



EDMUND G. BROWN JR.
GOVERNOR



MATTHEW RODRIGUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Los Angeles Regional Water Quality Control Board

November 2, 2018

Mr. Eric Lardiere
Whittaker Corporation
1955 N. Surveyor Avenue
Simi Valley, CA 93063

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
CLAIM NO. 7017 2400 0000 9373 4300

REVISED MONITORING AND REPORTING PROGRAM NO. CI-10295, FOR ALLUVIAL GROUNDWATER REMEDIATION AT FORMER BERMITE HOT SPOT NO. 4 AREA (HOT SPOTS NUMBERS 1 THROUGH 4, AND THE ADDITIONAL TREATMENT AREA AT WELL 75-MW-25A/B/C) – 22116 SOLEDAD CANYON ROAD, SANTA CLARITA, CALIFORNIA 91350 (FILE NO. 16-167, ORDER NO. R4-2014-0187, SERIES NO. 090, MONITORING AND REPORTING PROGRAM NO. CI-10295, GLOBAL ID WDR100039631)

Dear Mr. Lardiere:

The Regional Water Quality Control Board, Los Angeles Region (Regional Board), is the public agency with primary responsibility for the protection of ground and surface water quality for all beneficial uses of water within major portions of Los Angeles and Ventura Counties, including the facility mentioned above. The Department of Toxic Substances Control (DTSC) is the lead regulatory agency for the project.

The Whittaker Corporation Bermite Hotspot No. 4 Area (Site) is in Operable Unit 7 (OU-7), Areas 67 and 75, at 22116 Soledad Canyon Road in Santa Clarita, California. The Site includes Hotspots Numbers 1, 2, 3, and 4, and the additional treatment area at well 75-MW-25A/B/C. The Site is on the Metrolink, Santa Clarita Station property (Figures 1 and 2).

On March 8, 2017, the Regional Board enrolled Whittaker Corporation (hereinafter Discharger) under Waste Discharge Requirements (WDR) Order No. R4-2014-0187 and Monitoring and Reporting Program (MRP) No. CI-10295 which authorized the injection of sodium persulfate activated with sodium hydroxide, at Hot Spot No. 4.

Following a successful pilot test, the Discharger submitted the *Work Plan for Full-Scale Groundwater Hot-Spots Treatment in Northern Alluvium Area, former Bermite Facility* (Full-Scale Work Plan) on December 22, 2017. DTSC approved the Full-Scale Work Plan on January 25, 2018. On February 23, 2018, the Regional Board received the request to modify the existing coverage of general WDRs, Order No. R4-2014-0187, for implementation of the Full-Scale Work Plan.

Based on the results of an in-situ chemical oxidation (ISCO) pilot test at Hot Spot No. 4 and the results of in-situ bioremediation (ISB) pilot tests elsewhere on the former Bermite facility, the Discharger proposes to expand remediation to full-scale, in-situ groundwater treatment to include five locations at the Site (Figures 1 and 2). The injections would use techniques similar to those

used at Hot Spot No. 4. The remedial reagent placement rate is not expected to exceed 20 gallons per minute or 20 pounds per square inch. The hot spot/treatment area names, characteristics, and proposed remedial technologies are summarized in Table 1. The injection intervals, size of treatment areas, and injection volumes may change minimally during implementation based on new data from step-out borings.

Table 1: Hot Spots and Treatment Area Characteristics and Proposed Remedial Technologies

| Parameters | Hot Spot #1 Area 67 | Hot Spot #2 Area 67 | Hot Spot #3 Area 75 | Additional Treatment Area at Well 75-MW- 25A/B/C | Hot Spot #4 Area 75 |
|---|------------------------|------------------------|--|--|---|
| Main COCs | Perchlorate | Perchlorate | TCE ¹ | TCE ¹ | PCE ¹ , TCE ¹ , 1,1-DCE ¹ , 1,4-Dioxane |
| Remedial Technology | In Situ Bioremediation | In Situ Bioremediation | Enhanced In Situ Bioremediation | Enhanced In Situ Bioremediation | In Situ Chemical Oxidation |
| Impacted Interval (feet below grade) | 70 to 105 | 55 to 65 | 65 to 90 | 95 to 115 | 60 to 75 |
| Reagent Injection Treatment Interval thickness (feet) | 35 | 10 | 25 | 25 | 15 |
| Treatment Area (feet ²) | 1,400 | 2,500 | 5,650 | 2,000 | 7,200 |
| Remedial Reagents | 5% EVO ¹ | 5% EVO ¹ | 10% EVO ¹ , BAC-9 ¹ , and sodium bicarbonate | 10% EVO ¹ , BAC-9 ¹ , and sodium bicarbonate | Sodium persulfate (up to 230 grams per liter) activated with sodium hydroxide |
| Total Injection Volumes (gallons) | 12,830 | 6,550 | 36,980 | 13,090 | 28,280 |

Notes: 1) TCE = trichloroethene; PCE = perchloroethene; 1,1-DCE = 1,1-dichloroethene; EVO = emulsified vegetable oil; BAC-9 = trade mark belonging to EOS Remediation LLC for a microbial consortium of *Dehalococcoides mcmartyi* enriched to degrade TCE and PCE to ethene

A groundwater monitoring program will be implemented at each hot spot/treatment area to detect and evaluate impacts associated with the ISCO and ISB activities. Monitoring program details are provided in the attached revised MRP No. CI-10295.

Regional Board staff have reviewed the Request, supporting documents, and several October 2018 emails from Wood Environment & Infrastructure Solutions, Inc., and GSI Environmental Inc., both representing Whittaker Corporation. The emails provided information on new and proposed well and injection locations and the results of laboratory analyses of samples collected from the new wells. Regional Board staff have determined that the proposed discharge modifications meet the conditions specified in Order No. R4-2014-0187, Series 090. You shall implement revised MRP No. CI-10295 (attached). Should significant changes to the discharge be needed, revised engineering drawings and process descriptions showing the changes must be filed with the Regional Board a minimum of 30 days prior to implementation of the changes. The Discharger must receive approval from the Regional Board for such changes prior to implementation.

Mr. Eric Lardiere
Whittaker Corporation

- 3 -

November 2, 2018

If you have any questions, please contact Mr. Peter Raftery, Project Manager, at (213) 620-6156 (peter.raftery@waterboards.ca.gov) or Dr. Eric Wu, Chief of the Groundwater Permitting Unit, at (213) 576-6683 (eric.wu@waterboards.ca.gov).

Sincerely,


for Deborah J. Smith
Executive Officer

Attachment:

Revised Monitoring and Reporting Program No. CI-10295

cc: Mr. Jose Diaz, Department of Toxic Substances Control
Dr. Hassan Amini, GSI Environmental, Irvine
Mr. Calvin H. Hardcastle, P.E., Wood Environment & Infrastructure Solutions, Inc., Irvine
Ms. Miae Jeon, PE, PG, GSI Environmental, Irvine
Dr. Ying Song, P.E., Wood Environment & Infrastructure Solutions, Inc., Irvine
Mr. William Weaver, CDM Smith

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

REVISED MONITORING AND REPORTING PROGRAM NO. CI-10295
FOR
HOTSPOT NO. 4 AREAS
(HOT SPOTS 1, 2, 3, 4 AND TREATMENT AREA AT WELL 75-MW-25A/B/C)
FULL SCALE IN SITU CHEMICAL OXIDATION AND IN SITU BIOREMEDIATION
OPERABLE UNIT 7, AREAS 67 AND 75
FORMER BERMITE FACILITY
22116 SOLEDAD CANYON ROAD
SANTA CLARITA, CA

ENROLLMENT UNDER REGIONAL BOARD
ORDER NO. R4-2014-0187 (SERIES NO. 090)
FILE NO. 16-167

I. REPORTING REQUIREMENTS

- A. Whittaker Corporation (hereinafter Discharger) shall implement this revised Monitoring and Reporting Program (MRP) at Operable Unit 7, Areas 67 and 75, 22116 Soledad Canyon Road, Santa Clarita, California, the location of which is shown on Figures 1 and 2, on the effective date of this enrollment (**November 2, 2018**) under Regional Board Order No. R4-2014-0187. The first monitoring report under this monitoring program is due by January 30, 2019.

Monitoring reports shall be received by the dates in the following schedule:

| <u>Reporting Period</u> | <u>Report Due</u> |
|-------------------------|-------------------|
| January – March | April 30 |
| April – June | July 30 |
| July – September | October 30 |
| October – December | January 30 |

- B. If there is no discharge or injection of in situ bioremediation (ISB) or in situ chemical oxidation (ISCO) remedial reagent during any reporting period, the report shall so state.
- C. By January 31st of each year, beginning January 31, 2019, the Discharger shall submit an annual summary report to the Regional Board. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous calendar year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken, planned, or which may be needed to bring the discharge into full compliance with the waste discharge requirements.

- D. Laboratory analyses – all chemical, bacteriological, and/or toxicity analyses shall be conducted at a laboratory certified for such analyses by the State Water Resources Control Board, Division of Drinking Water (SWRCB-DDW) Environmental Laboratory Accreditation Program (ELAP).
- E. The method limits (MLs) employed for analyses shall be lower than the permit limits established for a given parameter, unless the Discharger can demonstrate that a particular ML is not attainable and obtains approval for a higher ML from the Executive Officer. At least once a year, the Discharger shall submit a list of the analytical methods employed for each test and the associated laboratory quality assurance/quality control (QA/QC) procedures.
- F. All QA/QC samples must be run on the same dates when samples were actually analyzed. The Discharger shall make available for inspection and/or submit the QA/QC documentation upon request by Regional Board staff. Proper chain of custody procedures must be followed and a copy of the chain of custody documentation shall be submitted with the report.
- G. Each monitoring report must affirm in writing that “All analyses were conducted at a laboratory certified for such analyses by the SWRCB-DDW ELAP, and in accordance with current United States Environmental Protection Agency (USEPA) guideline procedures or as specified in this Monitoring Program.” Proper chain of custody procedures must be followed and a copy of the completed chain of custody form shall be submitted with the report.
- H. For every item where the requirements are not met, the Discharger shall submit a statement of the cause(s), and actions undertaken or proposed which will bring the discharge into full compliance with waste discharge requirements at the earliest possible time, including a timetable for implementation of those actions.
- I. The Discharger shall maintain all sampling and analytical results, including strip charts, date, exact place, and time of sampling, dates analyses were performed, analyst's name, analytical techniques used, and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Regional Board.
- J. In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized to demonstrate compliance with the requirements and, where applicable, shall include results of receiving water observations.
- K. Any mitigation/remedial activity including any pre-discharge treatment conducted at the site must be reported in the quarterly monitoring report.

- L. Each monitoring report shall contain a separate section titled "Summary of Non-Compliance" which discusses the compliance record and the corrective actions taken or planned that may be needed to bring the discharge into full compliance with Waste Discharge Requirements (WDR). This section shall be located at the front of the report and shall clearly list all non-compliance with discharge requirements, as well as all excursions of effluent limitations.
- M. The Discharger shall comply with requirements contained in Section G of WDR Order No. R4-2014-0187 "*Monitoring and Reporting Requirements*" in addition to the aforementioned requirements.

II. ISB AND ISCO INJECTION MONITORING REQUIREMENTS

The quarterly reports shall contain the following information regarding the ISB and ISCO injection activities:

1. Location map showing monitoring wells and injection locations used.
2. For each injection location a written and tabular summary of injection interval depth range, quantity and concentration of remedial reagents injected at each injection location, and injection pressures and flow rates at each injection location.
3. Written and photographic records of visual inspections at each injection location, conducted and recorded daily during injection.

III. GROUNDWATER MONITORING PROGRAM FOR ISB AND ISCO REMEDIAL ACTIONS

The groundwater monitoring program is designed to detect and evaluate impacts associated with the ISB and ISCO activities. Because there are five hot spot/treatment areas, the placement of remedial reagents may take several months. Therefore, the groundwater monitoring required in this MRP is expected to begin at each hot spot/treatment area immediately following the completion of remedial reagent placement at the specific hot spot/treatment area. The monitoring program shall assess: (i) performance of the ISB by sampling monitoring wells located within the anticipated ISB area of influence and (ii) potential down gradient impacts associated with the ISB and ISCO activities by sampling down gradient performance monitoring wells. Given these monitoring objectives, at each remediation area the following groundwater wells shall be included in the monitoring program:

HOT SPOT No. 1 Monitoring Wells (Figure 3)

| | |
|-----------------|--|
| Up gradient: | 67-MW-05, screened 75' – 85' |
| Treatment zone: | 67-MW-10, screened 50' – 100' |
| Cross gradient: | 67-MW-04, screened 55' – 70', north of treatment zone 67-MW-12, screened 70' – 95', south of treatment zone |
| Down gradient: | 67-MW-08, screened 70'- 80' |

HOT SPOT No. 2 Monitoring Wells (Figures 4 and 5)

Up gradient: 67-MW-03B, screened 35' – 45',
Treatment zone: 67-MW-02, screened 55' – 65'
Cross gradient: A railroad track prevents installation of a cross gradient well immediately west of the treatment zone
A hill prevents installation of a cross gradient well immediately northeast of the treatment zone
Down gradient: 75-MW-38, screen to be determined, to be installed at Hot Spot No. 3

HOT SPOT No. 3 Monitoring Wells (Figure 5)

Up gradient: 75-MW-21A, screened 85'- 95'
Treatment zone: 75-MW-20, screened 82'- 92'
Cross gradient: 75-MW-22, screened 70'- 80', north of treatment zone
75-MW-38, screen TBD, to be installed south of treatment zone
Down gradient: 75-MW-24, screened 50' – 60'

HOT SPOT No. 4 Monitoring Wells (Figure 6)

Up gradient: 75-MW-44, screened 55'- 75'
Treatment zone: 75-MW-26B, screened 58' – 68'
Cross gradient: 75-MW-43, screened 55'- 75', north of treatment zone
Insufficient space/access for a south well.
Down gradient: 75-MW-27, screened 60- - 70'

Treatment Area at Well 75-MW-25A/B/C Monitoring Wells (Figure 7)

Up gradient: 75-MW-39, screened TBD, to be installed
Treatment zone: 75-MW-25B, screened 105'- 115'
Cross gradient: 75-MW-41, screened TBD, to be installed north of treatment zone
75-MW-42, screen TBD, to be installed south of treatment zone
Down gradient: 75-MW-40, screen TBD, to be installed

The following shall constitute the Monitoring and Reporting Program for the groundwater monitoring wells identified above. Tables 1a and 1b, below, identify the constituents that shall be analyzed for during the baseline sampling event prior to injection and subsequent groundwater monitoring events for the purpose of evaluating the effects of the injections. The locations of the monitoring wells are shown on Figures 3 through 7. These monitoring wells shall not be changed and any proposed changes of monitoring locations shall be identified and approved by the Regional Board Executive Officer (Executive Officer) prior to their use.

**TABLE 1a – Groundwater Monitoring Constituents for ISB Locations
 (HOT SPOTS NO. 1, 2, 3, AND TREATMENT AREA AT WELL 75-MW-25A/B/C)**

| <u>CONSTITUENT</u> | <u>UNITS</u> 1 | <u>TYPE OF SAMPLE</u> | <u>MINIMUM FREQUENCY OF ANALYSIS</u> |
|--|-------------------|-----------------------|---|
| Water Temperature ² | °C | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| Dissolved Oxygen ² | mg/L | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| pH ² | pH units | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| Oxidation-Reduction Potential ² | mV | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| Dissolved ethene, ethane, methane | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Volatile Organic Compounds (full suite) | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Chloride | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Sulfate | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Boron | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Total Dissolved Solids | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Perchlorate | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |

1) mg/L: milligrams per liter; µg/L: micrograms per liter; mV: millivolts; °C: degree Celsius.

2) Field instrument can be used to test for this constituent.

TABLE 1b – Groundwater Monitoring Constituents ISCO Location (Hot Spot No. 4)

| <u>CONSTITUENT</u> | <u>UNITS</u> ¹ | <u>TYPE OF SAMPLE</u> | <u>MINIMUM FREQUENCY OF ANALYSIS</u> |
|--|---------------------------|-----------------------|---|
| Water Temperature ² | °C | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| Dissolved Oxygen ² | mg/L | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| pH ² | pH units | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| Oxidation-Reduction Potential ² | mV | grab | Baseline, daily during injection, one month following injection, and quarterly thereafter |
| Volatile Organic Compounds (full suite) | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| 1,4-Dioxane | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Dissolved metals | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Hexavalent chromium | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Chloride | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Sulfate | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Boron | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Total Dissolved Solids | mg/L | grab | Baseline, one month following injection, and quarterly thereafter |
| Perchlorate | µg/L | grab | Baseline, one month following injection, and quarterly thereafter |

1) mg/L: milligrams per liter; µg/L: micrograms per liter; mV: millivolts; °C: degree Celsius.

2) Field instrument can be used to test for this constituent.

All groundwater monitoring reports must include, at minimum, the following:

1. Well identification, and date and time of sampling;
2. Sampler (method and person) identification, and laboratory identification;
3. Quarterly observation of groundwater levels, recorded to 0.01 feet mean sea level and groundwater flow direction.
4. Copies of field data forms.

IV. MONITORING FREQUENCIES

Specifications in this monitoring program are subject to periodic revisions. Monitoring requirements may be modified or revised by the Executive Officer based on review of monitoring data submitted pursuant to this Order. Monitoring frequencies may be adjusted to a less frequent basis or parameters and locations dropped by the Executive Officer if the Discharger makes a request and the request is backed by statistical trends of monitoring data submitted.

V. CERTIFICATION STATEMENT

Each report shall contain the following completed declaration:

"I certify under penalty of law that this document, including all attachments and supplemental information, was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment.

Executed on the _____ day of _____ at _____

_____ (Signature)

_____ (Title)"

VI. ELECTRONIC SUBMITTAL OF INFORMATION (ESI) TO GEOTRACKER

The Discharger shall comply with the Electronic Submittal of information (ESI) requirements by submitting all reports required under the MRP, including groundwater monitoring data, discharge location data, and pdf monitoring reports to the State Water Resources Control Board GeoTracker database under Global ID WDR100039631.

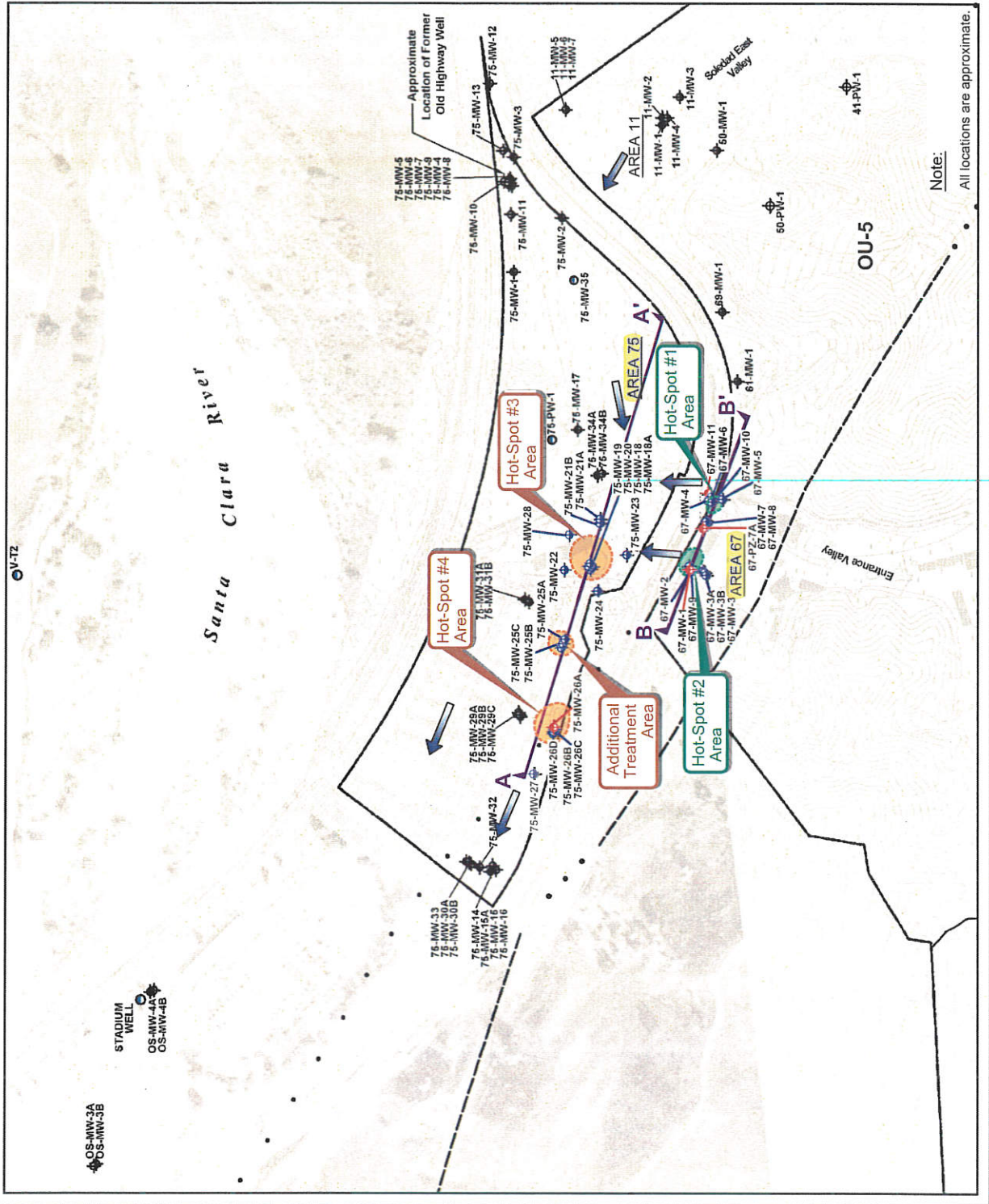
All records and reports submitted in compliance with this Order are public documents and will be made available for inspection during business hours at the office of the California Regional Water Quality Control Board, Los Angeles Region, upon request by interested parties. Only proprietary information, and only at the request of the Discharger, will be treated as confidential.

Ordered by:



for Deborah J. Smith
Executive Officer

Date: November 2, 2018

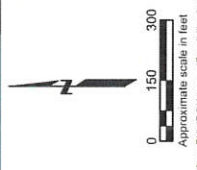


Explanation

- 67-MW-11 Alluvium monitoring well
- 75-MW-20 Saugus monitoring well
- Perched Zone monitoring well
- Alluvium production well
- Estimated hotspot area - perchlorate
- Estimated hotspot area - trichloroethene (TCE)

OU-5 Site Operable Unit
 General groundwater flow direction for Northern Alluvium Area
 Line of cross section

San Gabriel Fault Zone
 Fault dashed where approximate, dotted where concealed



Approximate scale in feet
 Basemap modified from ENVRON report "Feasibility Study, Operable Unit 7 - Groundwater", Figure 1-2 titled "Well Location Map Detail, Northern Alluvium", Contract Number: 09-1-1368R, dated January 19, 2011.

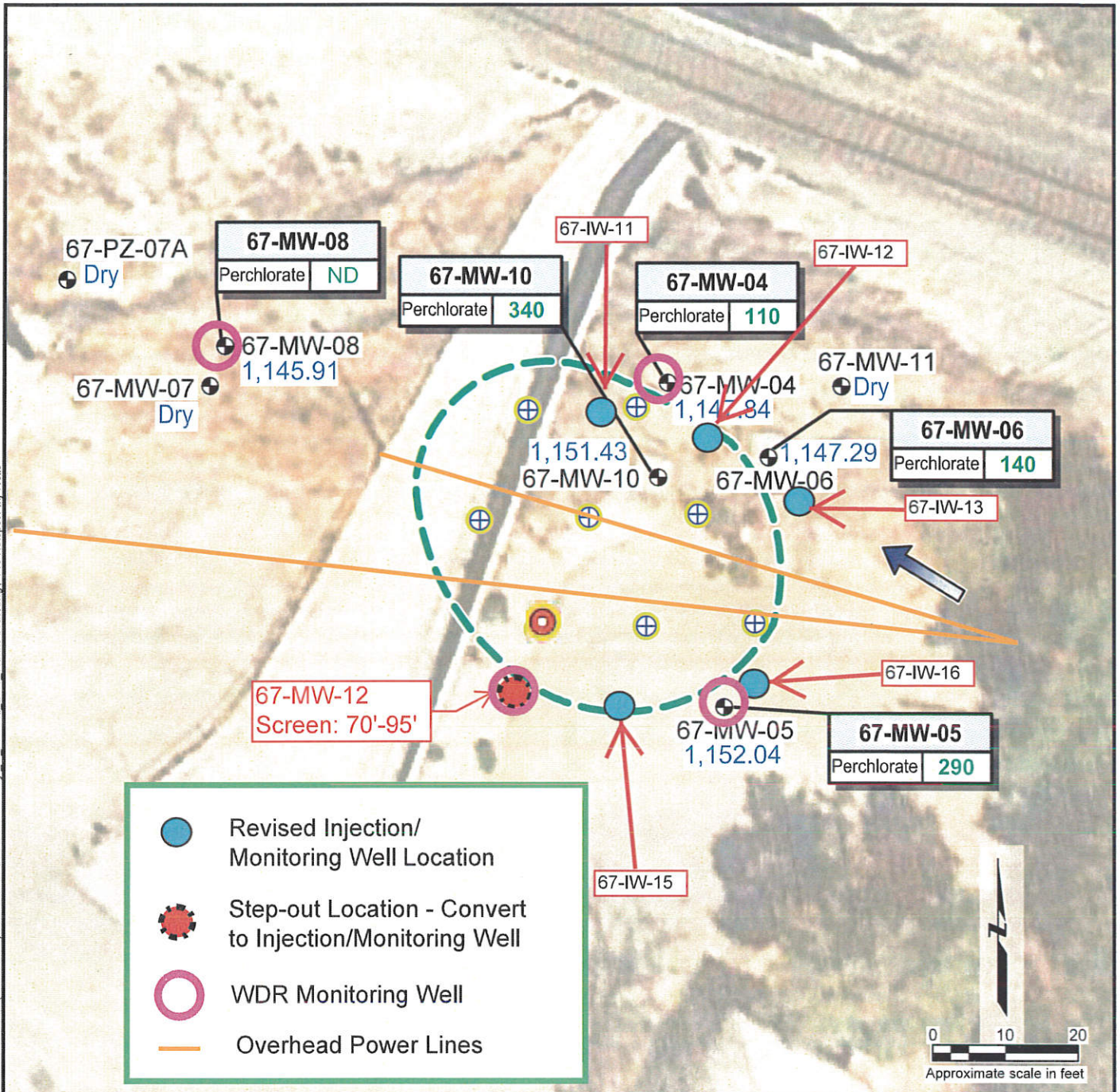
| | |
|---|----------------------|
| LOCATIONS OF TREATMENT AREAS Northern Alluvium Area Former Bermite Facility Santa Clara, California | |
| Date: 09/13/2017 | Project No. 99670000 |
| Submitted By: ys | Drawn By: jrw |
| Figure 1 | |

Note: All locations are approximate.

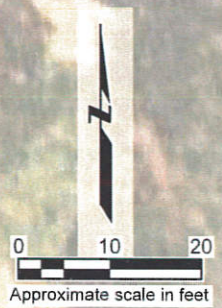


Locations of Treatment Areas, Former Bermite Facility - Figure 2

Plot Date: 9/20/2017 11:37:13 AM, Plotted by: janna.worker Drawing Path: W:\Projects\09967\000\0 (Whittaker B)\acsd\North Alluvium Pilot Study_1b_ProWell_Locs_TrimmAreas.dwg, Pro Hotspot 1 Inj Wells



| | |
|--|---|
| | Revised Injection/ Monitoring Well Location |
| | Step-out Location - Convert to Injection/Monitoring Well |
| | WDR Monitoring Well |
| | Overhead Power Lines |



Explanation

- Proposed injection well
 - Proposed step-out borehole
 - Existing monitoring well with groundwater elevation in feet above mean sea level (measured in Feb. 2017)
 -
 - Groundwater flow direction
- | Well Name | |
|-------------|------|
| Perchlorate | µg/L |
- - Estimated Hotspot boundary (Perchlorate)

Note: See Revised Well Locations

Note:

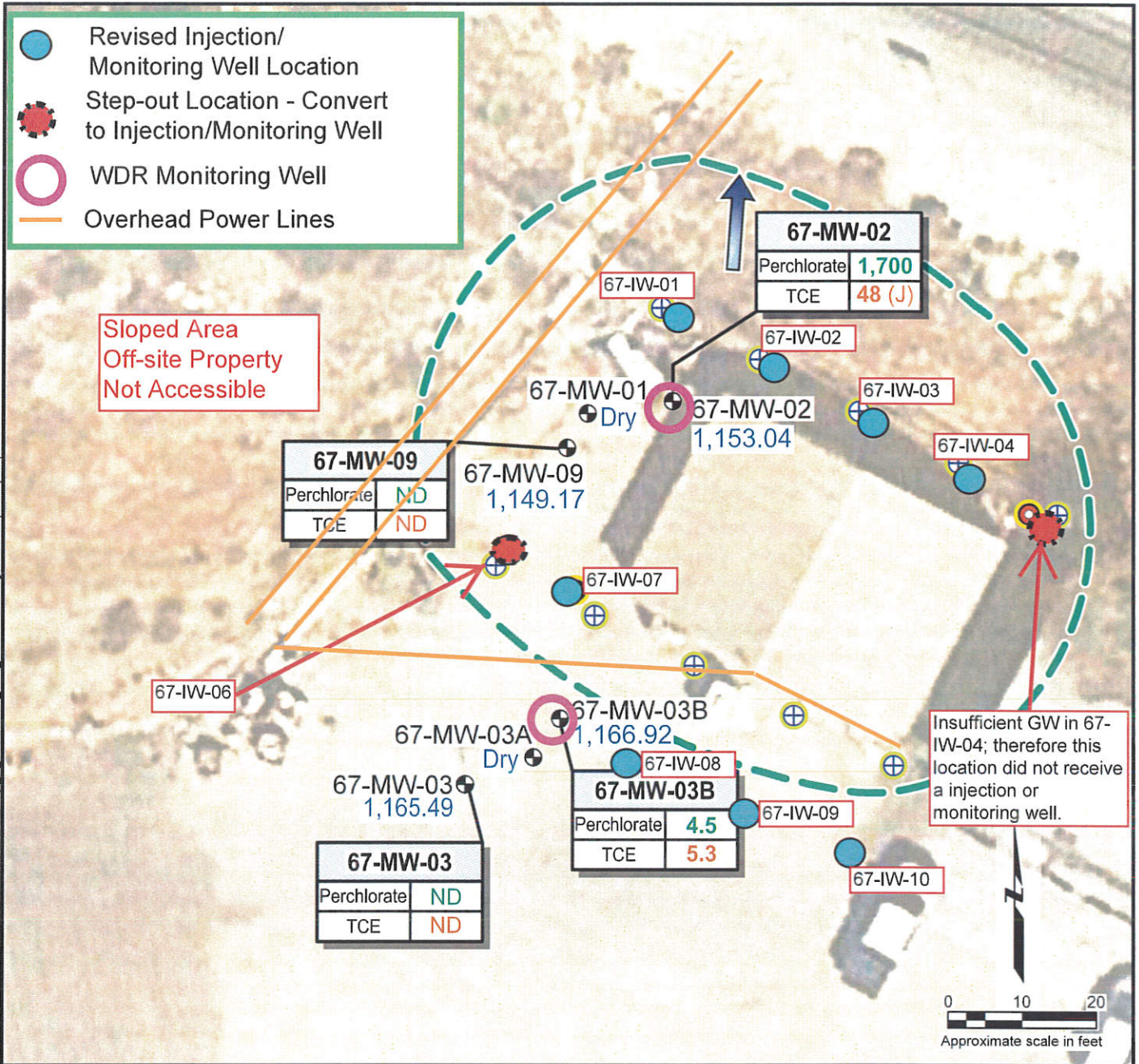
ND = not detected at or below laboratory reporting limits.

Modified by GSI on 10/10/18

Basemap modified from an aerial photo from Google™ earth Pro, dated 10-2-2016.

| | | |
|---|----------------------|--|
| <p>PROPOSED HOT-SPOT #1 STEP-OUT BOREHOLE AND INJECTION WELL LOCATIONS</p> <p>Northern Alluvium Area Former Bermite Facility Santa Clarita, California</p> | | |
| Date: 09/20/2017 | Project No. 99670000 | |
| Submitted By: ys | Drawn By: jrw | |

Plot Date: 12/22/2017 3:50:50 PM, Plotted by: joanna.worker Drawing Path: W:\Projects\00967_000_0 (Whittaker B)\acad\North Alluvium Pilot Study\1b_002-ProWell_Locs_TrimmAreas.dwg, Pro Hotspot2 Inj-Stepouts



Explanation

- ~~⊕~~ Proposed injection well Note: See Revised Well Locations
- ~~⊙~~ Proposed step-out borehole

67-MW-09 ⊕ Existing monitoring well with groundwater elevation in feet above mean sea level (measured in Feb. 2017)
1,149.17

← Groundwater flow direction

| Well Name | |
|-------------|------|
| Perchlorate | µg/L |
| TCE | µg/L |

Analytical results in groundwater in micrograms per liter (µg/L) for Perchlorate
Trichloroethene (TCE)


--- Estimated Hotspot boundary (Perchlorate)

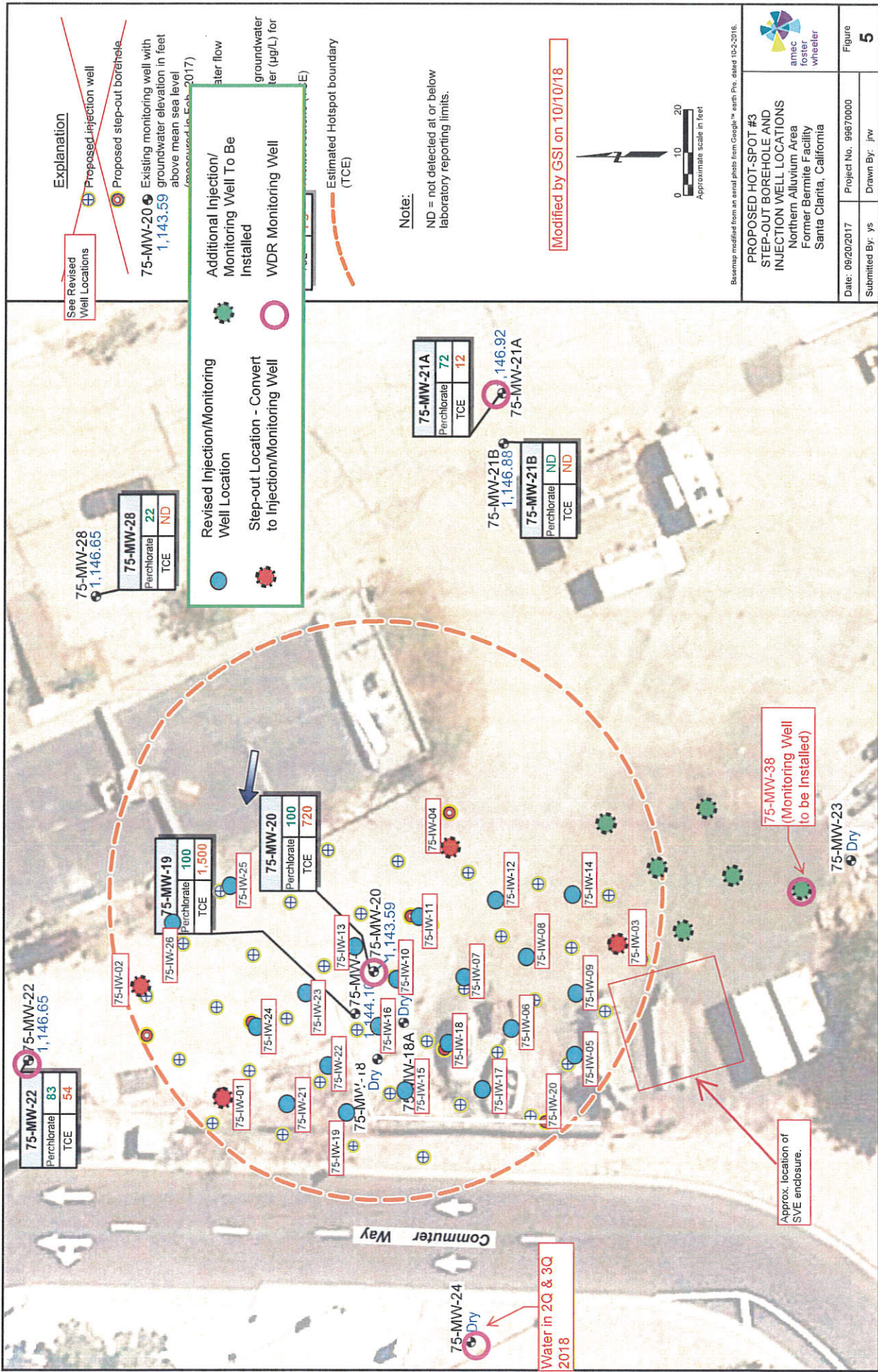
Notes:

1. ND = not detected at or below laboratory reporting limits.
2. J = estimated value.

Modified by GSI on 10/10/18

Basemap modified from an aerial photo from Google™ earth Pro, dated 10-2-2016.

| | | |
|---|----------------------|--|
| PROPOSED HOTSPOT #2 INJECTION WELL and STEP-OUT BOREHOLE LOCATIONS AND EXISTING MONITORING WELLS Northern Alluvium Area Former Bermite Facility Santa Clarita, California | |  amec foster wheeler |
| Date: 12/21/2017 | Project No. 99670000 | |
| Submitted By: ys | Drawn By: pah/jrw | |



See Revised Well Locations

Additional Injection Well To Be Installed

- Revised Injection/ Monitoring Well Location
- Step-out Location - Convert to Injection/ Monitoring Well
- WDR Monitoring Well

Explanation

- Proposed step-out borehole
- Monitoring well (Amec Foster Wheeler, 2016)
- Injection point (Amec Foster Wheeler, 2016)
- Monitoring well

1,163.17
Current groundwater elevation in feet above mean sea level (ft MSL)
General groundwater flow direction

| Well Name | GW Elev ft MSL | 1,4-diox PCE pg/L | 1,1-DCE TCE pg/L |
|-----------|----------------|-------------------|------------------|
| 75-MW-37A | 1,145.17 | 70 | 16,000 |
| 75-MW-37B | 1,151.35 | 410 | 22,000 |

Analytical results in groundwater in micrograms per liter (µg/L) With date of sample collection

GW Elev Groundwater elevation

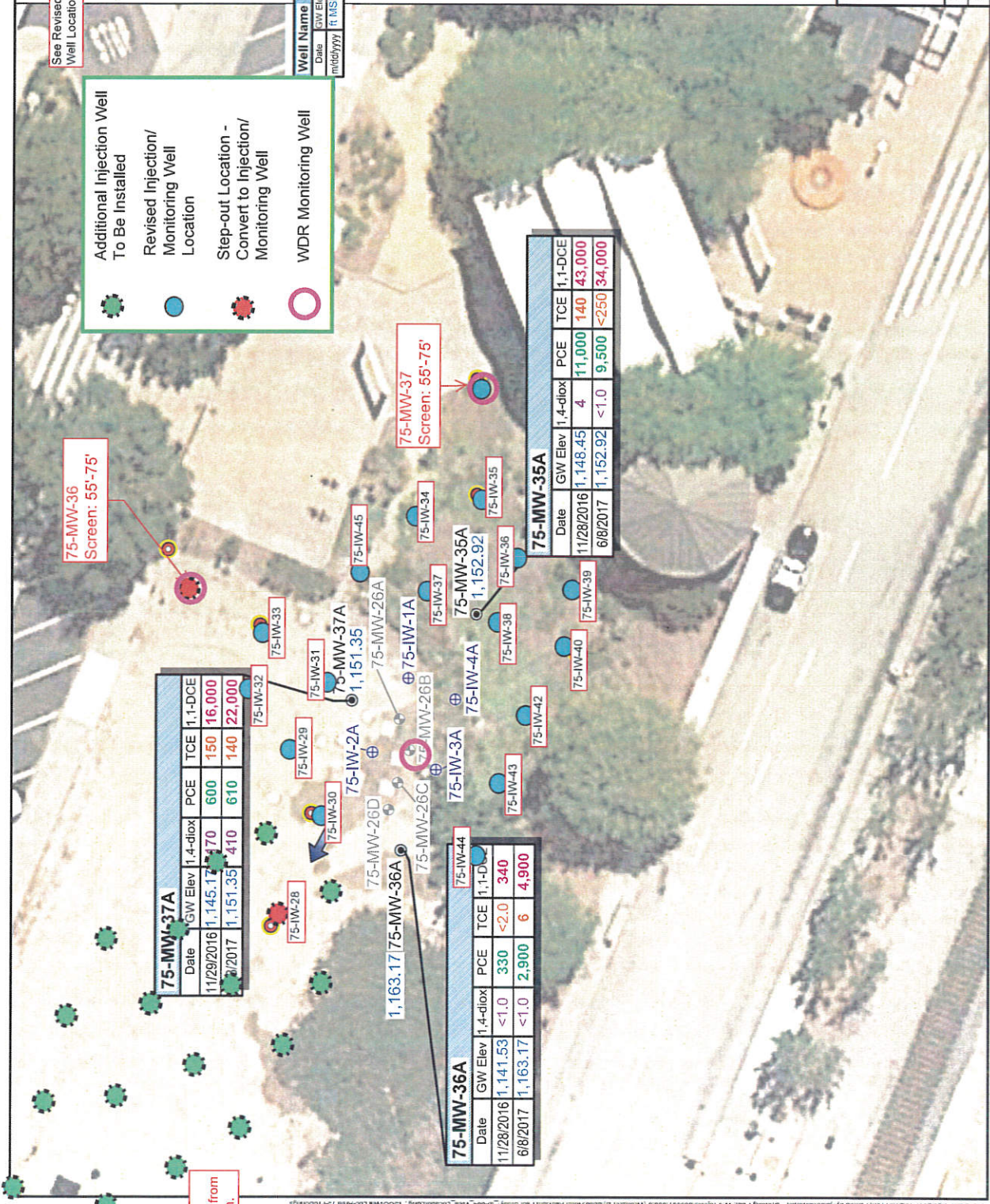
1,4-diox 1,4-dioxane

PCE Tetrachloroethene

TCE Trichloroethene

1,1-DCE 1,1-dichloroethene

<1.0 At or below laboratory detection limit shown



Notes:

- Current groundwater elevations gauged June 7 & 8 2017.
- All locations are approximate.

Modified by GSI on 10/10/18



Base map modified from an aerial photo from Google Earth Pro, dated 10-2-2016.

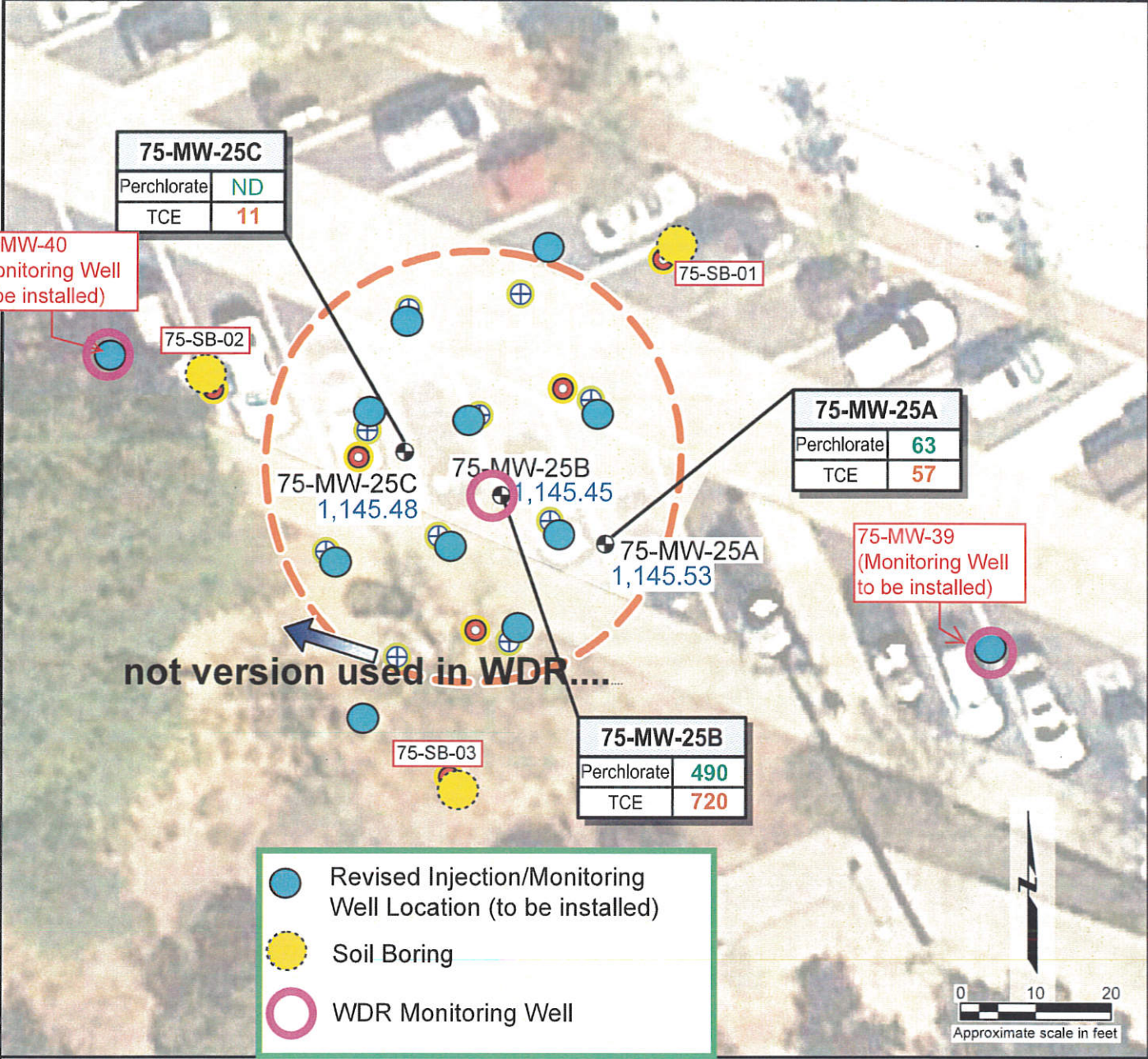
PROPOSED HOT-SPOT #4 STEP-OUT BOREHOLE AND INJECTION WELL LOCATIONS

Northern Alluvium Area
Former Bermitte Facility
Santa Clarita, California

| | | |
|------------------|----------------------|--------|
| Date: 09/20/2017 | Project No. 99670000 | Figure |
| Submitted By: ys | Drawn By: jrw | 6 |



Plot Date: 9/20/2017 11:47:35 AM, Plotted by: joanna.worker Drawing Path: W:\Projects\099670000\0 (Whittaker B)\Acad\North Alluvium Pilot Study\1b_ProWell_Locs_Trim\Areas.dwg, Pro Well Locs-Add TreatArea



Explanation

- ~~⊕~~ Proposed injection well
 - ~~⊗~~ Proposed step-out borehole
- Note: See Revised Well Locations

75-MW-25A ⊕ Existing monitoring well with groundwater elevation in feet above mean sea level (measured in Feb. 2017)
1,145.53

← Groundwater flow direction

| Well Name | |
|-------------|------|
| Perchlorate | µg/L |
| TCE | µg/L |

Analytical results in groundwater in micrograms per liter (µg/L) for Perchlorate
Trichloroethene (TCE)

--- Estimated Hotspot boundary (TCE)

Note:
ND = not detected at or below laboratory reporting limits.

Revised by GSI on 10/10/18

Basemap modified from an aerial photo from Google™ earth Pro, dated 10-2-2016.

PROPOSED ADDITIONAL TREATMENT AREA STEP-OUT BOREHOLE AND INJECTION WELL LOCATIONS
Northern Alluvium Area
Former Berrite Facility
Santa Clarita, California



| | | |
|------------------|----------------------|----------|
| Date: 09/20/2017 | Project No. 99670000 | Figure |
| Submitted By: ys | Drawn By: jrw | 7 |