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December 15, 2018

Mr. Aaron Yue
Project Manager
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Subject: *Third Quarter 2018 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 Third Quarter 2018 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 Third Quarter (July through October 2018) performance monitoring results for the IM-3 hydraulic containment system. This report also presents groundwater and surface water monitoring activities, results, and analyses related to the Groundwater and Surface Water Monitoring Programs during Third Quarter 2018.

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: Third Quarter 2018 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: December 15, 2018 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 Third Quarter 2018. On July 23, 2010, DTSC approved a revised reporting schedule for this report that included a revised IM-3 sample collection period from July 1, 2018 through October 31, 2018.

Written by: PG&E

Recommendations:
none

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

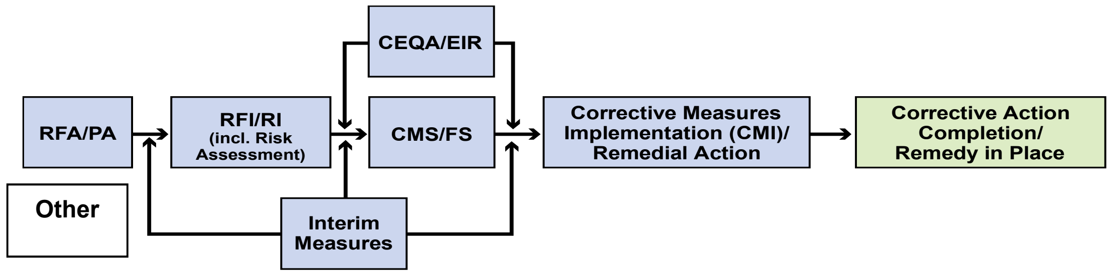
This report is required by DTSC as part of the Interim Measures Performance Monitoring Program.

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

Design & Consultancy for natural and built assets

Pacific Gas and Electric Company

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

Topock Compressor Station,
Needles, California

December 15, 2018

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

Topock Compressor Station,

Needles, California

Prepared for:

California Department of Toxic Substances Control

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December 15, 2018

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

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
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
MS/MSD	matrix spike/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
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 quarterly 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 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 included in this report are: (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 Third 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 Third 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 July 1 and October 31, 2018 (hereafter referred to as "Third Quarter 2018"). 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 Third Quarter 2018 monitoring activities and site operations conducted in support of these programs.

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

Section 4 presents PMP monitoring results and the IM evaluation for the Third Quarter 2018.

Section 5 describes upcoming monitoring events for the Fourth Quarter 2018.

Section 6 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 Third Quarter 2018 Regulatory Communication

PG&E communications with the DTSC in Third Quarter 2018 in regard to the GMP, RMP, and/or PMP programs are outlined below.

- Submittal to the DTSC of the Second Quarter 2018 Interim Measures Performance Monitoring and Site-Wide Groundwater and Surface Water Monitoring Report ("PMP-GMP Report") submitted August 15, 2018; Arcadis 2018b).
- Submittal of required GMP, RMP, and PMP notifications. Notifications submitted in Third Quarter 2018 included:
  - o On October 5, 2018, Arcadis, on behalf of PG&E, sent a quarterly email notification to the DTSC providing preliminary, unvalidated hexavalent chromium (Cr[VI]) and dissolved chromium results from the September 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 November 12, 2018, 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 shutoff of extraction well PE-01, GMP monitoring results for monitoring wells listed in the July 20, 2015 DTSC approval letter (see Section 1.4.2.3; 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 Third Quarter 2018, Cr(VI) concentrations at PE-01 (October 2, 2018; 7.6 micrograms per liter [µg/L]) exceeded the 2014 maximum concentration (5.6 µg/L); a notification email was submitted to the DTSC on November 6, 2018.

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 µg/L (CH2M Hill 2009). 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 Hill 2005). The main objective of the GMP and RMP programs is 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 Hill 2005). In accordance with the 2005 Monitoring Plan for Groundwater and Surface Water Monitoring, 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 Third Quarter 2018 GMP and RMP monitoring activities.

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 Hill 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 feet 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-sections
  - 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: I-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 shutoff, GMP monitoring results from 48 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

- o 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 IMCP 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 (total dissolved solids [TDS], chloride, sulfate, nitrate, alkalinity, stable isotopes [oxygen-18 and deuterium], calcium, potassium, magnesium, sodium, bromide, and boron), 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). Results of IMCP monitoring were last reported in the Fourth Quarter 2017 and Annual GMP-PMP Report (Arcadis 2018a). The next scheduled monitoring event is planned for Fourth Quarter 2018.

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 were installed 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 THIRD QUARTER 2018 MONITORING ACTIVITIES

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

2.1 Groundwater Monitoring Program

The Third 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 July, August, September, and October 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 September 24 through 27 and October 1 through 2, 2018 and consisted of groundwater sampling and inspection of 20 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 and three-volume purge; 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 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
- General chemistry parameters: Specific conductivity
- COPCs: dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen
- In-situ by-products: dissolved arsenic and dissolved manganese

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 2014). 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 Third 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 wells were approved for or switched sampling methods in Third 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 2014). 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 technical memoranda 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).

The purpose of the sampling method trials is to directly compare two different sampling methods. The method trials are assessed annually following Fourth Quarter sampling, with the latest assessment included in the Fourth Quarter 2017 and Annual PMP-GMP Report (Arcadis 2018a). The latest annual report presented the results of existing method trials and made recommendations for updates to the trials (currently under agency review). Sampling method trials have continued through Third Quarter 2018 at 10 select wells shown on Figure 1-2: MW-38S, MW-38D, MW-40S, MW-40D, MW-57-185, MW-60BR-245, MW-70BR-225, MW-72BR-200, TW-04, and TW-05 (PG&E 2017).

The next assessment of the sampling method trials will be presented in the Fourth Quarter 2018 and Annual PMP-GMP Report (planned for March 2019).

2.2 Surface Water Monitoring Program

The Third Quarter 2018 RMP monitoring event was performed on September 12 and 13, 2018, and consisted of collecting 24 surface water samples from 15 locations (note that a sample was not collected from location RRB due to inaccessibility). At nine of the 15 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 Third Quarter 2018 consisted of groundwater chromium monitoring within the floodplain area, a review of IM extraction system operation, and IM hydraulic 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. Twenty-two monitoring wells were sampled for Cr(VI) in September and October 2018. Extraction wells PE-01 and TW-03D were sampled monthly in July, August, September, and October 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 July, August, September, and October 2018. Pumping rates, planned/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 part of the conditional approval for PE-01 shutoff, as discussed in Section 1.4.2.1, four monitoring wells were sampled for Cr(VI) and dissolved chromium as part of the Third Quarter 2018 GMP program. 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 continuous water levels at 30-minute intervals. During the first two weeks of each month (July, August, September, and October 2018), pressure transducers were downloaded 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.

2.3.4 IM Contingency Plan Monitoring

As discussed in Section 1.4.2.3, three IMCP monitoring wells were sampled for Cr(VI) as part of the Third 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).

3 SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING RESULTS

This section summarizes results from the groundwater and surface water monitoring activities performed during Third 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 Third 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 Third Quarter 2018 are provided in Appendix A. Historical Cr(VI) and dissolved chromium concentration data are presented in Appendix B.

Figures 3-1a and 3-1b present the Third Quarter 2018 Cr(VI) results in map view for wells monitoring the upper-depth (shallow wells) and lower-depth (deep wells) intervals, respectively, 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 Hill 2009).

During Third Quarter 2018, the maximum detected Cr(VI) and dissolved chromium concentrations were 8,500 µg/L and 8,900 µg/L (both at MW-68-180), respectively.

3.1.2 Contaminants of Potential Concern and In Situ By-Products

Table 3-1 presents the Third Quarter 2018 groundwater sample results for COPCs (dissolved molybdenum, dissolved selenium, and nitrate/nitrite as nitrogen) and in-situ by-products (dissolved arsenic and dissolved manganese). Maximum concentrations for each constituent are summarized below:

- Dissolved molybdenum: 190 µg/L (MW-46-175)
- Dissolved selenium: 12 µg/L (MW-69-195)
- Nitrate/nitrite as nitrogen: 21 milligrams per liter (mg/L; MW-69-195)
- Dissolved arsenic: 16 µg/L (MW-72BR-200)
- Dissolved manganese: 920 µg/L (MW-64BR)

3.1.3 Well Maintenance

During collection of groundwater samples in Third Quarter 2018, the monitoring wells were inspected. No corrective actions were needed. Appendix C provides a summary of the inspection results

3.2 Surface Water Monitoring Results

3.2.1 Cr(VI) and Dissolved Chromium

Table 3-2 presents the Third 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 Third Quarter 2018 are provided in Appendix A.

3.2.2 Contaminants of Potential Concern and In Situ By-Products

Table 3-2 presents the Third 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 (dissolved barium and TSS). Maximum concentrations for each constituent are summarized below:

- Dissolved molybdenum: 4.9 µg/L (C-R22A-D)
- Dissolved selenium: 1.7 µg/L (C-BNS, C-NR1-S, C-NR3-S, C-NR4-S, R-19, R-63)
- Nitrate/nitrite as nitrogen: 0.52 mg/L (C-CON-S, C-MAR-S)
- Dissolved arsenic: 2.8 µg/L (C-CON-S)
- Total iron: 1,100 µg/L (C-MAR-D)
- Dissolved iron: 52 µg/L (C-R27-S)
- Dissolved manganese: 14 µg/L (C-MAR-D)
- Dissolved barium: 110 µg/L (all locations)
- TSS: 36 mg/L (C-MAR-D)

3.3 Data Validation and Completeness

Laboratory analytical data from the Third 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 Third Quarter 2018:

- The relative standard deviation did not meet criteria for dissolved selenium in sample MW-65-225-Q318 in diluted and undiluted analyses. The sample was qualified as estimated and flagged "J."
- Dissolved molybdenum was recovered at concentrations greater than quality control (QC) limits in the matrix spike duplicate (MSD) and post-digestion spike of sample MW-63-065-Q318. The associated parent and field duplicate samples were qualified as an estimated detect and flagged "J."
- Nitrate/nitrite as nitrogen was recovered at concentrations greater than QC limits in the MSDs of samples TW-03D-0818 and MW-73-080-Q318. Additionally, the relative percent difference between

matrix spike (MS)/MSD of sample TW-03D-0818 exceeded the QC criteria. The associated parent samples were qualified as estimated detects and flagged “J.”

- Nitrate/nitrite as nitrogen demonstrated a relative percent difference greater than QC criteria for the field duplicate pair of samples C-CON-S-Q318/MW-909-Q318. The associated results were qualified as estimated detects and flagged “J.”
- Based on the March 2007 United States Environmental Protection Agency (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 Third Quarter 2018 sampling event analyzed in a certified lab are considered estimated.

No other significant analytical deficiencies were identified in the Third Quarter 2018 data. Additional details are provided in the data validation reports kept in the project file and available upon request.

4 THIRD QUARTER 2018 IM PERFORMANCE MONITORING PROGRAM EVALUATION

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

4.1 Distribution of Hexavalent Chromium in the Floodplain

Cr(VI) data collected as part of the Third 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) concentrations in the upper-depth (shallow wells) and lower-depth (deep wells) intervals of the Alluvial Aquifer is shown in plan view and cross-section view (cross-section A) on Figure 4-1. Figure 4-2 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 4-1. 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 in the floodplain area.

Appendix D provides Cr(VI) concentration time series charts for wells sampled in Third Quarter 2018 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, therefore, 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. In Third Quarter 2018, Cr(VI) concentrations at the six wells were below 20 µg/L (Appendices B and D). 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.

4.2 IM Extraction System Operation

During Third 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 21,804,981 gallons of groundwater during Third Quarter 2018, and an estimated 86.7 pounds (39.3 kilograms) of chromium were removed from the aquifer between June 1 and September 30, 2018 (Table 4-1). Note that groundwater extraction is reported on a different schedule than chromium removal reporting (i.e., July - October and June - September, respectively; Table 4-1). The operational runtime percentage for the IM-3 system during Third Quarter 2018 was 91.1 percent. Appendix E 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 123.2 gpm, including periods of planned and unplanned downtime. The average monthly pumping rates were 119.1 gpm (July 2018), 108.4 gpm (August 2018), 133.6 (September 2018), and 131.7 gpm (October 2018). Table 4-1 shows the average pumping rates and total groundwater volumes pumped during Third Quarter 2018.

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

During Third Quarter 2018, Cr(VI) and dissolved chromium concentrations in three out of four wells monitored were lower than the 2014 maximum concentrations. In October 2018, Cr(VI) concentrations detected at extraction well PE-01 (7.6 µg/L) exceeded the 2014 maximum concentration of 5.6 µg/L; however, concentrations were not detected at this well in July, August, and September 2018. Similar results were observed in September 2017 where Cr(VI) concentrations were detected at 9.0 µg/L, but were observed below the notification level throughout the rest of the year.

The DTSC was notified of this exceedance via email on November 6, 2018. Because Cr(VI) concentrations in PE-01 remained lower than the regional natural background level of 32 µg/L in Third Quarter 2018, and landward groundwater gradients and hydraulic compliance were maintained (as discussed in Section 4.3 below), ongoing monitoring and data evaluation were recommended before reinitiating pumping at PE-01. Shutdown of extraction well PE-01 continued through the end of the reporting period. Table 4-2 presents the Cr(VI) and dissolved chromium concentrations and their associated 2014 maximum concentrations.

4.3 IM Hydraulic Monitoring Results

Table 4-3 presents the Third 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 F. 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 4-3a, 4-3b, and 4-3c present the average Third Quarter 2018 groundwater elevations and associated groundwater contours for the shallow, mid-depth, and deep wells, respectively. Figure 4-4 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 4-3a, 4-3b, 4-3c, or 4-4.

During Third 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 1.4.2.2, a landward hydraulic gradient of 0.001 ft/ft must be maintained to demonstrate compliance with the performance standard. Table 4-4 presents the monthly average hydraulic gradients measured for each of the gradient well pairs in Third Quarter 2018, as well as the overall average of all well pairs. The overall monthly average gradients for all well pairs were 0.0033, 0.0030, 0.0040, and 0.0035 ft/ft for July, August, September, and October 2018, respectively. Landward gradients measured each month exceeded the 0.001 ft/ft requirement, as shown in Table 4-4. Figure 4-5 illustrates the measured hydraulic gradients during Third Quarter 2018 with the concurrent Colorado River elevations and IM-3 pumping rates.

Hydraulic Gradient Evaluation: Arizona Side of the Colorado River

During Third 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 4-3b and 4-3c, and are used for contouring where appropriate. With the exception of 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 4-3b). In Third Quarter 2018, the pressure transducer located at MW-55-120 was not functioning properly; therefore, groundwater contouring of deep wells on the Arizona side of the Colorado River was limited. However, average quarterly water levels at MW-54-085 and MW-55-045, as shown on Figures 4-3b and 4-3c, indicate that potentiometric levels 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.

4.4 IM Contingency Plan Monitoring Results

During Third Quarter 2018, Cr(VI) concentrations in the three 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 4-5.

4.5 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 4-6 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 November 2018 is based on the October 2018 USBR projections of Davis Dam release and Lake Havasu level. Future projections of Colorado River stage, shown on Figure 4-6, are based on USBR long-range projections of Davis Dam releases and Lake Havasu levels from October 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 4-6, show that the projected Davis Dam release for November 2018 is 10,500 cubic feet per second, and the predicted Colorado River elevation at the I-3 gauge is 454.40.

4.6 Third Quarter 2018 Performance Monitoring Program Evaluation Summary

A summary of the Third 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 21,804,981 gallons of groundwater were extracted by the IM-3 system, and an estimated 86.7 pounds (39.3 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 2014 maximum concentrations (i.e., notification levels), except at PE-01 in October 2018. The DTSC was notified with results from this well 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 July, August, September, and October 2018 were 3.3, 3.0, 4.0, and 3.5 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.

5 UPCOMING OPERATION AND MONITORING EVENTS

GMP, RMP, and PMP monitoring activities will continue under direction from the DTSC in Fourth Quarter 2018. Monitoring activities and results will be reported in the Fourth Quarter 2018 and Annual PMP-GMP Report (planned for submittal by March 15, 2019).

5.1 Groundwater Monitoring Program

5.1.1 Monthly Groundwater Monitoring

Monthly GMP monitoring events are planned for November and December 2018 at extraction wells PE-01 and TW-03D.

5.1.2 Quarterly Groundwater Sampling

The quarterly GMP monitoring event is planned for December 2018. This event will consist of groundwater sampling and inspection of 141 monitoring wells. Any necessary corrective actions to monitoring wells will be performed in a timely manner.

If rainfall events occur in Fourth Quarter 2018 that cause surface water flow in Bat Cave Wash, monitoring wells MW-09, MW-10, and MW-11 will be sampled.

5.1.3 Sampling Method Trials at Select Wells

Sampling in support of the sampling method trials will be conducted at monitoring wells MW-38S, MW-38D, MW-40S, MW-40D, MW-57-185, MW-60BR-245, MW-70BR-225, MW-72BR-200, TW-04, and TW-05 in Fourth Quarter 2018.

5.2 Surface Water Monitoring Program

The surface water monitoring event is planned for December 2018. This event will consist of surface water sampling at 16 locations.

5.3 IM Performance Monitoring Program

5.3.1 Chromium Monitoring

Chromium monitoring will be performed as part of the Fourth Quarter 2018 monthly and quarterly GMP monitoring events. Cr(VI) chromium data will be collected from a total of 143 monitoring wells.

5.3.2 IM Extraction System Operation

During Fourth Quarter 2018, 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.

Fourth Quarter 2018 GMP monitoring results from wells listed in the July 20, 2015 DTSC approval letter for conditional PE-01 shutoff (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.

5.3.3 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 two 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.

In addition, manual water level measurements will be collected in December 2018 from 25 shallow wells in the IM hydraulic monitoring network within a 3-hour period. These measurements will be used to create a snapshot of groundwater elevations within the shallow depth interval of the Alluvial Aquifer.

5.3.4 IM Contingency Plan Monitoring

Fourth Quarter 2018 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).

5.4 Quarterly Notifications

Email notifications will be sent to the DTSC in Fourth Quarter 2018 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.

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TABLES

Table 1-1

Topock Monitoring Reporting Schedule

Third Quarter 2018 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
Third Quarter 2018 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

Printed: 11/14/2018

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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	--	--	--	--	

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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	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, Third Quarter 2018

Third Quarter 2018 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)	ORP (mV)	Field pH (SU)	Turbidity (NTU)
MW-34-100	DA	10/1/2018		LF	ND (1)	ND (1)	10,000	49	ND (0.5)	3.6	1.6	200	-91	7.8	2
MW-38S	SA	9/27/2018		3V	2.7	2.8	1,700	30	3.2	5	6.2	50	57	7.9	2
MW-38S-SMT	SA	9/27/2018		LF	3	3.3	1,700	29	3.4	4.8	5.8	47	67	7.9	3
MW-44-115	DA	10/1/2018		LF	6.4	7	11,000	75	ND (0.5)	ND (0.05)	5.4	17	-10	8.2	10
MW-46-175	DA	10/2/2018		LF	6.5	7	18,000	190	ND (2.5)	1	---	---	-53	8.7	4
MW-46-175	DA	10/2/2018	FD	---	6.5	7	18,000	180	ND (2.5)	1	---	---	---	---	---
MW-58BR	BR	9/27/2018		LF	9.7	9.6	8,200	24	1.8	0.94	1.8	300	-16	7.5	2
MW-60BR-245	BR	9/25/2018		3V	76	81	16,000	58	3.6	0.21	9.1	11	70	7.8	2
MW-60BR-245_D	BR	9/25/2018		LF	6.4	6.2	15,000	57	ND (2.5)	ND (0.05)	5.3	26	45	7.8	2
MW-60BR-245_S	BR	9/25/2018		LF	ND (1)	ND (1)	15,000	57	2.2	ND (0.05)	4.7	26	25	7.8	2
MW-62-065	BR	9/26/2018		LF	540	570	5,700	13	4.7	5	1.7	ND (0.5)	82	7.3	5
MW-62-110	BR	9/26/2018		3V	ND (1)	ND (1)	12,000	59	ND (2.5)	ND (0.05)	3.2	170	-130	7.4	3
MW-63-065	BR	9/24/2018		LF	1	1.4	5,400	16 J	1	1	1.6	ND (0.5)	78	7	5
MW-63-065	BR	9/24/2018	FD	---	1	1.5	5,400	17 J	1.2	1.1	1.5	ND (0.5)	---	---	---
MW-64BR	BR	9/24/2018		LF	ND (1)	ND (1)	12,000	65	ND (0.5)	ND (0.05)	4	920	-110	7.2	4
MW-65-160	SA	9/27/2018		LF	170	170	3,600	54	8.9	14	0.75	47	110	7.1	7
MW-65-225	DA	9/27/2018		LF	180	170	15,000	47	2.5 J	2.9	3.1	27	63	7.2	4
MW-65-225	DA	9/27/2018	FD	---	180	170	15,000	47	2	2.5	2.9	26	---	---	---
MW-68-180	SA	9/27/2018		LF	8,500	8,900	3,300	33	9.5	11	3.2	3.1	140	7.3	29
MW-69-195	BR	9/27/2018		LF	460	450	3,200	65	12	21	2.1	ND (0.5)	140	7.1	6
MW-72-080	BR	9/26/2018		LF	91	100	15,000	79	ND (2.5)	0.68	12	45	-2	7.5	2
MW-72BR-200	BR	9/26/2018		3V	3	2.9	15,000	76	ND (2.5)	0.14	16	15	-233	7.92	2
MW-72BR-200_D	BR	9/26/2018		LF	ND (1)	ND (1)	15,000	67	ND (2.5)	0.081	10	260	-229	7.75	3
MW-72BR-200_S	BR	9/26/2018		LF	ND (1)	ND (1)	15,000	82	ND (2.5)	0.44	15	56	-200	7.91	28
MW-73-080	BR	9/24/2018		LF	36	39	9,600	27	3.9	3 J	1.4	24	71	7.1	14
PE-01	DA	7/3/2018		Tap	ND (0.2)	ND (1)	2,400	---	---	ND (0.05)	---	500	96	7.7	1
PE-01	DA	8/1/2018		Tap	ND (0.2)	ND (1)	1,900	---	---	ND (0.05)	---	370	92	7.9	4
PE-01	DA	9/6/2018		Tap	ND (0.2)	ND (1)	4,000	---	---	ND (0.05)	---	470	-26	7.9	1
PE-01	DA	10/2/2018		Tap	7.6	5.6	4,400	---	---	0.33	---	30	---	---	---
TW-02D	DA	9/26/2018		Tap	ND (0.2)	ND (1)	3,800	12	1.3	---	---	84	180	6.9	6
TW-02D	DA	9/26/2018	FD	---	ND (0.2)	ND (1)	4,000	12	1.5	---	---	86	---	---	---
TW-03D	DA	7/3/2018		Tap	480	500	7,200	---	---	2.7	---	17	100	7.6	1
TW-03D	DA	8/1/2018		Tap	480	480	7,200	---	---	2.7 J	---	13	89	7.8	4
TW-03D	DA	9/6/2018		Tap	500	510	7,600	---	---	2.7	---	34	91	8.1	1
TW-03D	DA	10/2/2018		Tap	480	500	7,500	---	---	2.6	---	12	47	8.6	1

Table 3-1

Groundwater Sampling Results, Third Quarter 2018

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

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 molybdenum, dissolved selenium, dissolved arsenic, dissolved manganese = SW6020
   PE-01/TW-03D: dissolved chromium, dissolved manganese = USEPA 200.8
   Specific conductance = USEPA 120.1
   Nitrate/Nitrate as Nitrogen = SM 4500-NO3 F
3. Monitoring wells MW-57-050 and MW-58-065 were dry during the Third Quarter 2018 sampling event.

-- = not applicable.
µg/L = micrograms per liter.
µS/cm = microSiemens per centimeter.
3V = three volume.
BR = bedrock.
COPC = constituent of potential concern.
DA = deep interval of Alluvial Aquifer.
DTSC = Department of Toxic Substance Control.
FD = field duplicate.
ID = identification.
J = concentration or reporting limit (RL) estimated by laboratory or data validation.
LF = Low Flow (minimal drawdown)
mg/L = milligrams per liter.
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

Surface Water Sampling Results, Third Quarter 2018

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

							COPCs			In Situ Byproducts				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	9/12/2018		ND (0.2)	ND (1)	8.1	880	4.6	1.7	0.37	2.6	ND (20)	36	1.2	110	ND (10)
C-CON-D	9/13/2018		ND (0.2)	ND (1)	7.6	850	4.5	1.5	0.41	2.6	ND (20)	34	1.7	110	ND (10)
C-CON-S	9/13/2018		ND (0.2)	ND (1)	8.1	860	4.8	1.4	0.52 J	2.8	ND (20)	31	1.8	110	ND (10)
C-CON-S	9/13/2018	FD	ND (0.2)	ND (1)	--	860	4.6	1.4	0.38 J	2.6	ND (20)	29	1.8	110	ND (10)
C-I-3-D	9/12/2018		ND (0.2)	ND (1)	8.1	880	4.7	1.5	0.41	2.7	ND (20)	33	1.1	110	ND (10)
C-I-3-S	9/12/2018		ND (0.2)	ND (1)	8.1	890	4.4	1.5	0.38	2.5	ND (20)	33	1	110	ND (10)
C-MAR-D	9/13/2018		ND (0.2)	ND (1)	8.1	850	4.6	1.6	0.34	2.7	39	1100	14	110	36
C-MAR-S	9/13/2018		ND (0.2)	ND (1)	8.2	870	4.7	1.4	0.52	2.5	ND (20)	360	11	110	21
C-NR1-D	9/13/2018		ND (0.2)	ND (1)	8.1	860	4.6	1.5	0.36	2.6	ND (20)	32	1.8	110	ND (10)
C-NR1-D	9/13/2018	FD	ND (0.2)	ND (1)	--	850	4.7	1.5	0.38	2.6	ND (20)	41	1.8	110	ND (10)
C-NR1-S	9/13/2018		ND (0.2)	ND (1)	8.1	850	4.4	1.7	0.37	2.5	ND (20)	33	2.1	110	ND (10)
C-NR3-D	9/13/2018		ND (0.2)	ND (1)	8.1	860	4.7	1.5	0.36	2.7	ND (20)	30	2.1	110	ND (10)
C-NR3-S	9/13/2018		ND (0.2)	ND (1)	8.1	860	4.7	1.7	0.35	2.7	ND (20)	37	2	110	ND (10)
C-NR4-D	9/13/2018		ND (0.2)	ND (1)	8.1	870	4.7	1.4	0.35	2.7	ND (20)	28	2.9	110	ND (10)
C-NR4-S	9/13/2018		ND (0.2)	ND (1)	8.1	860	4.4	1.5	0.42	2.6	ND (20)	24	2.4	110	ND (10)
C-NR4-S	9/13/2018	FD	ND (0.2)	ND (1)	--	860	4.7	1.7	0.42	2.6	ND (20)	27	2.2	110	ND (10)
C-R22A-D	9/12/2018		ND (0.2)	ND (1)	8.1	860	4.9	1.6	0.35	2.7	23	34	1	110	ND (10)
C-R22A-S	9/12/2018		ND (0.2)	ND (1)	8.1	870	4.5	1.4	0.41	2.6	ND (20)	34	1.1	110	ND (10)
C-R27-D	9/12/2018		ND (0.2)	ND (1)	8.1	870	4.6	1.5	0.45	2.6	ND (20)	32	1.3	110	ND (10)
C-R27-S	9/12/2018		ND (0.2)	ND (1)	8.1	880	4.8	1.5	0.44	2.6	52	32	1.4	110	ND (10)
C-TAZ-D	9/12/2018		ND (0.2)	ND (1)	8	880	4.5	1.5	0.4	2.6	39	36	0.78	110	ND (10)
C-TAZ-S	9/12/2018		ND (0.2)	ND (1)	8.1	880	4.7	1.6	0.37	2.5	ND (20)	27	1.2	110	ND (10)
SHORELINE LOCATIONS															
R-19	9/13/2018		ND (0.2)	ND (1)	8.2	860	4.3	1.5	0.39	2.4	ND (20)	58	1.5	110	ND (10)
R-19	9/13/2018	FD	ND (0.2)	ND (1)	--	870	4.7	1.7	0.44	2.7	ND (20)	32	1.7	110	ND (10)
R-28	9/12/2018		ND (0.2)	ND (1)	8.1	880	4.7	1.5	0.36	2.6	ND (20)	33	1.3	110	ND (10)
R-63	9/12/2018		ND (0.2)	ND (1)	8	880	4.6	1.7	0.38	2.6	ND (20)	39	1.3	110	ND (10)
OTHER SURFACE WATER LOCATIONS															
SW-1	9/12/2018		ND (0.2)	ND (1)	7.9	910	--	--	--	--	--	--	--	--	--
SW-2	9/12/2018		ND (0.2)	ND (1)	7.9	910	--	--	--	--	--	--	--	--	--

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 = SW6020
   Dissolved iron, total iron, dissolved manganese, dissolved molybdenum = SW6010B
   Specific conductance = USEPA 120.1
   Dissolved selenium = SW6020A
   Nitrate/Nitrate as Nitrogen = SM 4500-NO3 F
   Total suspended solids = SM 2540D
3. Location RRB was not sampled during Third Quarter 2018 due to inaccessibility.

Table 3-2
Surface Water Sampling Results, Third Quarter 2018
Third Quarter 2018 Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

-- = 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
Pumping Rate and Extracted Volume for IM System, Third Quarter 2018
Third Quarter 2018 Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report
PG&E Topock Compressor Station, Needles, California

Extraction Well ID	July 2018		August 2018		September 2018		October 2018		Third Quarter 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)	Average Pumping Rate[a] (gpm)	Volume Pumped (gal)
TW-02S	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
TW-02D	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
TW-03D	119.05	5,314,470	108.42	4,839,984	133.60	5,771,467	131.67	5,877,747	123.19	21,803,667
PE-01	0.00	198	0.01	367	0.01	382	0.01	368	0.01	1,314
TOTAL	**119.1**	**5,314,668**	**108.4**	**4,840,351**	**133.6**	**5,771,849**	**131.7**	**5,878,114**	**123.2**	**21,804,981**
Chromium Removed This Quarter (kg)										39.3
Chromium Removed Project to Date (kg)										4,220
Chromium Removed This Quarter (lb)										86.7
Chromium Removed Project to Date (lb)										9,310

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 June 1, 2018 through September 30, 2018.

gal = gallons.
gpm = gallons per minute.
IM = Interim Measure.
kg = kilograms.
lb = pounds.

Table 4-1
Pumping Rate and Extracted Volume for IM-3 System, Third Quarter 2018
Third Quarter 2018 Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report
PG&E Topock Compressor Station, Needles, California

Extraction Well ID	July 2018		August 2018		September 2018		October 2018		Third Quarter 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)	Average Pumping Rate[a] (gpm)	Volume Pumped (gal)
TW-02S	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
TW-02D	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
TW-03D	119.05	5,314,470	108.42	4,839,984	133.60	5,771,467	131.67	5,877,747	123.19	21,803,667
PE-01	0.00	198	0.01	367	0.01	382	0.01	368	0.01	1,314
TOTAL	**119.1**	**5,314,668**	**108.4**	**4,840,351**	**133.6**	**5,771,849**	**131.7**	**5,878,114**	**123.2**	**21,804,981**
									Chromium Removed This Quarter (kg)	39.3
									Chromium Removed Project to Date (kg)	4,220
									Chromium Removed This Quarter (lb)	86.7
									Chromium Removed Project to Date (lb)	9,310

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 June 1, 2018 through September 30, 2018.

gal = gallons.
gpm = gallons per minute.
IM = Interim Measure.
kg = kilograms.
lb = pounds.

Table 4-2

Wells Monitored for Conditional Shutdown of PE-01, Third Quarter 2018

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

PG&E Topock Compressor Station, Needles, California

Location ID	Sample Date	Sample Method	Hexavalent Chromium		Dissolved Chromium		Exceeded 2014 Maximum Concentration?
			2014 Maximum Concentration (µg/L)	Q3 2018 Result (µg/L)	2014 Maximum Concentration (µg/L)	Q3 2018 Result (µg/L)	
WELLS IN SHALLOW ZONE OF ALLUVIAL AQUIFER							
MW-20-070	--	--	2,200	NS	2,400	NS	--
MW-26	--	--	2,400	NS	2,300	NS	--
MW-27-020	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-28-025	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-30-030	--	--	0.21	NS	ND (1.0)	NS	--
MW-31-060	--	--	600	NS	660	NS	--
MW-32-020	--	--	ND (1.0)	NS	ND (5.0)	NS	--
MW-32-035	--	--	ND (1.0)	NS	ND (1.0)	NS	--
MW-33-040	--	--	0.28	NS	ND (1.0)	NS	--
MW-36-020	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-36-040	--	--	0.34	NS	ND (1.0)	NS	--
MW-39-040	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-42-030	--	--	0.54	NS	ND (1.0)	NS	--
MW-47-055	--	--	16	NS	16	NS	--
WELLS IN MIDDLE ZONE OF ALLUVIAL AQUIFER							
MW-20-100	--	--	2,900	NS	2,900	NS	--
MW-27-060	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-30-050	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-33-090	--	--	13.3	NS	15.5	NS	--
MW-34-055	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-36-050	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-36-070	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-39-050	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-39-060	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-39-070	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-42-055	--	--	0.35	NS	2.8	NS	--
MW-42-065	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-44-070	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-51	--	--	4,800	NS	4,800	NS	--
WELLS IN DEEP ZONE OF ALLUVIAL AQUIFER							
MW-20-130	--	--	9,100	NS	9,000	NS	--
MW-27-085	--	--	ND (1.0)	NS	ND (1.0)	NS	--
MW-28-090	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-31-135	--	--	12	NS	12	NS	--
MW-33-150	--	--	12	NS	10.8	NS	--
MW-33-210	--	--	13	NS	13.5	NS	--
MW-34-080	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-34-100	10/1/2018	LF	263	ND (1)	270	ND (1)	No
MW-36-090	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-36-100	--	--	65	NS	62	NS	--
MW-39-080	--	--	ND (0.20)	NS	ND (1.0)	NS	--
MW-39-100	--	--	57	NS	49	NS	--
MW-44-115	10/1/2018	LF	41.6	6.4	42.9	7	No
MW-44-125	--	--	4.0 J	NS	5.9	NS	--

Table 4-2

Wells Monitored for Conditional Shutdown of PE-01, Third Quarter 2018

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

PG&E Topock Compressor Station, Needles, California

Location ID	Sample Date	Sample Method	Hexavalent Chromium		Dissolved Chromium		Exceeded 2014 Maximum Concentration?
			2014 Maximum Concentration (µg/L)	Q3 2018 Result (µg/L)	2014 Maximum Concentration (µg/L)	Q3 2018 Result (µg/L)	
MW-45-095a	--	--	13.7*	NS	14.2*	NS	--
MW-46-175	10/2/2018	LF	46.3	6.5	46.1	7	No
MW-46-205	--	--	5.5	NS	4.8	NS	--
MW-47-115	--	--	24	NS	20	NS	--
PE-01	7/3/2018	Tap	5.6	ND (0.2)	6	ND (1)	No
	8/1/2018			ND (0.2)		ND (1)	No
	9/6/2018			ND (0.2)		ND (1)	No
	10/2/2018			7.6		5.6	Yes
TW-04	--	--	7.4*	NS	6.5*	NS	--

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.

-- = not applicable.
µg/L = micrograms per liter.
DTSC = Department of Toxic Substance Control.
ID = identification.
LF = low flow (minimal drawdown).
ND = not detected at listed reporting limit.
NS = not sampled.
Q3 = third 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 (United States Environmental Protection Agency ID No. CAT080011729)." July 20.

Table 4-3

Interim Measure Hydraulic Monitoring Results, Third Quarter 2018

Third Quarter 2018 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)					
	July Average	August Average	September Average	October Average	Quarterly Average	Days in Quarterly Average
WELLS IN SHALLOW ZONE OF ALLUVIAL AQUIFER						
MW-20-070	454.43	454.11	453.95	453.47	453.99	123
MW-22	455.60	455.16	455.28	454.84	455.22	123
MW-25	456.11	455.74	455.56	455.35	455.69	123
MW-26	INC	455.43	455.29	455.03	INC	91
MW-27-020	456.18	455.23	INC	INC	INC	66
MW-28-025	455.89	455.13	455.74	454.68	455.36	123
MW-31-060	455.39	454.88	455.05	454.47	454.95	123
MW-32-035	INC	INC	455.41	454.49	INC	56
MW-33-040	455.80	455.82	455.59	455.30	455.63	123
MW-35-060	456.29	455.65	456.08	455.23	455.81	123
MW-36-020	INC	455.10	455.50	454.67	INC	91
MW-36-040	455.61	454.96	455.39	454.49	455.11	123
MW-39-040	455.30	454.70	455.15	454.30	454.86	123
MW-42-030	455.51	454.89	455.28	454.46	455.03	123
MW-43-025	455.84	455.07	455.74	454.70	455.33	123
MW-47-055	456.13	455.59	455.82	455.14	455.66	120
WELLS IN MIDDLE ZONE OF ALLUVIAL AQUIFER						
MW-20-100	453.92	453.60	453.31	452.84	453.42	123
MW-27-060	455.89	455.16	455.77	454.77	455.40	123
MW-30-050	455.52	454.92	455.30	454.41	455.03	123
MW-33-090	INC	455.28	455.65	454.82	INC	92
MW-34-055	455.86	455.23	455.27	454.65	455.25	123
MW-36-050	455.56	454.90	455.38	454.45	455.07	123
MW-36-070	455.55	454.90	454.71	454.41	454.89	123
MW-39-050	455.31	INC	INC	454.15	INC	62
MW-39-060	455.16	454.61	454.86	454.06	454.67	123
MW-39-070	454.56	454.12	454.17	453.47	454.08	123
MW-42-065	455.48	454.87	455.26	454.49	455.02	123
MW-44-070	455.68	455.00	455.54	454.54	455.19	123
MW-50-095	455.83	455.38	455.47	454.95	455.41	123
MW-51	455.32	455.04	454.88	454.60	454.95	120
MW-55-045	456.71	456.29	456.46	456.10	456.39	123
WELLS IN DEEP ZONE OF ALLUVIAL AQUIFER						
MW-20-130	453.53	453.17	452.86	452.29	452.97	123
MW-27-085	455.78	455.16	455.69	454.69	455.33	123
MW-28-090	INC	455.06	455.61	454.62	455.12	94
MW-31-135	454.62	454.27	454.23	453.63	454.19	123
MW-33-150	455.89	455.45	455.71	455.01	455.52	123
MW-34-080	456.11	455.39	455.95	454.95	455.60	123
MW-34-100	455.87	455.17	455.64	454.65	455.33	123
MW-35-135	456.00	455.46	455.70	455.09	455.56	123
MW-36-090	455.08	454.53	454.81	453.72	454.53	123
MW-36-100	455.32	454.73	455.01	454.18	454.80	123
MW-39-080	454.53	454.08	454.13	453.42	454.04	123
MW-39-100	455.04	INC	INC	454.10	INC	60
MW-43-090	INC	455.25	455.94	454.87	INC	91
MW-44-115	455.15	454.54	454.89	454.06	454.65	121
MW-44-125	455.72	455.10	455.43	454.61	455.21	123
MW-45-095a	455.44	454.80	455.52	454.32	455.02	123
MW-46-175	455.74	455.20	455.51	454.76	455.29	120
MW-47-115	455.67	INC	INC	454.73	INC	63
MW-49-135	456.15	455.55	455.94	455.13	455.69	123
MW-54-085	456.08	455.40	456.04	454.98	455.62	123
MW-54-140	455.55	454.93	455.41	454.61	455.12	123
MW-54-195	454.90	454.31	454.76	454.07	454.51	123
MW-55-120	INC	456.20	456.43	456.17	INC	90
PT-2D	454.48	454.05	INC	INC	INC	68
PT-5D	455.01	454.52	454.65	453.90	454.52	123
PT-6D	454.92	454.44	INC	INC	INC	68
SURFACE WATER MONITORING LOCATIONS						
I-3	456.33	455.58	456.29	455.16	455.84	123
RRB	INC	INC	INC	INC	INC	0

Notes:

ft amsl = feet above mean sea level.

INC = data are incomplete.

ID = identification.

Table 4-4

Average Hydraulic Gradients Measured at Well Pairs, Third Quarter 2018

Third Quarter 2018 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	July	0.0033	NA	no
	August	0.0030	NA	no
	September	0.0040	NA	no
	October	0.0035	NA	no
Northern Gradient Pair MW-31-135 / MW-33-150	July	0.0027	31	no
	August	0.0025	31	no
	September	0.0031	30	no
	October	0.0029	31	no
Central Gradient Pair (used when PE-01 is run for gradient control) MW-45-095 / MW-34-100	July	--	--	no
	August	--	--	no
	September	--	--	no
	October	--	--	no
Central Gradient Pair (used when PE-01 is not run for gradient control) MW-20-130 / MW-34-100	July	0.0041	31	no
	August	0.0035	31	no
	September	0.0048	30	no
	October	0.0041	31	no
Southern Gradient Pair (used when PE-01 is run for gradient control) MW-45-095 / MW-27-085	July	--	--	no
	August	--	--	no
	September	--	--	no
	October	--	--	no
Southern Gradient Pair (used when PE-01 is not run for gradient control) MW-20-130 / MW-27-085	July	0.0033	31	no
	August	0.0029	31	no
	September	0.0041	30	no
	October	0.0035	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.
NA = not applicable.

Table 4-5

Interim Measure Contingency Plan Trigger Levels and Results, Third Quarter 2018

Third Quarter 2018 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	Trigger Level	Q3 2018 Result	Exceeded Trigger Level?
				Hexavalent Chromium (µg/L)	Hexavalent Chromium (µg/L)	
MW-21	--	--	--	20	NS	--
MW-27-085	--	--	--	20	NS	--
MW-28-090	--	--	--	20	NS	--
MW-32-020	--	--	--	20	NS	--
MW-32-035	--	--	--	20	NS	--
MW-33-040	--	--	--	20	NS	--
MW-33-090	--	--	--	25	NS	--
MW-33-150	--	--	--	20	NS	--
MW-33-210	--	--	--	20	NS	--
MW-34-080	--	--	--	20	NS	--
MW-34-100	Deep	10/1/2018	LF	750	ND (1)	No
MW-36-070	--	--	--	20	NS	--
MW-39-040	--	--	--	20	NS	--
MW-42-055	--	--	--	20	NS	--
MW-42-065	--	--	--	20	NS	--
MW-43-075	--	--	--	20	NS	--
MW-43-090	--	--	--	20	NS	--
MW-44-070	--	--	--	20	NS	--
MW-44-115	Deep	10/1/2018	LF	1200	6.4	No
MW-44-125	--	--	--	475	NS	--
MW-46-175	Deep	10/2/2018	LF	225	6.5	No
MW-46-205	--	--	--	20	NS	--
MW-47-055	--	--	--	150	NS	--
MW-47-115	--	--	--	31	NS	--

Notes:

1. If a field duplicate sample was collected, the maximum concentration between the primary and field duplicate sample is presented.

-- = not applicable or not sampled.
µg/L = micrograms per liter.
Deep = deep interval of Alluvial Aquifer.
ID = identification.
LF = Low Flow (minimal drawdown).
Middle = mid-depth interval of Alluvial Aquifer.
ND = not detected at listed reporting limit.
NS = not sampled.
Q3 = third quarter.
Shallow = shallow interval of Alluvial Aquifer.

Table 4-6

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

Third Quarter 2018 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
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

Table 4-6

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

Third Quarter 2018 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)
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	456.03	456.29	-0.26
October 2018	11,200	10,300	900	454.54	455.16	-0.62
November 2018	10,500			454.40		

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_11.pdf.

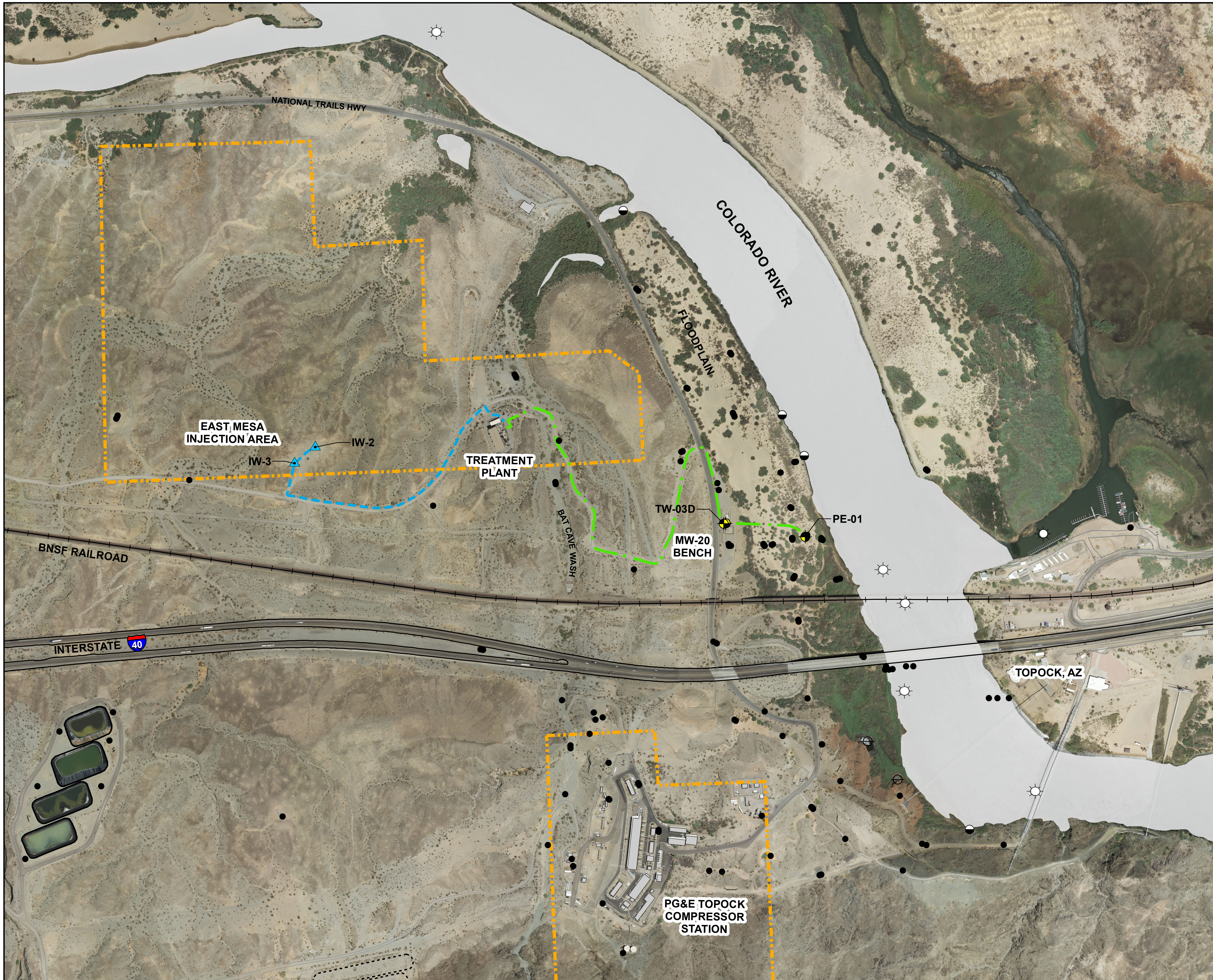
cfs = cubic feet per second.

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.

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

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

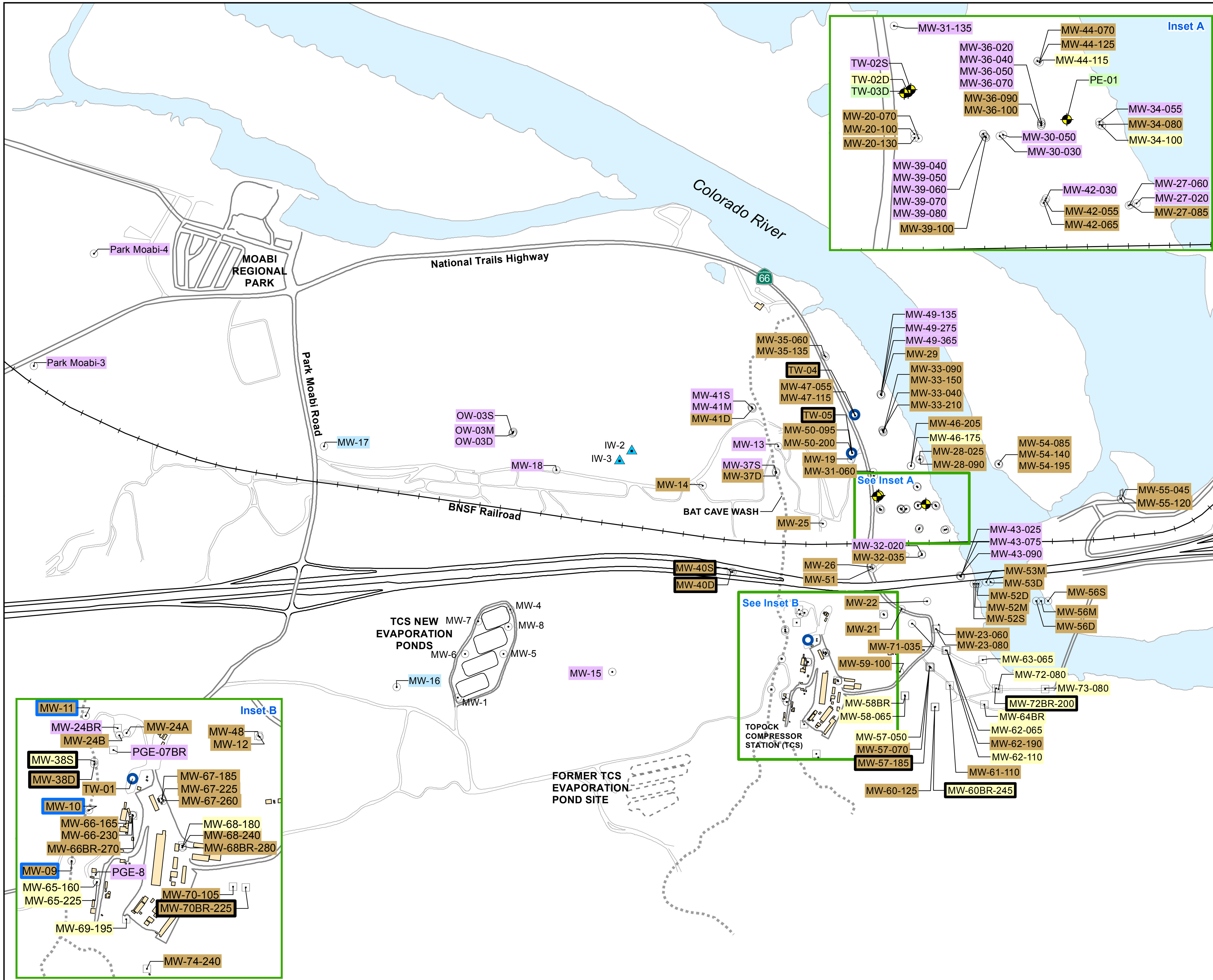
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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\3Q18\FINAL\FIGURE1-1_IM3_GMP_LOCS_2018Q3.MXD 11/14/2018 10:36:29 AM



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

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

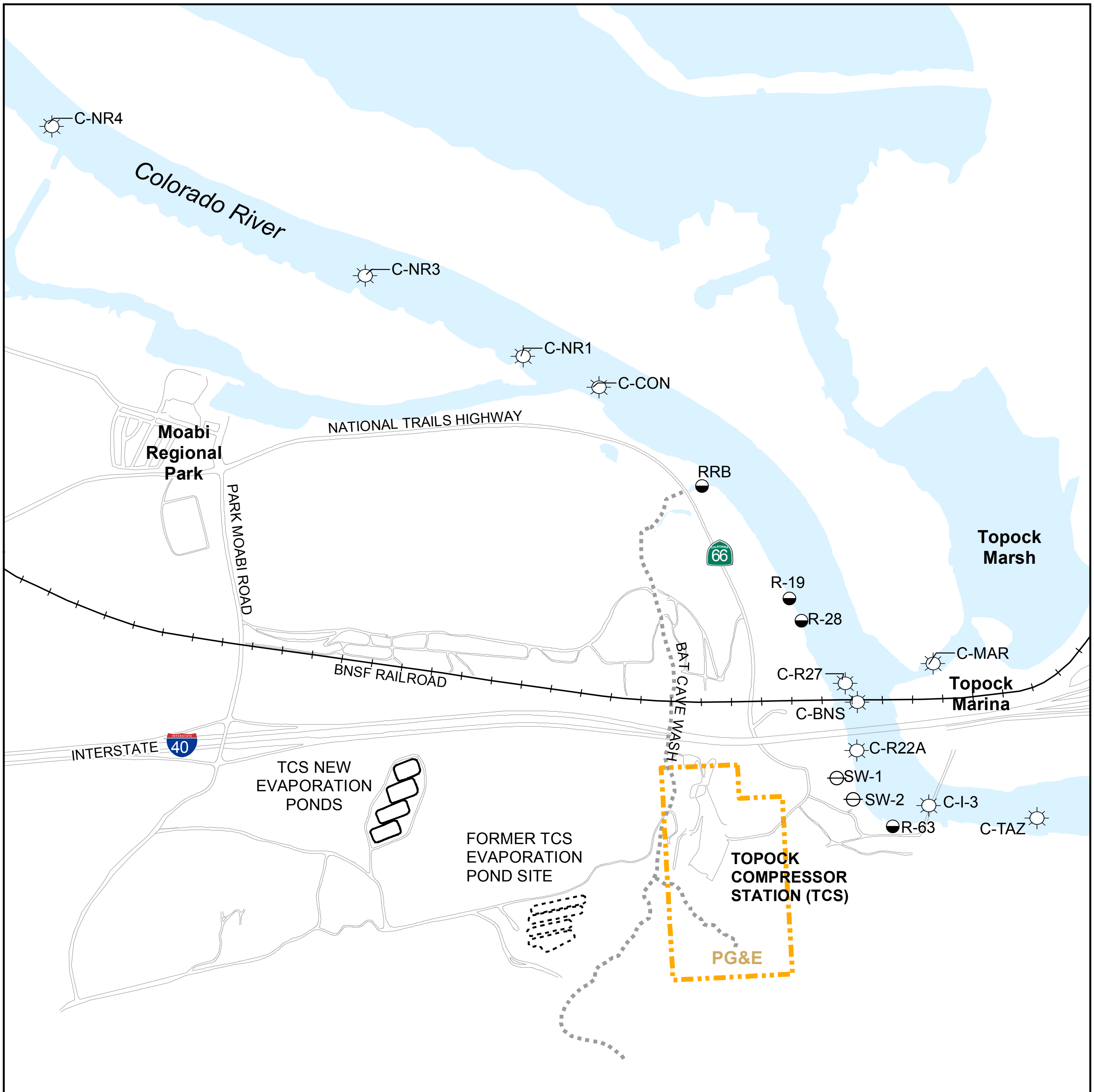
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

MONITORING LOCATIONS AND SAMPLING FREQUENCY FOR GMP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1-2

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\3Q18\FINAL\FIGURE1-2_GMP_SAMPLING_FREQUENCY_2018Q3.MXD 11/14/2018 10:32:19 AM



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

THIRD QUARTER 2018 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

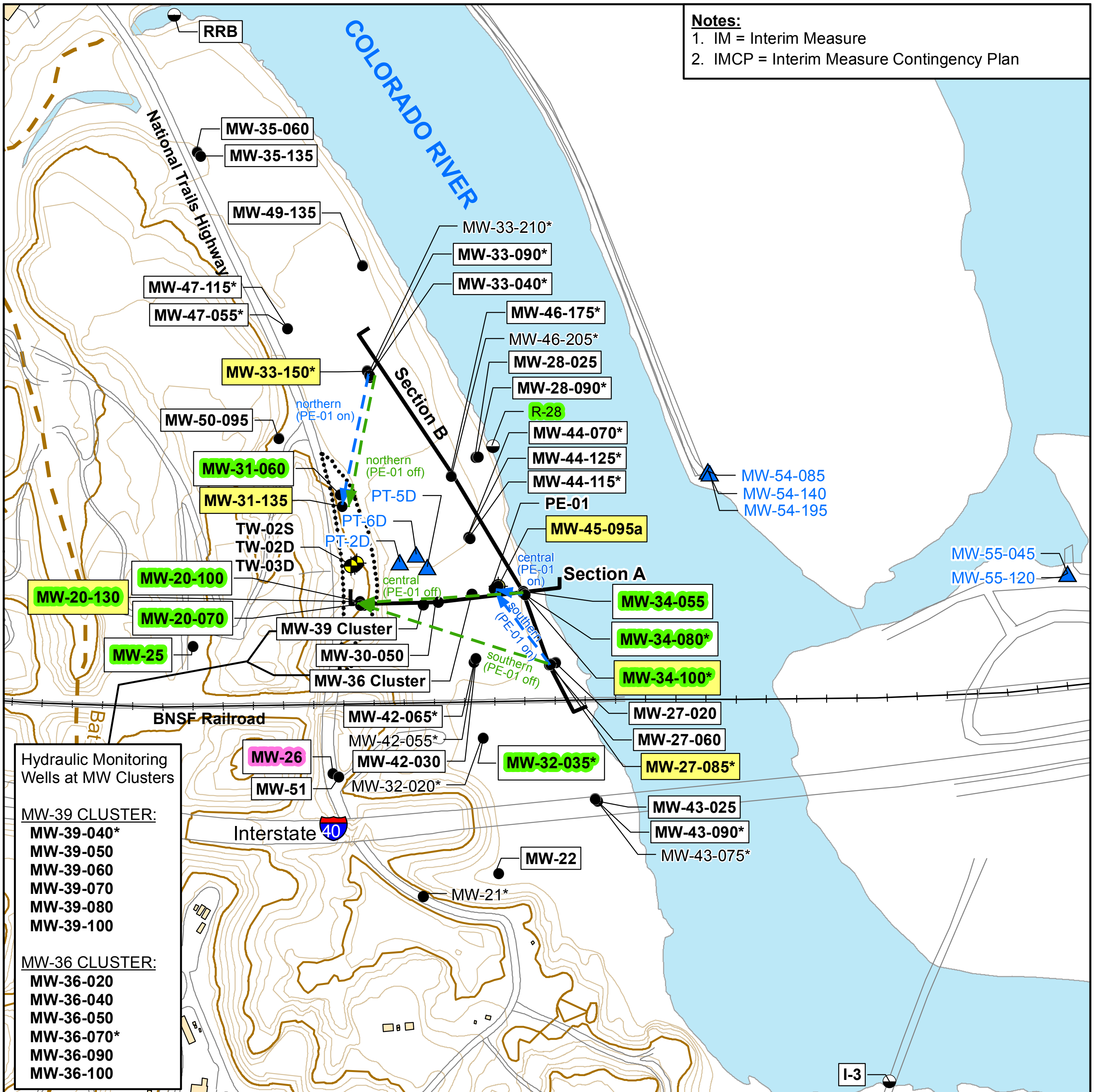
ARCADIS Design & Consultancy for natural and built assets

FIGURE

1-3

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\3Q18\FINAL\FIGURE1-3_GMP_RIVER_SWLOCS_2018Q3.MXD 11/14/2018 10:32:13 AM

Notes:
1. IM = Interim Measure
2. IMCP = Interim Measure Contingency Plan



LEGEND

Hydraulic Monitoring Network (59 Wells)

- MW-35-060 — Hydraulic Monitoring Network Well
- MW-31-135 — Hydraulic Monitoring Well - used for gradient calculation
- MW-54-085 — Hydraulic Monitoring Well - used but not required

Chemical Performance Monitoring Network (11 Locations)

- R-28 — Monitored Annually
- MW-26 — Monitored Biennially

IM Contingency Plan Network (24 wells)

- * IMCP Monitoring Well

Other IM Features

- IM Extraction Well
- River Gage Station or Sampling Location

Key Well Gradient Pair (PE-01 on)

Key Well Gradient Pair (PE-01 off)

Hydrogeologic Section

0 300 600

Feet

THIRD QUARTER 2018 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

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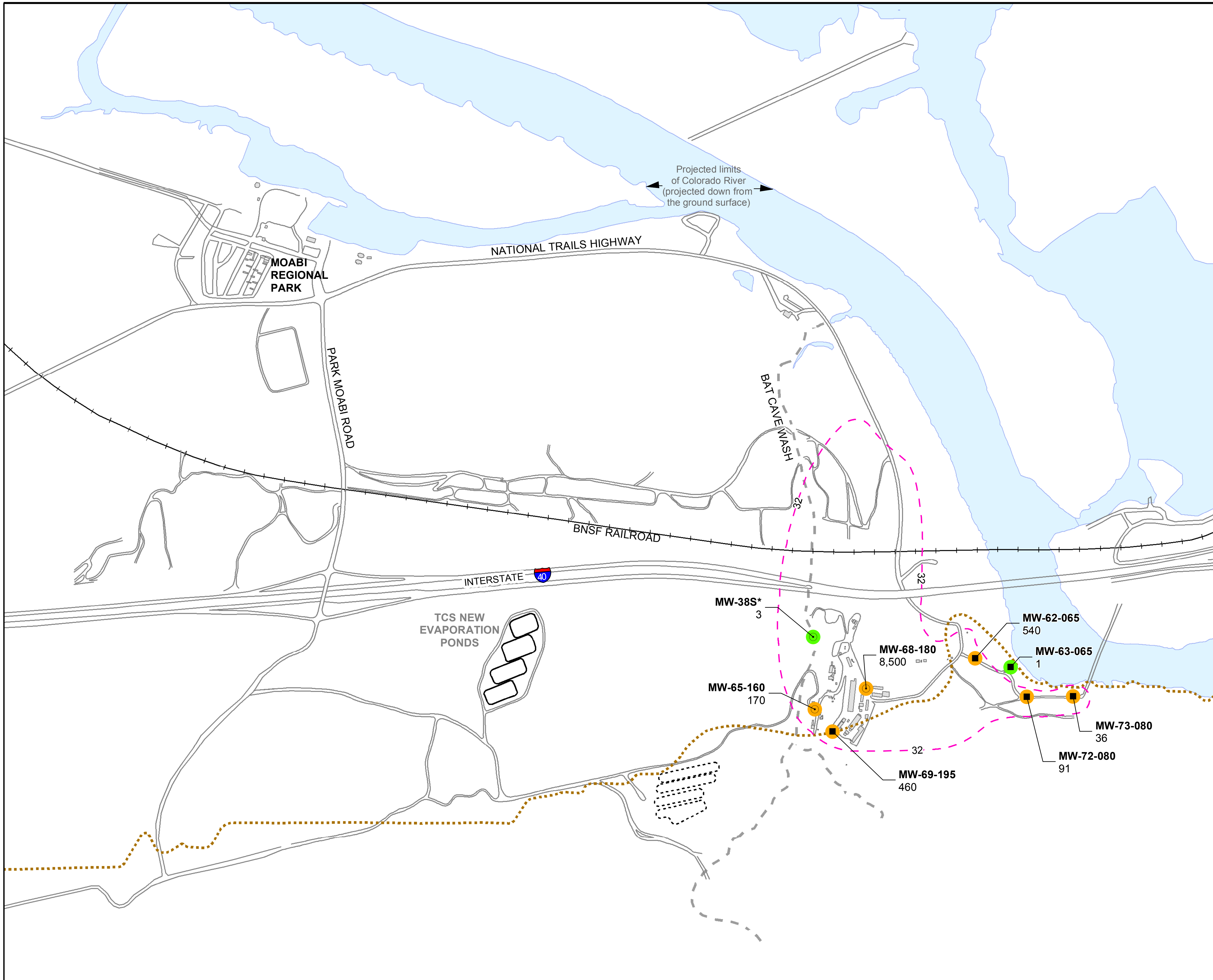
FIGURE

1-4



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-63-065 — Sampling Location
540 — Groundwater Cr(VI) Concentration (µg/L)

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

0 500 1,000
Feet

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

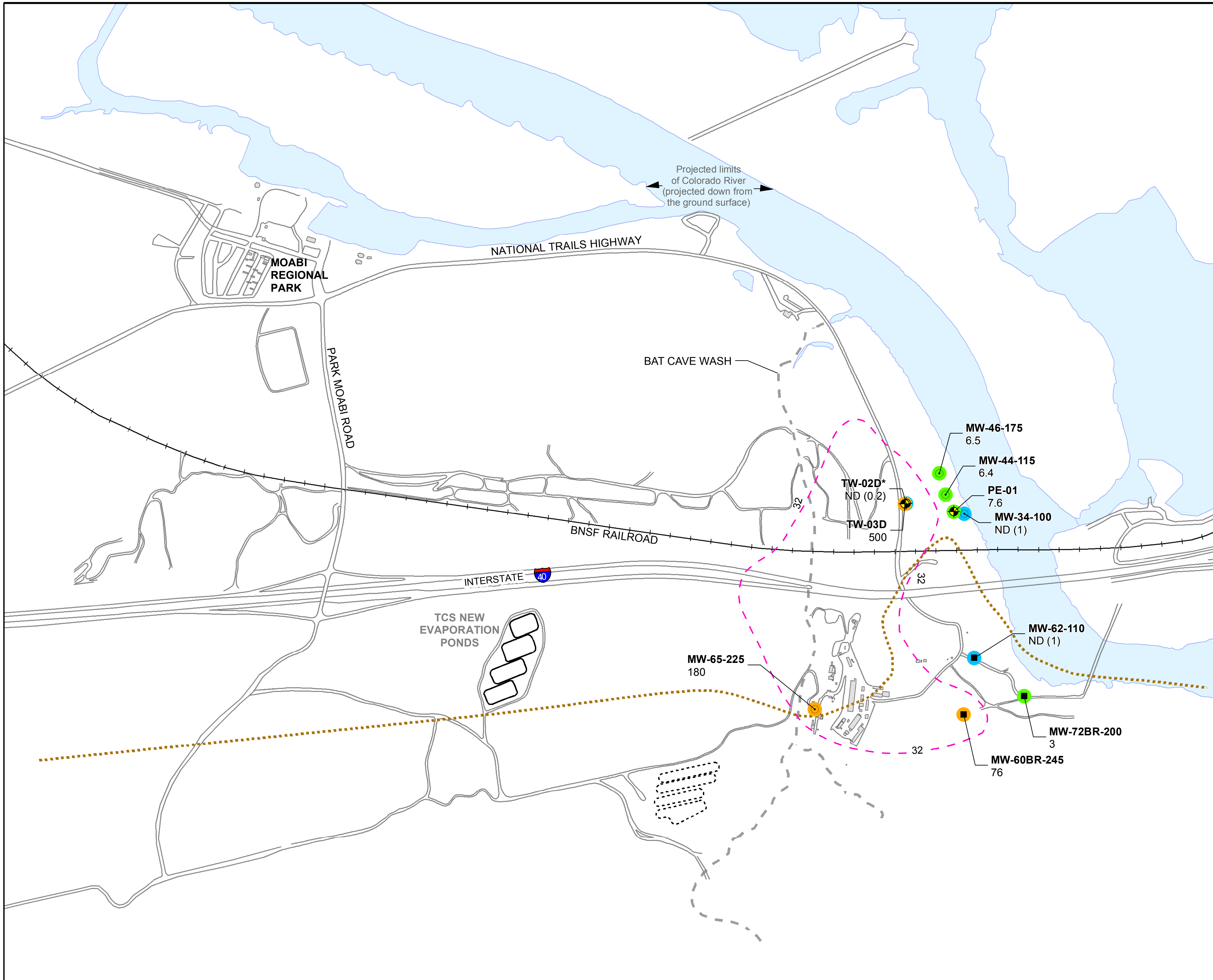
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3-1a

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\3Q18\FINAL\FIGURE3-1A_CRVI_SHALLOW_2018Q3.MXD PSI01045 11/21/2018 10:27:56 AM



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-44-115 — 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. 32 µg/L is used as the background Cr(VI) concentration in groundwater for remedial activities.
7. * = Wells with sampled values less than 32 µg/L shown within footprint of 32 µg/L boundary.
8. Results plotted are maximum concentration from primary and duplicate samples.
9. The 32 µg/L boundary for Cr(VI) is estimated based on available groundwater sampling, hydrogeologic and geochemical data.
10. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

0 500 1,000
Feet

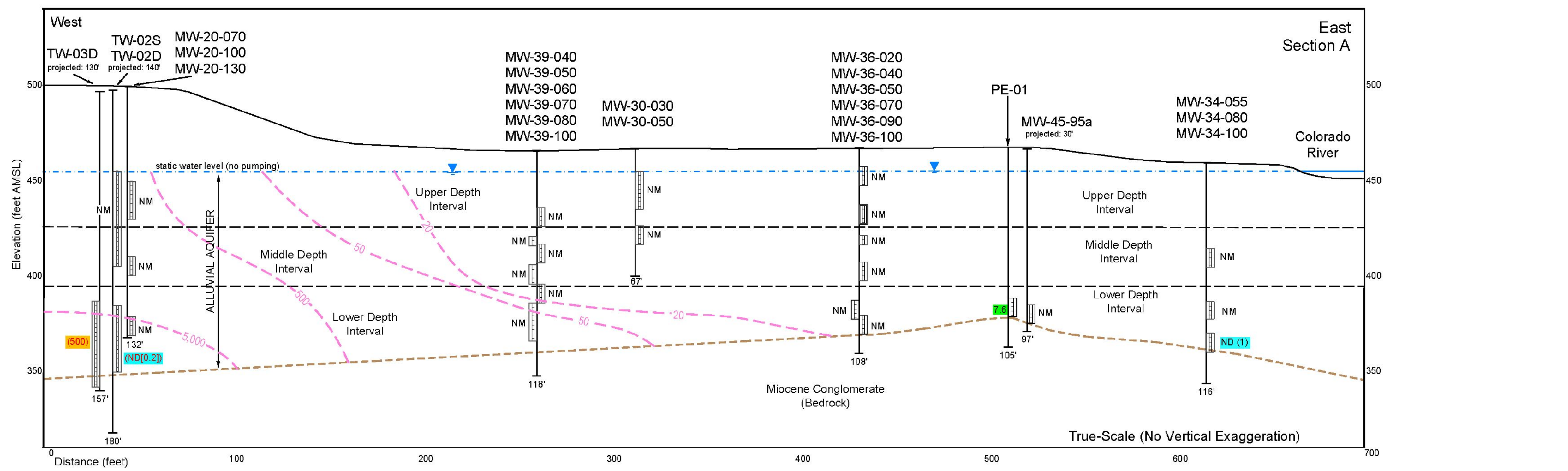
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

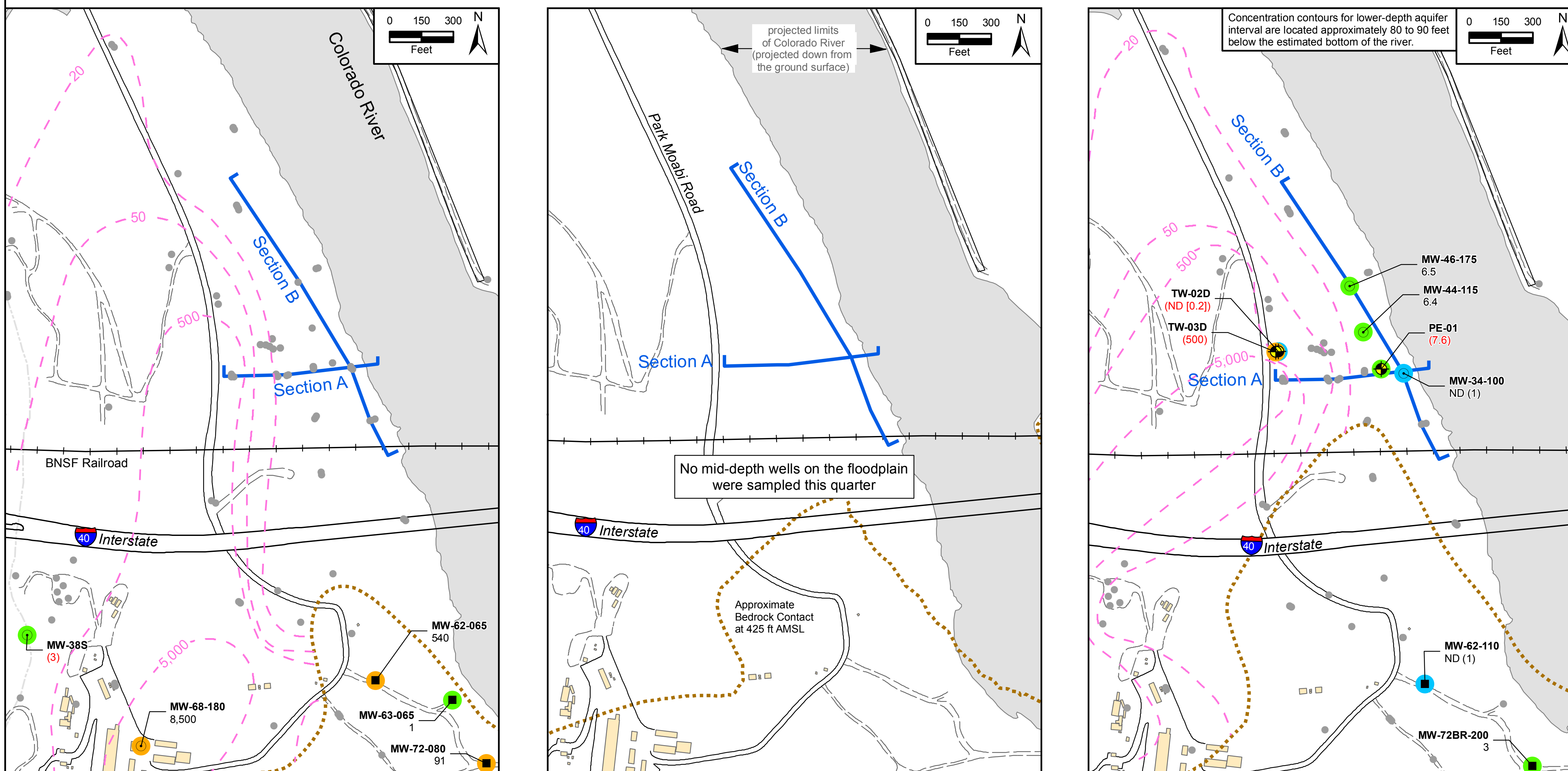
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3-1b





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

water level
well screen
7.6 Groundwater Cr(VI) Concentration (µg/L)
boring depth (feet) 105'

MW-46-175 — Sampling Location
6.5 — Groundwater Cr(VI) Concentration (µg/L)
(7.6) — 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. 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.
6. 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.
7. 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.
8. Long-screened wells and wells screened across more than one depth interval are generally not posted on this map.

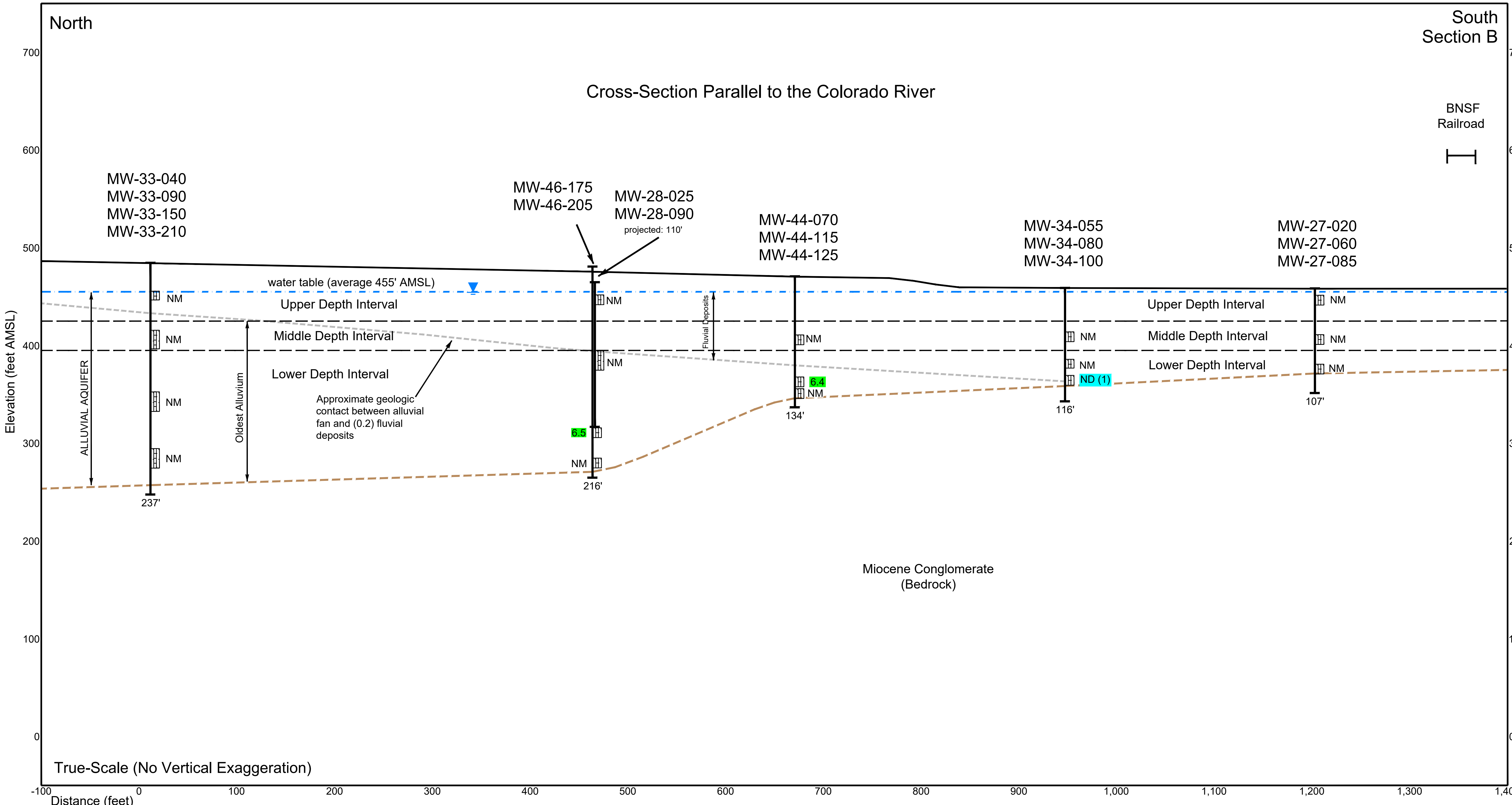
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4-1



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

1. See Figure 4-1 for location of this cross-section.

Legend

water level

well screen

14 Groundwater Cr(VI) Concentration (µg/L)

boring depth (feet) 103'

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

Cr(VI) Concentrations

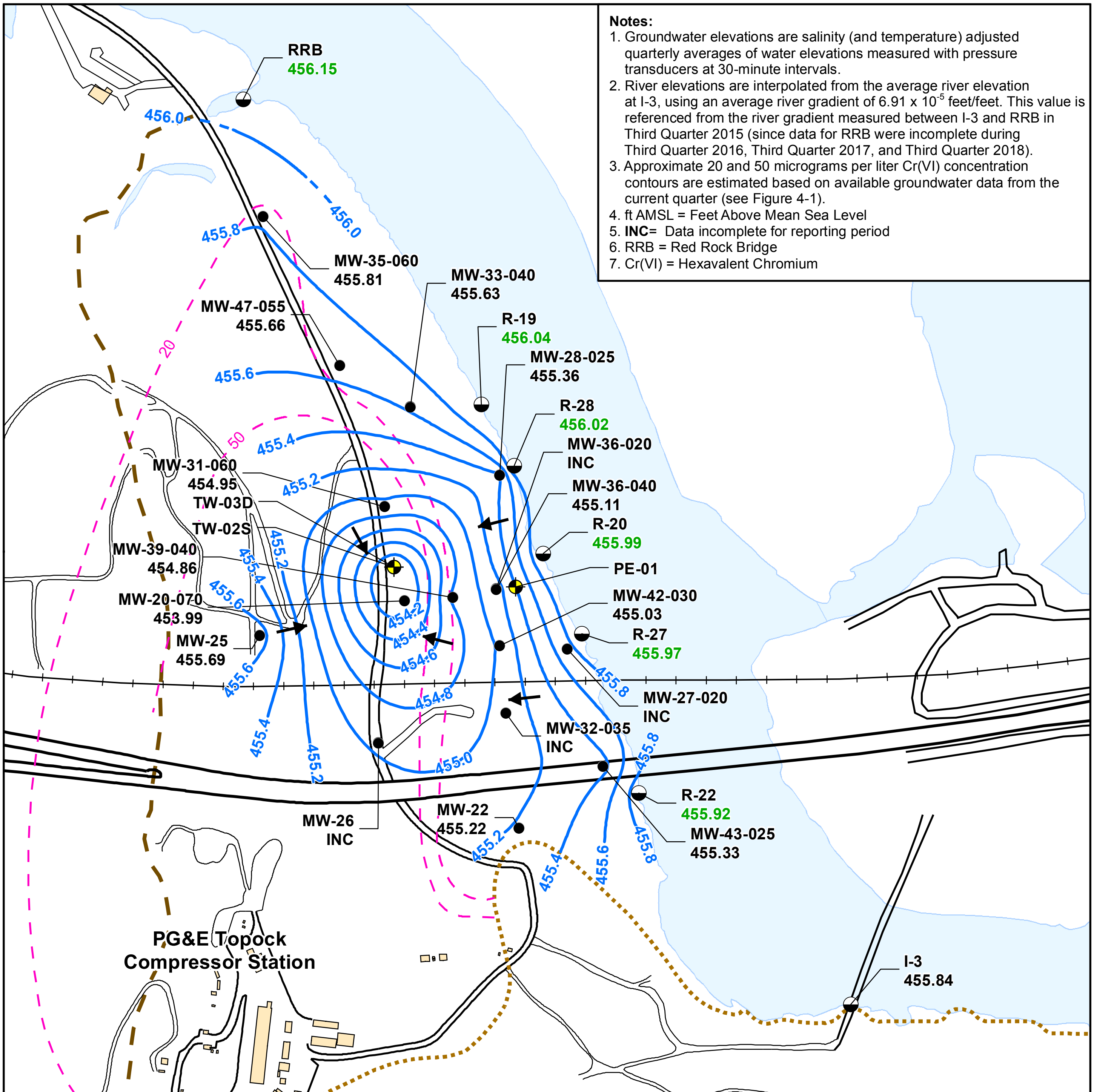
- Not detected at analytical reporting limit
- Concentration between reporting limit and 32 µg/L
- Concentration ≥ 32 µg/L

THIRD QUARTER 2018 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,
THIRD QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4-2



Notes:

1. Groundwater elevations are salinity (and temperature) adjusted quarterly averages of water elevations measured with pressure transducers at 30-minute intervals.
2. River elevations are interpolated from the average river elevation at I-3, using an average river gradient of 6.91 x 10^{-5} feet/feet. This value is referenced from the river gradient measured between I-3 and RRB in Third Quarter 2015 (since data for RRB were incomplete during Third Quarter 2016, Third Quarter 2017, and Third Quarter 2018).
3. Approximate 20 and 50 micrograms per liter Cr(VI) concentration contours are estimated based on available groundwater data from the current quarter (see Figure 4-1).
4. ft AMSL = Feet Above Mean Sea Level
5. **INC**= Data incomplete for reporting period
6. RRB = Red Rock Bridge
7. Cr(VI) = Hexavalent Chromium

LEGEND

- Monitoring Well
- River Station
- Extraction Well
- Bedrock Contact at 455 ft AMSL Elevation
- Interpreted Groundwater Flow Direction
- Groundwater Elevation Contour 0.2 ft (dashed where inferred)
- Inferred Cr(VI) concentration (micrograms per liter) contour

MW-43-025 — Gauging Location
455.33 — Average Groundwater Elevation (ft AMSL)

R-27 — River Station
455.97 — River Elevation (ft AMSL) Interpolated Average

0 400 800
Feet

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

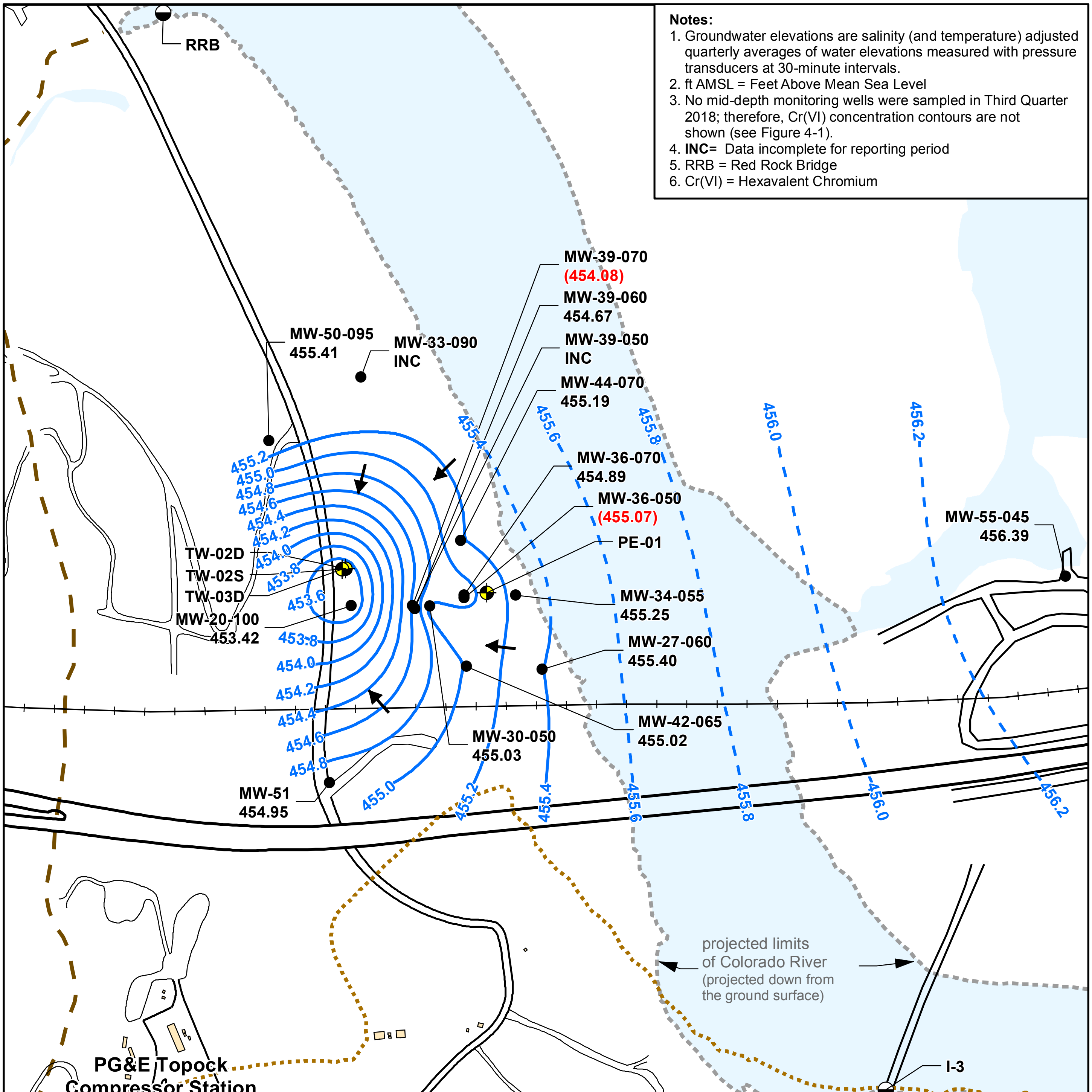
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4-3a

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\3Q18\FINAL\FIGURE4-3A_2018Q3_GWE_SHALLOW.MXD 12/12/2018 2:32:48 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. No mid-depth monitoring wells were sampled in Third Quarter 2018; therefore, Cr(VI) concentration contours are not shown (see Figure 4-1).
4. **INC**= Data incomplete for reporting period
5. RRB = Red Rock Bridge
6. Cr(VI) = Hexavalent Chromium

LEGEND

- Monitoring Well
- River Station
- Extraction Well
- Bedrock Contact at 425 ft AMSL Elevation
- Interpreted Groundwater Flow Direction
- Groundwater Elevation Contour 0.2 ft (dashed where inferred)

0 400 800
Feet

MW-39-060 — Gauging Location
454.67 — Average Groundwater Elevation (ft AMSL)
(454.08) — Elevation in red parentheses not used for contouring

THIRD QUARTER 2018 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, THIRD QUARTER 2018

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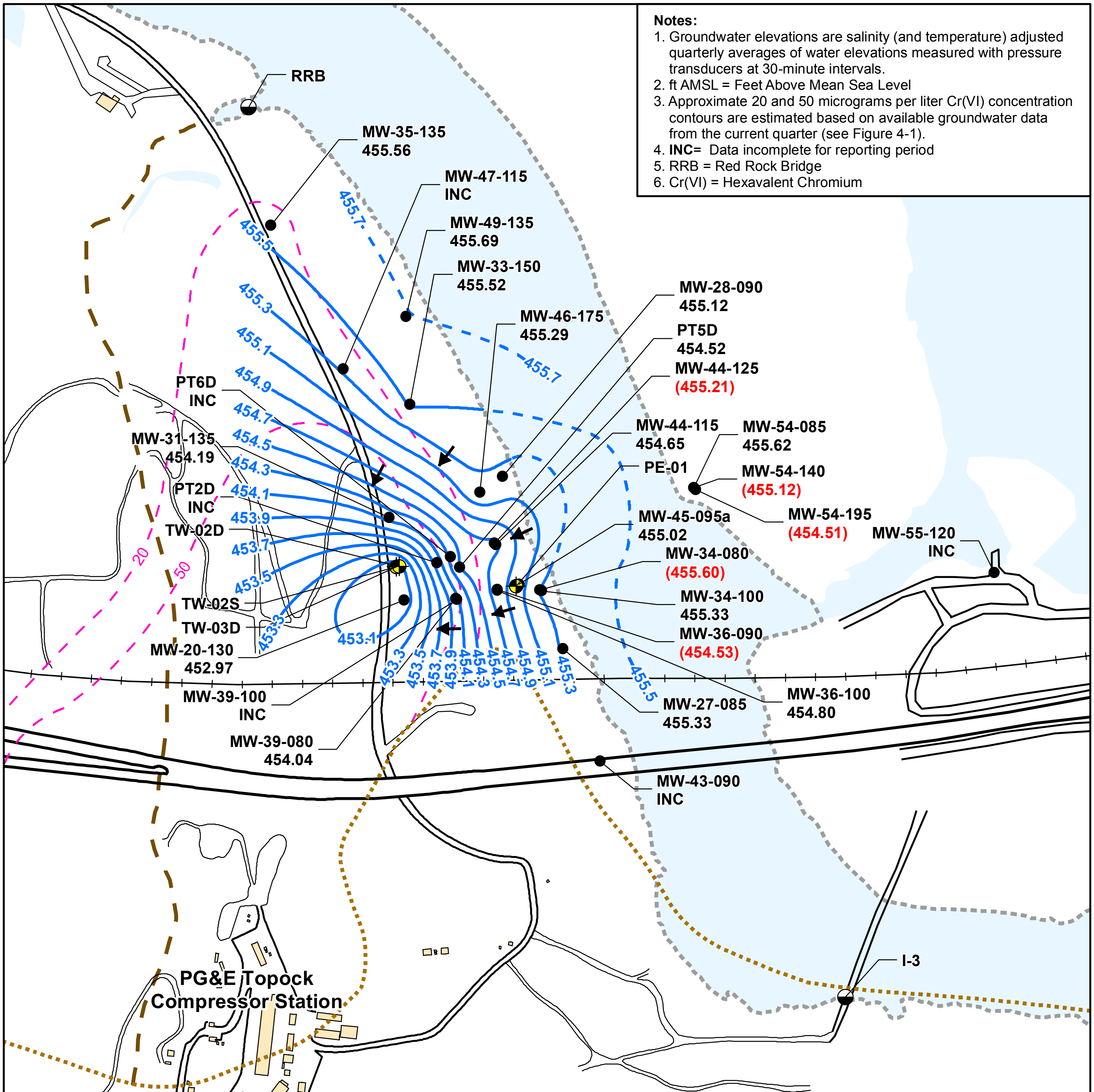
FIGURE
4-3b

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\3Q18\FINAL\FIGURE4-3B_2018Q3_GWE_MIDDEPTH.MXD 12/12/2018 12:28:19 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 groundwater data from the current quarter (see Figure 4-1).
4. **INC**= Data incomplete for reporting period
5. RRB = Red Rock Bridge
6. Cr(VI) = Hexavalent Chromium

LEGEND

- Monitoring Well
- River Station
- Extraction Well
- Bedrock Contact at 396 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-27-085 — Gauging Location
455.33 — Average Groundwater Elevation (ft AMSL)
(454.53) — Elevation in red parentheses not used for contouring

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

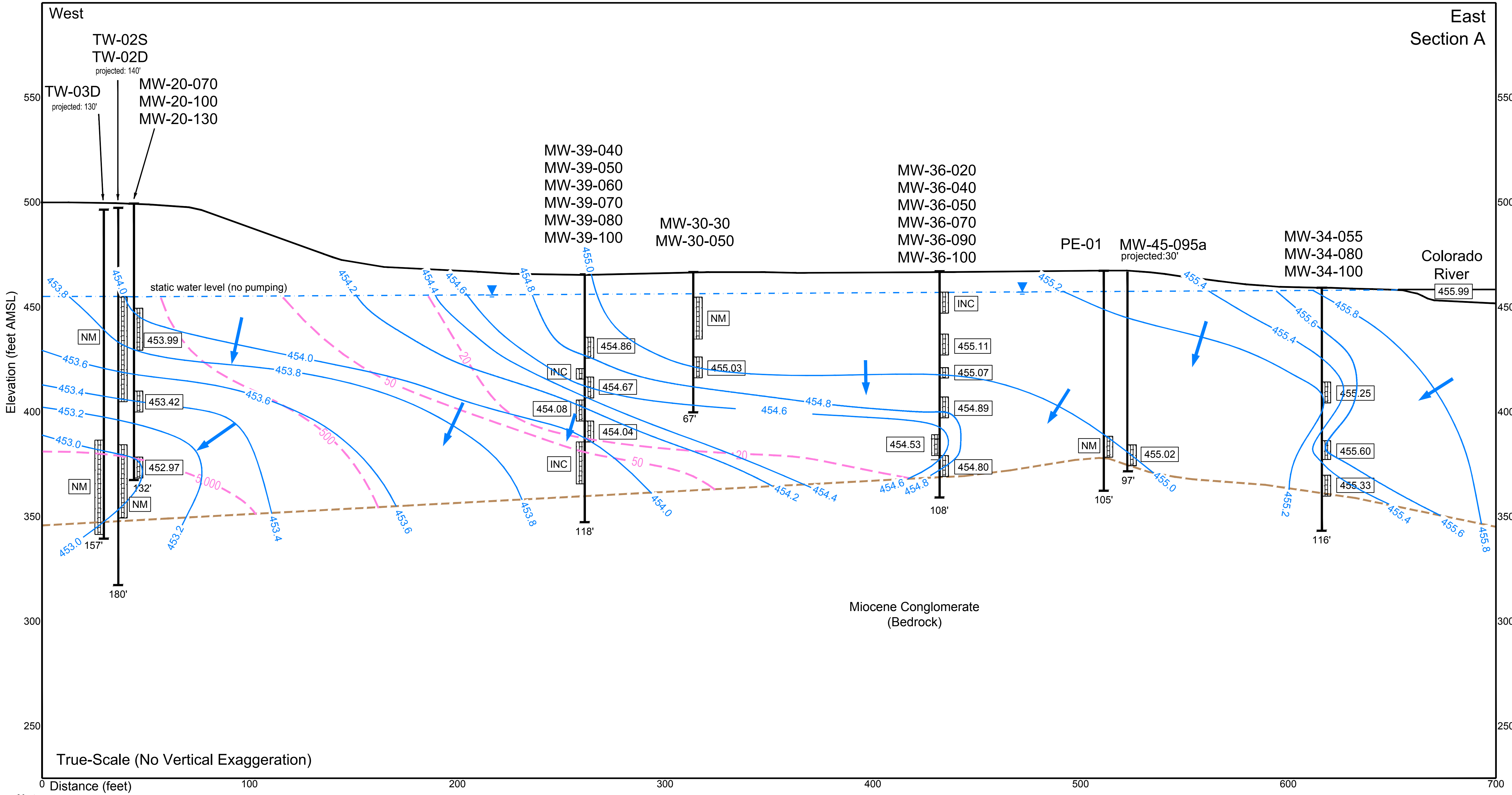
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

AVERAGE GROUNDWATER ELEVATIONS IN DEEP WELLS, THIRD QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4-3c

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\3Q18\FINAL\FIGURE4-3C_2018Q3_GWE_DEEP.MXD 12/12/2018 2:39:31 PM



Notes:

1. Results show average groundwater elevations for July through October 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 Third Quarter 2018 average from R-20 river monitoring location.
4. The hexavalent chromium contour lines are from Figure 4-1.

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 the current quarter

453.4 — Inferred groundwater head contour

Interpreted groundwater flow direction

THIRD QUARTER 2018 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, THIRD QUARTER 2018

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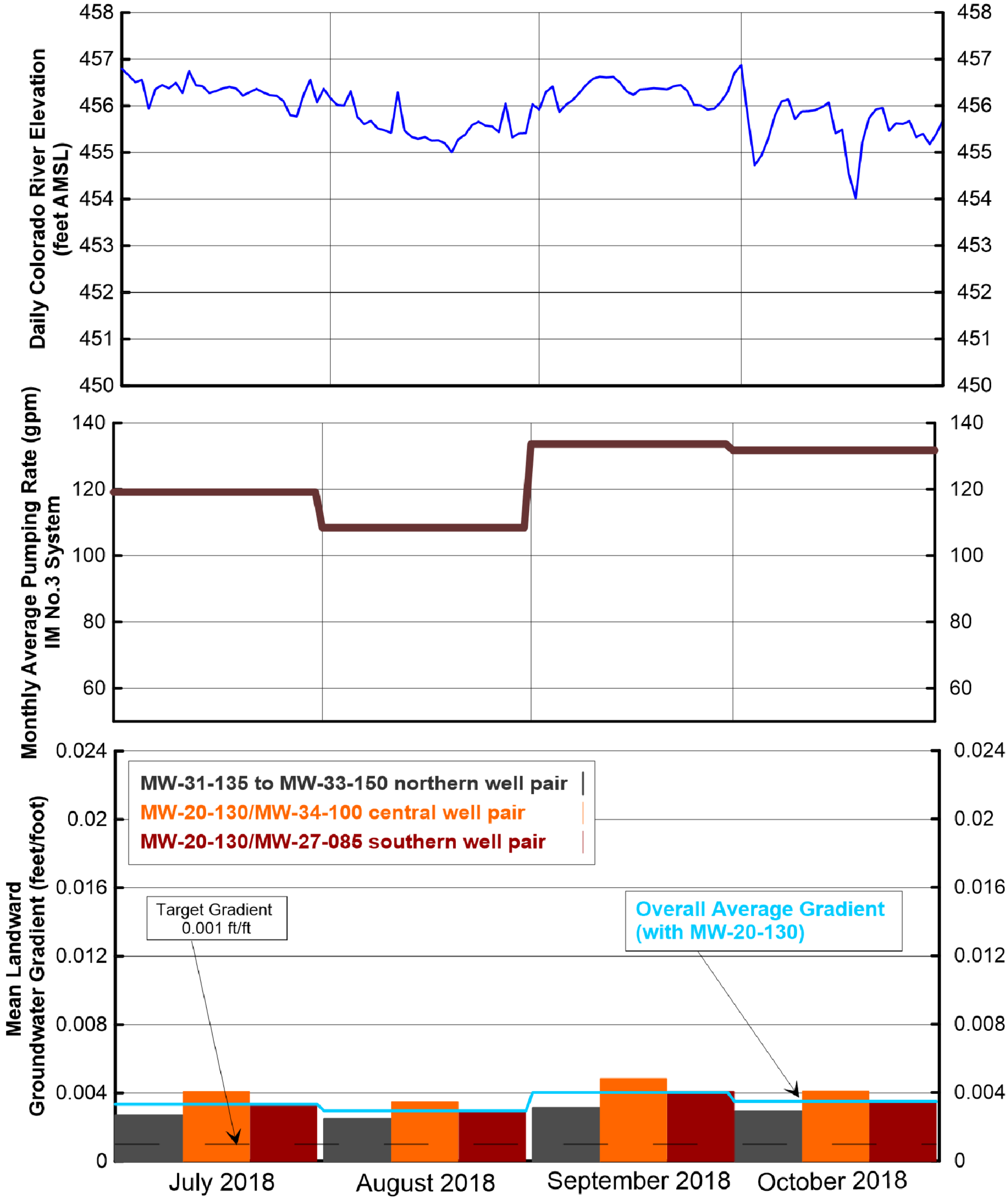
FIGURE
4-4



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

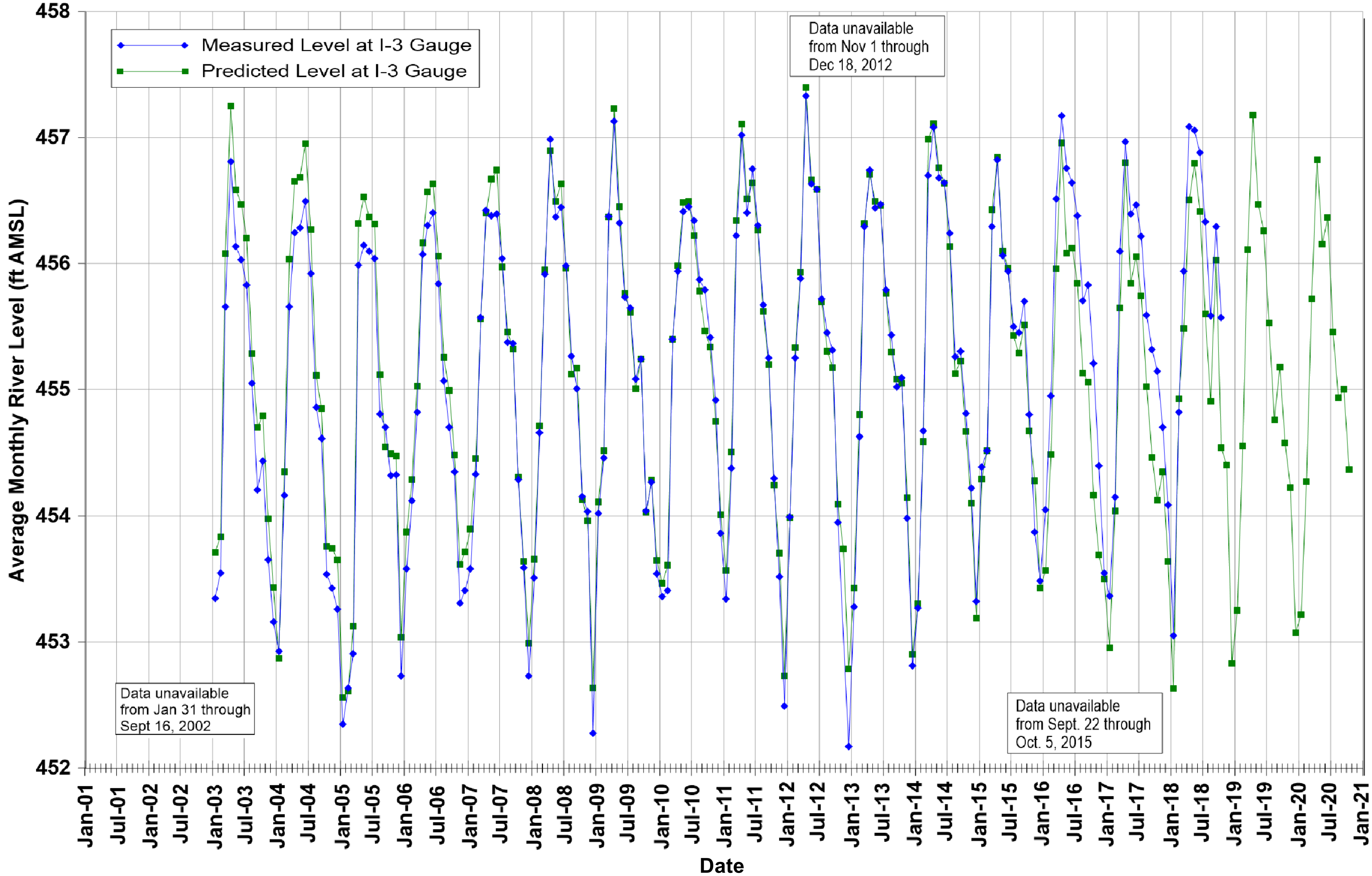
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

MEASURED HYDRAULIC GRADIENTS, RIVER ELEVATION, AND PUMPING RATE, THIRD QUARTER 2018

ARCADIS Design & Consultancy for natural and built assets

FIGURE **4-5**



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 November 24-Month Study (Report dated November 14, 2018). These data are reported monthly by the US Department of Interior, at https://www.usbr.gov/uc/water/crsp/studies/24Month_ 11.pdf

ft AMSL = feet above mean sea level

THIRD QUARTER 2018 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
4-6

Z:\GISPROJECTS_ENV\PGE_TOPOCK\GEC\MXD\GMP\3Q18\FINAL\FIGURE4-6_PREDICTED_RIVER_LEVELS_2018Q3.MXD 11/22/2018 3:03:46 PM

APPENDIX A

Lab Reports, Third Quarter 2018 (Provided on CD with Hard Copy Submittal)

APPENDIX B

Historical Cr(VI) Concentrations

Appendix B

Historical Cr(VI) and Dissolved Chromium Concentrations, July 2017 through October 2018

Third Quarter 2018 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	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-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-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-12	SA	12/11/2017		LF	1,800	2,100
MW-12	SA	5/1/2018		LF	1,500	1,600
MW-14	SA	12/13/2017		LF	12	13
MW-14	SA	5/1/2018		LF	13	14
MW-19	SA	12/8/2017		LF	340	340
MW-19	SA	4/27/2018		LF	370	380
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-20-100	MA	12/8/2017		LF	1,500	1,400
MW-20-100	MA	12/8/2017	FD	LF	1,500	1,400
MW-20-100	MA	4/27/2018		LF	1,800	1,800
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-21	SA	12/12/2017		LF	2.3	2.7
MW-21	SA	5/2/2018		LF	ND (1)	1
MW-21	SA	5/2/2018	FD	LF	ND (1)	ND (1)
MW-22	SA	12/6/2017		LF	ND (1)	ND (1)
MW-22	SA	4/23/2018		LF	ND (1)	ND (5)
MW-23-060	BR	12/8/2017		LF	40	35
MW-23-060	BR	4/26/2018		LF	39	37 J
MW-23-080	BR	12/8/2017		LF	1.5	1.9
MW-23-080	BR	4/26/2018		LF	ND (1)	1.5
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)
MW-24B	DA	12/7/2017		LF	250	250
MW-24B	DA	5/2/2018		LF	200	200
MW-25	SA	12/8/2017		LF	91	90
MW-25	SA	5/1/2018		LF	68	65

Appendix B

Historical Cr(VI) and Dissolved Chromium Concentrations, July 2017 through October 2018

Third Quarter 2018 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		LF	2,300	2,600
MW-26	SA	12/11/2017	FD	LF	2,400	2,500
MW-26	SA	5/1/2018		LF	2,300	2,400
MW-27-085	DA	12/4/2017		LF	ND (1)	ND (1)
MW-27-085	DA	4/24/2018		LF	ND (1)	ND (1)
MW-28-025	SA	12/7/2017		LF	ND (0.2)	ND (1)
MW-28-025	SA	4/25/2018		LF	ND (0.2)	ND (1)
MW-28-025	SA	4/25/2018	FD	LF	ND (0.2)	ND (1)
MW-28-090	DA	12/7/2017		LF	ND (0.2)	ND (1)
MW-28-090	DA	4/25/2018		LF	ND (0.2)	ND (1)
MW-29	SA	12/7/2017		LF	ND (0.2)	ND (1)
MW-29	SA	4/25/2018		LF	ND (0.2)	ND (1)
MW-31-060	SA	12/12/2017		LF	390	410
MW-31-060	SA	4/27/2018		LF	380	390
MW-32-035	SA	12/4/2017		LF	ND (1)	ND (1)
MW-32-035	SA	4/23/2018		LF	ND (1)	ND (1)
MW-33-040	SA	12/7/2017		LF	ND (1)	1.7
MW-33-040	SA	4/25/2018		LF	ND (1)	1.2
MW-33-090	MA	12/7/2017		LF	5.5	5
MW-33-090	MA	4/24/2018		LF	3.3	3.8
MW-33-150	DA	12/7/2017		LF	7	7.2
MW-33-150	DA	4/25/2018		LF	5.2	5
MW-33-210	DA	12/7/2017		LF	14	15
MW-33-210	DA	4/25/2018		LF	6	5.9
MW-34-080	DA	12/6/2017		LF	ND (0.2)	ND (1)
MW-34-080	DA	4/24/2018		LF	ND (1)	ND (1)
MW-34-100	DA	10/2/2017		LF	ND (1)	ND (1)
MW-34-100	DA	12/6/2017		LF	ND (1)	ND (1)
MW-34-100	DA	2/20/2018		LF	ND (1)	1.5
MW-34-100	DA	4/24/2018		LF	ND (1)	1.1
MW-34-100	DA	4/24/2018	FD	LF	ND (1)	1.3
MW-34-100	DA	10/1/2018		LF	ND (1)	ND (1)
MW-35-060	SA	12/8/2017		LF	21	20
MW-35-060	SA	4/27/2018		LF	22	24
MW-35-135	DA	12/8/2017		LF	29	29
MW-35-135	DA	4/27/2018		LF	26	25
MW-36-090	DA	12/6/2017		LF	ND (0.2)	ND (1)
MW-36-090	DA	4/24/2018		LF	ND (0.2)	ND (1)
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

Appendix B

Historical Cr(VI) and Dissolved Chromium Concentrations, July 2017 through October 2018

Third Quarter 2018 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	12/8/2017		LF	5	6.4
MW-37D	DA	5/3/2018		LF	7.4	7.1
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-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
MW-38S	SA	9/27/2018		3V	2.7	2.8
MW-38S-SMT	SA	9/27/2018		LF	3	3.3
MW-39-100	DA	12/5/2017		LF	71	66
MW-39-100	DA	4/24/2018		LF	57	54
MW-40D	DA	4/25/2018		H	25	31
MW-40D	DA	4/25/2018		LF	120	120
MW-40S	SA	4/25/2018		H	18	17
MW-40S	SA	4/25/2018		LF	20	20
MW-41D	DA	12/13/2017		LF	ND (1)	ND (1)
MW-41D	DA	12/13/2017	FD	LF	ND (1)	1.2
MW-41D	DA	5/4/2018		LF	ND (1)	ND (1)
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)
MW-42-065	MA	12/4/2017		LF	ND (0.2)	ND (1)
MW-42-065	MA	4/24/2018		LF	ND (0.2)	ND (1)
MW-44-070	MA	12/6/2017		LF	ND (0.2)	ND (1)
MW-44-070	MA	4/24/2018		LF	ND (0.2)	ND (1)
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
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

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Third Quarter 2018 Interim Measures Performance Monitoring and Site-wide
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PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
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
MW-46-175	DA	10/2/2018	FD	LF	6.5	7
MW-46-205	DA	12/7/2017		3V	ND (1)	ND (1)
MW-46-205	DA	4/25/2018		LF	ND (1)	ND (1)
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-47-115	DA	12/7/2017		LF	18	16
MW-47-115	DA	4/25/2018		LF	23	23
MW-48	BR	12/13/2017		LF	ND (1)	ND (1)
MW-48	BR	5/3/2018		LF	ND (1)	ND (1)
MW-50-095	MA	12/8/2017		LF	13	14
MW-50-095	MA	4/27/2018		LF	11	10
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-51	MA	12/11/2017		LF	3,700	4,100
MW-51	MA	5/1/2018		LF	3,500	3,700
MW-52D	DA	12/5/2017		LF	ND (1)	ND (1)
MW-52D	DA	4/23/2018		LF	ND (1)	ND (5)
MW-52M	DA	12/5/2017		LF	ND (1)	ND (1)
MW-52M	DA	12/5/2017	FD	LF	ND (1)	ND (1)
MW-52M	DA	4/23/2018		LF	ND (1)	ND (5)
MW-52S	MA	12/5/2017		LF	ND (1)	ND (1)
MW-52S	MA	4/24/2018		LF	ND (1)	ND (1)
MW-53D	DA	12/5/2017		LF	ND (1)	ND (5)
MW-53D	DA	4/23/2018		LF	ND (1)	ND (1)
MW-53M	DA	12/5/2017		LF	ND (0.2)	ND (1)
MW-53M	DA	4/23/2018		LF	ND (1)	ND (1)
MW-54-085	DA	12/13/2017	(a)	LF	4.96	ND (1)
MW-54-085	DA	5/4/2018	(a)	LF	ND (0.1)	ND (0.2)
MW-54-140	DA	12/13/2017	(a)	LF	4.92	ND (1)
MW-54-140	DA	5/4/2018	(a)	LF	4.95	ND (0.2)
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-55-045	MA	12/13/2017	(a)	LF	ND (0.2)	ND (1)
MW-55-045	MA	5/3/2018	(a)	LF	ND (0.1)	ND (0.2)

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Third Quarter 2018 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-55-120	DA	12/13/2017	(a)	LF	7.11	9.03
MW-55-120	DA	5/3/2018	(a)	LF	8	8.35
MW-56D	DA	12/13/2017	(a)	LF	4.93	ND (1)
MW-56D	DA	5/2/2018	(a)	LF	5.03	ND (0.2)
MW-56M	DA	12/13/2017	(a)	LF	4.83	ND (1)
MW-56M	DA	5/2/2018	(a)	LF	4.99	ND (0.2)
MW-56S	SA	12/13/2017	(a)	LF	ND (0.2)	ND (1)
MW-56S	SA	5/2/2018	(a)	LF	ND (0.1)	ND (0.2)
MW-57-070	BR	12/11/2017		LF	420	430
MW-57-070	BR	5/3/2018		LF	340	360
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	5/3/2018		LF	5.3	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-59-100	SA	12/7/2017		LF	3,600	3,900
MW-59-100	SA	5/3/2018		LF	2,800	3,000
MW-60-125	BR	12/6/2017		LF	770	730
MW-60-125	BR	5/2/2018		LF	510	470
MW-60BR-245	BR	9/26/2017		3V	ND (1)	ND (1)
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	2/21/2018		LF	4.1	39
MW-60BR-245	BR	5/2/2018		3V	73	67
MW-60BR-245	BR	5/2/2018		LF	1.2	1.7
MW-60BR-245	BR	9/25/2018		3V	76	81
MW-60BR-245_D	BR	9/25/2018		LF	6.4	6.2
MW-60BR-245_S	BR	9/25/2018		LF	ND (1)	ND (1)
MW-61-110	BR	12/6/2017		LF	410	380
MW-61-110	BR	5/4/2018		LF	330	340
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

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Third Quarter 2018 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-62-065	BR	9/26/2018		LF	540	570
MW-62-110	BR	9/27/2017		Tap	ND (1)	ND (1)
MW-62-110	BR	12/7/2017		Tap	ND (1)	3
MW-62-110	BR	2/21/2018		Tap	ND (1)	ND (1)
MW-62-110	BR	5/3/2018		G	ND (1)	ND (1)
MW-62-110	BR	9/26/2018		3V	ND (1)	ND (1)
MW-62-190	BR	12/7/2017		Tap	ND (1)	ND (1)
MW-62-190	BR	12/7/2017	FD	Tap	ND (1)	ND (1)
MW-62-190	BR	5/3/2018		G	ND (1)	ND (1)
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	1.4
MW-63-065	BR	9/24/2018	FD	LF	1	1.5
MW-64BR	BR	9/25/2017		LF	ND (1)	ND (1)
MW-64BR	BR	12/6/2017		LF	ND (1)	ND (1)
MW-64BR	BR	2/19/2018		LF	ND (1)	ND (1)
MW-64BR	BR	2/19/2018	FD	LF	ND (1)	ND (1)
MW-64BR	BR	5/2/2018		LF	ND (1)	ND (1)
MW-64BR	BR	9/24/2018		LF	ND (1)	ND (1)
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-65-225	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-66-165	SA	12/5/2017		LF	500	520
MW-66-165	SA	4/30/2018		LF	540	540
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-66BR-270	BR	12/14/2017		3V	ND (0.2)	ND (1)
MW-66BR-270	BR	5/2/2018		3V	ND (1)	ND (1)
MW-67-185	SA	12/4/2017		LF	1,500	1,700
MW-67-185	SA	4/30/2018		LF	1,800	1,700

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
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-67-260	DA	12/4/2017		LF	590	630
MW-67-260	DA	4/30/2018		LF	820	830
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-68-240	DA	2/22/2018		LF	2,100	2,000
MW-68-240	DA	5/1/2018		LF	2,000	2,100
MW-68BR-280	BR	2/22/2018		LF	ND (1)	ND (1)
MW-68BR-280	BR	5/1/2018		LF	ND (1)	ND (5)
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-70-105	BR	12/11/2017		LF	160	150
MW-70-105	BR	5/3/2018		LF	160	150
MW-70BR-225	BR	12/11/2017		3V	1,700	1,800
MW-70BR-225	BR	12/11/2017		LF	1,400	1,600
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-71-035	SA	12/12/2017		LF	ND (1)	1.5
MW-71-035	SA	5/2/2018		LF	ND (1)	ND (1)
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-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	2/20/2018		LF	1.6	2.1
MW-72BR-200	BR	4/26/2018		3V	3.3	2.6
MW-72BR-200	BR	4/26/2018		LF	ND (1)	2
MW-72BR-200	BR	9/26/2018		3V	3	2.9
MW-72BR-200_D	BR	9/26/2018		LF	ND (1)	ND (1)
MW-72BR-200_S	BR	9/26/2018		LF	ND (1)	ND (1)

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Location ID	Aquifer Zone	Sample Date		Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
MW-73-080	BR	9/27/2017		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
MW-73-080	BR	9/24/2018		LF	36	39
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)
PE-01	DA	7/18/2017		Tap	ND (0.2)	ND (1)
PE-01	DA	8/2/2017		Tap	ND (0.2)	ND (1)
PE-01	DA	9/7/2017		Tap	9	4.5
PE-01	DA	10/3/2017		Tap	ND (0.2)	ND (1)
PE-01	DA	11/2/2017		Tap	0.52	ND (1)
PE-01	DA	12/7/2017		Tap	ND (0.2)	ND (1)
PE-01	DA	1/4/2018		Tap	ND (0.2)	ND (1)
PE-01	DA	2/7/2018		Tap	0.7	ND (1)
PE-01	DA	3/7/2018		Tap	2.3	2
PE-01	DA	4/3/2018		Tap	ND (0.2)	ND (1)
PE-01	DA	5/4/2018		Tap	ND (0.2)	1.8
PE-01	DA	6/7/2018		Tap	ND (0.2)	ND (1)
PE-01	DA	7/3/2018		Tap	ND (0.2)	ND (1)
PE-01	DA	8/1/2018		Tap	ND (0.2)	ND (1)
PE-01	DA	9/6/2018		Tap	ND (0.2)	ND (1)
PE-01	DA	10/2/2018		Tap	7.6	5.6
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-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
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)
TW-02D	DA	9/26/2018	FD	Tap	ND (0.2)	ND (1)
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

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Location ID	Aquifer Zone	Sample Date	Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)
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-04	DA	12/14/2017	3V	8.2	8.3
TW-04	DA	12/14/2017	LF	2.8	4
TW-04	DA	4/26/2018	3V	8.9	9.4
TW-04	DA	4/26/2018	LF	ND (1)	ND (5)
TW-05	DA	12/14/2017	3V	14	12
TW-05	DA	12/14/2017	LF	10	13
TW-05	DA	5/1/2018	3V	11	11
TW-05	DA	5/1/2018	LF	8.8	9.1

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 C

Well Inspection and Maintenance Log, Third Quarter 2018

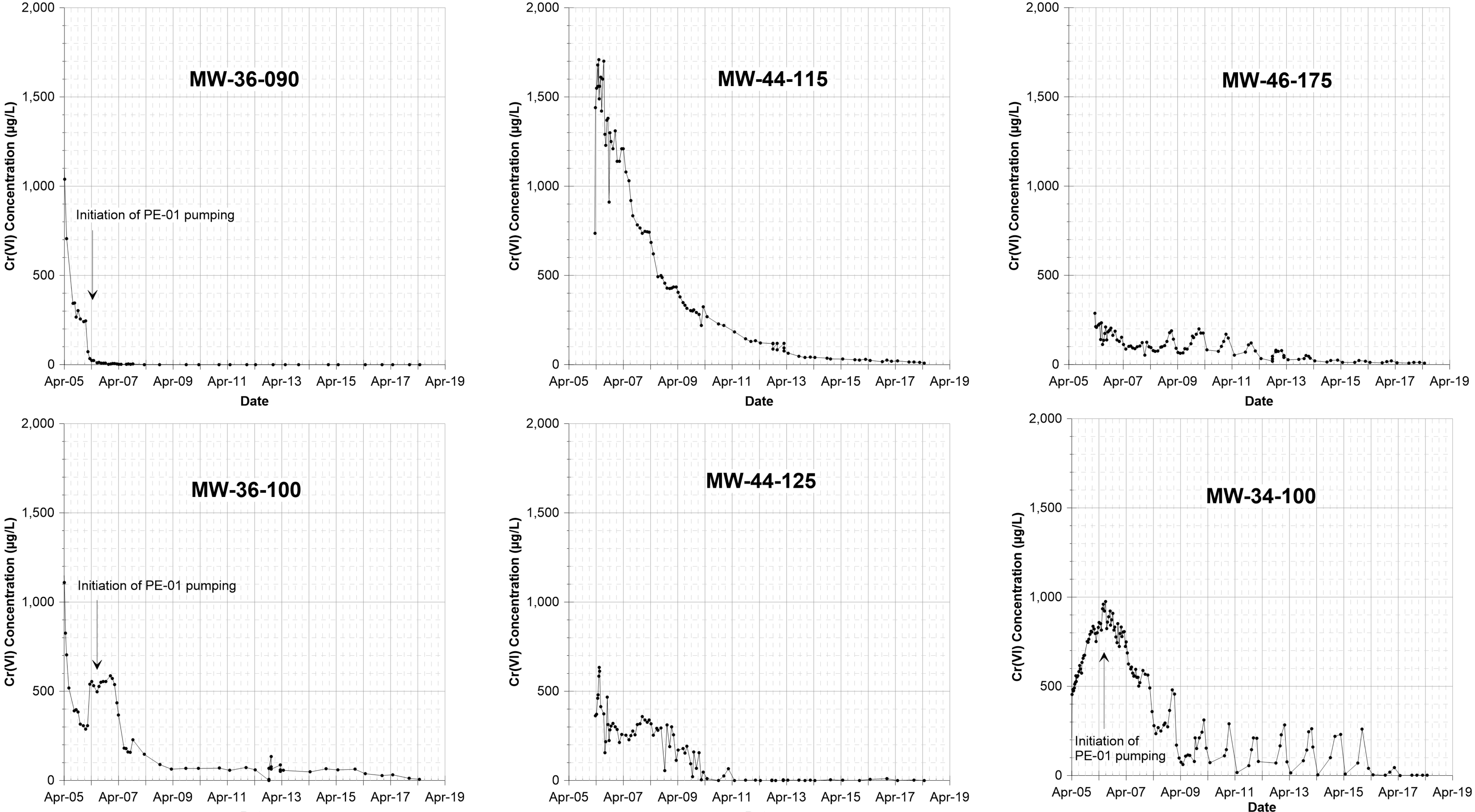
Appendix C
Well Inspection and Maintenance Log, Third Quarter 2018
Third Quarter 2018 Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California

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? (Yes/No)
MW-38S	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-57-050	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-58-065	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-58BR	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-60BR-245	09/25/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-62-065	09/26/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-62-110	09/25/2018	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-63-065	09/24/2018	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-64BR	09/24/2018	Yes	No	Yes	No	Yes	--	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-65-160	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-65-225	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-68-180	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-69-195	09/27/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-72-080	09/26/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-72BR-200	09/26/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
MW-73-080	09/24/2018	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	--
PE-01	08/01/2018	--	--	--	No	Yes	--	--	No	--	--	No	--	Yes	--
TW-02D	09/26/2018	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	--
TW-03D	08/01/2018	--	--	--	No	Yes	--	--	No	--	--	--	--	Yes	--

Notes:
-- = not applicable

APPENDIX D

Cr(VI) Concentration Time Series Charts, Third 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 D

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

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

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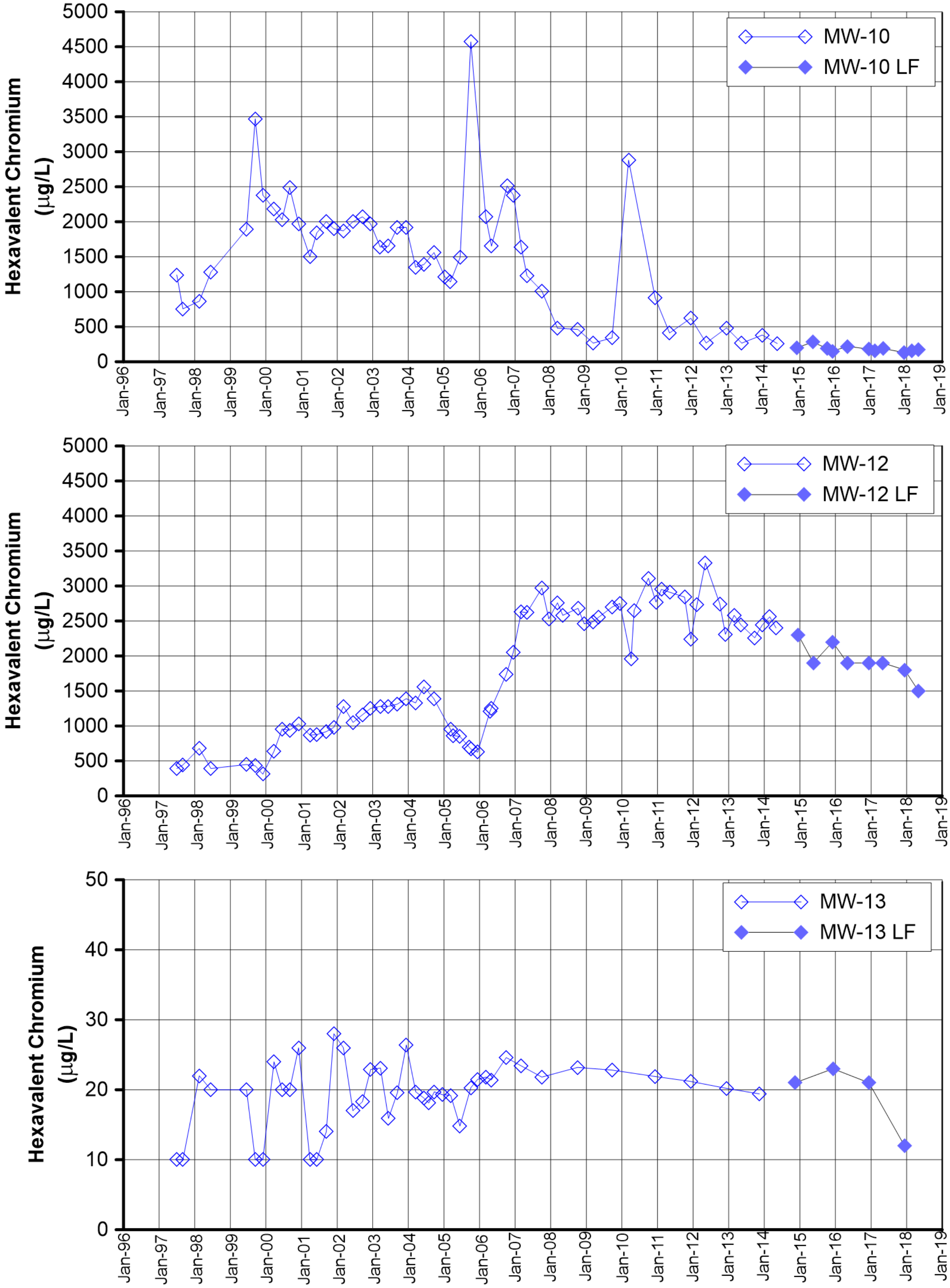


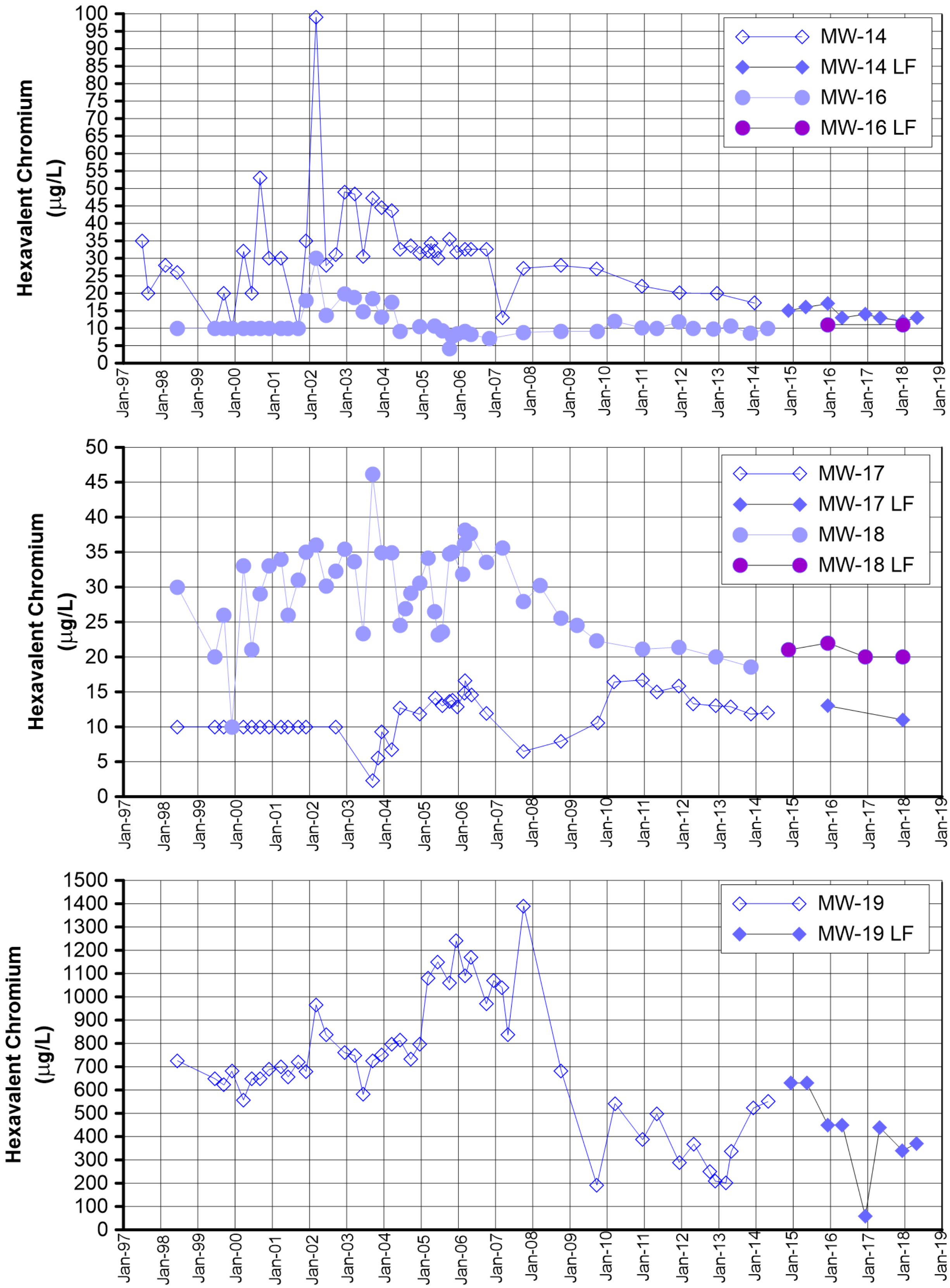
Notes:

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 D-1
HEXAVALENT CHROMIUM IN MW-10, MW-12, AND MW-13

THIRD QUARTER 2018 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 D-2
HEXAVALENT CHROMIUM IN MW-14, MW-16, MW-17, MW-18, AND MW-19

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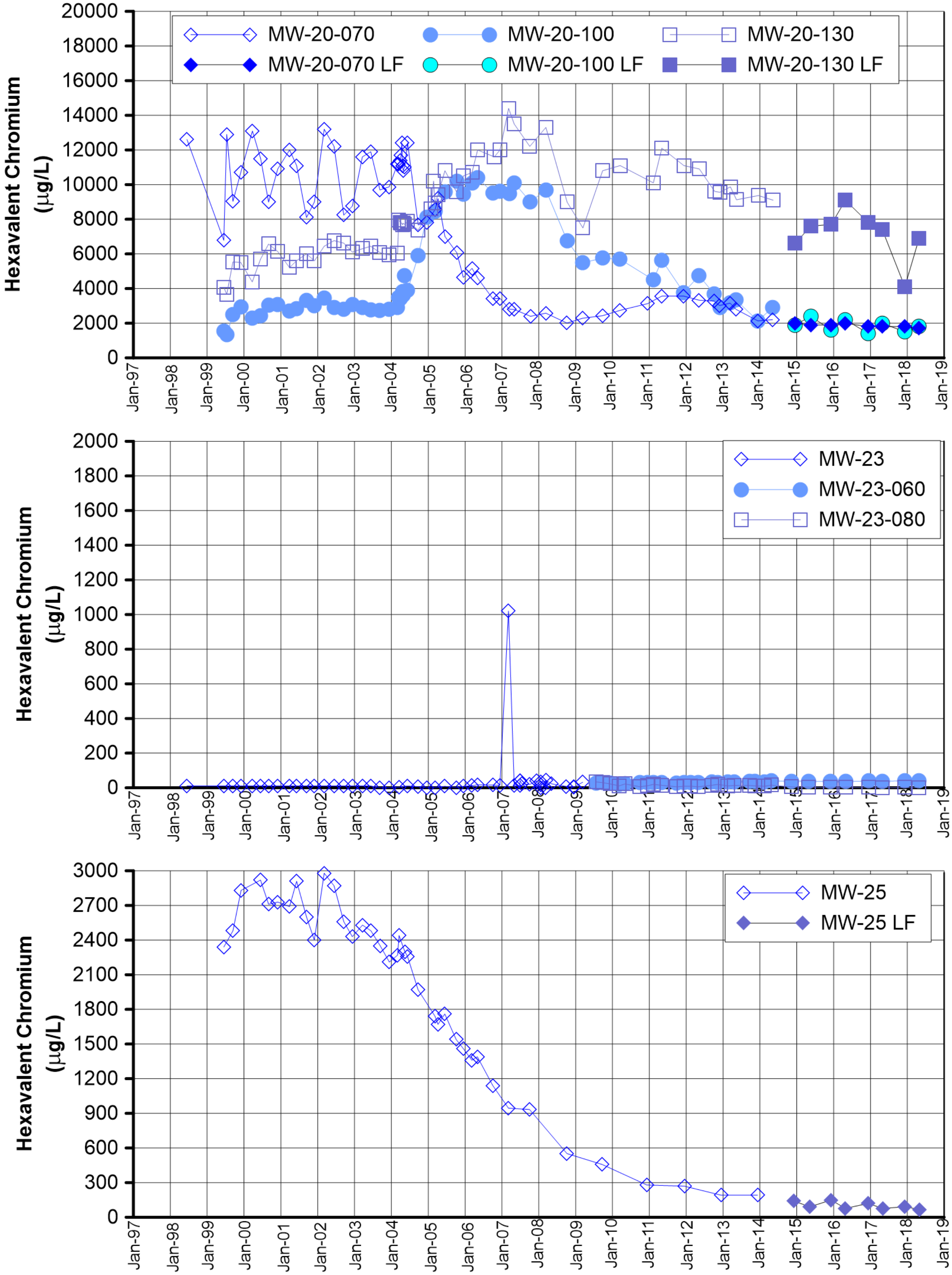
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA



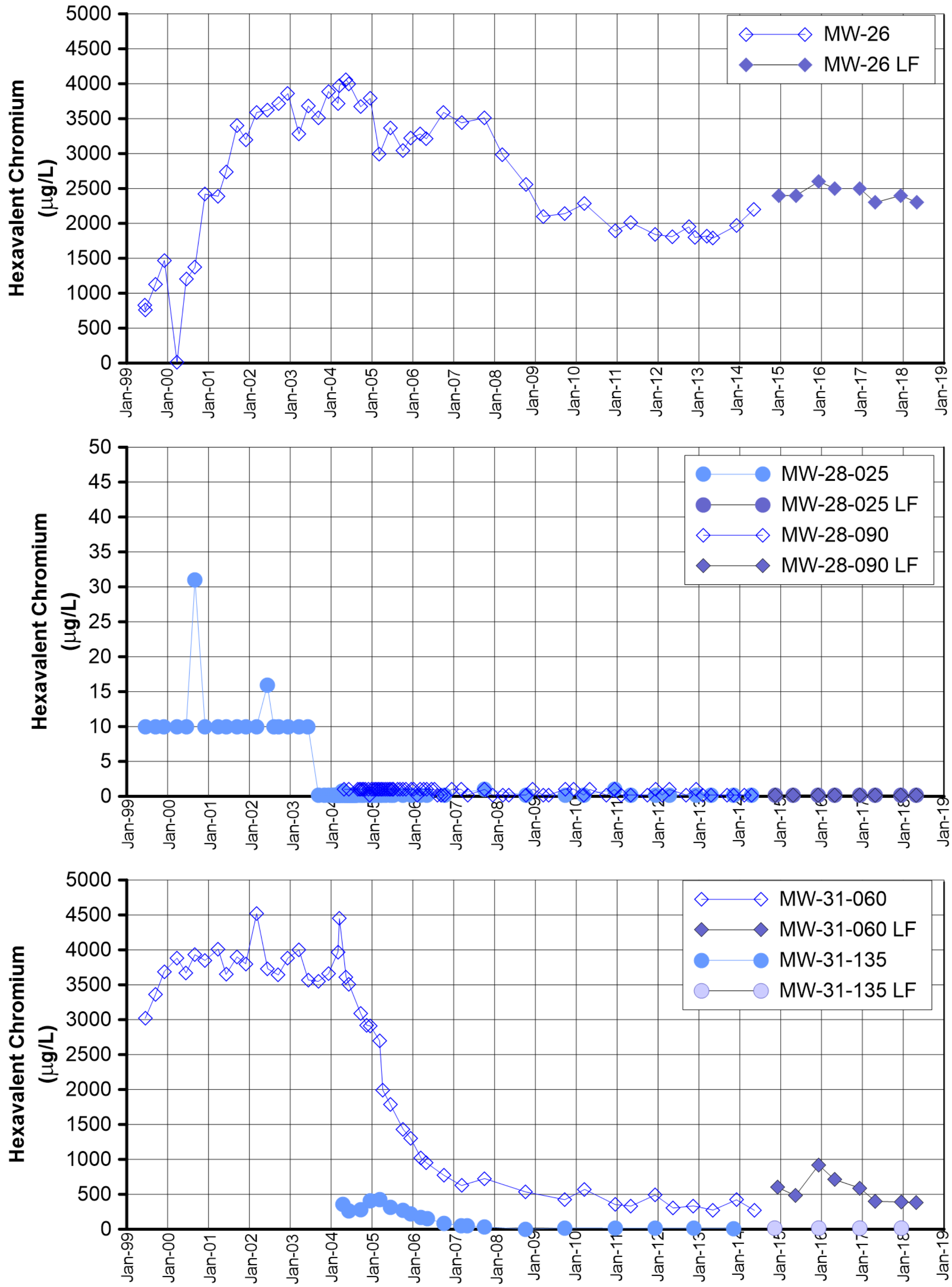
Notes:

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 D-3
HEXAVALENT CHROMIUM IN MW-20 AND MW-23 CLUSTERS AND MW-25

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

ARCADIS



Notes:

1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).

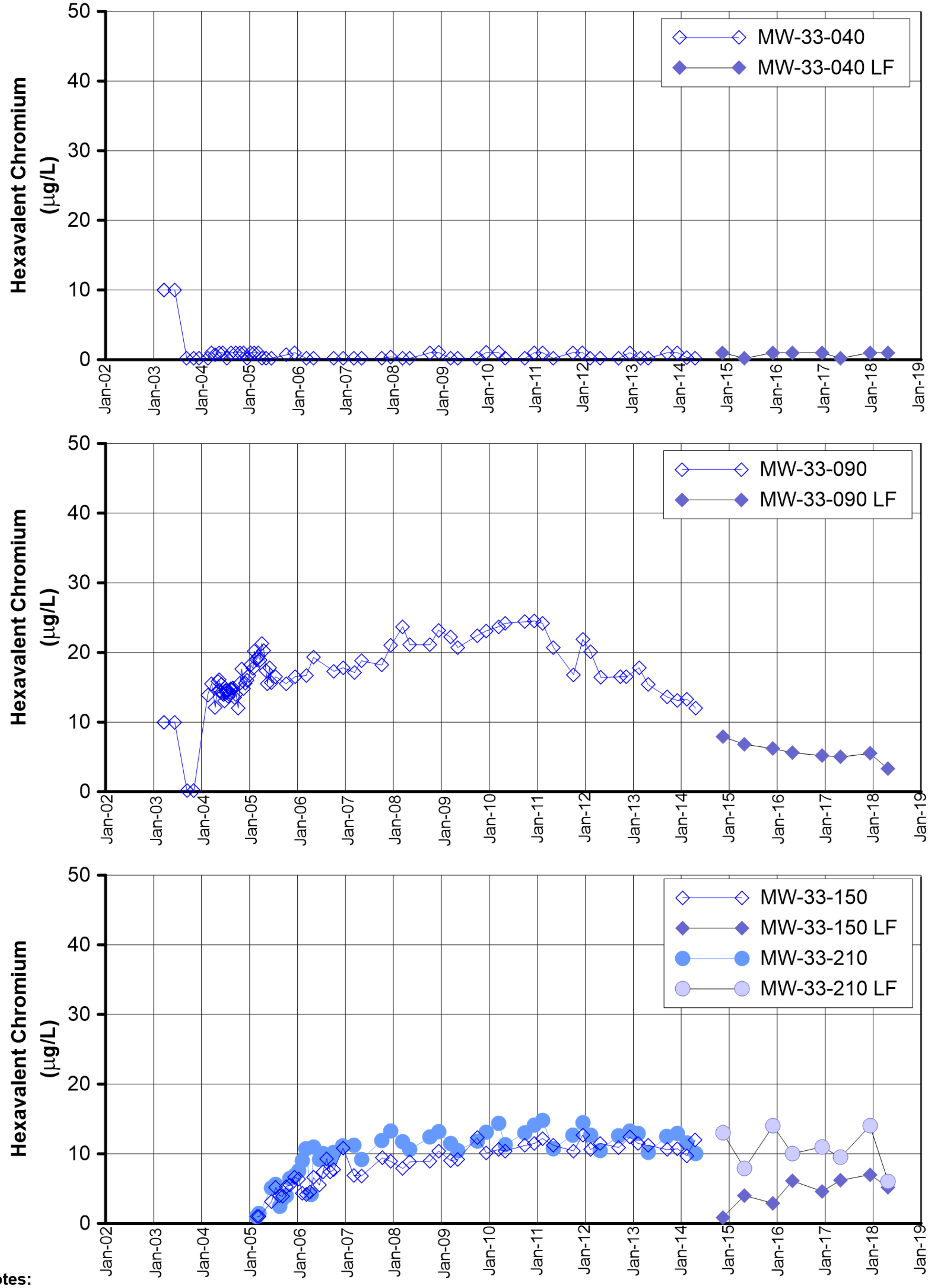
2) The trigger level for MW-28-090 is 20 µg/L.

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 D-4
HEXAVALENT CHROMIUM IN MW-26, MW-28, AND MW-31 CLUSTERS

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

ARCADIS



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 D-5
HEXAVALENT CHROMIUM IN MW-33 CLUSTER

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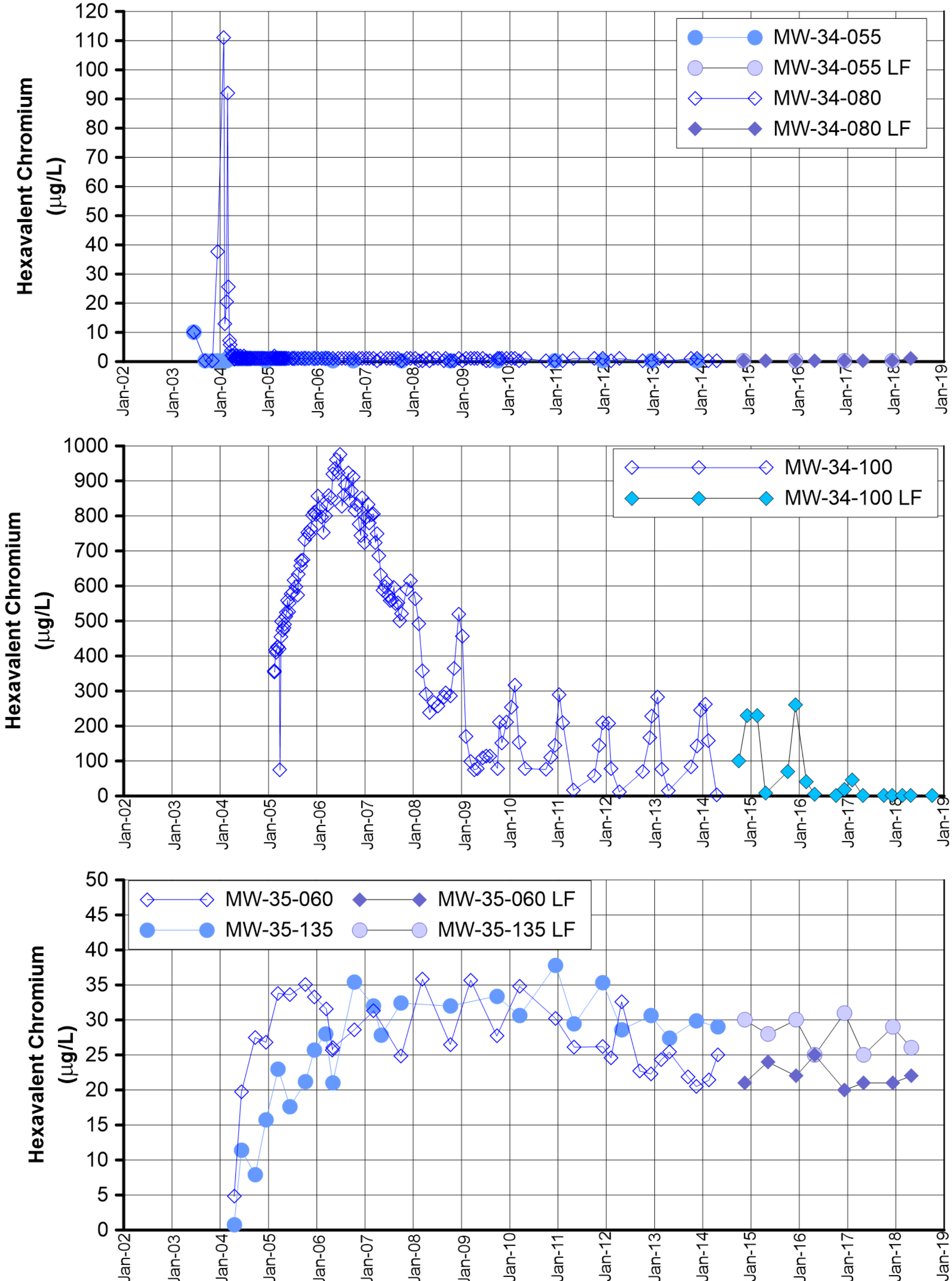
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA



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 D-6
HEXAVALENT CHROMIUM IN MW-34 AND MW-35 CLUSTERS

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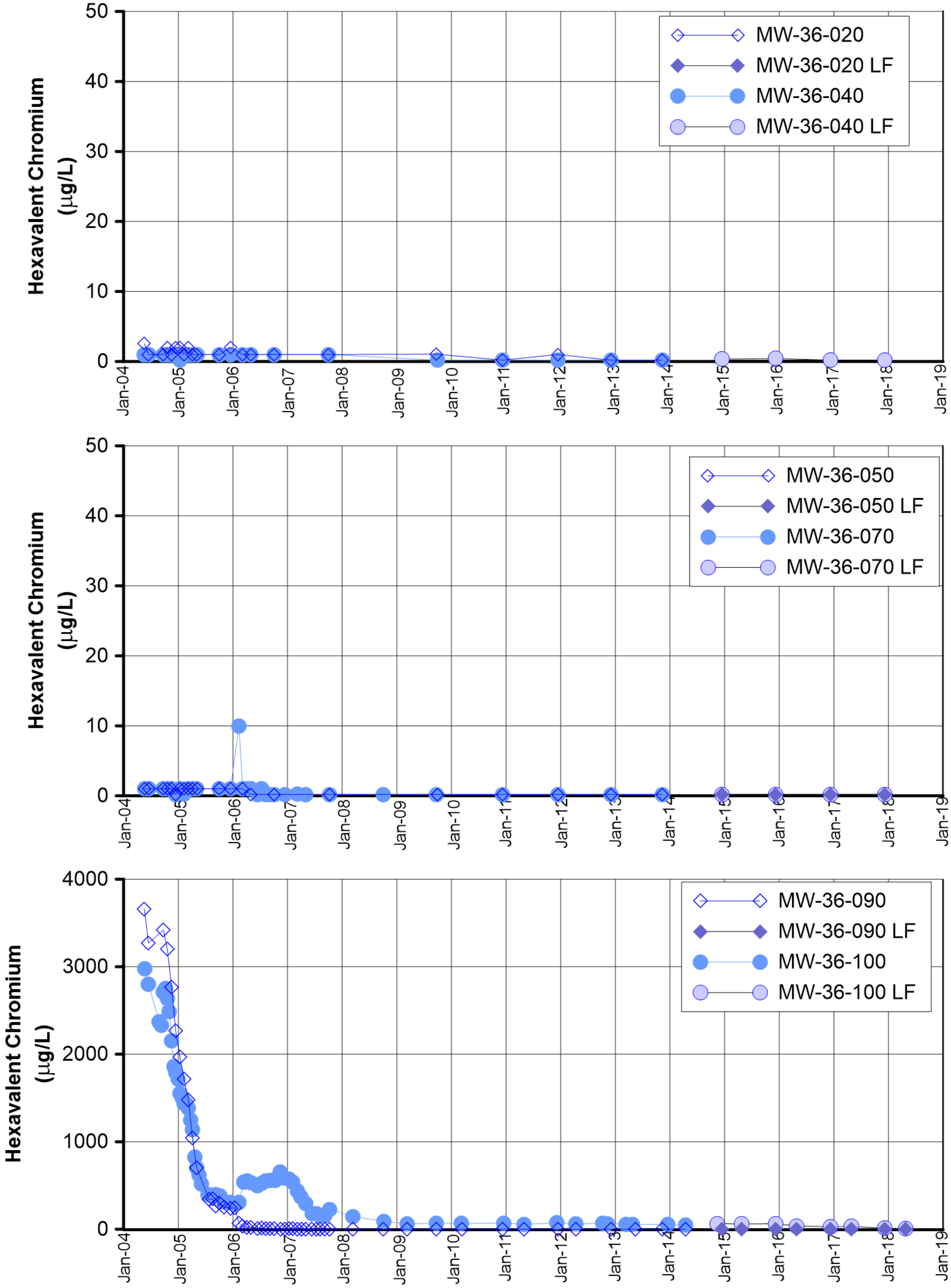
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA



Notes:

1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).

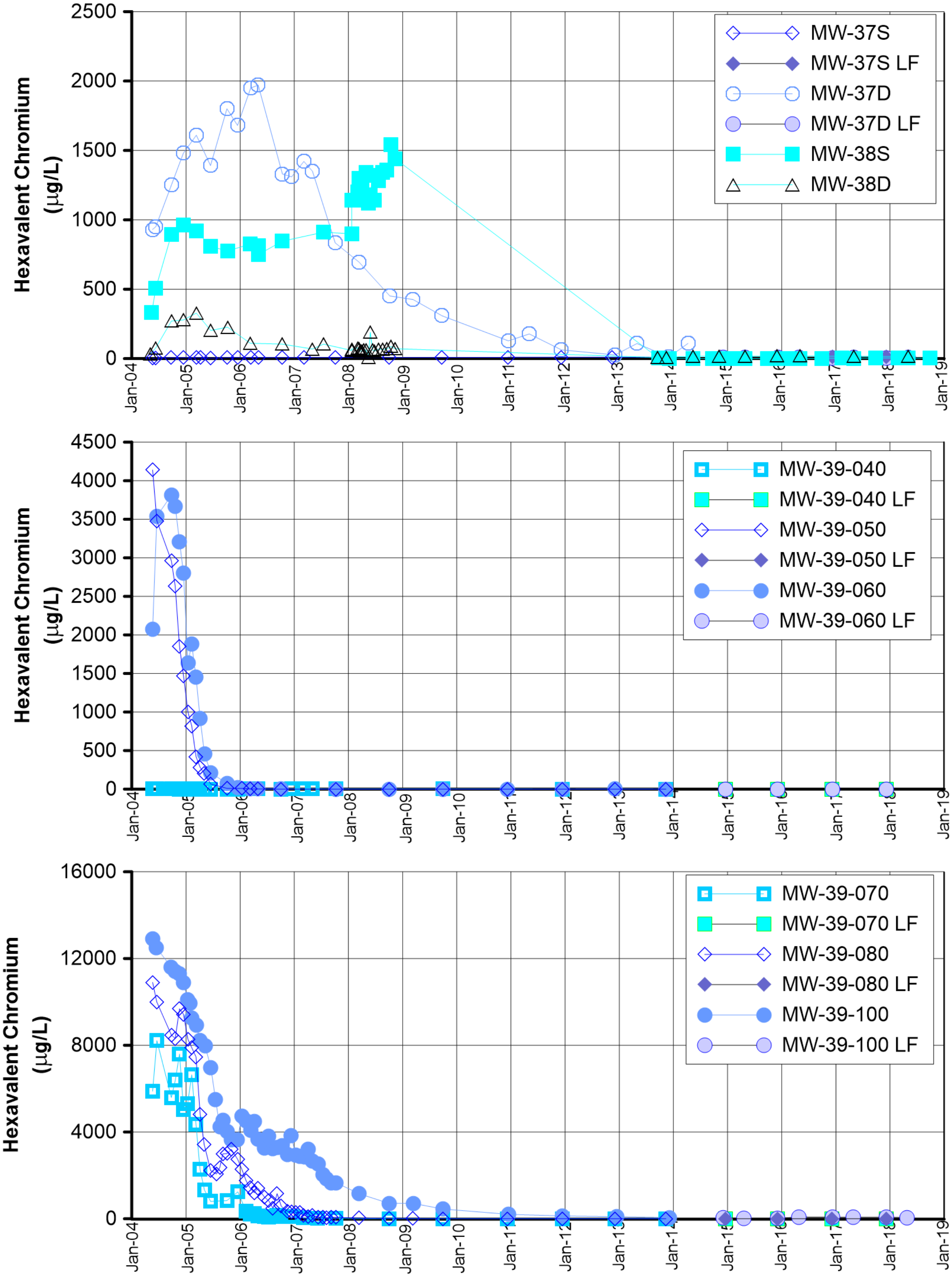
2) The trigger level for MW-36-070 is 20 µg/L.

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 D-7
HEXAVALENT CHROMIUM IN MW-36 CLUSTER

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

ARCADIS



Notes:

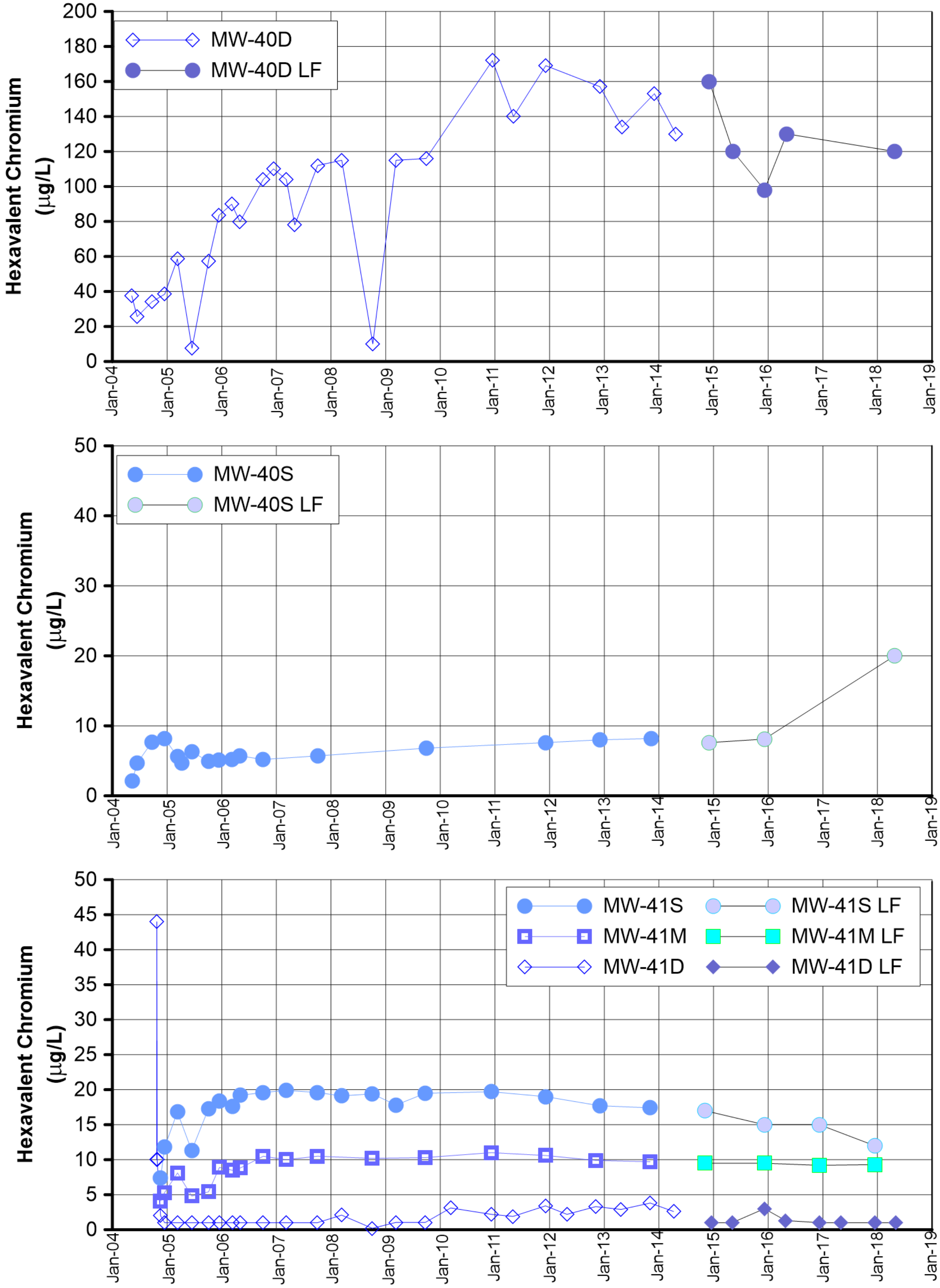
1) The IM Contingency Plan and hexavalent chromium [Cr(VI)] trigger levels were updated July 17, 2008 (DTSC, 2008b).

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 D-8
HEXAVALENT CHROMIUM IN MW-37, MW-38 AND MW-39 CLUSTERS

THIRD QUARTER 2018 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 D-9
HEXAVALENT CHROMIUM IN MW-40 AND MW-41 CLUSTERS

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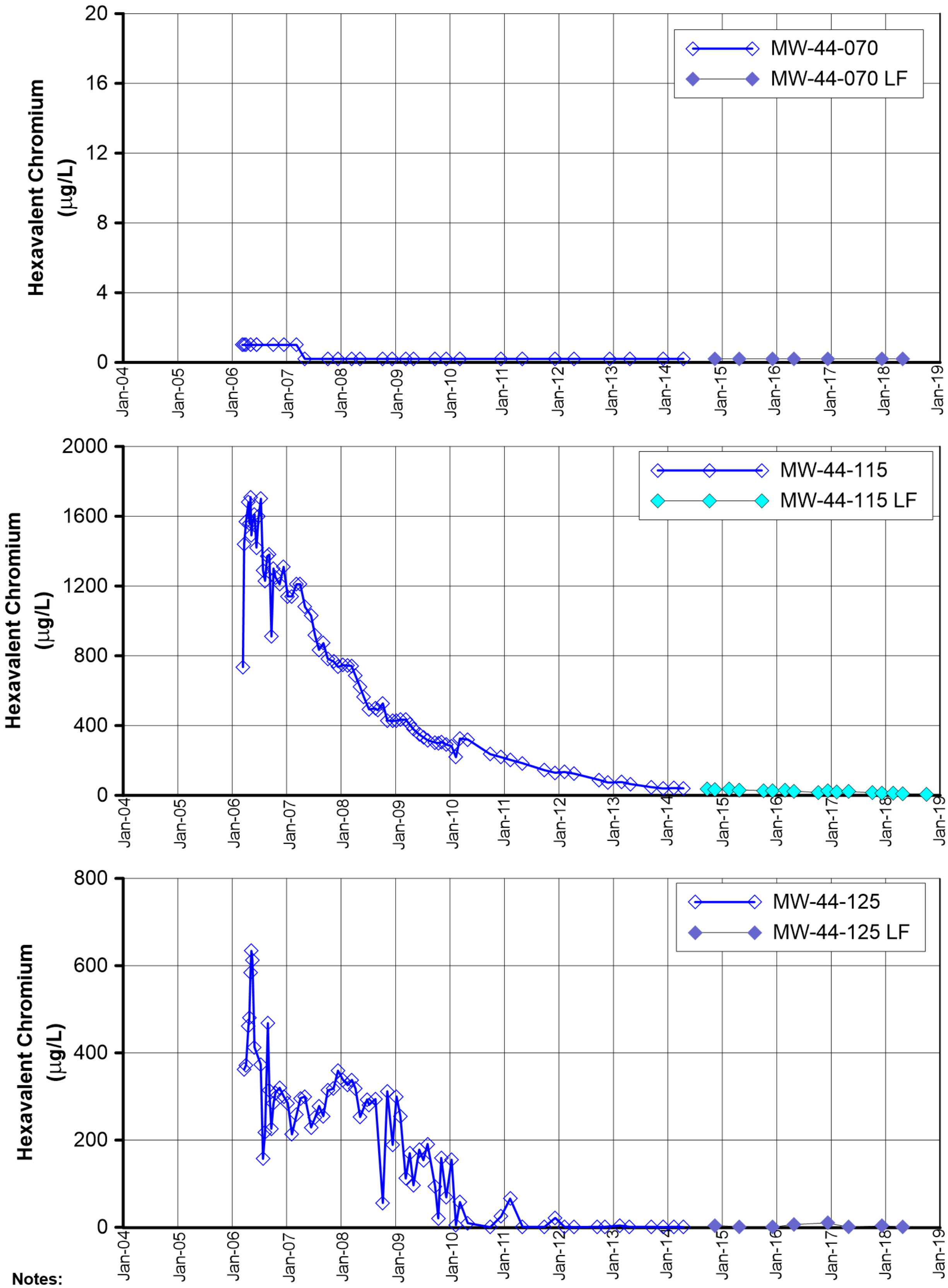
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA



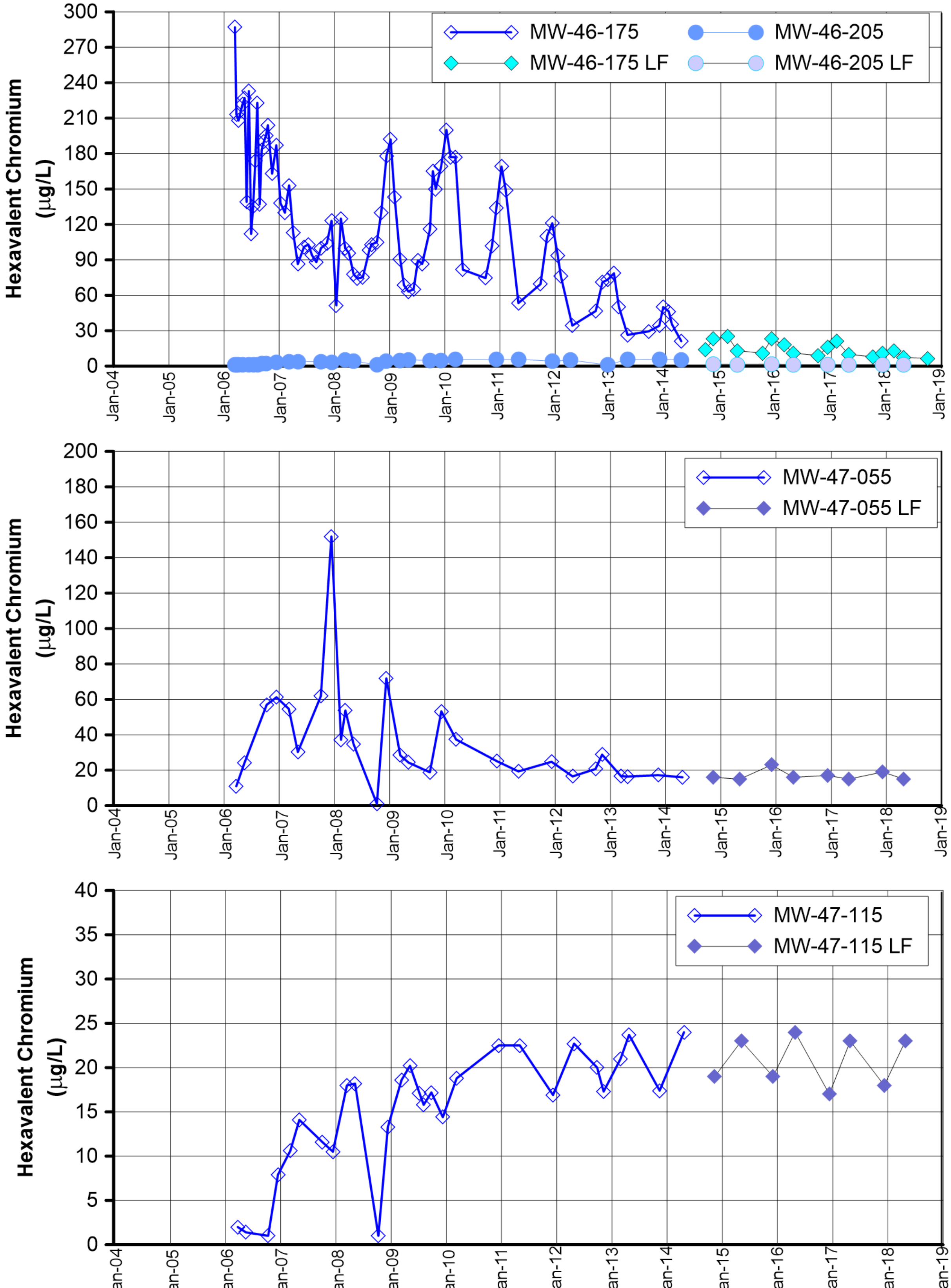
Notes:

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 D-10
HEXAVALENT CHROMIUM
IN MW-44 CLUSTER

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



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 D-11
HEXAVALENT CHROMIUM IN MW-46 AND MW-47 CLUSTERS

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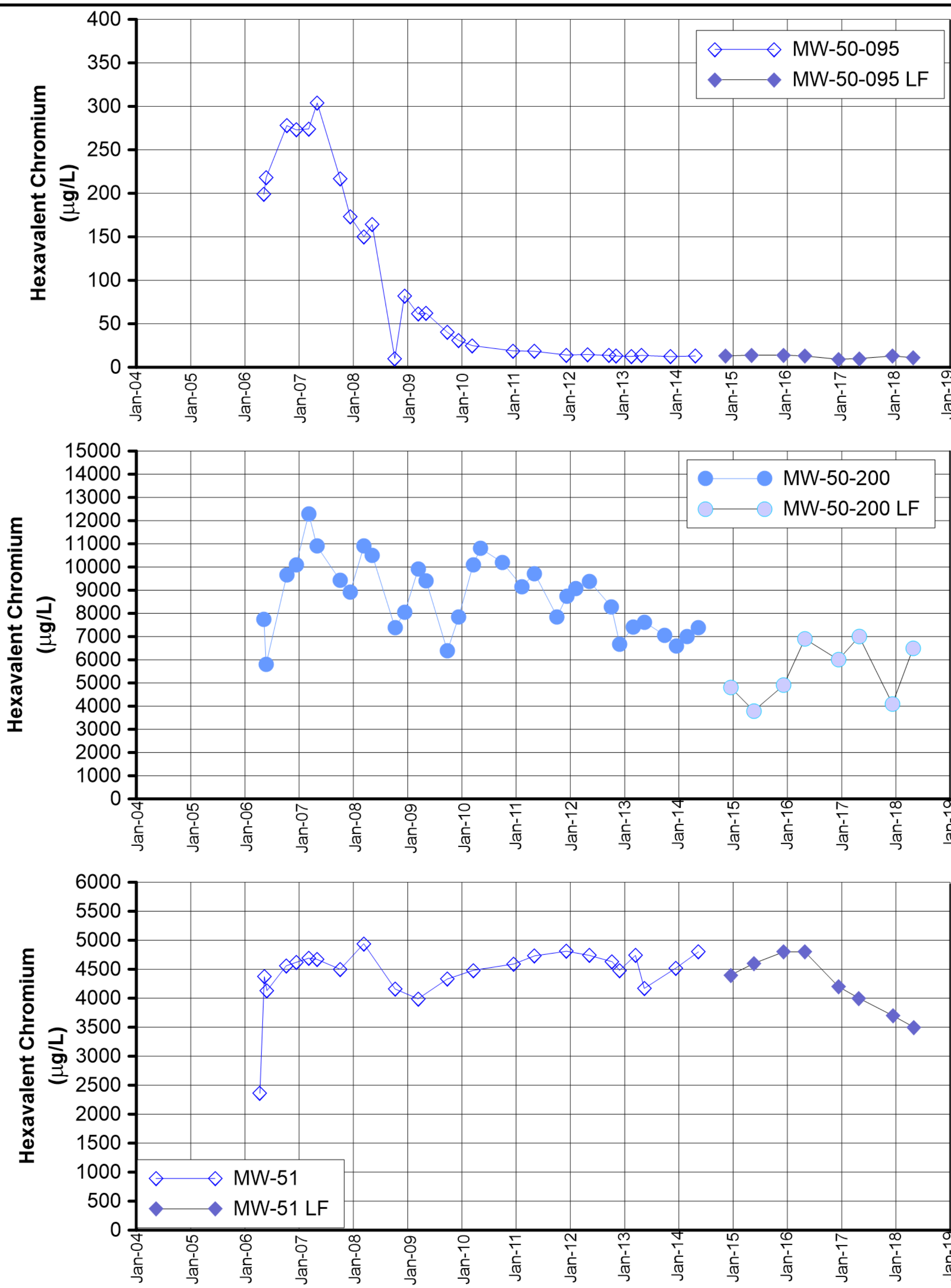
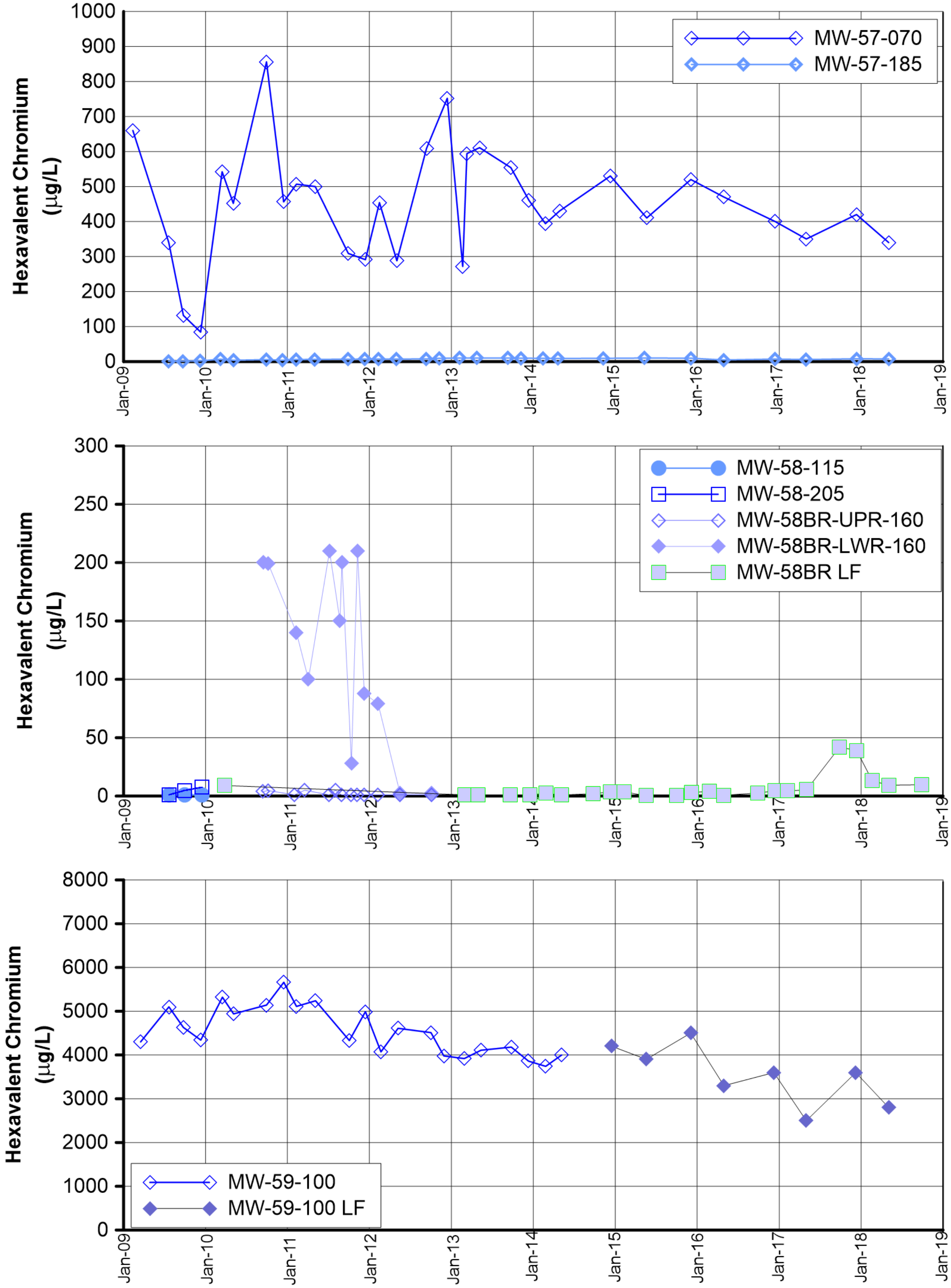


Notes:

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 D-12
HEXAVALENT CHROMIUM IN MW-50 AND MW-51 CLUSTERS

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



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 D-13
HEXAVALENT CHROMIUM IN MW-57 CLUSTER, MW-58 CLUSTER AND MW-59-100

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

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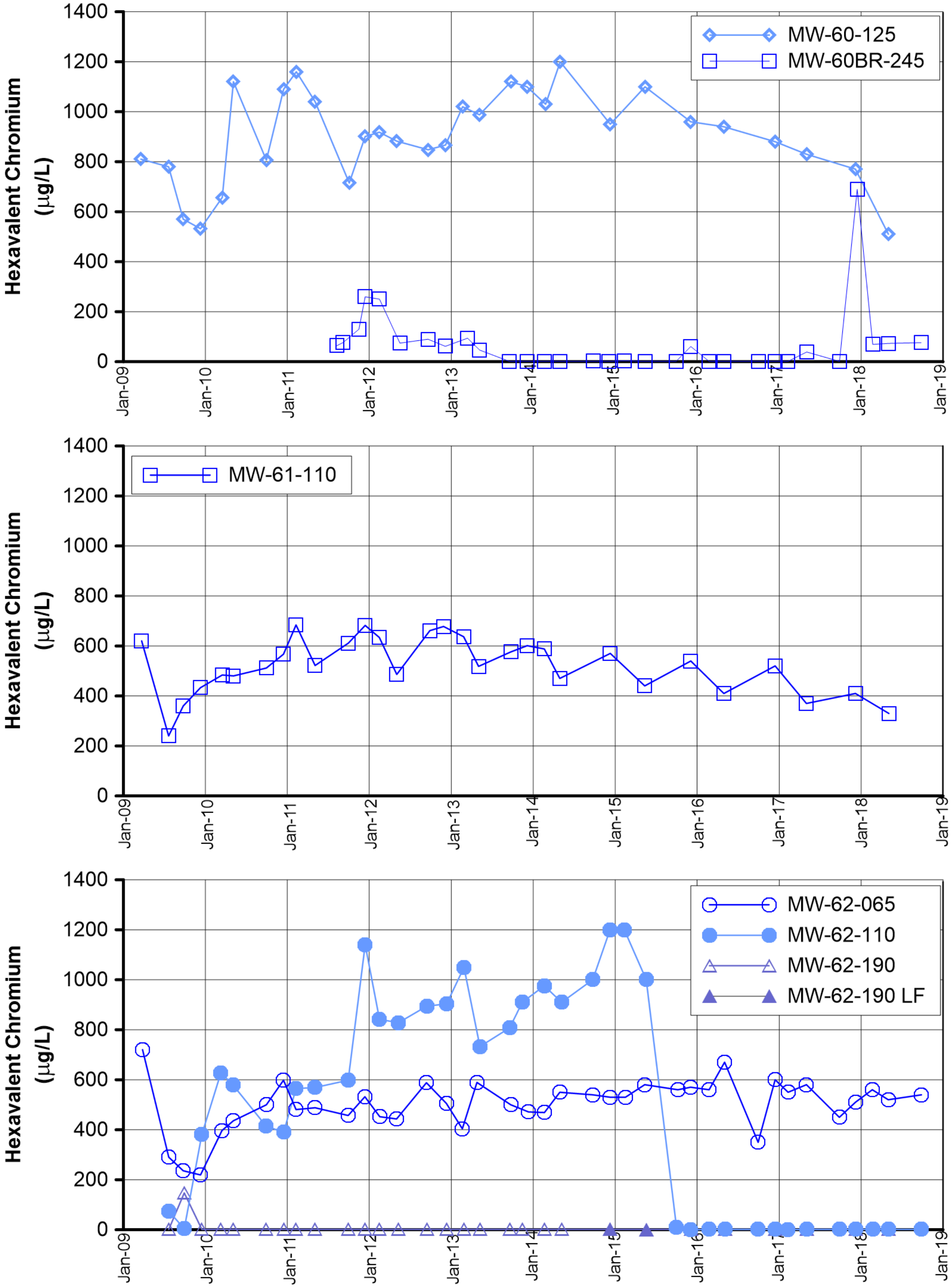

Notes:

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 D-14
HEXAVALENT CHROMIUM IN MW-60 CLUSTER, MW-61-110 AND MW-62 CLUSTER

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

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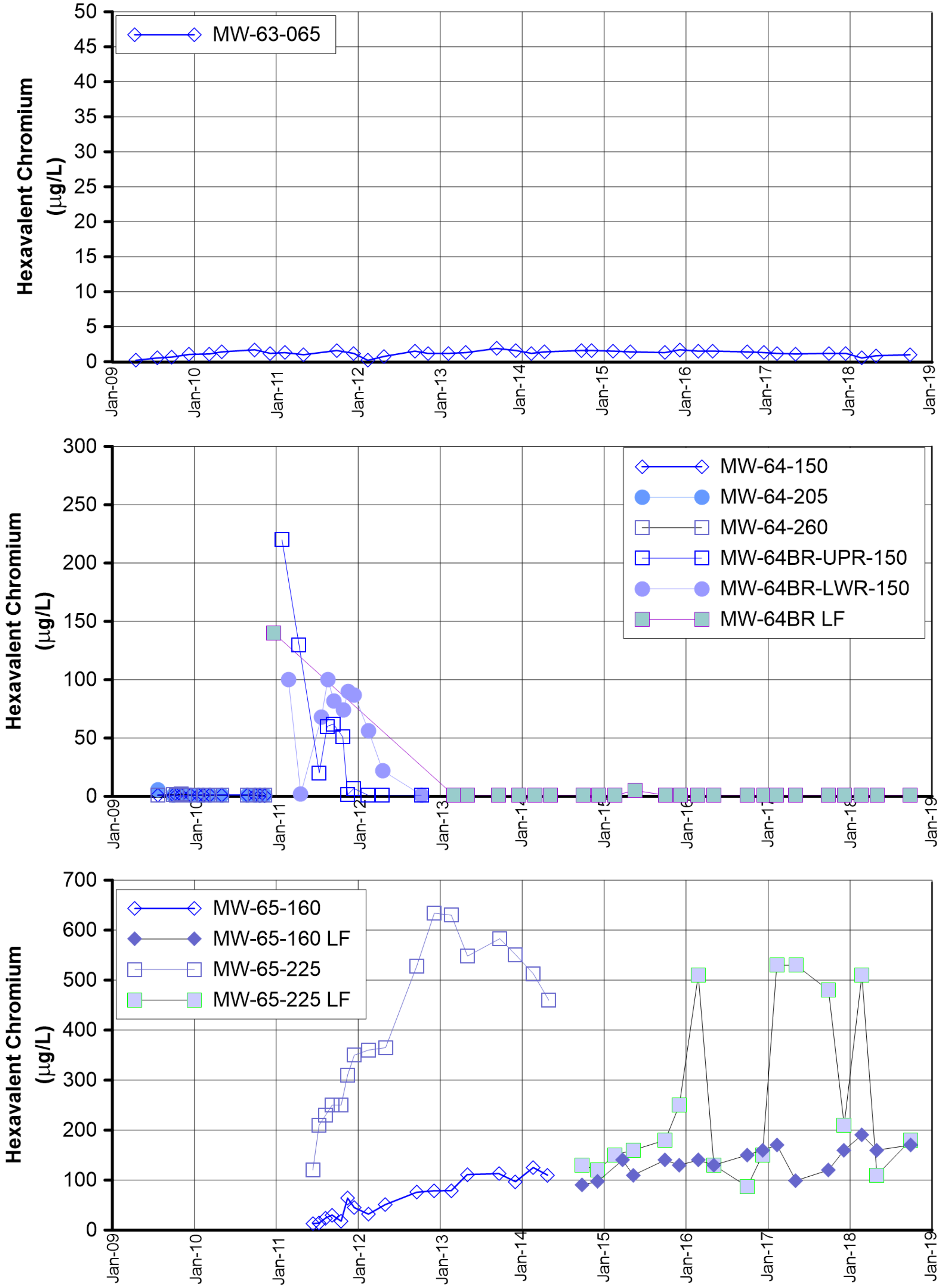


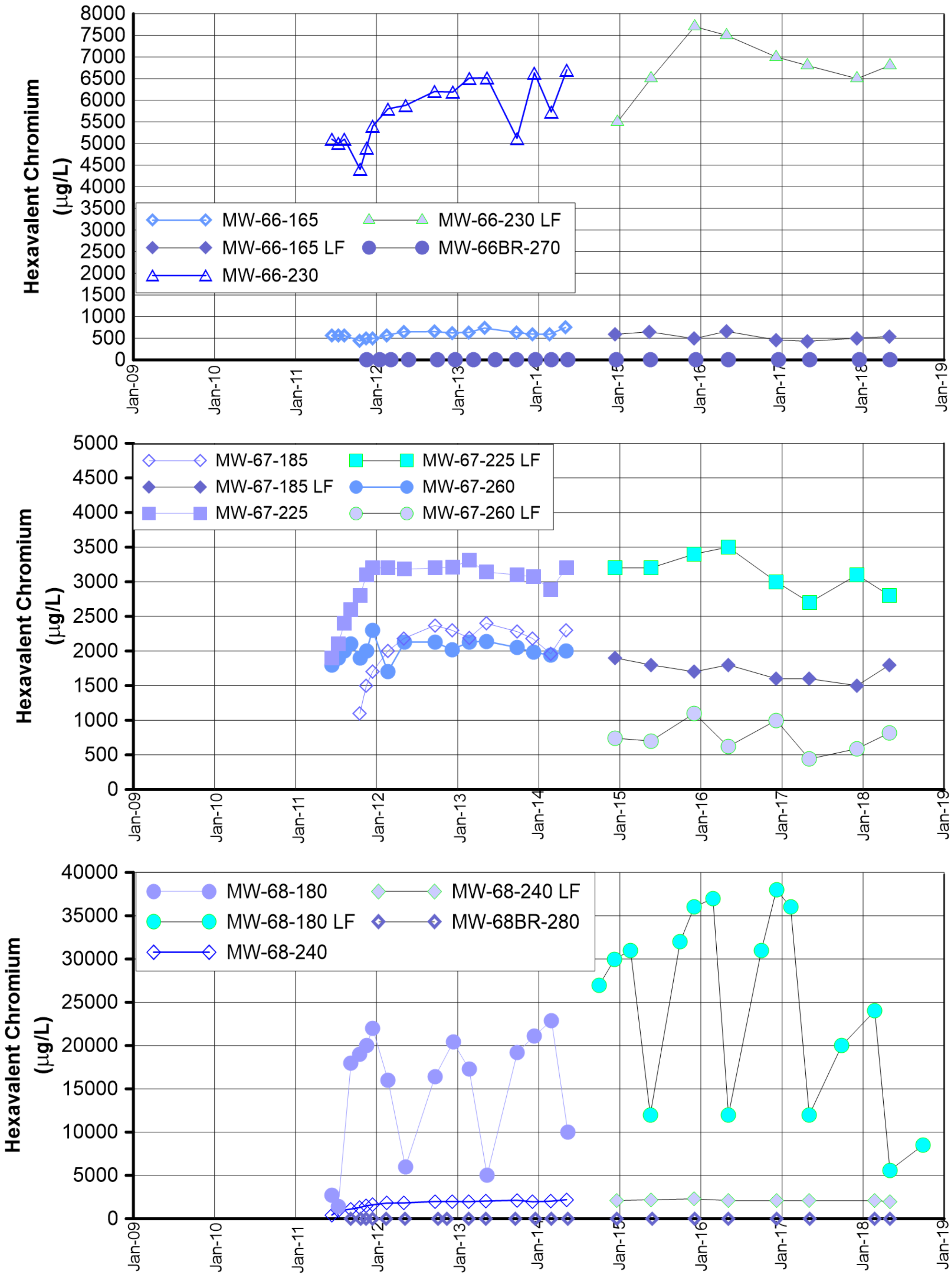
Notes:

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 D-15
HEXAVALENT CHROMIUM
IN MW-63-065, MW-64 CLUSTER AND MW-65 CLUSTER

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

ARCADIS

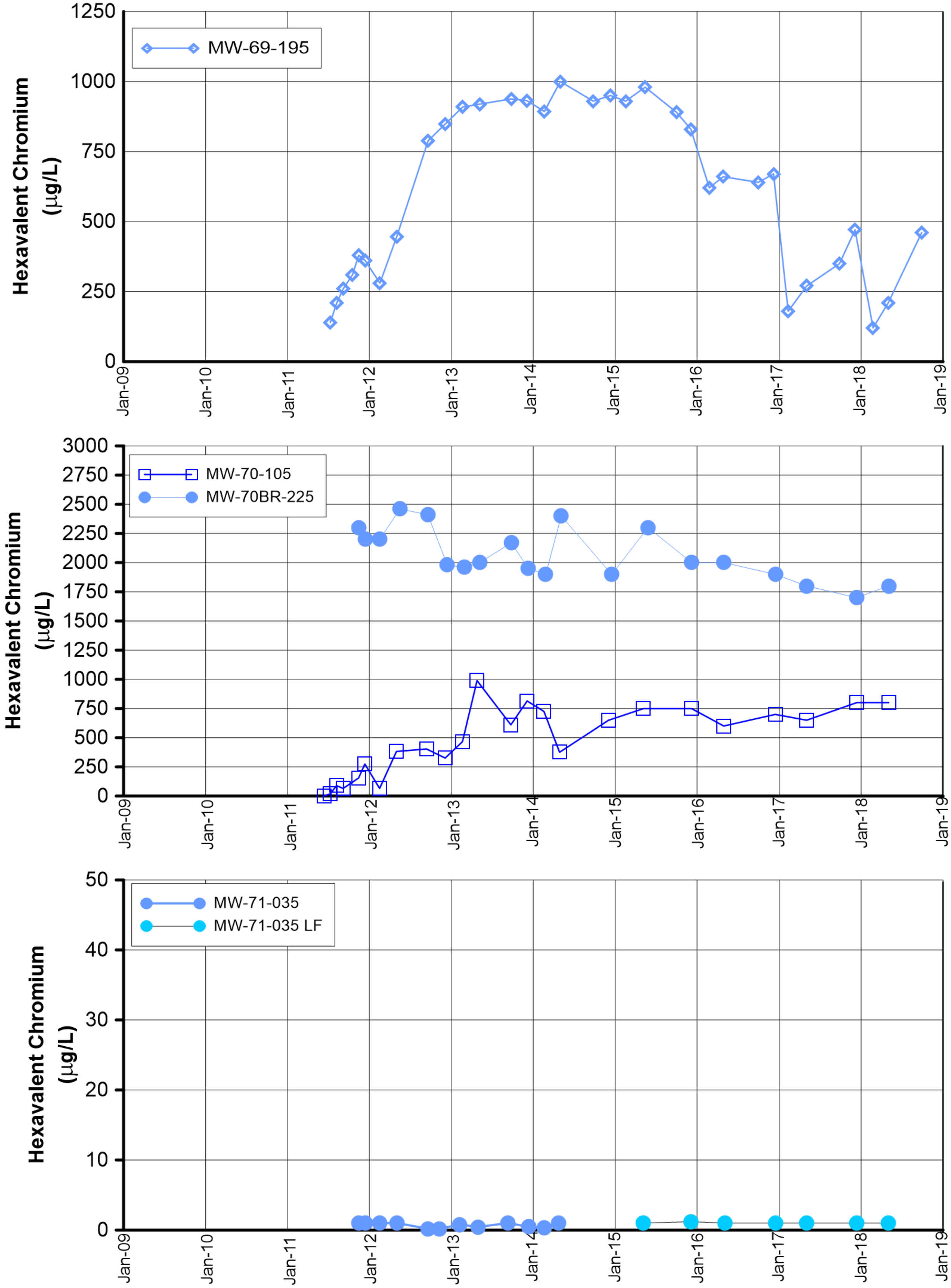


Notes:

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 D-16
HEXAVALENT CHROMIUM IN MW-66, MW-67, AND MW-68 CLUSTERS
THIRD QUARTER 2018 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 D-17
HEXAVALENT CHROMIUM IN MW-69-195, MW-70 CLUSTER, AND MW-71-035

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

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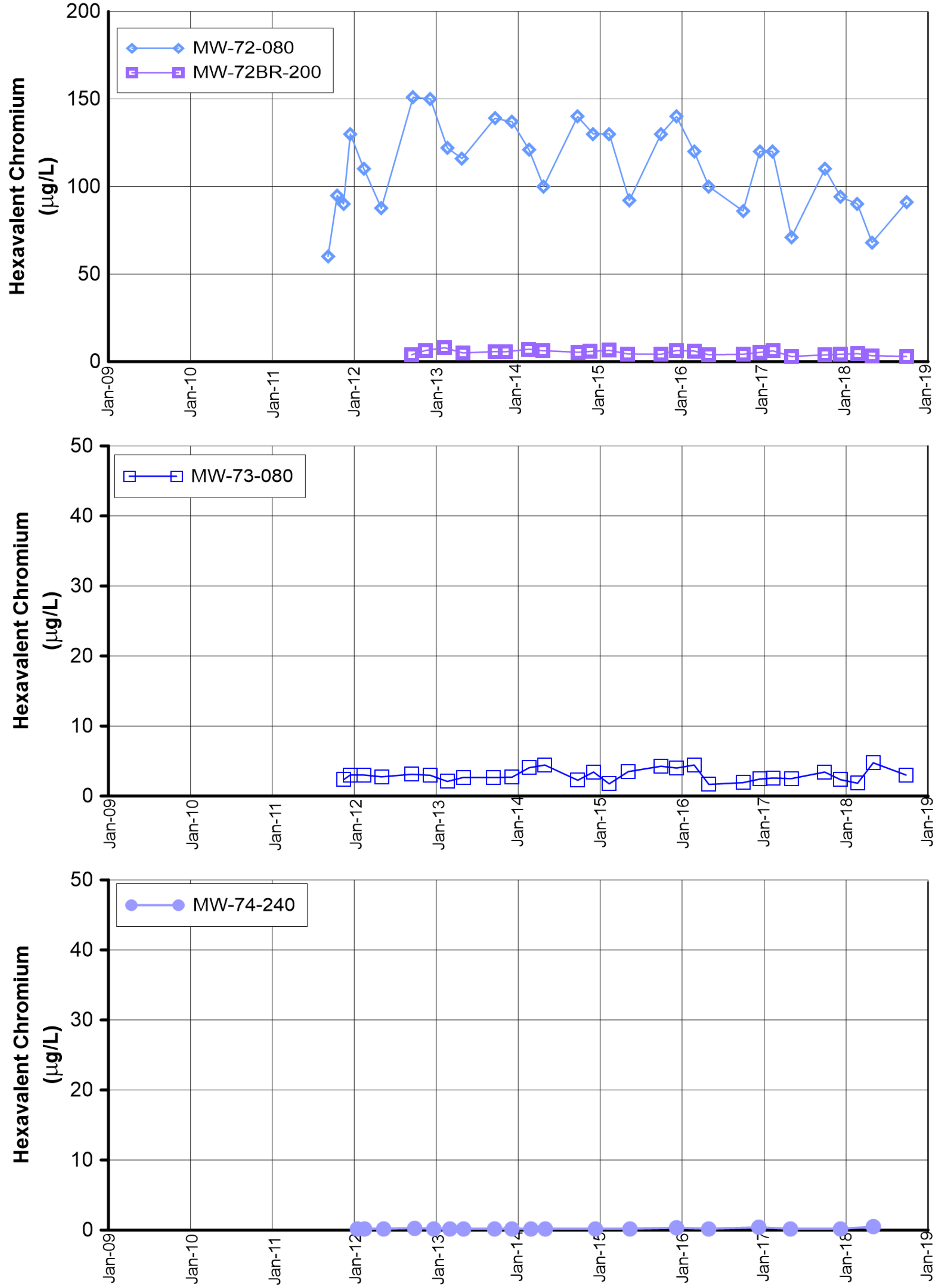

FIGURE D-18
HEXAVALENT CHROMIUM
IN MW-72 CLUSTER, MW-73-080, AND MW-74-240
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT, PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

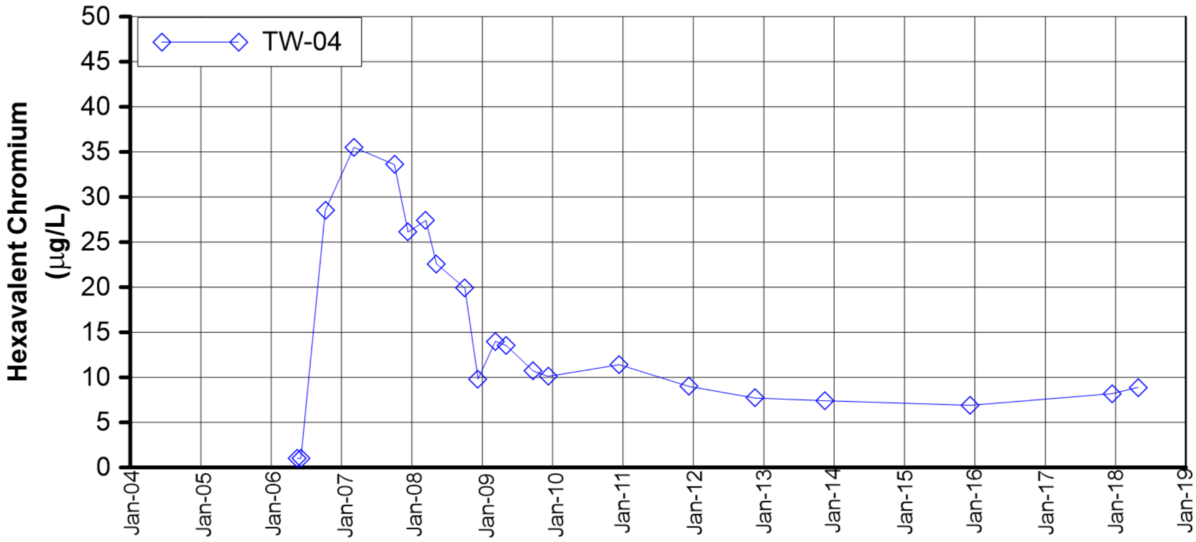

FIGURE D-19
HEXAVALENT CHROMIUM
IN TW-04

THIRD QUARTER 2018 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 E

Interim Measures Extraction System Operations Log, Third Quarter 2018

APPENDIX E

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

During Third Quarter 2018 (July through October), extraction well TW-3D operated at a target pump rate of at 135 gallons per minute, excluding periods of planned and unplanned downtime. Extraction wells TW-02D and PE-01 were only operated to collect a sample during Third Quarter 2018. Extraction well TW-02S was not operated during Third Quarter 2018. The operational run time for the Interim Measure groundwater extraction system (combined or individual pumping) was approximately 91.1 percent during Third Quarter 2018.

The Interim Measure Number 3 (IM-3) facility treated approximately 21,804,981 gallons of extracted groundwater during Third Quarter 2018. The IM-3 facility treated approximately 700 gallons of purge water from site sampling activities. Four containers of solids (sludge) were transported offsite from the IM-3 facility during the reporting period.

Periods of planned and unplanned extraction system downtime (that together resulted in approximately 8.9 percent of downtime during Third 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.

E.1 July 2018

- **July 1 - 2, 2018 (unplanned):** The extraction well system was offline from 23:56 p.m. July 1, 2018 to 8:10 a.m. July 2, 2018 because the starter failed to the Raw Water Feed Pump (P-200). Extraction system downtime was 8 hours 14 minutes.
- **July 3, 2018 (unplanned):** The extraction well system was offline from 10:38 a.m. to 12:02 p.m. to change out the microfilter modules in the east bank. Extraction system downtime was 1 hour 24 minutes.
- **July 5, 2018 (unplanned):** The extraction well system was offline from 12:16 p.m. to 13:06 p.m. to lower levels at Iron Oxidation Reactor #3 (T-301C) and Raw Water Storage Tank (T-100). Extraction system downtime was 50 minutes.
- **July 9, 2018 (unplanned):** The extraction well system was offline from 21:12 p.m. to 21:20 p.m. The plant operator switched from Needles Power to the generator power because there was a thunderstorm. Extraction system downtime was 8 minutes.
- **July 10, 2018 (unplanned):** The extraction well system was offline from 2:42 p.m. to 2:48 p.m. The plant operator switched back to Needles Power from generator power because the thunderstorm ended. Extraction system downtime was 6 minutes.
- **July 11, 2018 (planned):** The extraction well system was offline from 9:38 a.m. to 11:36 a.m. due to testing of the pipeline critical alarms and leak detection system. Extraction system downtime was 1 hour 58 minutes.
- **July 13, 2018 (unplanned):** The extraction well system was offline from 7:30 a.m. to 8:22 a.m. to maintain appropriate water levels in T-100. There was a high level in T-100 because of the heavy rinse needed to clean the extremely dirty modules. The rinse water went from Process Drain Tank (T-900), which is the normal process. Extraction system downtime was 52 minutes.
- **July 14, 2018 (unplanned):** The extraction well system was offline from 4:56 a.m. to 7:24 a.m. to change out the microfilter modules. Extraction system downtime was 2 hours 28 minutes.

- **July 16, 2018 (unplanned):** The extraction well system was offline from 5:40 a.m. to 7:42 a.m. to maintain appropriate water levels in T-100. Extraction system downtime was 2 hours 2 minutes.
- **July 16-17, 2018 (unplanned):** The extraction well system was offline from 12:32 p.m. July 16, 2018 to 18:46 p.m. July 17, 2018 because one of the airline ports on the header of the microfilter cracked. The microfilter cannot run without the airline functioning properly so the operators had to drive to Riverside, California for the repair. Extraction system downtime was 1 day 6 hours 14 minutes.
- **July 18, 2018 (planned):** The extraction well system was offline from 6:56 a.m. to 13:10 p.m. to replace the pre-treated Water Transfer Pump (P-500) and valve #5 (valve that controls flow on the microfilter). Extraction system downtime was 6 hours 14 minutes.
- **July 19, 2018 (unplanned):** The extraction well system was offline from 11:22 a.m. to 14:50 p.m. to clean the hand operated valve on the discharge of P-500. Extraction system downtime was 3 hours 28 minutes.
- **July 20-21, 2018 (unplanned):** The extraction well system was offline from 7:04 a.m. to 8:32 a.m. July 20, 2018 and from 5:24 a.m. July 21, 2018 to 7:06 a.m., and from 18:12 p.m. to 19:46 p.m. to maintain appropriate water levels in T-100. Extraction system downtime was 4 hours 44 minutes.
- **July 21, 2018 (unplanned):** The extraction well system was offline from 8:18 a.m. to 8:30 a.m. and from 9:02 a.m. 9:10 a.m. and from 14:12 p.m. and from 14:30 p.m. due to Needles Power loss, switching to generator power, and switching back to Needles Power. Extraction system downtime was 38 minutes.
- **July 22-23, 2018 (unplanned):** The extraction well system was offline from 15:30 p.m. July 22, 2018 to 16:22 p.m. and from 4:28 a.m. July 23, 2018 to 5:30 a.m. to maintain appropriate water levels in T-100. Extraction system downtime was 1 hour 54 minutes.
- **July 23, 2018 (unplanned):** The extraction well system was offline from 9:50 a.m. to 11:18 a.m. to change out the microfilter modules. Extraction system downtime was 1 hour 28 minutes.
- **July 24, 2018 (unplanned):** The extraction well system was offline from 3:18 a.m. to 3:36 a.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 18 minutes.
- **July 24, 2018 (unplanned):** The extraction well system was offline from 4:24 a.m. to 5:56 a.m. to maintain appropriate water levels in T-100. Extraction system downtime was 1 hour 32 minutes.
- **July 25, 2018 (unplanned):** The extraction well system was offline from 11:30 a.m. to 12:52 p.m. due to a pipe blockage at the top of the chemical loop. Plant was shut down to clean the blockage. Extraction system downtime was 1 hour 22 minutes.
- **July 25, 2018 (unplanned):** The extraction well system was offline from 16:06 p.m. to 17:26 p.m. due to a blockage in the pipeline on the discharge of P-500, which feeds the microfilter. This was causing flow problems throughout the plant. Operators had to drain Pretreated Water Tank (T-500), which filled Process Drain Tank (T-900) and T-100. Plant was shut down to clean the blockage. Extraction system downtime was 1 hour 20 minutes.
- **July 26, 2018 (unplanned):** The extraction well system was offline from 22:36 p.m. to 22:54 p.m. due to extraction well TW-3D shutting off automatically because of high levels at T-100. Extraction system downtime was 18 minutes.
- **July 27, 2018 (unplanned):** The extraction well system was offline from 4:48 a.m. to 5:08 a.m. and from 10:20 a.m. to 10:46 a.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 46 minutes.

- **July 27-28, 2018 (unplanned):** The extraction well system was offline from 10:48 a.m. July 27, 2018 to 11:50 a.m. and from 4:58 a.m. July 28, 2018 to 5:54 a.m. to maintain appropriate water levels in T-100. Extraction system downtime was 1 hour 58 minutes.
- **July 28-29, 2018 (unplanned):** The extraction well system was offline from 21:26 p.m. July 28, 2018 to 21:38 p.m. and from 0:16 a.m. July 29, 2018 to 0:30 a.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 26 minutes.
- **July 29, 2018 (unplanned):** The extraction well system was offline from 5:58 a.m. to 9:12 a.m. and from 9:50 a.m. to 10:14 a.m., and from 10:20 a.m. to 10:46 a.m. due a microfilter air valve not working. An air controller on the microfilter faulted and need to be reset and reprogrammed. Extraction system downtime was 4 hour 4 minutes
- **July 29-31, 2018 (unplanned):** The extraction well system was offline from 1:14 a.m. July 29, 2018 to 2:38 a.m. and from 19:44 p.m. to 21:34 p.m. and from 1:48 a.m. July 31, 2018 to 2:58 a.m. to maintain appropriate water levels in T-100. Extraction system downtime was 4 hours 24 minutes
- **July 31, 2018 (unplanned):** The extraction well system was offline from 8:08 a.m. to 9:50 a.m. and from 10:02 a.m. to 15:04 p.m. due to the Clarifier Feed Pump (P-400) shutting down which caused high levels in all the oxidation tanks at the front of the plant. Extraction system downtime was 6 hours 44 minutes

E.2 August 2018

- **August 1 - 2, 2018 (unplanned):** The extraction well system was offline from 12:08 p.m. August 1, 2018 to 1:02 p.m. August 1, 2018 and from 7:46 p.m. August 1, 2018 to 9:06 p.m. August 1, 2018 and from 11:30 a.m. August 2, 2018 to 12:16 p.m. August 2, 2018 to maintain appropriate water levels in Raw Water Storage Tank (T-100). There was a blockage in the microfilters that cause the water levels to be high in T-100. Plant was shut down to clean the blockage. Extraction system downtime was 3 hours.
- **August 3 - 4, 2018 (unplanned):** The extraction well system was offline from 3:26 a.m. August 3, 2018 to 5:46 a.m. August 3, 2018 and from 1:26 a.m. August 4, 2018 to 2:24 a.m. August 4, 2018 and from 2:40 a.m. August 4, 2018 to 5:30 a.m. August 4, 2018 to maintain appropriate water levels in T-100. A high level in Raw Water Storage Tank (T-500) caused the Clarifier Feed Pump (P-400) to shut down, which caused the high level in T-100. Extraction system downtime was 6 hours 8 minutes.
- **August 4, 2018 (unplanned):** The extraction well system was offline from 11:38 p.m. to 11:50 p.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 12 minutes
- **August 5, 2018 (unplanned):** The extraction well system was offline from 4:58 a.m. to 6:30 a.m. to maintain appropriate water levels in Raw Water Storage Tank (T-100). There was a blockage in the microfilters that cause the water levels to be high in T-100. The plant was shut down to clean the blockage. Extraction system downtime was 1 hour 32 minutes.
- **August 5, 2018 (unplanned):** The extraction well system was offline from 2:44 p.m. to 3:58 p.m. because the air compressor overheated and shut down due to extreme weather temperatures. Extraction system downtime was 1 hour 14 minutes.
- **August 6, 2018 (planned):** The extraction well system was offline from 2:54 a.m. to 4:06 a.m. to lower the level in T-100 in preparation for the semiannual scheduled maintenance. Extraction system downtime was 1 hour 12 minutes.

- **August 6-10, 2018 (planned):** The extraction well system was offline from 6:18 a.m. August 6, 2018 to 6:52 a.m. August 10, 2018 for the semiannual scheduled maintenance. Extraction system downtime was 4 days 34 minutes.
- **August 10, 2018 (planned):** The extraction well system was offline from 9:32 a.m. to 11:26 a.m. and from 12:04 p.m. to 4:18 p.m. and from 4:40 p.m. to 5:48 p.m. and from 6:06 p.m. to 10:32 p.m. and from 10:44 p.m. to 11:52 p.m. as part of the semiannual scheduled maintenance. Plant operators were filling tanks and testing the water before moving on to the next step. Extraction system downtime was 12 hours 50 minutes.
- **August 11 - 13, 2018 (unplanned):** The extraction well system was offline from 11:32 p.m. August 11, 2018 to 1:18 a.m. August 12, 2018 and from 10:54 p.m. August 12, 2018 to 12:26 a.m. August 13, 2018 to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be high in T-100. The plant was shut down to clean the blockage. Extraction system downtime was 3 hours 18 minutes.
- **August 14, 2018 (unplanned):** The extraction well system was offline from 12:02 p.m. to 1:04 p.m. to change out the microfilter modules. Extraction system downtime was 1 hour 2 minutes.
- **August 14, 2018 (unplanned):** The extraction well system was offline from 5:48 p.m. to 6:10 p.m. due to a PLC and HMI connectivity issue. Extraction system downtime was 22 minutes
- **August 14, 2018 (unplanned):** The extraction well system was offline from 7:00 p.m. to 8:20 p.m. to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be high in T-100. Plant was shut down to clean the blockage. Extraction system downtime was 1 hour 20 minutes.
- **August 15, 2018 (unplanned):** The extraction well system was offline from 12:06 a.m. to 3:24 a.m. because the plant was put in recirculation. Extraction system downtime was 3 hours 18 minutes.
- **August 16, 2018 (unplanned):** The extraction well system was offline from 5:42 p.m. to 6:00 p.m. to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be high in T-100. Plant was shut down to clean the blockage. Extraction system downtime was 18 minutes.
- **August 17, 2018 (unplanned):** The extraction well system was offline from 12:08 a.m. to 12:20 a.m. and from 5:06 a.m. to 6:08 a.m. to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be high in T-100. The plant was shut down to clean the blockage. Extraction system downtime was 1 hour 14 minutes.
- **August 18, 2018 (unplanned):** The extraction well system was offline from 8:16 a.m. to 9:00 a.m. to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be high in T-100. Plant was shut down to clean the blockage. Extraction system downtime was 44 minutes.
- **August 19, 2018 (unplanned):** The extraction well system was offline from 12:02 a.m. to 12:22 a.m. and from 4:56 a.m. to 6:16 a.m. to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be high in T-100. Plant was shut down to clean the blockage. Extraction system downtime was 1 hour 40 minutes.
- **August 20, 2018 (unplanned):** The extraction well system was offline from 12:08 p.m. to 1:38 p.m. because the pH probes in Iron Oxidation Reactor No. 2 (T-301B) were not reading properly. The plant was shut down to repair the probes. Extraction system downtime was 1 hour 30 minutes.
- **August 21 - 22, 2018 (unplanned):** The extraction well system was offline from 4:06 p.m. August 21, 2018 to 5:34 p.m. August 21, 2018 and from 10:02 p.m. August 22, 2018 to 11:32 p.m. August 22, 2018 to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be

high in T-100. Plant was shut down to clean the blockage. Extraction system downtime was 2 hours 58 minutes.

- **August 23, 2018 (unplanned):** The extraction well system was offline from 8:48 p.m. to 9:24 p.m. to maintain appropriate water levels in T-100. The Raw Water Feed Pump (P-200) shut down for an unknown reason and caused a high level in T-100. Extraction system downtime was 36 minutes
- **August 23, 2018 (unplanned):** The extraction well system was offline from 10:42 p.m. to 10:54 p.m. due to a PLC and HMI connectivity issue. Extraction system downtime was 12 minutes
- **August 24, 2018 (unplanned):** The extraction well system was offline from 10:12 a.m. to 12:00 p.m. to maintain appropriate water levels in T-100. There was a blockage in the microfilters that cause the water levels to be high in T-100. Plant was shut down to clean the blockage. Extraction system downtime was 1 hour 48 minutes.
- **August 31, 2018 (unplanned):** The extraction well system was offline from 5:26 a.m. to 12:20 p.m. because the air blower failed and needed to be replaced. Extraction system downtime was 6 hours 54 minutes.

E.3 September 2018

- **September 6, 2018 (unplanned):** The extraction well system was offline from 6:56 a.m. to 6:58 a.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 2 minutes.
- **September 6, 2018 (unplanned):** The extraction well system was offline from 9:46 a.m. to 10:16 a.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 30 minutes.
- **September 6, 2018 (unplanned):** The extraction well system was offline from 10:20 a.m. to 10:22 a.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 2 minutes.
- **September 15, 2018 (unplanned):** The extraction well system was offline from 8:40 a.m. to 10:04 a.m. to change out the microfilter modules. Extraction system downtime was 1 hour 24 minutes.
- **September 22, 2018 (unplanned):** The extraction well system was offline from 5:40 a.m. to 7:50 a.m. because the supplier ran out of hydrochloric acid, which caused a late acid delivery. The plant was shut down while the acid was in transit. Extraction system downtime was 2 hours 10 minutes.
- **September 23, 2018 (unplanned):** The extraction well system was offline from 3:20 p.m. to 4:24 p.m. to change out the microfilter modules. Extraction system downtime was 1 hour 4 minutes.
- **September 29, 2018 (unplanned):** The extraction well system was offline from 5:26 a.m. to 6:24 a.m. to change out the microfilter modules. Extraction system downtime was 58 minutes.

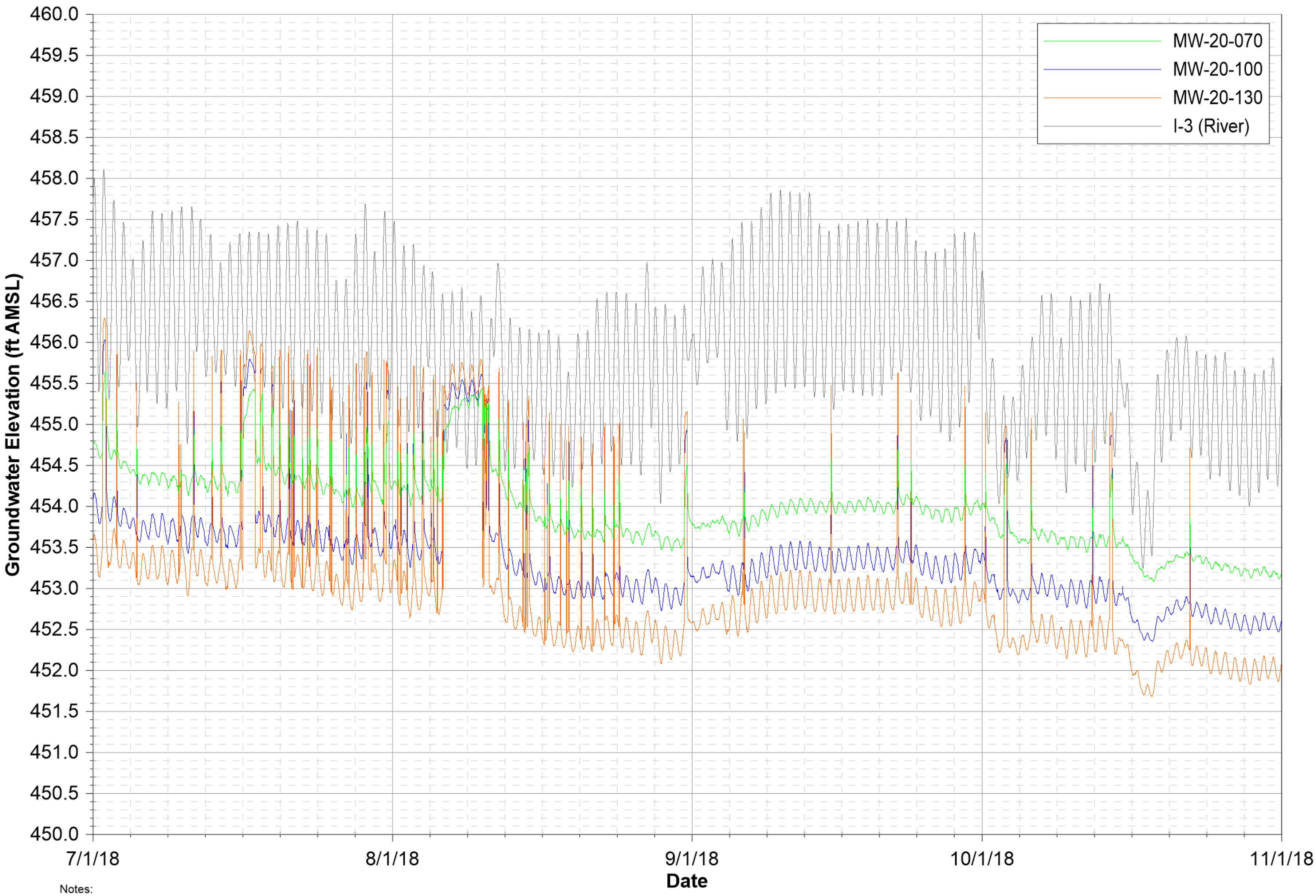
E.4 October 2018

- **October 1, 2018 (unplanned):** The extraction well system was offline from 8:10 a.m. to 8:52 a.m. due to testing of the pipeline critical alarms and leak detection system and also to change out 4 microfilter modules. Extraction system downtime was 42 minutes.
- **October 1, 2018 (unplanned):** The extraction well system was offline from 8:54 a.m. to 8:56 a.m. due to a programmable logic controller (PLC) and human machine interface (HMI) connectivity issue. Extraction system downtime was 2 minutes.

- **October 1, 2018 (unplanned):** The extraction well system was offline from 8:58 a.m. to 9:00 a.m. due to a PLC and HMI connectivity issue. Extraction system downtime was 2 minutes.
- **October 3, 2018 (unplanned):** The extraction well system was offline from 6:30 a.m. to 2:14 p.m. to remove sludge from the clarifier that plugged the pipelines in between the waste and recycle pumps and associated valves. Extraction system downtime was 7 hours 44 minutes.
- **October 6, 2018 (unplanned):** The extraction well system was offline from 1:26 a.m. to 2:56 a.m. due to a plugged feed line from Raw Water Storage Tank (T-100) to the Raw Water Feed Pump (P-200). The plug was removed (strainer changed) and the plant returned to service. Extraction system downtime was 1 hours 30 minutes.
- **October 12, 2018 (unplanned):** The extraction well system was offline from 9:52 a.m. to 10:44 a.m. to change out the microfilter modules. Extraction system downtime was 52 minutes.
- **October 14, 2018 (unplanned):** The extraction well system was offline from 5:20 a.m. to 11:26 a.m. due to low pH in the plant. A backflow pressure device failed at the hydrochloric acid injection point in the chemical loop, which caused the low pH. The device was replaced and the plant was in recirculation until the pH returned to normal. Extraction system downtime was 6 hours 6 minutes
- **October 15, 2018 (unplanned):** The extraction well system was offline from 1:02 p.m. to 1:06 p.m. due to a PLC and HMI connectivity issue. Extraction system downtime was 4 minutes.
- **October 22, 2018 (unplanned):** The extraction well system was offline from 11:44 a.m. to 12:40 p.m. due to low ferrous flow. A low level in the ferrous feed tote cause prime loss in the pump. The tote was changed out, the pump re-primed, and the plant returned to service. Extraction system downtime was 56 minutes.
- **October 31, 2018 (unplanned):** The extraction well system was offline from 3:34 p.m. to 3:38 p.m. due to a PLC and HMI connectivity issue. Extraction system downtime was 4 minutes.

APPENDIX F

Hydrographs, Third Quarter 2018

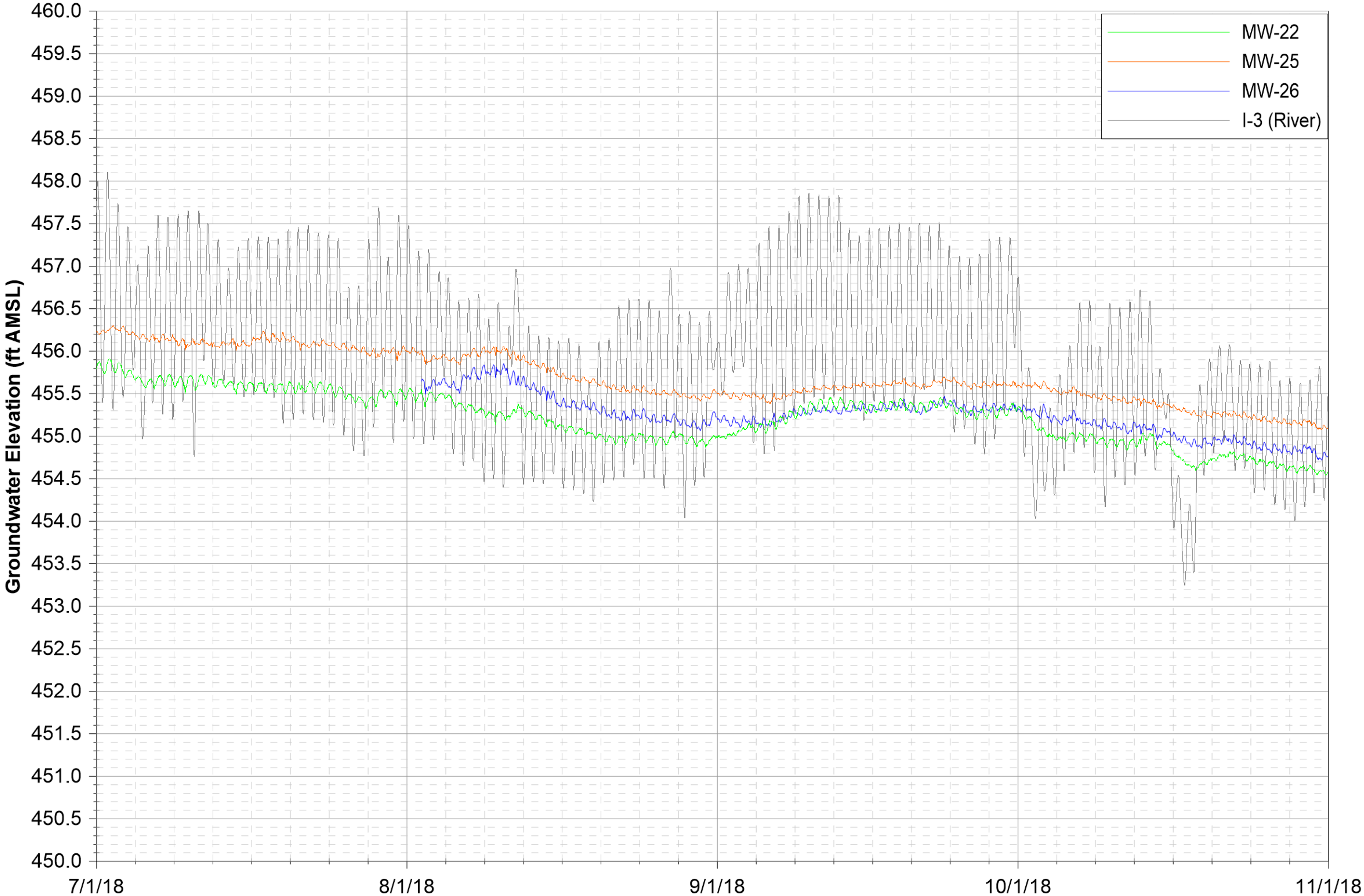


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE F-1A
MW-20 CLUSTER HYDROGRAPHS

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

ARCADIS

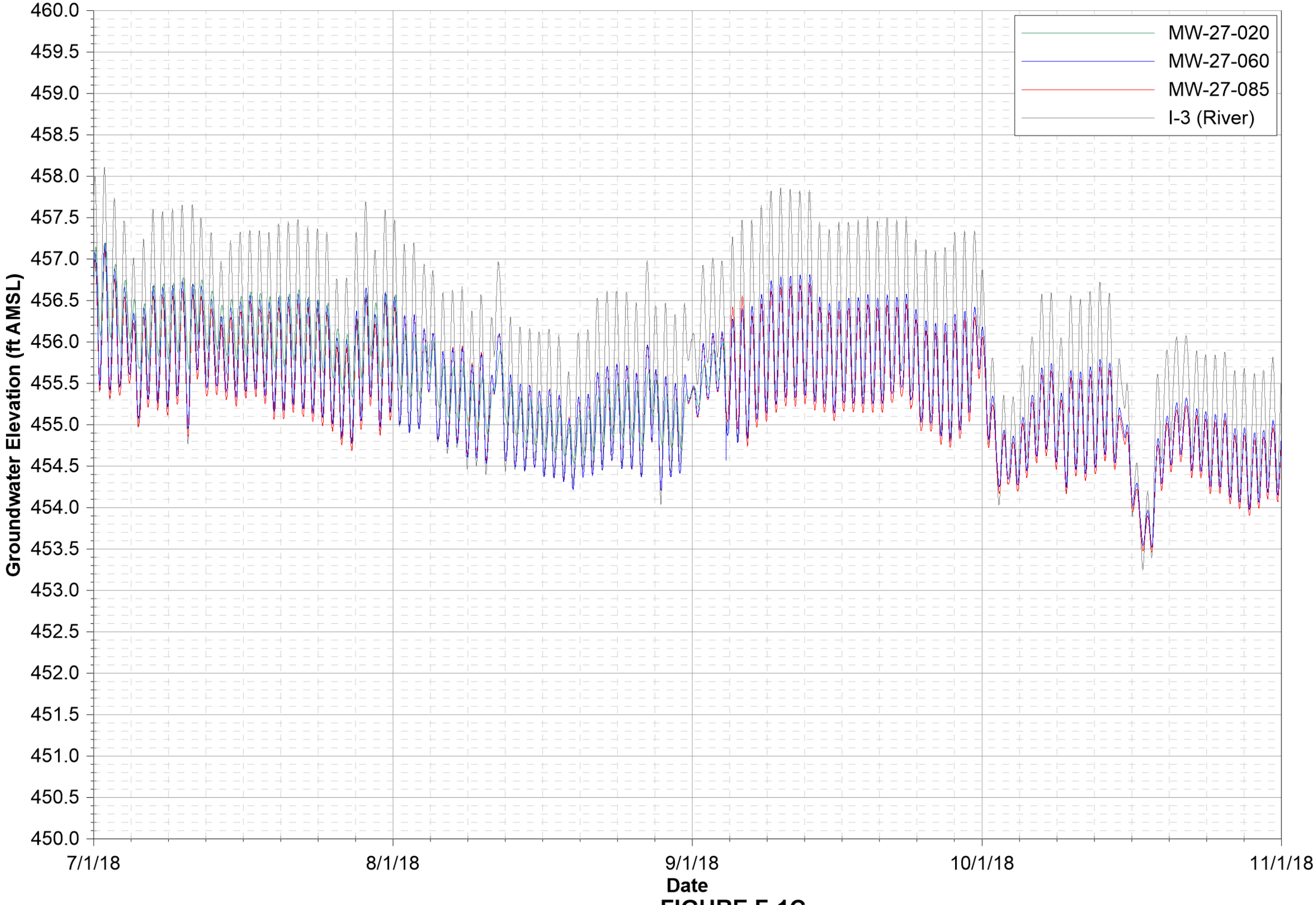


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-26 data unavailable from July 1, 2018 through August 1, 2018 due to transducer malfunction.

FIGURE F-1B
MW-22, MW-25, AND MW-26 HYDROGRAPHS

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

ARCADIS



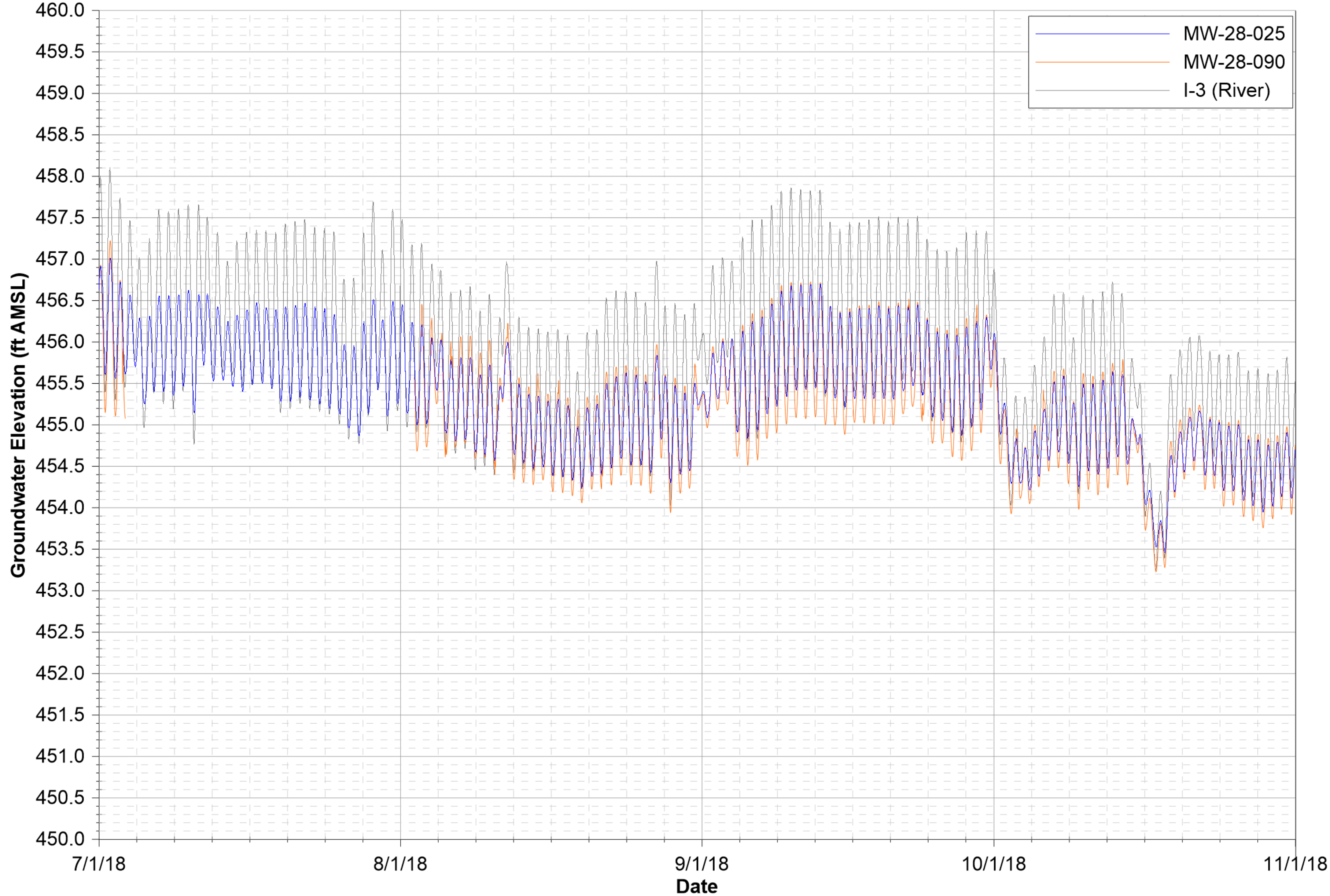
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level
3. MW-27-020 data unavailable from September 4, 2018 through October 31, 2018 due to transducer malfunction.

FIGURE F-1C

MW-27 CLUSTER HYDROGRAPHS

THIRD QUARTER 2018 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 F-1D
MW-28 CLUSTER HYDROGRAPHS

THIRD QUARTER 2018 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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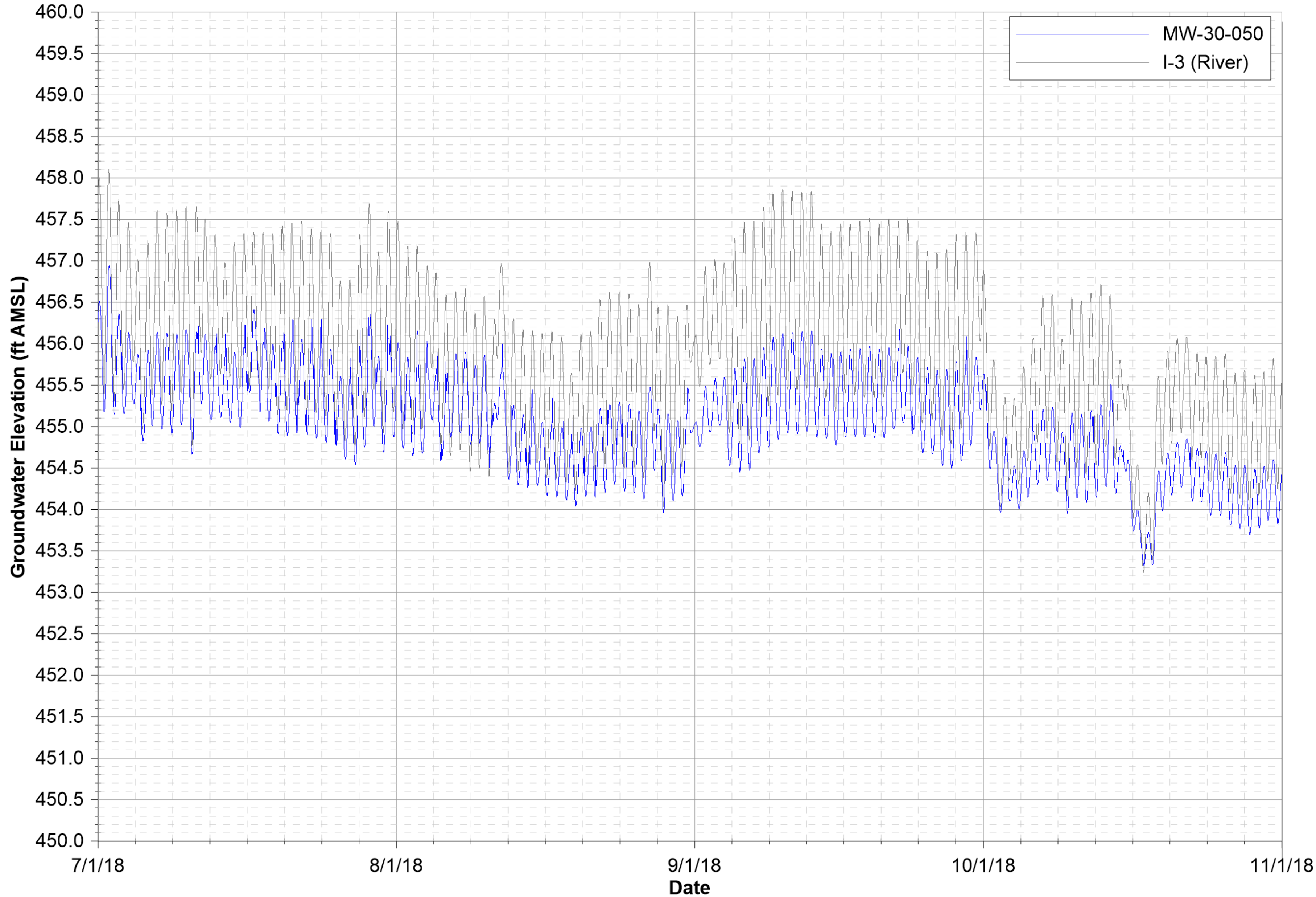
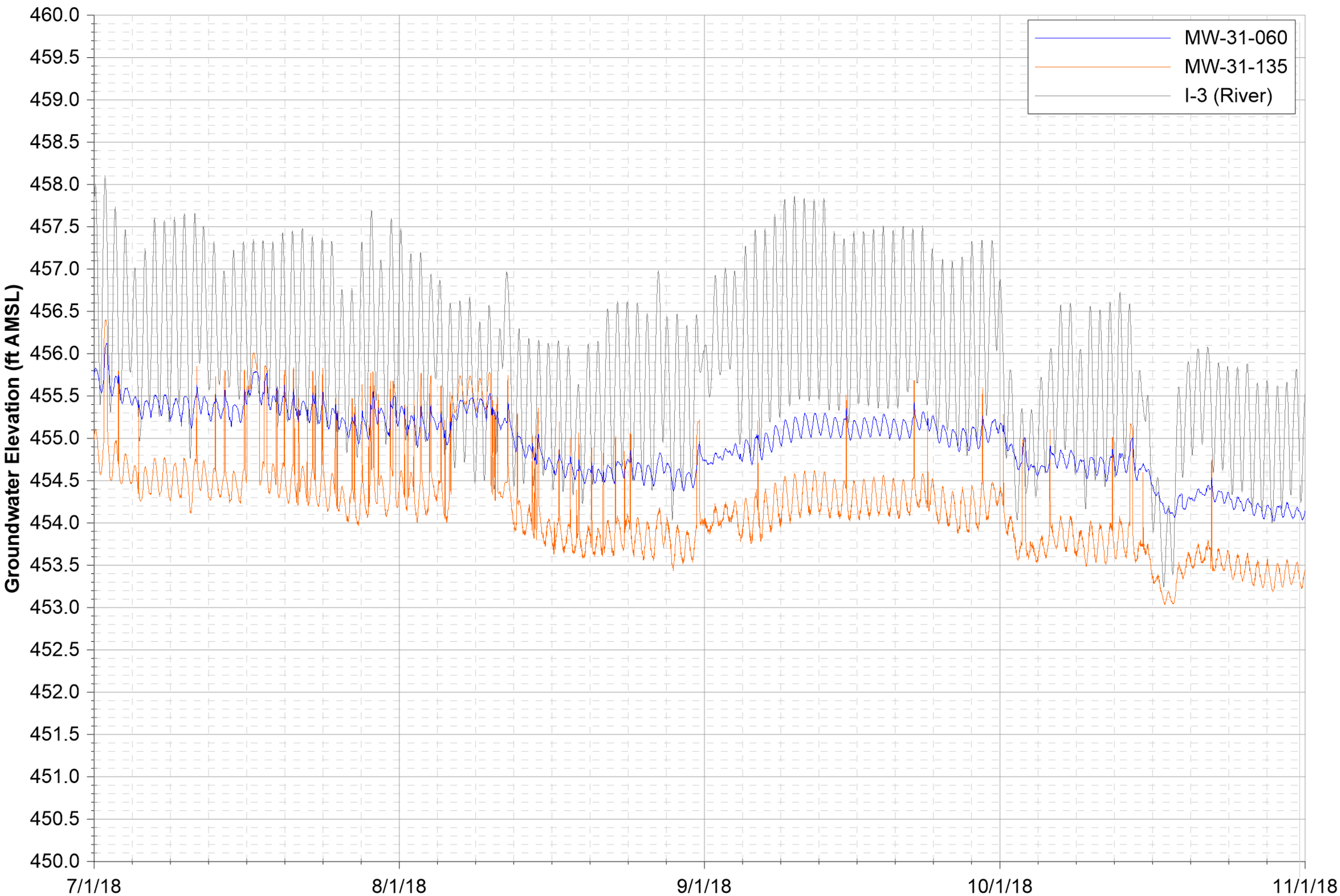


Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE F-1E
MW-30-050 HYDROGRAPH

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

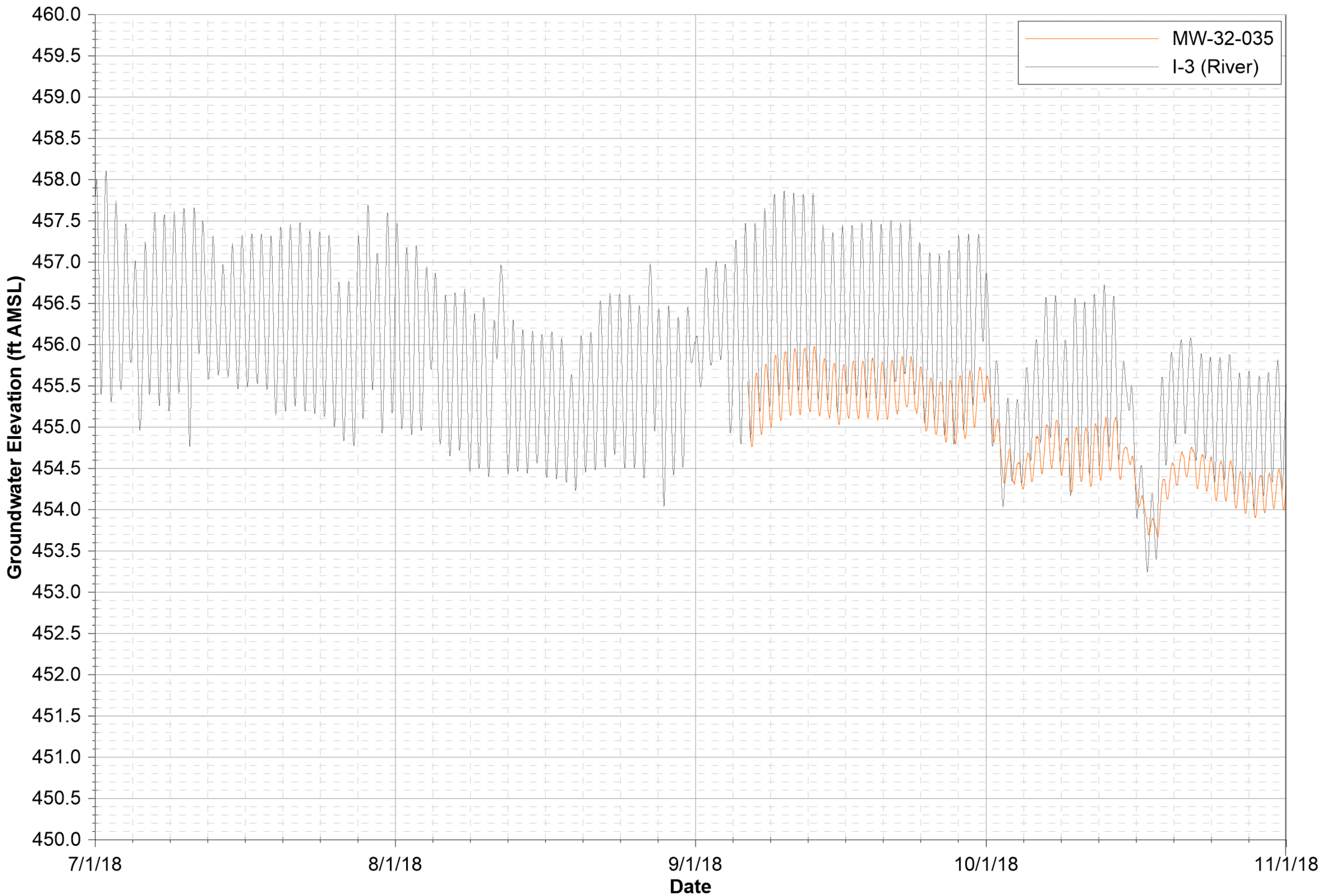
ARCADIS



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

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

ARCADIS



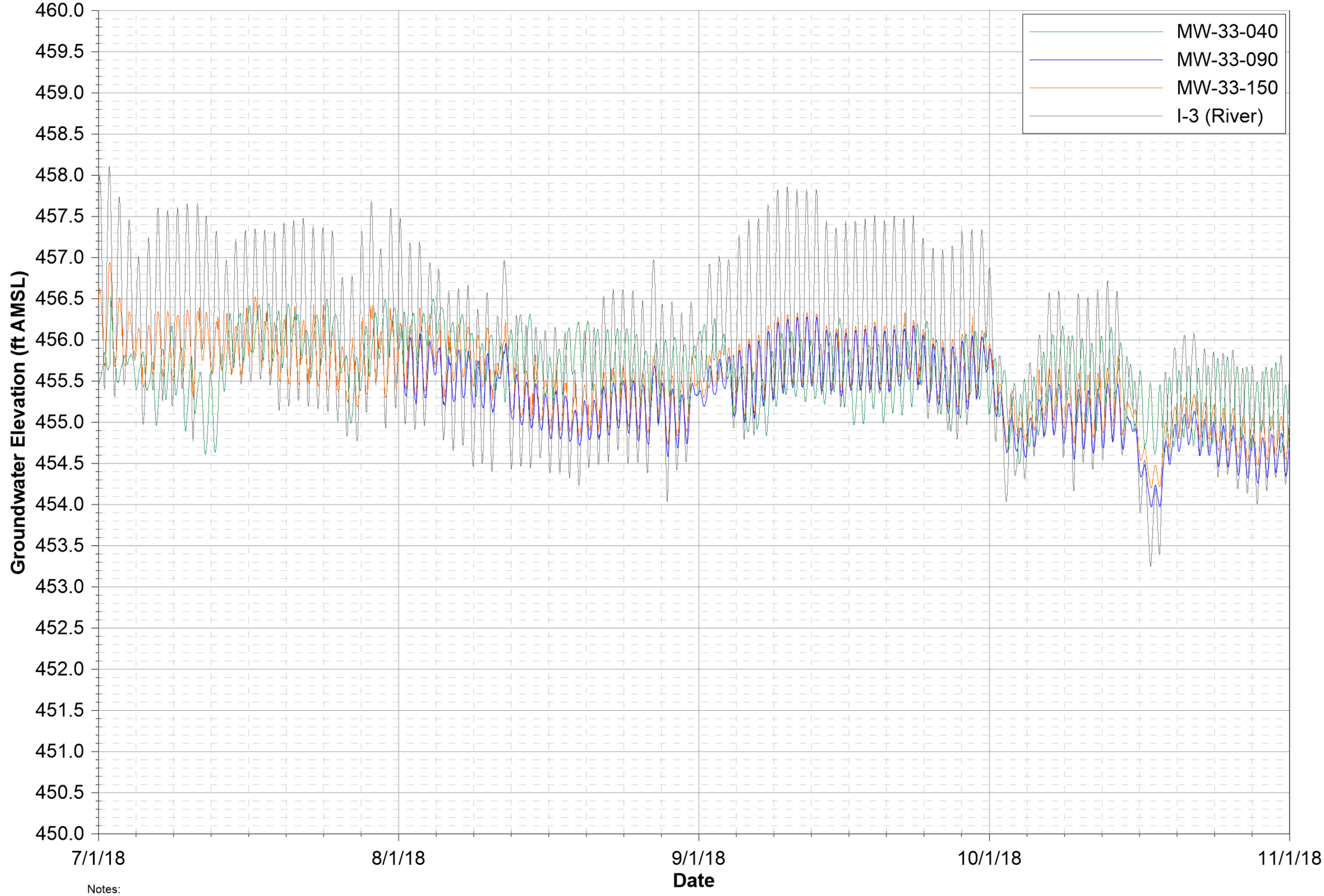
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-32-035 data unavilable from July 1, 2018 through September 6, 2018 due to transducer malfunction.

FIGURE F-1G

MW-32 HYDROGRAPH

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

ARCADIS



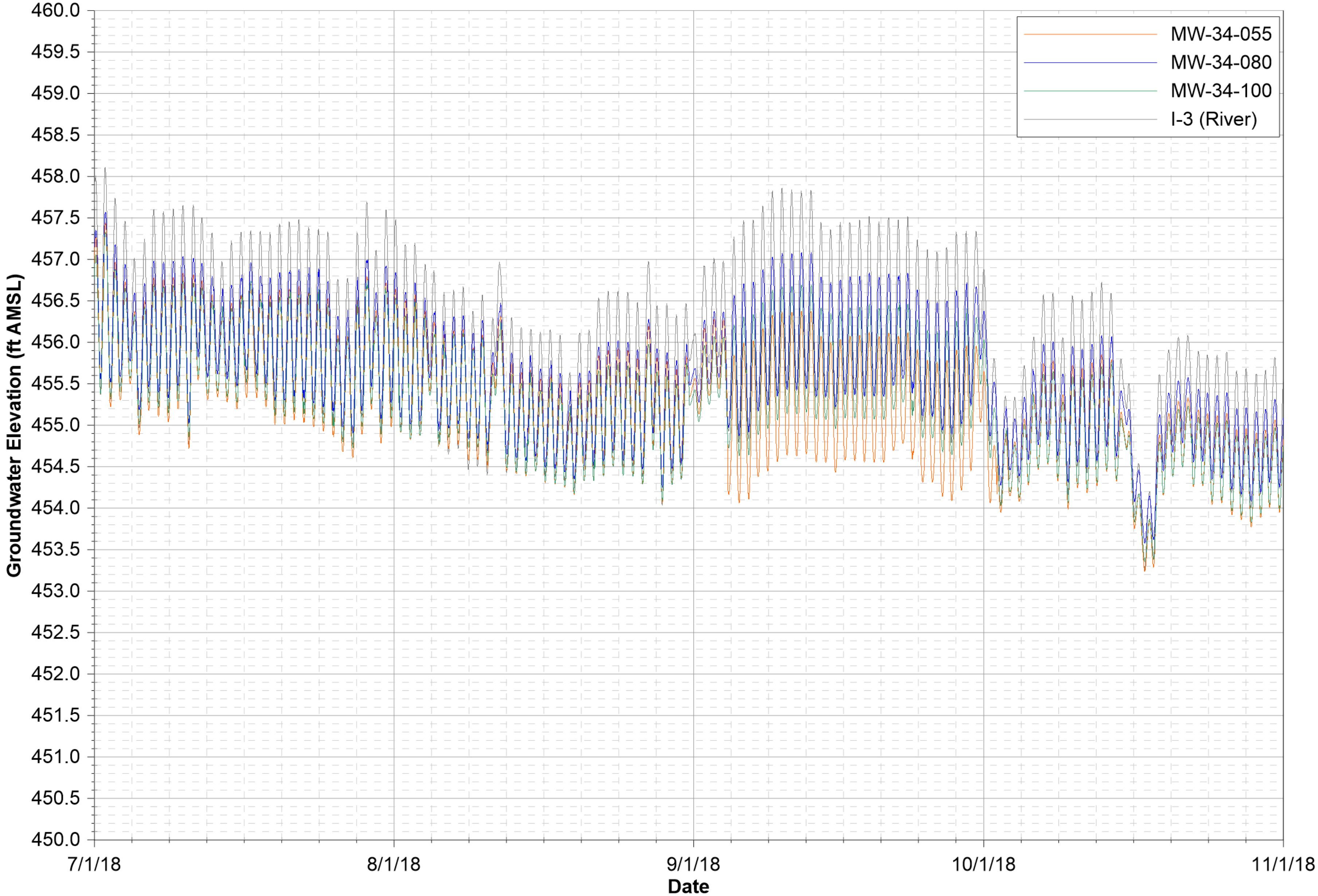
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-33-090 data unavailable from July 1, 2018 through August 1, 2018 due to transducer malfunction.

FIGURE F-1H

MW-33 CLUSTER HYDROGRAPHS

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

ARCADIS



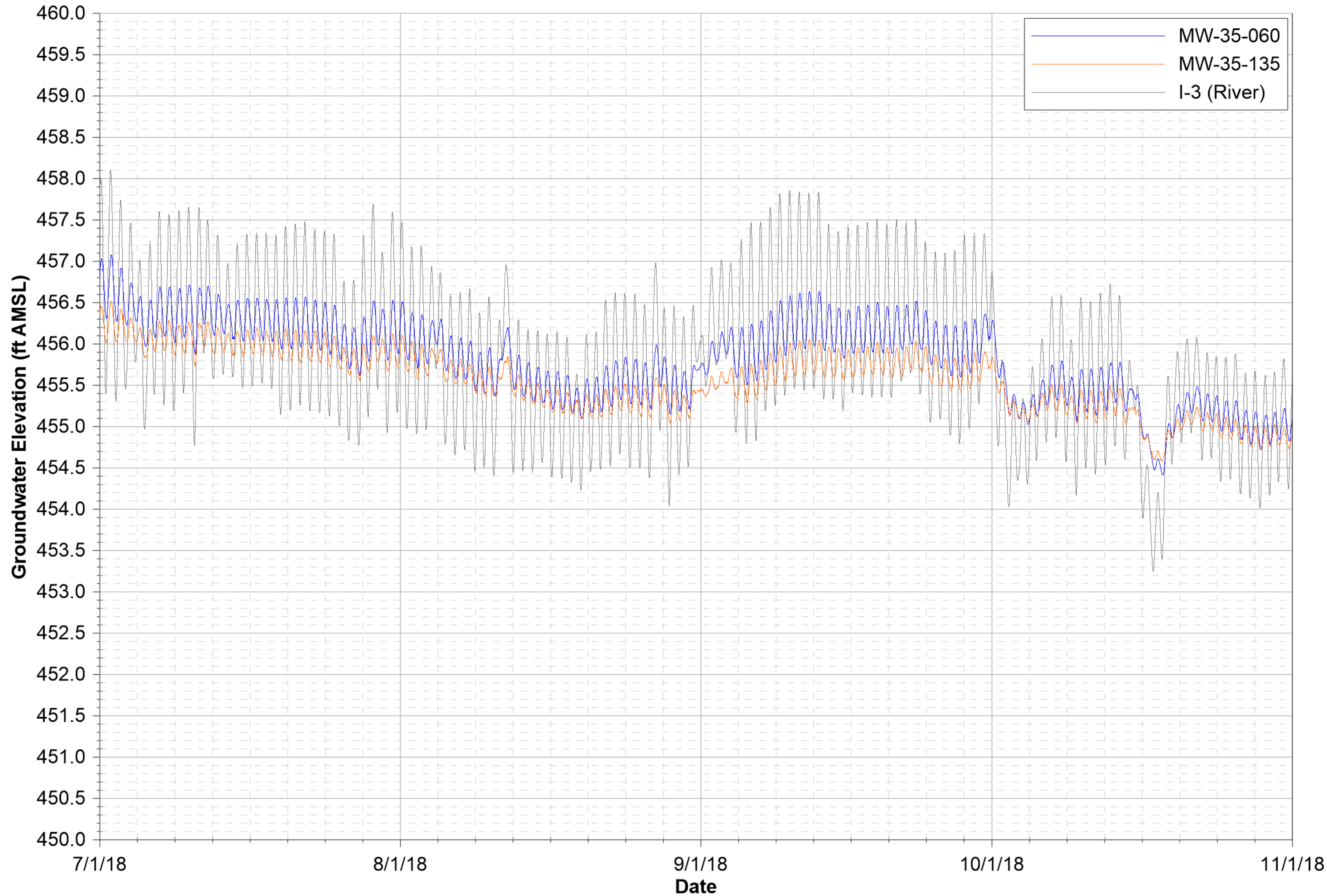
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE F-1I

MW-34 CLUSTER HYDROGRAPHS

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

ARCADIS



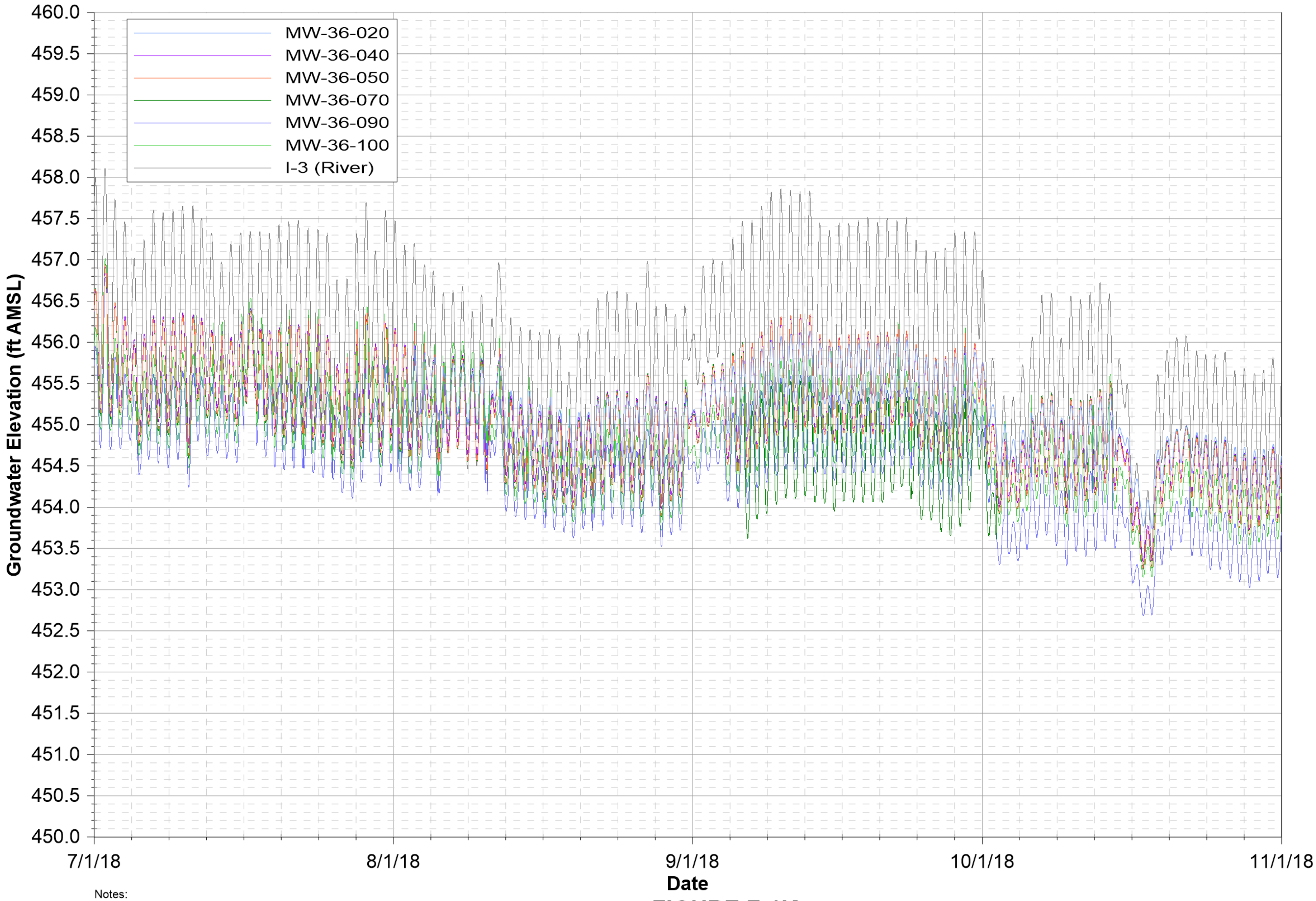
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE F-1J

MW-35 CLUSTER HYDROGRAPHS

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

ARCADIS



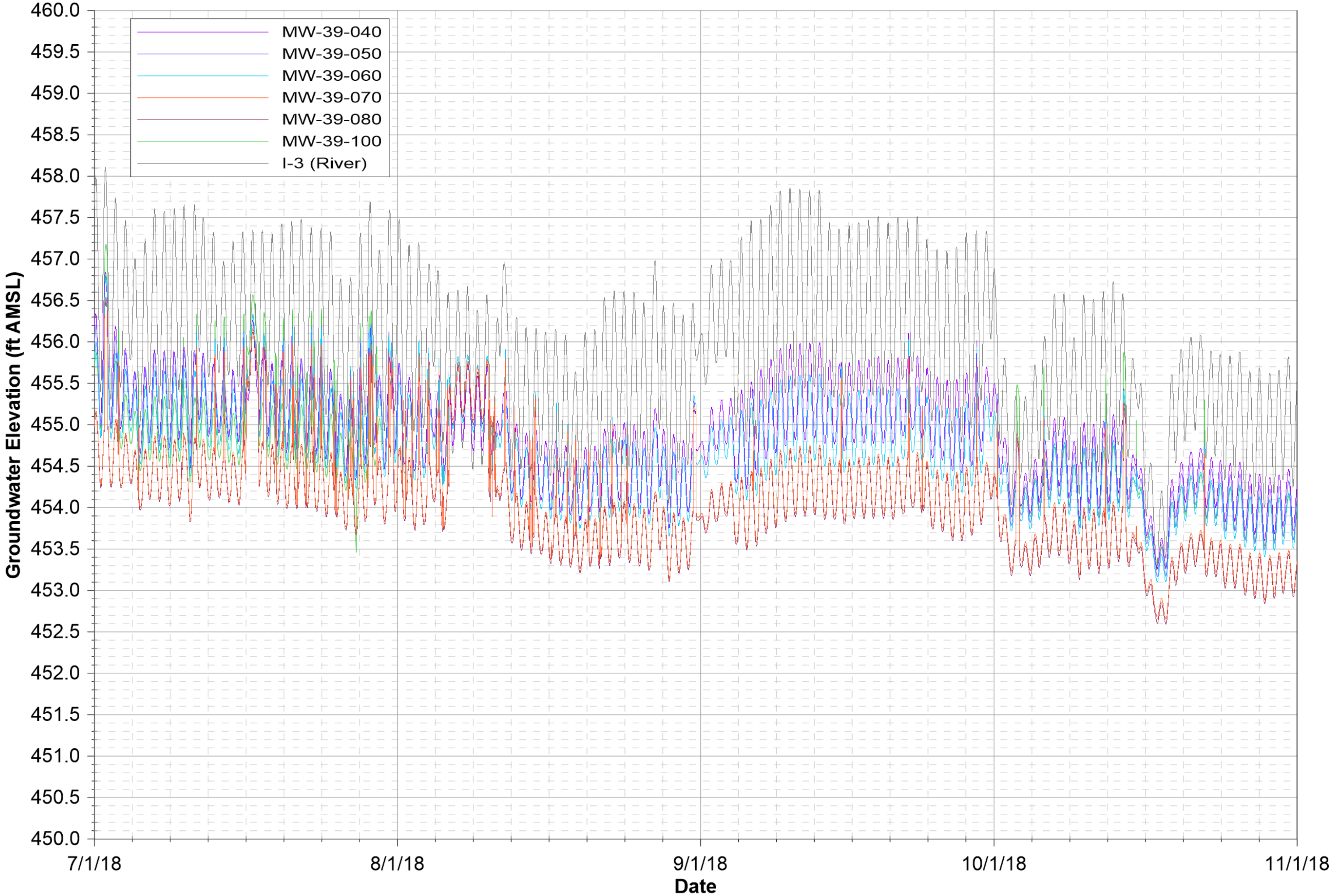
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-36-020 data unavailable from July 1, 2018 through August 2, 2018 due to transducer malfunction.

FIGURE F-1K

MW-36 CLUSTER HYDROGRAPHS

THIRD QUARTER 2018 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-39-040 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 F-1L
MW-39 CLUSTER HYDROGRAPHS

THIRD QUARTER 2018 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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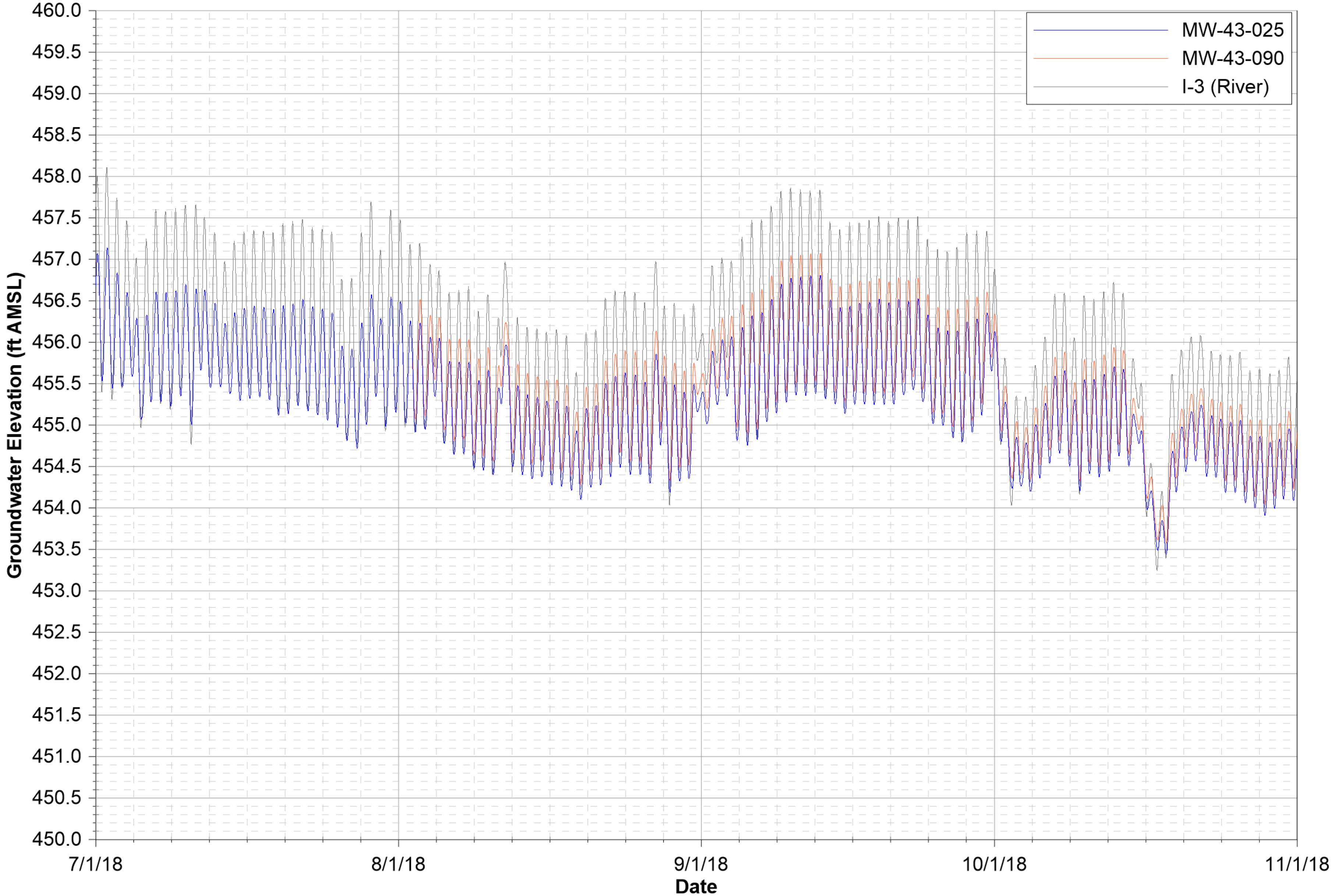
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE F-1M
MW-42 CLUSTER HYDROGRAPHS

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

ARCADIS



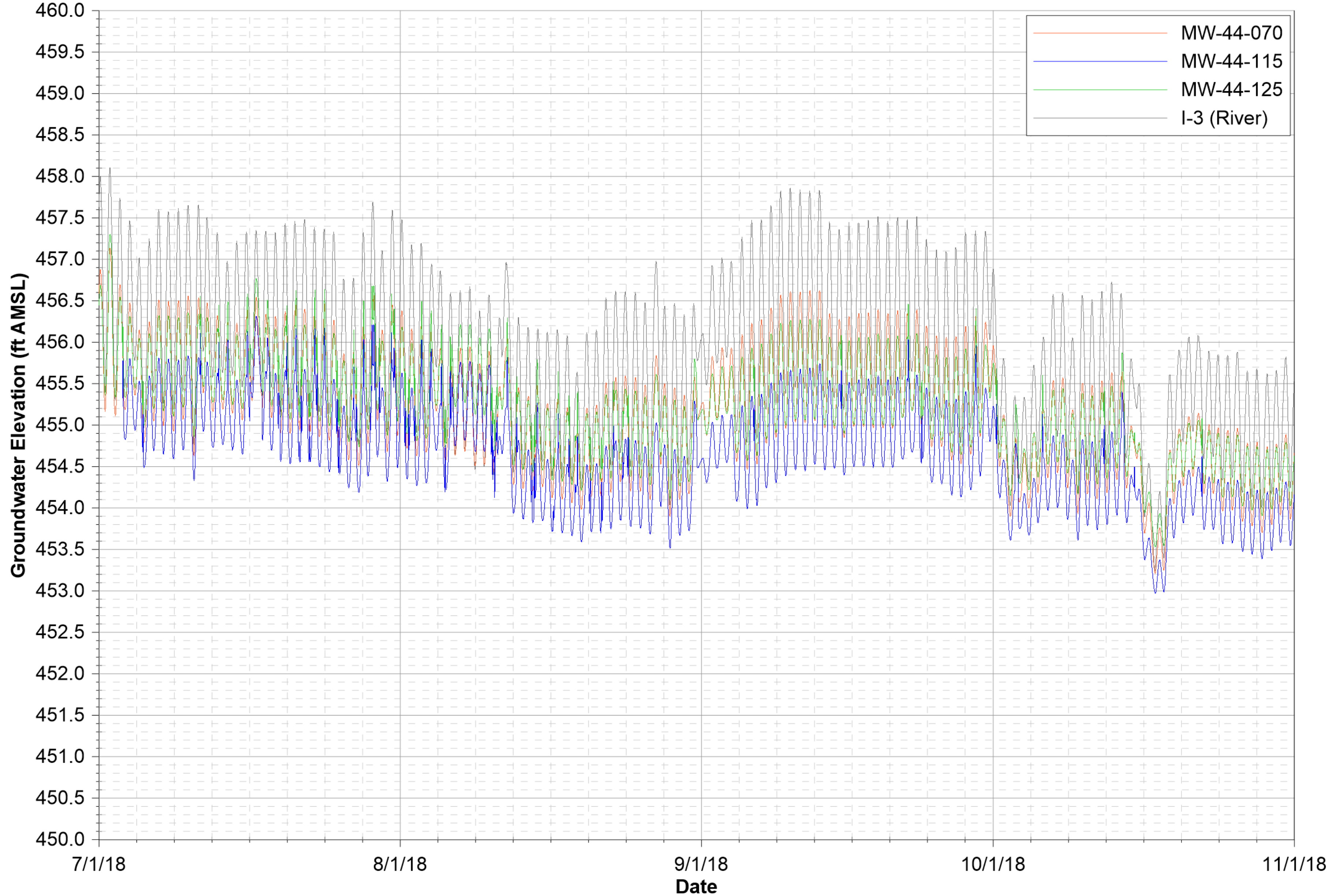
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-43-090 data unavailable from July 1, 2018 through August 2, 2018 due to transducer malfunction.

FIGURE F-1N

MW-43 CLUSTER HYDROGRAPHS

THIRD QUARTER 2018 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 F-1O
MW-44 CLUSTER HYDROGRAPHS

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

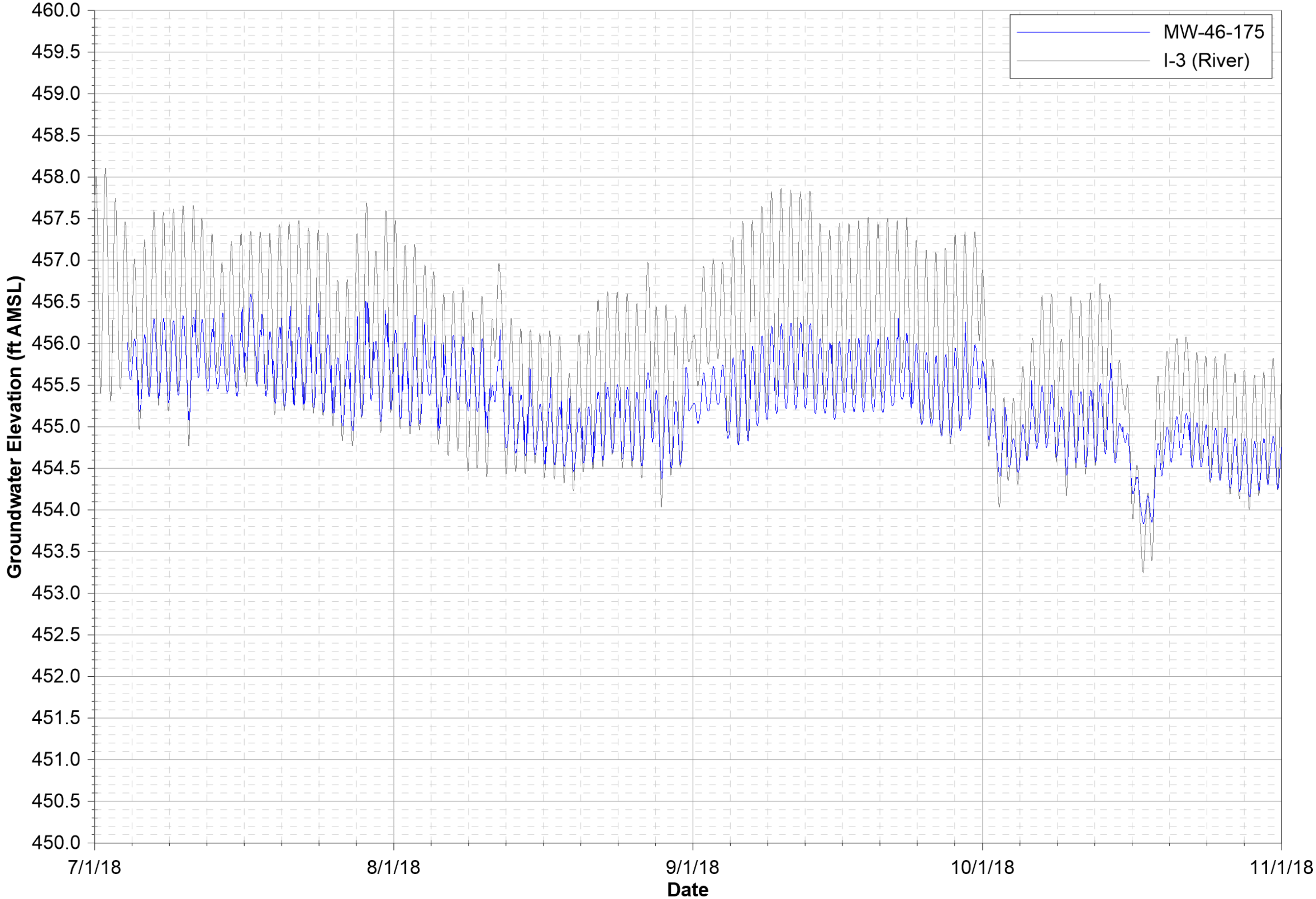
ARCADIS

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

FIGURE F-1P
MW-45-095a HYDROGRAPH

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

ARCADIS



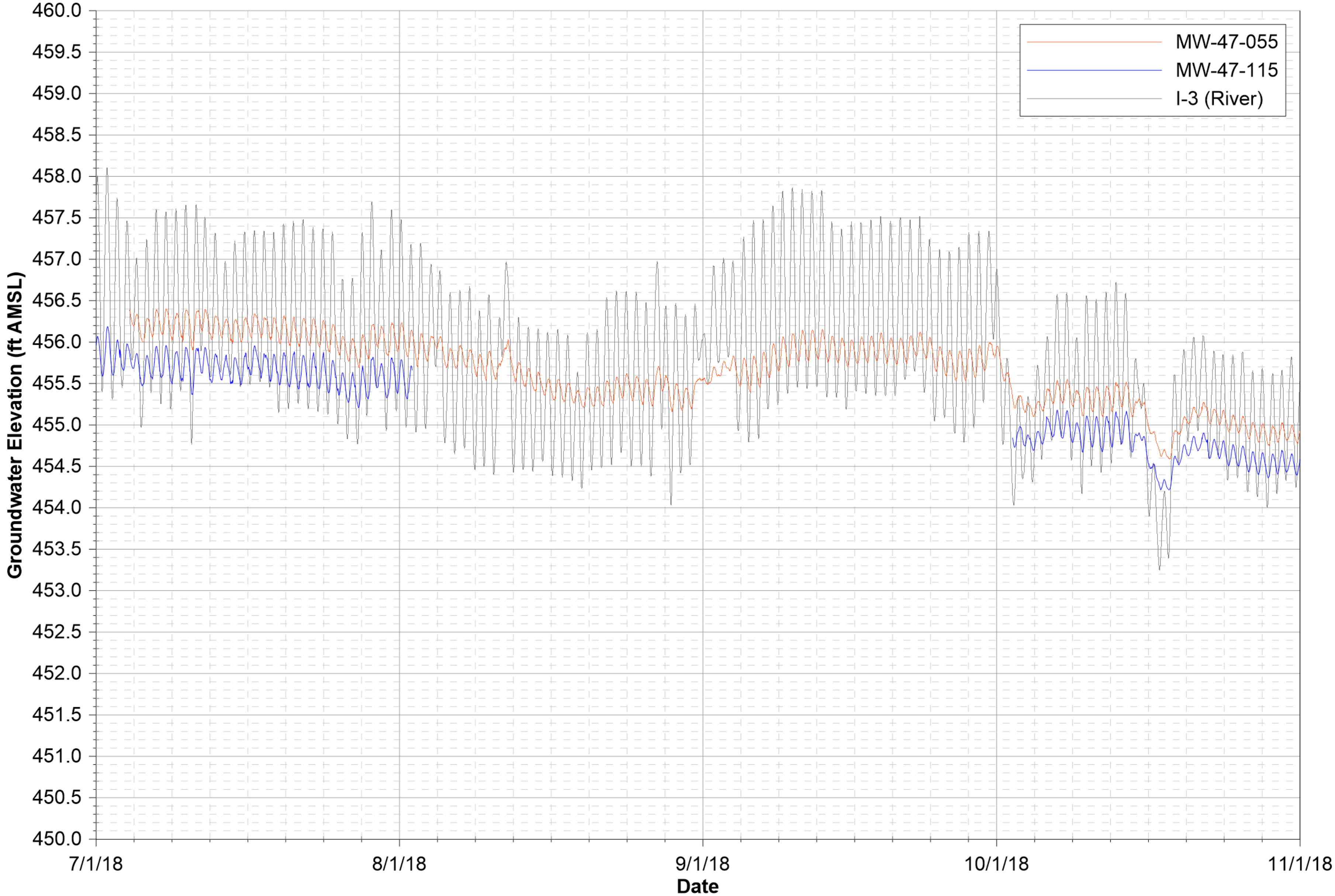
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-46-175 data unavailable from July 1, 2018 through July 4, 2018 due to transducer malfunction.

FIGURE F-1Q

MW-46 HYDROGRAPH

THIRD QUARTER 2018 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-47-115 data unavailable from August 2, 2018 through October 2, 2018 due to transducer malfunction.

FIGURE F-1R

MW-47 CLUSTER HYDROGRAPHS

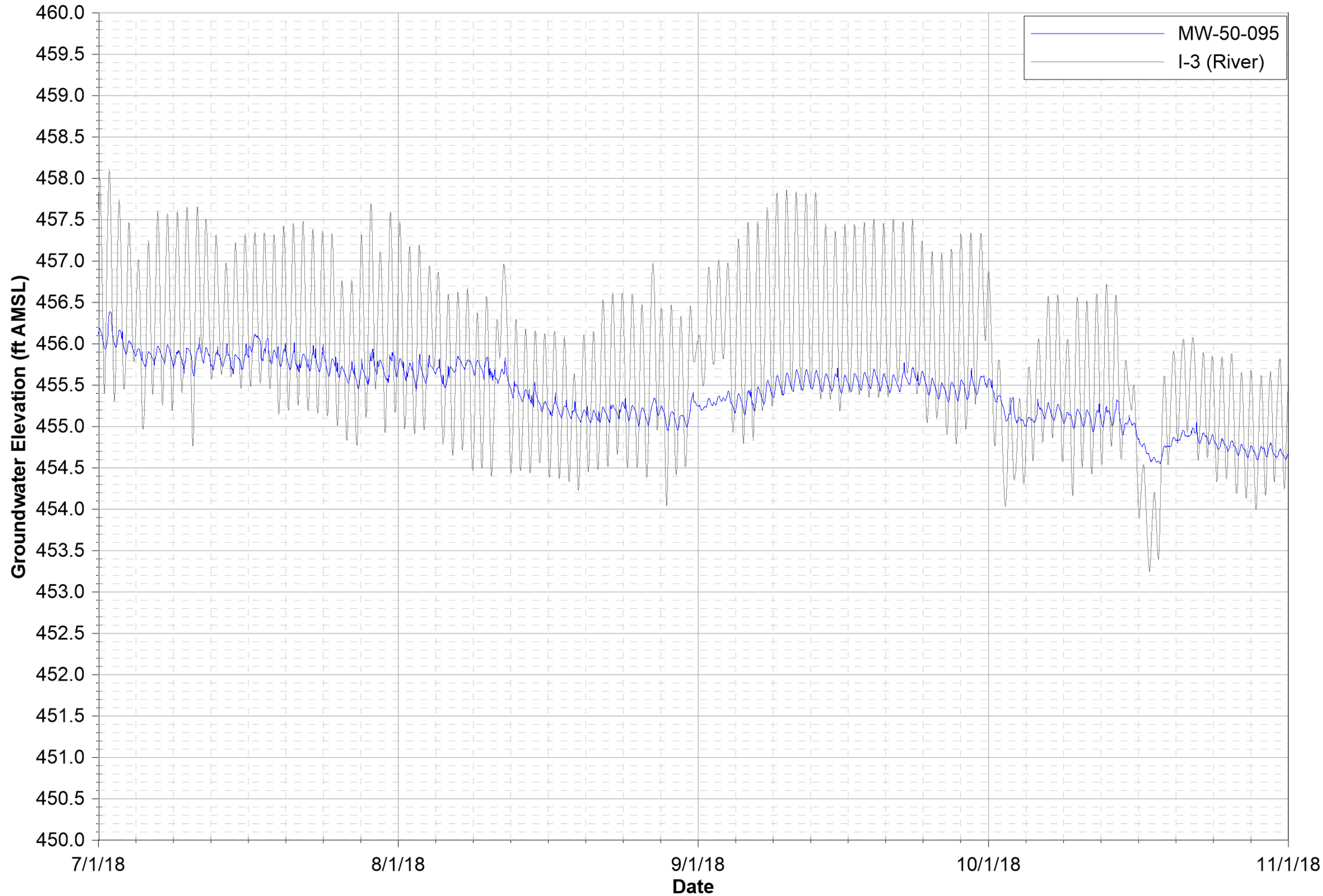
THIRD QUARTER 2018 INTERIM MEASURES PERFORMANCE MONITORING AND SITE-WIDE GROUNDWATER AND SURFACE WATER MONITORING REPORT,
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

ARCADIS

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

FIGURE F-1S
MW-49 HYDROGRAPH
THIRD QUARTER 2018 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 F-1T

MW-50 HYDROGRAPH

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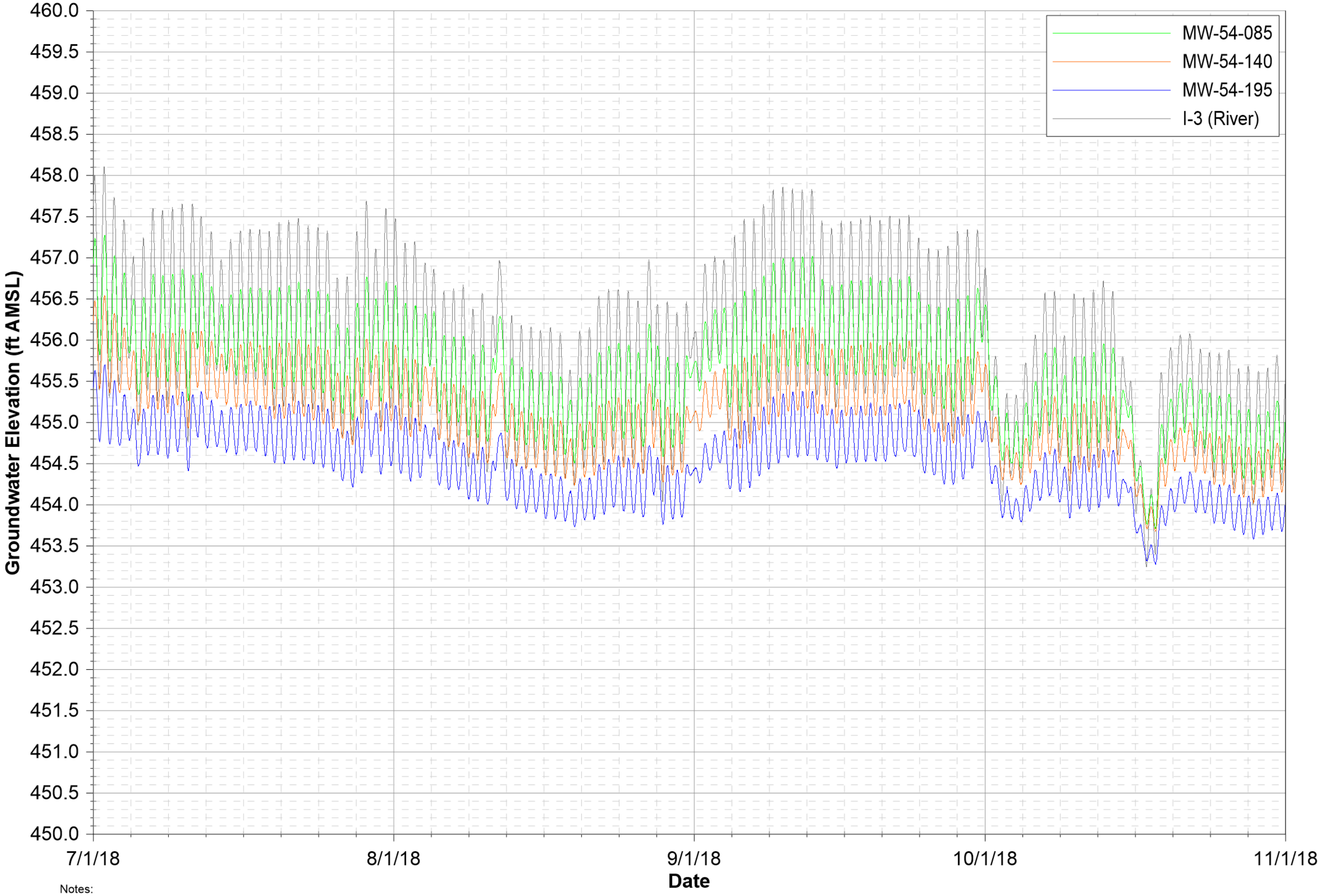
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-51 data unavailable from July 1, 2018 through July 4, 2018 due to transducer malfunction.

FIGURE F-1U

MW-51 HYDROGRAPHS

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

ARCADIS



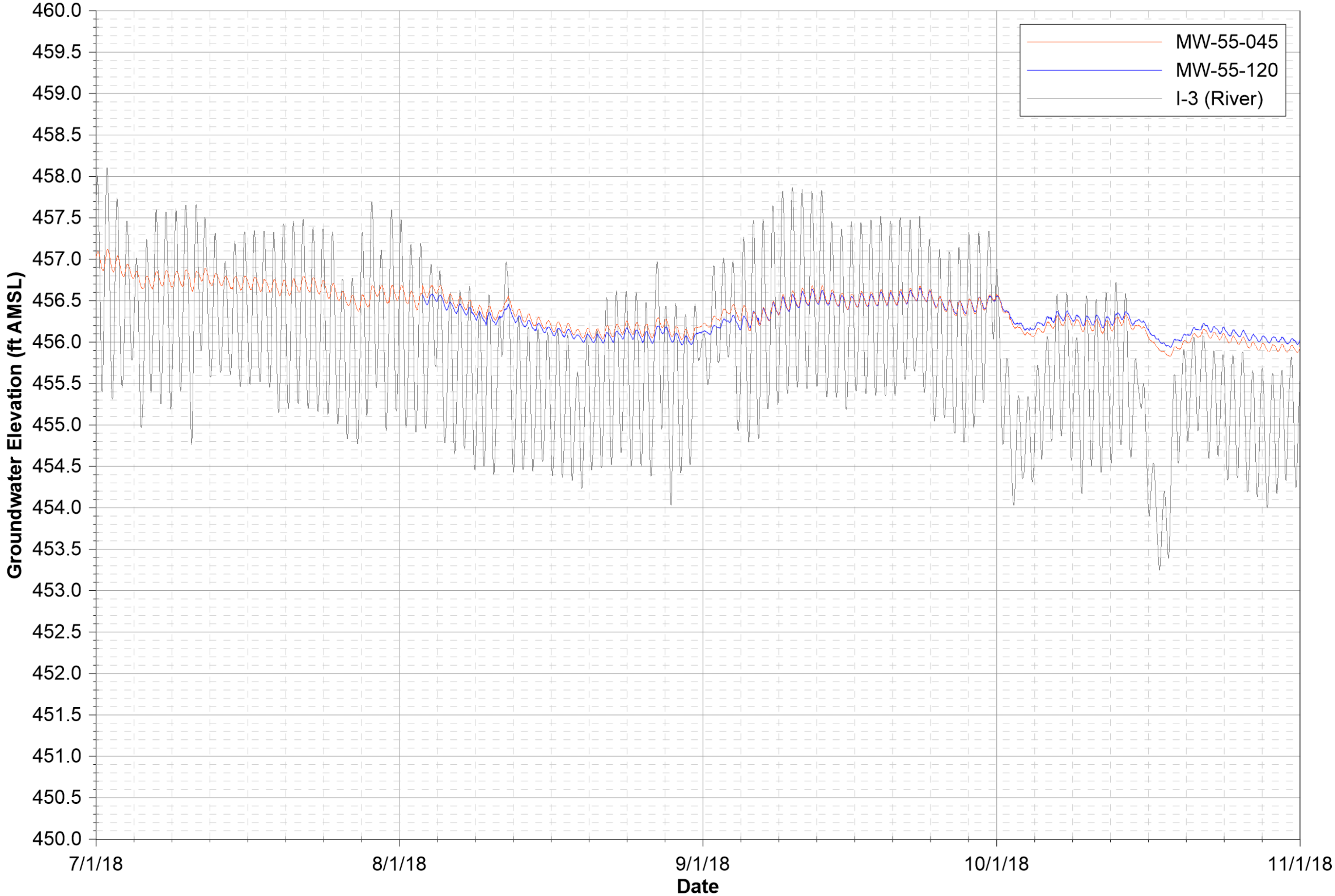
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.

FIGURE F-1V

MW-54 CLUSTER HYDROGRAPHS

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

ARCADIS



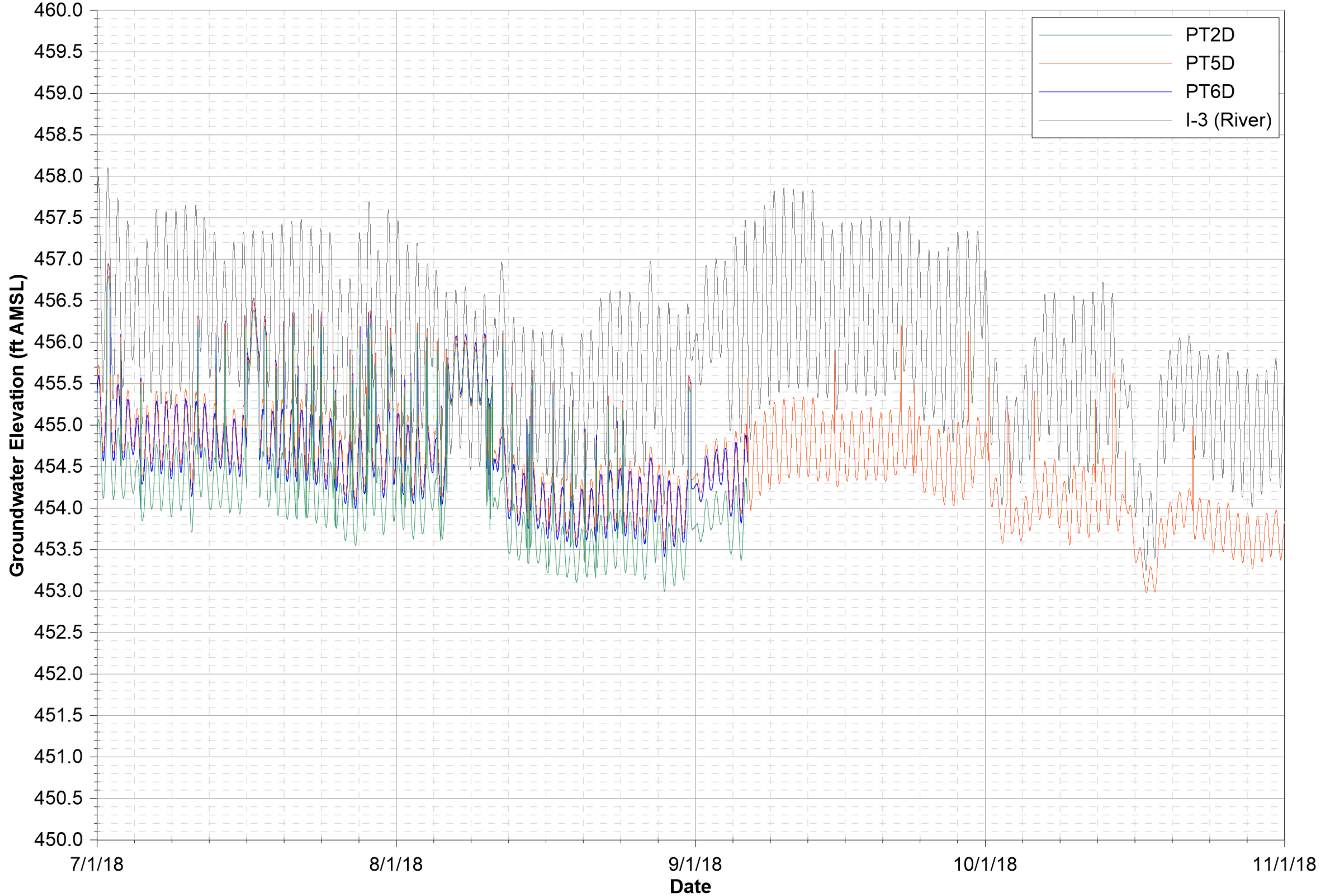
Notes:
1. Data subject to review.
2. ft AMSL = feet above mean sea level.
3. MW-55-120 data unavailable from July 1, 2018 through August 3, 2018 due to transducer malfunction.

FIGURE F-1W

MW-55 CLUSTER HYDROGRAPHS

THIRD QUARTER 2018 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. PT6D data unavailable from September 6, 2018 through October 31, 2018 due to transducer malfunction.

FIGURE F-1X

INSITU PILOT STUDY WELL HYDROGRAPHS

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

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