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HYDROGEOLOGY • ENGINEERING

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July 10, 2019

VIA FEDERAL EXPRESS STANDARD

Mr. Steve Rounds
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
Southern California Region
9211 Oakdale Avenue
Chatsworth, CA 91311-6520

Re: Data Submittal for Groundwater Monitoring and Groundwater Extraction and Treatment Pilot Testing, Second Quarter 2019, Raytheon Company (Former Hughes Aircraft Company) Facility, 1901 West Malvern Avenue, Fullerton, California

Dear Mr. Rounds:

This letter has been prepared for the submittal of groundwater monitoring and groundwater treatment pilot testing data collected during the second quarter 2019 for the former Raytheon Company site located at 1901 West Malvern Avenue, Fullerton, California (the Site) (Figure 1). Groundwater monitoring activities were completed in general accordance with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC)-approved Groundwater Monitoring Work Plan and Sampling and Analysis Plan (GMWPSAP) and subsequent addenda (DTSC, 2003 and 2011; Hargis + Associates, Inc. [H+A], 2003, 2011a, and 2011b). Groundwater treatment pilot testing continued throughout the second quarter 2019 in general accordance with the DTSC-approved Groundwater Extraction and Treatment System (GETS) Pilot Testing, Corrective Measures Study Work Plan Addendum No. 6 (DTSC, 2013; H+A, 2013). The results of the second quarter 2019 groundwater monitoring and pilot GETS operation from March through May 2019 are included in this data submittal.

GROUNDWATER MONITORING

Groundwater monitoring consists of measuring groundwater levels and collecting groundwater samples from monitor wells and piezometers at the Site (Figure 2). Quarterly water level measurements were taken at all wells and piezometers, and groundwater samples were collected from extraction wells and select monitor wells in May 2019 in general accordance with the GMWPSAP and Addendum No.1 (H+A, 2003 and 2011a) (Table 1).

Water Level Measurement and Groundwater Sample Collection

Groundwater monitoring included water level measurements in all Site monitor wells, piezometers, and extraction wells (Figures 2 and 3). Quarterly groundwater levels were measured in all wells on May 14, 2019 (Table 2).

Other Offices:
Folsom, CA
Mesa, AZ
Tucson, AZ

Groundwater samples were collected on May 15 and May 16, 2019 (Appendix A). Analytical results are summarized in Table 3 and provided in Appendix B. Additional groundwater monitoring was conducted as part of routine operation and monitoring of the pilot GETS. A summary of the pilot GETS operation and monitoring is provided below.

Original and field-duplicate groundwater samples were analyzed by Advanced Technology Laboratories, Inc., Signal Hill, California (ATL) (Appendix B). Laboratory split groundwater samples were analyzed by Eurofins Calscience, Garden Grove, California (Appendix B). Chain-of-custody documentation was enclosed with each sample shipment. Results of groundwater sample volatile organic compound (VOC) and 1,4-dioxane analyses have been summarized (Table 3).

Additionally, samples also were collected after two-screen volumes were purged from three of the large-volume monitor wells during this event; these additional samples were collected to compare results between the two-screen-volume purge method to the conventional three-screen-volume purge method which has been used historically at the Site for the large-volume monitor wells. Groundwater samples were collected after both two- and three-screen volumes had been purged from monitor wells MW-32B, MW-33, and MW-36 (Table 3; Appendix B).

Two monitor wells, MW-35C and MW-40, were not sampled in accordance with their sample schedule outlined in the GMWPSAP due to well pump operation issues. New submersible pumps will be installed in monitor wells MW-35C and MW-40 and groundwater samples will be collected during the next quarterly sampling event in August 2019. In addition, results for groundwater samples collected from monitor well MW-38 in May 2019 are included in this report. Monitor well MW-38 is routinely sampled annually in February of every year as outlined in the GMWPSAP however, due to well pump operation issues in February 2019, a groundwater sample was collected in May 2019 after the pump issue had been resolved. There were no other deviations from the GWMP/SAP during this quarterly reporting period.

Initial and confirmation groundwater samples were collected from both newly constructed monitor wells MW-42 and MW-43 on June 3 and June 24, 2019, respectively (Appendix A). The groundwater samples were submitted for analysis of VOCs and 1,4-dioxane, and the analytical results for these groundwater samples are also included in this report (Table 3; Appendix B). Details of the well construction and further discussion of the initial and confirmation groundwater sampling of these wells will be described in a pending Monitor Well Construction Report (H+A, 2019, in press).

Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) samples collected during the May 2019 groundwater sampling event consisted of trip blanks, field duplicates, equipment rinsate blanks, and laboratory split samples. Trip blanks were provided by ATL. Field duplicate and laboratory split groundwater samples were collected for analysis of VOCs and 1,4-dioxane from monitor wells MW-08 and MW-32B in May 2019 (Table 3). The relative percent difference (RPD) was calculated between the results of each field duplicate and each laboratory split sample with its corresponding original sample. The RPD between the original and laboratory split results for 1,4-dioxane in groundwater samples collected from monitor well MW-08 was outside of acceptable limits, therefore the 1,4-dioxane results from MW-08 were qualified as estimated. All other results for groundwater samples collected from monitor wells MW-08 and MW-32B in May 2019 are within quality control criteria.

There were no detections of 1,4-dioxane and VOCs in the trip blanks and/or laboratory method blanks analyzed with groundwater samples collected during the May 2019 groundwater monitoring event (Table 3; Appendix B). Additionally, there were no detections of 1,4-dioxane or VOCs in the equipment rinsate blanks analyzed with groundwater samples collected during the May 2019 groundwater monitoring event.

The data quality assessment also included review of laboratory QA/QC results. Laboratory QA/QC results are within acceptable criteria.

GROUNDWATER EXTRACTION AND TREATMENT PILOT STUDY

This section summarizes the pilot GETS operation within the three-month period of monitoring conducted March to May 2019. The pilot GETS consists of four groundwater extraction wells, the treatment system, and the disposal system; however, the current phase of pilot testing is operating using only two extraction wells, EW-02 and MW-29. Current extraction rates are nominally 40 gallons per minute (gpm) from extraction well EW-02 and nominally 10 gpm from extraction well MW-29. The treatment system processes extracted groundwater through an advanced oxidation unit that utilizes ultraviolet (UV) light and hydrogen peroxide (UV Ox), followed by a granular activated carbon polish prior to disposal to the sanitary sewer.

Initial startup of the pilot GETS took place in July 2008. From July 2008 through November 2009, the pilot GETS was operated with extraction wells EW-01 and MW-21 operating at approximately 10 gpm each. Pilot GETS expansion took place between November 2009 and March 2010 in order to incorporate extraction well EW-02 into the extraction well network. The system maximum flowrate was also increased from 20 gpm to 50 gpm. Beginning in March 2010, the pilot GETS was operated at 50 gpm, entirely from extraction well EW-02. During December 2011, a synthetic media pilot test was started. The purpose of the synthetic media pilot test was to evaluate the efficacy of treating water collected from extraction well MW-21 (a relatively high-concentration extraction well) using a synthetic media for contaminant removal. In order to conduct the synthetic media pilot test, extraction wells EW-02 and MW-21 were operated at approximately 40 gpm and 10 gpm, respectively. The synthetic media pilot test was completed in March 2012, and operation of the pilot GETS was restored to 50 gpm entirely from extraction well EW-02. A second phase of pilot GETS expansion took place between March 2014 and August 2014 in order to incorporate extraction well MW-29 into the extraction well network as well as replacing an advanced oxidation unit that used ozone and hydrogen peroxide with a UV Ox system. Extraction wells EW-01 and MW-21 are on standby for the current phase of pilot testing, but are planned to be used as part of a full scale pump-and-treat system.

During the second quarter of 2019, the pilot GETS was operational approximately 92 percent of the available runtime and approximately 5.2 million gallons of groundwater were treated and discharged to the sanitary sewer (Table 4). Downtime during the second quarter of 2019 was associated with operations and maintenance activities and system shutdowns due to rain events. The average operational monthly discharge flowrate to the sanitary sewer from March to May 2019 was approximately 39 gpm. Since startup of the pilot GETS, approximately 178 million gallons of groundwater was treated at an average operational flowrate of 41 gpm through the end of May 2019 (Table 4).

Current monthly and quarterly pilot GETS monitoring activities include collecting groundwater samples from extraction wells EW-02 and MW-29 in addition to collecting samples at treatment system sampling ports: Influent, Post Particulate Filter, Post UV Ox, Carbon Breakthrough, and Carbon Effluent (Tables 5 and 6; Figures 4 and 5). Samples collected during these activities were sent to ATL for analysis. Analytical results of the extraction wells and treatment system sampling have been summarized (Table 6; Appendix B).

The UV Ox advanced oxidation treatment unit is designed to remove 1,4-dioxane and most VOCs in groundwater. The carbon adsorption units provide a polish following the UV Ox treatment and remove possible low-level VOCs remaining in groundwater post UV Ox (principally low-level ethanes). The UV Ox advanced oxidation and carbon adsorption treatment units effectively removed VOCs and 1,4-dioxane from extracted groundwater in the second quarter 2019. The samples collected from the effluent of the UV Ox treatment unit (Post UV Ox) were analyzed for VOCs and 1,4-dioxane, and resulted in non-detect values (Table 6).

The previous oxidation treatment unit that used an ozone-peroxide technology was shown to create bromate as a treatment byproduct which occasionally exceeded the drinking water maximum contaminant level (MCL) (Figure 6). The levels of bromate previously generated as a treatment byproduct were not an issue while discharging to the sewer, but would preclude injection of treated groundwater back into the aquifer as part of future groundwater corrective measures. The current UV Ox oxidation treatment unit has not generated bromate above the MCL, and bromate was not detected in the Post UV Ox samples collected during the second quarter 2019.

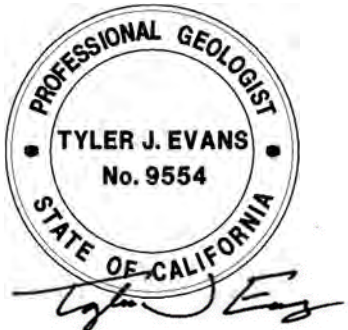
The pilot GETS continues to remove VOCs and 1,4-dioxane from extracted groundwater. During the second quarter of 2019, the pilot GETS removed approximately 1.7 pounds of VOCs and 1.1 pounds of 1,4-dioxane from extracted groundwater. Since startup of the pilot GETS in July 2008, approximately 170 pounds of VOCs and 40 pounds of 1,4-dioxane have been removed from groundwater through May 2019 (Figure 7). Operation of the pilot GETS continues to be optimized to maximize the treatment of 1,4-dioxane and VOCs in extracted groundwater.

If you have any questions or require additional information, please contact us at 858-455-6500.

Sincerely,

HARGIS + ASSOCIATES, INC.

Steven P. Netto, RG 8030, CHG 872
Senior Hydrogeologist



Tyler J. Evans, PG 9554
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Ross H. Horton
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REFERENCES

California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), 2003. Letter to P. Brewer, Raytheon Systems Company, from A. Plaza, DTSC, re: Review of Additional Groundwater Assessment Workplan and Groundwater Monitoring Workplan and Sampling and Analysis Plan. May 20, 2003.

_____, 2011. Email from W. Jeffers, DTSC, re: Conditional Approval of Addendum No. 1 to the Ground Water Monitoring Work Plan, Raytheon Fullerton, dated June 7, 2011.

_____, 2013. Email from W. Jeffers, DTSC, re: Groundwater Extraction and Treatment System Pilot Testing Corrective Measures Study Workplan, Addendum #6, dated April 16, 2013.

Hargis + Associates, Inc. (H+A), 2003. Groundwater Monitoring Work Plan and Sampling and Analysis Plan (Revision 1.0), Raytheon Company (former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. April 25, 2003.

_____, 2011a. Letter to W. Jeffers, DTSC, re: Addendum No. 1 to the *Groundwater Monitoring Work Plan and Sampling and Analysis Plan (Revision 1.0)*, by Hargis + Associates, Inc., dated April 25, 2003, for the Raytheon Company, (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. February 11, 2011.

_____, 2011b. Letter to W. Jeffers, DTSC, re: Amendment A, Addendum No. 1 to the *Groundwater Monitoring Work Plan and Sampling and Analysis Plan (Revision 1.0)*, by Hargis + Associates, Inc., dated April 25, 2003, for the Raytheon Company, (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. June 16, 2011.

_____, 2013. Groundwater Extraction and Treatment System Pilot Testing, Corrective Measures Study Workplan Addendum No. 6, Raytheon Company (former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. February 27, 2013.

_____, 2019. Monitor Well Construction Report, Monitor Wells MW-42 and MW-43, Raytheon Company (former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California (in press).

Enclosures

Tables

Table 1	Groundwater Monitoring Program
Table 2	Groundwater Levels, Second Quarter 2019
Table 3	Prevalent Volatile Organic Compounds and 1,4-Dioxane in Groundwater, Second Quarter 2019
Table 4	Pilot Groundwater Extraction and Treatment System Operational Summary
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Figure 3	Water Level and Water Quality, Unit B, May 2019
Figure 4	Pilot Groundwater Extraction and Treatment System Operation and Extraction Well Water Levels
Figure 5	1,1-Dichloroethylene and 1,4-Dioxane Concentrations in Extraction Wells
Figure 6	1,4-Dioxane and Bromate in Influent and Post-Oxidation Samples
Figure 7	Pilot Groundwater Extraction and Treatment System Mass Removal

Appendices

Appendix A	Groundwater Sampling Field Forms (Provided on CD only)
Appendix B	Laboratory Analytical Reports (Provided on CD only)

cc w/encl: (1 copy w-CD)
Mr. Steve Rounds, Department of Toxic Substances Control, Chatsworth
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Mr. Paul E. Brewer, Raytheon Company
Mr. Dave Mark, Orange County Water District
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Ms. Christine Ehrhardt, Greystar
Ms. Carol Owens, Greystar

(via Email only)
Mr. Duc Nguyen, Orange County Public Works
Mr. Paul Rodolf, Hydraflow
Mr. Robinson Sioson, Hydraflow

TABLE 1
GROUNDWATER MONITORING PROGRAM

WELL IDENTIFIER	HYDROGEOLOGIC ZONE	SAMPLED MAY 2019	SAMPLING FREQUENCY			
			QUARTERLY FEB, MAY, AUG, NOV	SEMIANNUAL FEBRUARY, AUGUST	ANNUAL FEBRUARY	BIENNIAL FEB (EVEN YEARS)
P-07	Perched				VOCs; 1,4-Dioxane	
P-09	Perched				VOCs; 1,4-Dioxane	
MW-35A	Other					VOCs; 1,4-Dioxane
MW-17	A		PIEZOMETER - WATER LEVEL MEASUREMENT ONLY			
MW-18	A			VOCs; 1,4-Dioxane		
MW-19	A					VOCs
MW-22	A					VOCs; 1,4-Dioxane
MW-23	A					VOCs
MW-34A	A			VOCs; 1,4-Dioxane		
MW-35B	A					VOCs; 1,4-Dioxane
MW-38	A	X			VOCs; 1,4-Dioxane	
MW-13	AB				VOCs; 1,4-Dioxane	
MW-15	AB			VOCs		
MW-26A	AB		PIEZOMETER - WATER LEVEL MEASUREMENT ONLY			
MW-26B	AB		PIEZOMETER - WATER LEVEL MEASUREMENT ONLY			
MW-32A	AB			VOCs; 1,4-Dioxane		
EW-01	B	X	VOCs; 1,4-Dioxane			
EW-02*	B	X	VOCs; 1,4-Dioxane			
MW-16	B			VOCs; 1,4-Dioxane		
MW-26C	B	X	VOCs; 1,4-Dioxane			
MW-27	B				VOCs; 1,4-Dioxane	
MW-28	B	X	VOCs; 1,4-Dioxane			
MW-29*	B	X	VOCs; 1,4-Dioxane			
MW-30A	B	X	VOCs; 1,4-Dioxane			
MW-31	B	X	VOCs; 1,4-Dioxane			
MW-32B	B	X	VOCs; 1,4-Dioxane			
MW-33	B	X	VOCs; 1,4-Dioxane			
MW-34B	B	X	VOCs; 1,4-Dioxane			
MW-35C	B		VOCs; 1,4-Dioxane			
MW-36	B	X	VOCs; 1,4-Dioxane			
MW-39	B	X	VOCs; 1,4-Dioxane			
MW-40	B		VOCs; 1,4-Dioxane			
MW-41	B	X	VOCs; 1,4-Dioxane			
MW-21	BC	X	VOCs; 1,4-Dioxane			
MW-08	BC	X	VOCs; 1,4-Dioxane			
MW-30B	BC	X	VOCs; 1,4-Dioxane			
MW-34C	BC			VOCs; 1,4-Dioxane		
MW-09	C			VOCs; 1,4-Dioxane		
MW-24	C				VOCs; 1,4-Dioxane	
MW-32C	C			VOCs; 1,4-Dioxane		
MW-06	D				VOCs	
MW-20	D			VOCs; 1,4-Dioxane		
MW-25	D		WATER LEVEL MEASUREMENT ONLY			
MW-37	D				VOCs; 1,4-Dioxane	

FOOTNOTES

Groundwater Monitoring Program 2014/2015 Letter (Hargis + Associates, Inc., 2015)

* = Extraction well monitored monthly as part of the Groundwater Extraction and Treatment System Pilot Testing

VOCs = volatile organic compounds

TABLE 2
GROUNDWATER LEVELS
SECOND QUARTER 2019

Well Identifier	Date Measured	Reference Point Elevation [(a)] (feet msl)	Depth to Water (feet btoc)	Water Level Elevation (feet msl)	Remediation System On
Regional Groundwater System Monitor and Extraction Wells					
MW-06	05/14/19	184.70	154.65	30.05	
MW-08	05/14/19	155.91	129.57	26.34	
MW-09	05/14/19	180.10	153.08	27.02	
MW-13	05/14/19	141.84	121.07	20.77	
MW-15	05/14/19	144.95	127.52	17.43	
MW-16	05/14/19	142.40	119.89	22.51	
MW-17	05/14/19	142.70	121.06	21.64	
MW-18	05/14/19	142.32	121.51	20.81	
MW-19	05/14/19	142.06	121.16	20.90	
MW-20	05/14/19	184.19	151.11	33.08	
MW-21	05/14/19	141.18	113.96	27.22	
MW-22	05/14/19	138.65	117.72	20.93	
MW-23	05/14/19	137.33	117.83	19.50	
MW-24	05/14/19	142.83	115.89	26.94	
MW-25	05/14/19	142.64	116.45	26.19	
MW-26A	05/14/19	137.04	117.65	19.39	
MW-26B	05/14/19	137.05	119.43	17.62	
MW-26C	05/14/19	137.22	115.82	21.40	
MW-27	05/14/19	137.16	115.33	21.83	
MW-28	05/14/19	140.77	119.64	21.13	
MW-29	03/05/19	139.81	171.84	-32.03	Pilot GETS
MW-29	03/21/19	139.81	174.46	-34.65	Pilot GETS
MW-29	04/04/19	139.81	171.17	-31.36	Pilot GETS
MW-29	04/18/19	139.81	172.41	-32.60	Pilot GETS
MW-29	05/02/19	139.81	173.46	-33.65	Pilot GETS
MW-29	05/14/19	139.81	176.10	-36.29	Pilot GETS
MW-29	05/16/19	139.81	173.71	-33.90	Pilot GETS
MW-30A	05/14/19	129.44	108.91	20.53	
MW-30B	05/14/19	129.39	106.79	22.60	
MW-31	05/14/19	119.60	97.91	21.69	
MW-32A	05/14/19	92.88	72.86	20.02	
MW-32B	05/14/19	92.89	72.48	20.41	

TABLE 2
GROUNDWATER LEVELS
SECOND QUARTER 2019

Well Identifier	Date Measured	Reference Point Elevation [(a)] (feet msl)	Depth to Water (feet btoc)	Water Level Elevation (feet msl)	Remediation System On
Reginal Groundwater System Monitor and Extraction Wells (continued)					
MW-32C	05/14/19	92.88	68.59	24.29	
MW-33	05/14/19	83.19	64.21	18.98	
MW-34A	05/14/19	153.25	138.72	14.53	
MW-34B	05/14/19	153.11	133.27	19.84	
MW-34C	05/14/19	153.29	132.67	20.62	
MW-35A	05/14/19	93.57	74.51	19.06	
MW-35B	05/14/19	93.56	78.06	15.50	
MW-35C	05/14/19	93.55	73.24	20.31	
MW-36	05/14/19	86.65	68.45	18.20	
MW-37	05/14/19	155.60	133.85	21.75	
MW-38	05/14/19	154.90	142.71	12.19	
MW-39	05/14/19	84.25	66.48	17.77	
MW-40	05/14/19	123.40	100.05	23.35	
MW-41	05/14/19	155.60	136.17	19.43	
MW-42	06/24/19	82.80	67.63	15.17	
MW-43	06/24/19	76.64	61.70	14.94	
EW-01	05/14/19	141.07	118.23	22.84	
EW-02	03/05/19	132.97	117.09	15.88	Pilot GETS
EW-02	03/21/19	132.97	116.18	16.79	Pilot GETS
EW-02	04/04/19	132.97	115.69	17.28	Pilot GETS
EW-02	04/18/19	132.97	115.92	17.05	Pilot GETS
EW-02	05/02/19	132.97	116.86	16.11	Pilot GETS
EW-02	05/14/19	132.97	117.23	15.74	Pilot GETS
EW-02	05/16/19	132.97	117.04	15.93	Pilot GETS
Perched Zone Water Levels					
P-07	05/14/19	142.31	111.28	31.03	
P-09	05/14/19	183.86	120.68	63.18	

FOOTNOTES

[(a)] Reference point elevations are relative to City of Fullerton datum.
btoc = Below top of casing
msl = Mean sea level
Pilot GETS = Pilot Groundwater Extraction and Treatment System On

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TABLE 3
PREVALENT VOLATILE ORGANIC COMPOUNDS AND 1,4-DIOXANE IN GROUNDWATER
SECOND QUARTER 2019

			Concentration (micrograms per liter)													
			VOLATILE ORGANIC COMPOUNDS (FEDERAL MCL/CALIFORNIA MCL)													Semi-VOCs
Well Identifier / Sample Identifier	Date Sampled	QA Code	Benzene (5/1)	Carbon Tetrachloride (5/0.5)	Chloroform (80/80)	1,1-DCA (--/5)	1,2-DCA (5/0.5)	1,1-DCE (7/6)	cis-1,2-DCE (70/6)	PCE (5/5)	1,1,1-TCA (200/200)	1,1,2-TCA (5/5)	TCE (5/5)	TCFM (--/150)	Toluene (1,000/150)	1,4-Dioxane (3*/1**)
Regional Groundwater System Monitor and Extraction Wells																
MW-08	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**47**	**3.3**	< 0.50	< 0.50	< 0.50	**75**	< 0.50	< 0.50	**3.4 E**
MW-0800	05/15/19	FD	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**53**	**3.9**	< 0.50	< 0.50	< 0.50	**77**	< 0.50	< 0.50	**3.7 E**
MW-08[(1)]	05/15/19	SPT	< 0.50	< 0.50	**0.31 J**	< 0.50	< 0.50	**57**	**3.2**	< 0.50	< 0.50	< 0.50	**80**	< 0.50	< 0.50	< 1.0 E
MW-08 Historical Range* **			< 0.50 - 0.95	< 0.50 - 0.50	< 0.50 - 0.86	< 0.50 - 5.1	< 0.50 - 0.99	< 0.50 - 500	< 0.50 - 13	< 0.50 - 1.3	< 0.50 - < 5.0	< 0.50 - < 5.0	< 0.50 - 480	< 0.50 - 1.0	< 0.50 - 2.3	< 0.20 - 130
MW-21	05/16/19	ORG	< 2.5	< 2.5	< 2.5	**16**	< 2.5	**1200**	**1.2 J**	< 2.5	< 2.5	**9.8**	**11**	< 2.5	< 2.5	**800**
MW-21 Historical Range* **			< 0.50 - < 25	< 0.50 - 1.9	< 0.50 - 4.6	< 0.50 - 71	< 0.50 - 8.9	200 - 4,900	< 0.50 - 2.4	< 0.50 - 12	< 0.50 - 2.0	< 0.50 - 27	0.96 - 46	< 0.50 - 0.53	< 0.50 - < 10	11 - 1,100
MW-26C	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-26C Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50 - 1.7	< 0.50	< 0.50 - 120	< 0.50	< 0.50 - 0.79	< 0.50	< 0.50 - 0.77	< 0.50	< 0.50	< 0.50 - 22	< 0.20 - 57
MW-28	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.08 J**
MW-28 Historical Range* **			< 0.50	< 0.50	< 0.50 - 0.20 J	< 0.50 - 0.94	< 0.50	<0.50 - 76 E	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20 - 19
MW-29	03/05/19	ORG	< 0.50	< 0.50	< 0.50	**1.5**	< 0.50	**100**	< 0.50	< 0.50	< 0.50	< 0.50	**1.5**	< 0.50	< 0.50	**110**
MW-29	03/21/19	ORG	< 0.50	< 0.50	< 0.50	**1.4**	< 0.50	**120**	< 0.50	< 0.50	< 0.50	< 0.50	**1.6**	< 0.50	< 0.50	**100**
MW-29	04/04/19	ORG	< 0.50	< 0.50	< 0.50	**1.2**	< 0.50	**150**	< 0.50	**0.51**	< 0.50	< 0.50	**1.3**	< 0.50	< 0.50	**100**
MW-29	04/18/19	ORG	< 0.50	< 0.50	< 0.50	**1.5**	< 0.50	**160**	< 0.50	**0.54**	< 0.50	**0.66**	**1.8**	< 0.50	< 0.50	**100**
MW-29	05/02/19	ORG	< 0.50	< 0.50	< 0.50	**1.6**	< 0.50	**110**	< 0.50	**0.51**	< 0.50	**0.69**	**1.7**	< 0.50	< 0.50	**110**
MW-29	05/16/19	ORG	< 0.50	< 0.50	< 0.50	**0.86**	< 0.50	**120**	< 0.50	< 0.50	< 0.50	**0.61**	**2.0**	< 0.50	< 0.50	**110**
MW-29 Historical Range* **			< 0.50 - 0.57	< 0.50 - < 5.0	< 0.50 - 0.80	< 0.50 - 9.2	< 0.50 - 1.4	99 - 900 E	< 0.50 - 0.61	< 0.50 - 6.6	< 0.50 - < 5.0	< 0.50 - 2.3	0.58 - 8.3	< 0.50 - 2.2	< 0.50 - < 5.0	26 BE - 301
MW-30A	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-30A Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50 - 2.9	< 0.50 - 0.67	< 0.50 - 270	< 0.50	< 0.50 - 0.58	< 0.50	< 0.50 - 1.1	< 0.50 - 1.9	< 0.50	< 0.50	< 0.20 - 95
MW-30B	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**17**	**4.4**	< 0.50	< 0.50	< 0.50	**76**	< 0.50	< 0.50	**0.58**
MW-30B Historical Range* **			< 0.50	< 0.50	< 0.50 - 0.43 J	< 0.50	< 0.50	<0.50 - 22	< 0.50 - 6.9	< 0.50	< 0.50	< 0.50	< 0.50 - 110	< 0.50	< 0.50 - 4.5	< 0.20 - 28 E
MW-31	05/16/19	ORG	< 0.50	< 0.50	< 0.50	**0.12 J**	< 0.50	**66**	**0.30 J**	< 0.50	< 0.50	< 0.50	**6.0**	< 0.50	< 0.50	**3.8**
MW-31 Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50 - 3.7	< 0.50	25 - 430	< 0.50 - 1.2	< 0.50 - 2.5	< 0.50	< 0.50 - 1.2	0.50 - 21	< 0.50	< 0.50 - 1.0	< 0.20 - 16
MW-32B_2SV	05/15/19	ORG	< 0.50	< 0.50	< 0.50	**0.46 J**	< 0.50	**110**	**3.0**	< 0.50	< 0.50	< 0.50	**30**	< 0.50	< 0.50	**3.4**
MW-32B	05/15/19	ORG	< 0.50	< 0.50	< 0.50	**0.55**	< 0.50	**110**	**3.1**	< 0.50	< 0.50	< 0.50	**29**	< 0.50	< 0.50	**3.4**
MW-3200B	05/15/19	FD	< 0.50	< 0.50	< 0.50	**0.52**	< 0.50	**110**	**3.1**	< 0.50	< 0.50	< 0.50	**30**	< 0.50	< 0.50	**3.4**
MW-32B	05/15/19	SPT	< 0.50	< 0.50	< 0.50	**0.89 J**	< 0.50	**130**	**2.7**	< 0.50	< 0.50	< 0.50	**31**	< 0.50	< 0.50	**5.0**
MW-32B Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50 - 1.4	< 0.50	16 - 180	1.9 - 5.9	< 0.50	< 0.50	< 0.50	20 - 75	< 0.50	< 0.50	< 2.0 - 6.9
MW-33_2SV	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.7**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-33	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.7**	< 0.50	< 0.50	< 0.50	< 0.50	**0.38 J**	< 0.50	< 0.50	< 0.20
MW-33 Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.7 - 12	< 0.50	< 0.50 - 0.32 J	< 0.50	< 0.50	< 0.50 - 2.0	< 0.50	< 0.50 - 1.4	< 0.20 - < 2.0

TABLE 3
PREVALENT VOLATILE ORGANIC COMPOUNDS AND 1,4-DIOXANE IN GROUNDWATER
SECOND QUARTER 2019

			Concentration (micrograms per liter)													
			VOLATILE ORGANIC COMPOUNDS (FEDERAL MCL/CALIFORNIA MCL)													Semi-VOCs
Well Identifier / Sample Identifier	Date Sampled	QA Code	Benzene (5/1)	Carbon Tetrachloride (5/0.5)	Chloroform (80/80)	1,1-DCA (--/5)	1,2-DCA (5/0.5)	1,1-DCE (7/6)	cis-1,2-DCE (70/6)	PCE (5/5)	1,1,1-TCA (200/200)	1,1,2-TCA (5/5)	TCE (5/5)	TCFM (--/150)	Toluene (1,000/150)	1,4-Dioxane (3*/1**)
Regional Groundwater System Monitor and Extraction Wells (continued)																
MW-34B	05/16/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**37**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**16**
MW-34B Historical Range* **			< 0.50 - < 5.0	< 0.50 - < 5.0	< 0.50 - 0.50	< 0.50 - 9.8	< 0.50 - 1.4	20 E - 1,100	< 0.50 - < 5.0	< 0.50 - 1.1	< 0.50 - 1.0	< 0.50 - 2.6	< 0.50 - 2.1	< 0.50 - < 5.0	< 0.50 - 2.6	< 2.0 E - 196
MW-36_2SV	05/16/19	ORG	< 0.50	< 0.50	< 0.50	**0.13 J**	< 0.50	**52**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**7.0**
MW-36	05/16/19	ORG	< 0.50	< 0.50	< 0.50	**0.13 J**	< 0.50	**52**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**6.2**
MW-36 Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50 - 1.9	< 0.50	2.9 - 220	< 0.50	< 0.50	< 0.50	< 0.50 - 0.24 J	< 0.50	< 0.50	<0.50 - 5.9	< 0.20 - 15
MW-38	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.16 J**	< 0.50	< 0.50	< 0.20
Historical High/Low													**High**			
MW-38 Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	<0.20 - 0.34
MW-39	05/16/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-39 Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 - 1.4	< 0.20 - < 2.0
MW-41	05/15/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**11**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-41 Historical Range* **			< 0.50	< 0.50	< 0.50 - 0.86	< 0.50 - 1.3	< 0.50	< 0.50 - 130	< 0.50	< 0.50 - 0.20 J	< 0.50	< 0.50 - 0.39 J	< 0.50 - 110	< 0.50	< 0.50	< 0.20 - 18
MW-42	06/03/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.41 J**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-4200	06/03/19	FD	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.61**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-42	06/03/19	SPT	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	**0.99 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0
MW-42	06/24/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**2.4**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.10 J**
MW-4200	06/24/19	FD	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**2.3**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.15 J**
MW-42	06/24/19	SPT	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	**1.7**	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	**0.53 J**
MW-43	06/03/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-4300	06/03/19	FD	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-43	06/03/19	SPT	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0
MW-43	06/24/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-4300	06/24/19	FD	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
MW-43	06/24/19	SPT	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	**0.38 J**
EW-01	05/16/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**190**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**47**
EW-01 Historical Range* **			< 0.50 - 2.0	< 0.50 - 0.55	< 0.50 - 1.2	< 0.50 - 16	< 0.50 - 4.0	< 0.50 - 1,600 E	< 0.50 - 0.52	< 0.50 - 4.3	< 0.50 - < 2.5	< 0.50 - 10	< 0.50 - 3.3	< 0.50 - 0.61	< 0.50 - 4.6	< 2.0 - 990 E
EW-02	03/05/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**8.5**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0
EW-02	03/21/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**11**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**4.4**
EW-02	04/04/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**10**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**5.0**
EW-02	04/18/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**11**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**6.8**
EW-02	05/02/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**9.7**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**8.6**
EW-02	05/16/19	ORG	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**12**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**8.0**
EW-02 Historical Range* **			< 0.50	< 0.50	< 0.50	< 0.50 - 1.5	< 0.50	2.3 - 160	< 0.50	< 0.50	< 0.50	< 0.50 - 0.59	< 0.50	< 0.50	< 0.50 - 0.85	< 2.0 - 48

TABLE 3
PREVALENT VOLATILE ORGANIC COMPOUNDS AND 1,4-DIOXANE IN GROUNDWATER
SECOND QUARTER 2019

			Concentration (micrograms per liter)													
			VOLATILE ORGANIC COMPOUNDS (FEDERAL MCL/CALIFORNIA MCL)													Semi-VOCs
Well Identifier / Sample Identifier	Date Sampled	QA Code	Benzene (5/1)	Carbon Tetrachloride (5/0.5)	Chloroform (80/80)	1,1-DCA (--/5)	1,2-DCA (5/0.5)	1,1-DCE (7/6)	cis-1,2-DCE (70/6)	PCE (5/5)	1,1,1-TCA (200/200)	1,1,2-TCA (5/5)	TCE (5/5)	TCFM (--/150)	Toluene (1,000/150)	1,4-Dioxane (3*/1**)
Quality Assurance/Quality Control Samples																
TB-030519	03/05/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-032119	03/21/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-040419	04/04/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-041819	04/18/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-050219	05/02/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-051519A	05/15/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-051519B	05/15/19	TB	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	NA
RB-051519	05/15/19	RB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.20
TB-051619	05/16/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-060319	06/03/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-060319	06/03/19	TB	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	NA
TB-062419	06/24/19	TB	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA
TB-062419	06/24/19	TB	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	**0.22 J**	NA

NOTE: Detections are shown in **BOLD** type.

(1) 1,1,2-Trichloro-1,2,2-Trifluoroethane was detected at a concentration of 1.1 J ug/L in the split sample for monitor well MW-08 collected on 05/15/19

FOOTNOTES

1,1-DCA = 1,1-Dichloroethane
1,2-DCA = 1,2-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
cis-1,2-DCE = cis-1,2-Dichloroethene
PCE = Tetrachloroethene
1,1,1-TCA = 1,1,1-Trichloroethane
1,1,2-TCA = 1,1,2-Trichloroethane
TCE = Trichloroethene

TCFM = Trichlorofluoromethane
(<) = Less than; the value is the Limit of Detection for that compound
* = 1,4-Dioxane Action Level of 3 ug/l
** = California Notification Level for 1,4-Dioxane of 1 ug/l
*** = Historical Range determined using original samples exclusively
Semi-VOCs = Semivolatile organic compounds
NA = Not analyzed for constituent
FD = Field duplicate sample

ug/l = Micrograms per liter
MCL = Maximum Contaminant Level
ORG = Original sample
TB = Trip blank sample
B = Analyte detected in associated Method Blank
E = Data qualified as Estimated in accordance with quality control criteria
J = Estimated Value; analyte detected at less than the Reporting Limit and greater than or equal to the Method Detection Limit

QA = Quality Assurance
SPT = Split sample
ug/l = micrograms per liter
RB = Rinsate blank sample

TABLE 4

PILOT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM OPERATIONAL SUMMARY

OPERATIONAL PERIOD (MONTH/QUARTER/YEAR)	WELLFIELD PRODUCTION[a] (gallons)	AVERAGE DISCHARGE RATE[b] (gpm)	AVERAGE OPERATIONAL DISCHARGE RATE[c] (gpm)	OPERATIONAL HOURS DURING OPERATIONAL PERIOD	HOURS IN OPERATIONAL PERIOD	% OPERATIONAL
2008[d]	3,659,562	13.8	18.2	3,358	4,416	76%
2009	5,787,848	11.0	18.1	5,319	8,760	61%
2010	14,295,261	27.2	46.4	5,131	8,760	59%
2011	20,456,899	38.9	45.8	7,442	8,760	85%
2012[e]	19,378,122	40.2	47.2	6,850	8,040	85%
2013[f]	21,148,029	40.2	45.7	7,713	8,760	88%
2014[g]	7,690,471	14.6	46.8	2,740	8,760	31%
2015[h]	18,019,312	34.3	47.9	6,275	8,760	72%
2016[i]	21,977,404	41.8	44.2	8,284	8,736	95%
2017[j]	18,364,603	34.6	39.8	7,684	8,835	87%
2018[k]	18,144,835	34.5	38.3	7,889	8,760	90%
Dec-18	1,691,132	39.1	40.5	696	721	97%
Jan-19	1,071,270	21.2	40.7	439	840	52%
Feb-19	1,139,085	30.6	41.8	454	621	73%
1Q2019	3,901,487	29.8	40.9	1,589	2,183	73%
Mar-19	1,433,449	33.1	42.2	567	721	79%
Apr-19	1,677,379	41.8	41.9	668	669	100%
May-19	2,045,093	40.5	41.5	822	841	98%
2Q2019	5,155,921	38.5	41.8	2,057	2,232	92%
SINCE INCEPTION	177,979,754	31.0	41.0	72,331	95,761	76%

Notes:

(a) Based on Effluent totalizer readings from the Carbon Effluent, which also includes relatively small amounts of monitor well purge water from quarterly sampling events, well installations, and aquifer testing.

(b) Total volume of water treated during the operational period divided by the total number of minutes in that operational period.

(c) Total volume of water treated during the operational period divided by the minutes of operation in that operational period.

(d) Operational period beginning 7/1/2008 (first month of system operation).

(e) 2012 Calendar year is from 1/1/2012 through 11/30/2012.

(f) 2013 Calendar year is from 12/1/2012 through 11/30/2013.

(g) 2014 Calendar year is from 12/1/2013 through 11/30/2014.

(h) 2015 Calendar year is from 12/1/2014 through 11/30/2015.

(i) 2016 Calendar year is from 12/1/2015 through 11/30/2016.

(j) 2017 Calendar year is from 12/1/2016 through 11/30/2017.

(k) 2018 Calendar year is from 12/1/2017 through 11/30/2018.

gpm = gallons per minute

Refer to previous quarterly reports for detail of 2008 through 2014 operational summary.

Treatment of groundwater from extraction well EW-02 initiated in 2010.

Treatment of groundwater from monitor well MW-29 initiated in 2014.

TABLE 5
PILOT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SAMPLING SCHEDULE

COMPOUND(S) / CONSITITUENT	ANALYTICAL METHOD	SAMPLE CONTAINER	REPORTING DETECTION LIMITS (milligrams per liter)	SAMPLE FREQUENCY AND LOCATION: Daily Samples[1]: Days 1-5 — System Influent (**INF**)	Post-Filter (**PF**)	Post-Oxidation (**POX**)	Carbon Breakthrough (**CBT**)[3]	Post-Carbon (**CEFF**)	Weekly Samples[1]: Weeks 1-4 — System Influent (**INF**)	Post-Filter (**PF**)	Post-Oxidation (**POX**)	Carbon Breakthrough (**CBT**)[3]	Post-Carbon (**CEFF**)	Monthly Samples: Week 5+ — Extraction Wells (**Well ID**)[2]	System Influent (**INF**)	Post-Filter (**PF**)	Post-Oxidation (**POX**)	Carbon Breakthrough (**CBT**)[3]	Post-Carbon (**CEFF**)	Quarterly Samples: Week 1+ — Extraction Wells (**Well ID**)[2]	System Influent (**INF**)	Post-Oxidation (**POX**)	Post-Carbon (**CEFF**)
COMPOUNDS/CONSTITUENTS NORMALLY REQUIRED AS PART OF NPDES OR WDR PERMITS, PURSUANT TO CRWQCB REGION 8 ORDER NO. R8-2003-0085																								
Volatile Organic Compounds	EPA 8260B	3 - 40 mL VOA, HCl	QAPP[4]	X		X	X	X	X		X	X	X	X	X			X	X	X				
1,4-Dioxane	EPA 8270 Modified	1 L Amber	0.002	X					X					X	X									
1,4-Dioxane	EPA 8270 SIM	1 L Amber	0.0002			X					X						X							
Total Suspended Solids	SM2540D	250 mL poly	10													X								
Total Dissolved Solids	SM2540C	250 mL poly	10																		X	X	X	X
SELECTED METALS																								
Dissolved Metals (Iron, Manganese, Calcium, Sodium, Magnesium)	EPA 6010B	500 mL poly	QAPP[4]	(a)																	X	X		
Selenium	EPA 6010B	500 mL poly, HNO_3	QAPP[4]																		X	X		
SELECTED INORGANIC CONSTITUENTS																								
Hydroxide Alkalinity	SM2320B	250 mL poly	2.0	(a)													X	X			X	X		
Bicarbonate Alkalinity	SM2320B	250 mL poly	2.0	(a)													X	X			X	X		
Carbonate Alkalinity	SM2320B	250 mL poly	2.0	(a)													X	X			X	X		
Total Alkalinity	SM2320B	250 mL poly	2.0	(a)													X	X			X	X		
BROMATE EVALUATION																								
Bromate	EPA 317.0	125 mL poly	0.0005			X					X							X						
Bromide	EPA 300.0	125 mL poly	0.05	(a)					(a)					X	X									
OTHER CONSTITUENTS/COMPOUNDS																								
Total Organic Carbon	SM5310B	3 - 40 mL VOA, HCl	3.0	(a)													X	X			X	X	X	
Anions (Chloride, Sulfate, Nitrate, Nitrite, and Phosphate)	EPA 300.0	500 mL poly	Varies	(a)																	X	X	X	
Chemical Oxygen Demand	EPA 410.4	125 mL poly, H_2SO_4	5.0	(a)																	X	X	X	
UV Absorption (UVA) @254nm	EPA 415.3	250 mL Amber	N/A		(a)												X				X	X	X	
Field Parameters																								
Dissolve Oxygen (DO)	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Electrical Conductance (EC)	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Redox Potential	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Temperature	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
pH	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Turbidity	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Flow-Meter	N/A	N/A	N/A	X				X	X				X	X	X					X				
Residual Hydrogen Peroxide	N/A	N/A	N/A			(a)	(a)	(a)			X	X	X					X	X	X				

TABLE 5
PILOT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SAMPLING SCHEDULE

FOOTNOTES

(a) Only one sample to be collected during sampling period.

1 Daily and weekly samples collected during the first month of operation will be repeated after major modifications to system equipment or operating parameters, as detailed in the Workplan.

2 If more than one extraction well is in operation, combined influent samples will be collected in addition to extraction wellhead samples, with the same sampling schedule as the extraction wellheads.

3 Carbon breakthrough will be collected from the effluent of the first carbon unit in series; when breakthrough of the first unit is detected, the breakthrough sample will be collected from the effluent of the second carbon unit in series.

4 QAPP, Quality Assurance Project Plan, Appendix B of Additional Groundwater Assessment Workplan, Hargis + Associates, Inc., April 25, 2003.

CRWQCB = California Regional Water Quality Control Board, Santa Ana Region 8
NPDES = National Pollutant Discharge Elimination System
WDR = Waste Discharge Requirement
N/A = Not applicable
mL = Milliliter
VOA = Volatile organic analysis
HCl = Hydrochloric acid
HNO_3 = Nitric acid
H_2SO_4 = Sulfuric acid
nm = Nanometers
EPA = U.S. Environmental Protection Agency
SIM = Selected ion monitoring
SM = Standard Method
L = Liter
poly = High density polyethylene bottle
Amber = Amber glass bottle

TABLE 6
SELECT COMPOUNDS MONITORED IN
PILOT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SAMPLES
SECOND QUARTER 2019

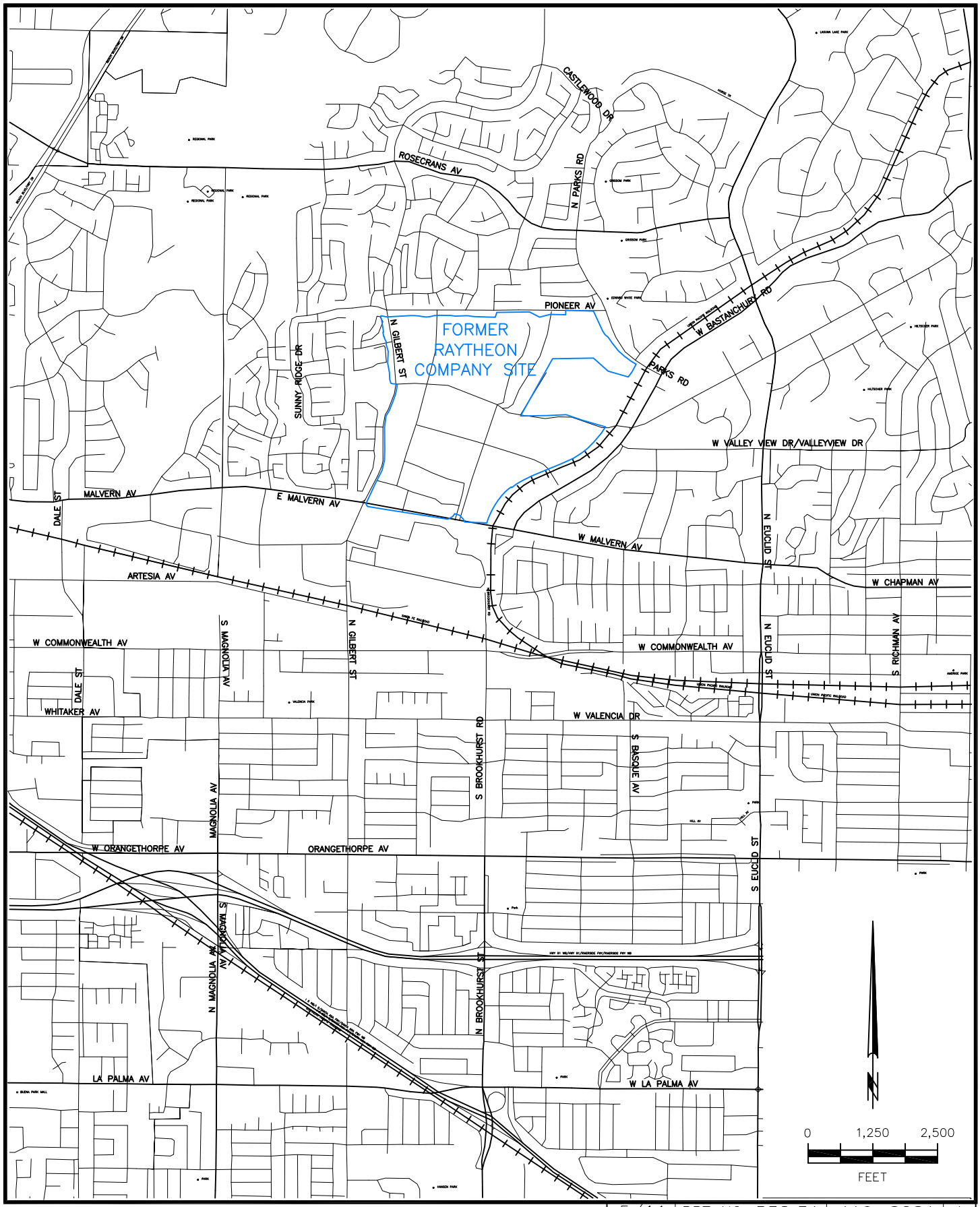
Compound	Date	Units	MW-21[(a)]	MW-29	EW-01[(a)]	EW-02	INF*	PF	POX	CBT	CEFF
Extraction Rate	3/1/19-5/31/19	gpm	0	10	0	40	--	--	--	--	--
1,1,2-Trichloroethane	03/05/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
(5 ug/L MCL)	03/21/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/04/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/18/19	ug/L	--	**0.66**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/02/19	ug/L	--	**0.69**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/16/19	ug/L	--	**0.61**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
1,1-Dichloroethane	03/05/19	ug/L	--	**1.5**	--	<0.5	**0.50**	--	<0.5	<0.5	<0.5
(5 ug/L MCL)	03/21/19	ug/L	--	**1.4**	--	<0.5	**0.53**	--	<0.5	<0.5	<0.5
	04/04/19	ug/L	--	**1.2**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/18/19	ug/L	--	**1.5**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/02/19	ug/L	--	**1.6**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/16/19	ug/L	--	**0.86**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
1,1-Dichloroethene	03/05/19	ug/L	--	**100**	--	**8.5**	**37**	--	<0.5	<0.5	<0.5
(6 ug/L MCL)	03/21/19	ug/L	--	**120**	--	**11**	**41**	--	<0.5	<0.5	<0.5
	04/04/19	ug/L	--	**150**	--	**10**	**41**	--	<0.5	<0.5	<0.5
	04/18/19	ug/L	--	**160**	--	**11**	**46**	--	<0.5	<0.5	<0.5
	05/02/19	ug/L	--	**110**	--	**9.7**	**37**	--	<0.5	<0.5	<0.5
	05/16/19	ug/L	--	**120**	--	**12**	**50**	--	<0.5	<0.5	<0.5
1,2-Dichloroethane	03/05/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
(0.5 ug/L MCL)	03/21/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/04/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/18/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/02/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/16/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
cis-1,2-Dichloroethene	03/05/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
(6 ug/L MCL)	03/21/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/04/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/18/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/02/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/16/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
Tetrachloroethene	03/05/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
(5 ug/L MCL)	03/21/19	ug/L	--	<0.50	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/04/19	ug/L	--	**0.51**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/18/19	ug/L	--	**0.54**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/02/19	ug/L	--	**0.51**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/16/19	ug/L	--	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
Trichloroethene	03/05/19	ug/L	--	**1.5**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
(5 ug/L MCL)	03/21/19	ug/L	--	**1.6**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/04/19	ug/L	--	**1.3**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	04/18/19	ug/L	--	**1.8**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/02/19	ug/L	--	**1.7**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
	05/16/19	ug/L	--	**2.0**	--	<0.5	<0.5	--	<0.5	<0.5	<0.5
1,4-Dioxane	03/05/19	ug/L	--	**110**	--	<2.0	**26**	--	<0.2	<0.2	<0.2
(1 ug/L California Notification Level)	03/21/19	ug/L	--	**100**	--	**4.4**	**25**	--	<0.2	<0.2	<0.2
	04/04/19	ug/L	--	**100**	--	**5.0**	**27**	--	<0.2	<0.2	<0.2
	04/18/19	ug/L	--	**100**	--	**6.8**	**28**	--	<0.2	<0.2	<0.2
	05/02/19	ug/L	--	**110**	--	**8.6**	**31**	--	<0.2	<0.2	<0.2
	05/16/19	ug/L	--	**110**	--	**8.0**	**34**	--	<0.2	**0.31**	<0.2
Bromide	03/05/19	mg/L	--	**0.41**	--	**0.23**	**0.27**	--	--	--	--
	04/04/19	mg/L	--	**0.49**	--	**0.28**	**0.32**	--	--	--	--
	05/02/19	mg/L	--	**0.39**	--	**0.22**	**0.26**	--	--	--	--
Bromate	03/05/19	ug/L	--	--	--	--	< 0.5	--	< 0.5	--	--
	04/04/19	ug/L	--	--	--	--	< 0.5	--	< 0.5	--	--
	05/02/19	ug/L	--	--	--	--	< 0.5	--	< 0.5	--	--
Total Non-Filterable-Residue	03/05/19	mg/L	--	--	--	--	--	< 1.0	--	--	--
(10 ug/L MCL)	04/04/19	mg/L	--	--	--	--	--	< 1.0	--	--	--
	05/02/19	mg/L	--	--	--	--	--	< 1.0	--	--	--
Total Filterable Residue (500 mg/L MCL)	03/05/19	mg/L	--	**760**	--	**620**	**650**	--	**650**	--	**650**

TABLE 6
SELECT COMPOUNDS MONITORED IN
PILOT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SAMPLES
SECOND QUARTER 2019

Compound	Date	Units	MW-21[(a)]	MW-29	EW-01[(a)]	EW-02	INF*	PF	POX	CBT	CEFF

NOTE: Detections are shown in **BOLD** type.

FOOTNOTES:
[(a)] = inactive extraction wells; extraction wells MW-21 and EW-01 operated from July 2008 to November 2009
MCL = Maximum Contaminant Level or Drinking Water Action Level, if applicable
ug/L = micrograms per liter
mg/L = milligrams per liter
gpm = gallon per minute
(--) = Not scheduled for performance monitoring
(<) = Less than; the numerical value is the Limit of Detection for that compound
INF* = Influent (extraction wells EW-02 and MW-29)
PF = Post Particulate Filter
POX = Post UV/Chem-Ox
CBT = Carbon Breakthrough
CEFF = Carbon Effluent



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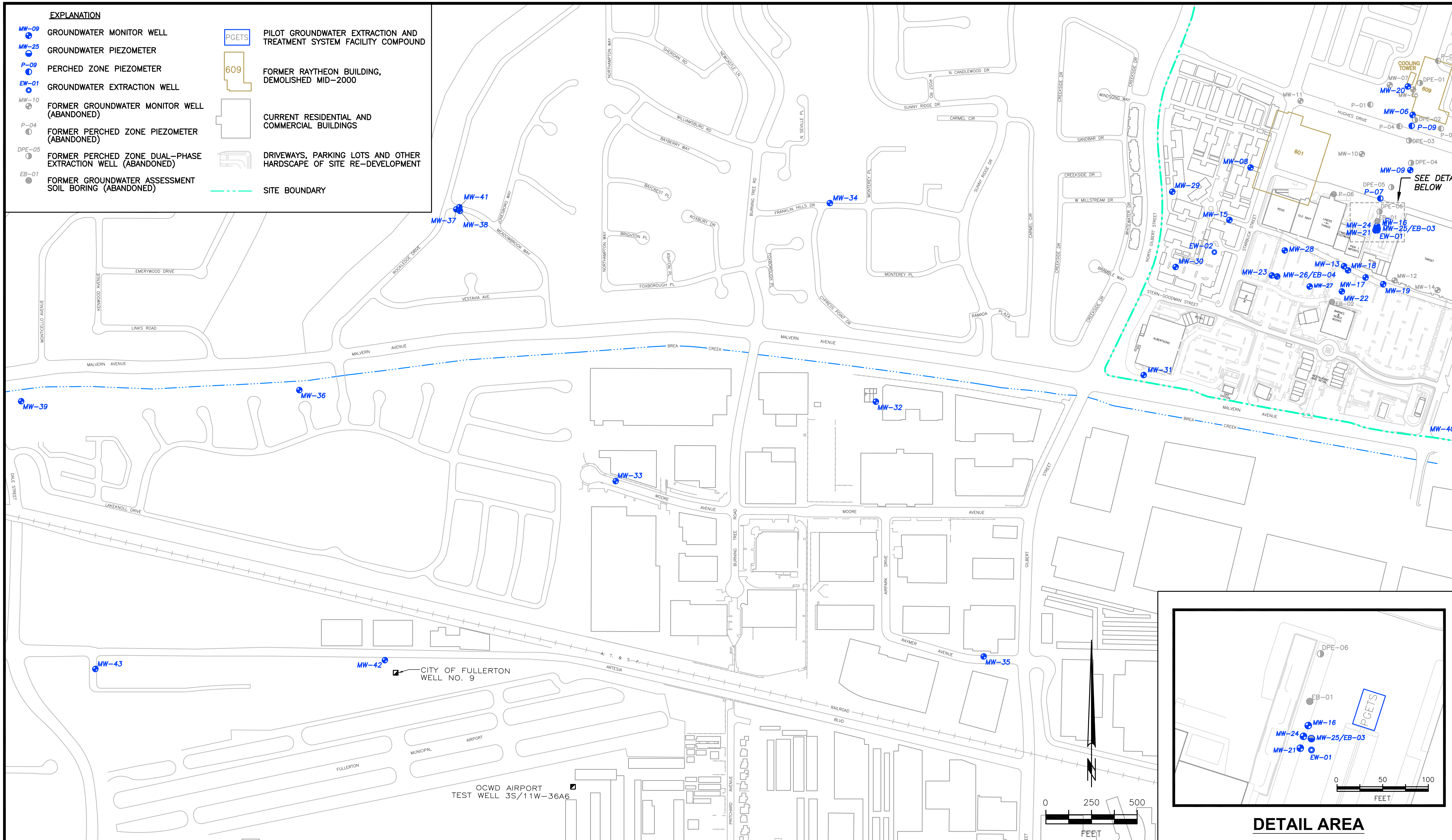
HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

5/11	RPT NO. 532.31	410-8281	A

FIGURE 1. SITE LOCATION



Jul 09, 2019 - 9:22am ESS - T:\2019\500-599\532 Raytheon\Hydrogeology\H+A Basemaps\410-10166.dwg

06/19	RPT NO. 532.71	410-10166	A

HARGIS + ASSOCIATES, INC
Hydrogeology/Engineering

FIGURE 2.
WELL AND PIEZOMETER LOCATIONS

EXPLANATION

- MW-16 — GROUNDWATER MONITOR WELL
- EW-01 — GROUNDWATER EXTRACTION WELL
- 22.84 — WATER LEVEL ELEVATION (FEET MEAN SEA LEVEL)
- 120/110/2.0 — CONCENTRATION OF 1,1-DICHLOROETHYLENE/1,4-DIOXANE/TRICHLOROETHYLENE IN GROUNDWATER (MICROGRAMS PER LITER)
- 22 — EQUAL WATER LEVEL ELEVATION CONTOUR
- 609 — FORMER RAYTHEON BUILDING, DEMOLISHED MID-2000
- CURRENT RESIDENTIAL AND COMMERCIAL BUILDINGS
- DRIVEWAYS, PARKING LOTS AND OTHER HARDSCAPE OF SITE RE-DEVELOPMENT
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW, MAY 2019 (COLLECTED ON MAY 14, 2019)
- * — EXTRACTION WELLS EW-02 2ND MW-29 PUMPING DURING WATER LEVEL GAUGING; ESTIMATED WATER LEVEL BASED ON THIEM EQUATION
- ** — WATER LEVELS NOT CONTOURED; SAMPLES COLLECTED ON JUNE 24, 2019
- NS — NOT SAMPLED

LOS COYOTES COUNTRY CLUB

APPROXIMATE SATURATED EXTENT OF UNIT B

MW-41
19.43
11/<0.20/<0.50

MW-34B
19.84
37/16/<0.50

MW-29
20.00
120/110/2.0

EW-02*
18.90
12/8.0/<0.50

MW-30A
20.53
<0.50/<0.20/<0.50

EW-01
22.84
190/47/<0.50

MW-16
22.51
NS

MW-28
21.13
<0.50/0.08J/<0.50

MW-26C
21.40
<0.50/<0.20/<0.50

MW-27
21.83
NS

MW-31
21.69
86/3.8/6.0

MW-40
23.35
NS

MW-39
17.77
<0.50/<0.20/<0.50

MW-36
18.20
52/6.2/<0.50

MW-32B
20.41
110/34/29

MW-33
18.98
1.7/<0.20/0.38J

MW-35C
20.31
NS

MW-42**
15.17
2.4/0.10J/<0.50

MW-43**
14.94
<0.50/<0.20/<0.50

CITY OF FULLERTON WELL NO. 9

OCWD AIRPORT TEST WELL 3S/11W-36A6

0 250 500
FEET
NOTE: NAD83 DATUM

Jun 27, 2019 - 4:48pm ESS - T:\2019\500-599\532 Raytheon\Hydrogeology\Water Lvl\220-2488.dwg

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Hydrogeology/Engineering

06/19	RPT NO. 532.31	220-2488	A

FIGURE 3.
WATER LEVEL AND WATER QUALITY UNIT B
MAY 2019

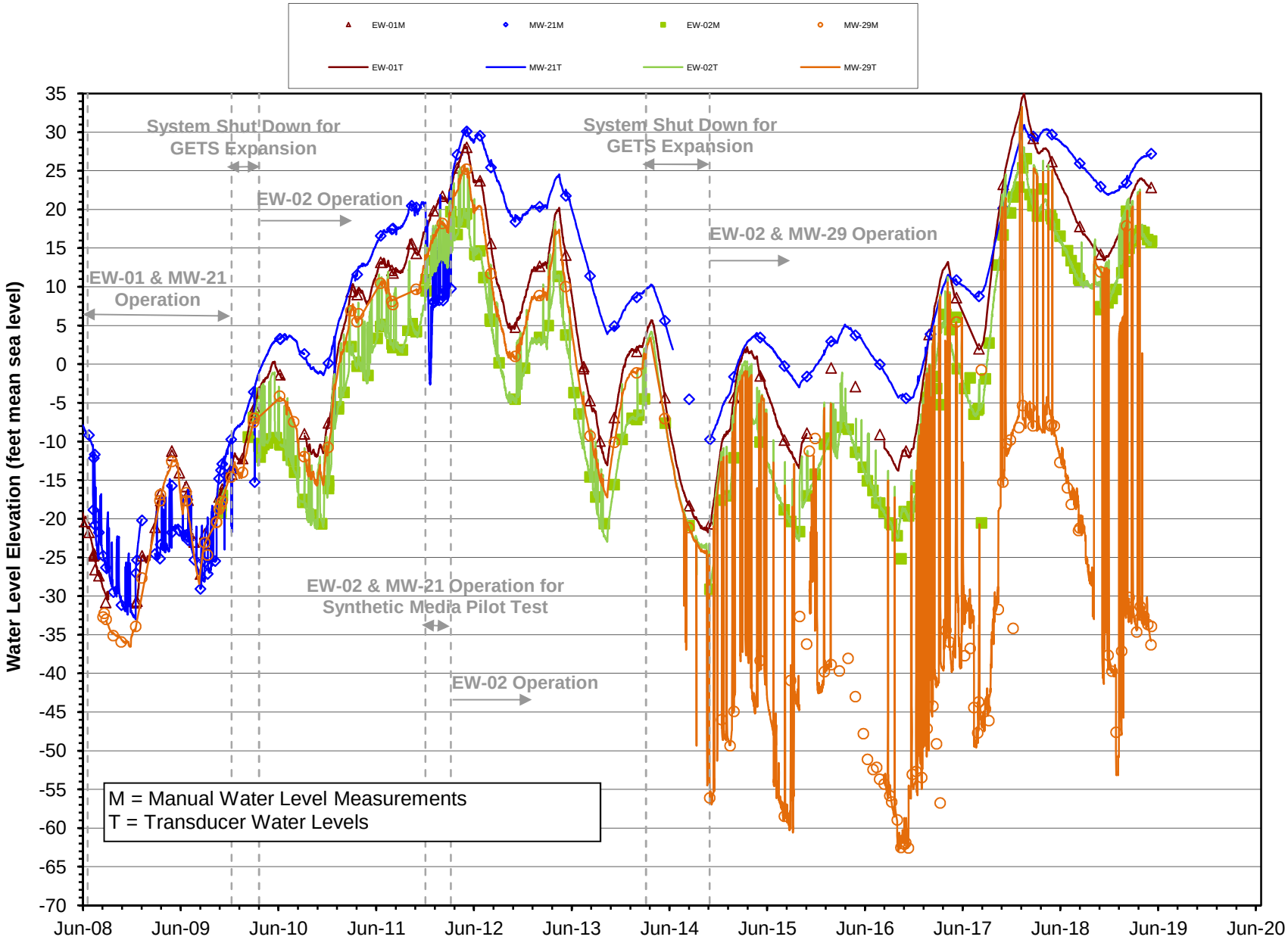


FIGURE 4.
PILOT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM OPERATION AND EXTRACTION WELL WATER LEVELS

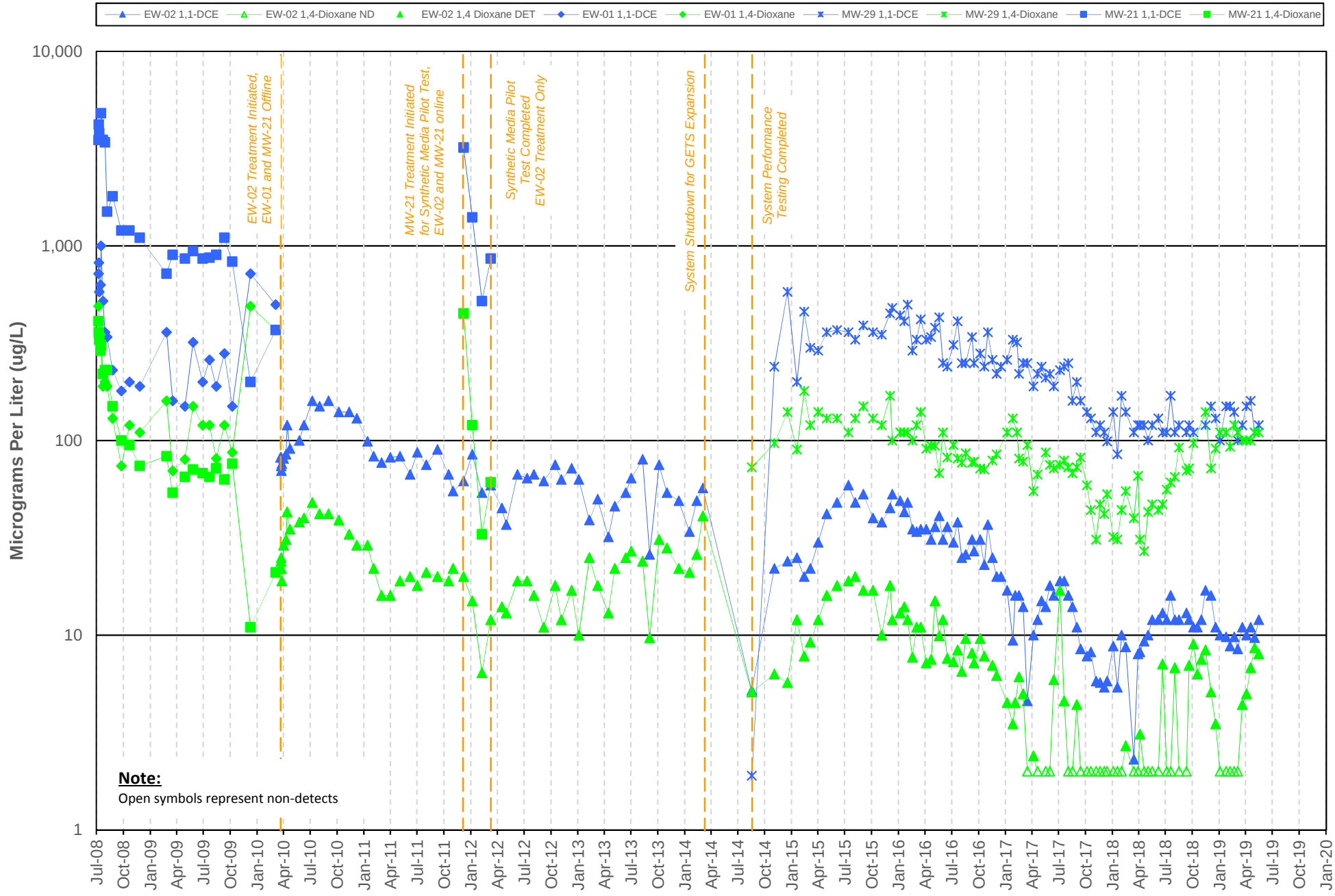
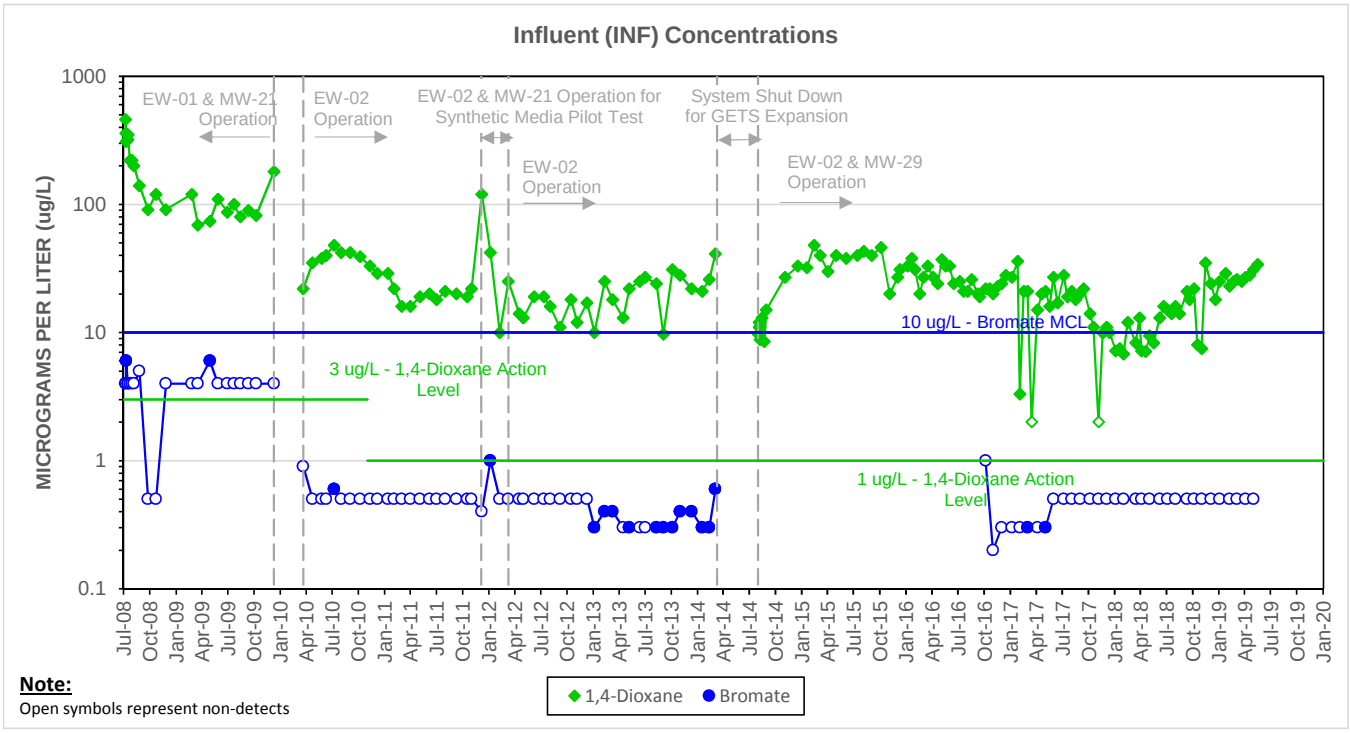


FIGURE 5.
1,1-DICHLOROETHYLENE AND 1,4-DIOXANE CONCENTRATIONS IN EXTRACTION WELLS



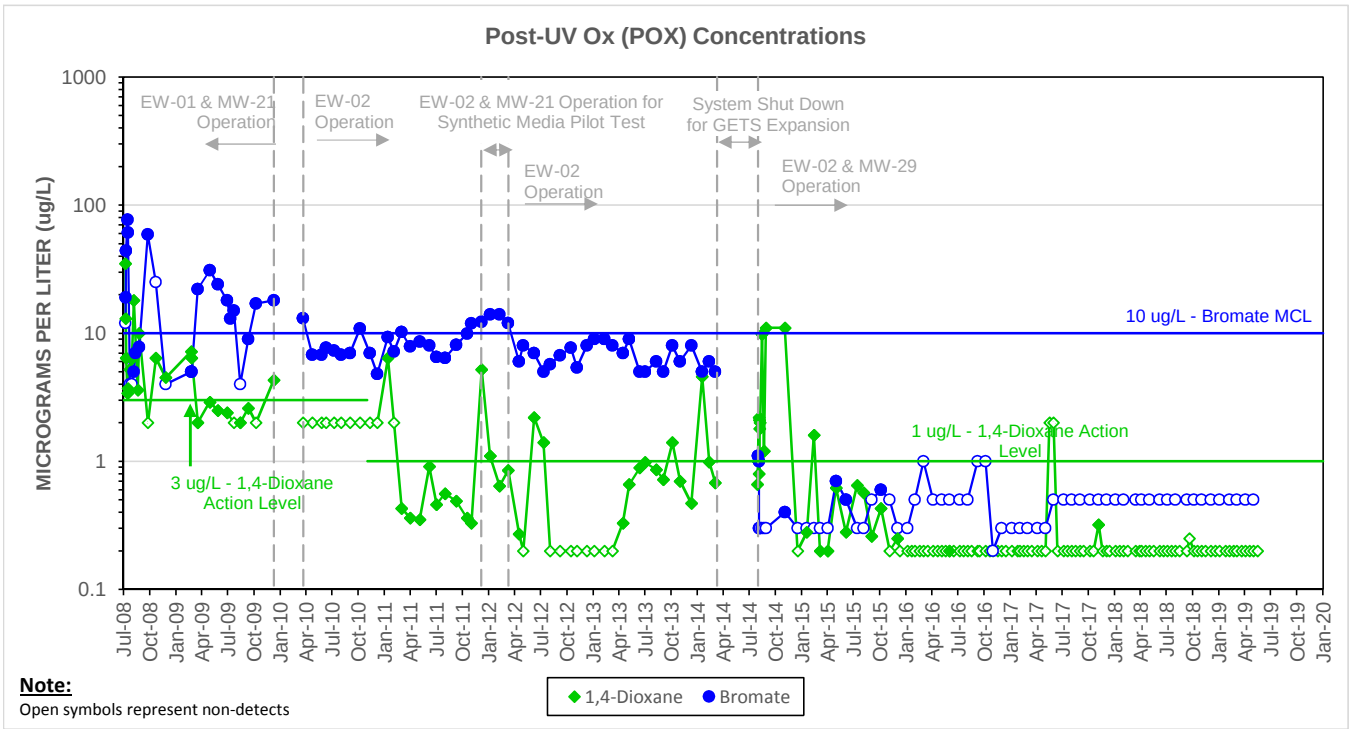


FIGURE 6.
1,4-DIOXANE AND BROMATE IN INFLUENT AND POST-OXIDATION SAMPLES

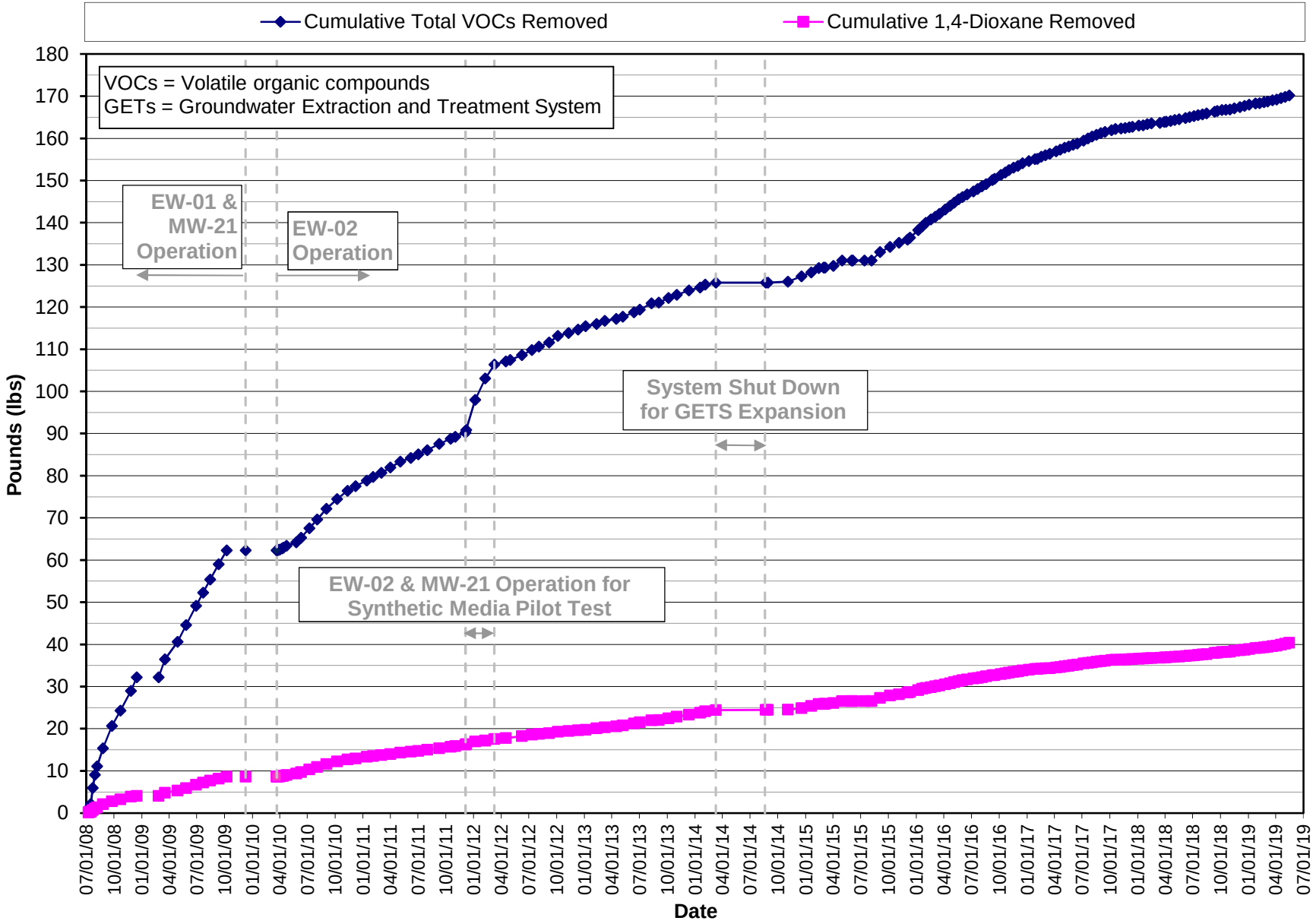


FIGURE 7.
PILOT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM MASS REMOVAL