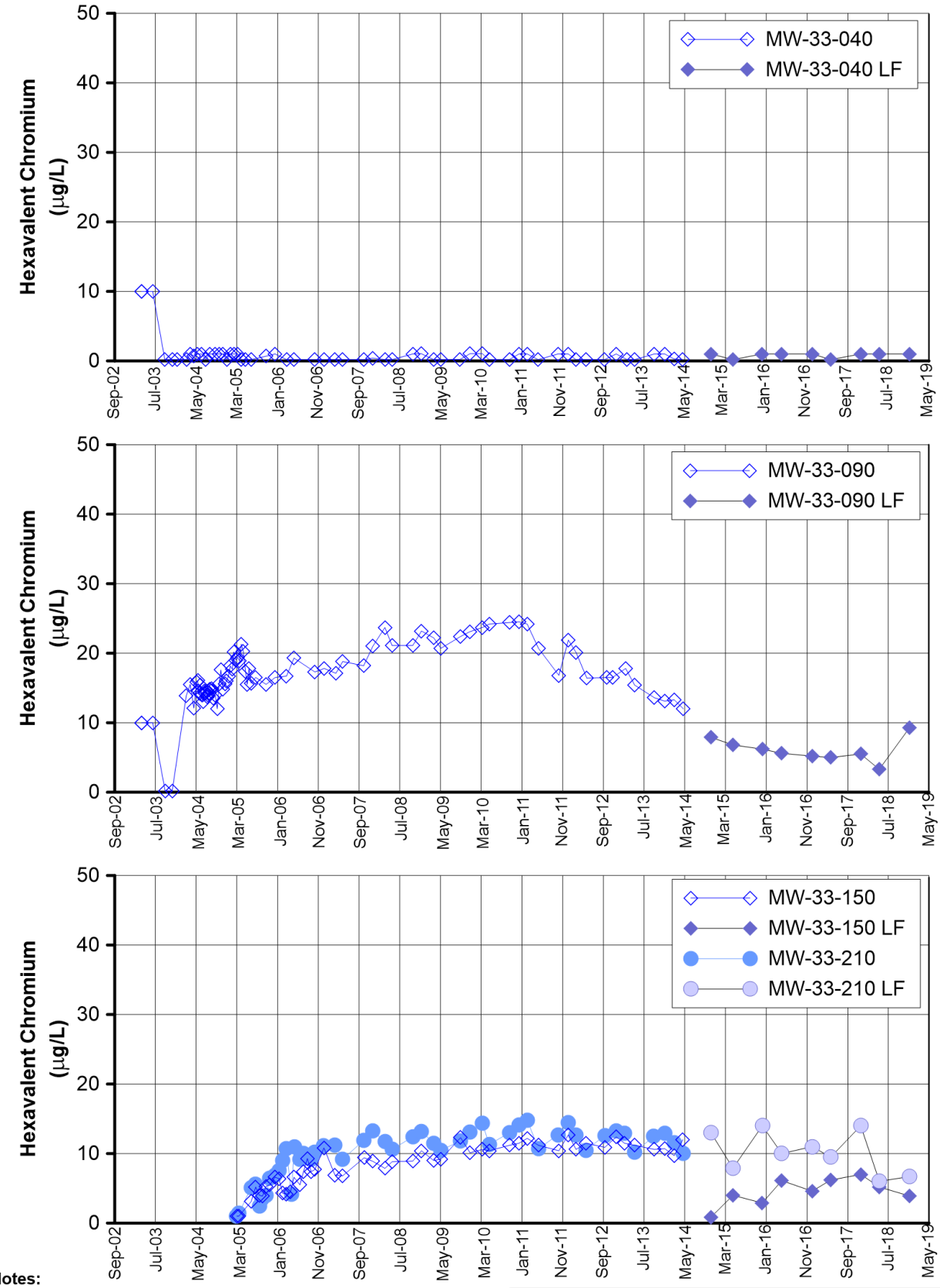

Notes:

1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).
2) The trigger level for MW-33-040 is 20 µg/L.
3) The trigger level for MW-33-090 is 25 µg/L.
4) The trigger level for MW-33-150 is 20 µg/L.
5) The trigger level for MW-33-210 is 20 µg/L.

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-5
HEXAVALENT CHROMIUM IN MW-33 CLUSTER

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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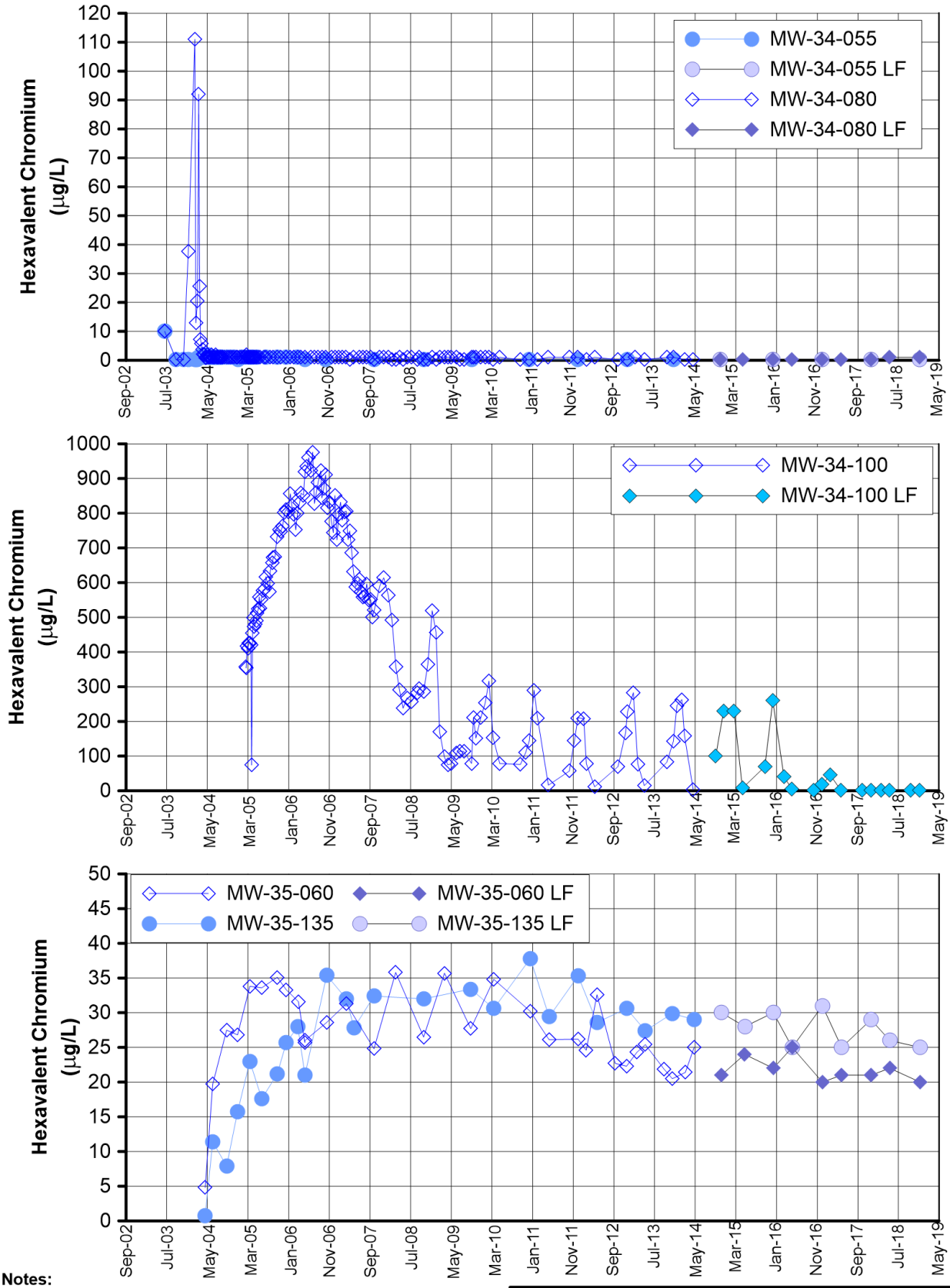

Notes:

1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).
2) The trigger level for MW-34-080 is 20 µg/L.
3) The trigger level for MW-34-100 is 750 µg/L.

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-6
HEXAVALENT CHROMIUM
IN MW-34 AND MW-35 CLUSTERS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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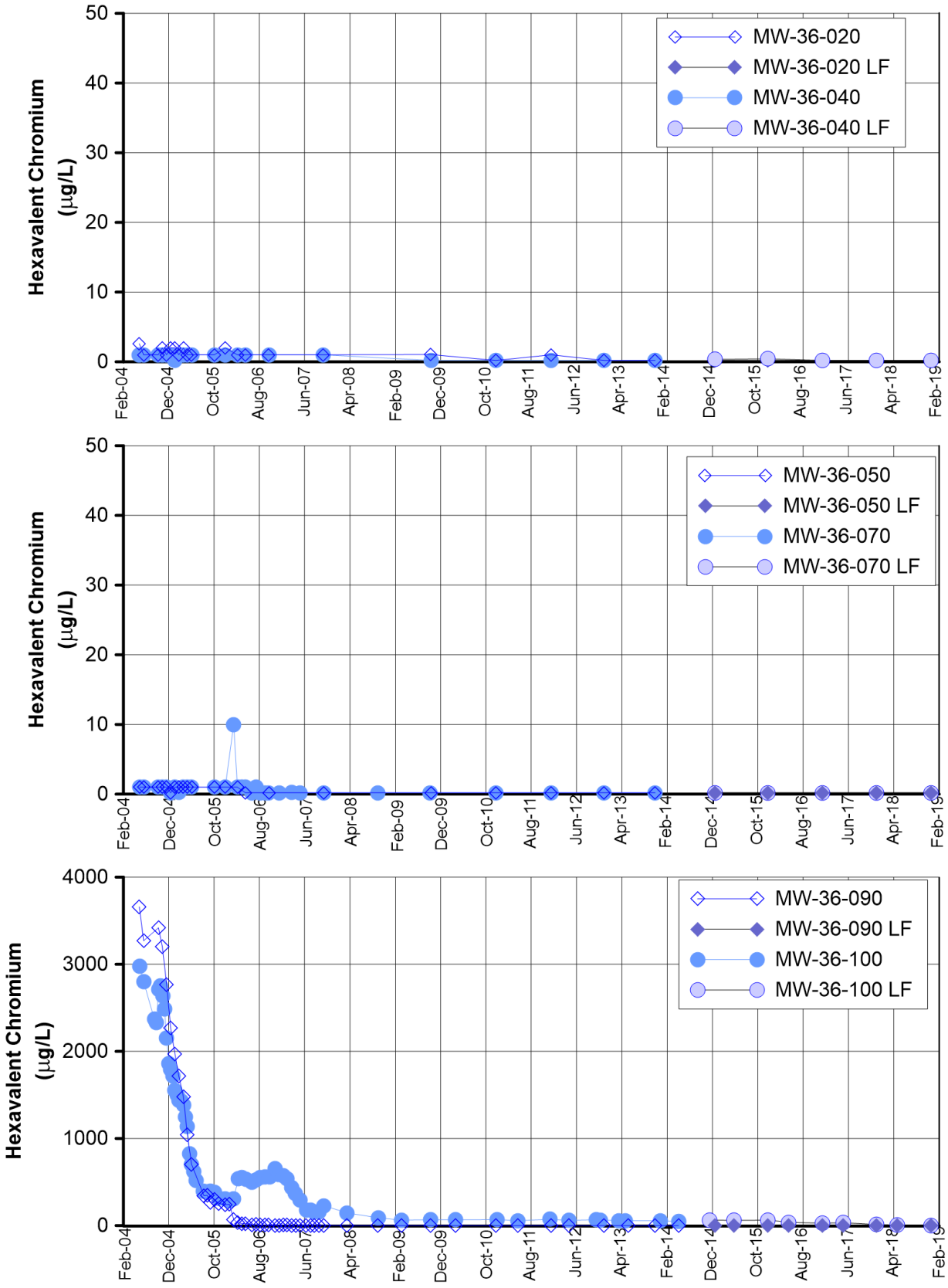

Notes:
1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).
2) The trigger level for MW-36-070 is 20 µg/L.

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-7
HEXAVALENT CHROMIUM IN MW-36 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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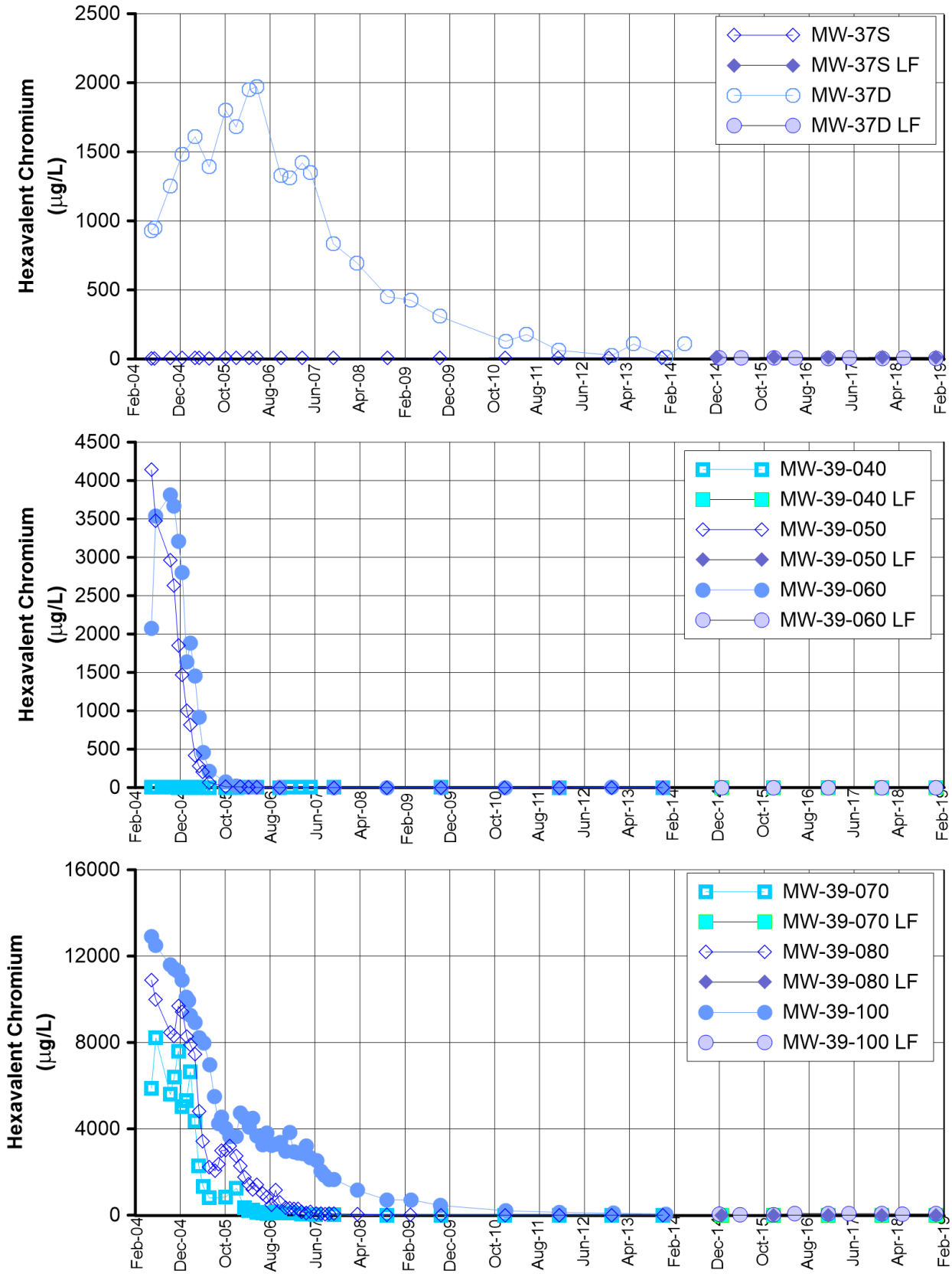

Notes:
1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).
2) The trigger level for MW-39-040 is 20 µg/L.

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-8
HEXAVALENT CHROMIUM IN MW-37 AND MW-39 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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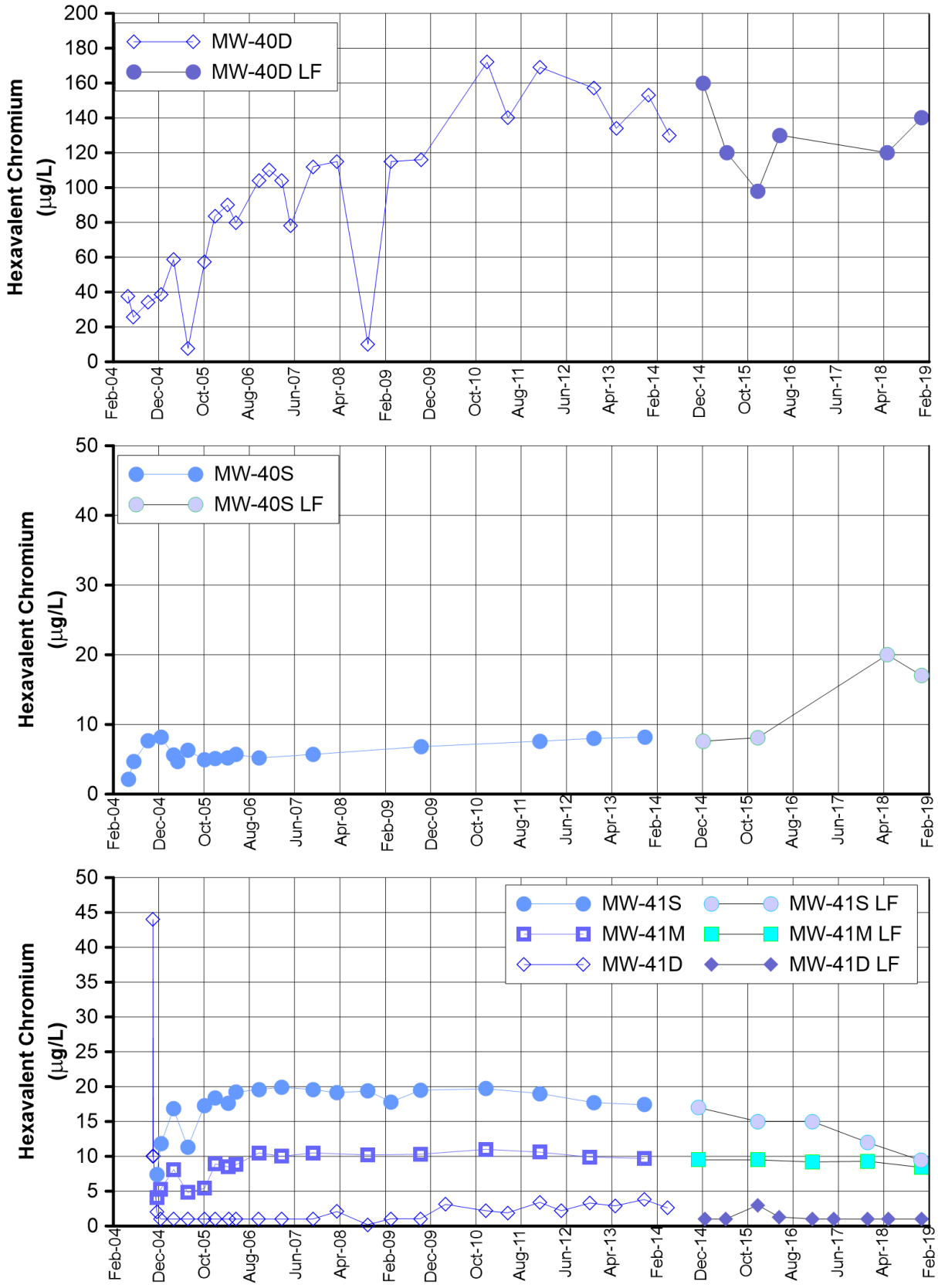

Notes:

1. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.
2. MW-40D and MW-40S were not sampled during 4th Quarter 2016 due to traffic control issues.

FIGURE F-9
HEXAVALENT CHROMIUM
IN MW-40 AND MW-41 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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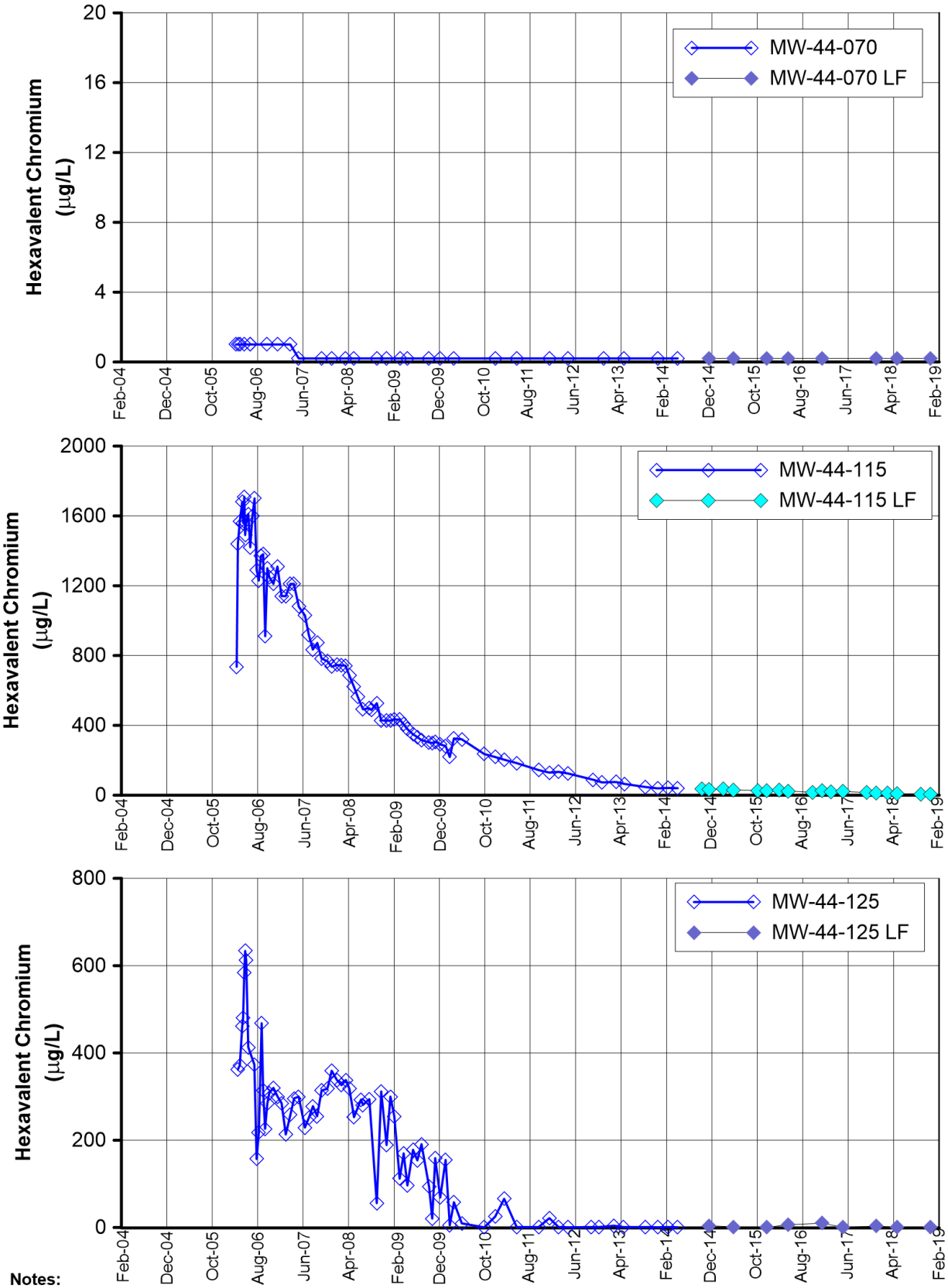

Notes:

1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).
2) The trigger level for MW-44-070 is 20 µg/L.
3) The trigger level for MW-44-115 is 1,200 µg/L.
4) The trigger level for MW-44-125 is 475 µg/L.

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-10
HEXAVALENT CHROMIUM IN MW-44 CLUSTER

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

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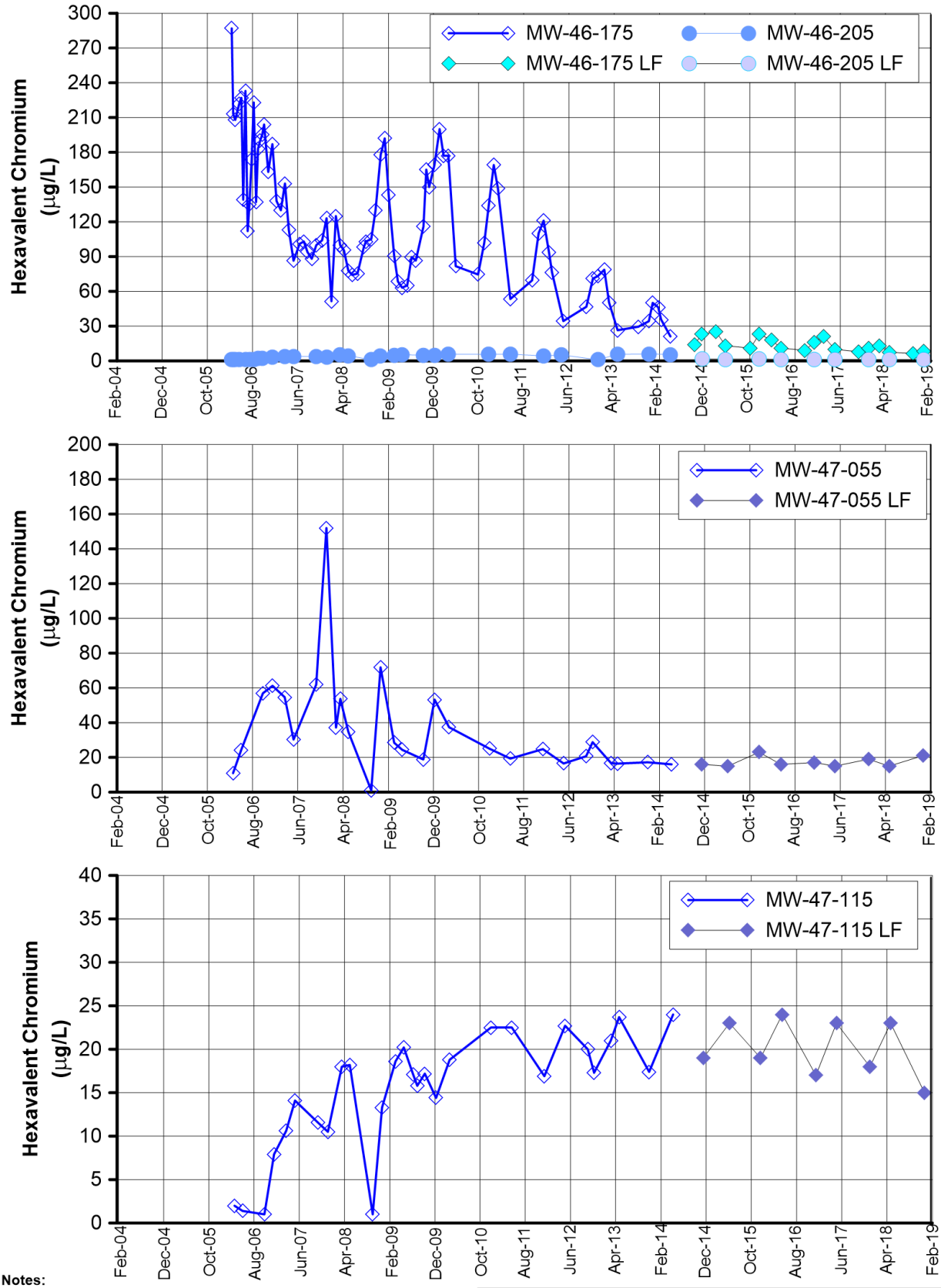

Notes:

1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).
2) The trigger level for MW-46-175 is 225 µg/L.
3) The trigger level for MW-46-205 is 20 µg/L.
4) The trigger level for MW-47-055 is 475 µg/L.
5) The trigger level for MW-47-115 is 31 µg/L.

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-11
HEXAVALENT CHROMIUM
IN MW-46 AND MW-47 CLUSTERS

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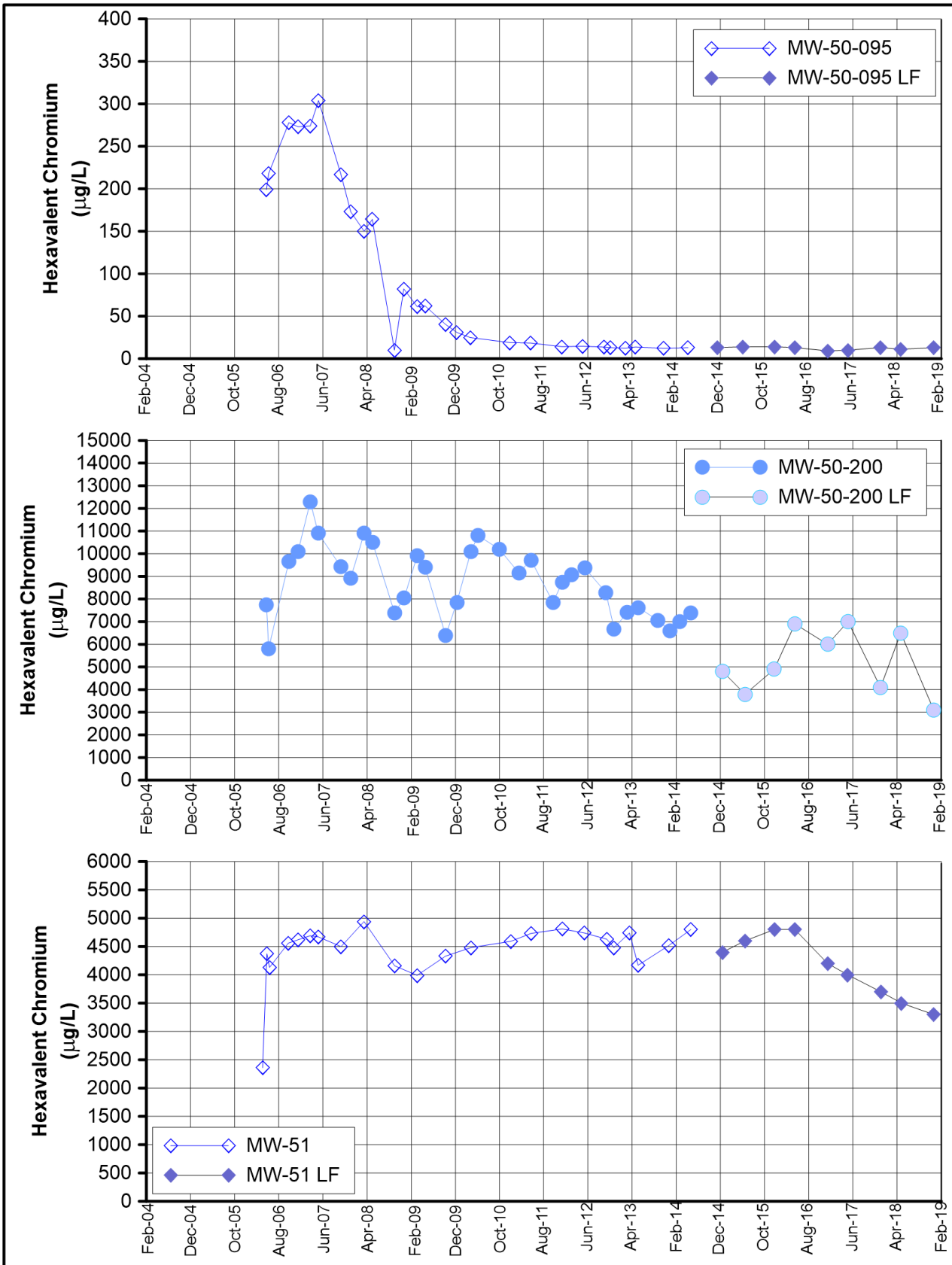

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-12
HEXAVALENT CHROMIUM
IN MW-50 AND MW-51 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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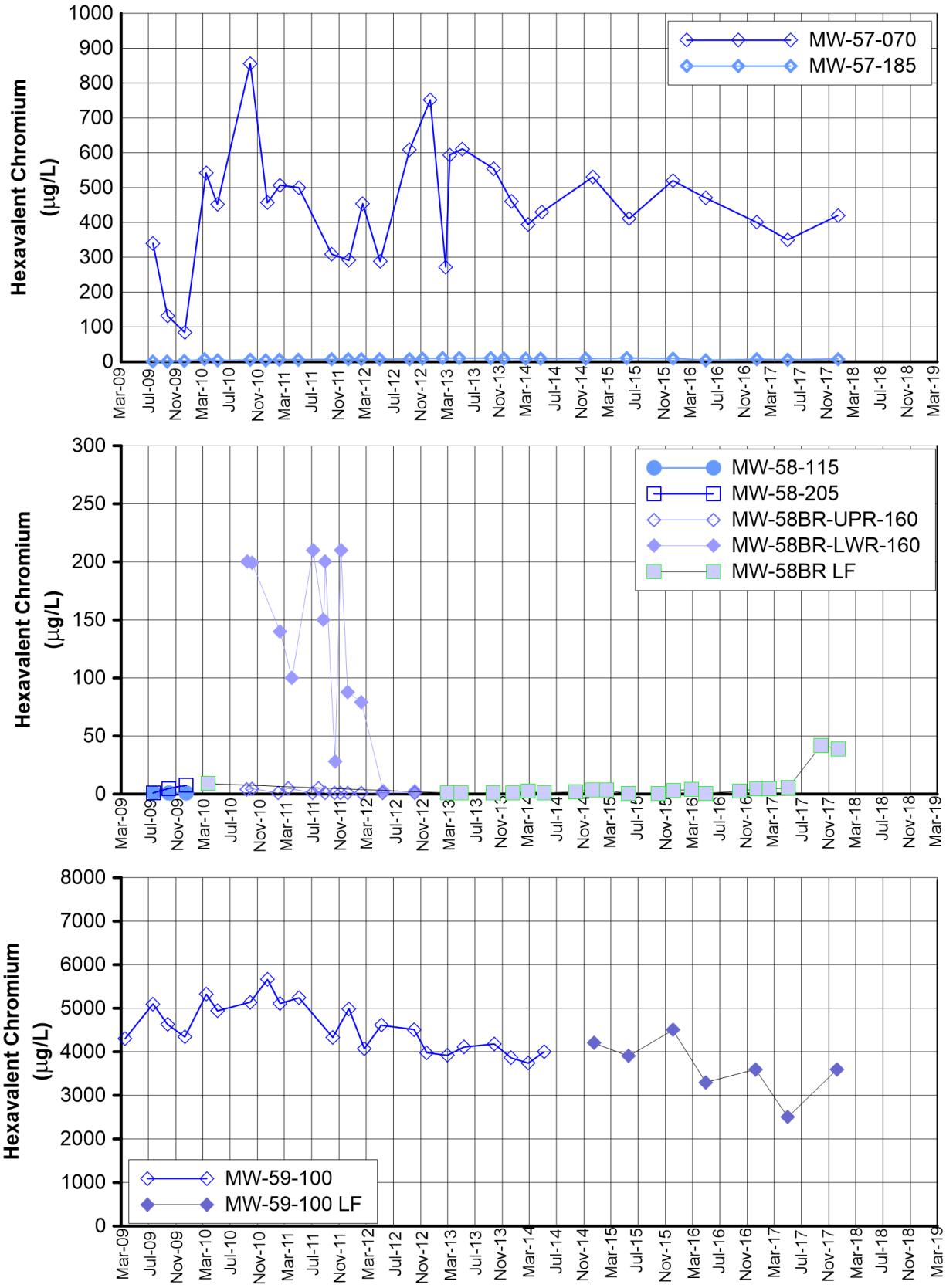

Note:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-13
HEXAVALENT CHROMIUM
IN MW-57 CLUSTER, MW-58 CLUSTER AND MW-59-100
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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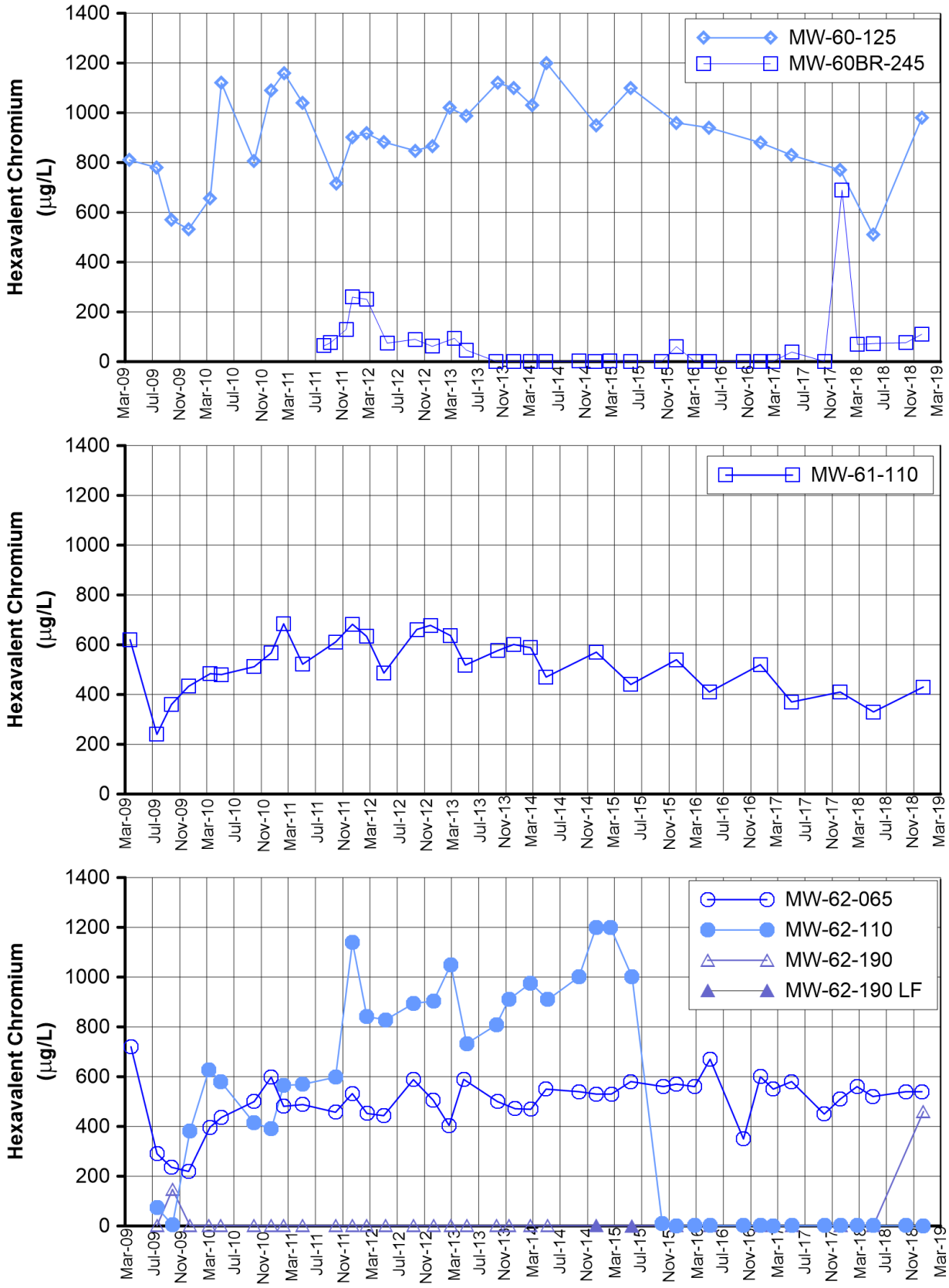

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-60-125 sampled using LF method on 12/06/2017.
2. MW-62-065 sampled using LF method on 5/02/2017, 9/25/2017 & 12/06/2017.

FIGURE F-14
HEXAVALENT CHROMIUM
IN MW-60 CLUSTER, MW-61-110 AND MW-62 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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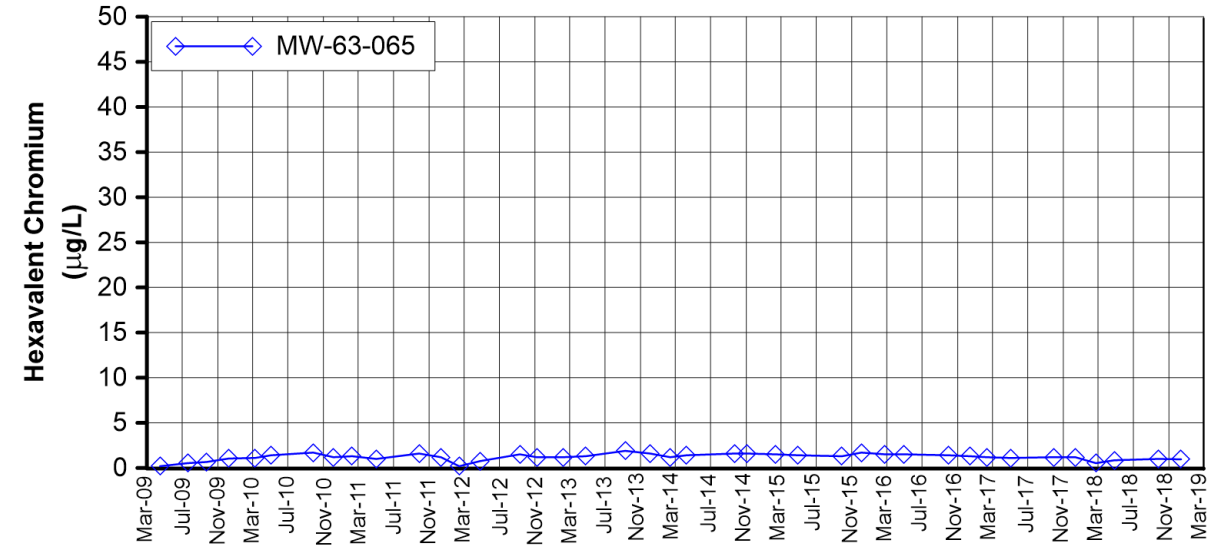

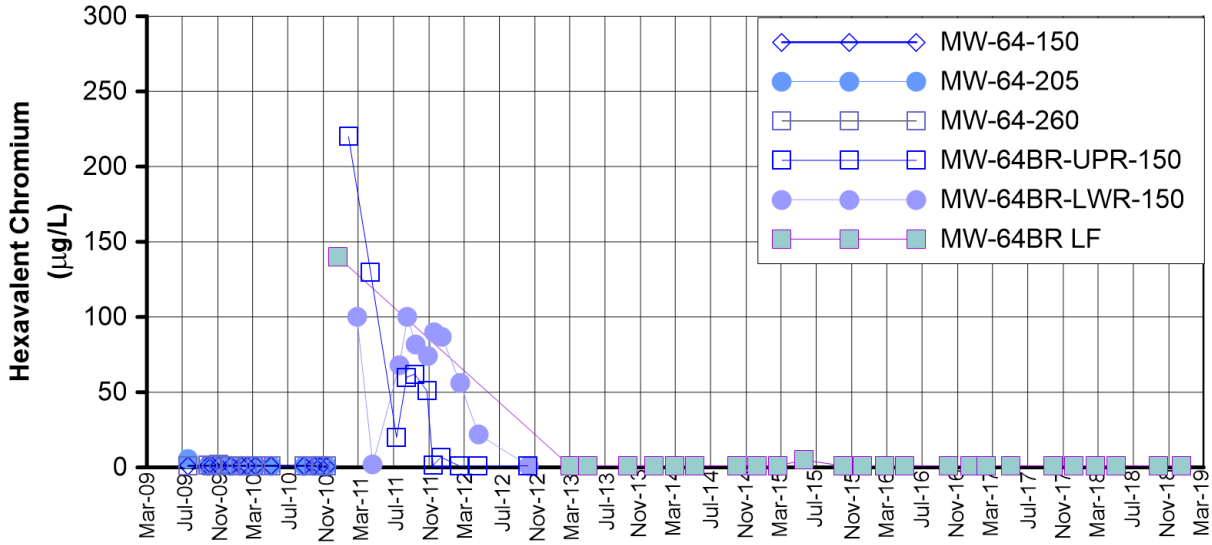

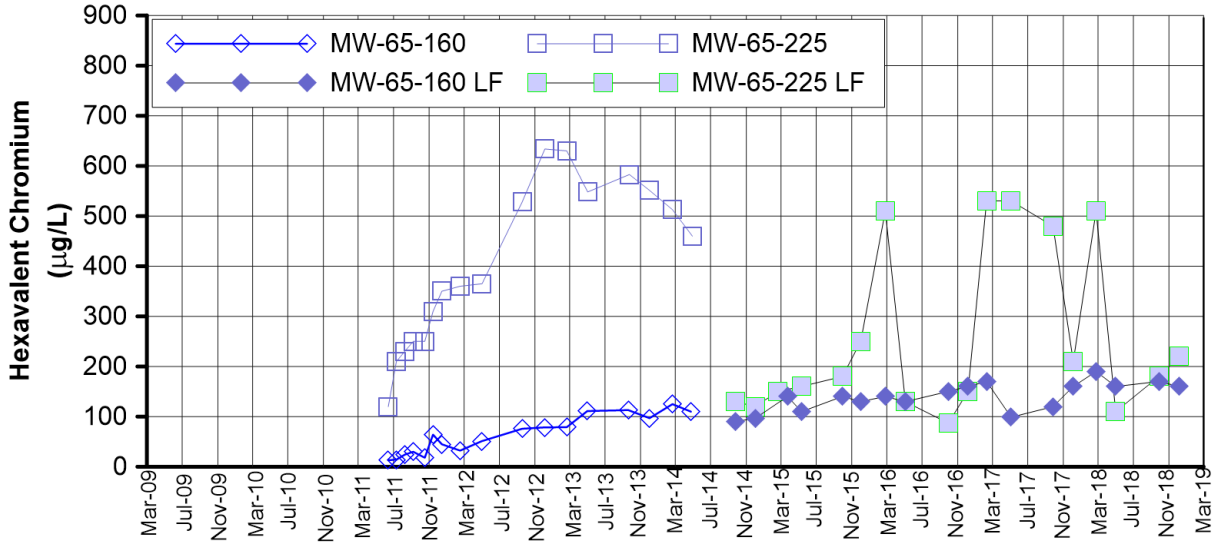

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-63-065 sampled using LF method on 5/02/2017, 9/28/2017 & 12/12/2017.

FIGURE F-15
HEXAVALENT CHROMIUM
IN MW-63-065, MW-64 CLUSTER AND MW-65 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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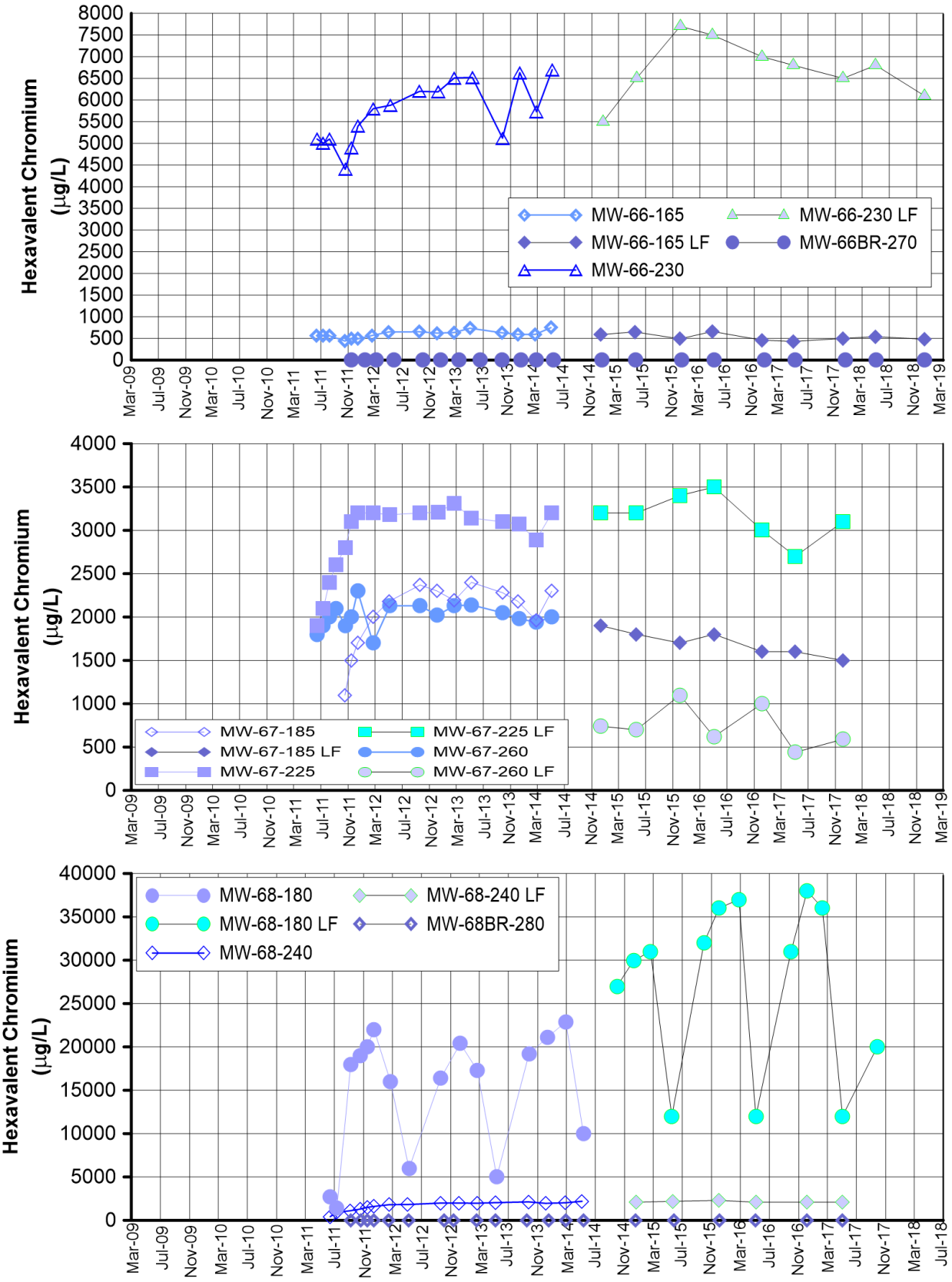

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-16
HEXAVALENT CHROMIUM
IN MW-66, MW-67, AND MW-68 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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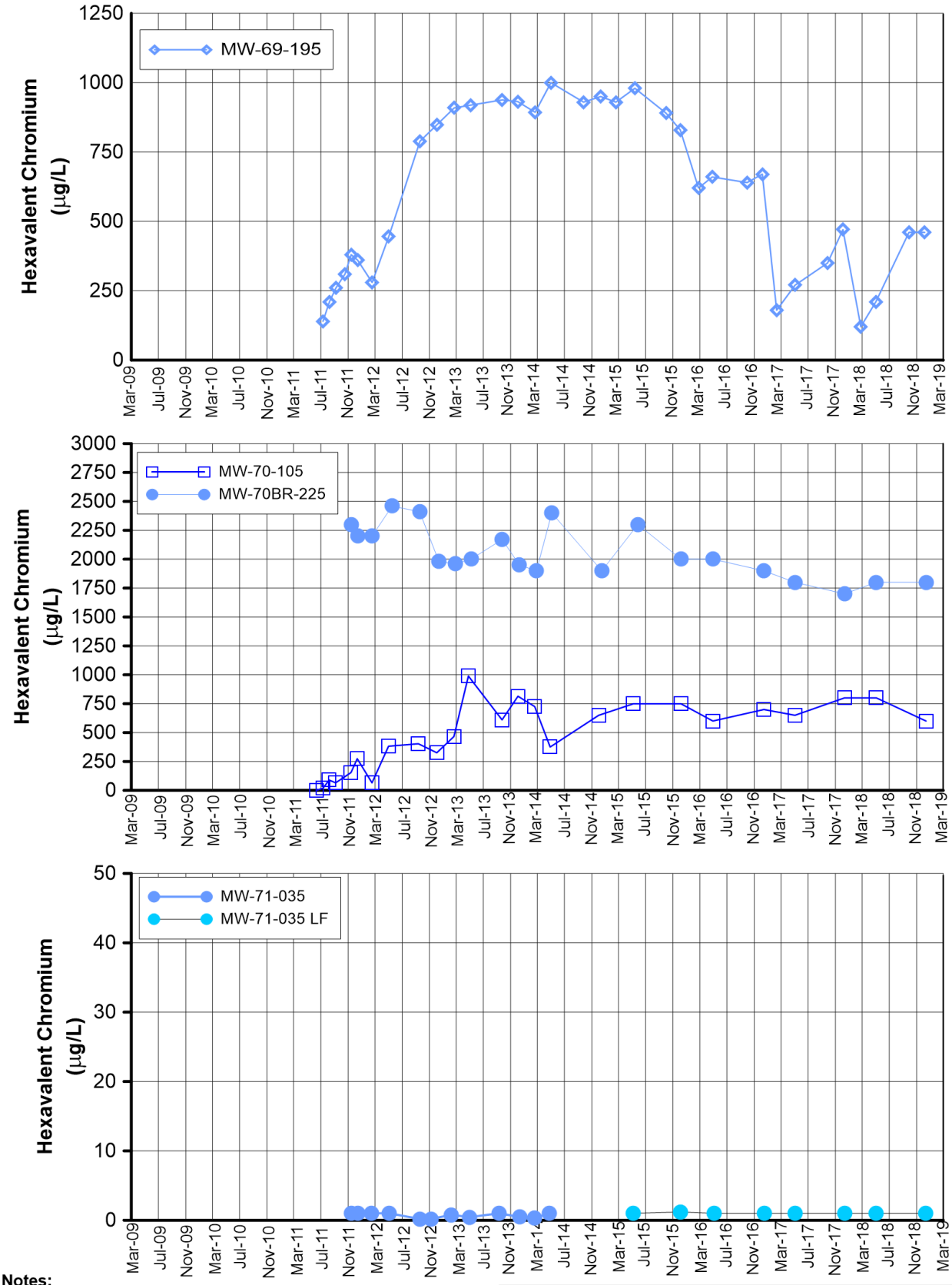

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-69-195 sampled using LF method on 2/09/2017, 5/3/2017, 9/26/2017, & 12/04/2017.
2. MW-70-105 sampled using LF method on 5/02/2017 & 12/11/2017.

FIGURE F-17
HEXAVALENT CHROMIUM
IN MW-69-195, MW-70 CLUSTER, AND MW-71-035
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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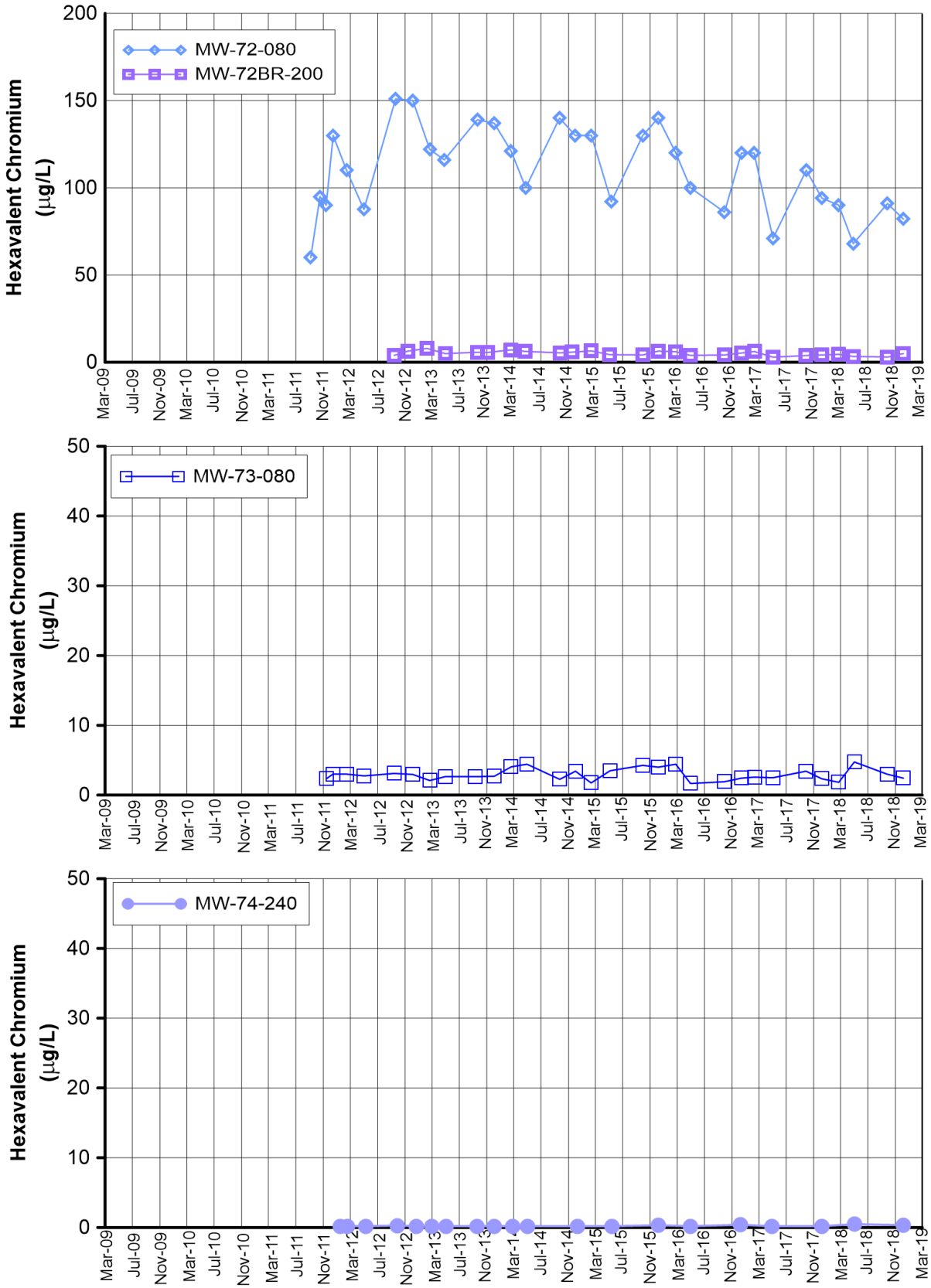

Notes:

1. MW-72-080 sampled using low flow sampling method on 5/02/2017 & 12/07/2017.
2. MW-73-080 sampled using low flow sampling method on 5/02/2017, 9/27/2017, & 12/6/2017.
3. MW-74-240 sampled using low flow sampling method on 4/27/2017 & 12/06/2017.

FIGURE F-18
HEXAVALENT CHROMIUM
IN MW-72 CLUSTER, MW-73-080, AND MW-74-240
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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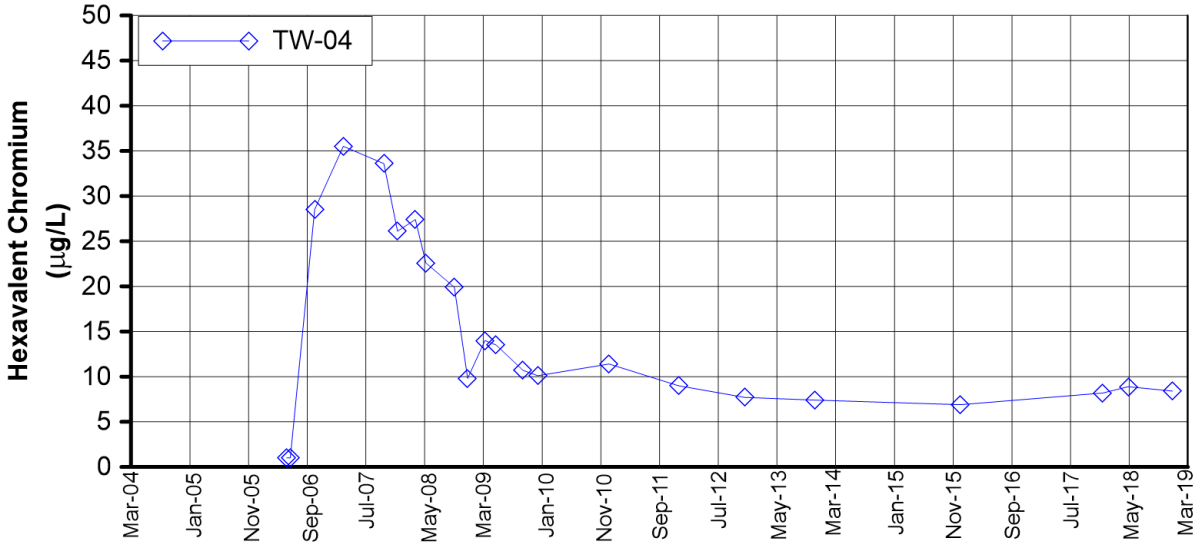
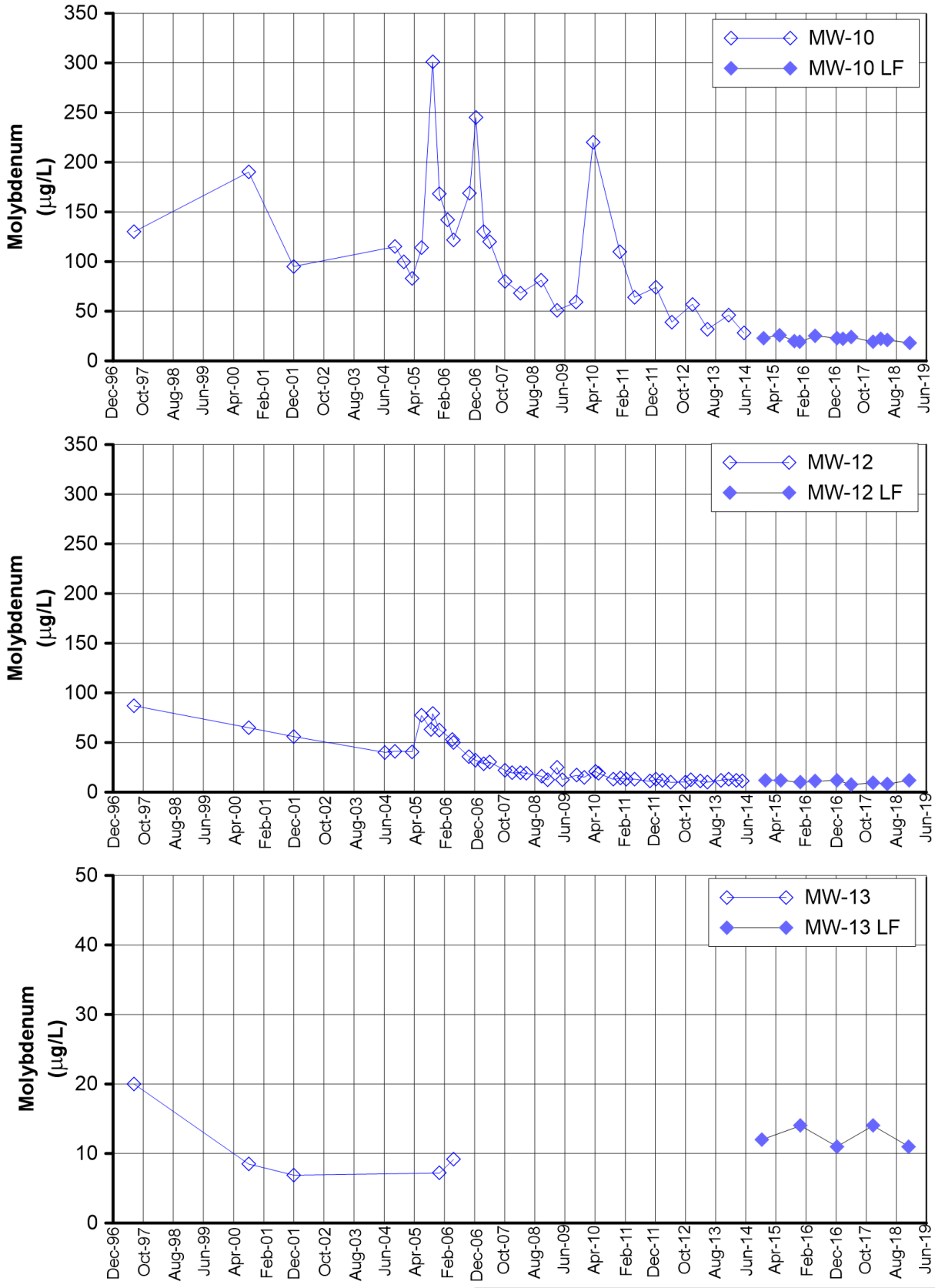


FIGURE F-19
HEXAVALENT CHROMIUM
IN TW-04

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA



Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-20
MOLYBDENUM
IN MW-10, MW-12, AND MW-13
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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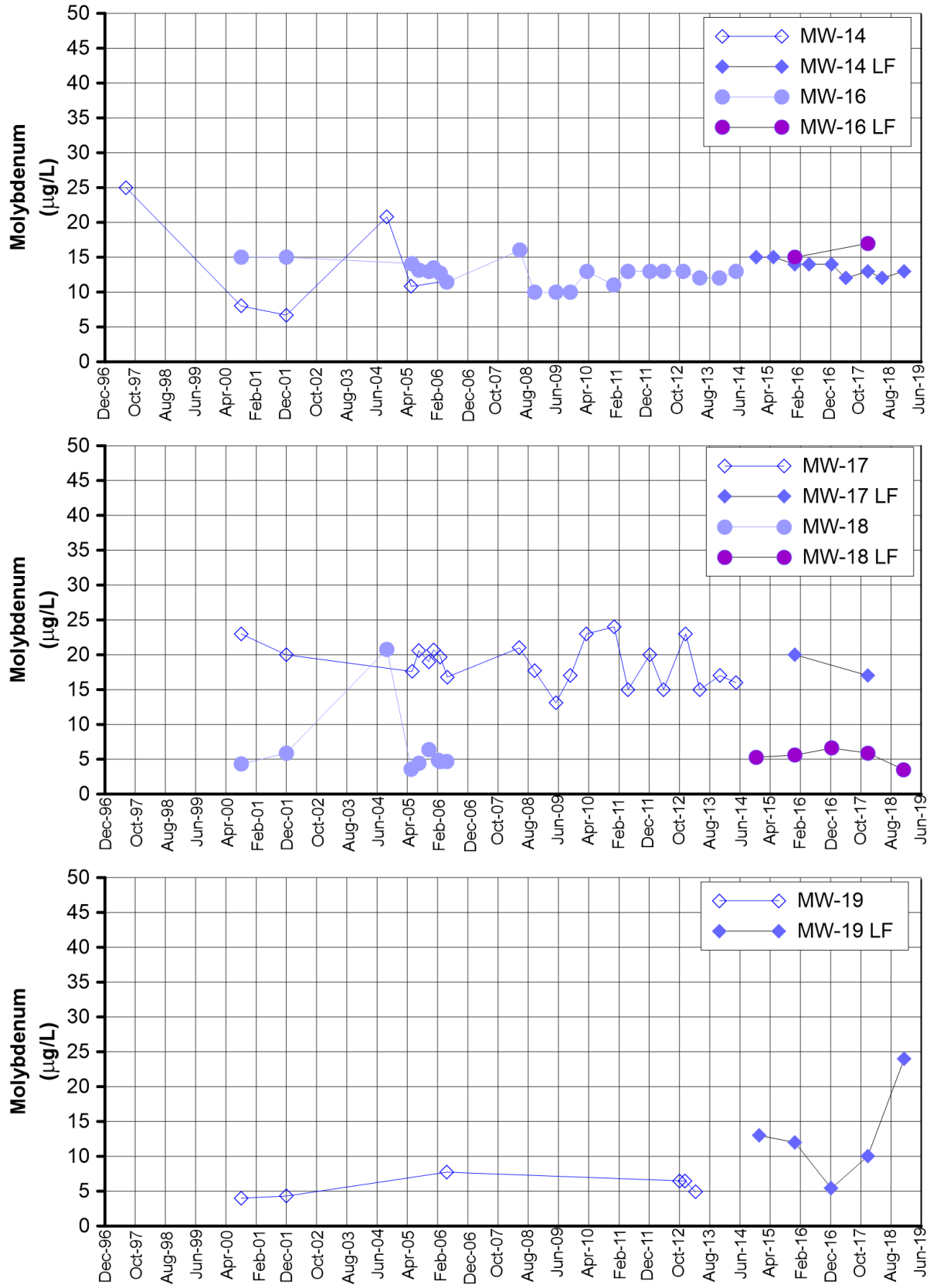

Notes:

1. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-21
MOLYBDENUM
IN MW-14, MW-16, MW-17, MW-18, AND MW-19
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
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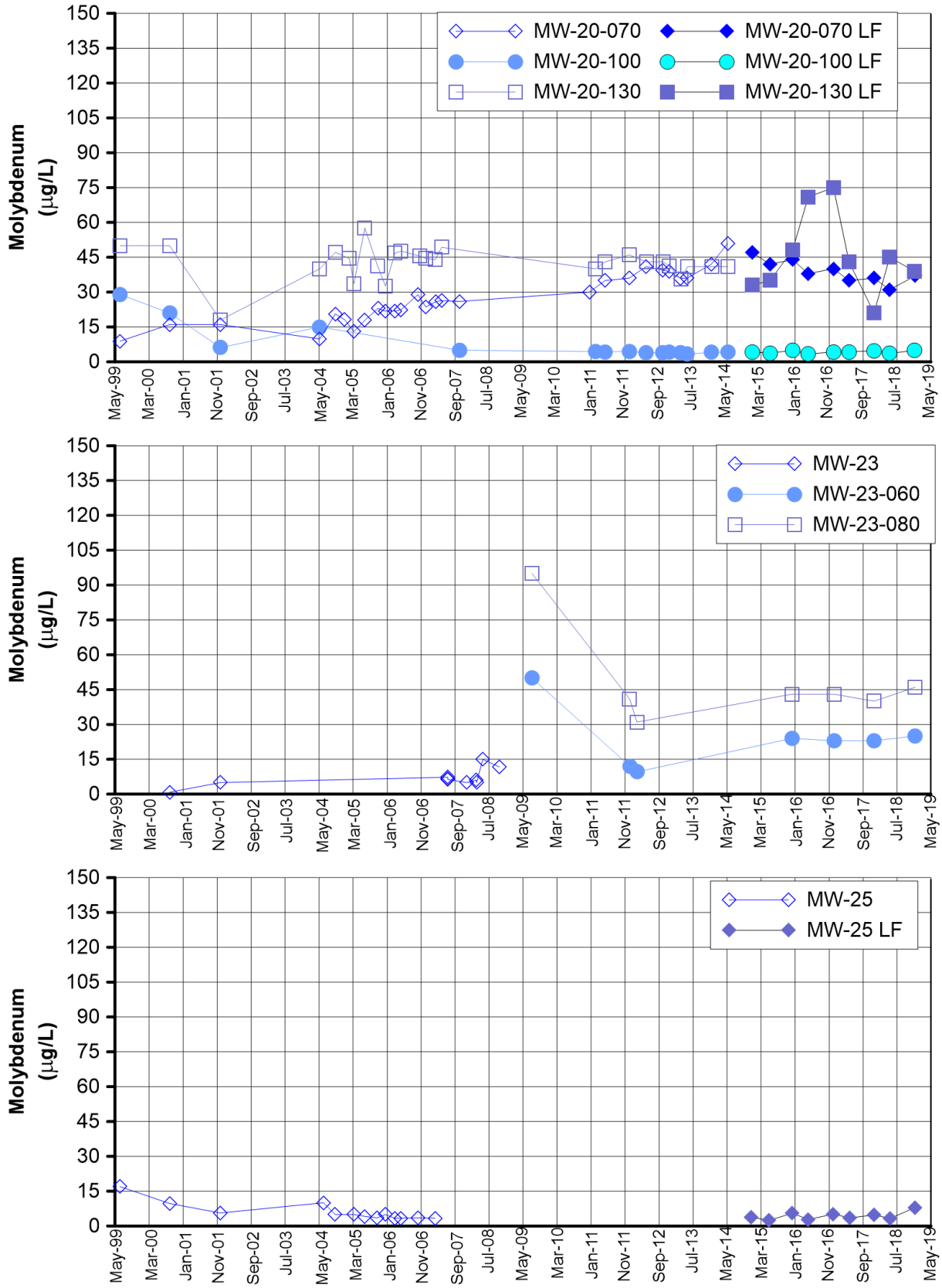

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-22
MOLYBDENUM
IN MW-20, MW-23, AND MW-25 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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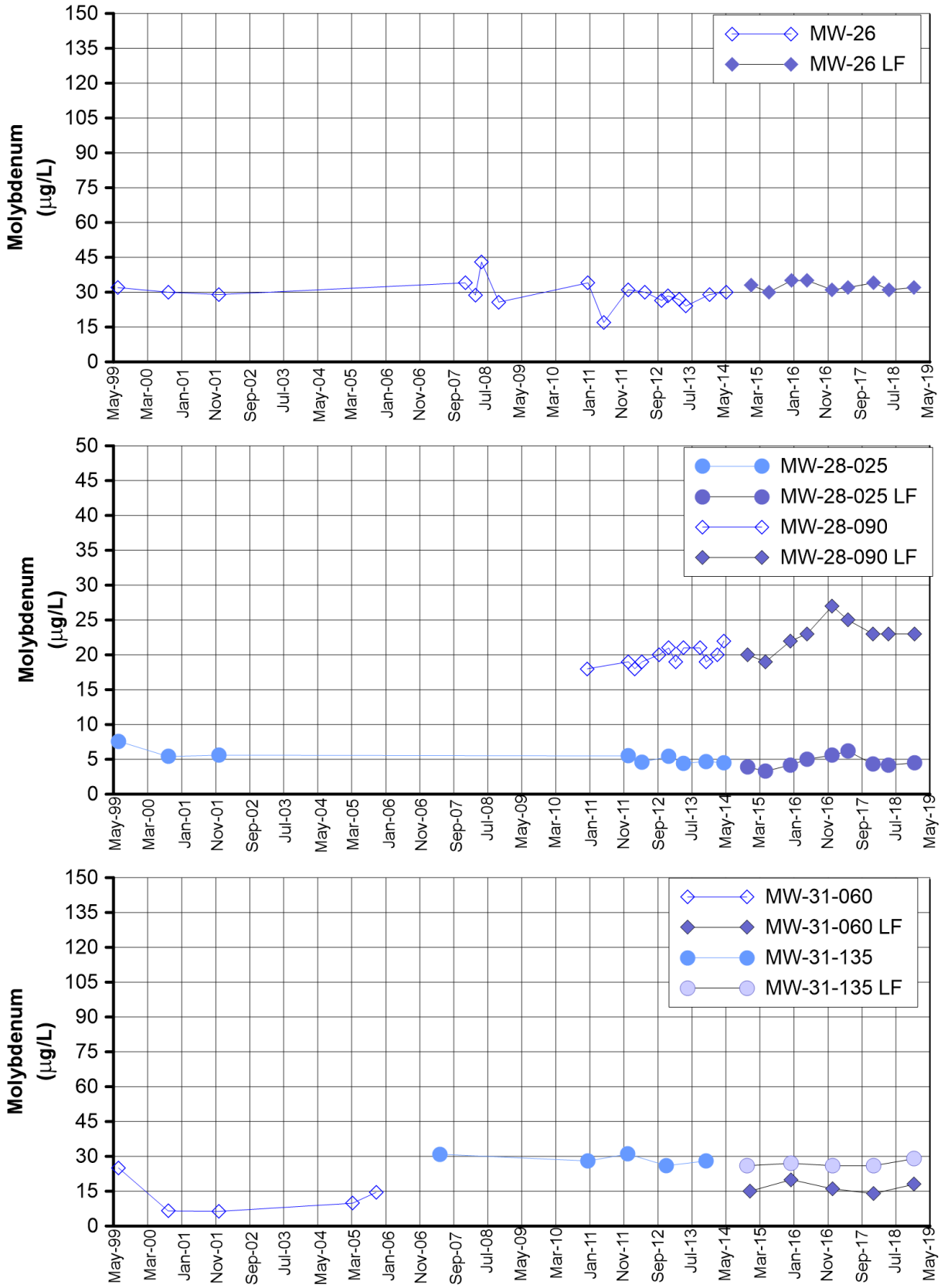

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-23
MOLYBDENUM
IN MW-26, MW-28, AND MW-31 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
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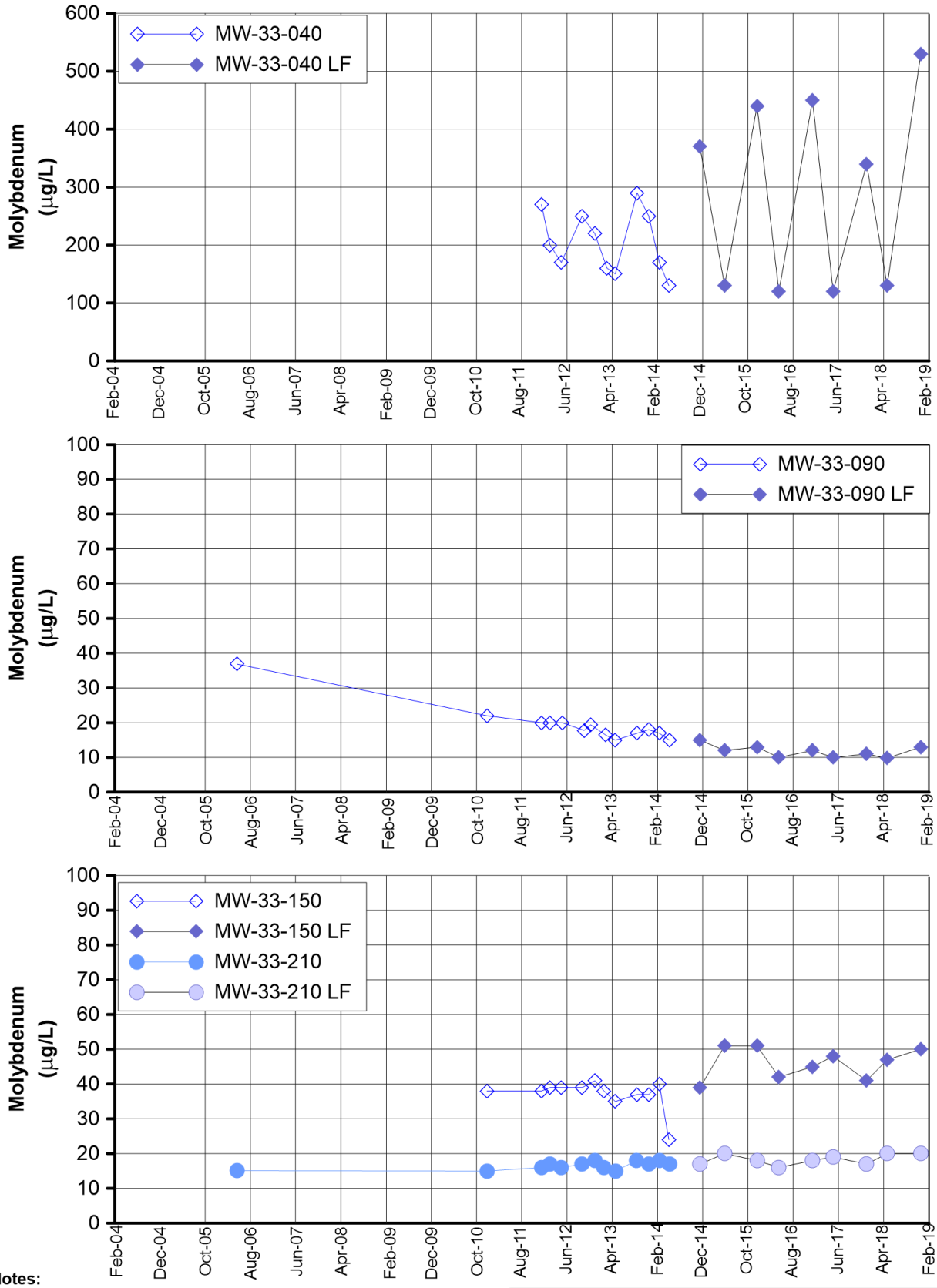

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-24
MOLYBDENUM
IN MW-33 CLUSTER

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
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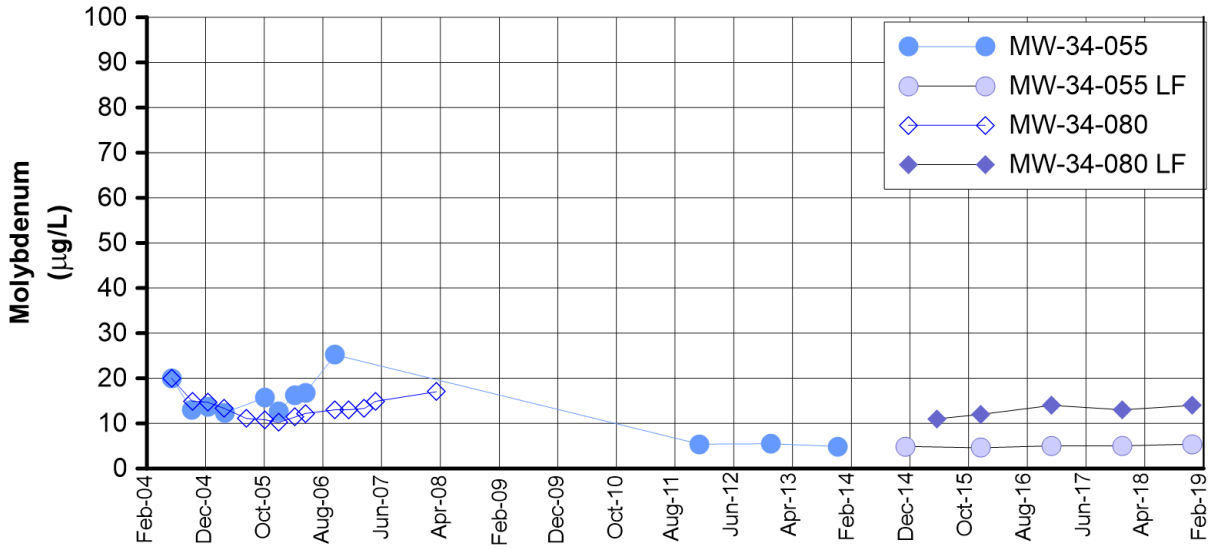

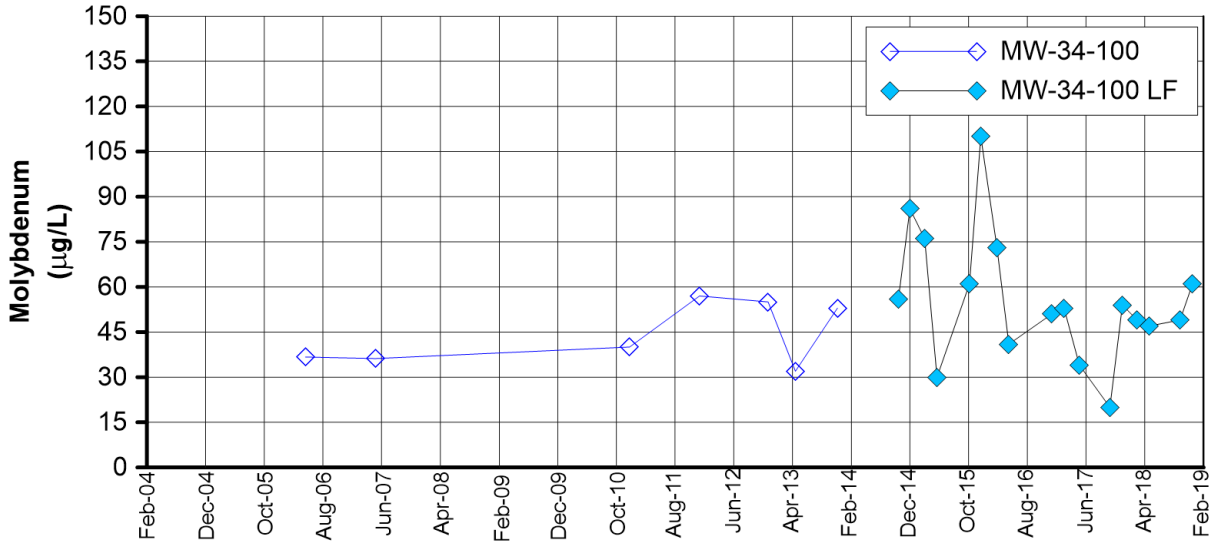

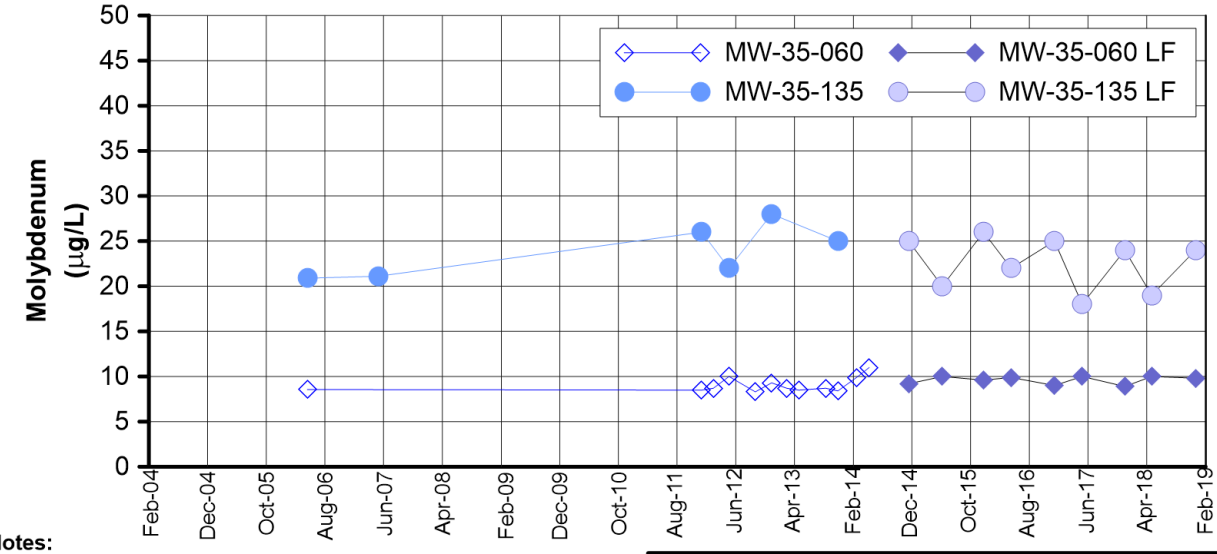

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-25
MOLYBDENUM
IN MW-34 AND MW-35 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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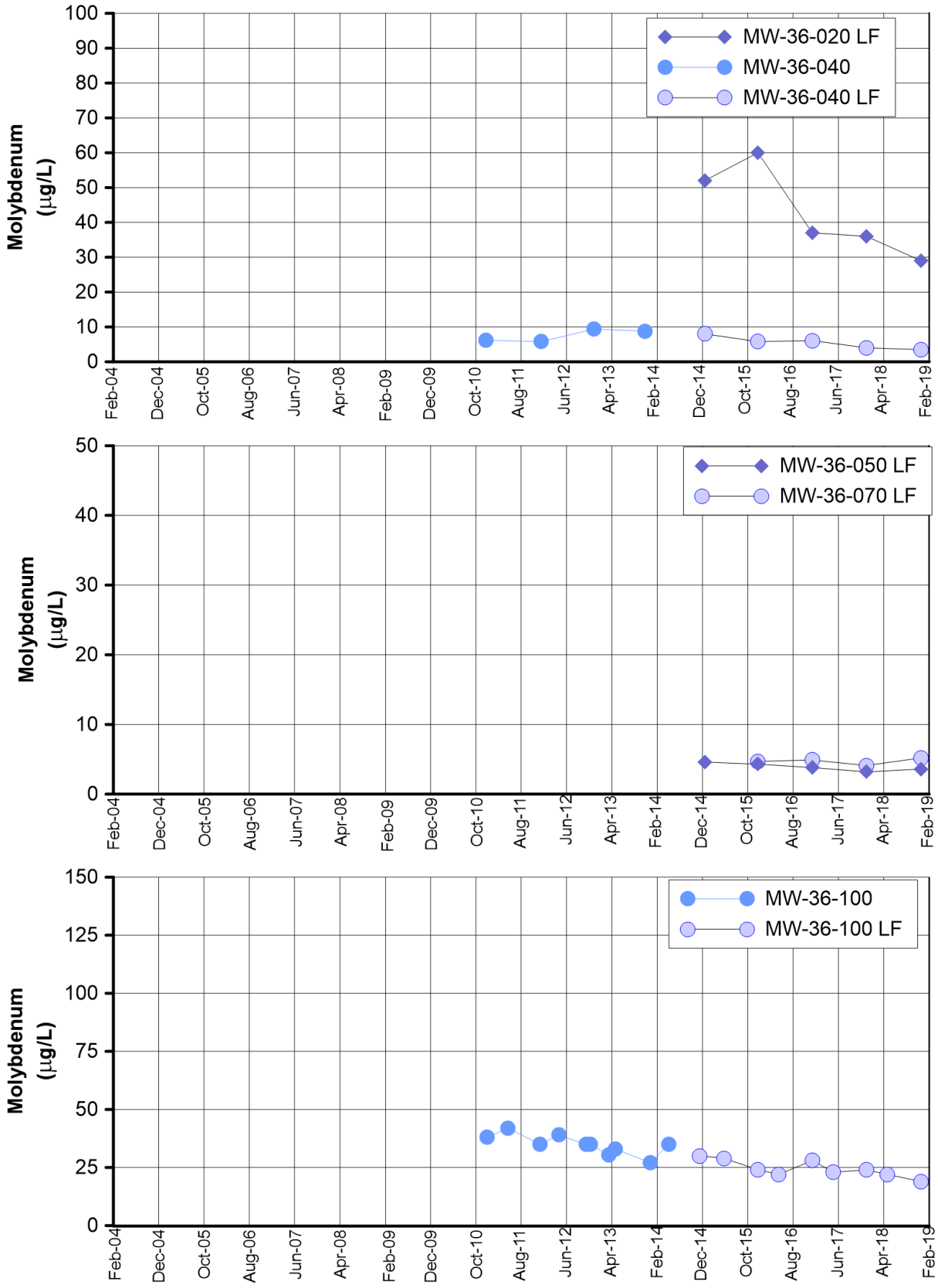

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-26
MOLYBDENUM
IN MW-36 CLUSTER

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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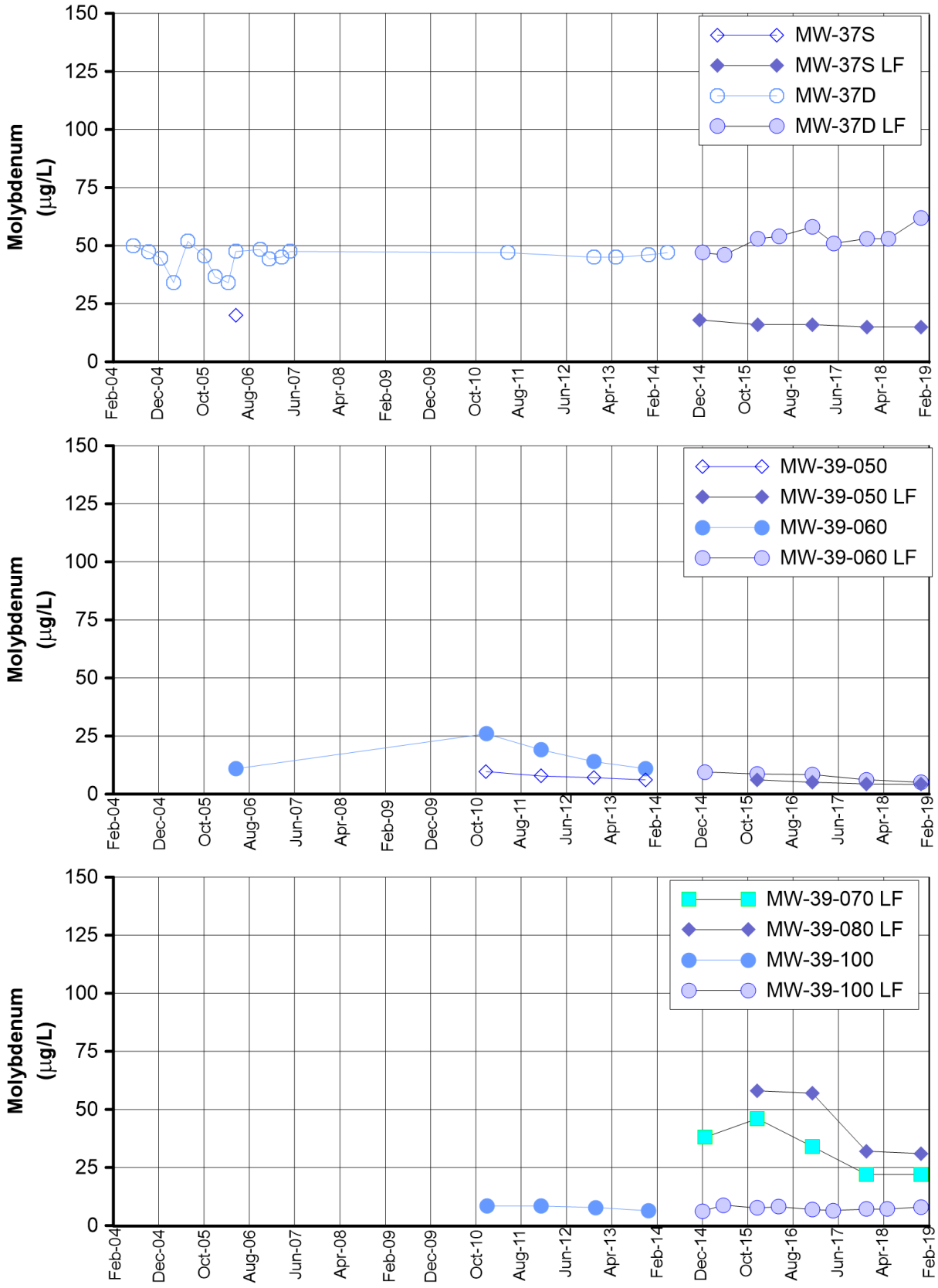

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-27
MOLYBDENUM
IN MW-37 AND MW-39 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
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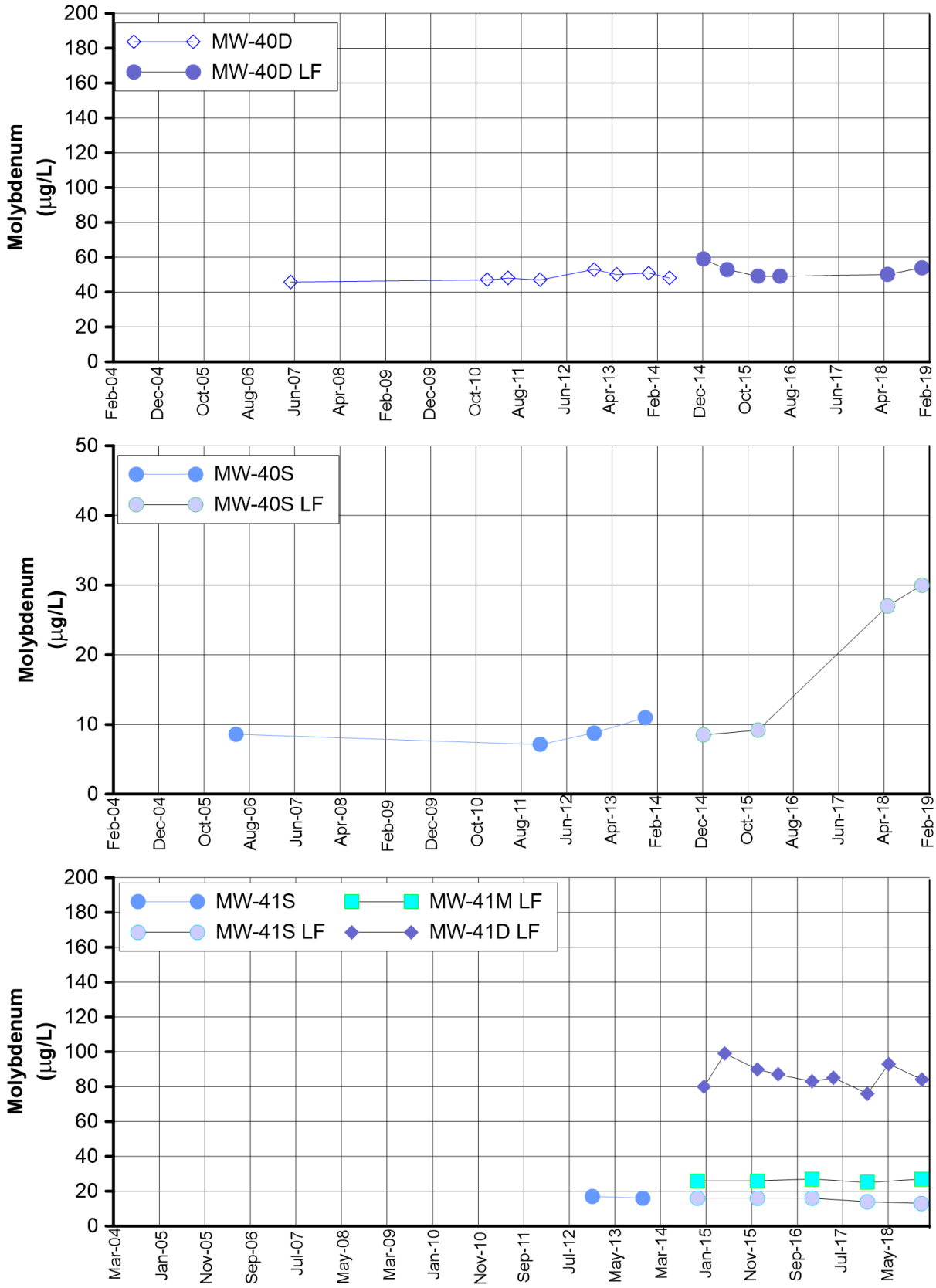

Notes:

1. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.
2. MW-40D and MW-40S were not sampled during 4th Quarter 2017 due to traffic control issues.

FIGURE F-28
MOLYBDENUM
IN MW-40 AND MW-41 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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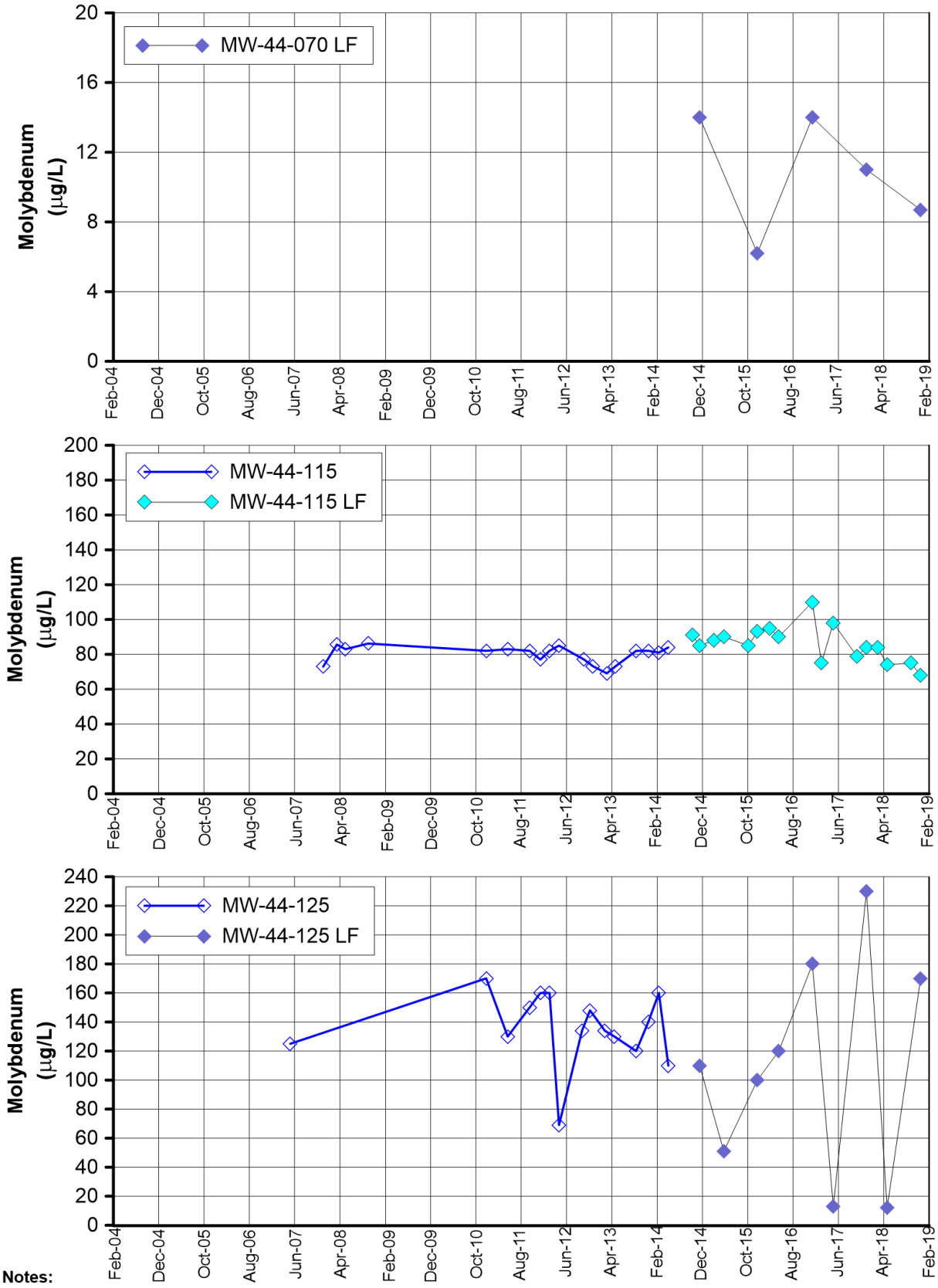

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-29
MOLYBDENUM
IN MW-44 CLUSTER

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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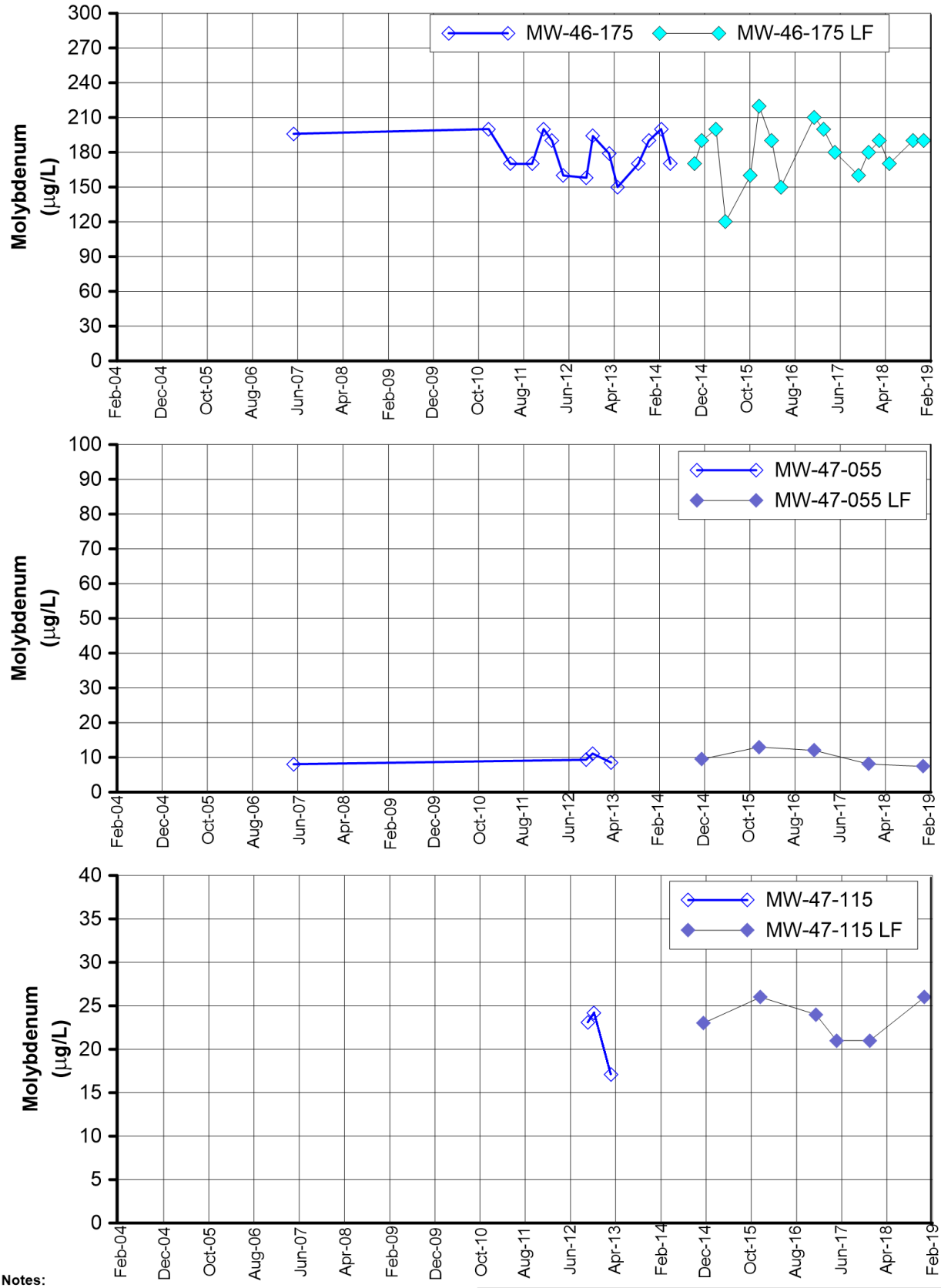

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-30
MOLYBDENUM
IN MW-46 AND MW-47 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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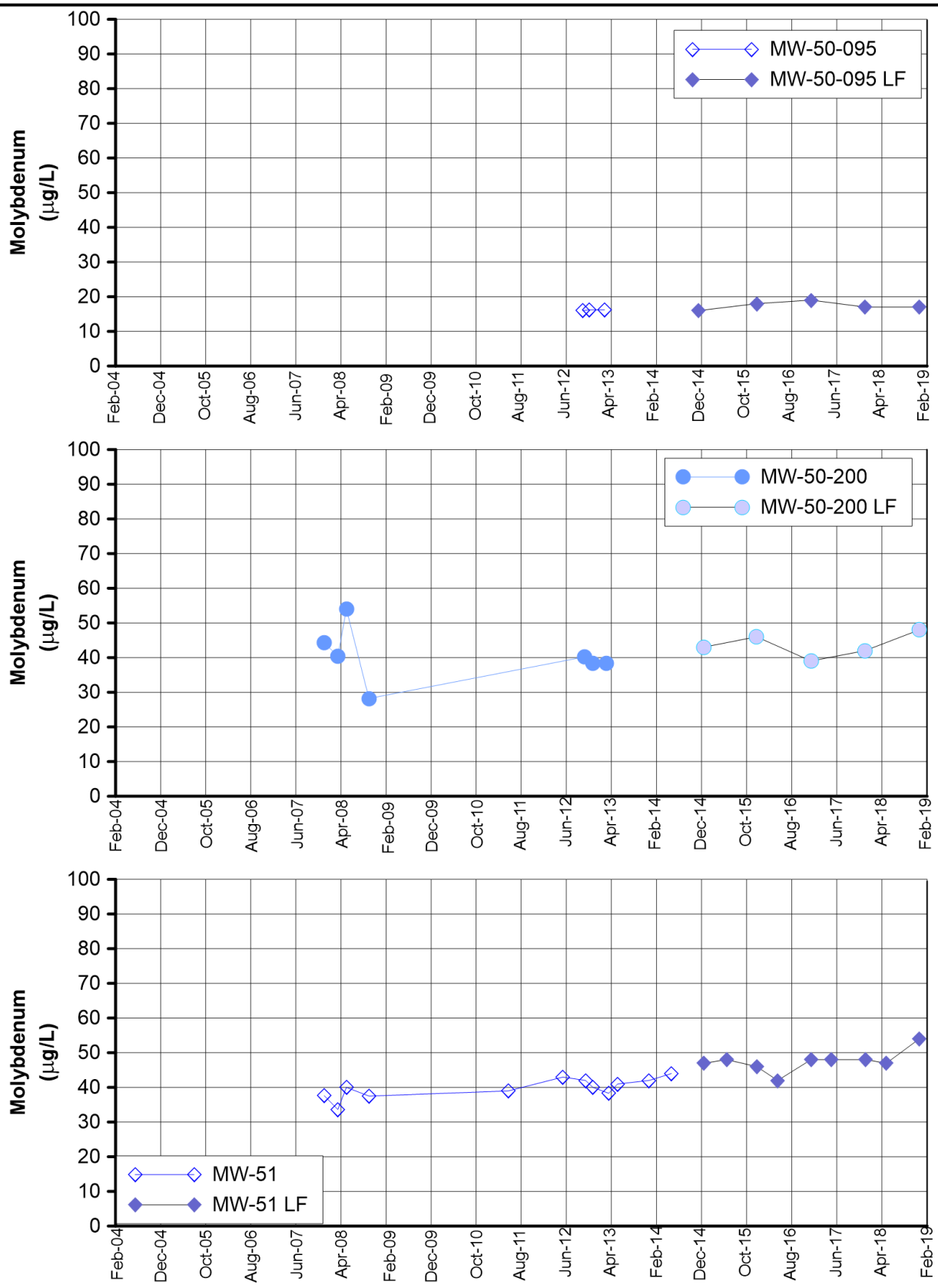
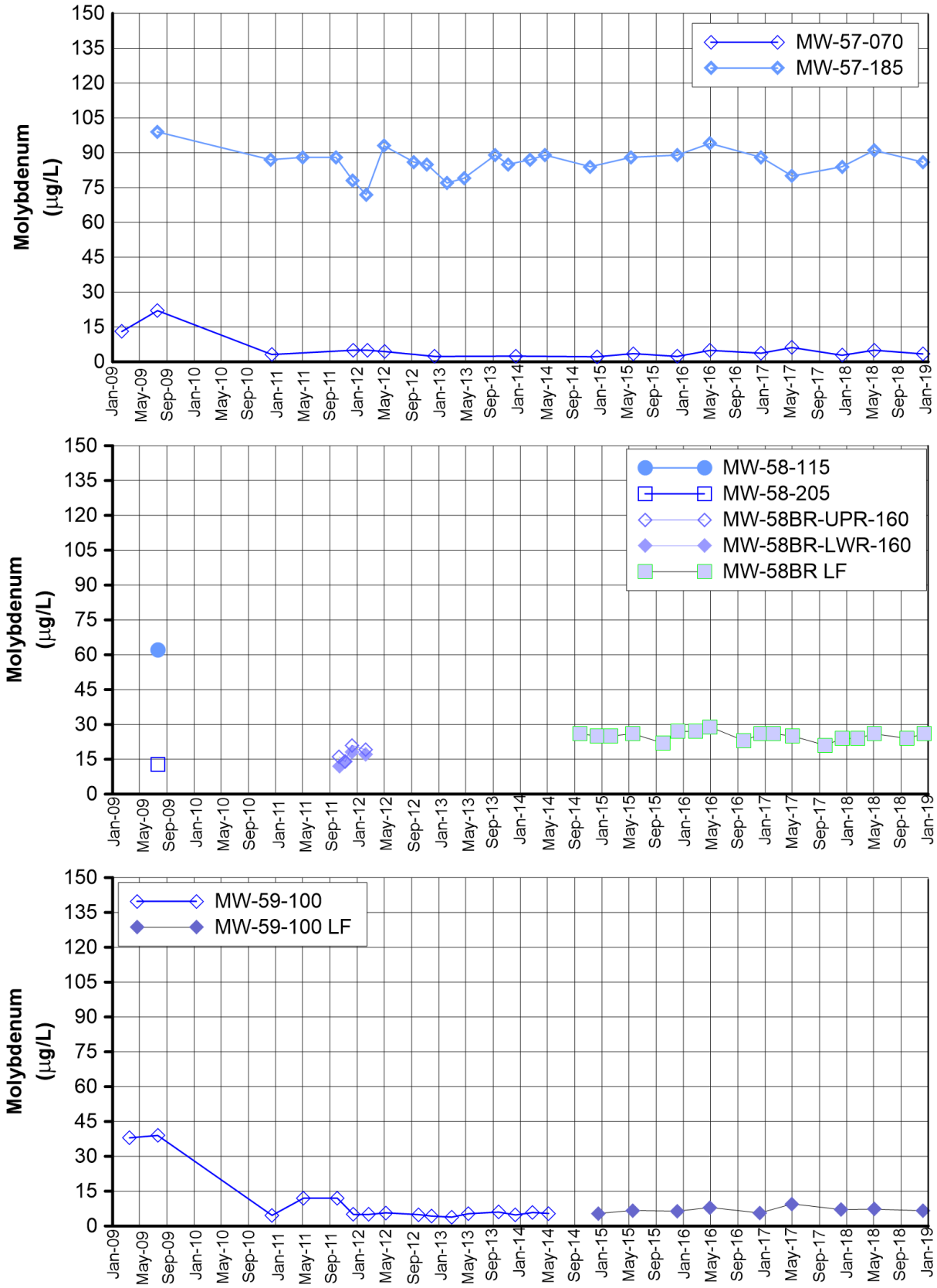


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-31
MOLYBDENUM
IN MW-50 AND MW-51 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS



Note:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-32
MOLYBDENUM
IN MW-57 CLUSTER, MW-58 CLUSTER AND MW-59-100
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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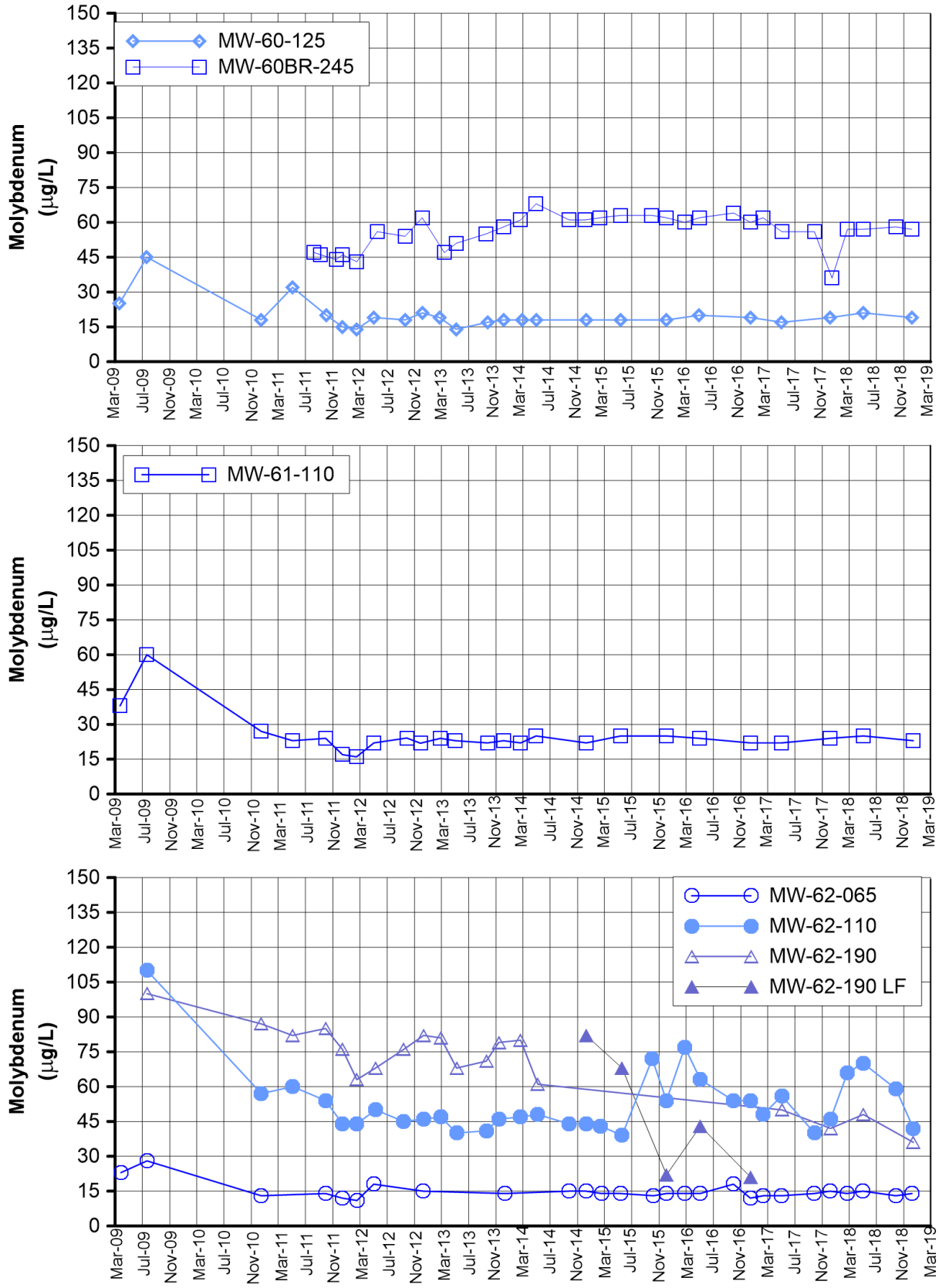

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-60-125 sampled using LF method on 5/02/2017 & 12/06/2017.
2. MW-62-065 sampled using LF method on 5/02/2017, 9/25/2017, & 12/06/2017.

FIGURE F-33
MOLYBDENUM
IN MW-60 CLUSTER, MW-61-110, AND MW-62 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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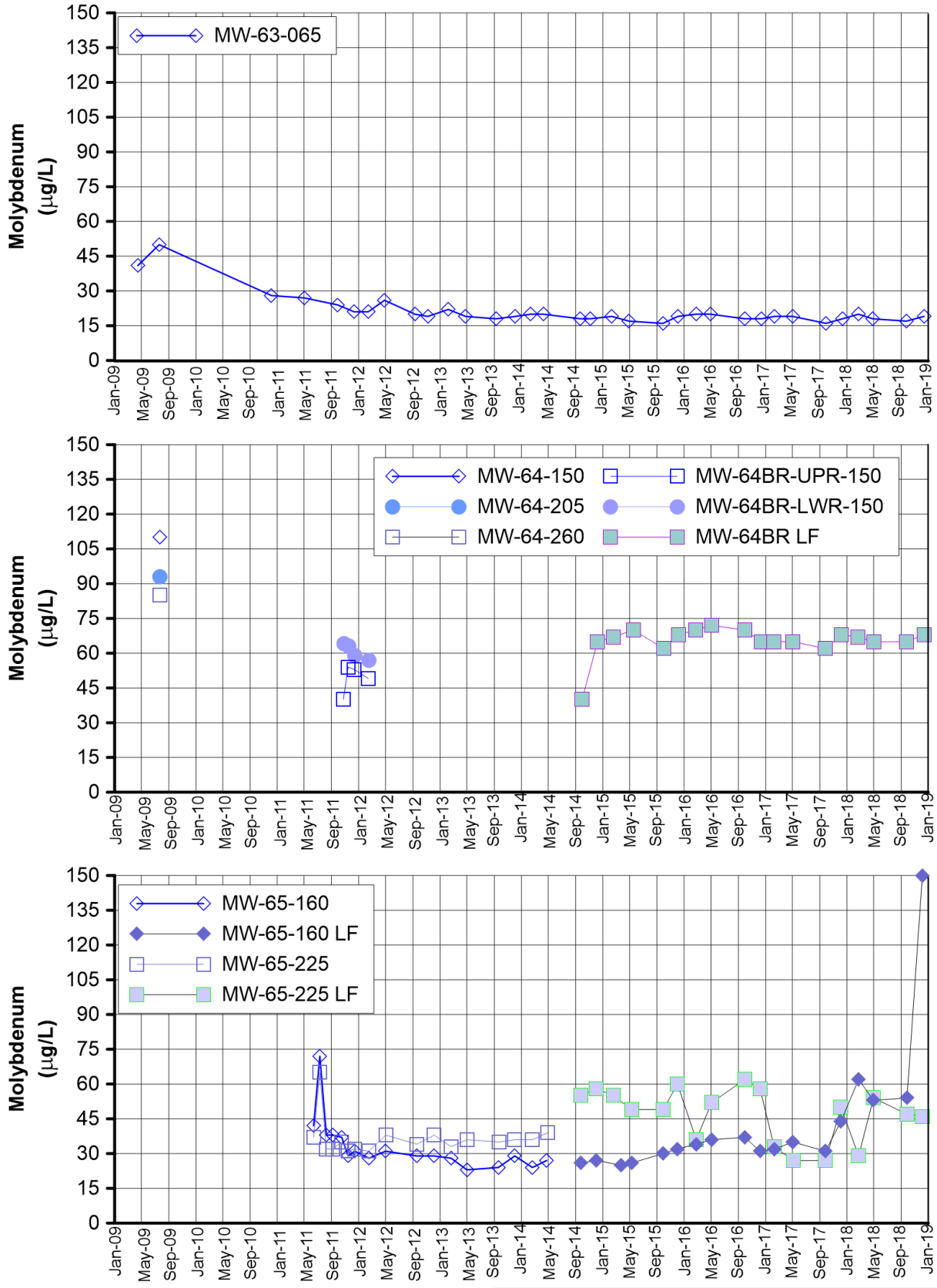

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-63-065 sampled using LF method on 5/02/2017, 9/28/2017, & 12/12/2017.

FIGURE F-34
MOLYBDENUM
IN MW-63-065, MW-64 CLUSTER AND MW-65 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
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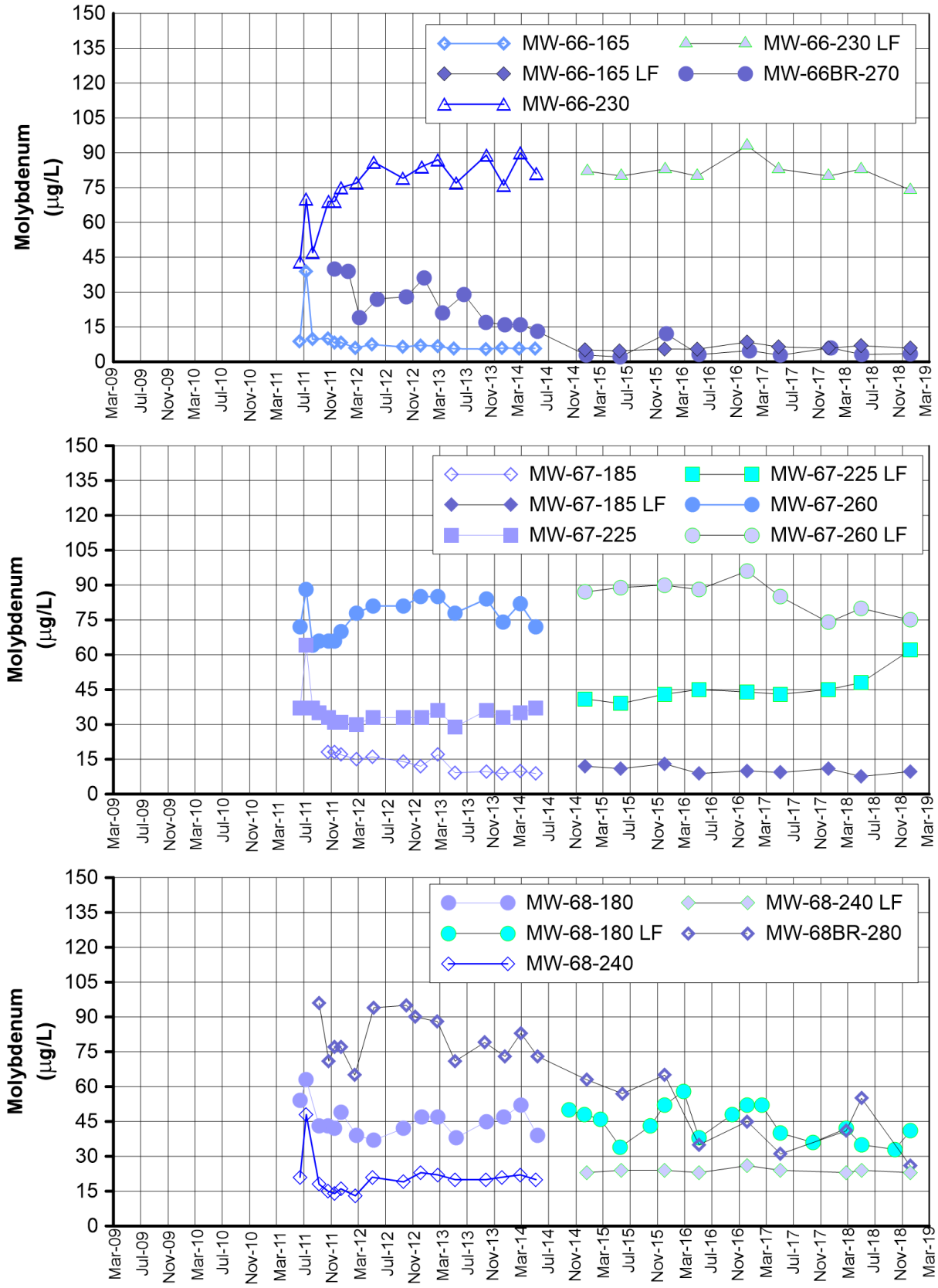

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-35
MOLYBDENUM
IN MW-66, MW-67, AND MW-68 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
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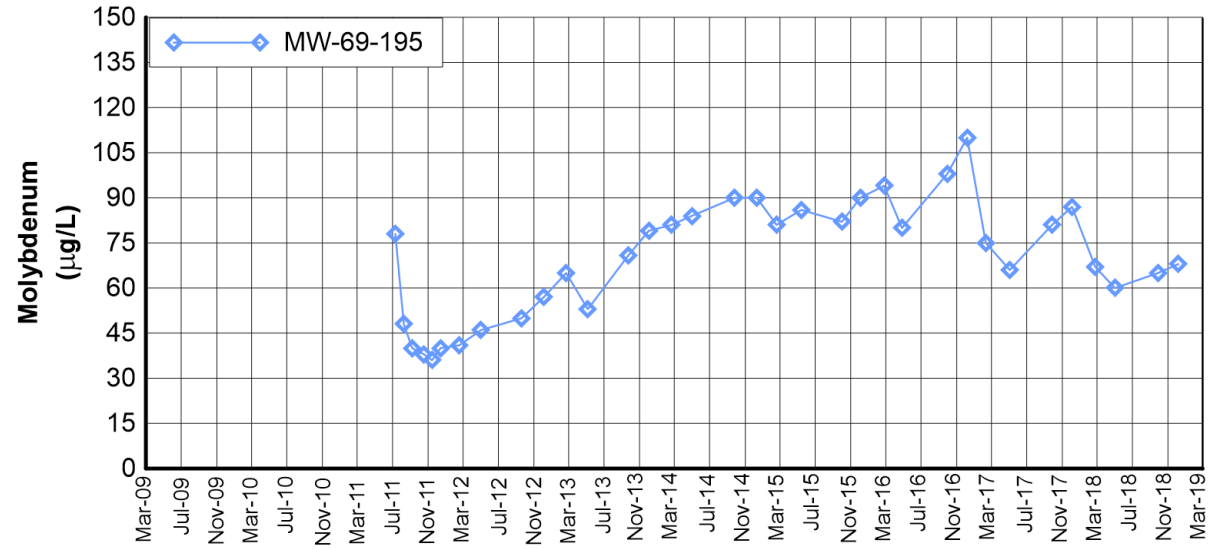

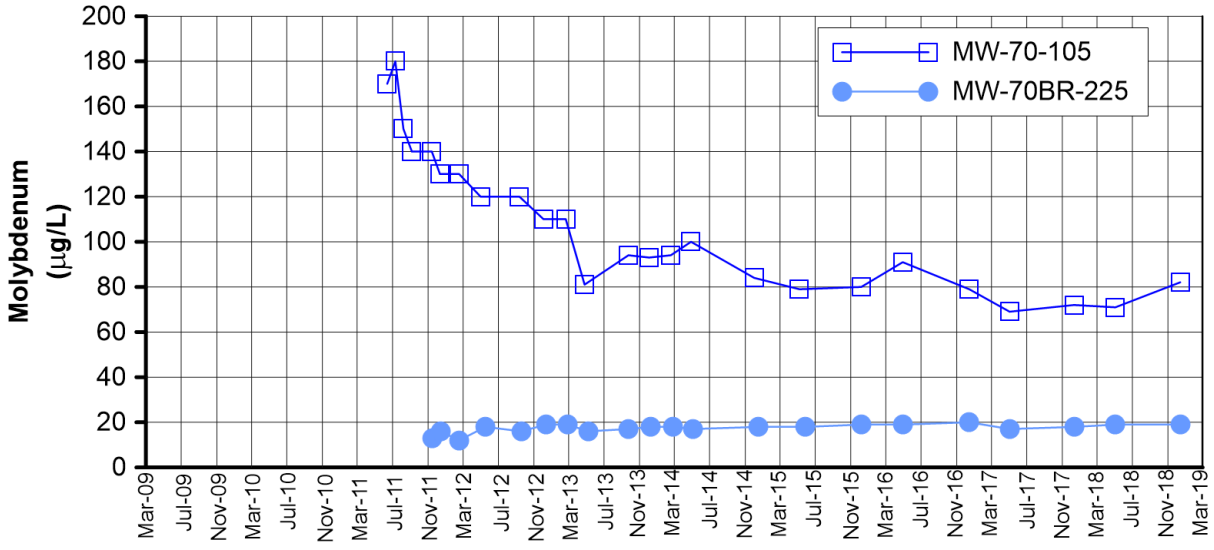

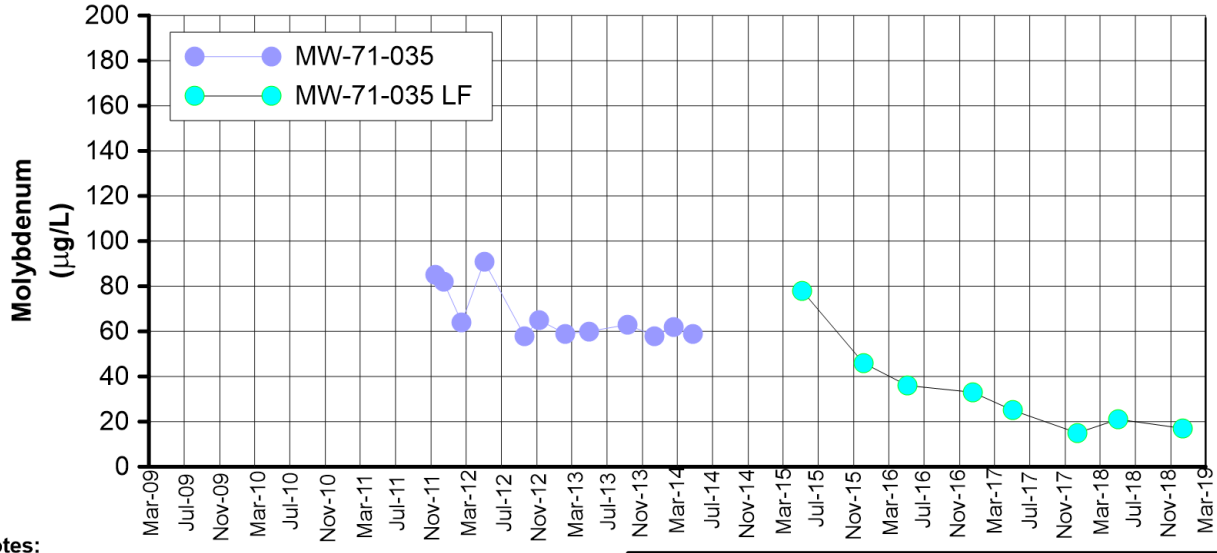

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-69-195 sampled using LF method on 2/09/2017, 5/03/2017, 9/26/2017, & 12/04/2017.
2. MW-70-105 sampled using LF method on 5/02/2017 & 12/11/2017.

FIGURE F-36
MOLYBDENUM
IN MW-69-195, THE MW-70 CLUSTER, AND MW-71-035
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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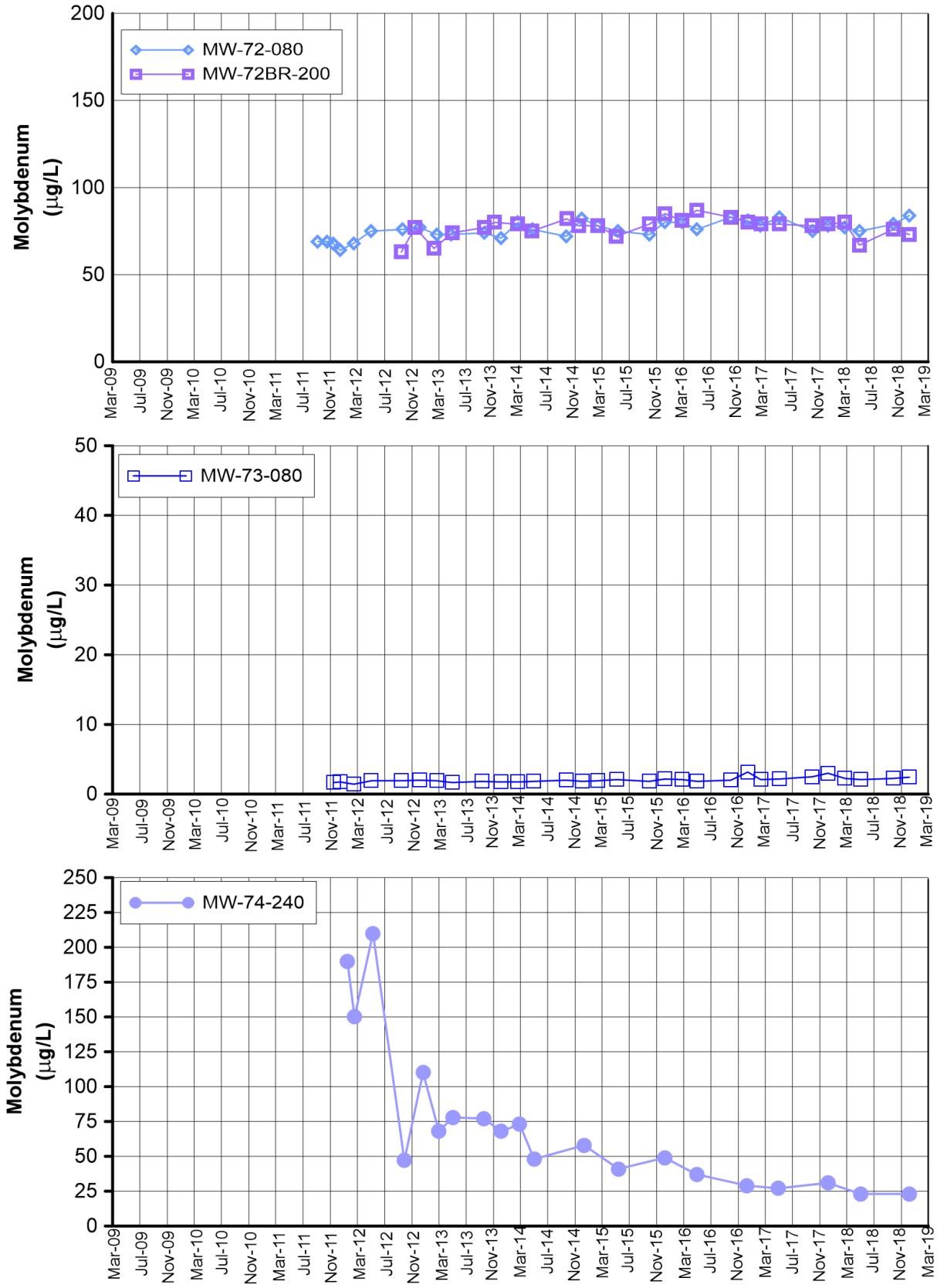

Notes:

1. MW-72-080 sampled using low flow sampling method on 5/02/2017 & 12/07/2017.
2. MW-73-080 sampled using low flow sampling method on 5/02/2017, 9/27/2017, & 12/06/2017.
3. MW-74-240 sampled using low flow sampling method on 4/27/2017 & 12/06/2017.

FIGURE F-37
MOLYBDENUM
IN MW-72 CLUSTER, MW-73-080, AND MW-74-240
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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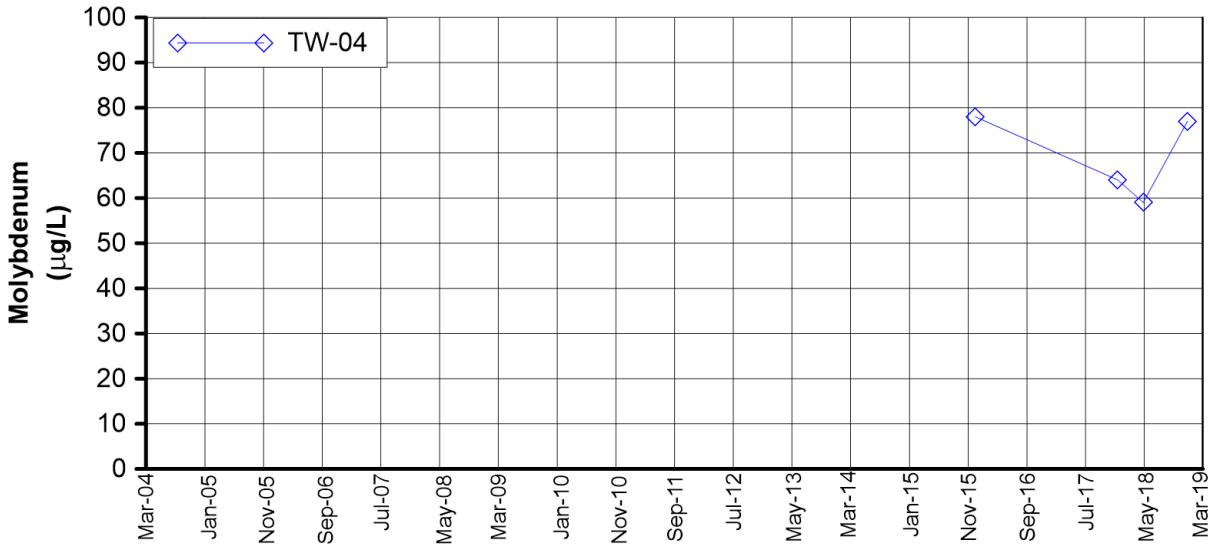
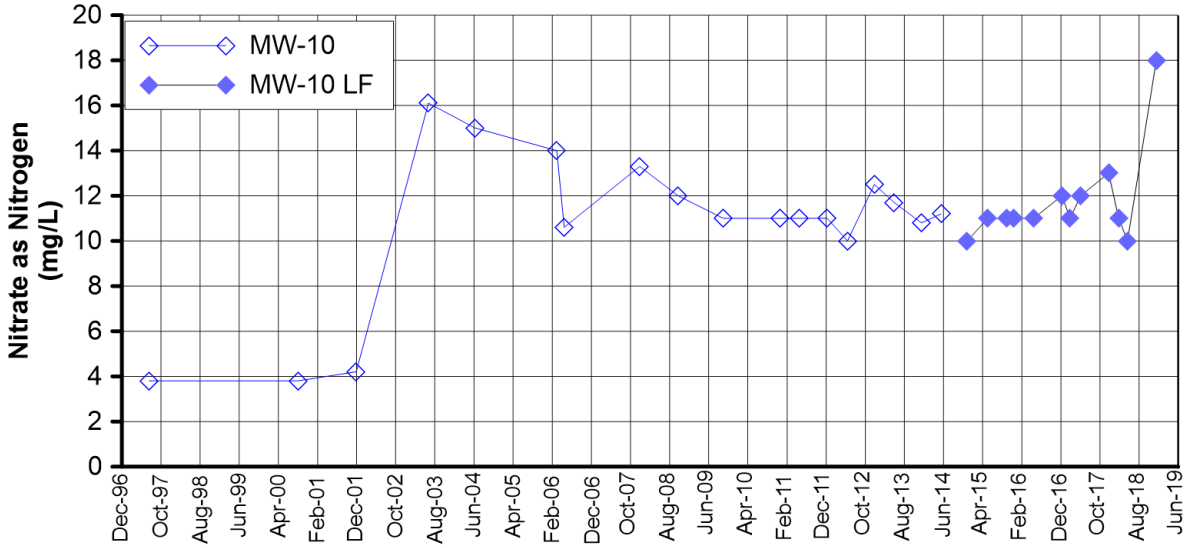
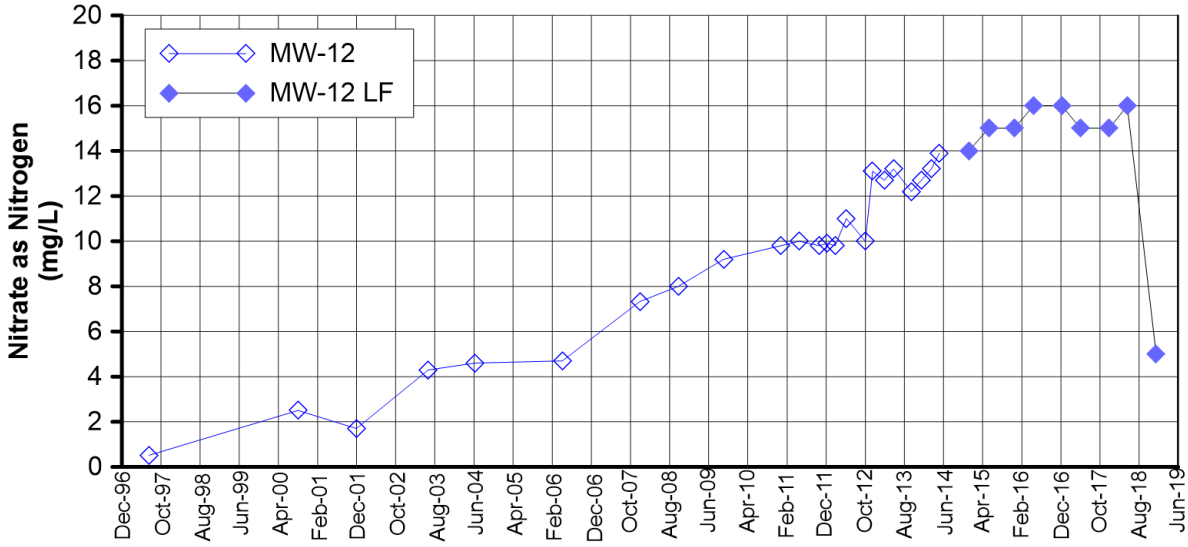
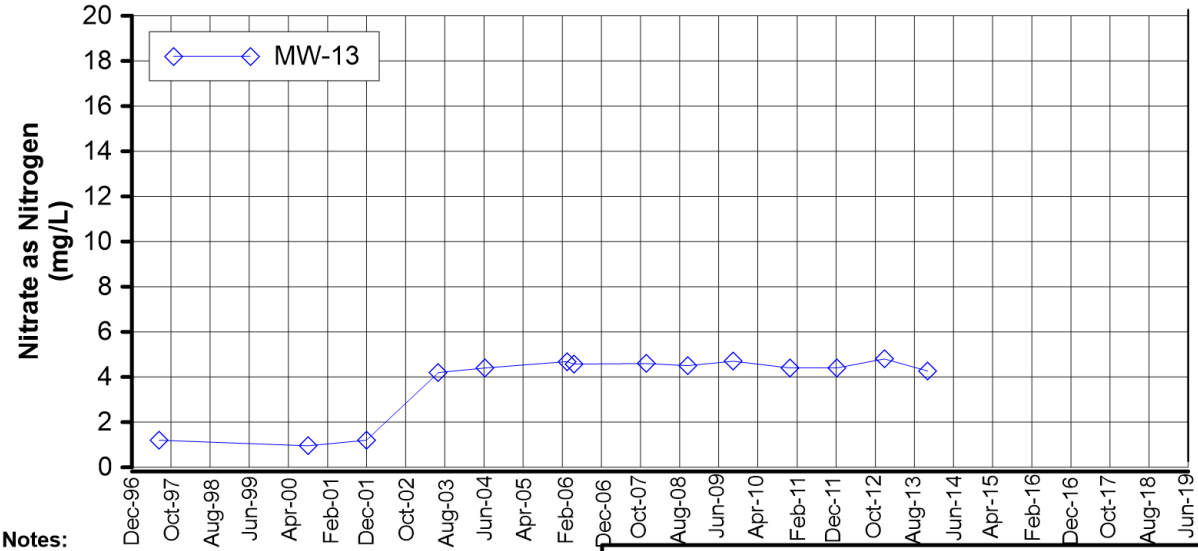


FIGURE F-38
MOLYBDENUM
IN TW-04

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA







Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-39
NITRATE as NITROGEN
IN MW-10, MW-12, AND MW-13

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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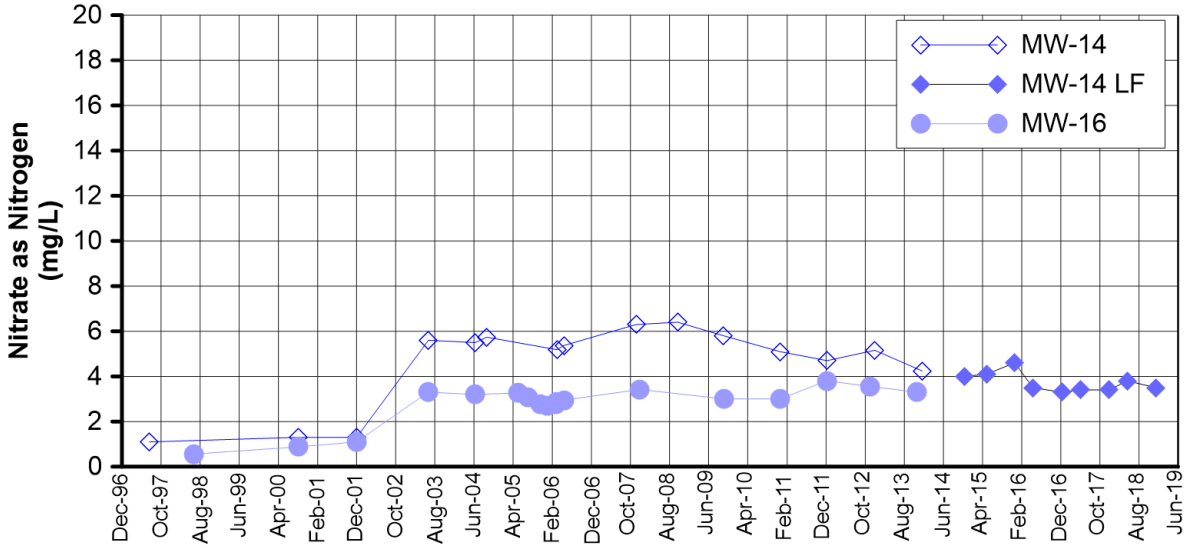

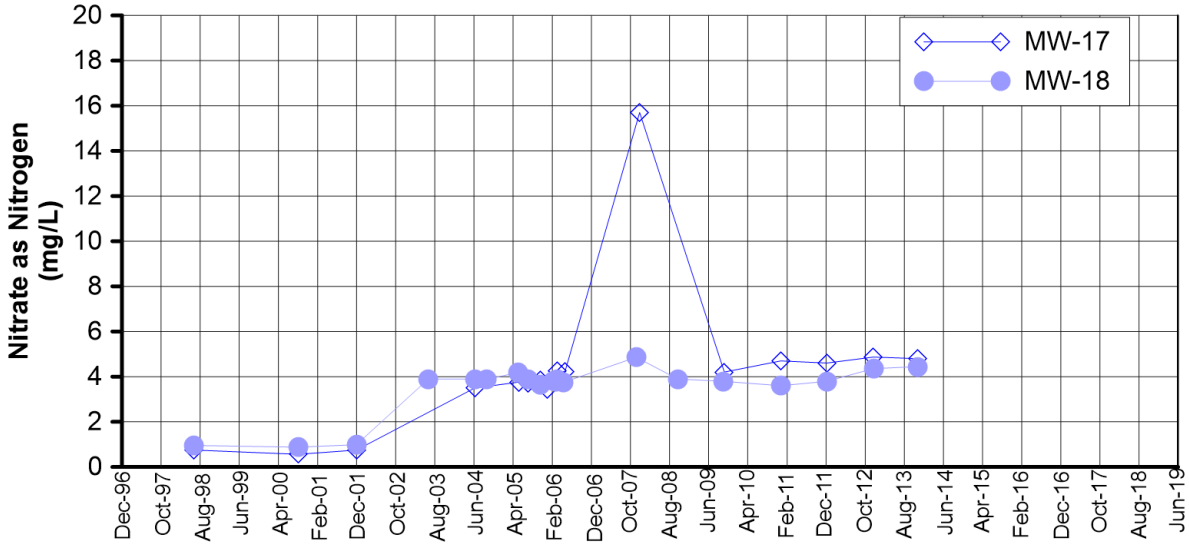

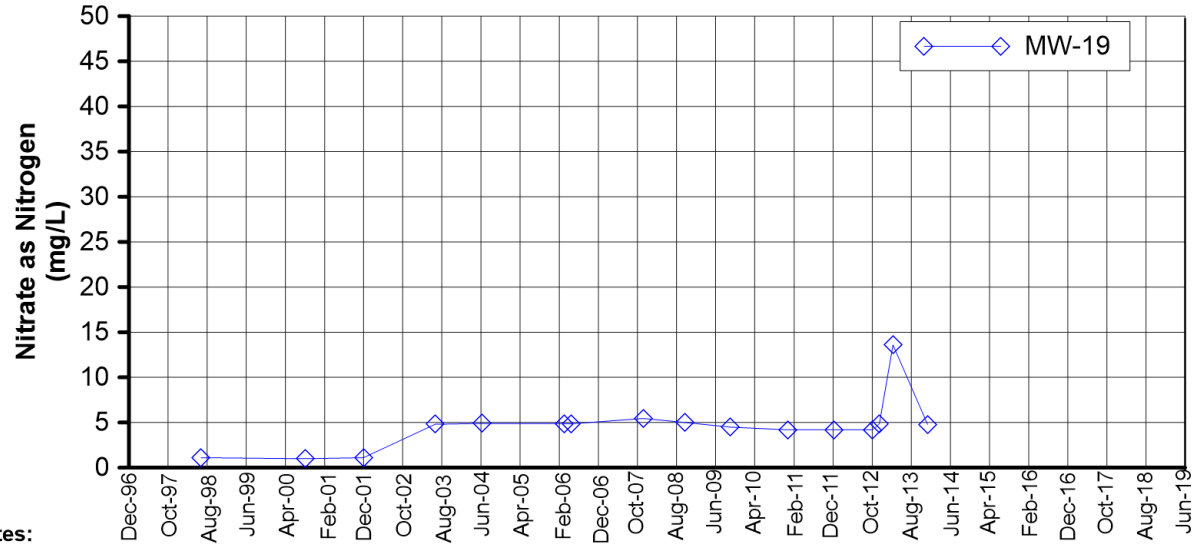

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-40
NITRATE as NITROGEN
IN MW-14, MW-16, MW-17, MW-18, AND MW-19
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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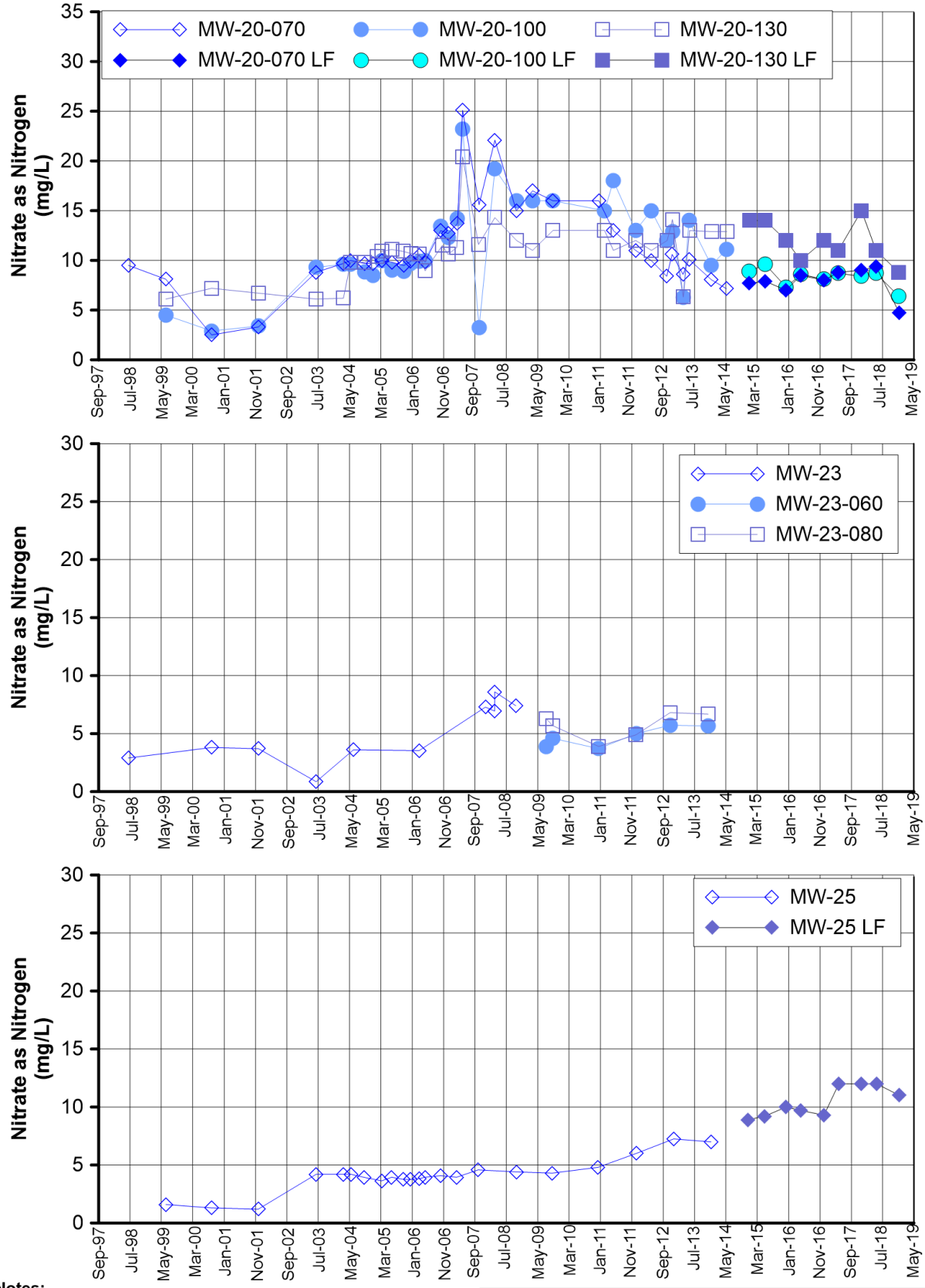

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-41
NITRATE as NITROGEN
IN MW-20, MW-23, AND MW-25 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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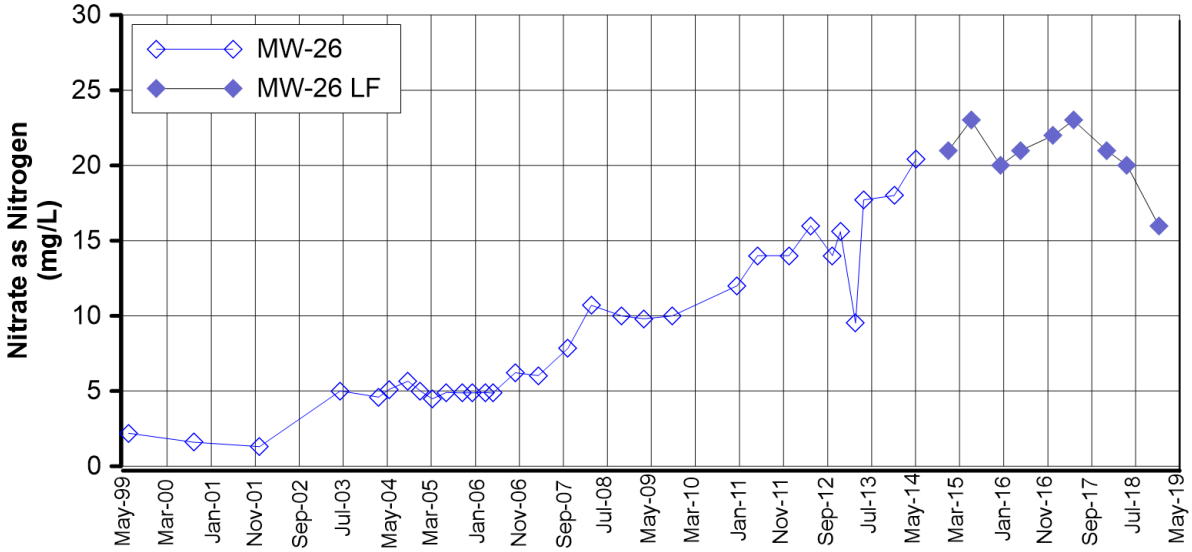

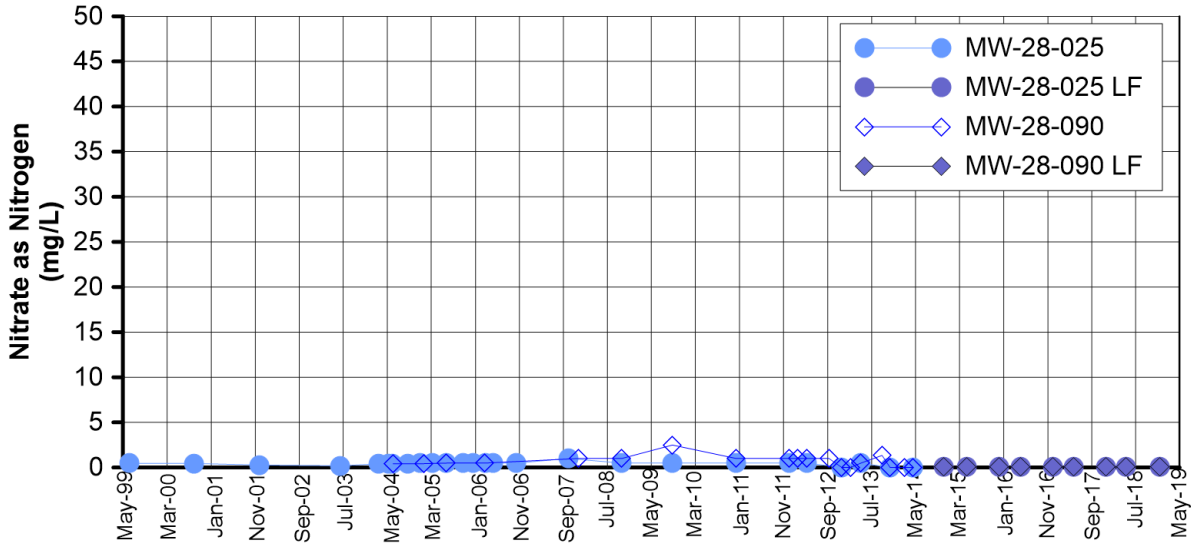

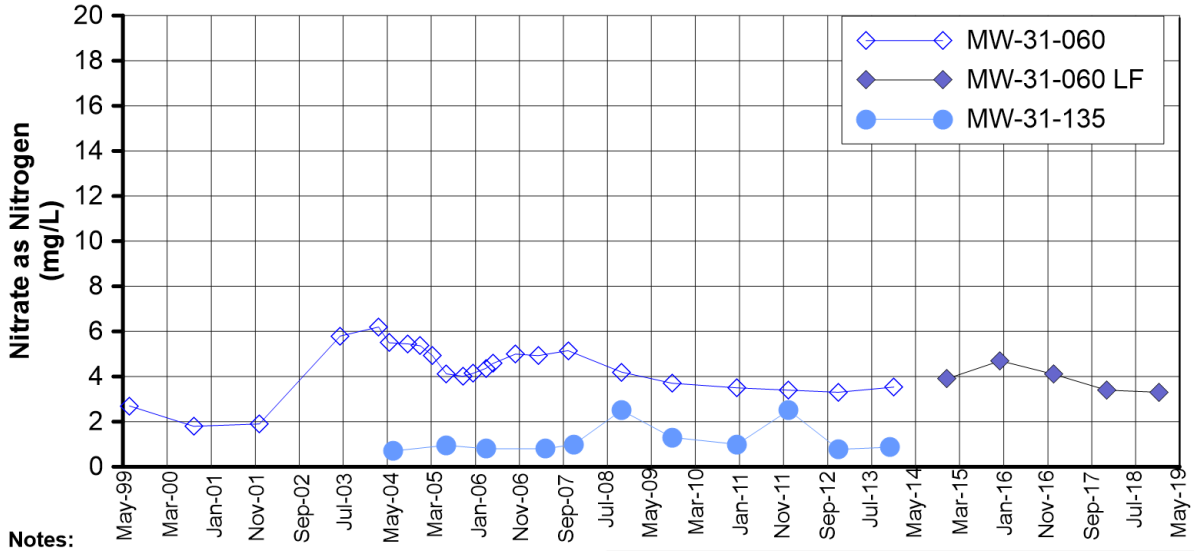

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method

FIGURE F-42
NITRATE as NITROGEN
IN MW-26, MW-28, AND MW-31 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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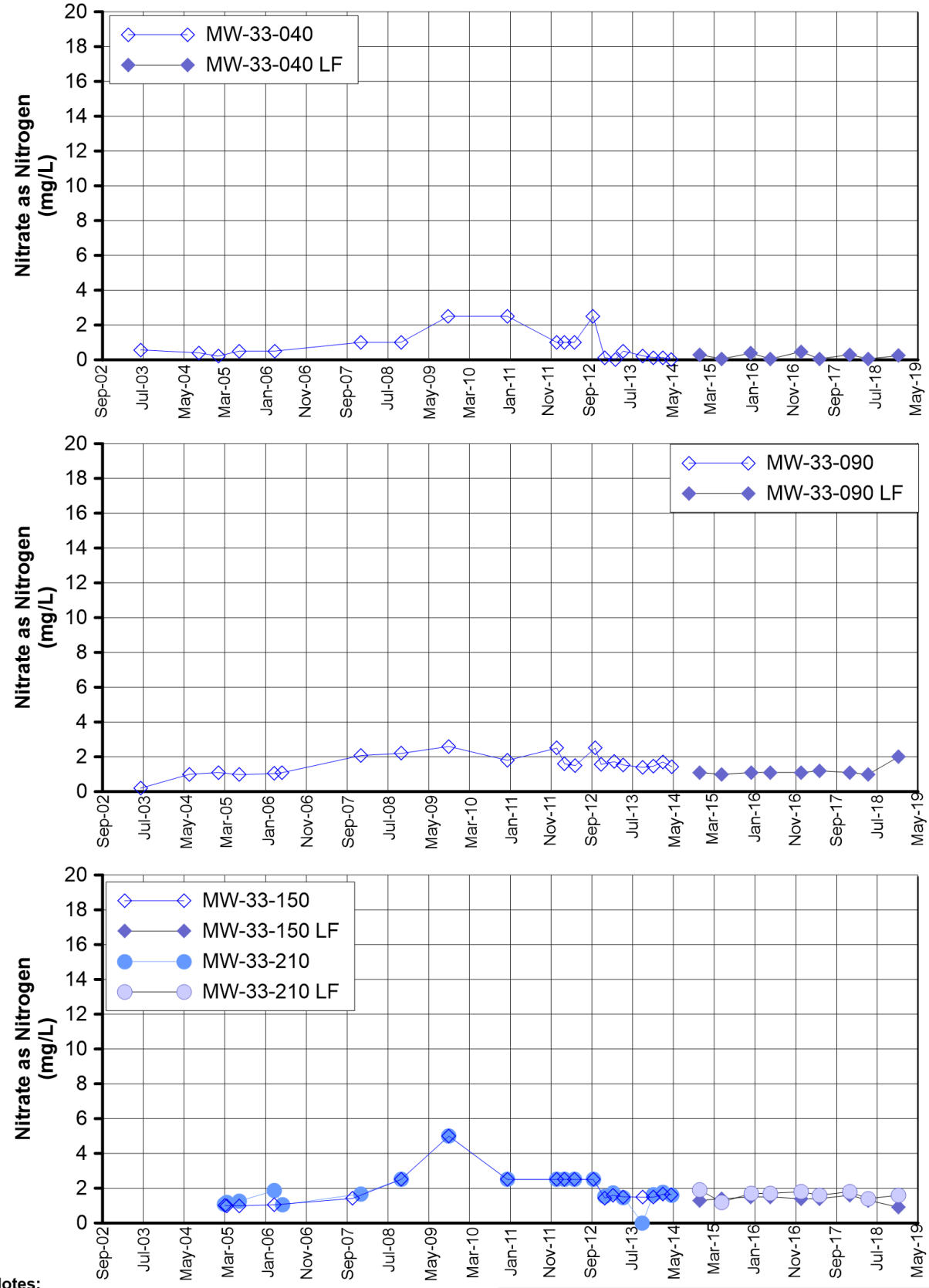

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-43
NITRATE as NITROGEN
IN MW-33 CLUSTER

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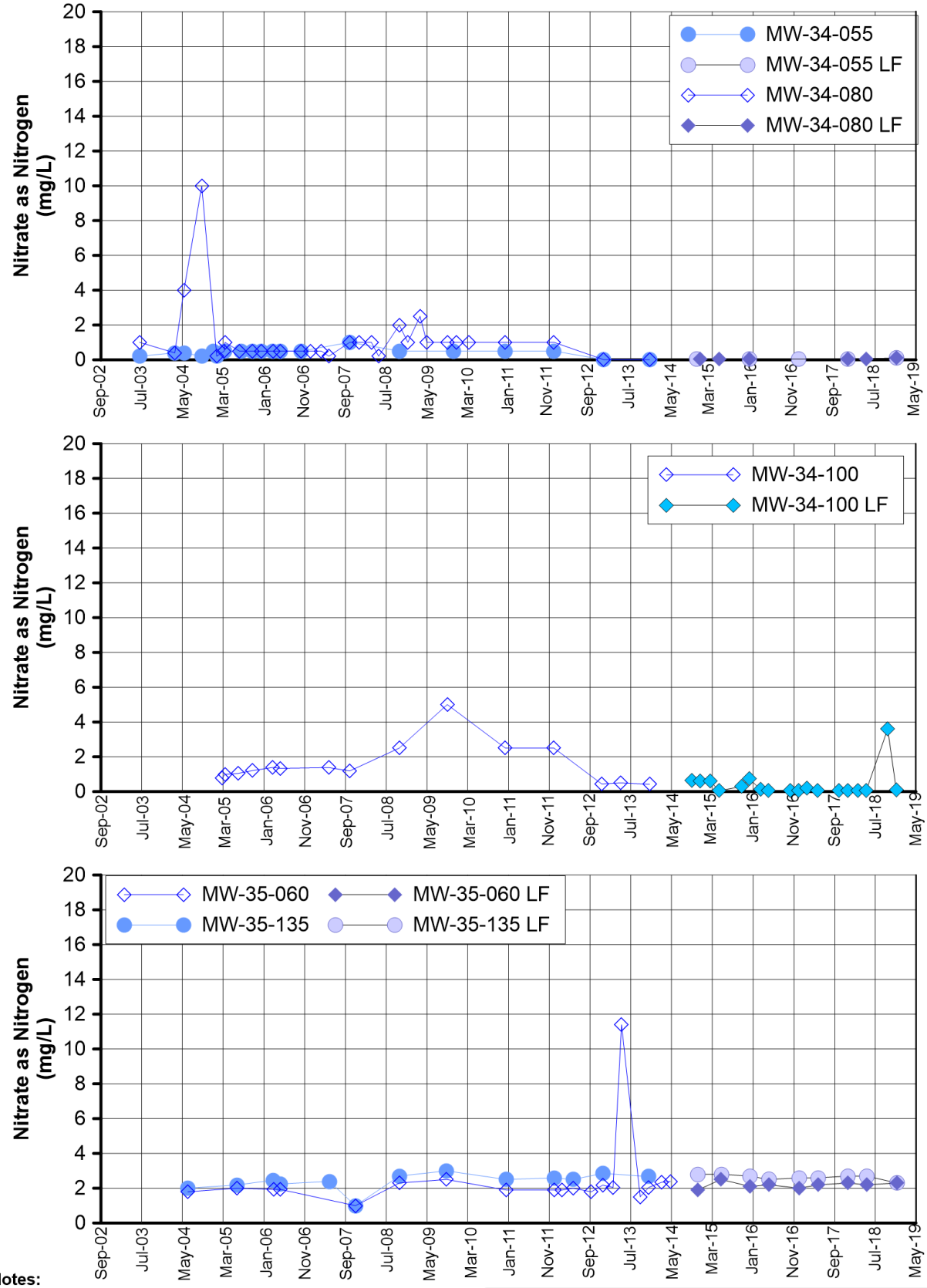

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-44
NITRATE as NITROGEN
IN MW-34 AND MW-35 CLUSTERS
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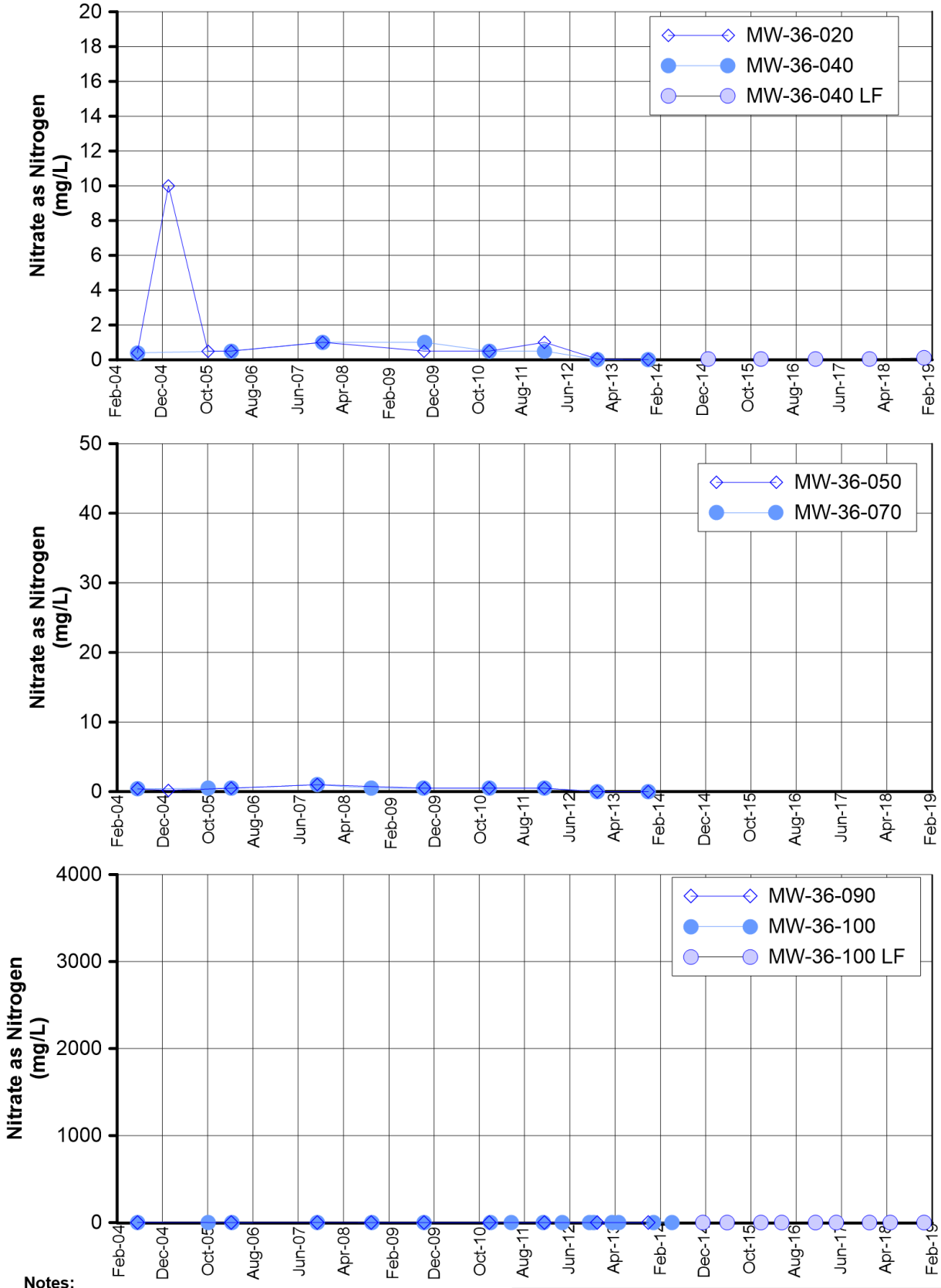

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-45
NITRATE as NITROGEN
IN MW-36 CLUSTER

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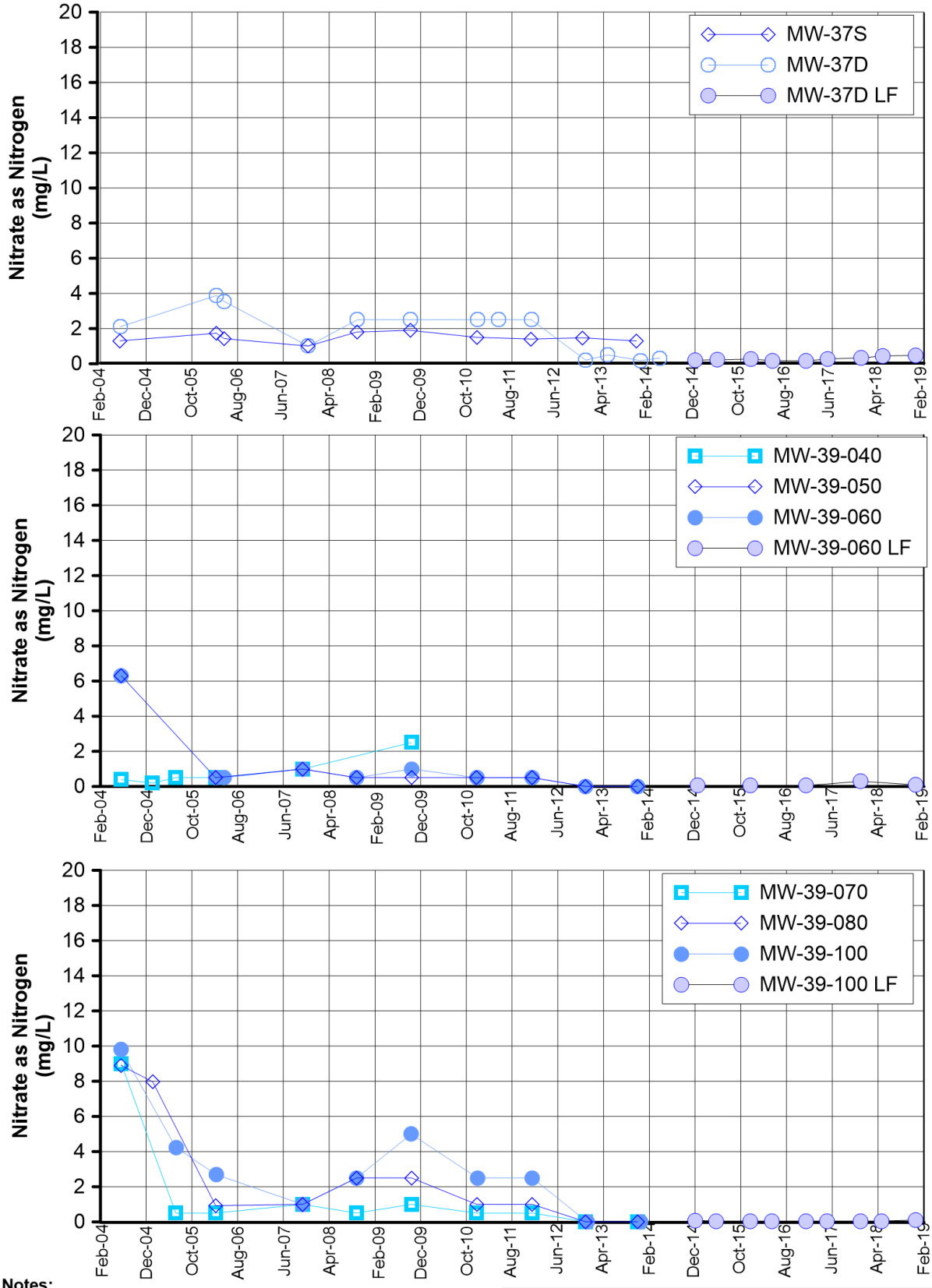

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-46
NITRATE as NITROGEN
IN MW-37 AND MW-39 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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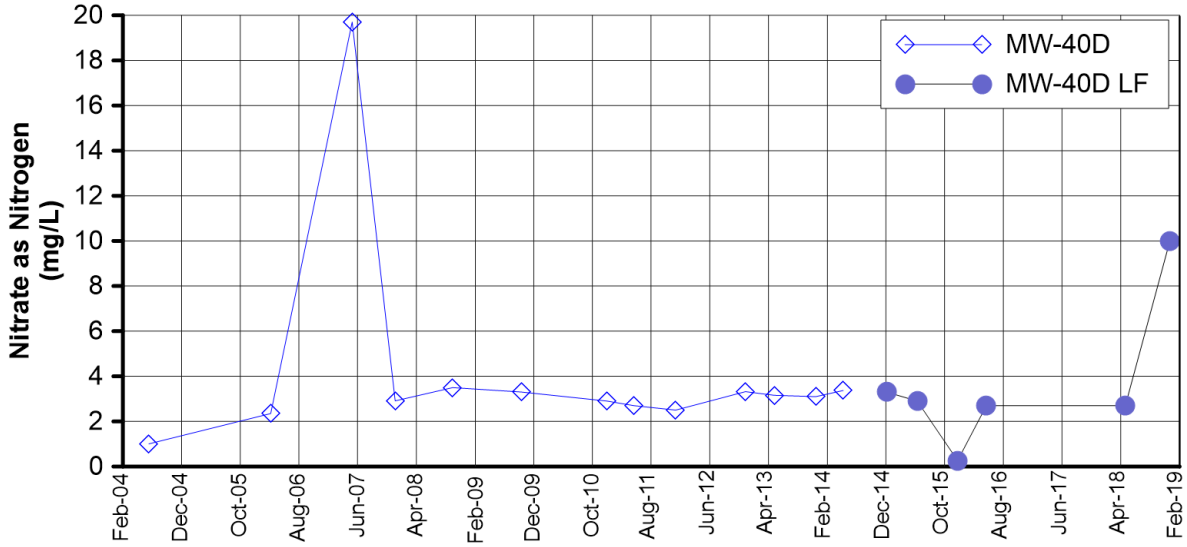

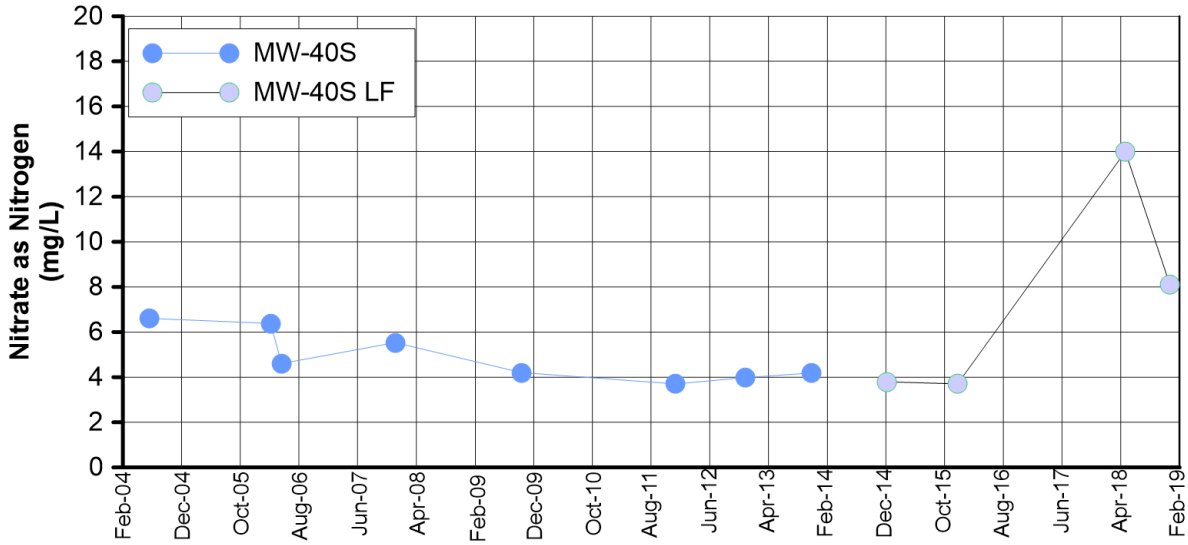

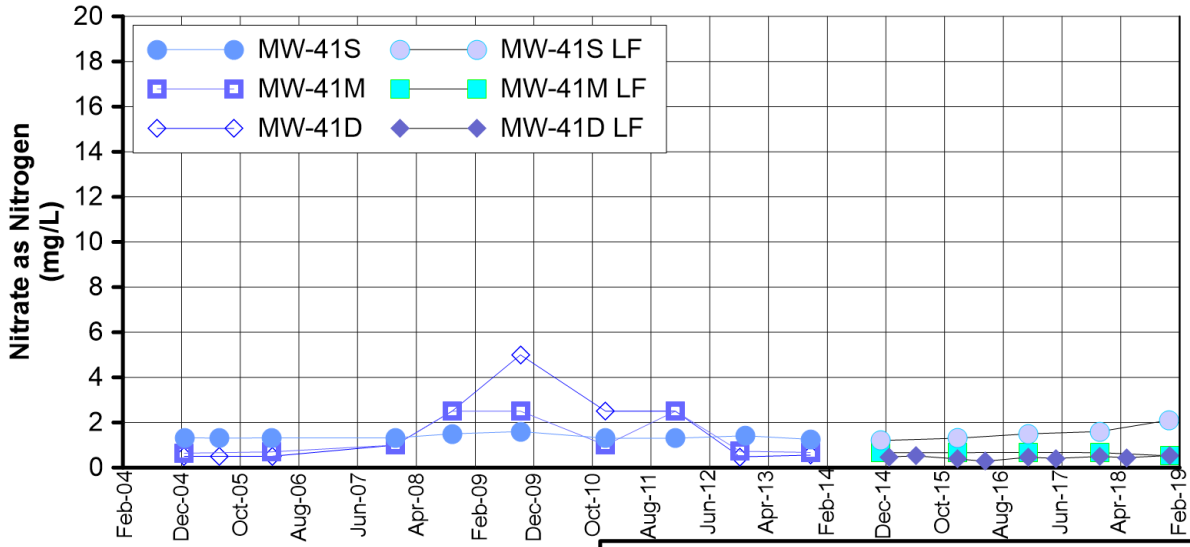

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrite as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.
3. MW-40D and MW-40S were not sampled during 4th Quarter 2017 due to traffic control issues.

FIGURE F-47
NITRATE as NITROGEN
IN MW-40 AND MW-41 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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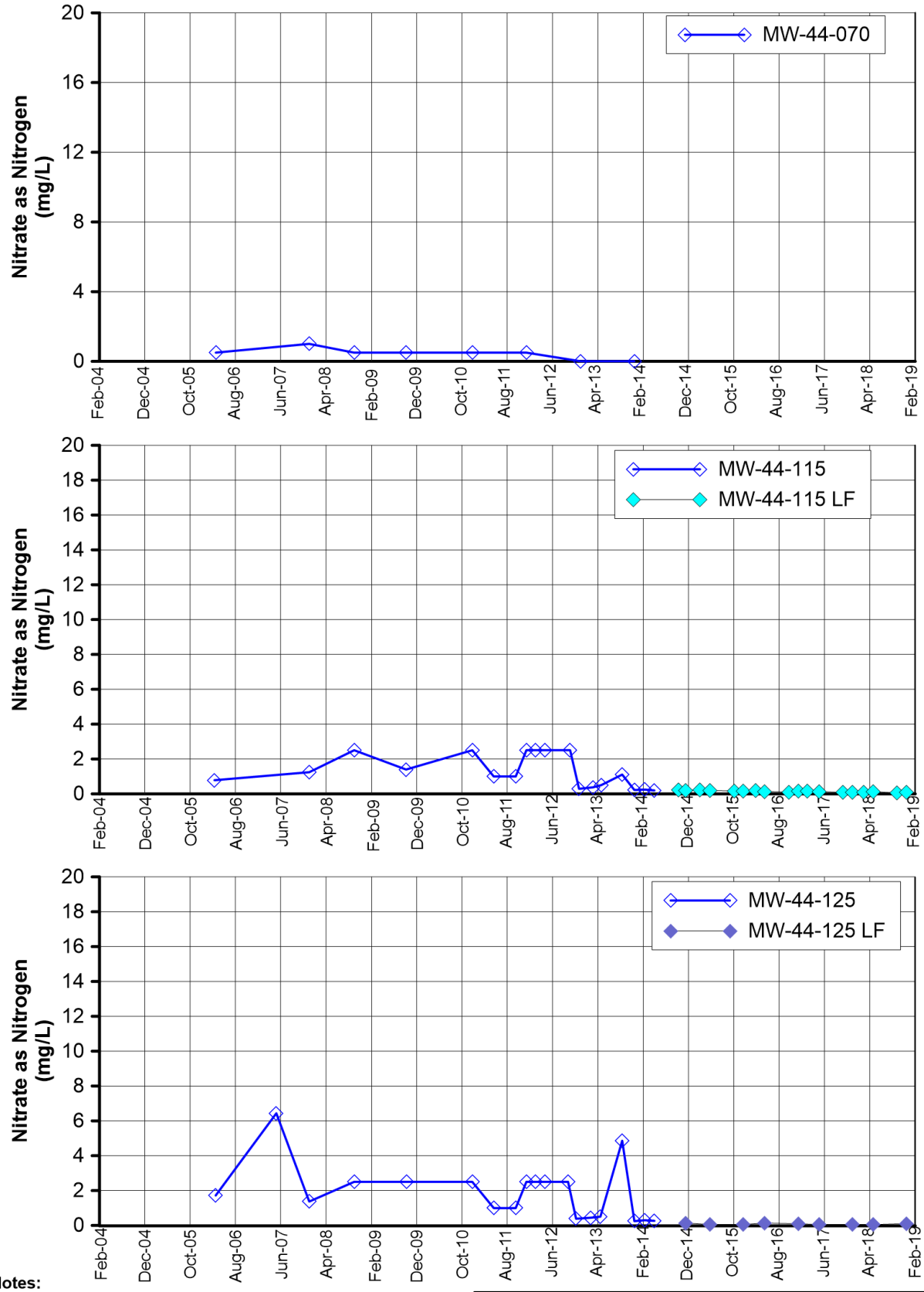

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-48
NITRATE as NITROGEN IN MW-44 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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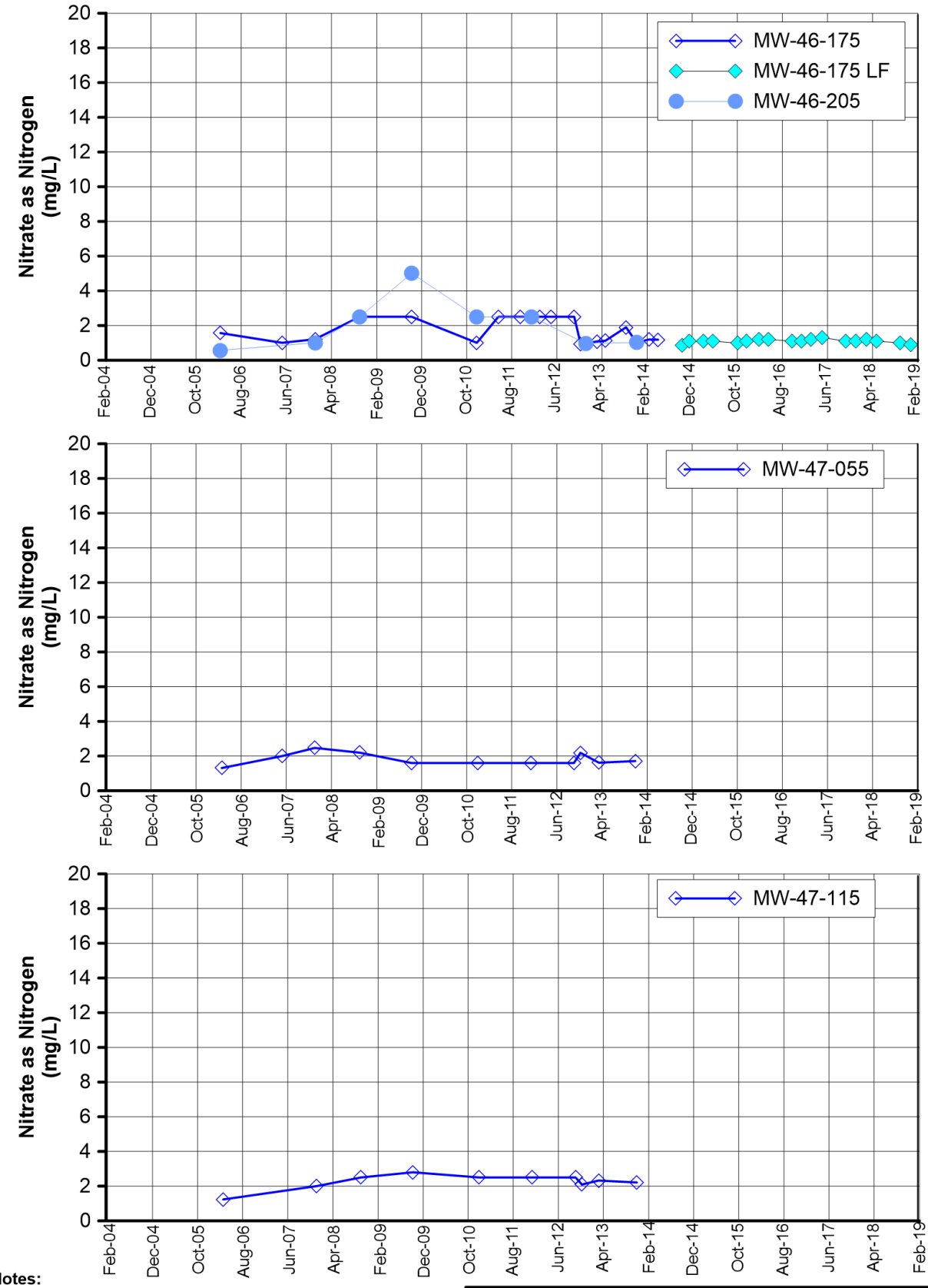

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-49
NITRATE as NITROGEN
IN MW-46 AND MW-47 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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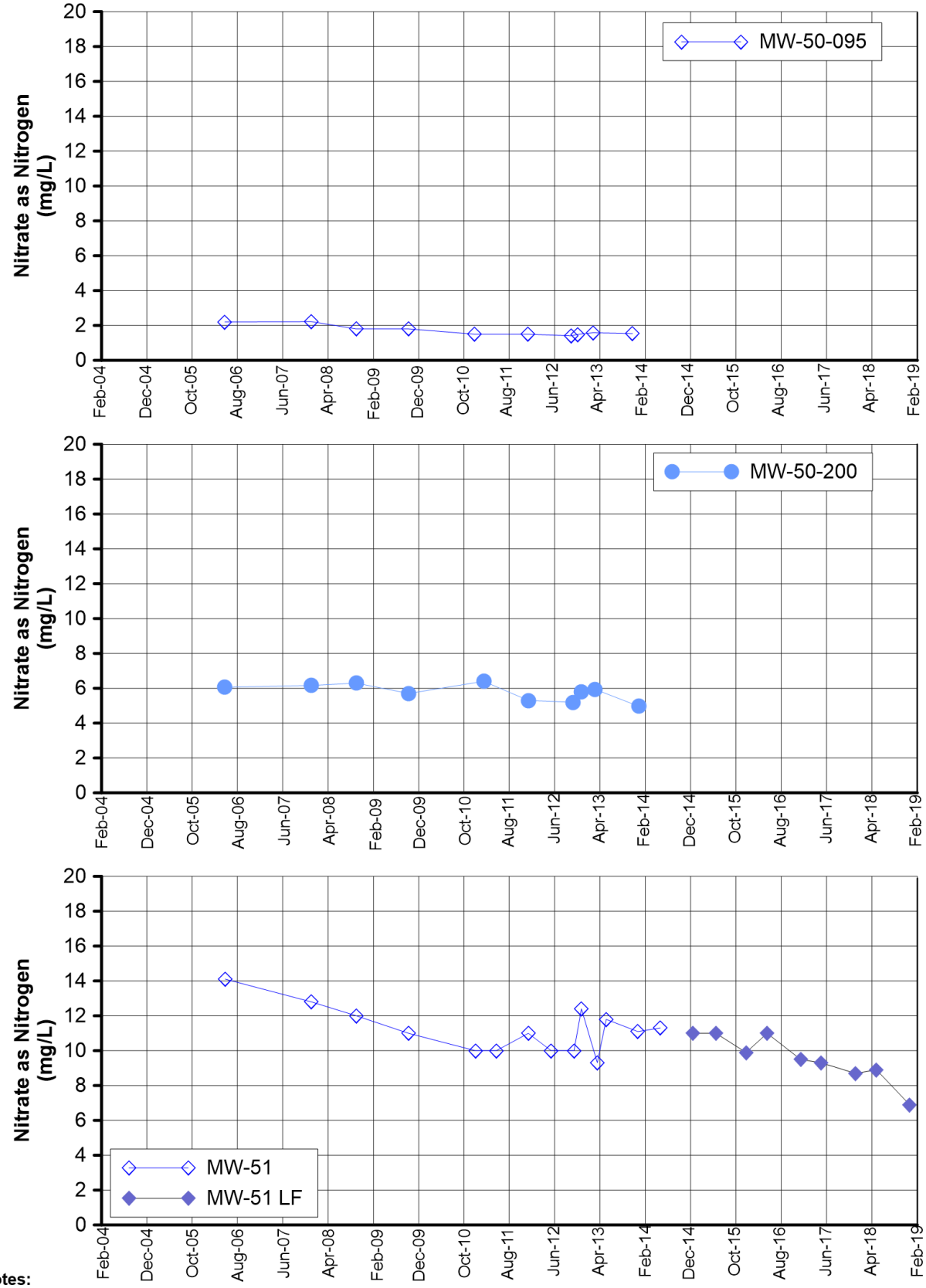

Notes:

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2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-50
NITRATE as NITROGEN
IN MW-50 AND MW-51 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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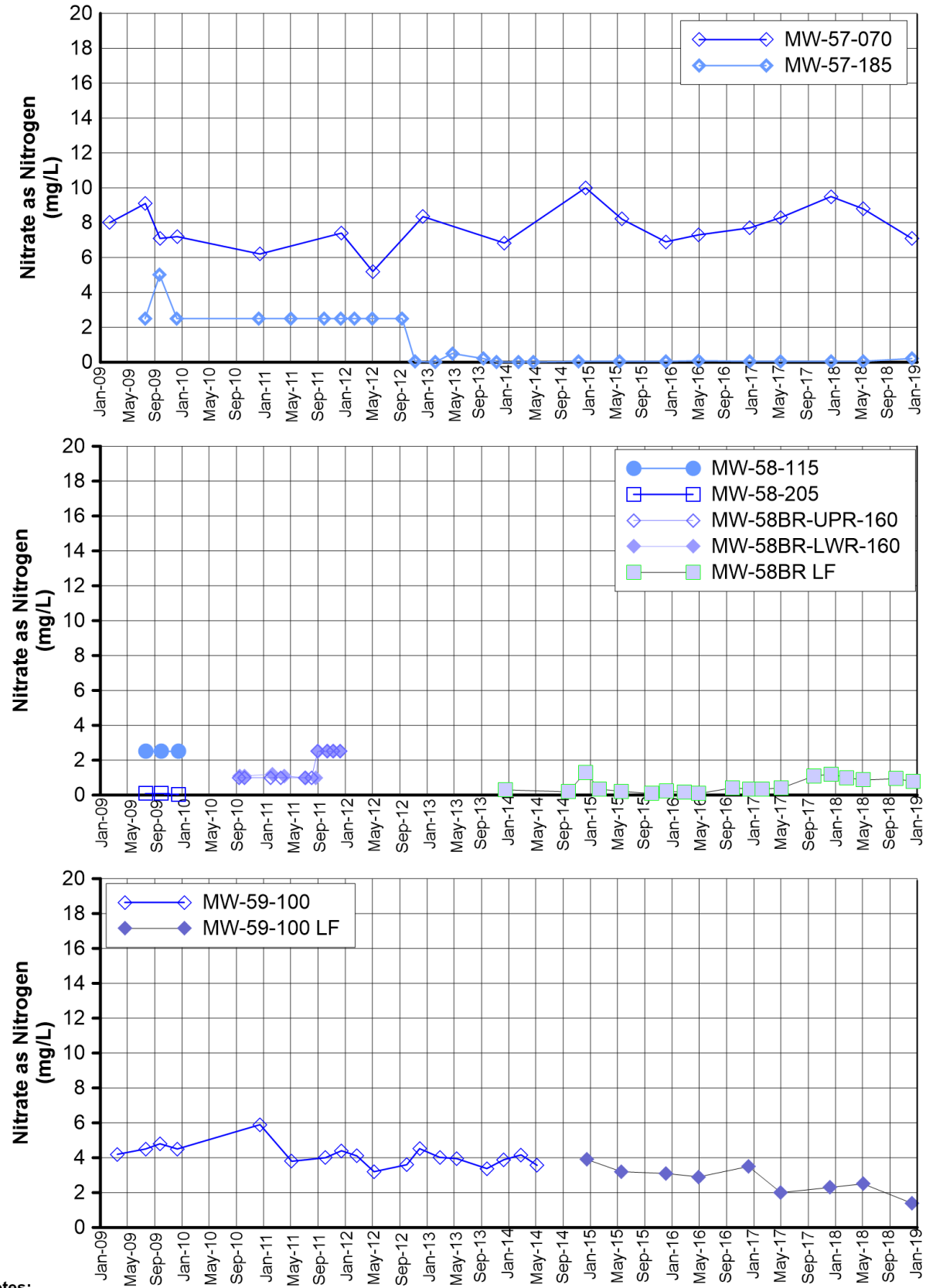

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.
2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-51
NITRATE as NITROGEN
IN MW-57 CLUSTER, MW-58 CLUSTER AND MW-59-100
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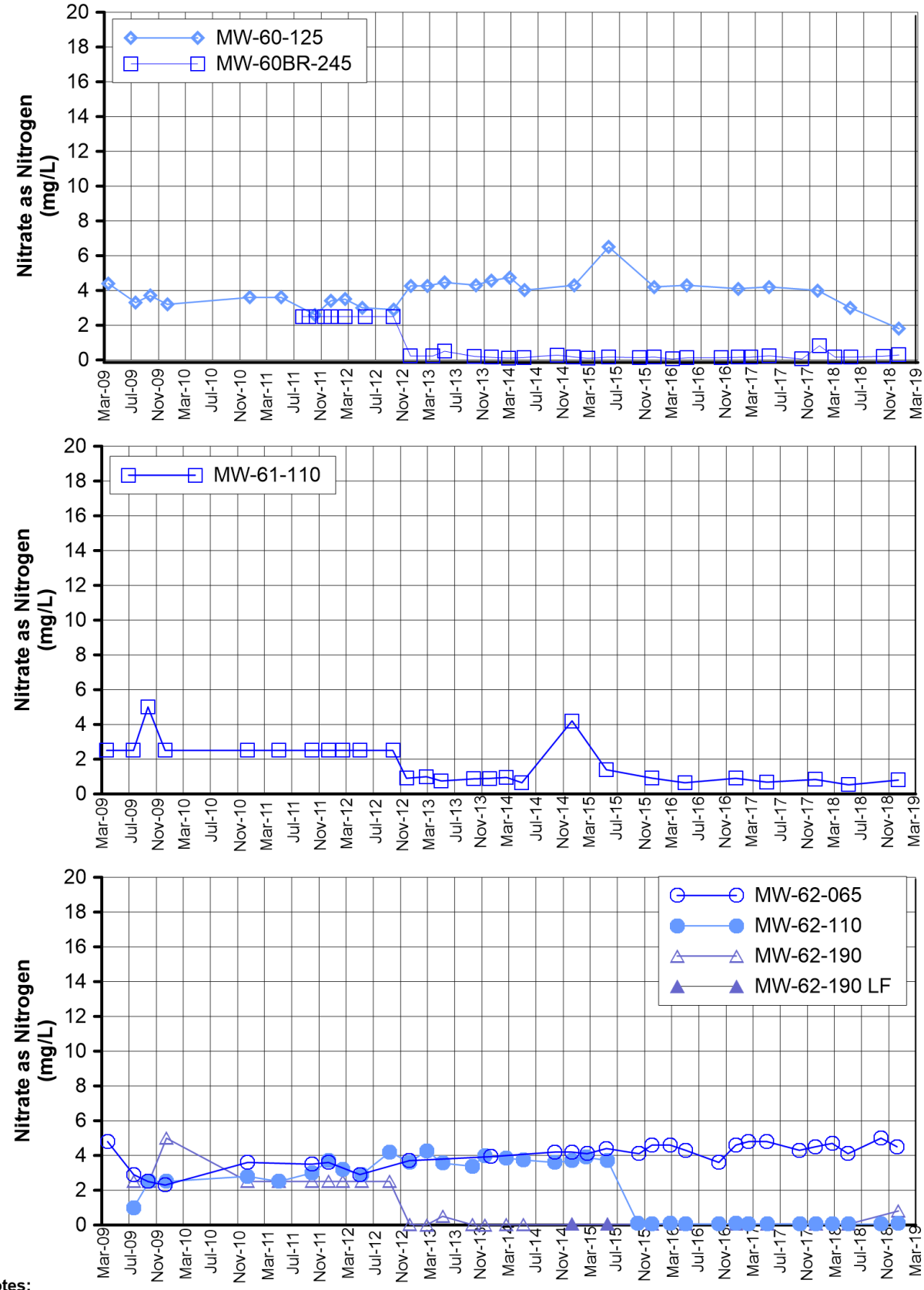

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2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-52
NITRATE as NITROGEN
IN MW-60 CLUSTER, MW-61-110, AND MW-62 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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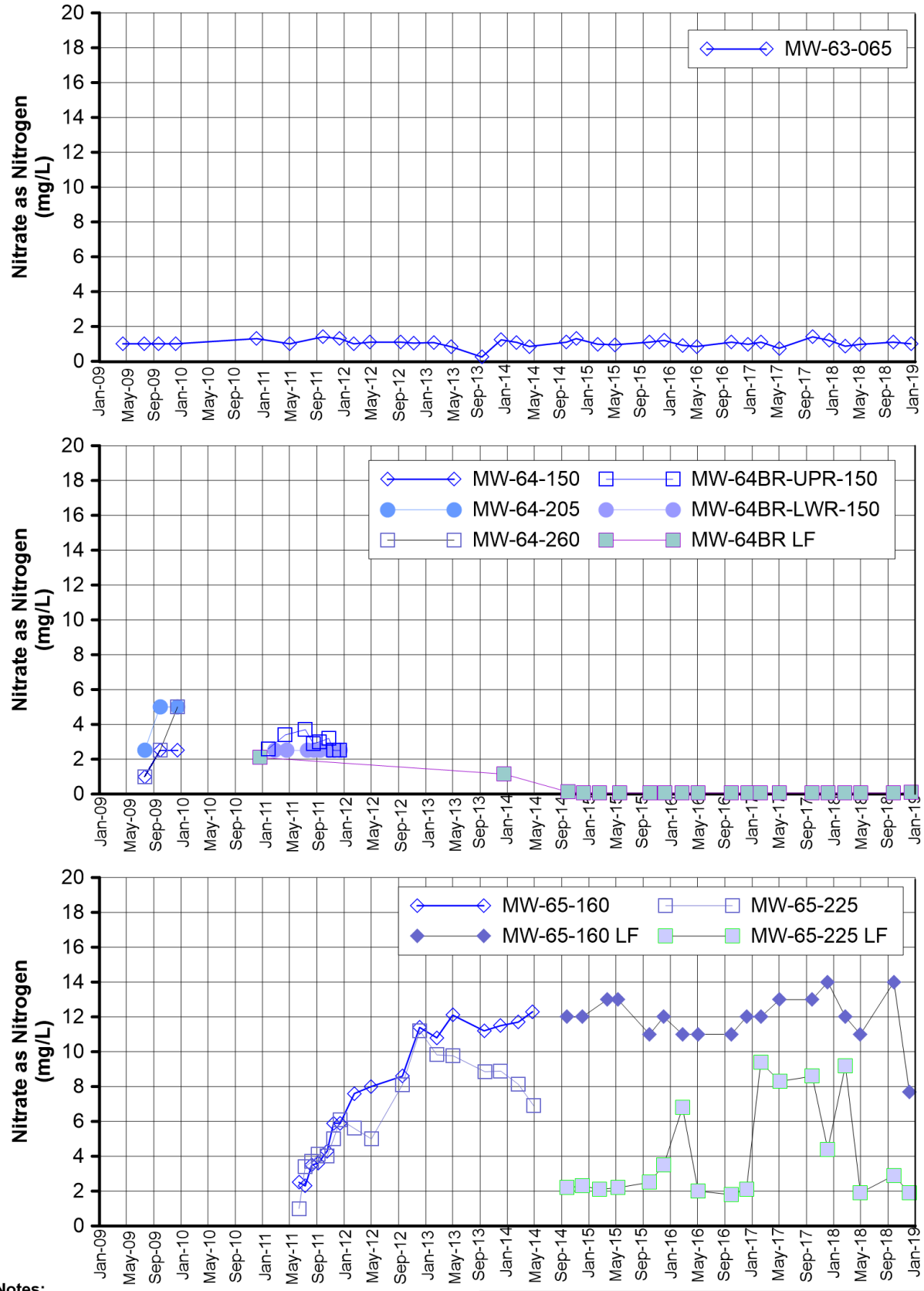

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2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-53
NITRATE as NITROGEN
IN MW-63-065, MW-64 CLUSTER AND MW-65 CLUSTER
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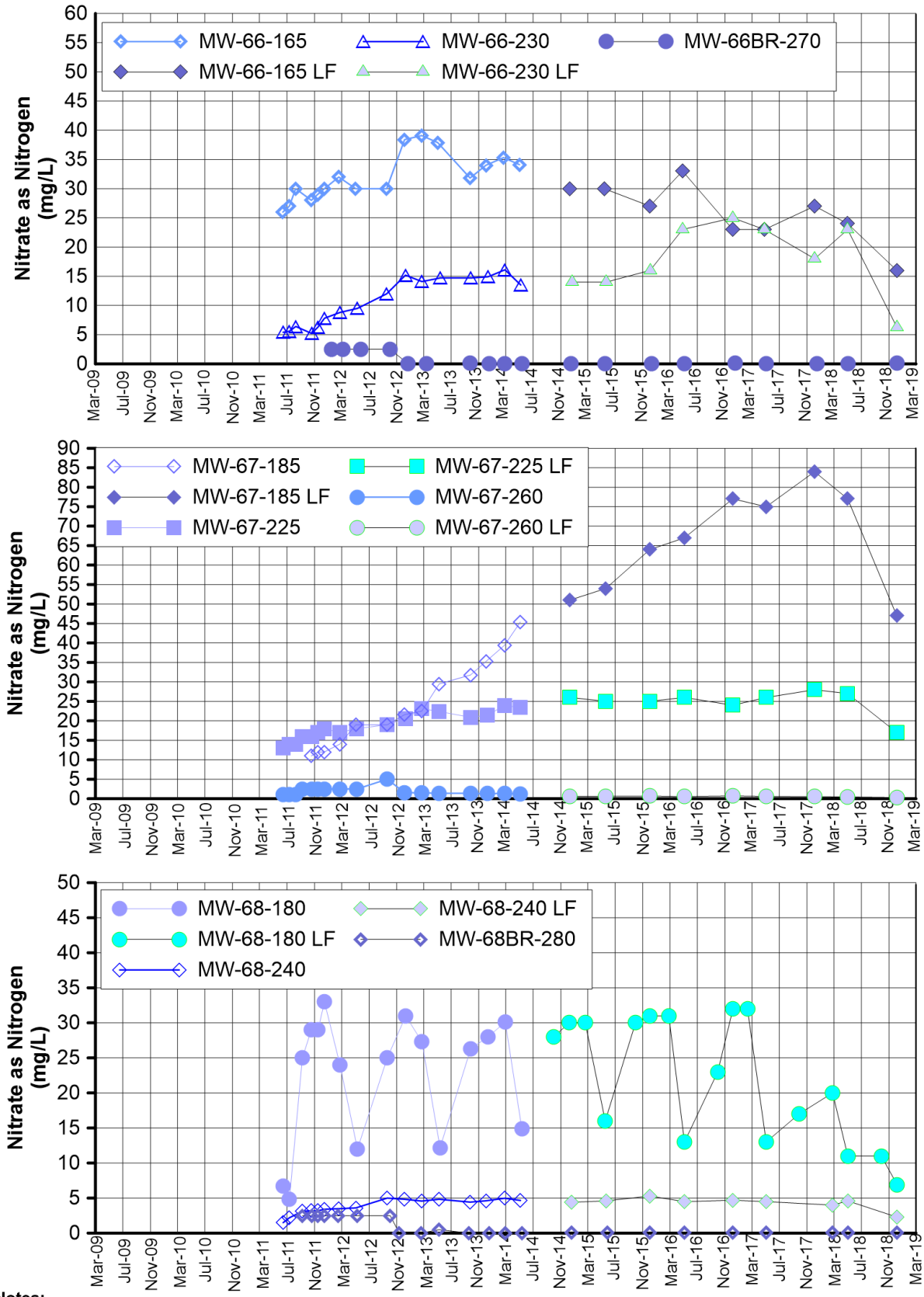

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2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-54
NITRATE as NITROGEN
IN MW-66, MW-67, AND MW-68 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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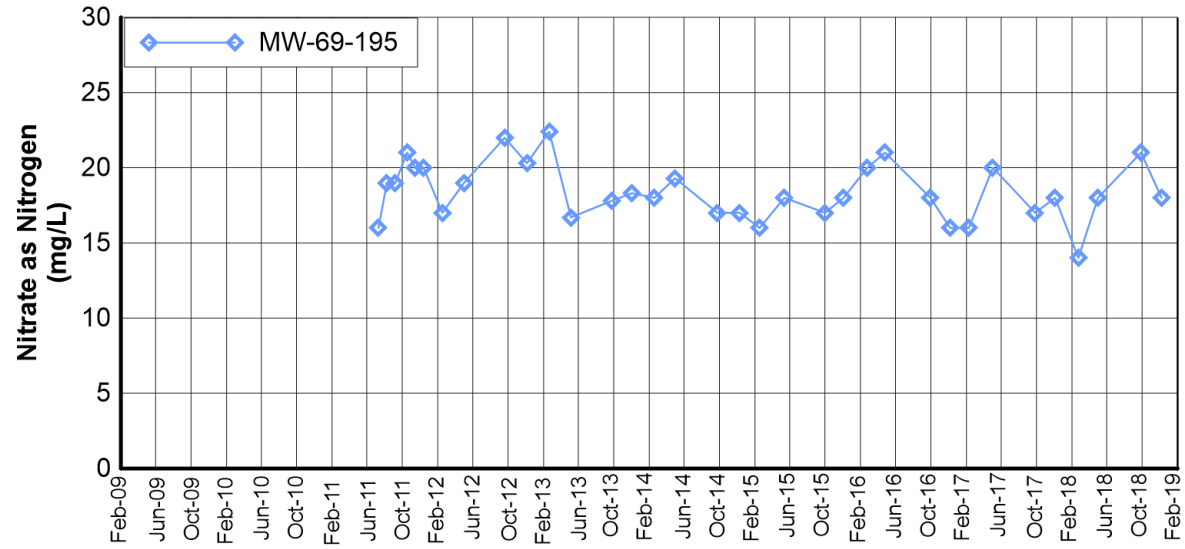

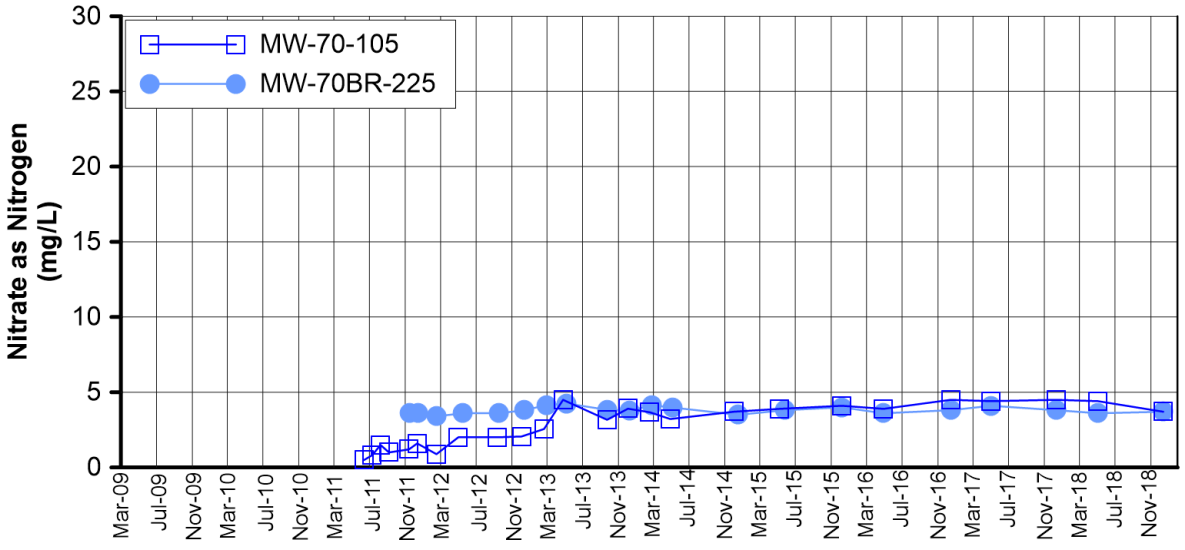

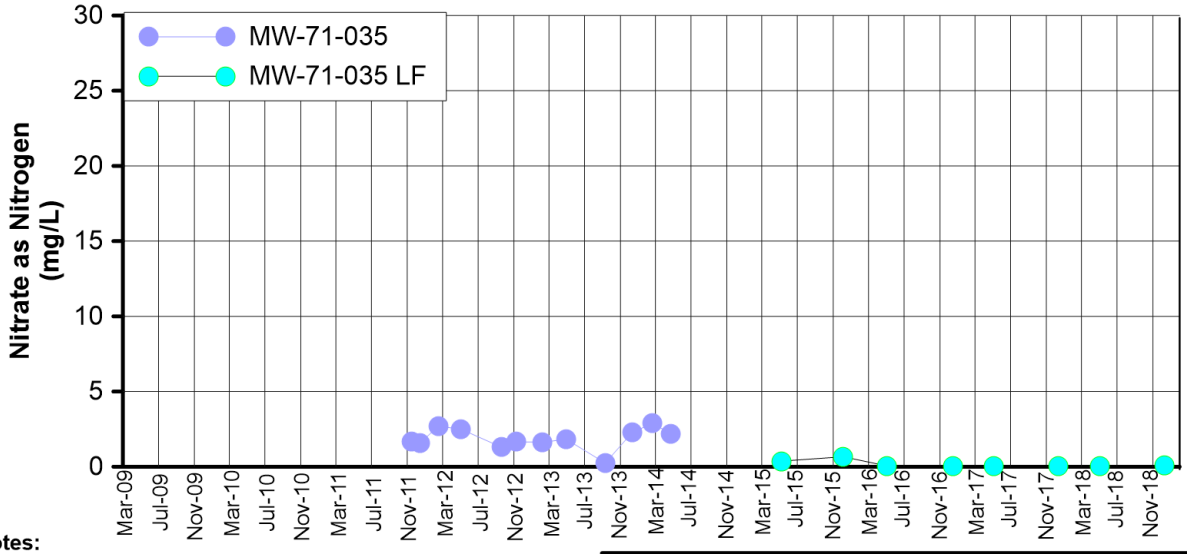

Notes:

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2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-55
NITRATE as NITROGEN
IN MW-69-195, THE MW-70 CLUSTER, AND MW-71-035
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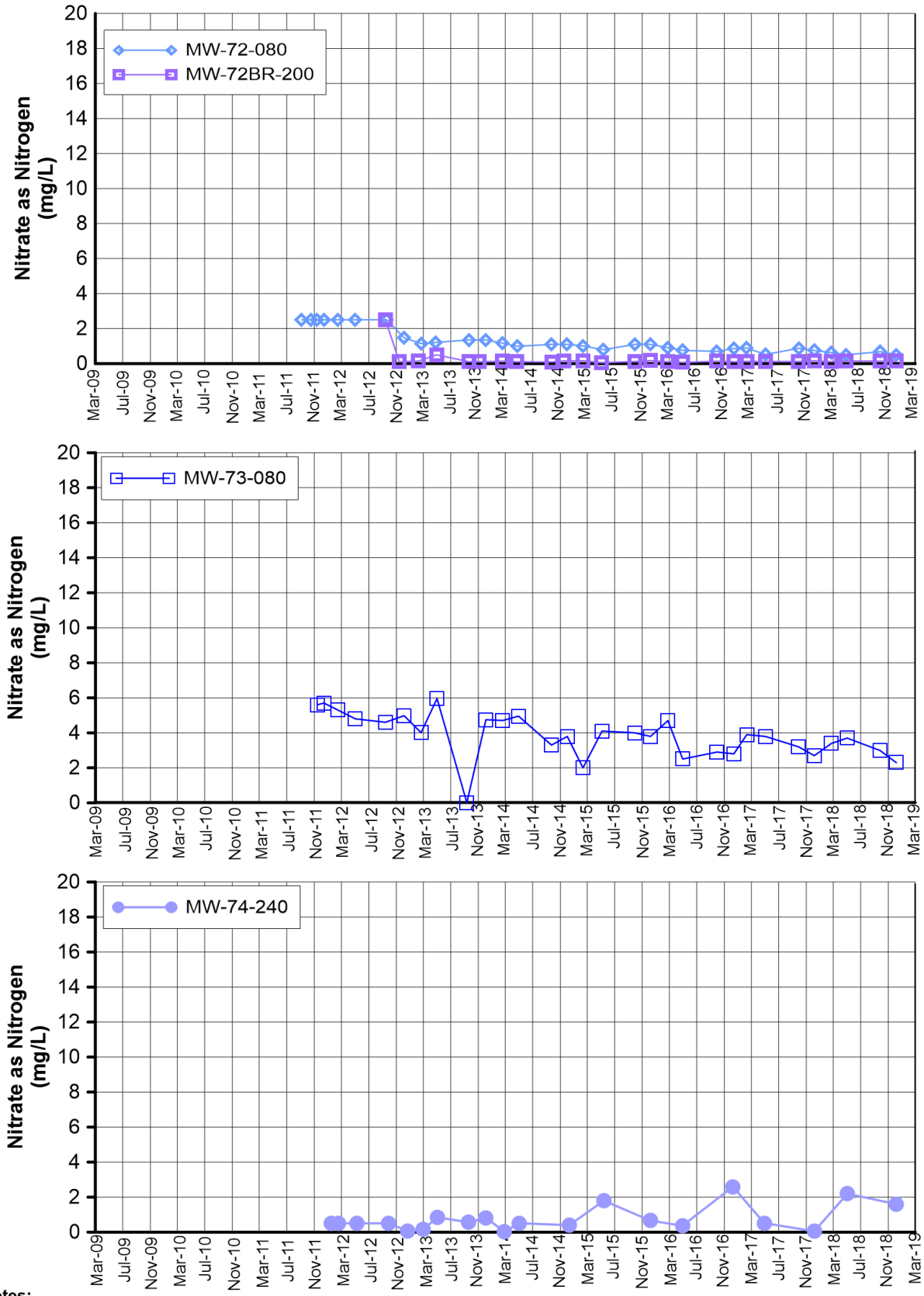

Notes:

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2. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-56
NITRATE as NITROGEN
IN MW-72 CLUSTER, MW-73-080, AND MW-74-240
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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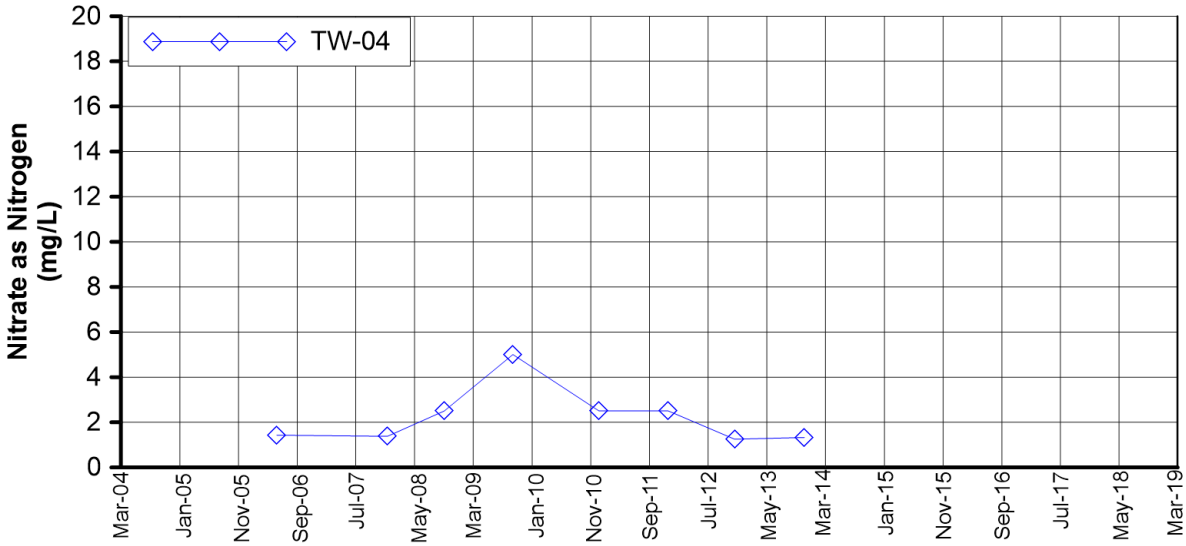

Notes:

1. Starting in Fourth Quarter 2012 nitrate samples were analyzed using method USEPA 353.2, which reports a combination of nitrate and nitrite. The contribution of nitrite to the reported result of nitrate plus nitrite as nitrogen is expected to be negligible; therefore, sample results for method USEPA 353.2 are expected to be essentially the same as previous samples analyzed using method USEPA 300.0 and reported as nitrate as nitrogen.

FIGURE F-57
NITRATE as NITROGEN IN TW-04

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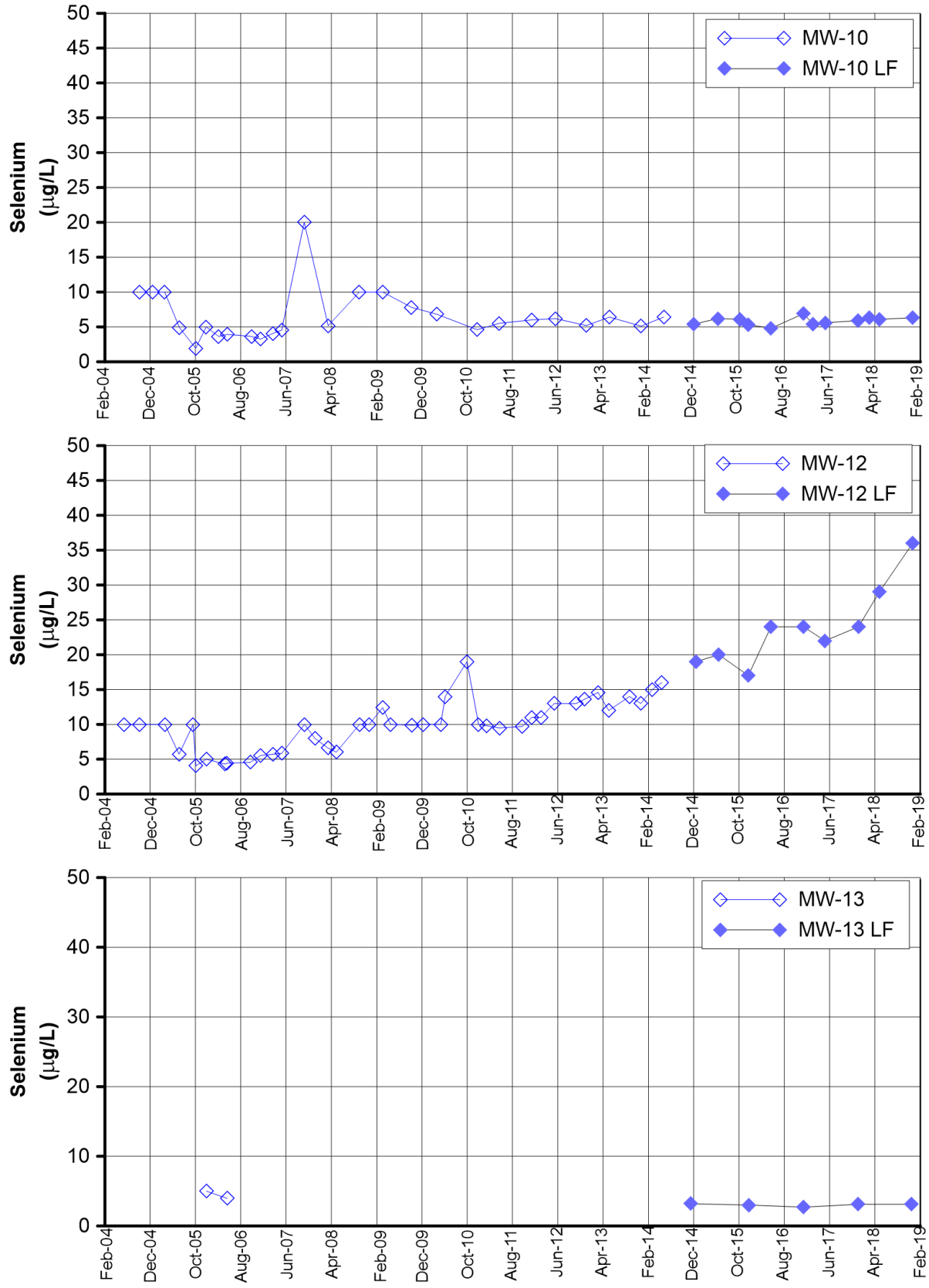

Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-58
SELENIUM
IN MW-10, MW-12, AND MW-13
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
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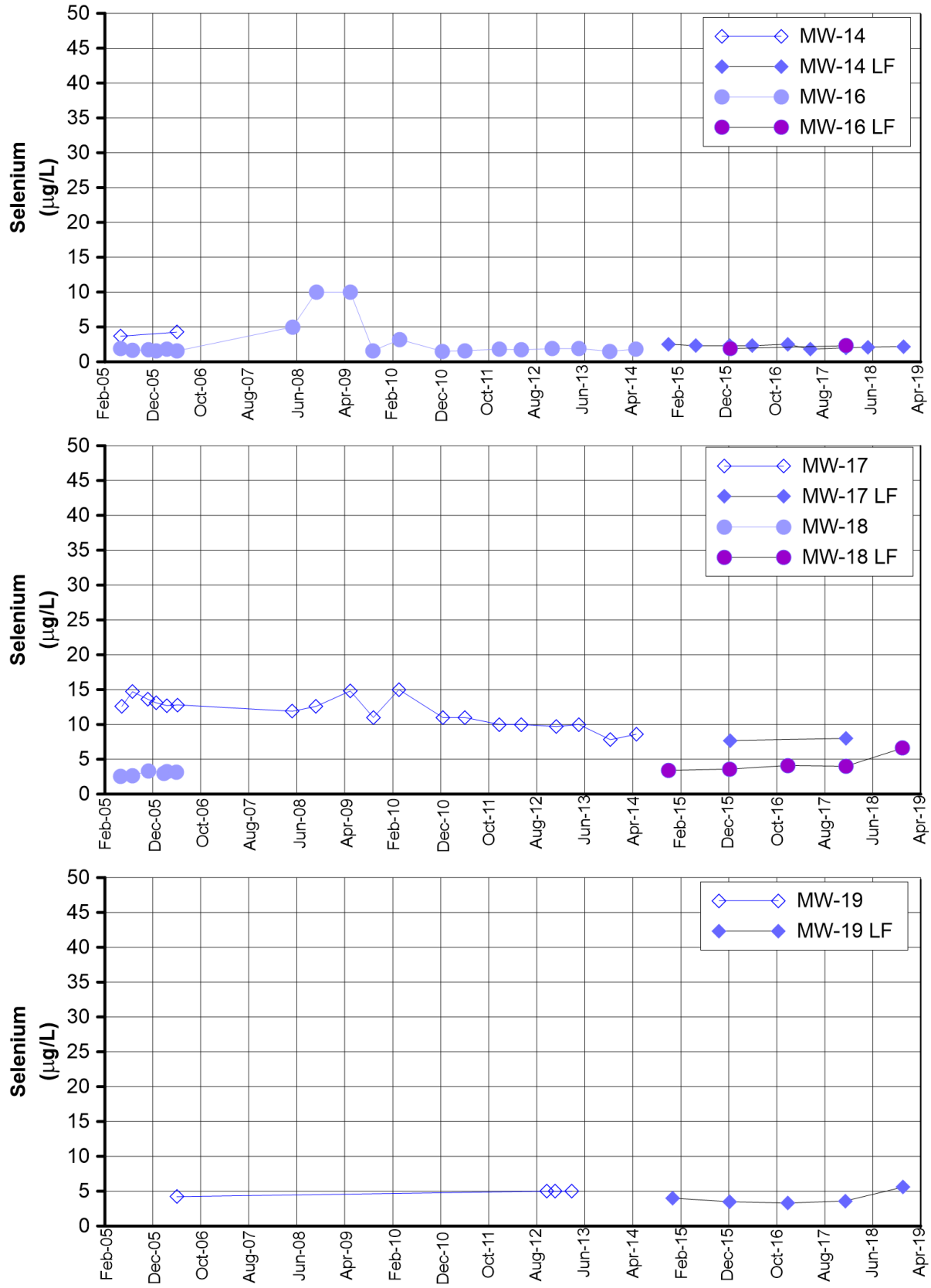

Notes:

1. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-59
SELENIUM
IN MW-14, MW-16, MW-17, MW-18, AND MW-19
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NEEDLES, CALIFORNIA

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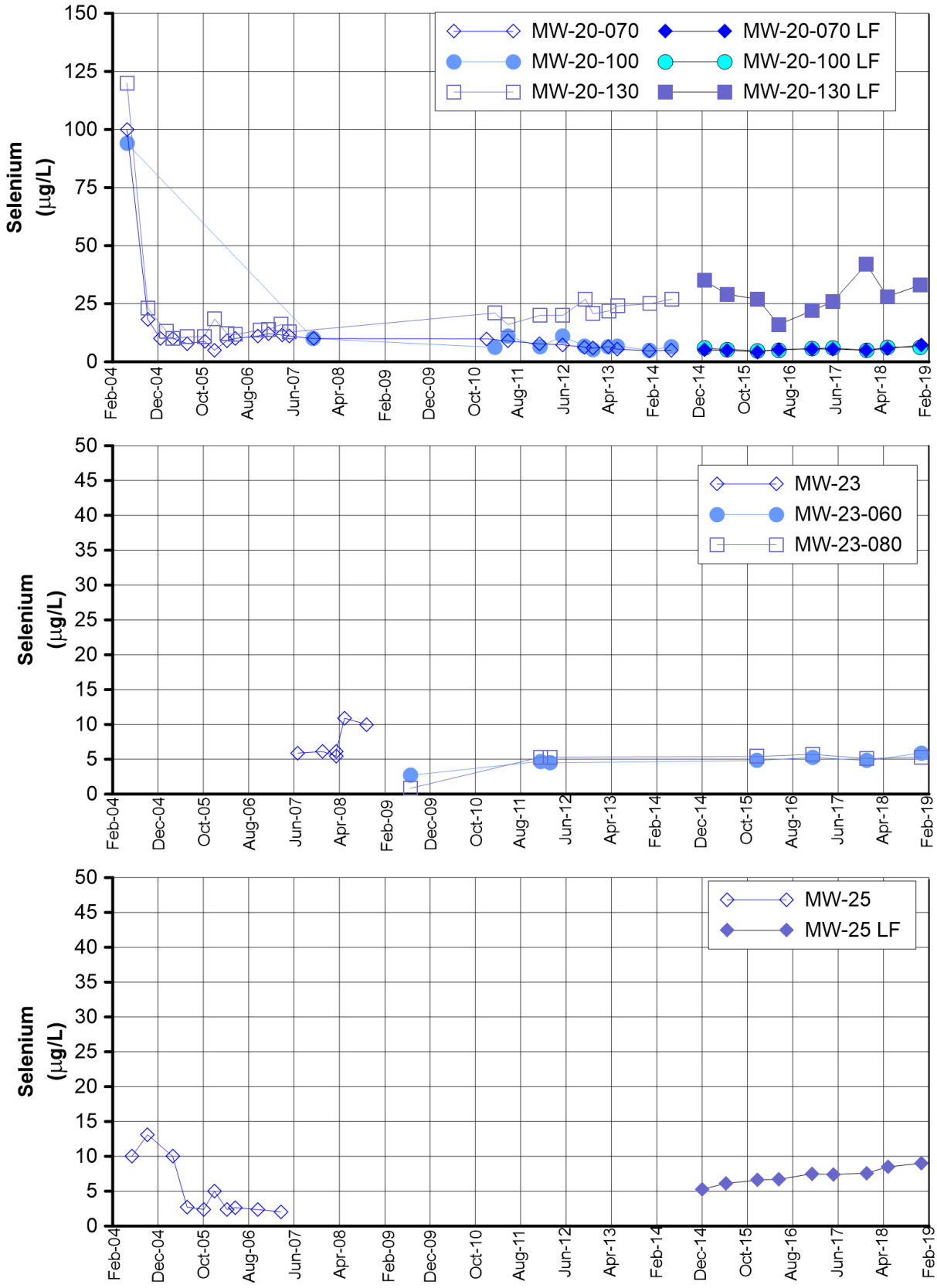
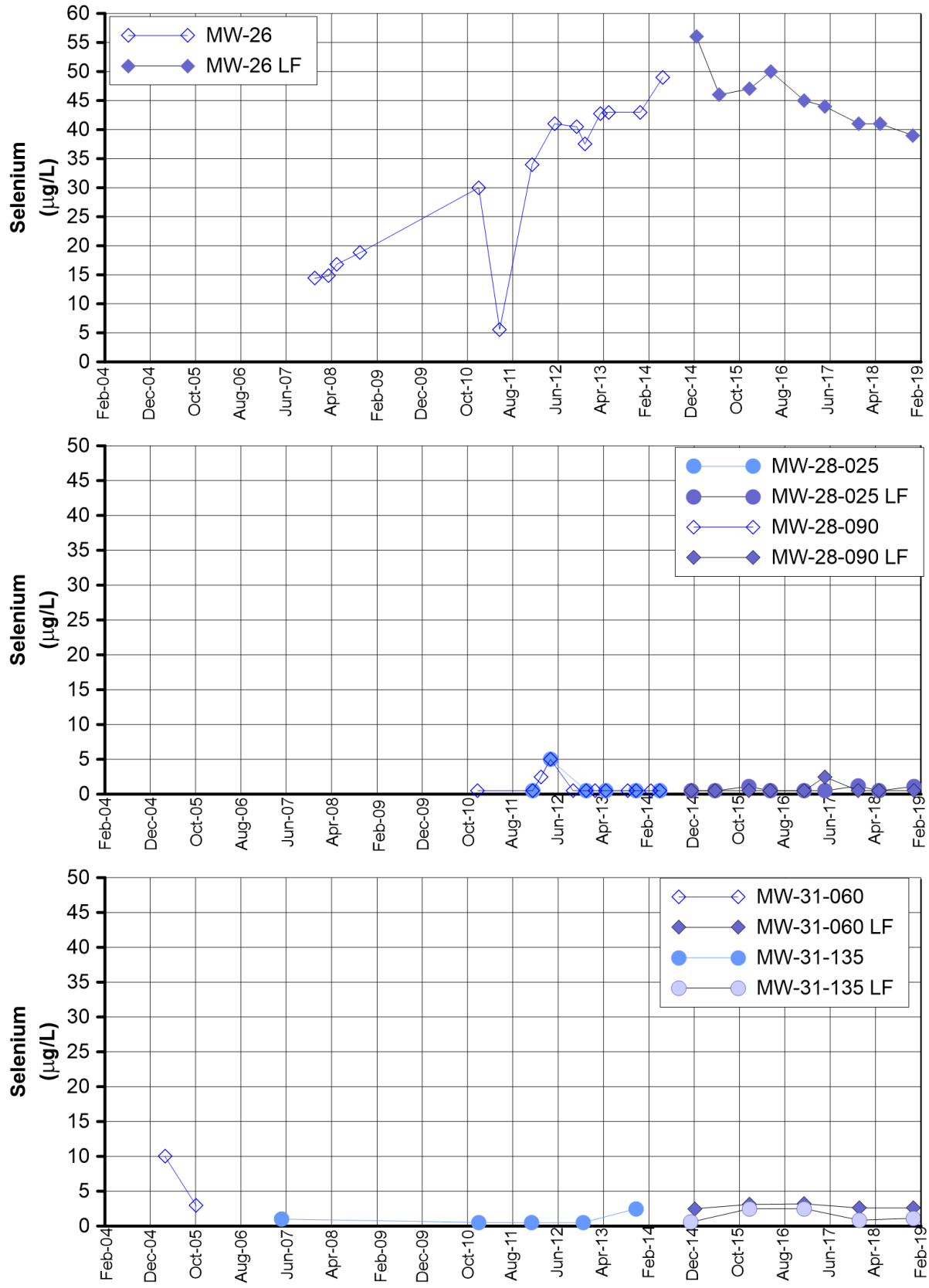


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-60
SELENIUM
IN MW-20 AND MW-23 CLUSTERS AND MW-25
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

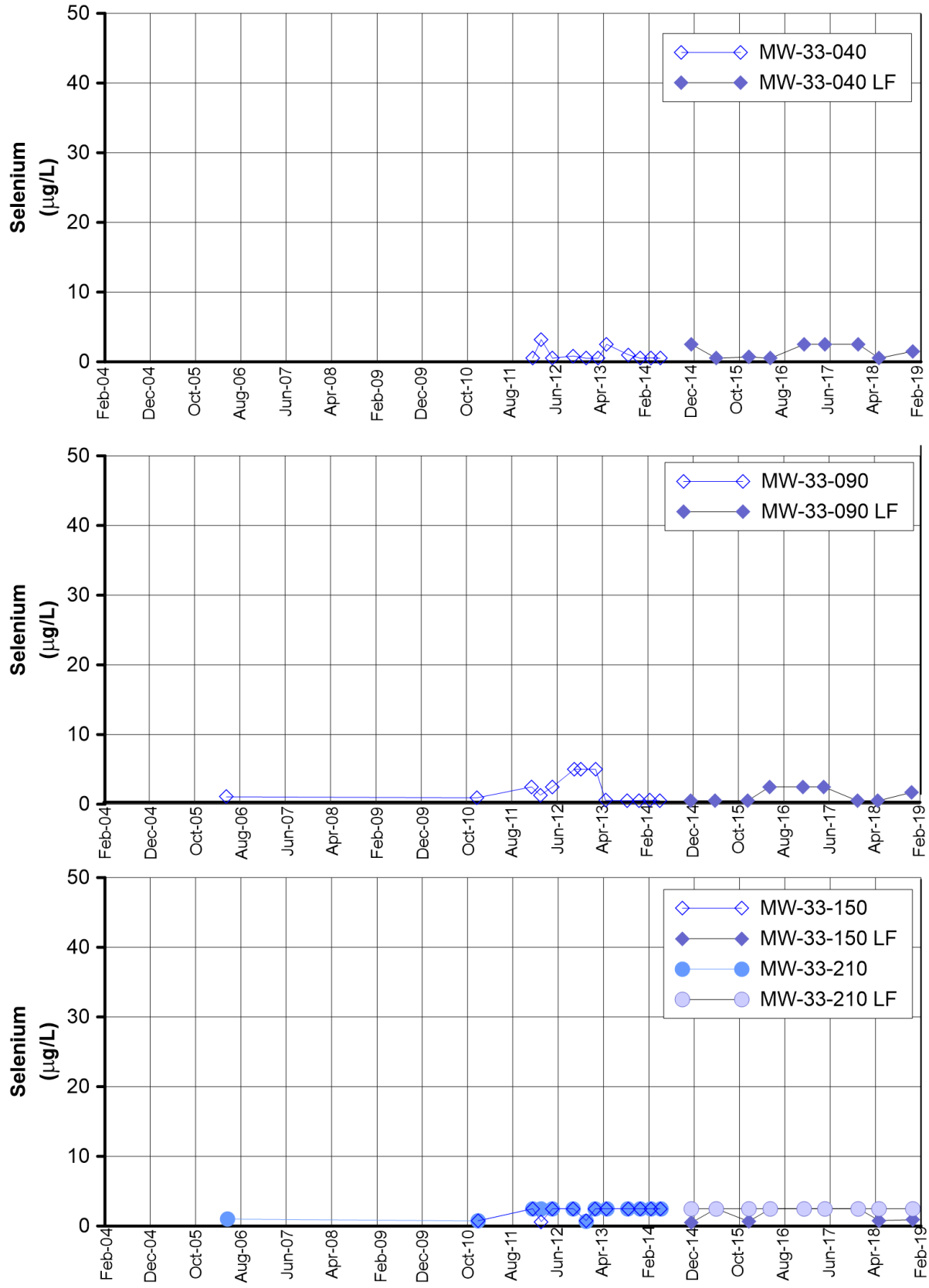


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-61
SELENIUM
IN MW-26, MW-28, AND MW-31 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS



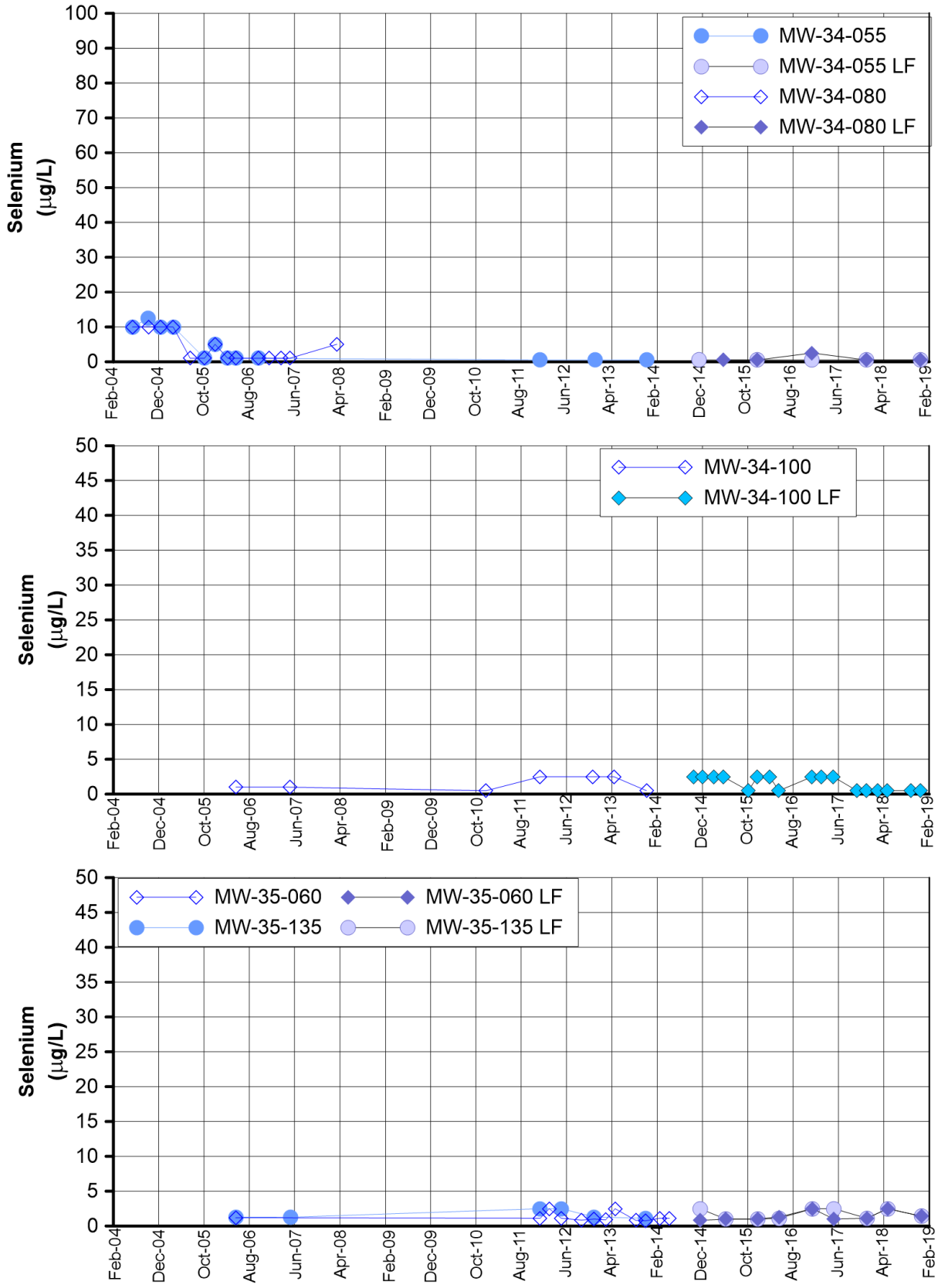
Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-62
SELENIUM
IN MW-33 CLUSTER

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

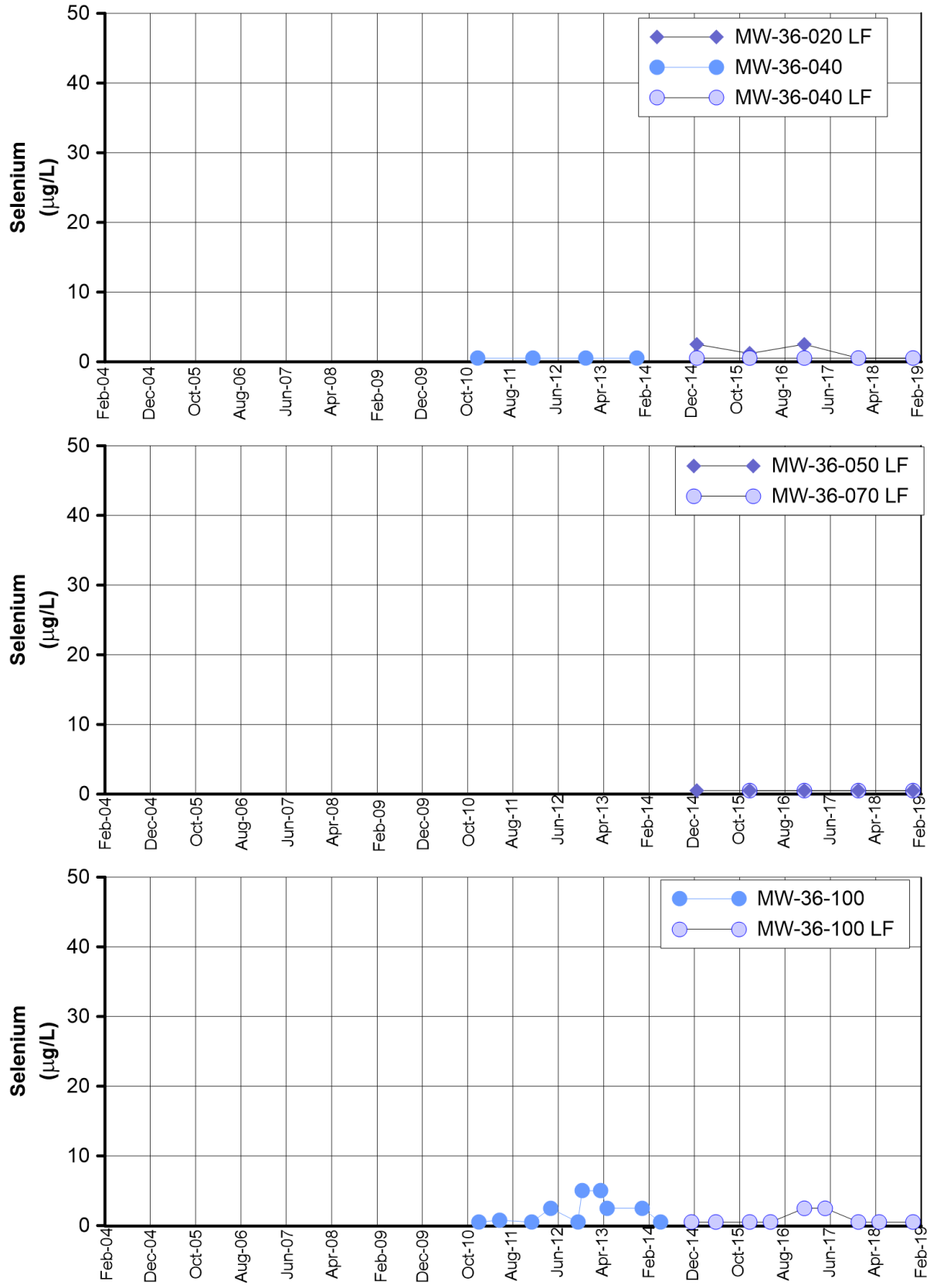


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-63
SELENIUM
IN MW-34 AND MW-35 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS



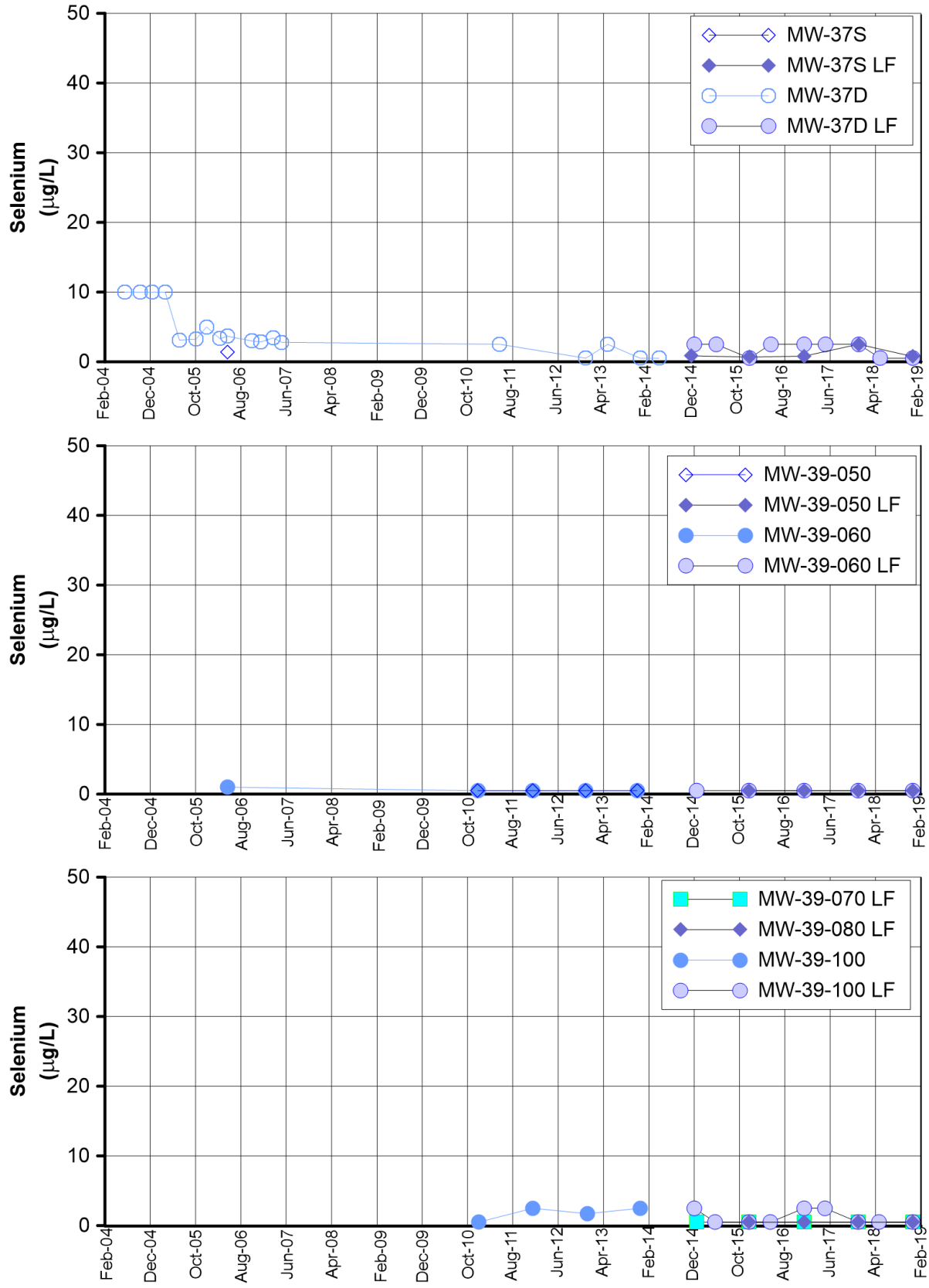
Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-64
SELENIUM
IN MW-36 CLUSTER

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

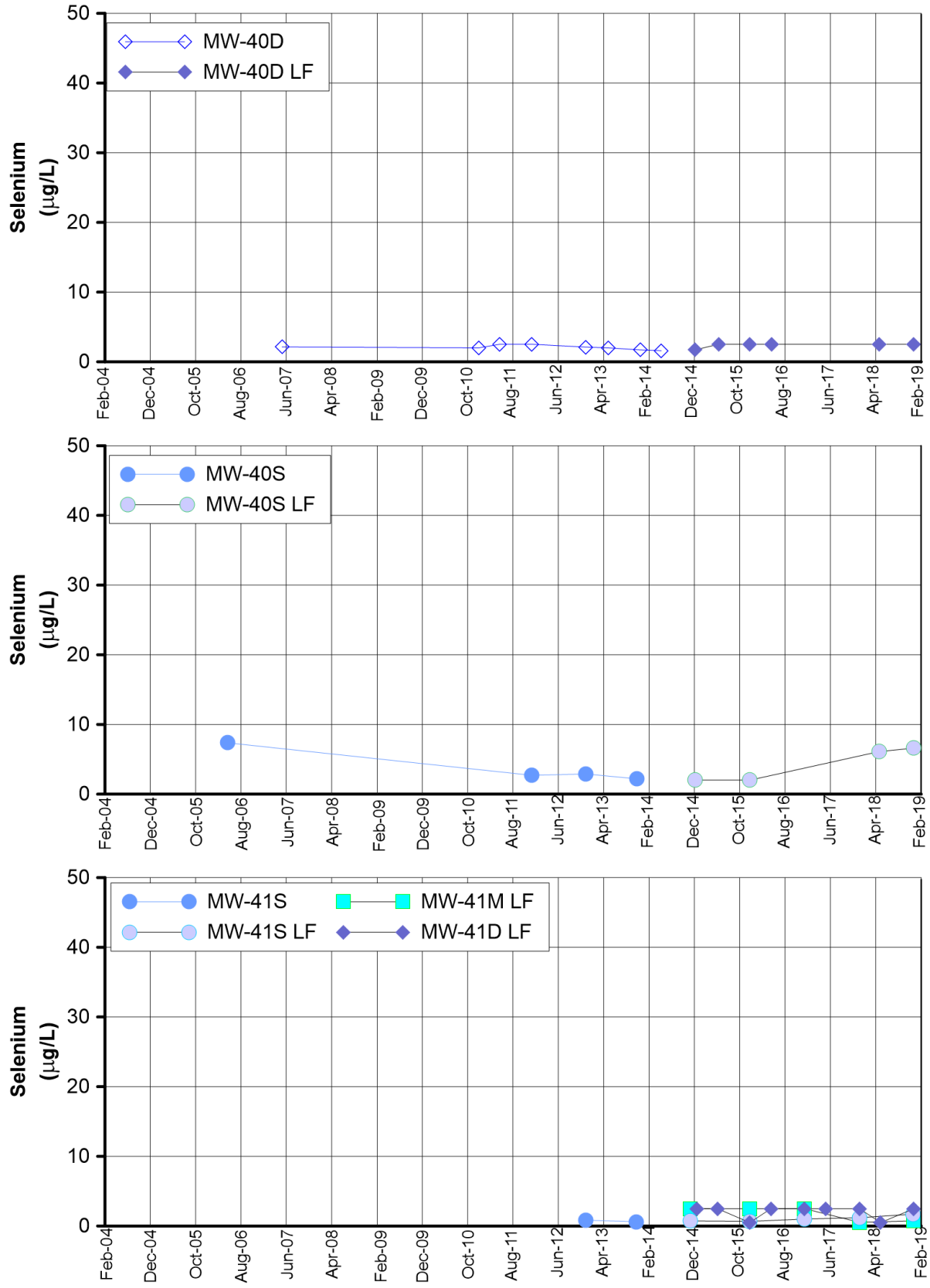


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-65
SELENIUM
IN MW-37 AND MW-39 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

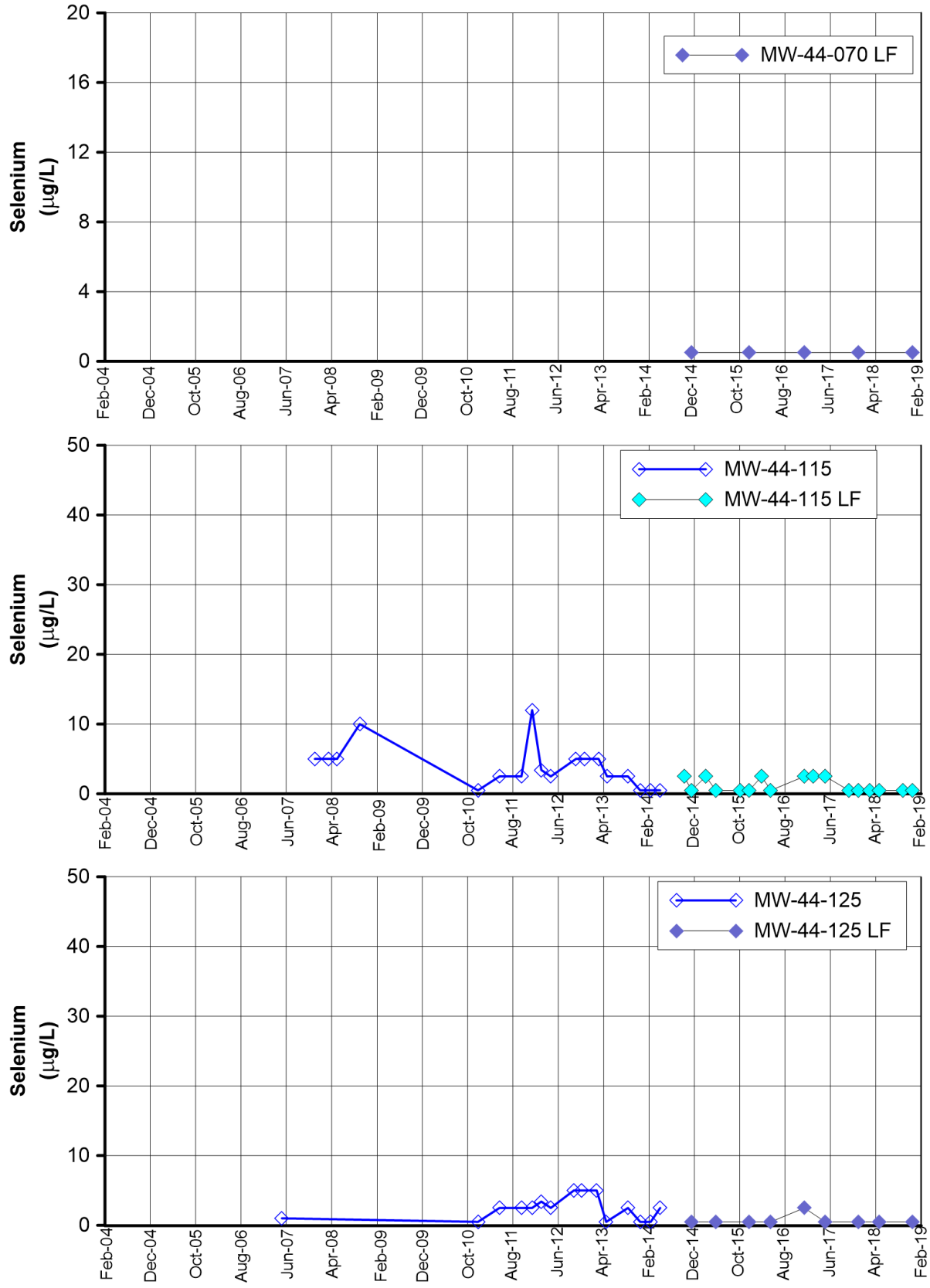


Notes:

1. LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.
2. MW-40D and MW-40S were not sampled during 4th Quarter 2017 due to traffic control issues.

FIGURE F-66
SELENIUM
IN MW-40 AND MW-41 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

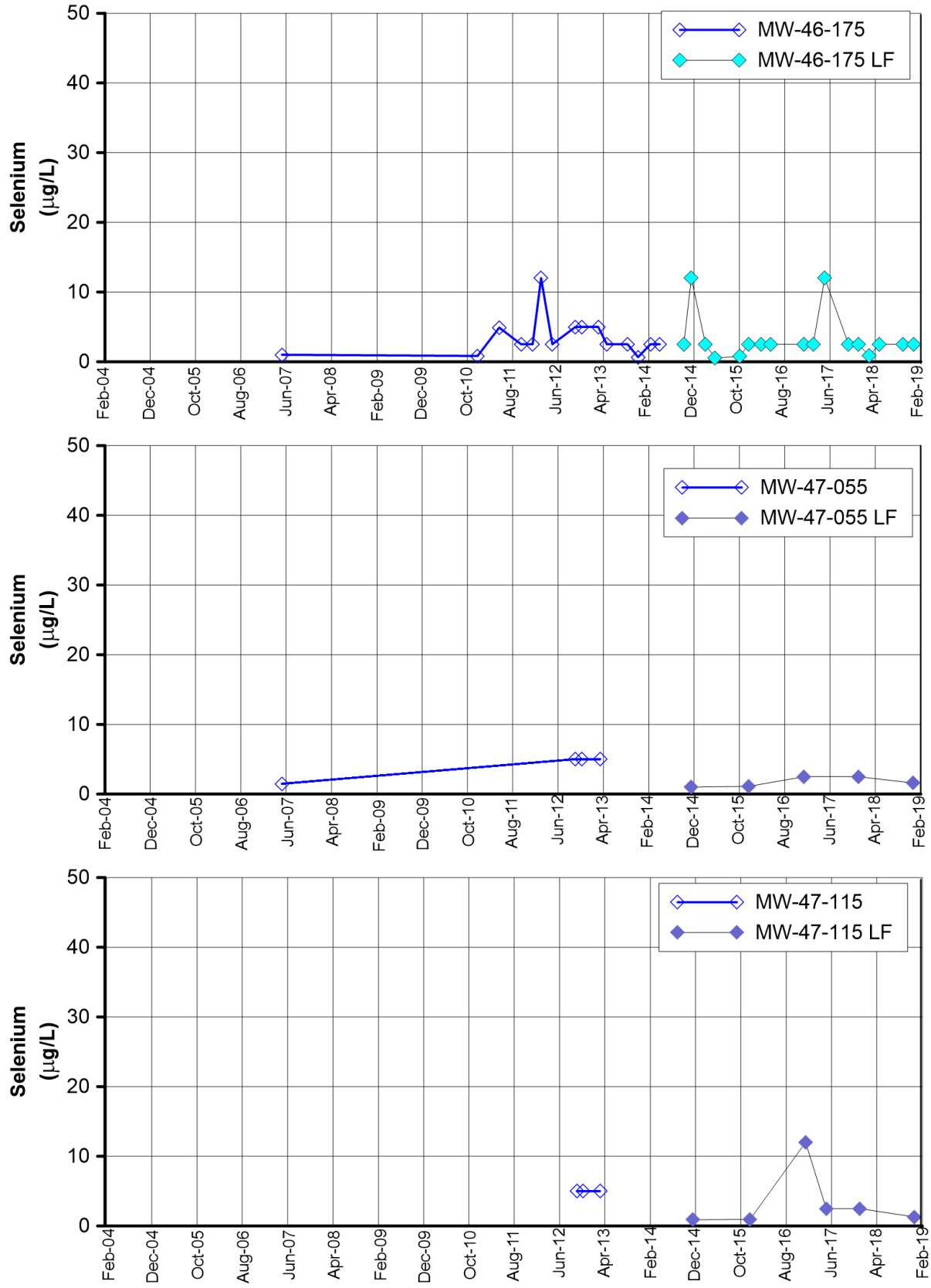


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-67
SELENIUM
IN MW-44 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

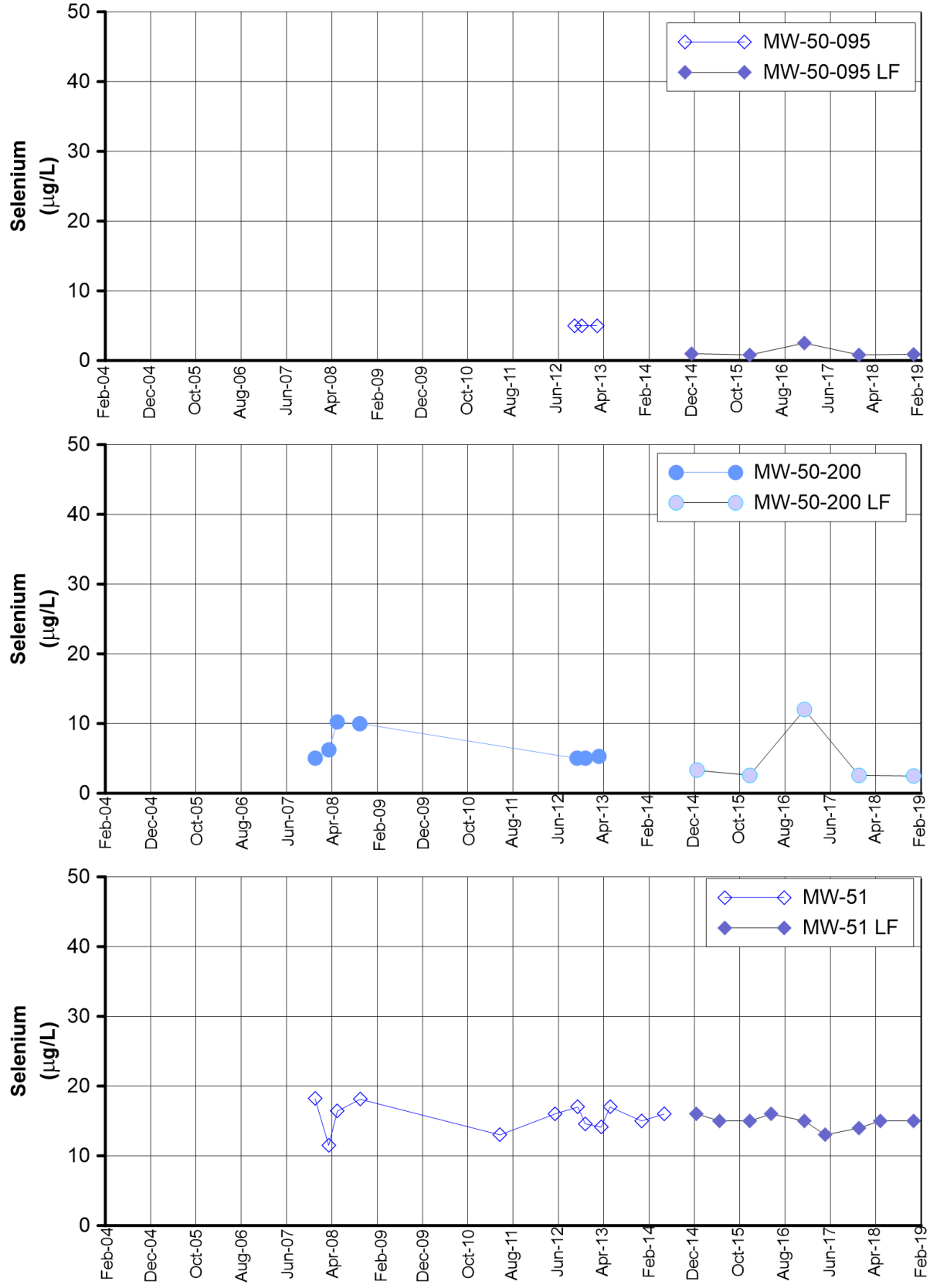


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-68
SELENIUM
IN MW-46 AND MW-47 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

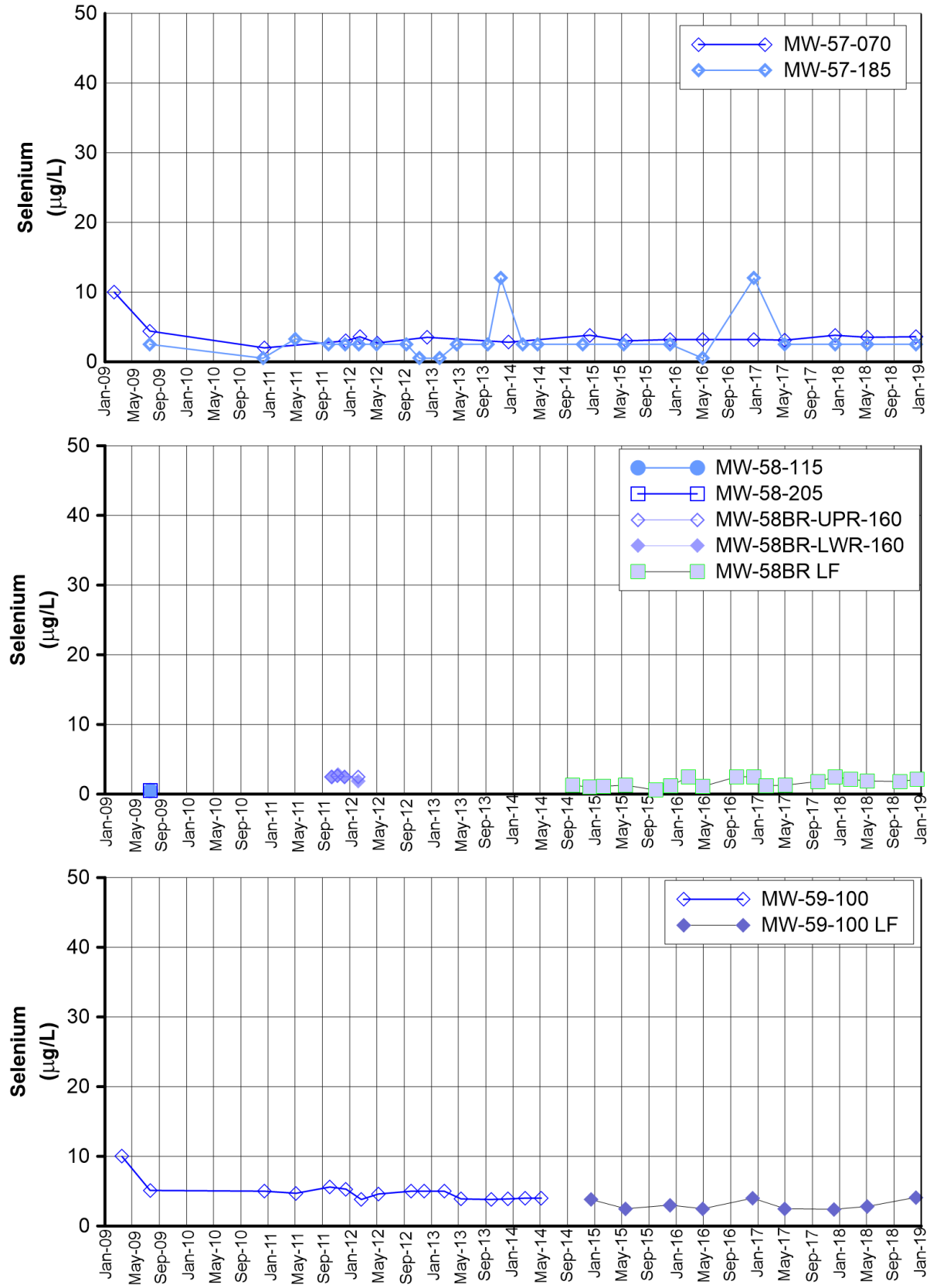


Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-69
SELENIUM
IN MW-50 AND MW-51 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

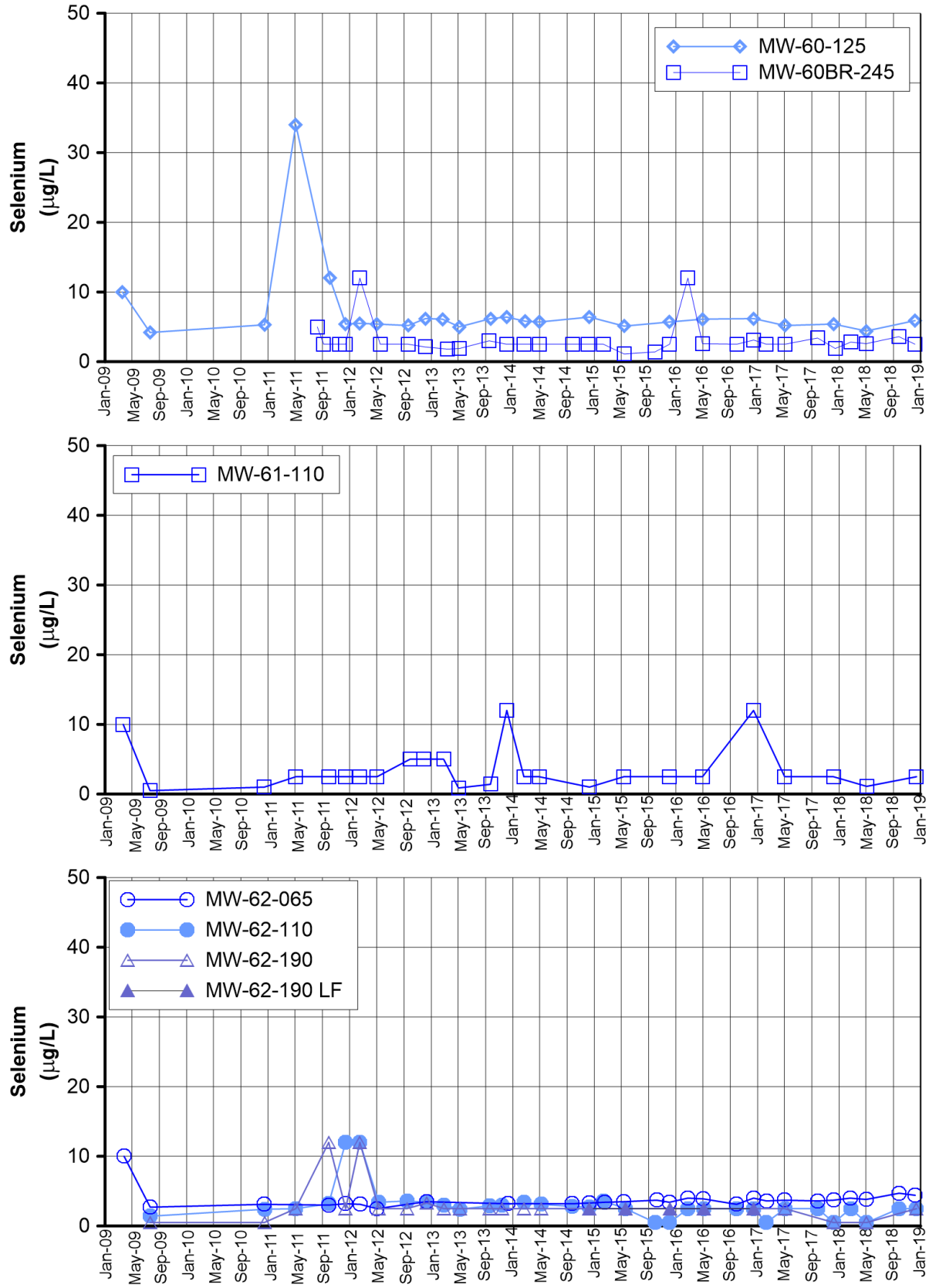


Note:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-70
SELENIUM
IN MW-57 CLUSTER, MW-58 CLUSTER AND MW-59-100
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS



Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-60-125 sampled using LF method on 5/02/2017 & 12/06/2017.
2. MW-62-065 sampled using LF method on 5/02/2017, 9/25/2017, & 12/06/2017.

FIGURE F-71
SELENIUM
IN MW-60 CLUSTER, MW-61-110, AND MW-62 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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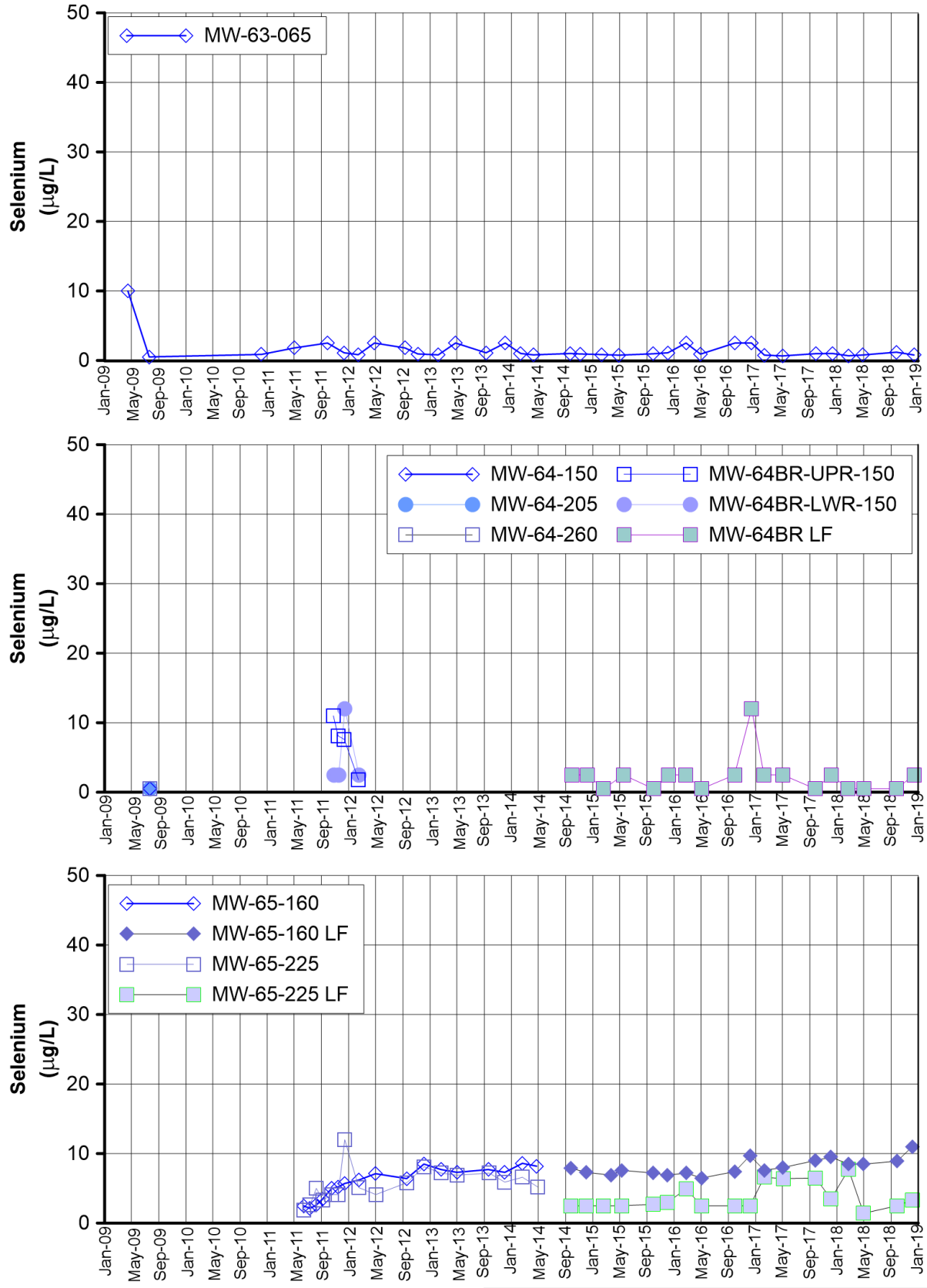


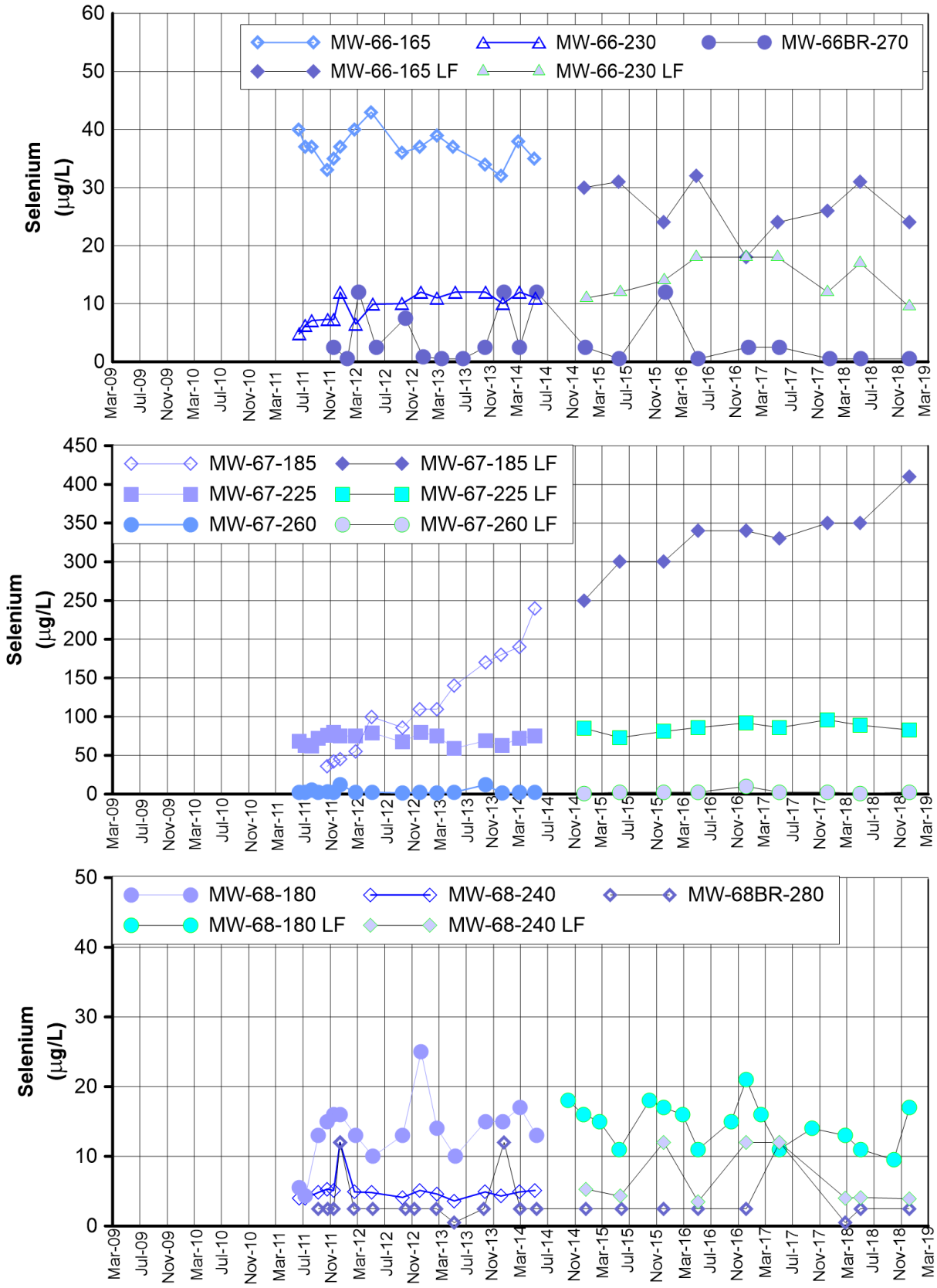
Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-63-065 sampled using LF method on 5/02/2017, 9/28/2017, & 12/12/2017.

FIGURE F-72
SELENIUM
IN MW-63-065, MW-64 CLUSTER AND MW-65 CLUSTER
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS



Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

FIGURE F-73
SELENIUM
IN MW-66, MW-67, AND MW-68 CLUSTERS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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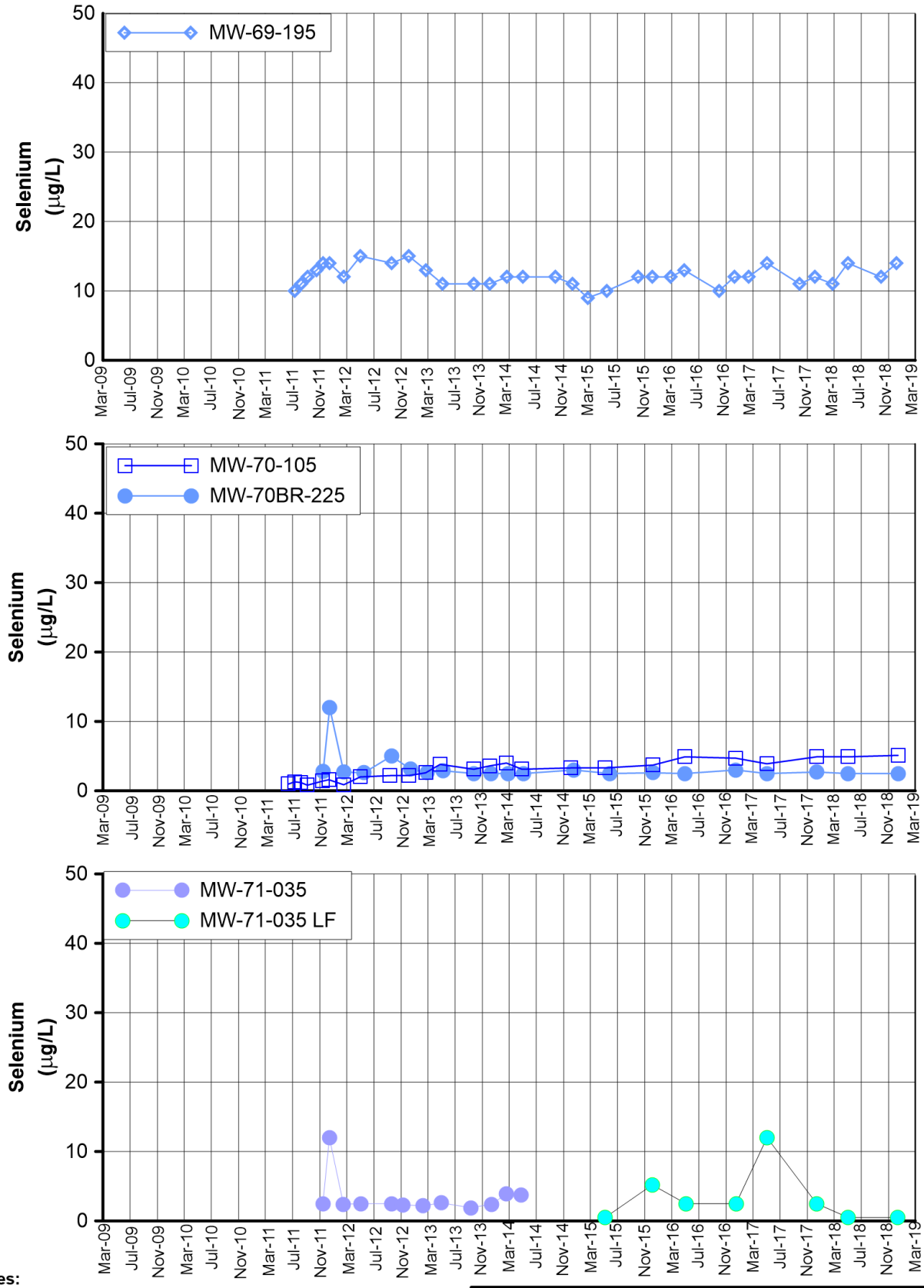


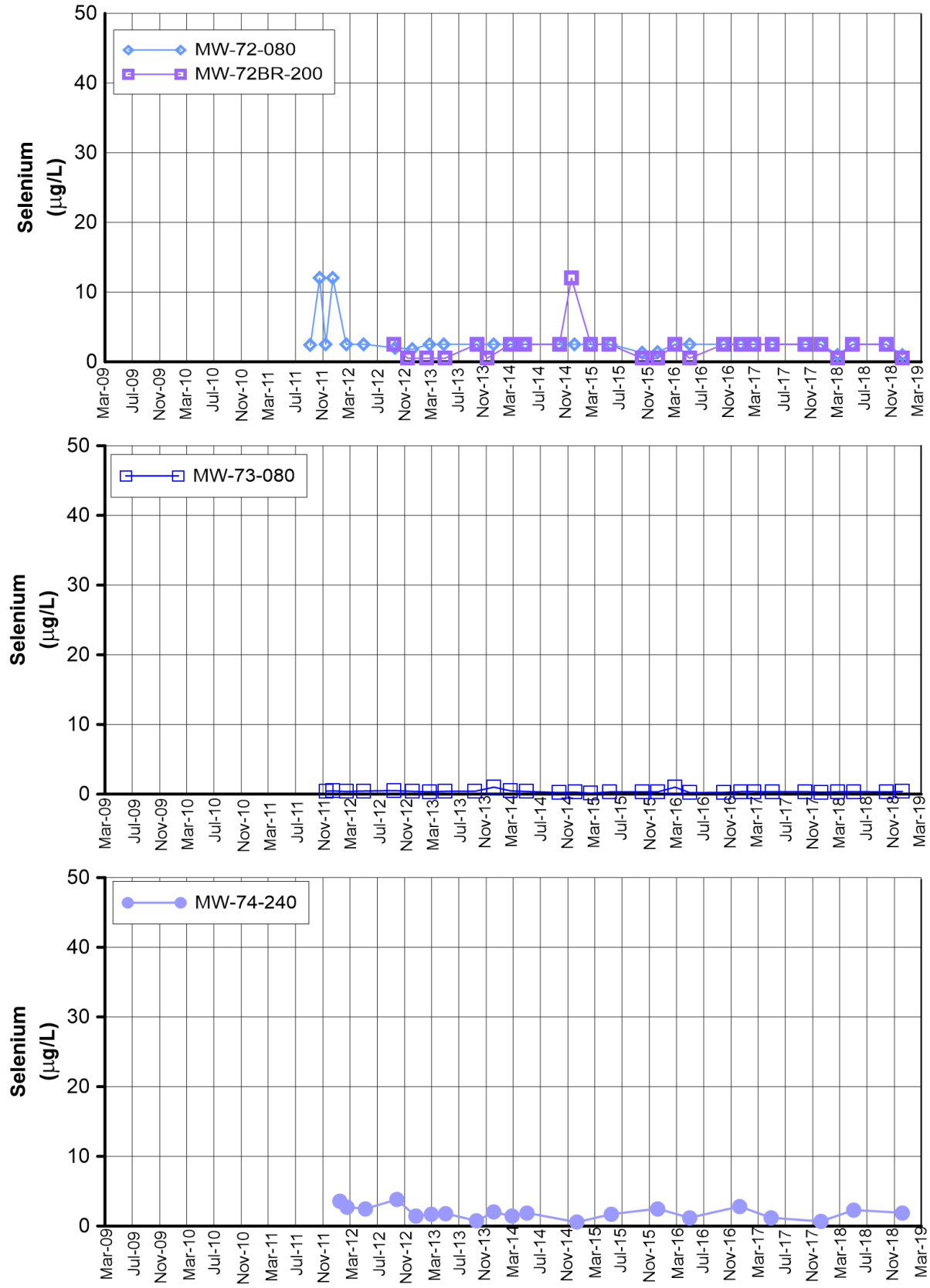
Notes:

LF = low flow, hexavalent chromium sample collected using low flow sampling method. Data not indicated with (LF) was collected using the three-volume purge sampling method.

1. MW-69-195 sampled using LF method on 2/09/2017, 5/03/2017, 9/26/2017, & 12/04/2017.
2. MW-70-105 sampled using LF method on 5/02/2017 & 12/11/2017.

FIGURE F-74
SELENIUM
IN MW-69-195, THE MW-70 CLUSTER, AND MW-71-035
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS



Notes:

1. MW-72-080 sampled using low flow sampling method on 5/02/2017 & 12/07/2017.
2. MW-73-080 sampled using low flow sampling method on 5/02/2017, 9/27/2017, & 12/06/2017
3. MW-74-240 sampled using low flow sampling method on 4/27/2017 & 12/06/2017.

FIGURE F-75
SELENIUM
IN MW-72 CLUSTER, MW-73-080, AND MW-74-240
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ARCADIS

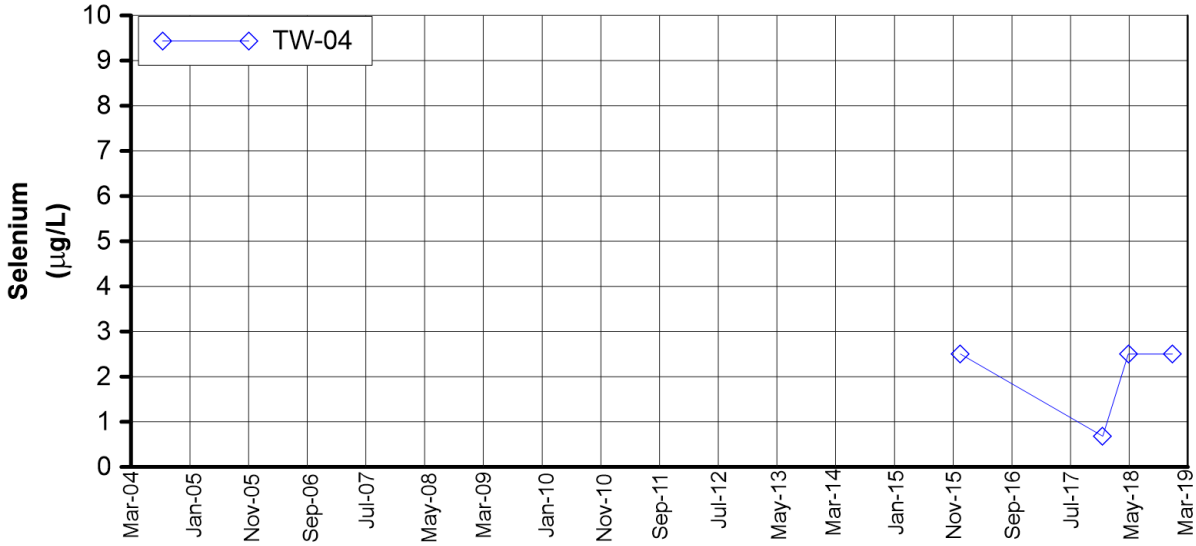


FIGURE F-76
SELENIUM
IN TW-04

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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APPENDIX G

Interim Measures Extraction System Operations Log, Fourth Quarter 2018

APPENDIX G

Interim Measures Extraction System Operations Log, Fourth Quarter 2018, PG&E Topock Performance Monitoring Program

During Fourth Quarter 2018 (November and December), extraction well TW-3D operated at a target pump rate of at 135 gallons per minute, excluding periods of planned and unplanned downtime. Extraction well TW-2D was only operated for a brief time on December 4, 2018 for sample collection during the fourth quarter groundwater monitoring program sampling event, and PE-01 was only operated for a brief time on November 7, 2018 and December 4, 2018 to collect monthly samples. Well TW-2S was not operated during fourth quarter 2018. The operational run time for the Interim Measure groundwater extraction system (combined or individual pumping) was approximately 97.9 percent during Fourth Quarter 2018. The operational run time for the Interim Measure groundwater extraction system (combined or individual pumping) was approximately 93.1 percent during the 2018 annual reporting period.

The Interim Measure Number 3 (IM-3) facility treated approximately 11,585,167 gallons of extracted groundwater during Fourth Quarter 2018. The IM-3 facility also treated approximately 5,885 gallons of purge water generated from the groundwater monitoring program and 30,000 gallons of water from IM-3 well backwashing/re-development from Groundwater Partners. No containers of solids from the IM-3 facility were transported offsite during the reporting period.

Periods of planned and unplanned extraction system downtime (that together resulted in approximately 2.1 percent of downtime during Fourth Quarter 2018) are summarized below. The times shown are in Pacific Standard Time to be consistent with other data collected (for example, water level data) at the site.

G.1 November 2018

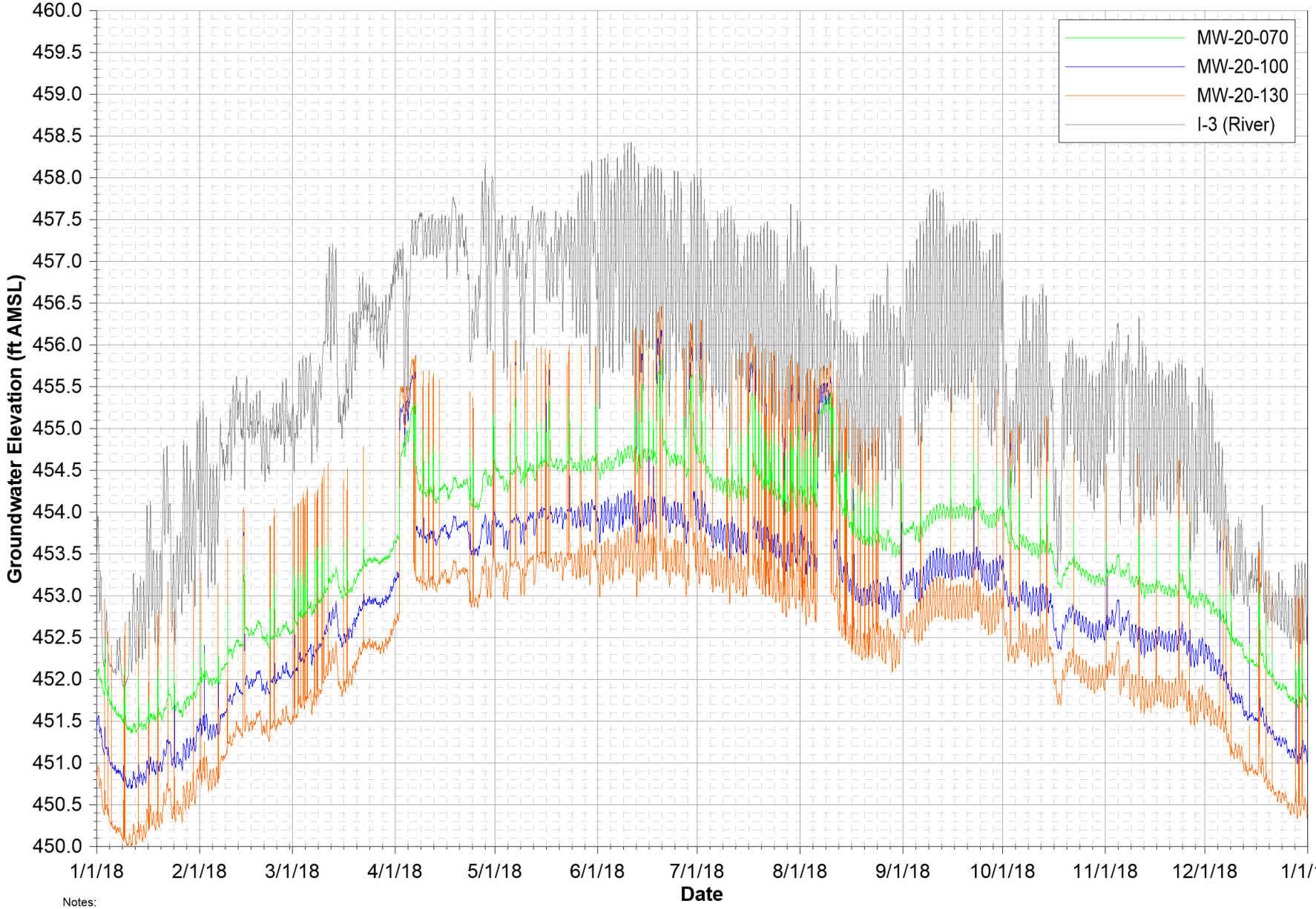
- **November 1, 2018 (unplanned):** The extraction well system was offline from 7:18 a.m. to 8:08 a.m. due to testing of the pipeline critical alarms and leak detection system. Extraction system downtime was 50 minutes.
- **November 1, 2018 (unplanned):** The extraction well system was offline from 8:36 a.m. to 8:54 a.m. due to work on the Human Machine Interface (HMI). Extraction system downtime was 18 minutes.
- **November 11, 2018 (unplanned):** The extraction well system was offline from 3:22 a.m. to 4:32 a.m. due the failure of the air valve controller on the microfilter. The controller was reset and the plant returned to service. Extraction system downtime was 1 hour 10 minutes.
- **November 16, 2018 (unplanned):** The extraction well system was offline from 8:18 a.m. to 9:36 a.m. to change out the microfilter modules. Extraction system downtime was 1 hour 18 minutes.
- **November 23, 2018 (unplanned):** The extraction well system was offline from 1:30 a.m. to 6:24 a.m. due the failure of the air valve controller on the microfilter. The controller was replaced and the plant returned to service. Extraction system downtime was 4 hours 54 minutes.
- **November 26, 2018 (unplanned):** The extraction well system was offline from 9:06 a.m. to 11:08 a.m. to change out the microfilter modules. Extraction system downtime was 2 hours 2 minutes.

G.2 December 2018

- **December 5, 2018 (unplanned):** The extraction well system was offline from 12:06 p.m. to 12:24 p.m. and from 12:32 p.m. to 12:34 p.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 20 minutes.
- **December 6, 2018 (unplanned):** The extraction well system was offline from 1:10 p.m. to 1:30 p.m. because the electric voltage coming into the plant was too high (higher voltage can damage the equipment). Needles Power had to lower the incoming electric voltage, which required a shutdown. Extraction system downtime was 20 minutes.
- **December 7, 2018 (unplanned):** The extraction well system was offline from 10:00 a.m. to 10:46 a.m. to change out the microfilter modules. Extraction system downtime was 46 minutes.
- **December 8, 2018 (unplanned):** The extraction well system was offline from 10:20 p.m. to 11:56 p.m. to change out the microfilter modules. Extraction system downtime was 1 hour 36 minutes.
- **December 14, 2018 (unplanned):** The extraction well system was offline from 8:40 a.m. to 8:54 a.m. because Groundwater Partners needed to measure the static water level from the wells. Extraction system downtime was 14 minutes.
- **December 17, 2018 (unplanned):** The extraction well system was offline from 2:34 a.m. to 6:10 a.m. and from 6:36 a.m. to 1:40 p.m. due to an upset clarifier. The polymer batch was weak and caused a bad floc. The plant operators had to work through the issue until the floc was normal. Extraction system downtime was 10 hours 40 minutes.
- **December 19, 2018 (unplanned):** The extraction well system was offline from 9:34 a.m. to 10:56 a.m. due to the same clarifier issue as on December 17, 2018. Extraction system downtime was 1 hour 22 minutes.
- **December 21, 2018 (unplanned):** The extraction well system was offline from 6:32 a.m. to 7:02 a.m. because of a high level in the Raw Water Storage Tank (T-100) due to the Clean in Place (CIP) flushing of the microfilter modules. The high level was caused by an extra-long flushing cycle because of the extremely dirty or plugged modules. Extraction system downtime was 30 minutes.
- **December 28, 2018 (unplanned):** The extraction well system was offline from 9:02 a.m. to 10:08 a.m. because of a high level in T-100 due to backwashing of the injection wells. Extraction system downtime was 1 hour 6 minutes.
- **December 29, 2018 (unplanned):** The extraction well system was offline from 6:40 a.m. to 7:50 a.m. because of a high level in T-100 due to backwashing of the injection wells. Extraction system downtime was 1 hour 10 minutes.
- **December 29, 2018 (unplanned):** The extraction well system was offline from 11:06 a.m. to 11:52 a.m. because Groundwater Partners need to measure static water levels in the extraction wells. Extraction system downtime was 46 minutes.
- **December 30, 2018 (unplanned):** The extraction well system was offline from 7:32 a.m. to 9:32 a.m. due to the Process Drain Pump (P-900) being down. The level sensor was malfunctioning due to the cold temperatures. Extraction system downtime was 2 hours.

APPENDIX H

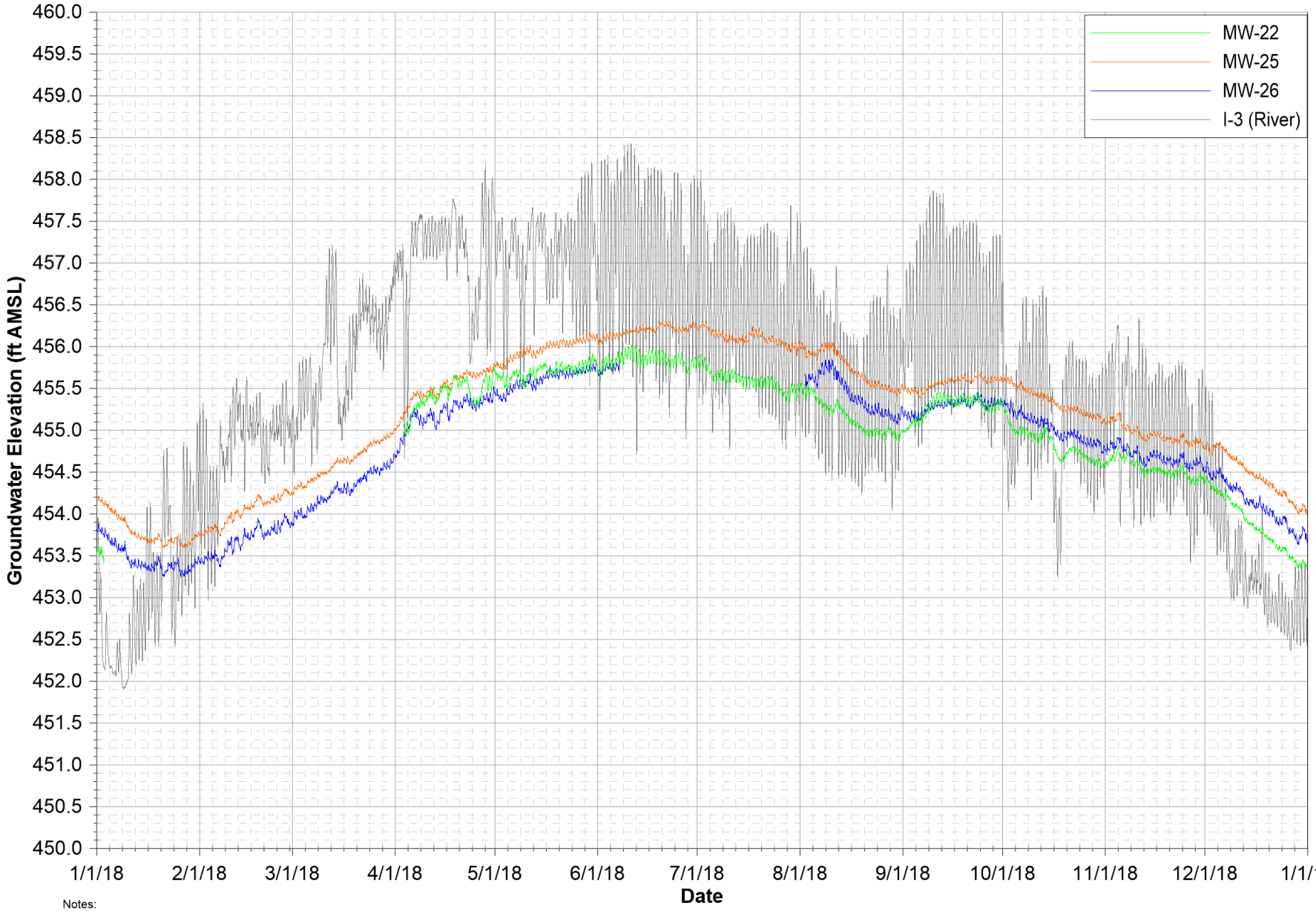
Hydrographs, Fourth Quarter 2018



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE H-1A
MW-20 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS



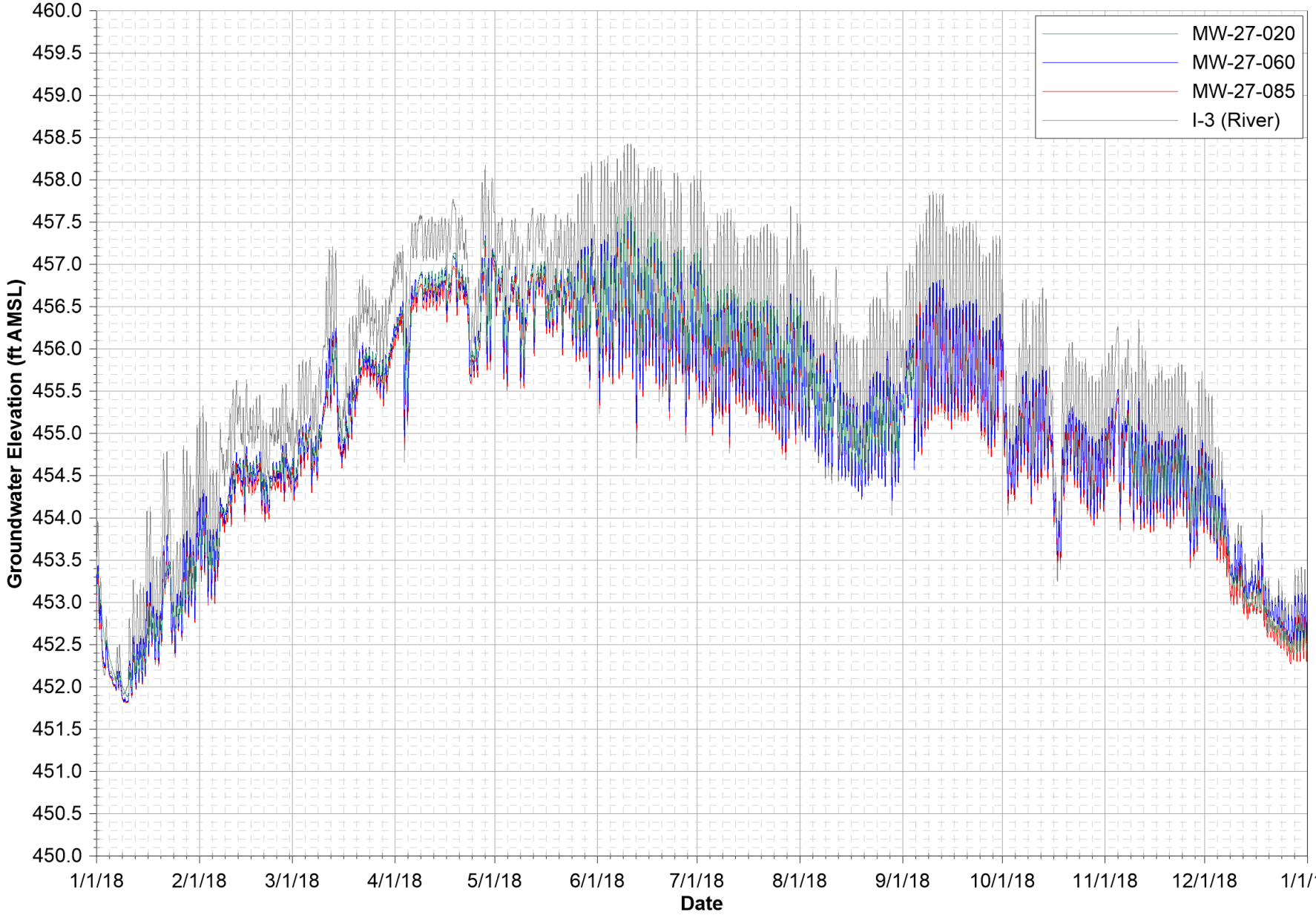
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-22 data unavailable from January 4, 2018 through April 2, 2018 due to transducer malfunction.
4. MW-26 data unavailable from June 8, 2018 through August 1, 2018 due to transducer malfunction.

FIGURE H-1B

MW-22, MW-25, AND MW-26 HYDROGRAPHS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS



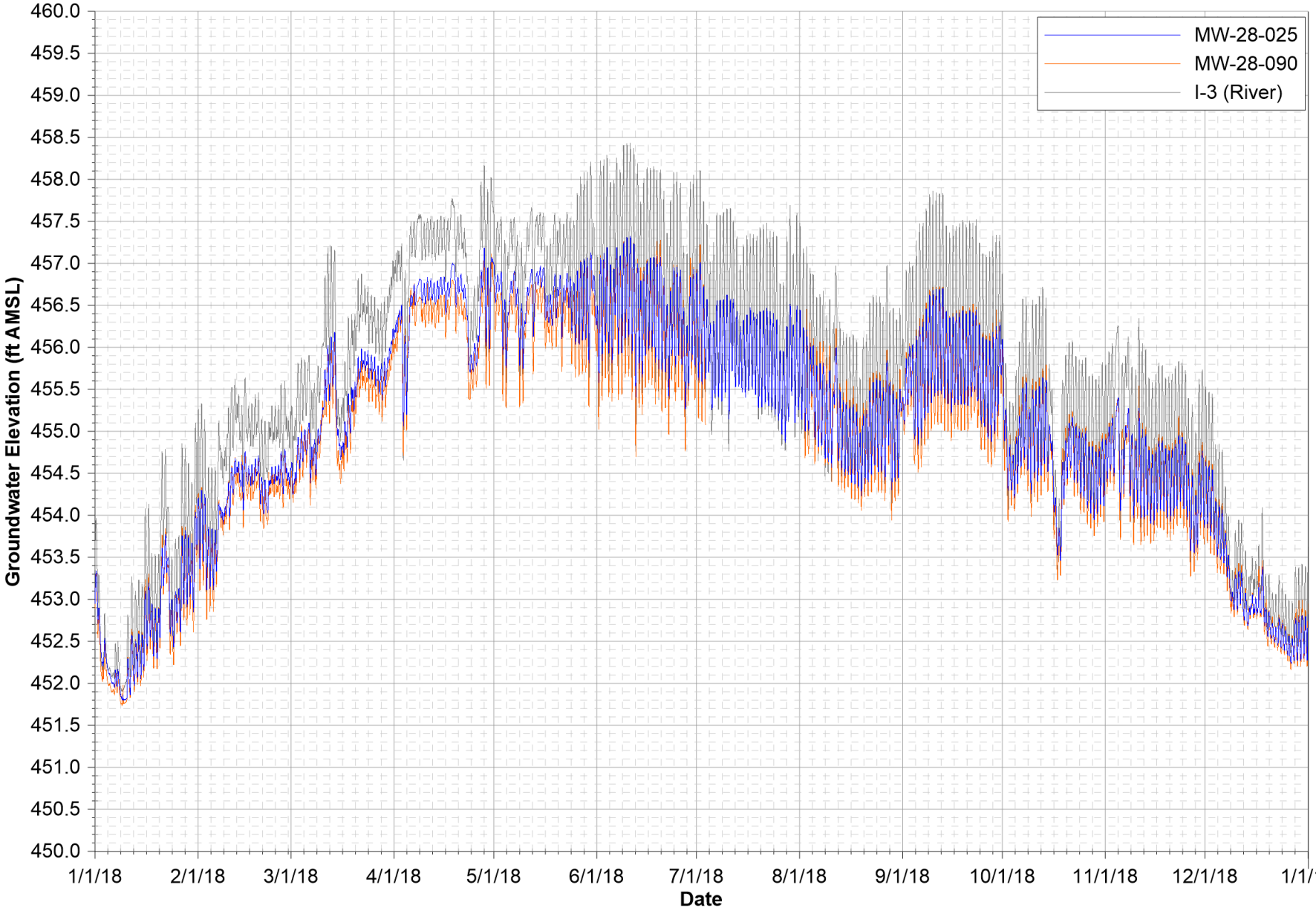
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level
3. MW-27-020 data unavailable from September 4, 2018 through November 6, 2018 due to transducer malfunction.

FIGURE H-1C

MW-27 CLUSTER HYDROGRAPHS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

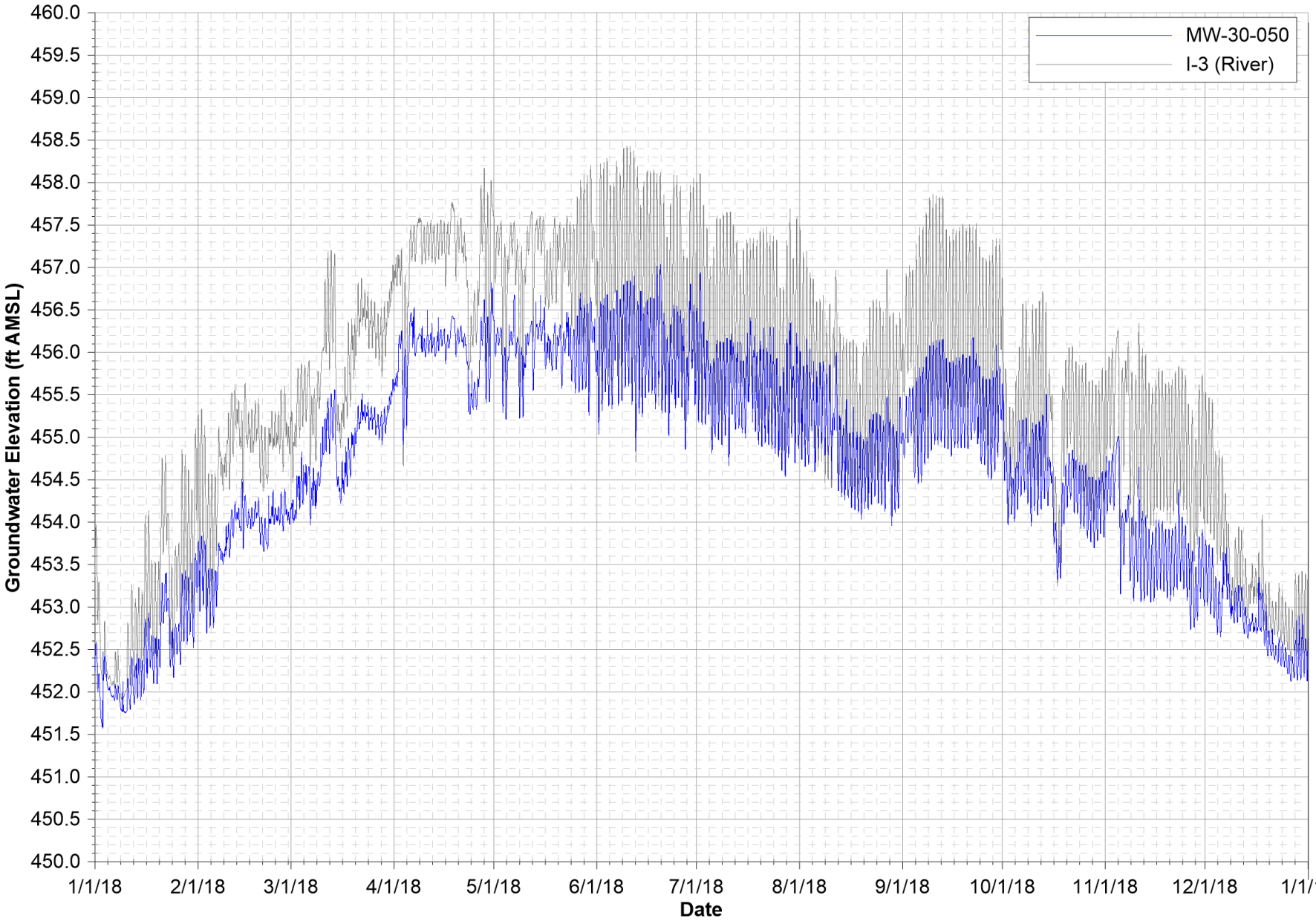


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-28-090 data unavailable from July 3, 2018 through August 2, 2018 due to transducer malfunction.

FIGURE H-1D
MW-28 CLUSTER HYDROGRAPHS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

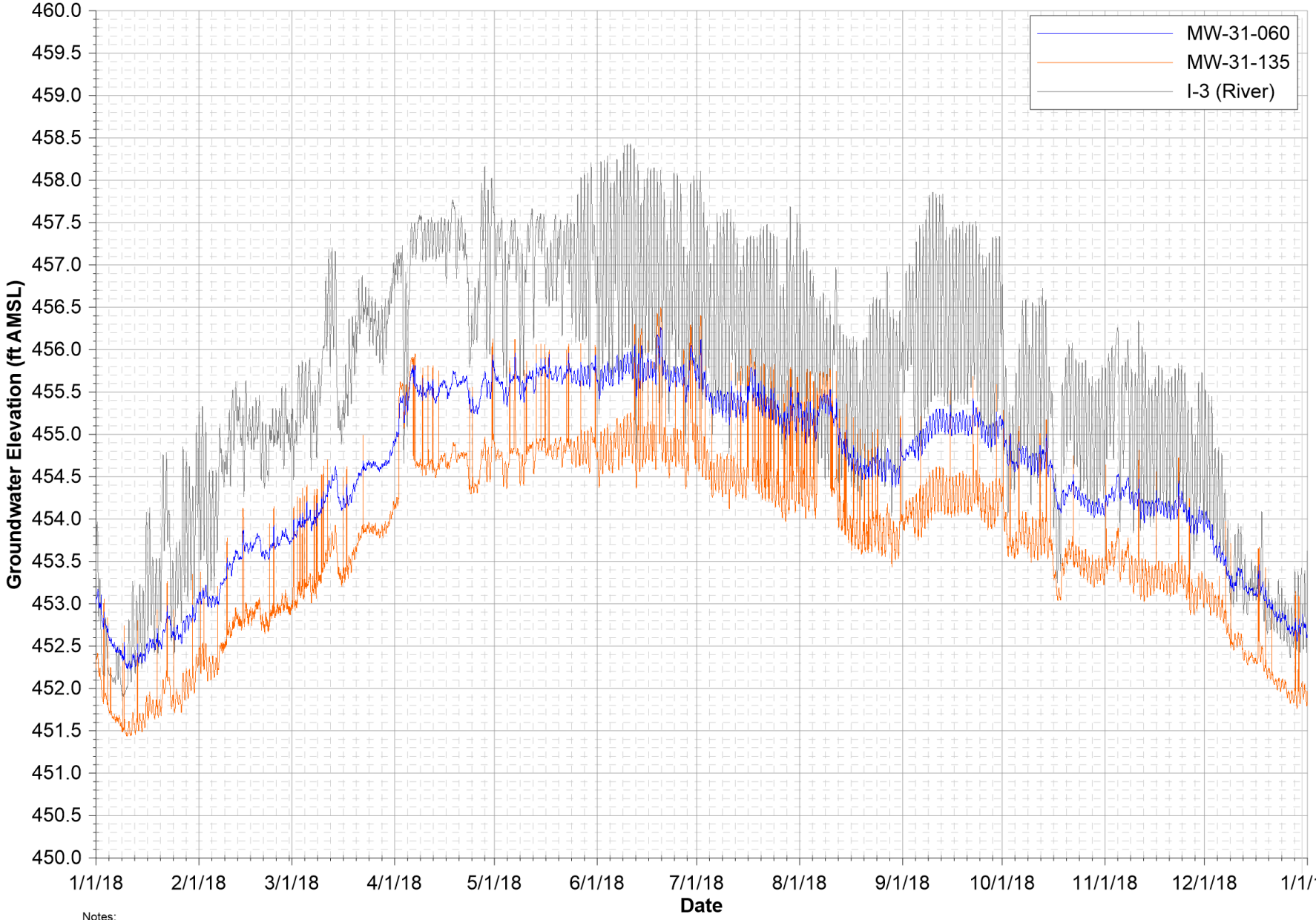
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE H-1E
MW-30-050 HYDROGRAPH
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

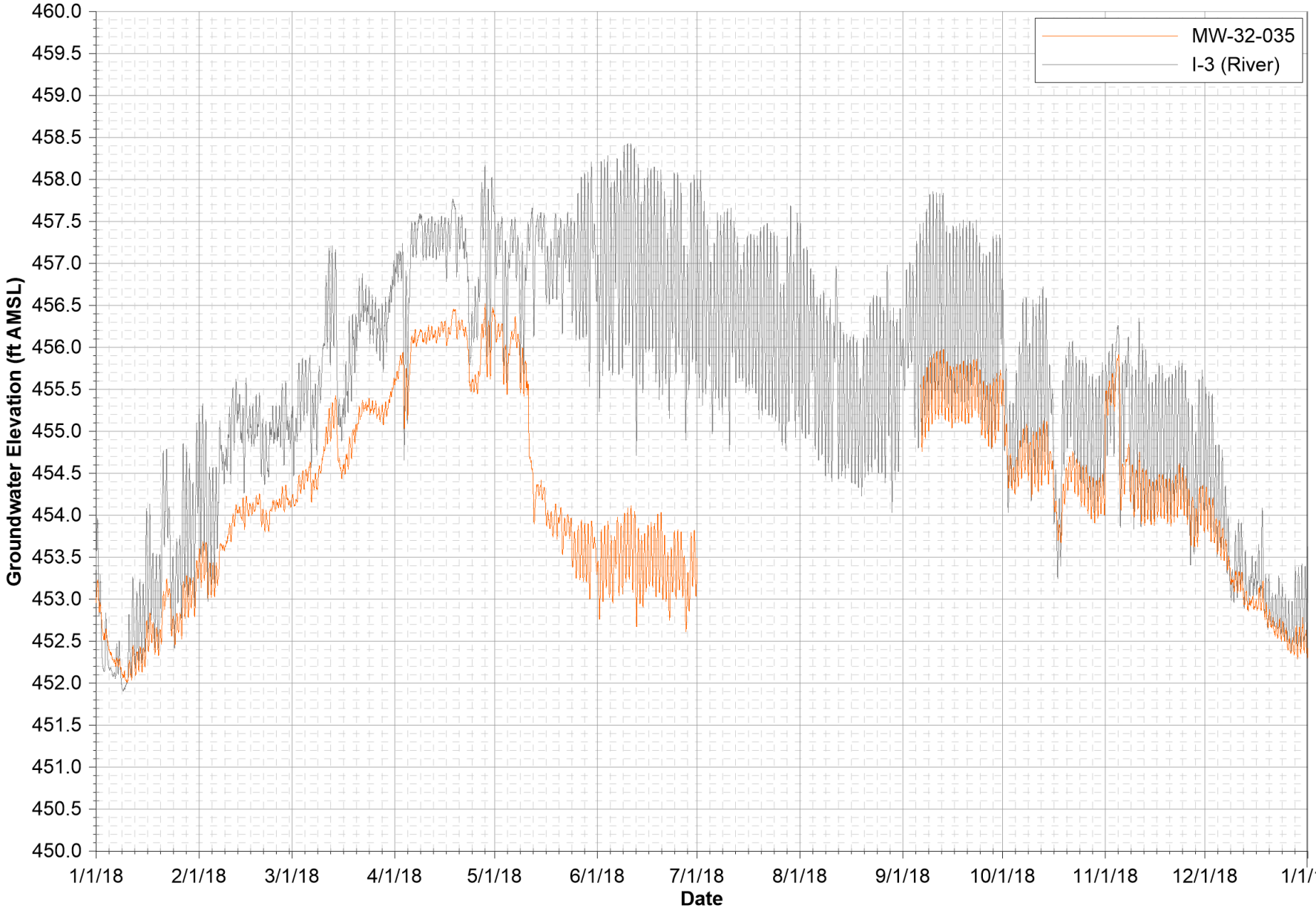
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE H-1F
MW-31 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

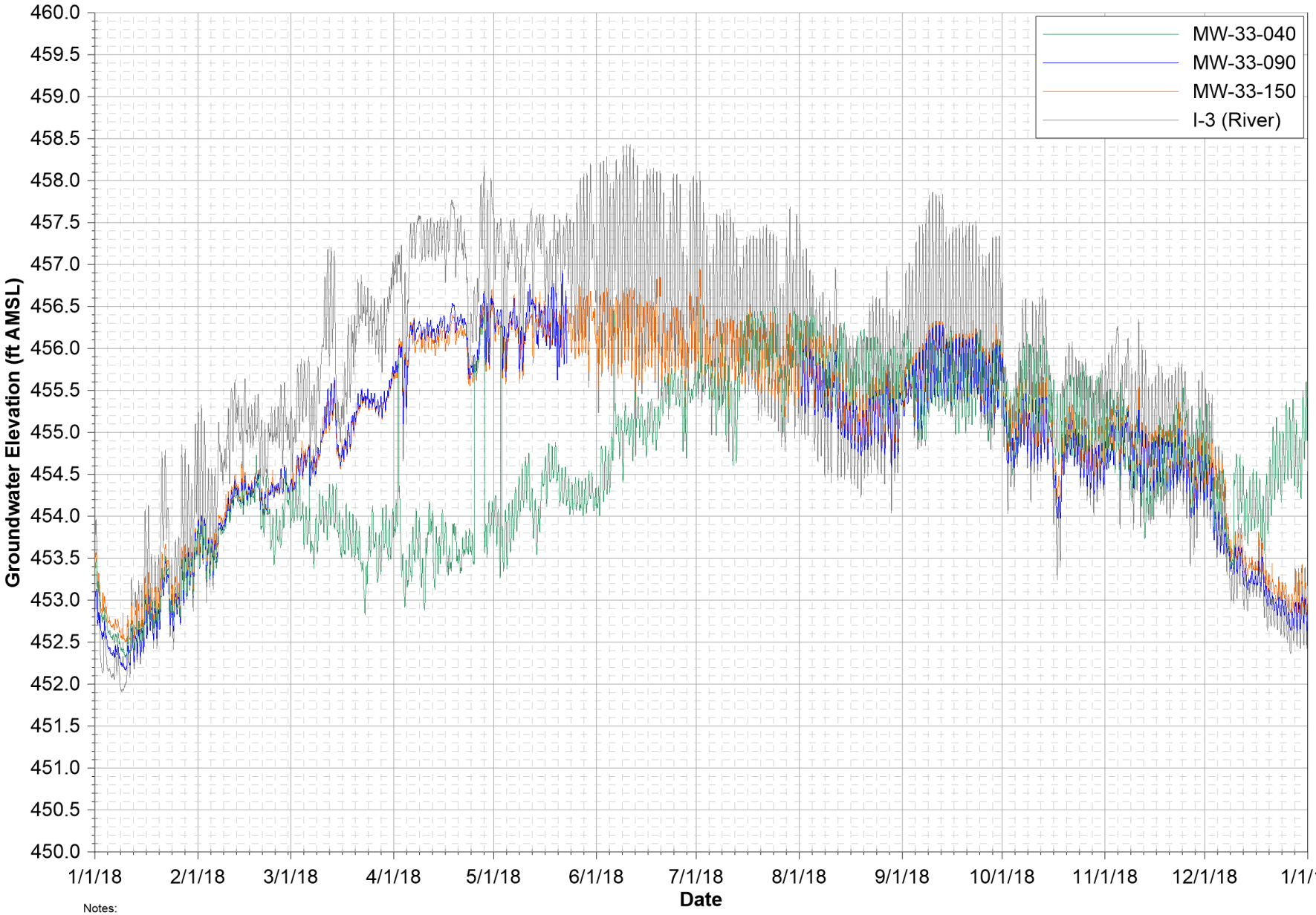
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-32-035 data unavailable from July 1, 2018 through September 6, 2018 due to transducer malfunction.

FIGURE H-1G
MW-32 HYDROGRAPH
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

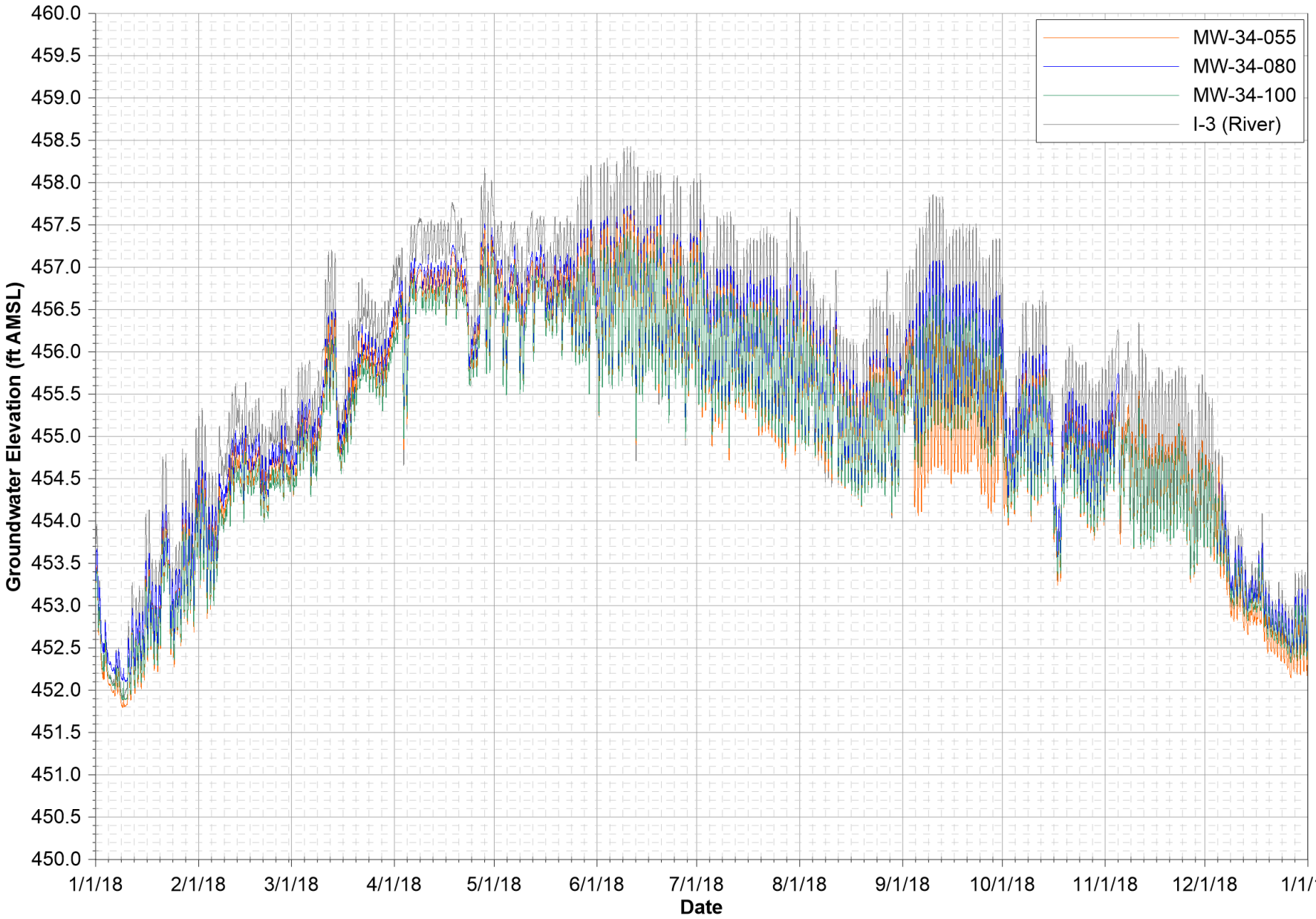


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-33-090 data unavailable from May 23, 2018 through August 1, 2018 due to transducer malfunction.

FIGURE H-1H
MW-33 CLUSTER HYDROGRAPHS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

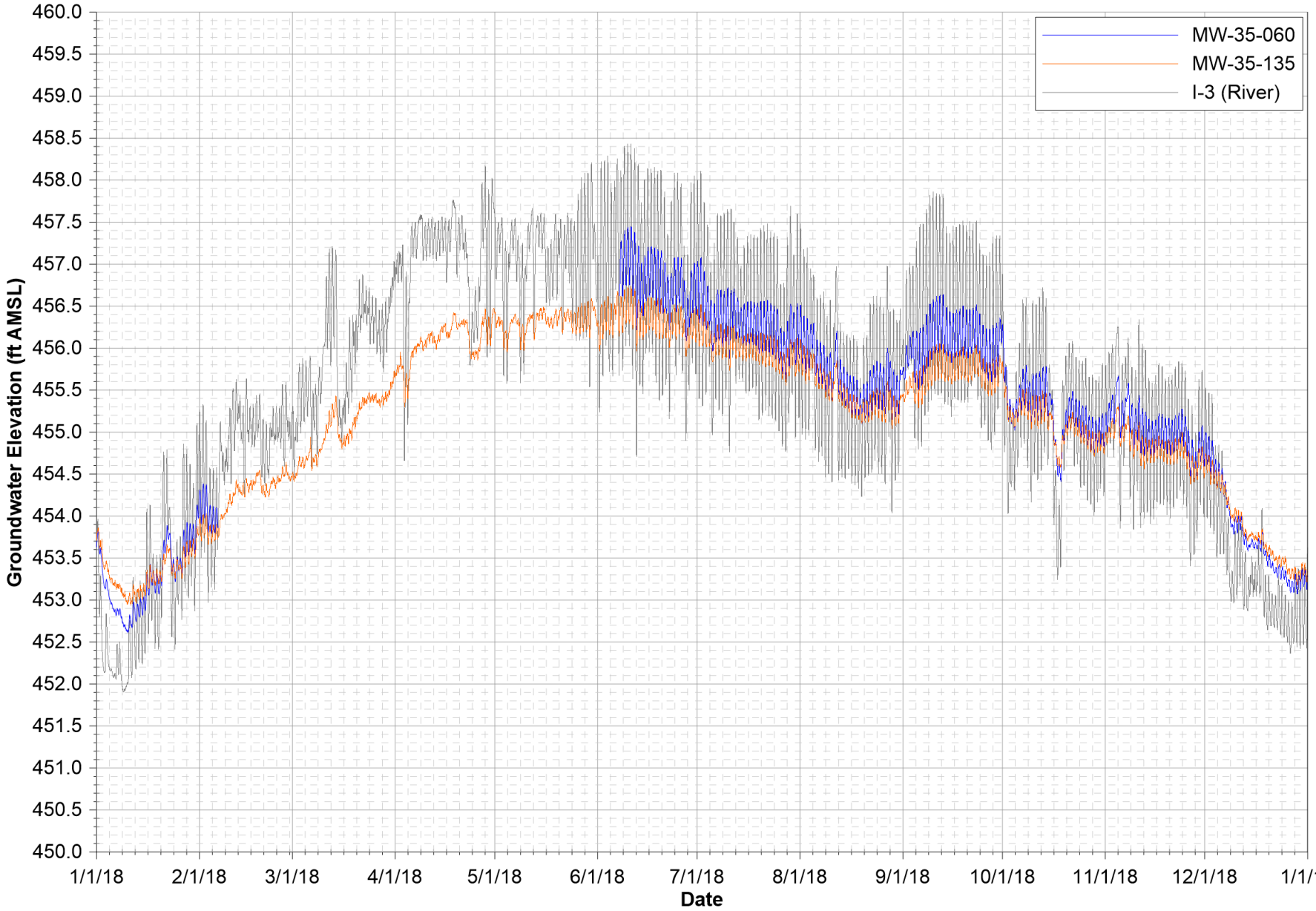
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-34-080 data unavailable from November 5, 2018 through December 4, 2018 due to transducer malfunction.

FIGURE H-1I
MW-34 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

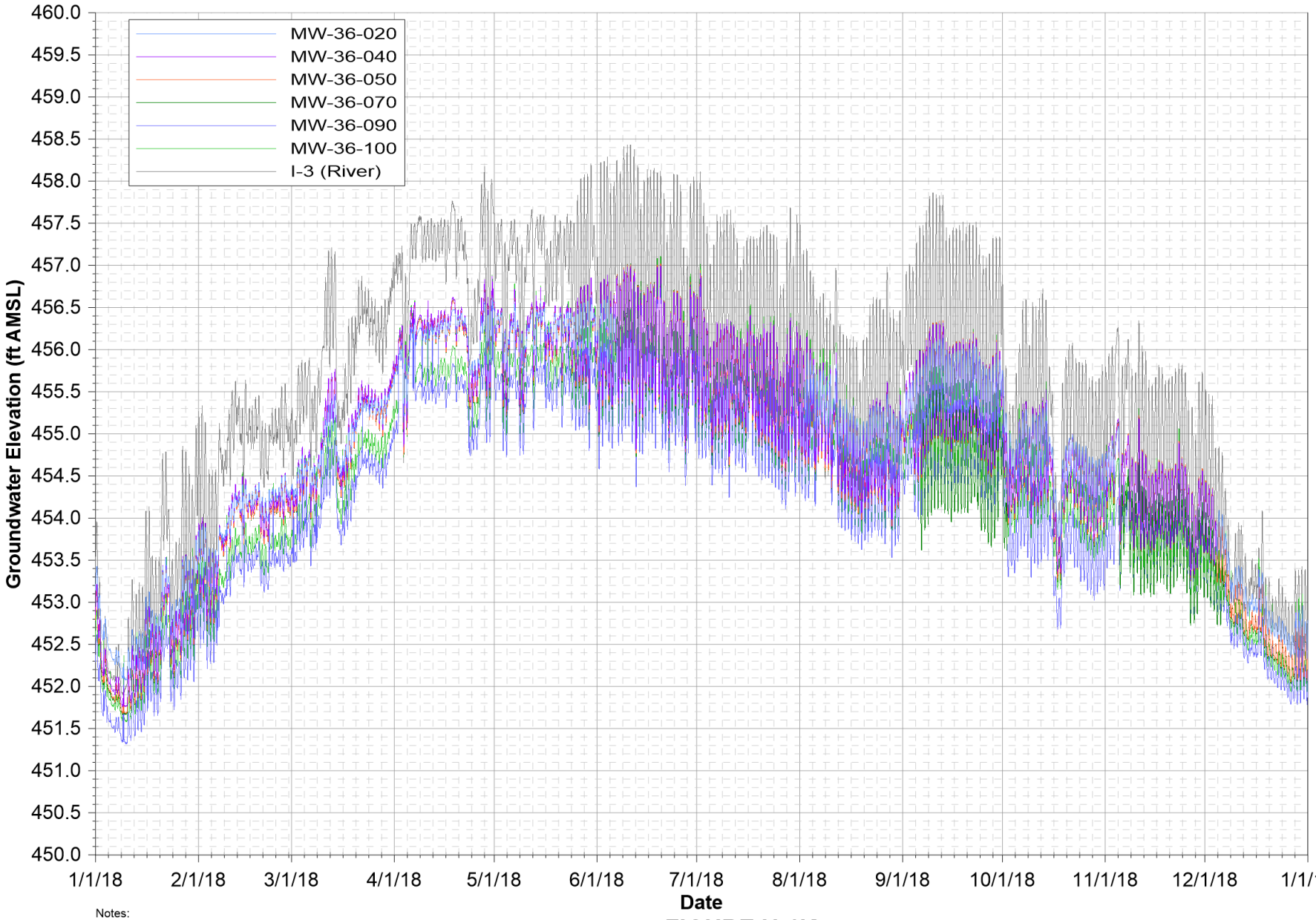
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-35-060 data unavailable from February 6, 2018 through June 7, 2018 due to transducer malfunction.

FIGURE H-1J
MW-35 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

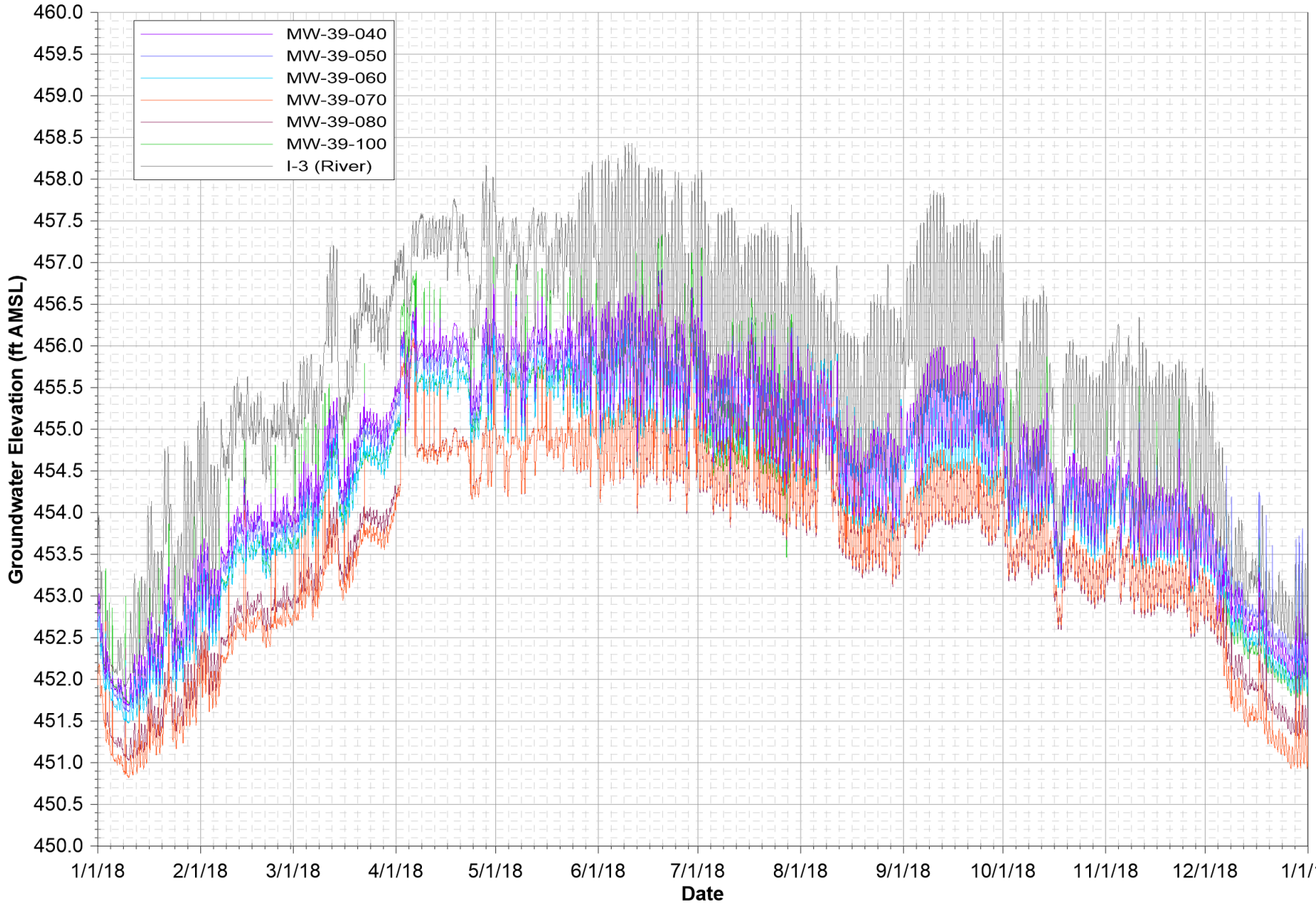
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-36-020 data unavailable from June 6, 2018 through August 2, 2018 and from November 5, 2018 through December 4, 2018 due to transducer malfunction.

FIGURE H-1K
MW-36 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

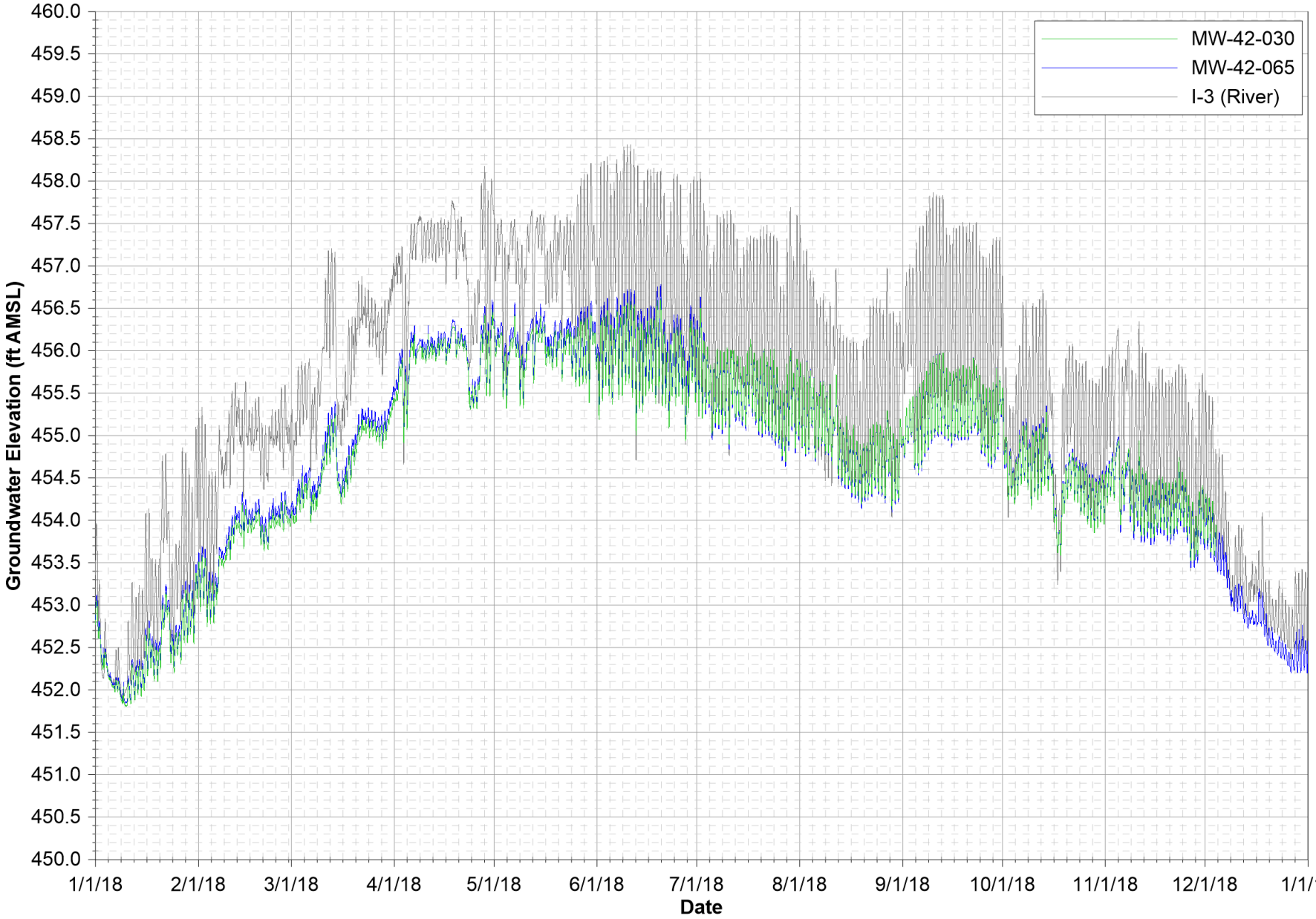
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-39-050 data unavailable from August 1, 2018 through October 2, 2018 due to transducer malfunction.
4. MW-39-100 data unavailable from July 30, 2018 through October 2, 2018 due to transducer malfunction.

FIGURE H-1L
MW-39 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

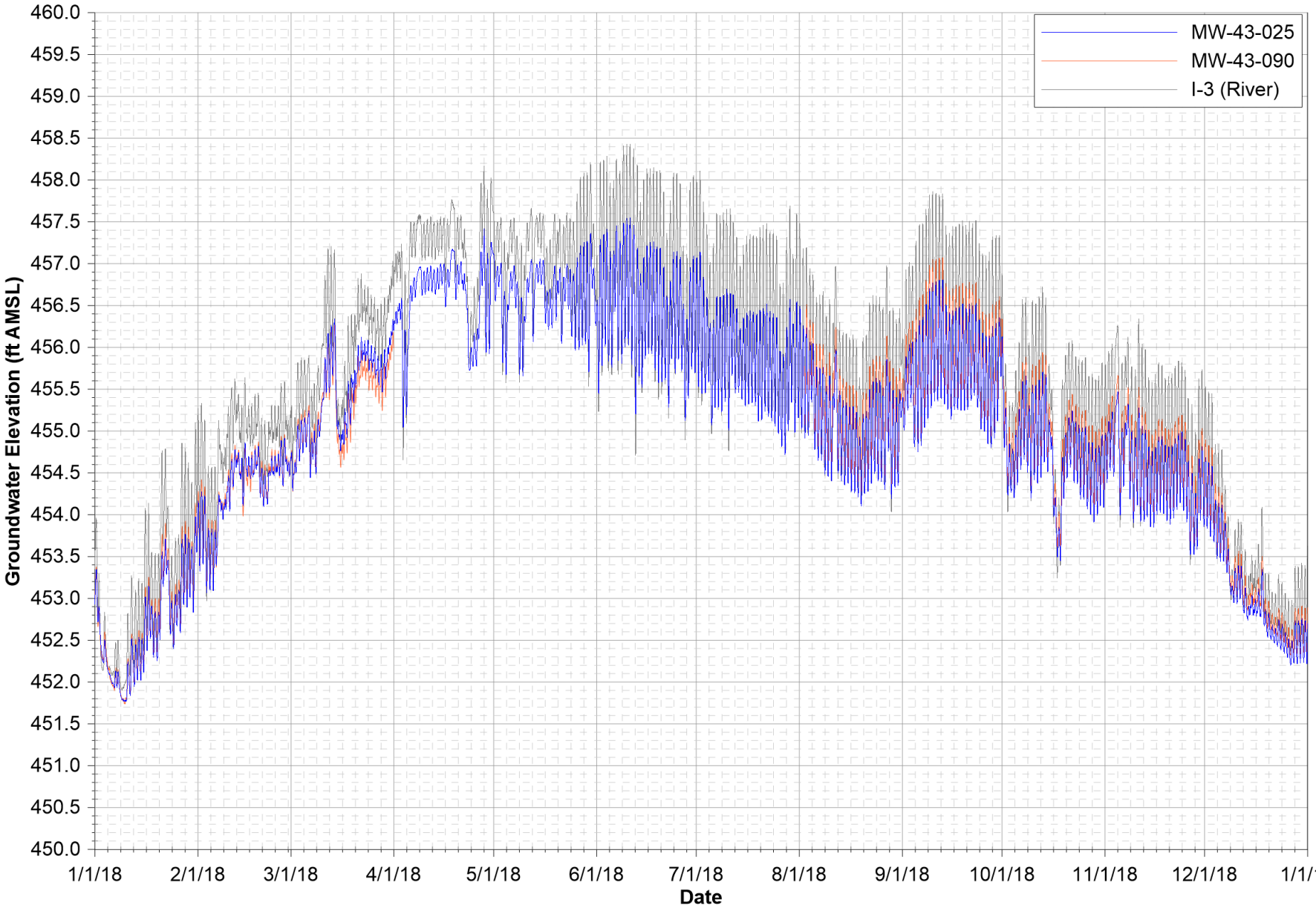


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-42-030 data unavailable from December 4, 2018 through December 31, 2018 due to transducer malfunction.

FIGURE H-1M
MW-42 CLUSTER HYDROGRAPHS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

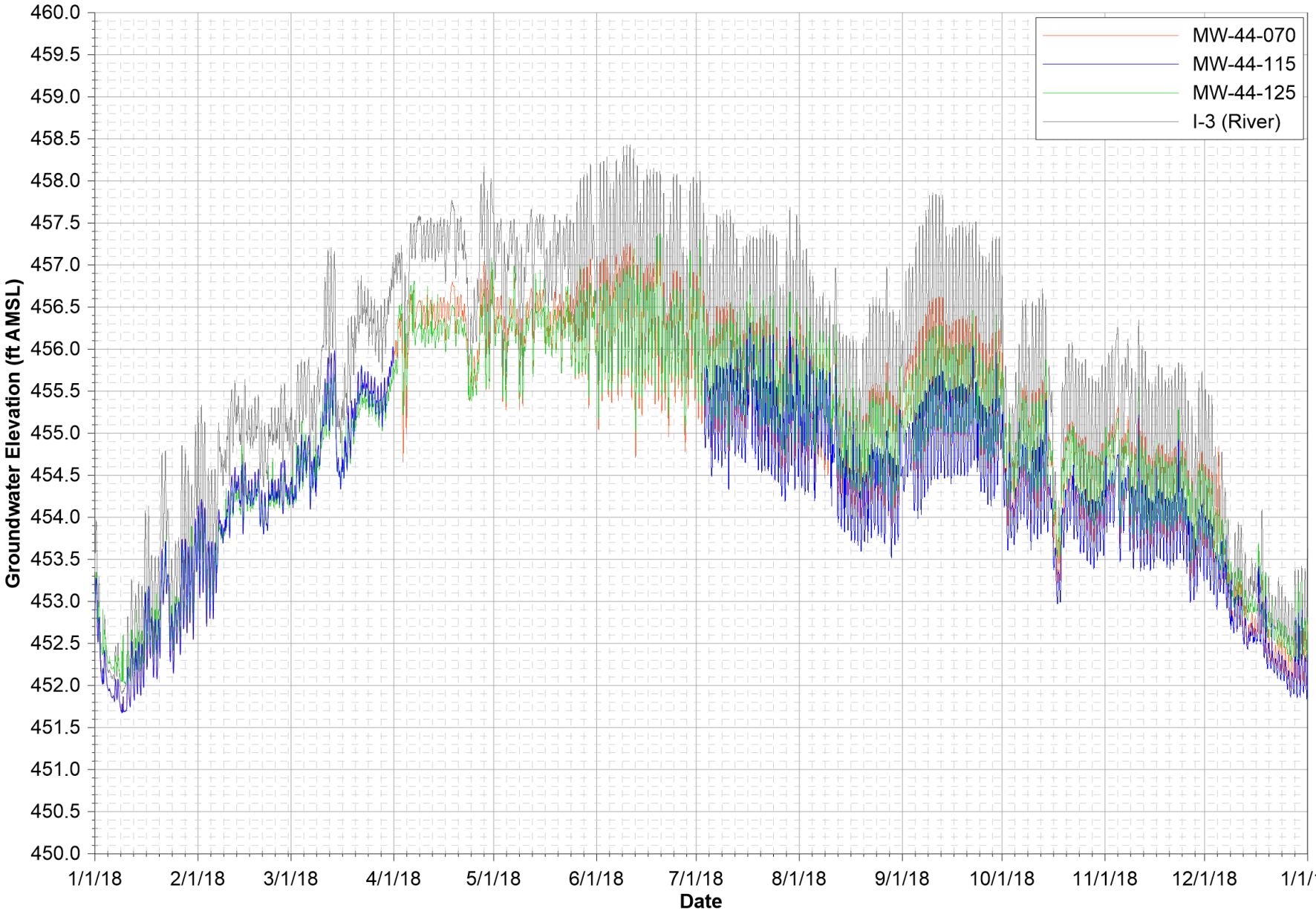


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-43-090 data unavailable from April 1, 2018 through August 2, 2018 due to transducer malfunction.

FIGURE H-1N
MW-43 CLUSTER HYDROGRAPHS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

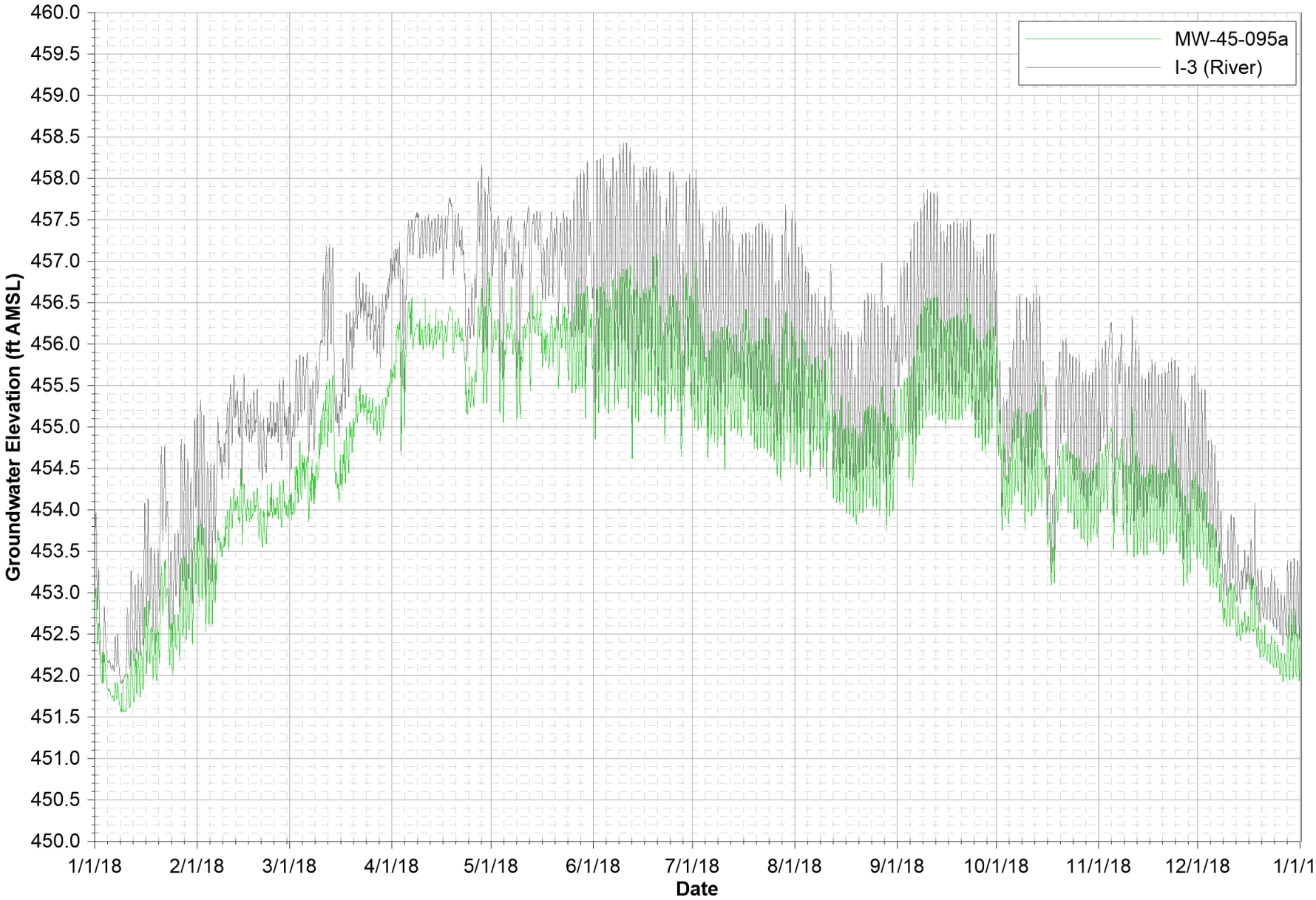
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-44-115 data unavailable from April 1, 2018 through July 3, 2018 due to transducer malfunction.

FIGURE H-1O
MW-44 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

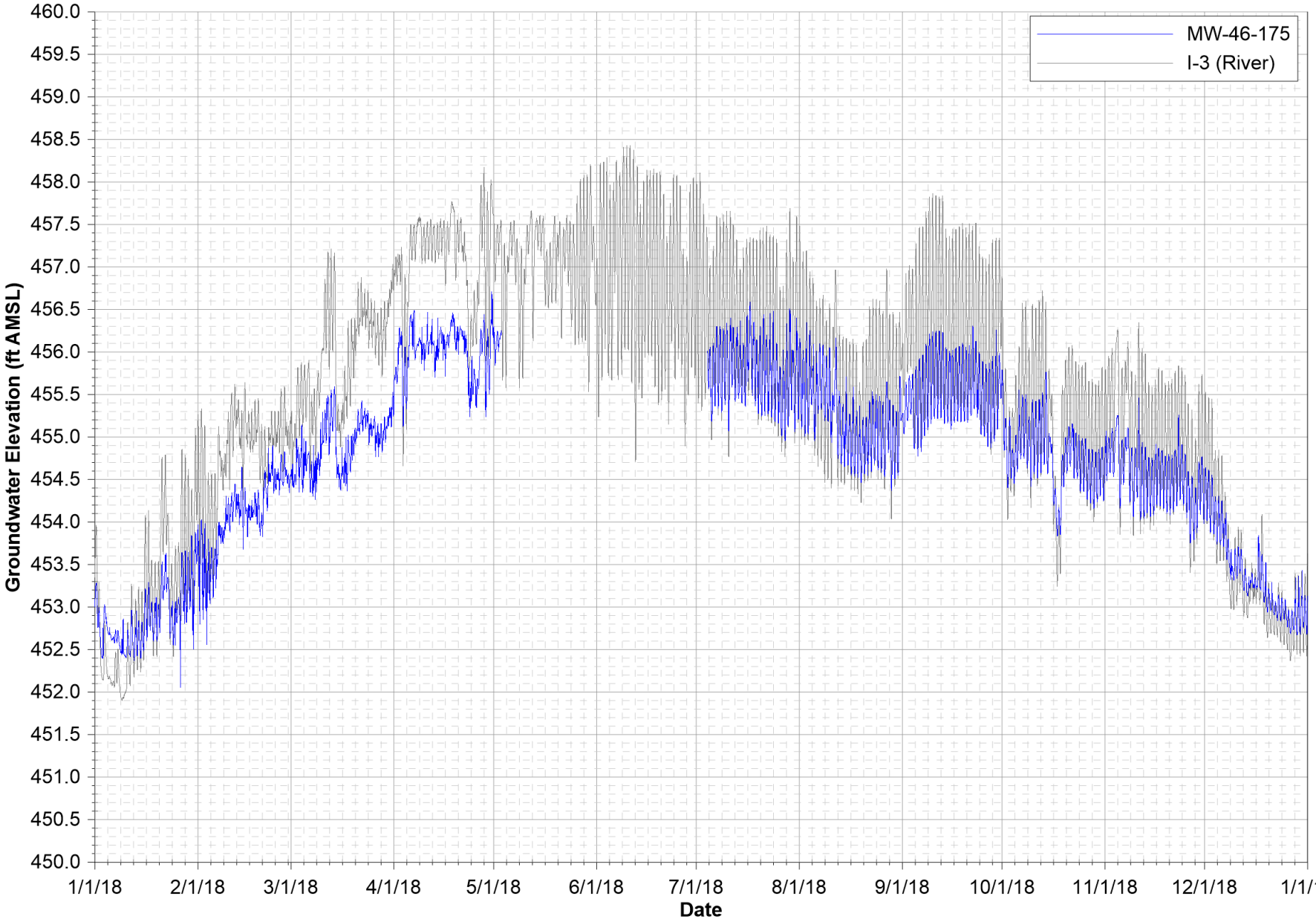
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE H-1P
MW-45-095a HYDROGRAPH
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

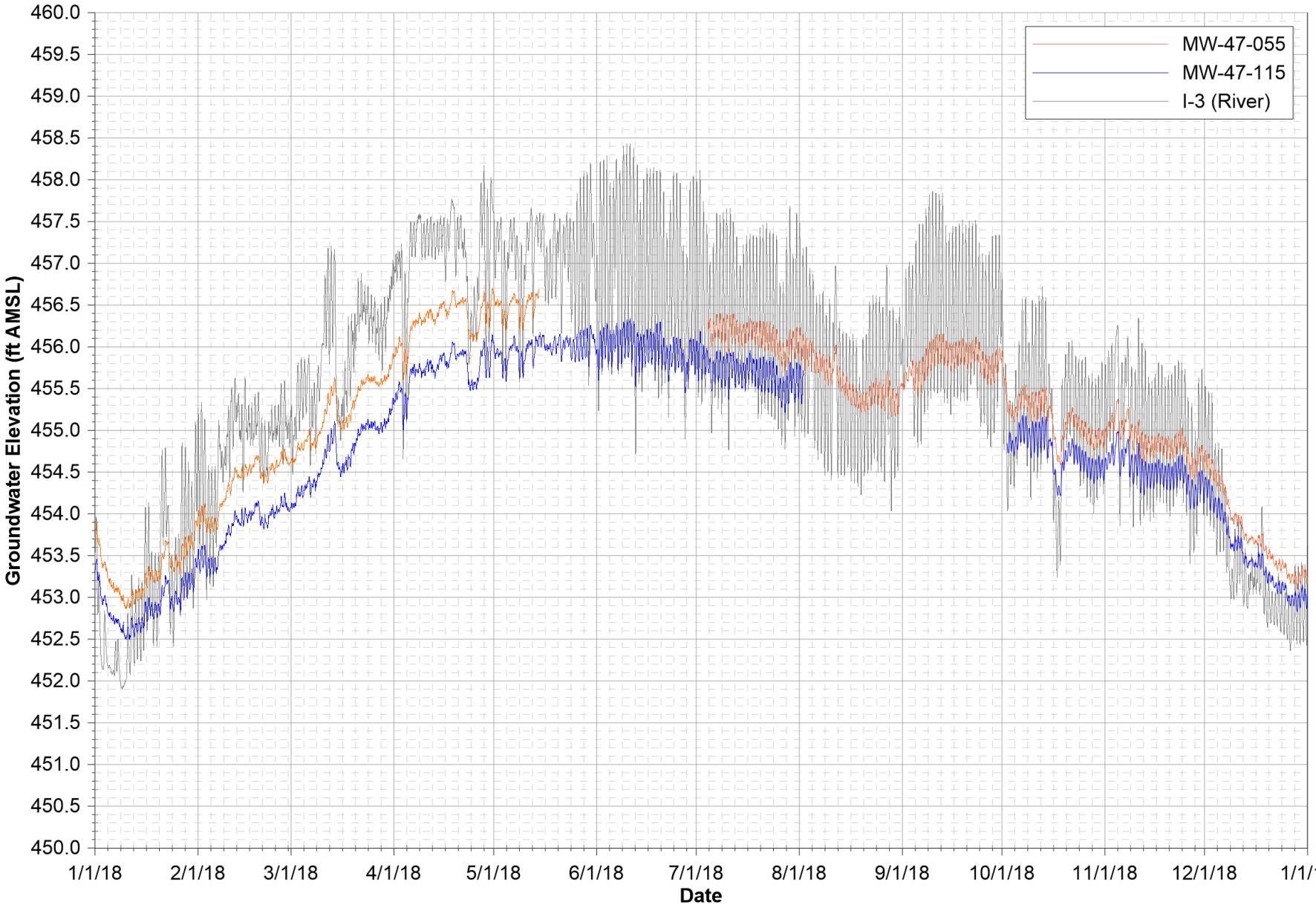
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-46-175 data unavailable from May 3, 2018 through July 4, 2018 due to transducer malfunction.

FIGURE H-1Q
MW-46 HYDROGRAPH
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

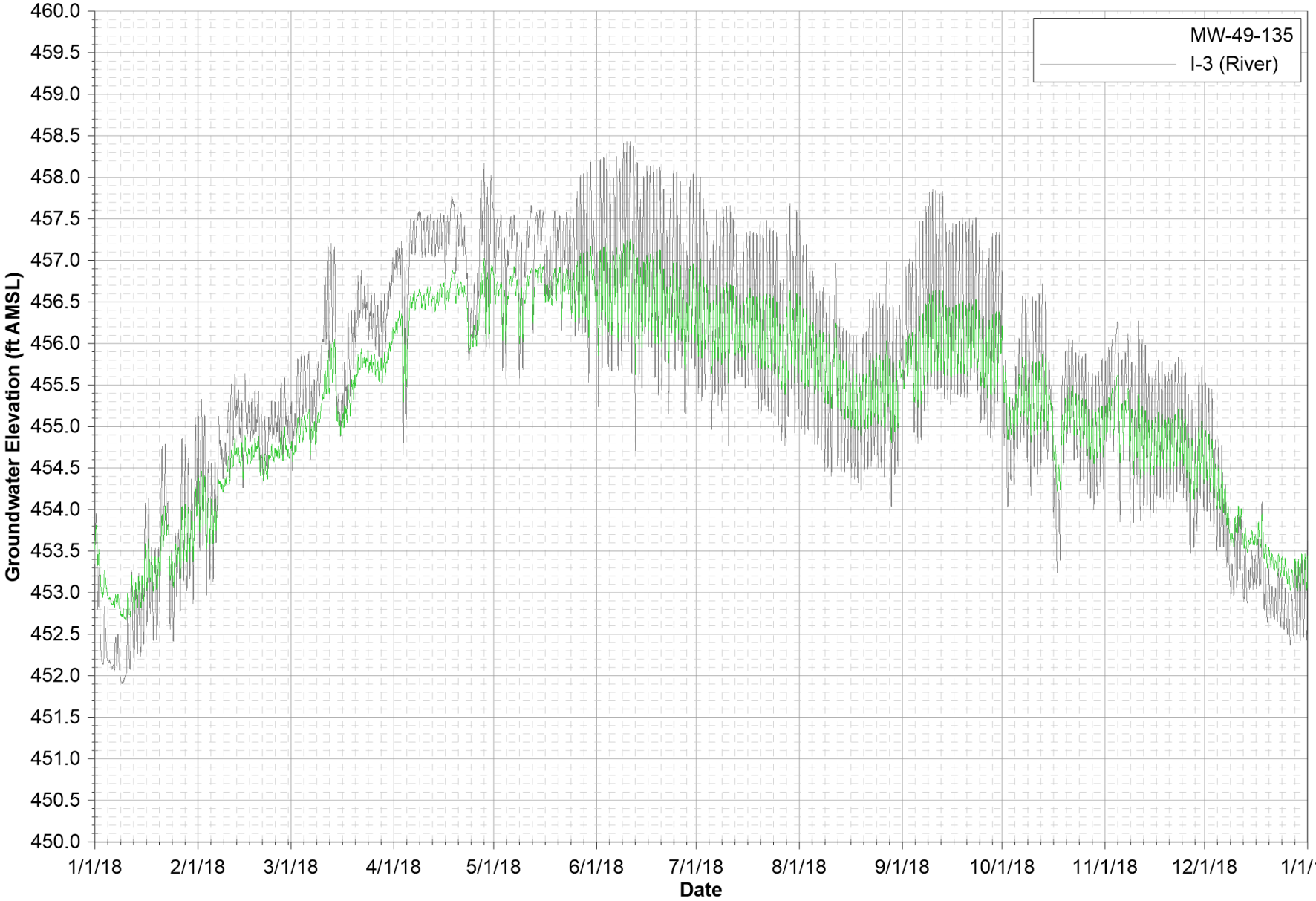
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-47-055 data unavailable from May 14, 2018 through July 4, 2018 due to transducer malfunction.
4. MW-47-115 data unavailable from August 2, 2018 through October 2, 2018 due to transducer malfunction.

FIGURE H-1R
MW-47 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

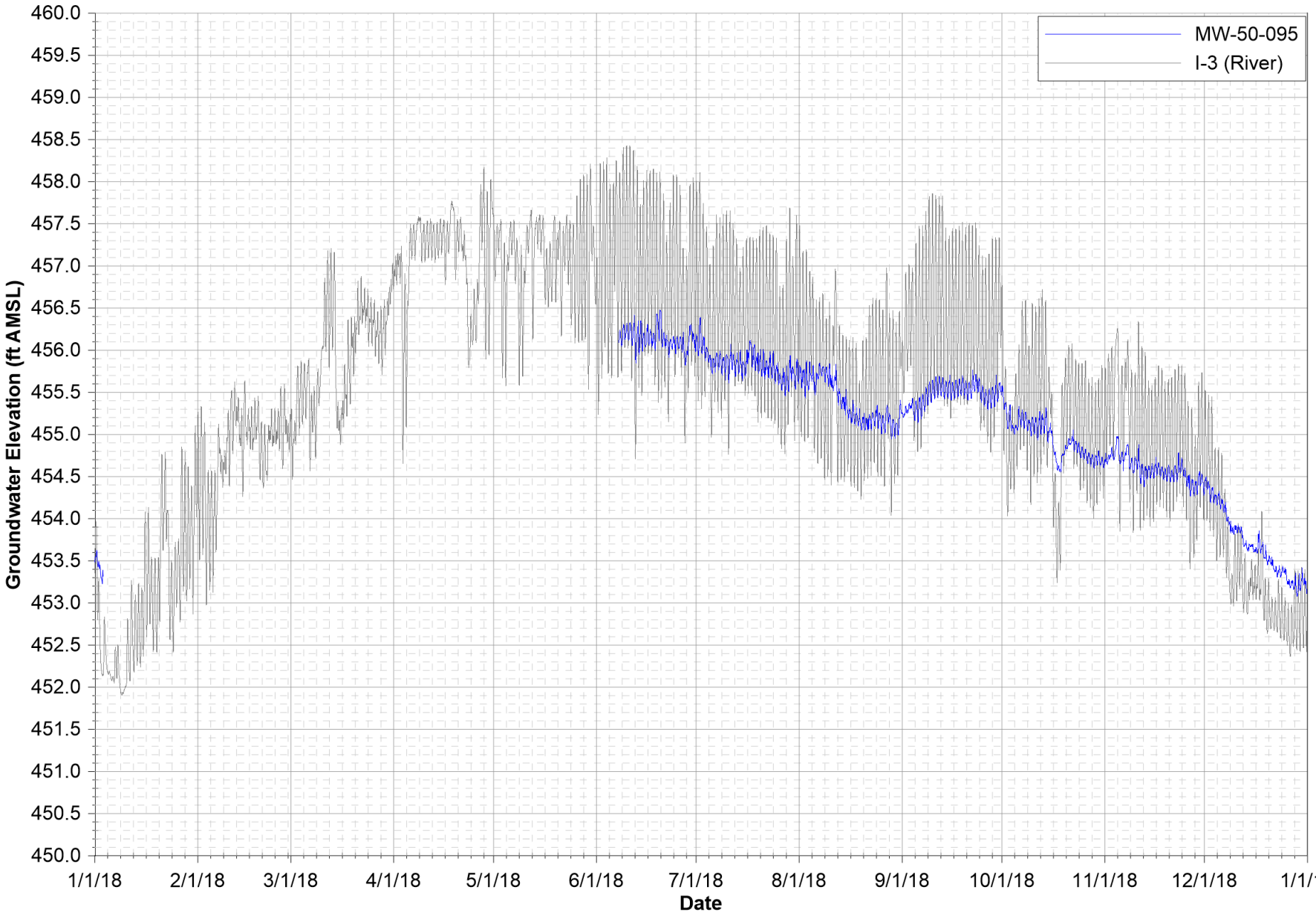
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE H-1S
MW-49 HYDROGRAPH
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS



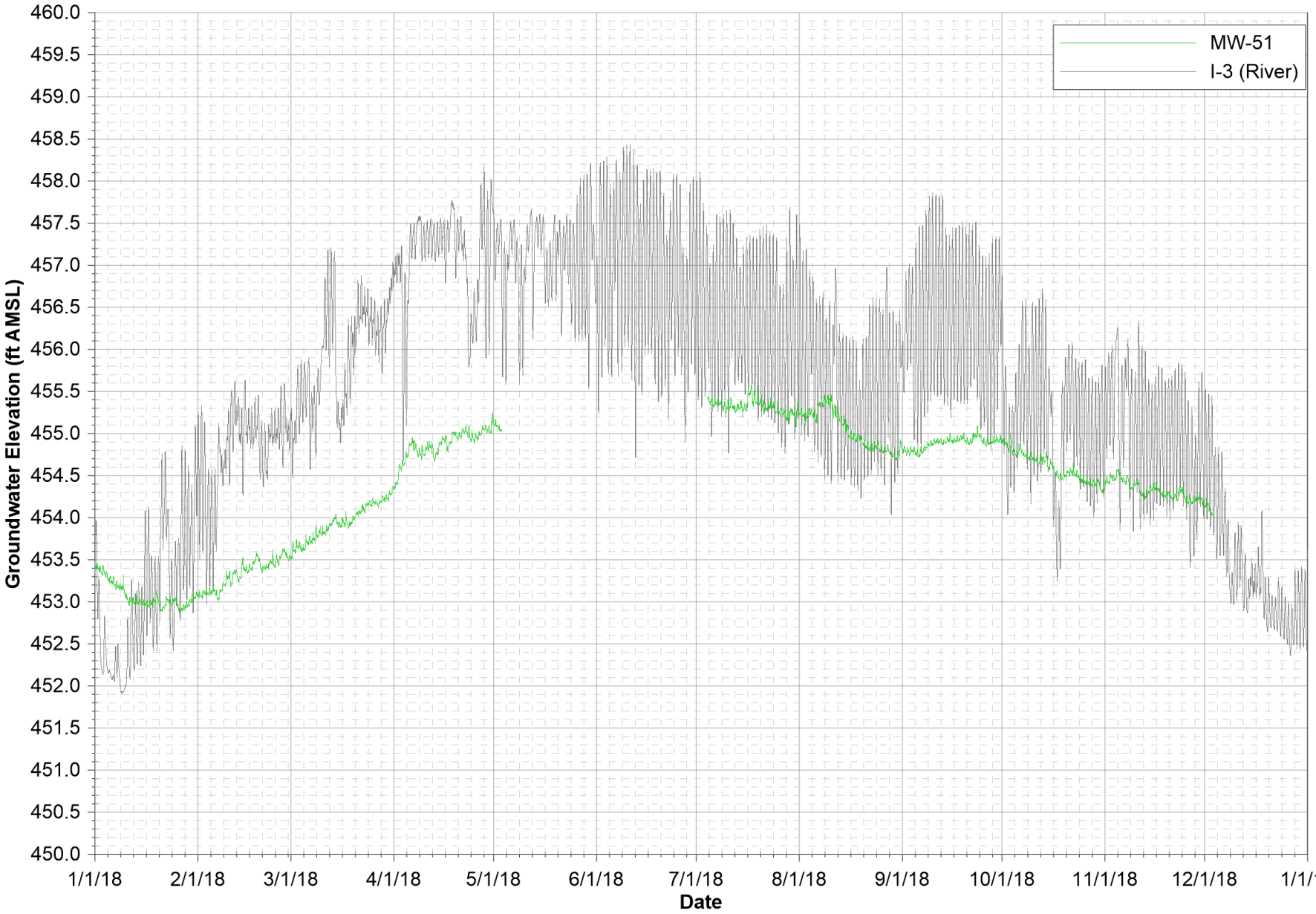
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-50-095 data unavailable from January 3, 2018 through June 7, 2018 due to transducer malfunction.

FIGURE H-1T

MW-50 HYDROGRAPH

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

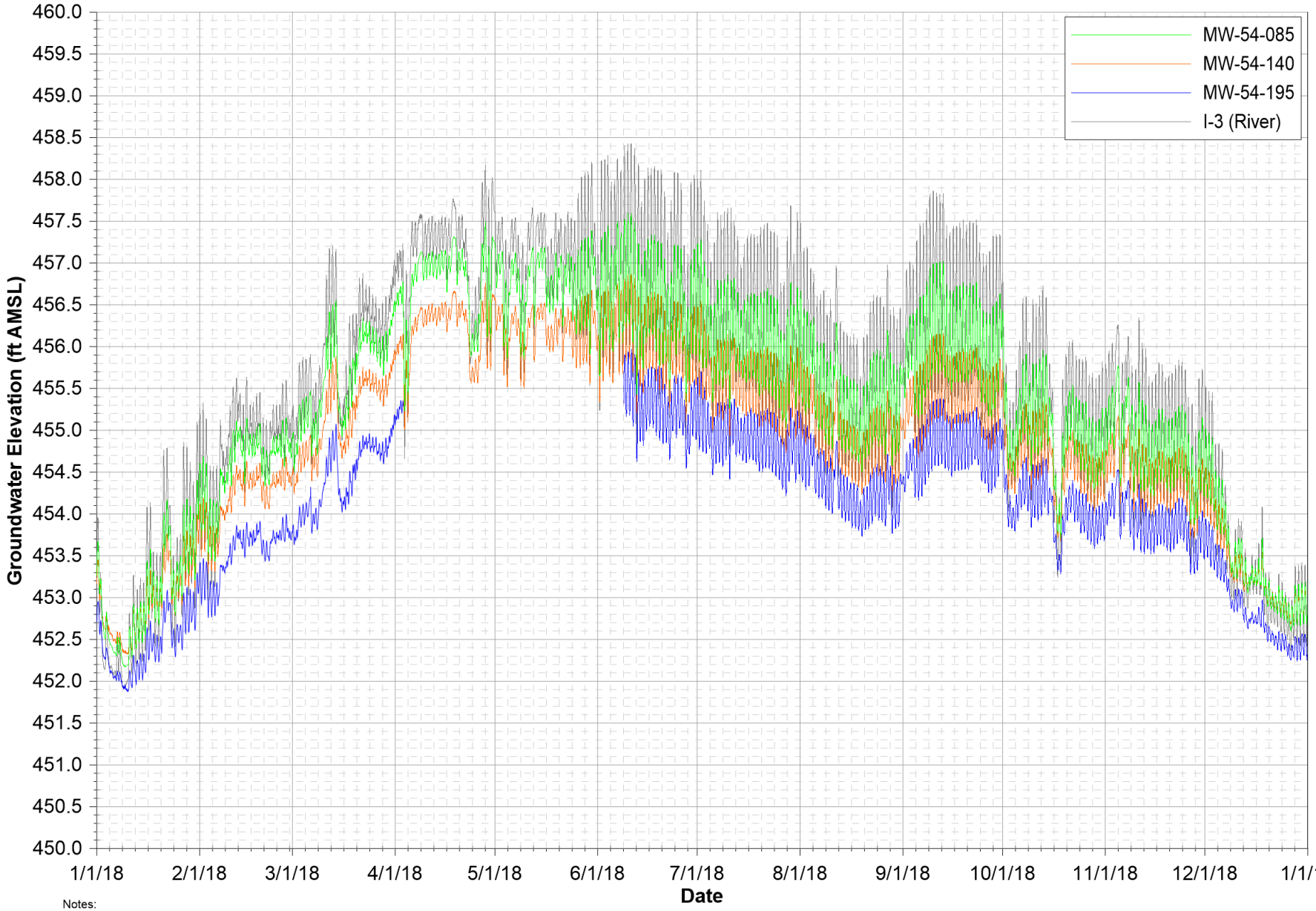
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-51 data unavailable from May 3, 2018 through July 4, 2018 and December 3, 21018 through December 31, 2018 due to transducer malfunction.

FIGURE H-1U
MW-51 HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

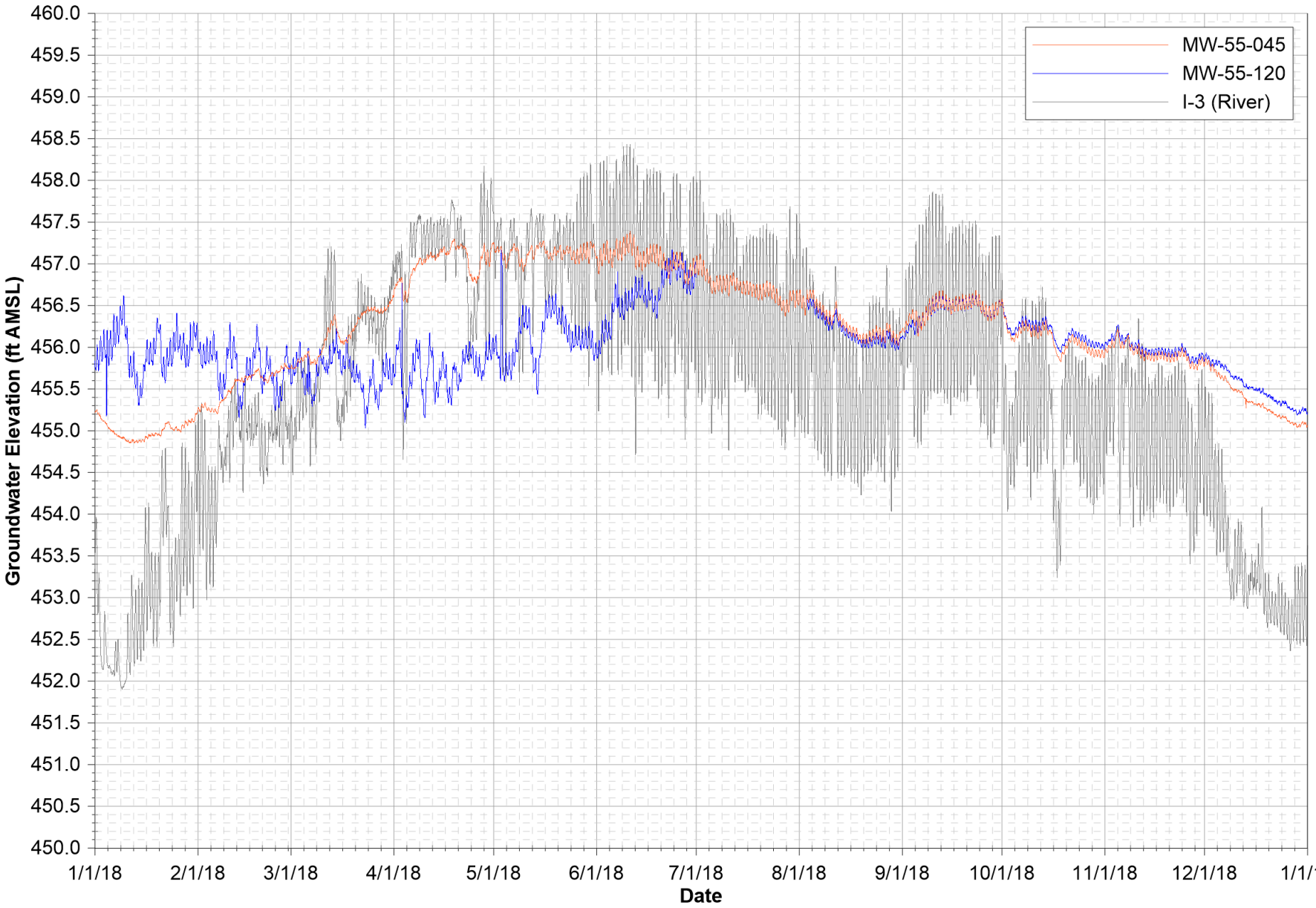
ARCADIS



Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-54-195 data unavailable from April 3, 2018 through June 8, 2018 due to transducer malfunction.

FIGURE H-1V
MW-54 CLUSTER HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

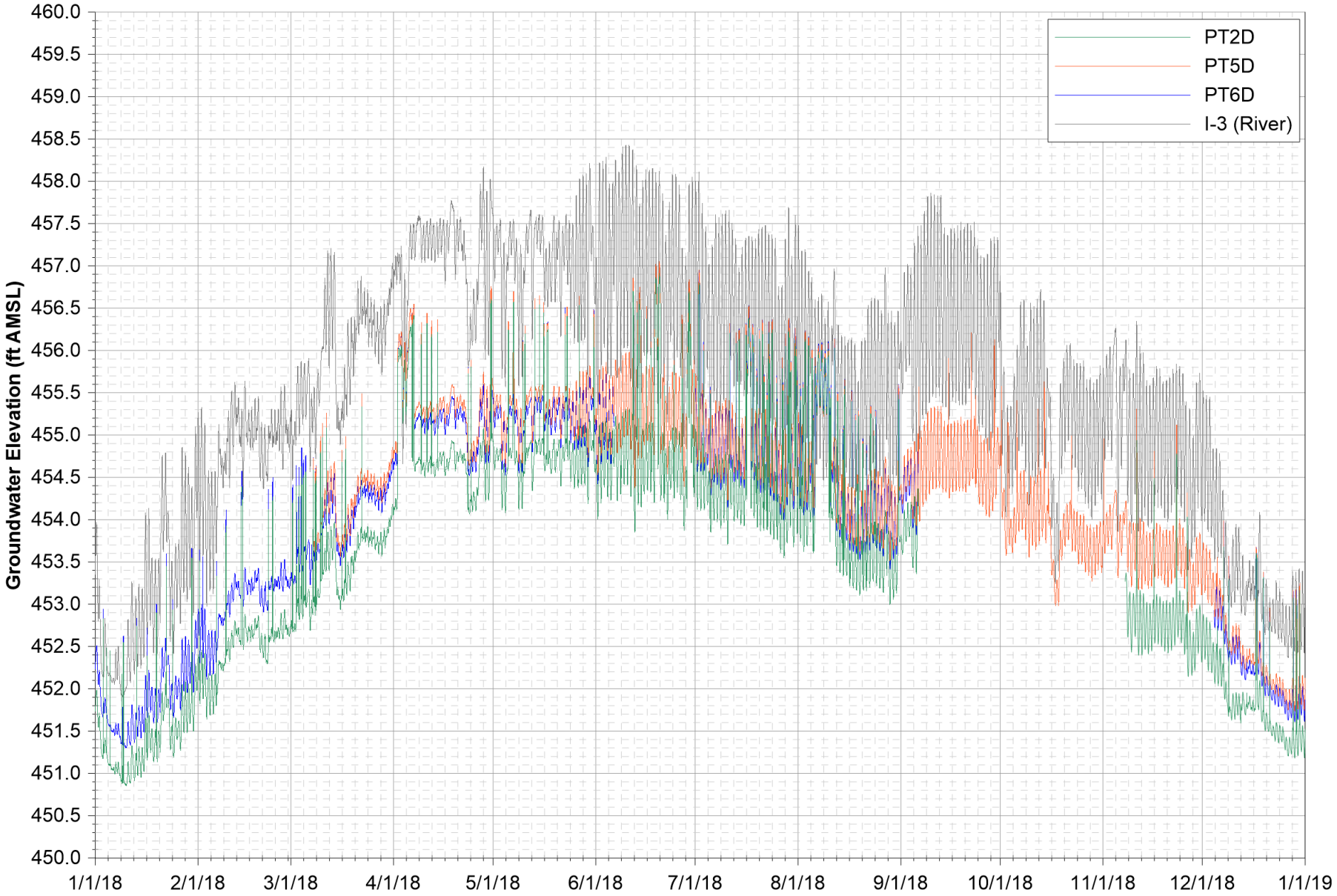


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-55-120 data unavailable from July 1, 2018 through August 3, 2018 due to transducer malfunction.

FIGURE H-1W
MW-55 CLUSTER HYDROGRAPHS

FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS



Note:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. PT2D data unavailable from September 6, 2018 through November 7, 2018 due to transducer malfunction.
4. PT5D data unavailable from January 1, 2018 through March 7, 2018 due to transducer malfunction.
5. PT6D data unavailable from June 6, 2018 through June 30, 2018 and September 6, 2018 through December 4, 2018 due to transducer malfunction.

FIGURE H-1X
INSITU PILOT STUDY WELL HYDROGRAPHS
FOURTH QUARTER 2018 AND ANNUAL INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

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APPENDIX I

Chemical Performance Monitoring Sampling Results, March 2005 through December 2018

Appendix I

Chemical Performance Monitoring Sampling Results, March 2005 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-20-070	SA	03/10/2005		3V	0.412	ND (1.0)	198	740	-59	55.4	--	-7.1	9.89	431	378	81.7	1,940
MW-20-070	SA	06/15/2005		3V	0.414	ND (1.0)	189	749	-60	55.4	--	-7	10.5	433	388	73.8	1,980
MW-20-070	SA	06/15/2005	FD	3V	0.445	ND (1.0)	204	760	-57	60.7	--	-8.3	11.4	468	392	71.3	2,050
MW-20-070	SA	10/11/2005		3V	0.402	0.641	198	737	-57	49.9	--	-7.2	14.6	323	359	69.9	1,950
MW-20-070	SA	12/15/2005		3V	0.441	ND (1.0)	138	645	-49	42.3	--	-7.1	14.5	267	326	77.8	1,830
MW-20-070	SA	03/10/2006		3V	0.427	ND (0.5)	161	679	-54	48.6	--	-7.2	9.22	424	358	82.2	1,940
MW-20-070	SA	05/05/2006		3V	0.476	0.574	162	696	-55.9	49.2	--	-8.2	9.55	461	376	74.5	1,750
MW-20-070	SA	10/03/2006		3V	0.535	ND (5.0)	158	677	-60.4	47.6	--	-8.1	9.82	472	357	85	1,890
MW-20-070	SA	10/03/2006	FD	3V	0.515	ND (5.0)	154	669	-60.5	45.9	--	-8.1	9.51	466	352	80	1,840
MW-20-070	SA	12/13/2006		3V	0.459	0.699	149	678	-61.2	44.3	--	-7.6	9.09	458	352	77.5	1,910
MW-20-070	SA	03/14/2007		3V	0.503	0.641	139	689	-64.3	42.2	--	-8.5	8.83	451	358	80	1,740
MW-20-070	SA	05/03/2007		3V	0.477	ND (1.0)	139	697	-66.7	41.2	--	-8.4	8.65	390	344	77.5	1,750
MW-20-070	SA	10/11/2007		3V	0.54	ND (1.0)	130	699	-63.9	39.1	--	-8.2	11	600	367	80	1,820
MW-20-070	SA	03/12/2008		3V	0.51	ND (1.0)	139	695	-65.2	41.2	--	-7.6	10.7	403	360	77	1,790
MW-20-070	SA	10/07/2008		3V	0.608	0.61	136	650	-64.4	37.9	--	-8.5	10.5	400	360	83	1,900
MW-20-070	SA	03/12/2009		3V	0.549	ND (1.0)	128	670	-60.82	40.2	--	-7.74	9.95	496	330	79	1,900
MW-20-070	SA	09/25/2009		3V	0.42	ND (2.5)	130	700	-66.43	33	--	-8.7	9.7	390	310	74	1,700
MW-20-070	SA	12/16/2010		3V	0.51	0.51	130	680	-62.3	33	--	-7.5	12	400	320	79	1,700
MW-20-070	SA	12/07/2011		3V	--	ND (0.5)	100	540	-61.9	25	--	-7.9	--	380	330	71	1,400
MW-20-070	SA	10/04/2012		3V	--	--	76.2	430	--	22.9	--	--	--	346	290	--	--
MW-20-070	SA	10/04/2012		H	--	--	71.1	420	--	19.9	--	--	--	327	280	--	--
MW-20-070	SA	10/04/2012		LF	--	--	72.7	430	--	20.9	--	--	--	342	270	--	--
MW-20-070	SA	11/27/2012		3V	0.484	ND (0.5)	79.2	450	-62.6	22.2	10.6	-7.8	8.07	350	290	89	1,400
MW-20-070	SA	11/27/2012		H	--	--	72.2	430	--	19.6	9.57	--	--	338	300	94	--
MW-20-070	SA	11/27/2012		LF	--	--	74.1	440	--	21.6	9.75	--	--	338	300	91	--
MW-20-070	SA	03/12/2013		3V	--	--	82.8	440	--	22.3	8.6	--	--	358	290	87	--
MW-20-070	SA	03/12/2013		H	--	--	65.5	380	--	16.1	7.54	--	--	336	270	100	--
MW-20-070	SA	03/12/2013		MPP	--	--	77.3	420	--	19.4	8.14	--	--	344	280	90	--
MW-20-070	SA	05/09/2013		3V	--	--	--	--	--	--	10.1 J	--	--	--	--	--	--
MW-20-070	SA	12/11/2013		3V	0.51	ND (0.5)	70	390	-63.88	17	8.05	-8.12	15	580	260	91	1,200
MW-20-070	SA	05/07/2014		3V	--	--	--	--	--	--	7.15	--	--	--	--	--	--
MW-20-070	SA	12/15/2014		LF	0.43	ND (0.5)	49	330	-63.1	12	7.7	-8.07	4.4	310	230	100	1,100
MW-20-070	SA	05/19/2015		LF	--	--	--	--	--	--	7.9	--	--	--	--	--	--
MW-20-070	SA	05/19/2015	FD	LF	--	--	--	--	--	--	7.6	--	--	--	--	--	--
MW-20-070	SA	12/08/2015		LF	0.52	ND (1.0)	54	320	-61.7815	13	7.0	-7.97973	4.8	300	220	100	1,000
MW-20-070	SA	04/27/2016		LF	--	--	--	--	--	--	8.5	--	--	--	--	--	--
MW-20-070	SA	12/09/2016		LF	0.41	ND (0.5)	52 J	360	-61.8873	14 J	8.0	-7.85368	5.3	340	240	100	1,100
MW-20-070	SA	04/27/2017		LF	--	--	--	--	--	--	8.8	--	--	--	--	--	--
MW-20-070	SA	12/07/2017		LF	0.5	ND (0.5 J)	54	390	-60.7979	13	9.0	-7.97363	5.2	310	240	100	1,100
MW-20-070	SA	04/27/2018		LF	--	--	--	--	--	--	9.4	--	--	--	--	--	--
MW-20-070	SA	12/11/2018		LF	0.47	ND (0.5)	63	370	-61.33	16	2.8	-8.17	5.9	320	240	100	1,100
MW-20-070	SA	12/11/2018	FD	LF	0.47	ND (0.5)	65	360	-62.93	16	4.7	-8.33	6.0	340	240	100	1,100
MW-20-100	MA	03/10/2005		3V	0.859	ND (1.0)	133	466	-49	19.8	--	-5.2	8.98	712	511	84.2	2,490
MW-20-100	MA	06/15/2005		3V	0.713	ND (1.0)	137	921	-46	21.3	--	-4.7	9.06	592	506	84	2,500
MW-20-100	MA	10/11/2005		3V	0.718	0.731	170	887	-48	23.7	--	-5.3	15.2	500	484	82.3	2,400
MW-20-100	MA	12/15/2005		3V	0.709	ND (1.0)	136	813	-40	21.4	--	-5.4	14.8	406	404	82.7	2,340
MW-20-100	MA	03/10/2006		3V	0.803	ND (0.5)	171	861	-50.3	27	--	-5.6	7.75	597	475	92.5	2,500
MW-20-100	MA	05/05/2006		3V	0.716	ND (1.0)	193	927	-46.4	32	--	-5.1	10.8	577	522	82.5	2,260
MW-20-100	MA	10/03/2006		3V	0.874	ND (5.0)	202	863	-51.5	34.4	--	-5.8	10.9 J	568	456	90	2,320
MW-20-100	MA	12/13/2006		3V	0.889	0.83	205	861	-54.4	32.2	--	-6.2	11.4	579	459	97.5	1,960
MW-20-100	MA	12/13/2006	FD	3V	0.881	0.851	205	874	-54.5	32.2	--	-6.2	9.55	575	457	92.5	2,200

Appendix I

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Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-20-100	MA	03/14/2007		3V	0.715	0.785	194	847	-57.8	31.7	--	-6.8	9.9	521	477	87.5	2,180
MW-20-100	MA	05/03/2007		3V	0.699	ND (1.0)	209	879	-59.2	36	--	-7.3	12 J	559	493	87.5	2,300
MW-20-100	MA	05/03/2007	FD	3V	0.686	ND (1.0)	208	888	-59.3	34.6	--	-6.7	9.63 J	532	484	87.5	2,330
MW-20-100	MA	10/10/2007		3V	0.81	ND (1.0)	190	858	-57.2	32	--	-7.2	15	560	468	92	2,160
MW-20-100	MA	03/12/2008		3V	0.702	ND (1.0)	218	827	-58.3	35.4	--	-6.9	11.9	469	442	870	2,470
MW-20-100	MA	10/08/2008		3V	0.669	ND (1.0)	215	760	-60.2	36.8	--	-7.9	10.3	453	420	90	2,200
MW-20-100	MA	03/13/2009		3V	0.89	ND (1.0)	213	770	-58.2	36.4	--	-7.08	11.6	543	420	97	2,200
MW-20-100	MA	09/25/2009		3V	0.7	ND (2.5)	200	750	-62.84	30	--	-7.67	12	430	400	89	2,000
MW-20-100	MA	02/10/2011		3V	0.81	0.57	180	610	-58.8	28	--	-7	14	400	380	120	1,800
MW-20-100	MA	12/08/2011		3V	--	ND (0.5)	170	580	-55.6	25	--	-6.7	--	390	380	120	1,700
MW-20-100	MA	10/04/2012		3V	--	--	157	570	--	27.8	--	--	--	400	390	--	--
MW-20-100	MA	10/04/2012		H	--	--	157	530	--	26.8	--	--	--	382	380	--	--
MW-20-100	MA	10/04/2012		LF	--	--	152	530	--	26.5	--	--	--	374	380	--	--
MW-20-100	MA	11/29/2012		3V	0.952	ND (0.5)	149	570	-56.6	30.6	12.9	-7	9.64	376	350	110	1,700
MW-20-100	MA	11/29/2012		H	--	--	142	530	--	25.2	14.2	--	--	350	360	99	--
MW-20-100	MA	11/29/2012		LF	--	--	142	540	--	25.2	14.1	--	--	374	350	100	--
MW-20-100	MA	03/13/2013		3V	--	--	164	560	--	27.8	6.27	--	--	388	370	120	--
MW-20-100	MA	03/13/2013		H	--	--	150	510	--	25.2	6.34	--	--	357	350	100	--
MW-20-100	MA	03/13/2013		MPP	--	--	155	500	--	25.7	6.5	--	--	365	360	110	--
MW-20-100	MA	05/09/2013		3V	--	--	--	--	--	--	14 J	--	--	--	--	--	--
MW-20-100	MA	12/11/2013		3V	1.0	ND (0.5)	140	550	-55.86	23	9.5	-7.46	8.2	400	290	110	1,600
MW-20-100	MA	05/07/2014		3V	--	--	--	--	--	--	11.1	--	--	--	--	--	--
MW-20-100	MA	12/15/2014		LF	0.76	ND (0.5)	120	530	-60.2	18	8.9	-7.62	6.4	340	260	120	1,500
MW-20-100	MA	05/19/2015		LF	--	--	--	--	--	--	9.6	--	--	--	--	--	--
MW-20-100	MA	12/08/2015		LF	0.92	ND (1.0)	120	510	-60.1171	20	7.3	-7.60373	7.0	340	240	110	1,300
MW-20-100	MA	04/27/2016		LF	--	--	--	--	--	--	8.6	--	--	--	--	--	--
MW-20-100	MA	12/09/2016		LF	0.83	0.62	110 J	500	-61.9035	19 J	8.1	-7.9278	7.2	330	250	130	1,300
MW-20-100	MA	04/27/2017		LF	--	--	--	--	--	--	8.7	--	--	--	--	--	--
MW-20-100	MA	12/08/2017		LF	0.88	0.57	110	480	-61.072	18	8.3	-8.08216	6.9	310	240	120 J	1,300
MW-20-100	MA	12/08/2017	FD	LF	0.9	0.58	110	490	-60.7743	18	8.4	-8.10333	7.0	320	270	92 J	1,300
MW-20-100	MA	04/27/2018		LF	--	--	--	--	--	--	8.7	--	--	--	--	--	--
MW-20-100	MA	12/04/2018		LF	0.9	0.66	110	450	-63.4	19	6.4	-8.31	6.8	340	240	130	1,300
MW-20-130	DA	03/02/2005		G	--	--	--	--	--	--	--	--	--	--	--	--	5,270 J
MW-20-130	DA	03/09/2005		3V	1.9	ND (1.0)	219	3,120	-56	12.1	--	-5.8	24.7	2,250	1,080	68.9	5,520
MW-20-130	DA	03/09/2005	FD	3V	1.99	ND (1.0)	231	3,080	-51	12.8	--	-5.4	25.4	2,390	1,080	68.9	6,200
MW-20-130	DA	06/15/2005		3V	2.75	ND (1.0)	352	3,410	-48	23.2	--	-5	31.3	2,980	1,230	68.7	7,790
MW-20-130	DA	10/07/2005		3V	2.41	1.04 J	349	3,010	-47	13.9	--	-5	38.4	2,070	1,210	72.4	7,330
MW-20-130	DA	12/16/2005		3V	1.98	ND (2.5)	324	3,260	-43	16.3	--	-5.8	44.4	1,780	1,000	63.2	7,860
MW-20-130	DA	03/10/2006		3V	2.03	ND (0.5)	312	3,370	-48.8	18.9	--	-5.5	27.7	2,730	1,250	74.5	8,610
MW-20-130	DA	05/05/2006		3V	2.4	ND (1.0)	349	3,900	-47.2	20.3	--	-5.3	27.7	2,810	1,280	69.2	7,700
MW-20-130	DA	10/18/2006		3V	2.28	ND (5.0)	358	3,680	-51.4	20.9	--	-6.3	28	2,870	1,100	70	8,450
MW-20-130	DA	12/13/2006		3V	2.31	0.896	335	3,970	-54.9	19.7	--	-6	27.6	2,900	1,250	72.5	7,890
MW-20-130	DA	12/13/2006	FD	3V	2.24	1.09	328	3,950	-54.4	19.1	--	-5.9	27.3	2,830	1,260	72.5	8,250
MW-20-130	DA	03/08/2007		3V	2.24	1.08	353	3,930	-57.7	21.3	--	-6.5	27	2,760	1,240	70	8,450
MW-20-130	DA	03/08/2007	FD	3V	2.19	1.06	351	3,900	-57.4	21.3	--	-6.6	26.8	2,750	1,210	72.5	8,510
MW-20-130	DA	05/03/2007		3V	2.49	ND (1.0)	338	4,020	-60	22.5	--	-7.7	27.8	2,550	1,310	75	8,150
MW-20-130	DA	05/03/2007	FD	3V	2.47	ND (1.0)	338	3,950	-60.1	21.9	--	-6.9	27.3	2,550	1,290	72.5	8,100
MW-20-130	DA	10/05/2007		3V	2.4	ND (1.0)	310	3,670	-57.5	19	--	-7	31	2,900	1,070	77	7,980
MW-20-130	DA	03/12/2008		3V	2.07	ND (1.0)	342	3,690	-58.7	23.4	--	-6.2	47	2,260	1,220	75	8,460
MW-20-130	DA	10/08/2008		3V	2.23	ND (2.5)	329	3,500	-59.6	22	--	-7.3	40.1	1,990	1,200	81	7,800
MW-20-130	DA	03/13/2009		3V	2.16	ND (2.5)	350	3,600	-56.41	22.7	--	-6.58	41.4	2,550	1,100	79	8,100

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Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-20-130	DA	09/25/2009		3V	2.0	ND (2.5)	280	3,500	-61.74	17	--	-7.59	33	2,400	1,100	76	6,500
MW-20-130	DA	02/10/2011		3V	2.2	1.0	310	3,100	-59	18	--	-6.6	50	2,100	1,100	80	5,900
MW-20-130	DA	12/09/2011		3V	2.4	ND (2.5)	340	3,300	-57.2	22	--	-6.6	33	2,400	1,200	74	6,200
MW-20-130	DA	10/09/2012		3V	--	--	283	3,200	--	19.1	--	--	--	2,140	1,100	79	--
MW-20-130	DA	10/09/2012		H	--	--	282	2,700	--	23.6	--	--	--	1,890	1,100	86	--
MW-20-130	DA	10/09/2012		LF	--	--	294	2,400	--	25.8	--	--	--	1,630	1,100	92	--
MW-20-130	DA	11/29/2012		3V	2.13	ND (2.5)	286	3,300	-59.5	24	14.1	-6.6	32.7	2,310	1,100	80	7,400
MW-20-130	DA	11/29/2012		H	--	--	281	--	--	26.2	17.9	--	--	1,970	--	--	--
MW-20-130	DA	11/29/2012		LF	--	--	280	2,400	--	28.7	19.4	--	--	1,750	1,000	98	--
MW-20-130	DA	11/29/2012	FD	3V	2.06	ND (2.5)	284	3,400	-60.4	24.2	14.1	-6.6	32.9	2,410	1,100	79	7,400
MW-20-130	DA	11/29/2012	FD	H	--	--	293	--	--	26.3	17.7	--	--	1,940	--	--	--
MW-20-130	DA	11/29/2012	FD	LF	--	--	315	2,400	--	29.2	18.6	--	--	1,780	1,000	96	--
MW-20-130	DA	12/12/2012		H	--	--	--	3,000	--	--	--	--	--	--	1,100	83	--
MW-20-130	DA	12/12/2012	FD	H	--	--	--	3,000	--	--	--	--	--	--	1,100	81	--
MW-20-130	DA	03/14/2013		3V	--	--	311	3,400	--	21.7	6.32	--	--	2,260	1,100	76	--
MW-20-130	DA	03/14/2013		H	--	--	315	3,000	--	25	6.9	--	--	2,100	1,100	100	--
MW-20-130	DA	03/14/2013		MPP	--	--	331	2,600	--	30.9	7.91	--	--	1,760	1,000	90	--
MW-20-130	DA	05/14/2013		3V	--	--	--	--	--	--	13	--	--	--	--	--	--
MW-20-130	DA	12/17/2013		3V	2.3	ND (1.0)	330	3,200	-57.69	22	12.4	-6.4	26	2,300	1,100	80	7,400
MW-20-130	DA	12/17/2013	FD	3V	2.7	ND (1.0)	330	3,200	-59.15	21	12.9	-6.52	27	2,400	1,100	78	7,300
MW-20-130	DA	05/12/2014		3V	--	--	--	--	--	--	12.9	--	--	--	--	--	--
MW-20-130	DA	12/15/2014		LF	1.9	ND (2.5)	310	2,800	-59.6	21	14	-6.7	24	1,800	1,100	85	6,900
MW-20-130	DA	12/15/2014	FD	LF	1.8	ND (2.5)	290	2,900	-59.6	20	15	-6.76	21	1,700	1,100	85	6,800
MW-20-130	DA	05/19/2015		LF	--	--	--	--	--	--	14	--	--	--	--	--	--
MW-20-130	DA	12/08/2015		LF	2.5	ND (2.5)	320	3,300	-58.0354	19	12	-6.41678	25	2,400	1,000	76	7,100
MW-20-130	DA	12/08/2015	FD	LF	2.6	ND (2.5)	320	3,100	-58.2233	19	13	-6.62848	25	2,400	1,100	80	6,600
MW-20-130	DA	04/27/2016		LF	--	--	--	--	--	--	10	--	--	--	--	--	--
MW-20-130	DA	12/09/2016		LF	2.3	ND (2.5)	260 J	3,400	-60.0955	16 J	12	-6.88176	30	2,600	1,100	77	7,000
MW-20-130	DA	12/09/2016	FD	LF	2.4	ND (2.5)	250 J	3,400	-60.3119	14 J	11	-6.81648	31	2,700	1,100	79	7,100
MW-20-130	DA	04/27/2017		LF	--	--	--	--	--	--	11	--	--	--	--	--	--
MW-20-130	DA	04/27/2017	FD	LF	--	--	--	--	--	--	11	--	--	--	--	--	--
MW-20-130	DA	12/07/2017		LF	2.1	ND (2.5)	240	2,500	-58.7852	22	15	-6.81531	22	1,600	1,000	98	5,500
MW-20-130	DA	04/27/2018		LF	--	--	--	--	--	--	11	--	--	--	--	--	--
MW-20-130	DA	12/04/2018		LF	2.3	ND (2.5)	280	3,000	-59.85	18	8.8	-7.2	27	2,200	990	85	6,400
MW-25	SA	03/09/2005		3V	0.441	ND (0.5)	77.6	247	-62	16.1	--	-8.4	6.24	211	169	158	877
MW-25	SA	06/14/2005		3V	0.464	ND (0.5)	93.5	289	-61	20	--	-8.6	8.91	253	183	137	942
MW-25	SA	06/14/2005	FD	3V	0.475	ND (0.5)	100	294	-59	20.9	--	-7.2	9.06	268	185	137	980
MW-25	SA	10/04/2005		3V	0.362	ND (0.5)	83.3	252	-68	14.9	--	-8.2	9.93	164	171	141	950
MW-25	SA	10/04/2005	FD	3V	0.371	ND (0.5)	94.6	251	-60	15.3	--	-8.3	10.2	185	171	146	910
MW-25	SA	12/14/2005		3V	0.396	ND (0.5)	75.5	224	-55	14.5	--	-8.4	9.8	143	158	153	838
MW-25	SA	12/14/2005	FD	3V	0.382	ND (0.5)	73	219	-50	14.1	--	-8.4	9.71	151	155	156	896
MW-25	SA	03/09/2006		3V	0.39	ND (0.5)	76.4	245	-64.1	15.6	--	-8.4	6.97	210	164	170	910
MW-25	SA	05/03/2006		3V	0.418	ND (0.5)	78	272	-59.4	17.3	--	-9	7.38	222	172	150	907
MW-25	SA	05/03/2006	FD	3V	0.431	ND (0.5)	79.7	274	-61	17.8	--	-9	7.53	245	173	155	924
MW-25	SA	10/03/2006		3V	0.466	ND (0.5)	73.3	222	-62.7	15	--	-8.9	7.25	206	158	163	892
MW-25	SA	03/06/2007		3V	0.459	ND (0.5)	72.9	221	-66.9	14.4	--	-9	6.85	203	164	160	843
MW-25	SA	10/02/2007		3V	0.49	ND (1.0)	66	189	-65.8	14	--	-9	7.9	200	155	180	796
MW-25	SA	10/02/2007	FD	3V	0.46	ND (1.0)	63	195	-65.7	13	--	-9	7.7	220	157	190	758
MW-25	SA	10/07/2008		3V	0.559	ND (0.5)	59.2	170	-68.5	12.9	--	-9.9	9.89	143	150	200	740
MW-25	SA	10/07/2008	FD	3V	0.559	ND (0.5)	58.4	170	-69.1	12.9	--	-10.1	10.2	144	150	210	730
MW-25	SA	09/21/2009		3V	0.46	ND (0.5)	64	180	-69.89	12	--	-8.91	7.2	180	130	200	660

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MW-25	SA	09/21/2009	FD	3V	0.47	ND (0.5)	64	180	-69.45	12	--	-8.87	7.9	190	130	200	650
MW-25	SA	12/07/2010		3V	0.43	ND (1.0)	74	220	-68.9	15	--	-9.4	10	180	120	180	780
MW-25	SA	12/15/2011		3V	0.49	ND (1.0)	89	270	-68.6	19	--	-9.2	8.5	210	120	170	860
MW-25	SA	12/15/2011	FD	3V	0.5	ND (0.5)	91	280	-66.7	19	--	-8.9	8.0	220	120	170	890
MW-25	SA	12/11/2012		3V	0.38	ND (0.5)	90	340	-67.6	19	7.25	-9.1	7.9	200	140	160	970
MW-25	SA	12/09/2013		3V	0.43	ND (0.5)	98	310	-68.72	20	6.99	-9.02	8.2	220	140	160	980
MW-25	SA	12/02/2014		LF	0.39	ND (0.5)	100	350	-67.9	19	8.9	-9.21	7.7	210	140	150	970
MW-25	SA	05/11/2015		LF	--	--	--	--	--	--	9.2	--	--	--	--	--	--
MW-25	SA	12/07/2015		LF	0.42	ND (0.5)	110	340	-67.0607	21	10	-8.99177	7.9	230	150	140	1,000
MW-25	SA	04/27/2016		LF	--	--	--	--	--	--	9.7	--	--	--	--	--	--
MW-25	SA	12/08/2016		LF	0.41	ND (0.5)	110 J	380	-65.8821	22	9.3	-8.78942	8.4	220	180	130	1,100
MW-25	SA	05/01/2017		LF	--	--	--	--	--	--	12	--	--	--	--	--	--
MW-25	SA	12/08/2017		LF	0.37	ND (2.5)	120	420	-65.905	24	12	-9.01549	8.8	240	200	130	1,200
MW-25	SA	05/01/2018		LF	--	--	--	--	--	--	12	--	--	--	--	--	--
MW-25	SA	12/10/2018		LF	0.34	ND (2.5)	120	380	-64.42	26	11	-8.75	8.9	230	210	120	1,100
MW-25	SA	12/10/2018	FD	LF	0.33	ND (2.5)	120	370	-64.54	25	10	-9.09	8.7	230	210	120	1,100
MW-26	SA	03/08/2005		3V	0.557	ND (0.5)	166	756	-70	41.6	--	-8.8	10.7	439	370	98.7	1,840
MW-26	SA	03/08/2005	FD	3V	0.559	ND (0.5)	166	708	-70	40.9	--	-8.7	11.4	438	338	96.1	1,800
MW-26	SA	06/13/2005		3V	0.663	ND (0.5)	178	847	-65	44.6	--	-8.2	14	511	371	103	2,130
MW-26	SA	10/04/2005		3V	0.526	0.601	166	779	-68	40.4	--	-7.8	19.8	352	372	109	2,120
MW-26	SA	12/12/2005		3V	0.613	0.546	162	788	-55	39.9	--	-8.5	20.3	349	372	99.7	2,610
MW-26	SA	03/08/2006		3V	0.621	ND (0.5)	155	772	-60.4	38.1	--	-8.6	11.7	434 J	324	121	2,070
MW-26	SA	05/01/2006		3V	0.723	ND (0.5)	165	927	-62.7	42	--	-8.9	12.8	555	382	121	2,130
MW-26	SA	10/03/2006		3V	0.692	ND (2.5)	170	894	-63	43.9	--	-8.8	12.8	510	370	105	2,220
MW-26	SA	03/12/2007		3V	0.622	0.646	163	917	-67	41.6	--	-9	12.9	621	387	90	2,280
MW-26	SA	10/02/2007		3V	0.66	ND (1.0)	170	945	-66.3	42	--	-8.6	15	620	391	100	2,180
MW-26	SA	03/12/2008		3V	0.589	ND (1.0)	176	908	-67.2	44.1 J	--	-8.1	16.2 J	498	398	103	2,500
MW-26	SA	03/12/2008	FD	3V	0.601	ND (1.0)	160	905	-68.2	32.8 J	--	-8.9	12.7 J	462	398	102	2,420
MW-26	SA	10/08/2008		3V	0.591	ND (1.0)	183	930	-66.5	45.8	--	-8.7	14.6	555	440	110	2,400
MW-26	SA	03/10/2009		3V	0.604	1.4	172	870	-65.3	47.9	--	-8.41	14.8	585	440 J	100	2,300
MW-26	SA	03/10/2009	FD	3V	0.65	1.5	174	860	-65.76	46.2	--	-8.68	15.6	631	440 J	100	2,300
MW-26	SA	09/22/2009		3V	0.59	ND (1.0)	170	870	-68.25	39	--	-9.04	14	550	450	100	2,200
MW-26	SA	12/15/2010		3V	--	--	180	900	--	40	--	--	--	560	480	100	--
MW-26	SA	12/09/2011		3V	0.89	1.2	210	930	-65.2	47	--	-8.1	15	690	530	94	2,300
MW-26	SA	10/04/2012		3V	--	--	178	920	--	46.2	--	--	--	637	520	--	--
MW-26	SA	10/04/2012		H	--	--	162	930	--	42.3	--	--	--	661	530	--	--
MW-26	SA	10/04/2012		LF	--	--	165	960	--	43.7	--	--	--	702	550	--	--
MW-26	SA	11/27/2012		3V	--	--	168	930	--	45	15.6	--	--	564	520	100	--
MW-26	SA	11/27/2012		H	--	--	152	840	--	39.1	14.7	--	--	575	480	100	--
MW-26	SA	11/27/2012		LF	--	--	157	960	--	41.7	18.1	--	--	671	570	110	--
MW-26	SA	03/12/2013		3V	--	--	186	930	--	48.7	9.51	--	--	662	530	100	--
MW-26	SA	03/12/2013		H	--	--	181	950	--	48.4	19.5	--	--	705	550	100	--
MW-26	SA	03/12/2013		MPP	--	--	174	950	--	46.8	19.2	--	--	683	560	100	--
MW-26	SA	05/07/2013		3V	--	--	--	--	--	--	17.7 J	--	--	--	--	--	--
MW-26	SA	12/04/2013		3V	0.93	1.0	160	890	-64.08	41	18	-8.41	12	670	520	110	2,600
MW-26	SA	05/05/2014		3V	--	--	--	--	--	--	20.4	--	--	--	--	--	--
MW-26	SA	12/15/2014		LF	0.79	1.1	150	910	-67.3	33	21	-8.33	--	470	530	110	2,700
MW-26	SA	12/15/2014	FD	LF	0.82	1.0	150	910	-66.9	34	22	-8.31	--	450	530	110	2,700
MW-26	SA	05/19/2015		LF	--	--	--	--	--	--	23	--	--	--	--	--	--
MW-26	SA	12/08/2015		LF	0.86	ND (1.0)	140	890	-65.4939	32	20	-8.19913	13	640	500	110	2,400
MW-26	SA	12/08/2015	FD	LF	0.81	ND (1.0)	140	870	-65.0305	30	20	-7.93156	14	640	520	110	2,500

Appendix I

Chemical Performance Monitoring Sampling Results, March 2005 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-26	SA	04/28/2016		LF	--	--	--	--	--	--	21	--	--	--	--	--	--
MW-26	SA	12/08/2016		LF	1.1	ND (2.5)	160 J	890	-65.4433	41	22	-7.9186	13	650	520	120	2,400
MW-26	SA	12/08/2016	FD	LF	1.1	ND (2.5)	160 J	880	-65.5157	42	21	-7.98162	13	680	520	120	2,500
MW-26	SA	04/26/2017		LF	--	--	--	--	--	--	23	--	--	--	--	--	--
MW-26	SA	12/11/2017		LF	1.0	ND (2.5)	160	910	-64.5812	37	21	-8.11508	12	620	500	120	2,300
MW-26	SA	12/11/2017	FD	LF	0.99	ND (2.5)	150	900	-64.4695	36	20	-8.44161	12	600	510	120	2,300
MW-26	SA	05/01/2018		LF	--	--	--	--	--	--	20	--	--	--	--	--	--
MW-26	SA	12/07/2018		LF	1.0	ND (2.5)	150	820	-64.04	35	16	-8.21	13	630	490	120	2,300
MW-31-060	SA	03/09/2005		3V	0.401	ND (0.5)	108	649	-63	17.3	--	-8.6	5.97	424	210	76.6	1,540
MW-31-060	SA	06/13/2005		3V	0.388	ND (0.5)	121	745	-65	18.9	--	-8.2	6.57	403	207	70	1,660
MW-31-060	SA	10/06/2005		3V	0.462	ND (0.5)	109	691	-65	16.5	--	-8.6	9.75	308	206	77.3	1,660
MW-31-060	SA	12/13/2005		3V	0.359	ND (0.5)	87	669	-54	15.4	--	-8.7	9.32	275	199	73	1,620
MW-31-060	SA	03/15/2006		3V	0.393	ND (0.5)	106	661	-65.6	17.5	--	-8.6	7.3	403	191	89.3	1,560 J
MW-31-060	SA	03/15/2006	FD	3V	0.383	ND (0.5)	101	662	-64.9	16.8	--	-8.6	6.94	391	192	81.9	1,640 J
MW-31-060	SA	05/01/2006		3V	0.449	ND (0.5)	118	691	-63.2	20.1	--	-9.6	7.78	467	209	79.6	1,630
MW-31-060	SA	10/05/2006		3V	0.464	ND (0.5)	113	687	-66.3	20.6	--	-9.4	9.6 J	325	205	80	1,620
MW-31-060	SA	03/12/2007		3V	0.402 J	ND (0.5)	116	757	-69	20.3	--	-9.3	6.05	454	222	72.5	1,750
MW-31-060	SA	10/04/2007		3V	0.64	ND (1.0)	150	799	-69.6	26	--	-9.4	7.3	580	208	80	1,720
MW-31-060	SA	10/06/2008		3V	0.399	ND (1.0)	150	810	-72.2	26	--	-10.2	9.39	460	240	81	2,000
MW-31-060	SA	09/21/2009		3V	0.43	ND (1.0)	160	870	-72.11	26	--	-9.23	9.6	480	220	75	1,800
MW-31-060	SA	12/15/2010		3V	0.43	ND (0.5)	170	840	-69.3	27	--	-9	12	440	210	78	2,000
MW-31-060	SA	12/06/2011		3V	0.54	ND (1.0)	150	790	-67.9	24	--	-8.8	7.6	450	200	76	1,800
MW-31-060	SA	11/13/2012		3V	0.44	ND (0.5)	150	890	-71.8	24	3.3	-9.2	7.1	470	200	78	1,900
MW-31-060	SA	12/03/2013		3V	0.48	ND (0.5)	140	870	-66.39	24	3.53	-8.56	6.4	520	220	78	1,900
MW-31-060	SA	12/03/2014		LF	0.4	ND (0.5)	120	790	-68.5	19	3.9	-8.83	5.2	430	210	140	1,700
MW-31-060	SA	12/07/2015		LF	0.5	ND (0.5)	100	620	-64.5767	17	4.7	-8.2946	5.4	470	200	92	1,600
MW-31-060	SA	04/27/2016		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-31-060	SA	12/09/2016		LF	0.42	ND (0.5)	120 J	750	-66.636	20 J	4.1	-8.48888	6.2	470	210	91	1,700
MW-31-060	SA	12/09/2016	FD	LF	0.42	ND (1.0)	120 J	760	-66.0943	22 J	4.1	-8.65932	6.6	470	220	93	1,700
MW-31-060	SA	04/27/2017		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-31-060	SA	12/12/2017		LF	0.79	ND (2.5)	130	840	-66.2365	22	3.4	-8.89909	6.1	490	210	86	1,800
MW-31-060	SA	04/27/2018		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-31-060	SA	12/10/2018		LF	0.49	ND (2.5)	150	910	-65.9	26	3.3	-8.82	7.2	560	220	89	1,900
MW-32-035	SA	03/09/2005		3V	1.07	0.845	312	1,770	-68	85.5	--	-8.2	13	944	465	260	3,560
MW-32-035	SA	06/17/2005		3V	1.18	ND (2.5)	506	3,520	-72	120	--	-9.5	14.8	2,110	787	223	7,550
MW-32-035	SA	10/04/2005		3V	1.26	ND (5.0)	567	3,840	-70	134	--	-8.3	29.3	1,530	765	208	8,340
MW-32-035	SA	12/16/2005		3V	1.25	1.02	606	3,510	-63	128	--	-8.8	30	1,580	710	219	7,660
MW-32-035	SA	03/10/2006		3V	1.13	ND (0.5)	654	4,210	-74	129	--	-8.6	19.2	2,360	1,010	234	9,230
MW-32-035	SA	05/04/2006		3V	1.38	ND (0.5)	693	4,960	-67.8	148	--	-9.1	19.5	2,800	1,130	218	9,840
MW-32-035	SA	10/02/2006		3V	1.48	ND (2.5)	839	5,430	-71.4	165	--	-9.4	23.9	3,260	1,050	290	11,200
MW-32-035	SA	12/11/2006		3V	1.43	1.9	845	5,090	-70.4	173	--	-9	22.5	2,620	1,000	338	10,400
MW-32-035	SA	03/06/2007		3V	1.35	2.65	1,080	6,070	-75.4	209	--	-10.2	23.5	2,910	1,200	360	12,600
MW-32-035	SA	04/30/2007		3V	1.35	2.6	1,250	6,610	-78.7	273	--	-9.9	26.2	3,280	1,280	475	12,100
MW-32-035	SA	10/01/2007		3V	1.7	2.62	1,000	6,830	-72.7	390	--	-8.9	29	4,000	1,120	490	13,700
MW-32-035	SA	10/03/2008		3V	1.49	3.1	829	7,600	-73.1	150	--	-9.8	52.3	3,490	1,300	550	15,000
MW-32-035	SA	09/22/2009		3V	1.7	2.8	880	6,900	-75.2	400	--	-9.32	53	3,100	1,400	530	13,000
MW-32-035	SA	12/09/2010		3V	1.7 J	ND (2.5)	750	5,500	-84.2	390 J	--	-10.2	51 J	3,000	1,600	590	11,000
MW-32-035	SA	12/09/2011		3V	1.7	ND (2.5)	680	5,000	-84.2	310	--	-10.8	34	3,100	1,700	640	8,500
MW-32-035	SA	12/05/2012		3V	1.3	ND (5.0)	460	4,300	-89	240	0.0274	-11	31	2,700	1,700	630	10,000
MW-32-035	SA	11/06/2013		3V	1.2	ND (2.5)	450	3,500	-87.16	210	0.0482	-10.97	23	2,500	1,600	580	8,300
MW-32-035	SA	11/11/2014		LF	1.1	ND (0.5)	450	3,100	-87.84	170	--	-10.39	18	2,000	1,500	550	5,800

Appendix I

Chemical Performance Monitoring Sampling Results, March 2005 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-32-035	SA	12/01/2014		LF	--	--	--	--	--	--	0.093	--	--	--	--	--	--
MW-32-035	SA	04/20/2015		LF	--	--	--	--	--	--	2.3	--	--	--	--	--	--
MW-32-035	SA	12/03/2015		LF	1.2	ND (2.5)	450	2,800	-87.49	220	0.058	-11.18	18	1,900	1,200	610	7,400
MW-32-035	SA	04/25/2016		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-32-035	SA	12/06/2016		LF	0.99	ND (2.5)	370	2,800	-87.0352	210	ND (0.05)	-10.7781	20	1,800	1,100	630	6,700
MW-32-035	SA	04/27/2017		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-32-035	SA	12/04/2017		LF	1.0	ND (2.5)	360	2,500	-88.18	160	ND (0.05)	-11.43	15	1,600	1,100	700	5,500
MW-32-035	SA	04/23/2018		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-32-035	SA	12/04/2018		LF	0.91	ND (2.5)	400	2,200	-88.68	170	ND (0.1)	-10.99	16	1,500	960	570	5,500
MW-34-055	MA	03/10/2005		3V	1.19	0.654	366	2,620	-82	71.3	--	-10.8	29.1	1,900	739	240	6,230
MW-34-055	MA	07/15/2005		3V	1.02	ND (0.5)	247	2,250	-84	52	--	-10.3	16.5	1,420	607	242	--
MW-34-055	MA	10/05/2005		3V	1.2	ND (0.5)	272	2,170	-88	59.1	--	-10.6	25.8	1,230	619	232	5,150
MW-34-055	MA	12/14/2005		3V	0.937	0.588	217	2,150	-74	45	--	-10.8	27.2	965	552	236	5,100
MW-34-055	MA	03/08/2006		3V	0.956	ND (0.5)	256	2,080	-86.8	54.2	--	-10.8	13.5	1,640	593	272	4,850
MW-34-055	MA	05/03/2006		3V	0.846	ND (0.5)	198	2,070	-84.3	44.8	--	-11.5	11.1	1,360	500	302	4,320
MW-34-055	MA	10/04/2006		3V	0.54	ND (0.5)	37.6	443	-94.8	8.08	--	-12.2	4.59	536	230	368	1,680 J
MW-34-055	MA	10/03/2007		3V	0.26	ND (1.0)	15	109	-96.6	3.3	--	-11.3	3.3	290	266	190	730
MW-34-055	MA	10/07/2008		3V	0.248	--	72.4	100	-100	16.9	--	-13	5.26	192	250	170	700
MW-34-055	MA	09/30/2009		3V	0.15	--	77	--	-100.79	17	--	-12.26	4.4	120	--	160	700
MW-34-055	MA	11/17/2009		3V	--	ND (0.5)	--	93	--	--	--	--	--	--	240	--	--
MW-34-055	MA	12/07/2010		3V	0.1	ND (0.5)	81	87	-98.8	19	--	-12.1	5.1	100	230	140	590
MW-34-055	MA	12/06/2011		3V	0.19	ND (0.5)	81	83	-100.5	19	--	-12.3	4.6	100	220	160	630
MW-34-055	MA	12/12/2012		3V	0.15	ND (0.5)	75	78	-105	20	ND (0.01)	-12.7	3.7	100	210	140	630
MW-34-055	MA	11/20/2013		3V	0.13	ND (0.5)	69	72	-103.32	19	ND (0.01)	-13.09	4.3	88	210	150	600
MW-34-055	MA	11/06/2014		LF	ND (0.1)	ND (0.5)	72	76	-101.86	20	ND (0.05)	-12.43	4.0	85	200	140	640
MW-34-055	MA	12/03/2015		LF	0.19	ND (0.5)	80	83	-102.02	25	ND (0.05)	-13.02	4.7	86	230	150	630
MW-34-055	MA	12/06/2016		LF	0.11	ND (0.5)	77 J	89	-101.069	26	ND (0.05)	-12.4446	5.6	100	230	150	680
MW-34-055	MA	12/06/2017		LF	ND (0.5)	ND (0.5)	85	100	-99.07	27	ND (0.05)	-11.89	4.9	91	230	160	640
MW-34-055	MA	12/05/2018		LF	ND (0.12)	ND (0.5)	74	88	-98.79	24	ND (0.1)	-12.29	5.1	99	230	150	670
MW-34-055	MA	12/05/2018	FD	LF	ND (0.11)	ND (0.5)	73	87	-98.78	23	ND (0.1)	-12.29	5.1	98	230	150	660
MW-34-080	DA	03/08/2005		3V	1.65	1.01	439	4,180	-83	68.1	--	-10.4	28	2,750	1,040	304	6,940
MW-34-080	DA	03/15/2005		3V	--	--	445	3,920	--	65.7	--	--	29.7	2,990	ND (5.0)	288	8,980
MW-34-080	DA	06/30/2005		3V	1.66	ND (0.5)	497	3,910	-82	76.5	--	-8.4	27.7	2,670	979	302	7,840
MW-34-080	DA	10/05/2005		3V	1.57	ND (0.5)	429	3,880	-85	72.5	--	-10.1	47.4	1,660	1,060	302	10,200
MW-34-080	DA	12/14/2005		3V	1.54	0.854	432	3,700	-71	68.3	--	-10.2	54.9	1,710	880	297	8,800
MW-34-080	DA	03/09/2006		3V	1.49	ND (0.5)	383	3,520	-86.8	65.8	--	-9.9	24	2,420	986	313	7,830
MW-34-080	DA	05/03/2006		3V	1.38	ND (0.5)	425	3,700	-77.6	70.3	--	-11.7	23.9	2,480	921	297	7,950
MW-34-080	DA	10/04/2006		3V	1.31	0.737	341	3,210	-81.8	65.4	--	-11.3	21.1	2,170	786	268	7,080
MW-34-080	DA	12/12/2006		3V	1.26	0.742	298	3,190	-80.9	62.9	--	-10.5	18.9	2,040	789	288	6,510
MW-34-080	DA	03/05/2007		3V	1.29	0.72	315	3,300	-85.8	68.3	--	-11.5	19.4	2,020	783	205	6,360 J
MW-34-080	DA	04/30/2007		3V	1.33	ND (1.0)	282	3,320 J	-88.9	57	--	-11.5	18.6	2,080	889 J	245	6,390
MW-34-080	DA	10/03/2007		3V	1.2	ND (1.0)	220	2,630	-87.8	53	--	-11.3	21	2,000	696	240	5,490
MW-34-080	DA	12/13/2007		3V	1.09	ND (1.0)	193	2,380	-88.6	49.1	--	-10.9	25.4	1,450	698	264	5,420
MW-34-080	DA	03/12/2008		3V	1.14	ND (1.0)	237	2,510	-87.3	52.6	--	-11.4	19.2	2,030	739	238	5,500
MW-34-080	DA	05/06/2008		3V	1.2	0.525	230	2,460	-87.3	49	--	-11.4	30	1,600	753	216	5,820
MW-34-080	DA	10/07/2008		3V	0.765	ND (2.0)	223	2,400	-87.6	46.3	--	-11.8	22	1,220	720	250	5,300
MW-34-080	DA	12/10/2008		3V	1.11	ND (1.0)	147	2,190	-93.1	45.2	--	-10.97	20.6	3,880	698	253	5,300
MW-34-080	DA	03/10/2009		3V	1.08	ND (2.5)	219	2,300	-84.77	46.3	--	-10.85	22.2	1,480	700 J	240	5,100
MW-34-080	DA	04/30/2009		3V	1.11	ND (1.0)	219	2,340	-85.79	50	--	-11.45	24.6	1,510	768	237	5,830
MW-34-080	DA	09/30/2009		3V	0.98	ND (1.0)	240	2,300	-88.93	46	--	-10.79	22	1,500	710	230	4,000
MW-34-080	DA	12/09/2009		3V	--	ND (1.0)	--	2,200	-89.1	--	--	-11.88	--	--	690	230	4,580

Appendix I

Chemical Performance Monitoring Sampling Results, March 2005 through December 2018

Fourth Quarter 2018 and Annual Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-34-080	DA	03/10/2010		3V	0.93	ND (1.0)	220 J	2,100	-91.56	41	--	-12.13	28	1,400 J	660	240	4,900
MW-34-080	DA	12/07/2010		3V	1.0	ND (1.0)	240	2,300	-87.3	47	--	-11.1	24	1,300	700	220	4,600
MW-34-080	DA	12/06/2011		3V	1.1	ND (1.0)	220	1,900	-88.1	43	--	-11.1	16	1,300	640	230	3,900
MW-34-080	DA	12/12/2012		3V	1.0	ND (1.0)	220	1,800	-90.2	51	ND (0.01)	-11.2	17	1,300	630	250	4,300
MW-34-080	DA	12/12/2012	FD	3V	--	--	210	1,800	-89.3	48	ND (0.01)	-11.1	--	1,300	630	250	--
MW-34-080	DA	11/20/2013		3V	0.96	ND (1.0)	210	1,900	-87.99	52	ND (0.01)	-11.43	14	1,300	620	260	4,500
MW-34-080	DA	11/20/2013	FD	3V	1.0	ND (1.0)	210	1,900	-88.36	56	ND (0.01)	-11.18	14	1,200	620	260	4,600
MW-34-080	DA	11/06/2014		LF	0.84	--	240	--	-90.9	50	--	-11.6	12	1,200	--	280 J	--
MW-34-080	DA	12/01/2014		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-080	DA	04/20/2015		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-080	DA	12/03/2015		LF	0.83	ND (2.5)	220	1,500	-92.07	48	ND (0.05)	-11.53	--	1,000	510	300	3,600
MW-34-080	DA	04/26/2016		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-34-080	DA	12/06/2016		LF	0.98	ND (2.5)	220 J	2,000	-88.5807	47	--	-11.3322	15	1,300	630	270	4,300
MW-34-080	DA	12/06/2016	FD	LF	0.98	ND (2.5)	230 J	1,900	-88.0238	47	--	-10.9343	16	1,300	620	290	4,200
MW-34-080	DA	04/27/2017		LF	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-34-080	DA	12/06/2017		LF	0.89	ND (2.5)	220	2,400	-85.89	71	ND (0.05)	-10.82	14	1,400	670	280	4,700
MW-34-080	DA	04/24/2018		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-080	DA	12/05/2018		LF	1.0	ND (2.5)	280	2,300	-84.72	82	ND (0.1)	-11.14	17	1,600	640	280	4,900
MW-34-100	DA	03/14/2005		3V	--	--	221	5,010	--	17.4	--	--	34.1	3,600	1,210	175	10,800
MW-34-100	DA	06/21/2005		3V	2.22	ND (0.5)	229	5,350	-75	17.4	--	-9.7	27.1	3,510	1,270	179	11,300
MW-34-100	DA	06/21/2005	FD	3V	2.36	ND (0.5)	243	4,920	-77	18.2	--	-9.5	32.1	3,740	1,180	179	10,900 J
MW-34-100	DA	10/05/2005		3V	2.57	ND (0.5)	171	4,530	-83	13.8	--	-9.9	55.2	2,450	1,150	172	10,400
MW-34-100	DA	10/05/2005	FD	3V	2.57	ND (0.5)	228	4,680	-83	14.1	--	-9.9	50.9	2,730	1,200	172	10,400
MW-34-100	DA	12/14/2005		3V	2.32	--	226	--	--	14.9	--	--	62.9	2,530	--	--	--
MW-34-100	DA	12/14/2005	FD	3V	2.4	--	220	--	--	15.1	--	--	64.2	2,530	--	--	--
MW-34-100	DA	03/08/2006		3V	2.41	--	179	4,720	-75.5J	12.1	--	-11.4	32.5	3,580	1,180	152	10,000
MW-34-100	DA	03/08/2006	FD	3V	2.46	--	182	4,920	-101.9J	11.9	--	-10.1	36.5	3,530	1,220	159	10,100
MW-34-100	DA	05/03/2006		3V	2.73	--	162	5,060	-74.5	12	--	-10.5	31.1	3,890	1,200	133	9,940
MW-34-100	DA	05/03/2006	FD	3V	2.77	--	166	5,170	-71.9	12.2	--	-10.6	31.3	3,900	1,230	136	9,990
MW-34-100	DA	04/30/2007		3V	2.39	--	186	5,920	-80.7	12	--	-10.9	31.5	3,840	1,040	123	10,600
MW-34-100	DA	04/30/2007	FD	3V	2.4	--	189	5,880	-82.1	12	--	-11.2	32.1	3,920	1,050	123	11,900
MW-34-100	DA	10/03/2007		3V	2.5	ND (1.0)	170	5,350	-78.2	11	--	-10.2	44	4,300	970	120	10,700
MW-34-100	DA	10/03/2007	FD	3V	2.4	ND (1.0)	160	5,360	-78.4	10	--	-10.6	43	4,300	953	120	10,500
MW-34-100	DA	10/07/2008		3V	2.35	ND (2.5)	158	5,400	-80.8	10.6	--	-10.9	54.5	2,970 J	1,200	140	11,000
MW-34-100	DA	10/07/2008	FD	3V	2.59	ND (2.5)	184	5,600	-81.3	11.5	--	-11	56.7	3,880 J	1,200	140	11,000
MW-34-100	DA	09/30/2009		3V	2.3	--	200	5,500	--	11	--	--	73	3,800	1,300	170	--
MW-34-100	DA	09/30/2009	FD	3V	--	--	--	5,600	--	--	--	--	--	--	1,300	170	--
MW-34-100	DA	11/17/2009		3V	--	ND (1.0)	--	--	-82.38	--	--	-10.47	--	--	--	--	11,000
MW-34-100	DA	12/08/2010		3V	2.6	ND (2.5)	190	5,800	-79.5	9.6	--	-9.8	52 J	4,100	1,300	140 J	10,000
MW-34-100	DA	12/08/2010	FD	3V	2.5	ND (1.0)	180	5,700	-80.4	9.8	--	-10	60 J	4,000	1,200	89 J	9,900
MW-34-100	DA	12/06/2011		3V	2.7	ND (2.5)	170	5,700	-79.2	7.6	--	-10.1	43	4,000	1,300	120	10,000
MW-34-100	DA	12/06/2011	FD	3V	2.7	ND (2.5)	160	5,600	-79.5	7.4	--	-10	43 J	3,900	1,200	120	9,400
MW-34-100	DA	11/26/2012		3V	2.6	ND (2.5)	150	5,900	-80.5	8.6	0.444	-10.1	47	3,100	1,200	120	11,000
MW-34-100	DA	11/26/2012	FD	3V	2.6	ND (2.5)	150	5,900	-80.9	8.2	0.421	-10.2	47	3,200	1,200	130	11,000
MW-34-100	DA	04/16/2013		3V	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	--
MW-34-100	DA	04/16/2013	FD	3V	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	--
MW-34-100	DA	11/20/2013		3V	2.6	ND (2.5)	140	5,300	-78.9	8.0	0.422	-10.18	35	3,900	1,200	120	10,000
MW-34-100	DA	11/20/2013	FD	3V	2.7	ND (2.5)	150	5,300	-79.33	8.5	0.419	-9.81	35	3,900	1,100	120	10,000
MW-34-100	DA	10/02/2014		LF	--	--	--	--	--	--	0.64	--	--	--	--	--	--
MW-34-100	DA	12/01/2014		LF	2.2	ND (1.0)	140	5,400	-76.95	5.6	0.58 J	-9.97	30	3,900	1,100	95	9,900
MW-34-100	DA	12/01/2014	FD	LF	2.0	ND (1.0)	140	5,500	-77.2	5.6	0.61 J	-10.1	32	4,000	1,100	100	9,900

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Location ID	Aquifer Zone	Sample Date		Sample Method	Boron, Dissolved (mg/L)	Bromide (mg/L)	Calcium, Dissolved (mg/L)	Chloride (mg/L)	Deuterium (‰)	Magnesium, Dissolved (mg/L)	Nitrate/Nitrite as Nitrogen (mg/L)	Oxygen-18 (‰)	Potassium, Dissolved (mg/L)	Sodium, Dissolved (mg/L)	Sulfate (mg/L)	Total Alkalinity as $CaCO_3$ (mg/L)	Total Dissolved Soilds (mg/L)
MW-34-100	DA	02/16/2015		LF	--	--	--	--	--	--	0.61	--	--	--	--	--	--
MW-34-100	DA	04/20/2015		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-100	DA	04/20/2015	FD	LF	--	--	--	--	--	--	ND (0.056)	--	--	--	--	--	--
MW-34-100	DA	10/06/2015		LF	--	--	--	--	--	--	0.29	--	--	--	--	--	--
MW-34-100	DA	12/03/2015		LF	2.7	ND (5.0)	150	5,100	-79.04	6.7	0.74	-10.1	30	3,700	980	100	9,900
MW-34-100	DA	12/03/2015	FD	LF	2.8	ND (5.0)	160	5,200	-78.93	7.1	0.73	-10.16	31	3,800	1,000	94	9,600
MW-34-100	DA	02/25/2016		LF	--	--	--	--	--	--	0.13	--	--	--	--	--	--
MW-34-100	DA	04/26/2016		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-100	DA	10/06/2016		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-100	DA	12/06/2016		LF	2.3	0.59	140 J	4,700	-81.5735	7.6	0.078	-10.6026	33	3,600	1,200	130	8,900
MW-34-100	DA	02/06/2017		LF	--	--	--	--	--	--	0.19	--	--	--	--	--	--
MW-34-100	DA	02/06/2017	FD	LF	--	--	--	--	--	--	0.18	--	--	--	--	--	--
MW-34-100	DA	04/27/2017		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-100	DA	10/02/2017		LF	--	--	--	--	-84.83	--	ND (0.05)	-10.55	--	--	--	--	--
MW-34-100	DA	12/06/2017		LF	1.7	ND (2.5)	140	3,500	--	21	ND (0.05)	--	24	2,300	1,000	170	6,800
MW-34-100	DA	02/20/2018		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-100	DA	04/24/2018		LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-100	DA	04/24/2018	FD	LF	--	--	--	--	--	--	ND (0.05)	--	--	--	--	--	--
MW-34-100	DA	10/01/2018		LF	--	--	--	--	--	--	3.6	--	--	--	--	--	--
MW-34-100	DA	12/05/2018		LF	1.7	ND (1.0)	170	3,100	-86.28	27	ND (0.1)	-11.24	24	2,400	950	180	6,100
R-28	--	03/08/2005		G	ND (0.2)	ND (0.5)	83.7	90.4	-102	31.4	--	-12.5	5.02	107	231	132	651
R-28	--	06/14/2005		G	ND (0.2)	ND (0.5)	78.5	91.2	-95	28.5	--	-11.6	5.08	94.5	268	127	680
R-28	--	10/05/2005		G	ND (0.2)	ND (0.5)	85.7	85.5	-94	30.4	--	-11.6	6.3	77	255	122	672
R-28	--	12/16/2005		G	ND (0.2)	ND (0.5)	87.2	88.1	-83	29.8	--	-11.5	6.11	76.8	254	126	710
R-28	--	03/06/2006		G	ND (0.2)	ND (0.5)	76.6	91	-93.4	26.6	--	-12.3	5.22 J	91.5	270	146	675
R-28	--	05/03/2006		G	ND (0.2)	ND (0.5)	88.1	93.4	-92.1	31.4	--	-13	4.04 J	107	270	136	586
R-28	--	10/04/2006		G	ND (0.2)	ND (0.5)	84.2	90.9	-95.3	32.1	--	-12.6	6.17 J	96.5	259	133	644 J
R-28	--	12/20/2006		G	ND (0.2)	ND (0.5)	85.7	93.3	-99.6	32	--	-12.4	4.66	108	262	143	615
R-28	--	03/14/2007		G	ND (0.2)	ND (0.5)	87.9	96.7	-100.4	31	--	-12.8	5.71	105	268	133	710
R-28	--	05/09/2007		G	ND (0.2)	ND (0.5)	86.1	95.8	-102.3	30.5	--	-13	5.92	103	271	143	690
R-28	--	09/12/2007		G	ND (0.2)	ND (0.2)	73.8	106	-99.4	29.9	--	-12.4	6.36	89.2	296	122	682
R-28	--	12/06/2007		G	ND (0.2)	ND (0.2)	75.7	96.5	-98.6	30.4	--	-11.7	6.62	79.4	258	139	--
R-28	--	04/02/2008		G	0.467	ND (1.0)	84.7	92.5	--	31.4	--	--	5.58	108	309	137	--
R-28	--	06/18/2008		G	ND (0.2)	ND (1.0)	43.3	89.4	-101.7	31.1	--	-13.2	6.95	93.9	248	132	672
R-28	--	09/17/2008		G	ND (0.2)	ND (0.5)	83.4	91.4	--	31.2	--	--	6.48	78	256	132	640
R-28	--	12/04/2008		G	0.262	ND (1.0)	81.7	97.4	-97	30	--	-11.89	5.95	114	260	135	649
R-28	--	01/21/2009		G	ND (0.2)	ND (0.5)	79.2	91.5	-96.7	27.8	--	-11.97	6.01	91.7	253	134	652
R-28	--	04/09/2009		G	ND (0.2)	ND (0.5)	79.6	92.7	-97.81	28.8	--	-12.43	5.44	97	250	138	643
R-28	--	07/08/2009		G	ND (0.2)	ND (0.5)	79.6	84.5	-98.62	27.3	--	-12.78	6.17	86.9	239	131	632
R-28	--	09/09/2009		G	ND (0.2)	ND (1.0)	74.8	86	-99.06	26.2	--	-12.47	6.01	78.7	236	131	640
R-28	--	12/14/2009		G	ND (0.2)	ND (1.0)	73.5	89.7	-98.33	26.7	--	-13.03	4.98	88.2	244	131	612
R-28	--	12/21/2010		G	ND (0.2)	ND (0.5)	69.1	91	-101.8	24.8	--	-12.1	4.75	87.8	223	133	602
R-28	--	06/08/2011		G	--	--	--	--	--	--	--	--	--	--	--	116	--
R-28	--	08/23/2011		G	--	--	--	--	--	--	--	--	--	--	--	115	--
R-28	--	11/30/2011		G	--	--	--	--	--	--	--	--	--	--	--	119	--
R-28	--	01/11/2012		G	ND (0.2)	ND (0.5)	70.2	80.5	--	27.4	--	--	4.76	83.7	218	127	--
R-28	--	02/29/2012		G	--	--	--	--	--	--	--	--	--	--	--	123	--
R-28	--	05/22/2012		G	--	--	--	--	--	--	--	--	--	--	--	124	--
R-28	--	08/22/2012		G	--	--	--	--	--	--	--	--	--	--	--	126	--
R-28	--	11/01/2012		G	ND (0.2)	ND (0.5)	71.3	75.4	-102.2	27.5	--	-12.6	4.12	79.3	212	132	499
R-28	--	01/09/2013		G	--	--	--	--	--	--	--	--	--	--	--	130	--

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R-28	--	03/05/2013		G	--	--	--	--	--	--	--	--	--	--	--	122	--
R-28	--	05/21/2013		G	--	--	--	--	--	--	ND (0.5)	--	--	--	--	127	--
R-28	--	07/16/2013		G	--	--	--	--	--	--	ND (0.5)	--	--	--	--	124	--
R-28	--	11/21/2013		G	0.121	ND (0.5)	73.2	80.4	-103.05	26.2	0.293	-12.79	4.44	84.7	220	131	564
R-28	--	01/14/2014		G	--	--	--	--	--	--	0.315	--	--	--	--	--	--
R-28	--	03/13/2014		G	--	--	--	--	--	--	0.41	--	--	--	--	--	--
R-28	--	05/22/2014		G	--	--	--	--	--	--	0.27	--	--	--	--	--	--
R-28	--	07/16/2014		G	--	--	--	--	--	--	0.37	--	--	--	--	--	--
R-28	--	11/20/2014		G	0.13	ND (0.5)	68	85	-99.96	23	0.29	-12.26	4.5	88	230	130	620
R-28	--	01/15/2015		G	--	--	--	--	--	--	0.33	--	--	--	--	--	--
R-28	--	02/25/2015		G	--	--	--	--	--	--	0.44	--	--	--	--	--	--
R-28	--	06/09/2015		G	--	--	--	--	--	--	0.37	--	--	--	--	--	--
R-28	--	09/16/2015		G	--	--	--	--	--	--	0.34	--	--	--	--	--	--
R-28	--	12/09/2015		--	0.13	ND (1.0)	61	94	-97.4889	20	0.38	-11.8759	4.7 J	100	250	120	640
R-28	--	01/26/2016		--	--	--	--	--	--	--	0.47	--	--	--	--	--	--
R-28	--	01/26/2016	FD	--	--	--	--	--	--	--	0.46	--	--	--	--	--	--
R-28	--	02/24/2016		--	--	--	--	--	--	--	0.52	--	--	--	--	--	--
R-28	--	04/27/2016		G	--	--	--	--	--	--	0.42	--	--	--	--	--	--
R-28	--	07/07/2016		G	--	--	--	--	--	--	0.44	--	--	--	--	--	--
R-28	--	11/29/2016		G	0.21	ND (1.0)	67 J	92	-101.7	22	0.31	-12.71	4.5	91	240	130	--
R-28	--	11/29/2016	FD	G	0.21	ND (1.0)	64 J	96	-101.1	22	0.42	-12.15	4.5	91	240	130	--
R-28	--	01/24/2017		G	--	--	--	--	--	--	0.38	--	--	--	--	--	--
R-28	--	02/21/2017		G	--	--	--	--	--	--	0.46	--	--	--	--	--	--
R-28	--	05/11/2017		G	--	--	--	--	--	--	0.42	--	--	--	--	--	--
R-28	--	08/16/2017		G	--	--	--	--	--	--	0.39	--	--	--	--	--	--
R-28	--	11/15/2017		G	0.12	ND (0.1)	60	91	-97.09	21	0.32	-12.42	4.0	88	230	130	580
R-28	--	01/03/2018		G	--	--	--	--	--	--	0.34	--	--	--	--	--	--
R-28	--	02/21/2018		G	--	--	--	--	--	--	0.48	--	--	--	--	--	--
R-28	--	06/12/2018		G	--	--	--	--	--	--	0.36	--	--	--	--	--	--
R-28	--	09/12/2018		G	--	--	--	--	--	--	0.36	--	--	--	--	--	--
R-28	--	12/11/2018		G	ND (0.13)	ND (0.5)	71	88	-97.19	25	0.29	-12.38	4.7	94	210	130	580
R-28	--	12/11/2018	FD	G	ND (0.13)	ND (0.5)	71	87	-98.12	25	0.28	-12.49	4.7	94	210	130	600

Notes:

-- = not applicable.

‰ = parts per thousand.
3V = three volume purge.
$CaCO_3$ = calcium carbonate.
DA = deep interval of Alluvial Aquifer.
FD = field duplicate.
G = grab sample.
H = HydraSleeve.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
LF = Low Flow (minimal drawdown).
MA = mid-depth interval of Alluvial Aquifer.
mg/L = milligrams per liter.
ND = not detected at listed reporting limit.
SA = shallow interval of Alluvial Aquifer.

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