CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
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MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Los Angeles Regional Water Quality Control Board

August 21, 2018

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

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
CLAIM NO. 7016 0750 0000 3359 7131

REVISED MONITORING AND REPORTING PROGRAM NO. CI-9986, FORMER BERMITE FACILITY, NORTHERN ALLUVIUM AREA OF OPERABLE UNIT 7, FULL–SCALE PERMEABLE REACTIVE ZONE IMPLEMENTATION, SAUGUS FORMATION – 22116 SOLEDAD CANYON ROAD, SANTA CLARITA, CALIFORNIA 91350 (FILE NO. 13-092, CI-9986, ORDER NO. R4-2014-0187, SERIES NO. 047, GLOBAL ID WDR100012924)

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 noted above. The Department of Toxic Substances Control (DTSC) is the lead regulatory agency for facility soil and groundwater assessment and remediation.

The Former Bermite facility (Facility), at 22116 Soledad Canyon Road in Santa Clarita, occupies approximately 996 acres. The proposed remediation will take place at the west end of the northern alluvium area of the Facility's Operable Unit 7 (Site). This corresponds to what is now the west end of the Santa Clarita Metrolink Station property. When operating as planned the remediation area will occupy approximately 0.75 acres, and include remediation of groundwater in alluvium and the underlying Saugus Formation (Saugus). However, the alluvium does not contain groundwater at this time. The Saugus portion of the remediation area (the subject of this revised Monitoring and Reporting Program) will occupy approximately 0.40 acres.

On October 14, 2013, Whittaker Corporation (hereinafter Discharger), was enrolled under Regional Board Order No. R4-2007-0014 authorizing the injection of emulsified vegetable oil (EVO) as part of an in situ reductive dichlorination pilot test, to provide data for evaluating the effectiveness of EVO to remediate perchlorate and volatile organic compounds (VOCs) in groundwater at the Site.

On October 23, 2015, enrollment under Regional Board Order No. R4-2007-0014 was terminated and the Discharger was enrolled under Regional Board Order No. R4-2014-0187 authorizing the injection of EVO and *Dehalococcoides* sp. (DHC), as part of a permeable reactive zone (PRZ) pilot study. The PRZ pilot study, conducted in 2015, demonstrated that perchlorate and VOCs in groundwater could be successfully remediated using the EVO and DHC PRZ.

On September 29, 2017, DTSC approved the September 8, 2017, *Final Permeable Reactive Zone Full-Scale Design Work Plan,* for implementation of a full-scale in situ reductive dichlorination PRZ in the Northern Alluvium Area of Operable Unit 7. The full-scale project will use EVO and DHC in the alluvium. In the Saugus, the full-scale project includes hydraulic fracturing, a brief test of the effectiveness of the fracturing, and, if the test results are favorable, injection of EVO and DHC. The increased hydraulic conductivity expected from the hydraulic fracturing, will be sustained with the addition of an inert silica-sand propant.

As described in the Work Plan, the full-scale PRZ will use two sets of collocated injection wells. One set (15 wells) will be screened in the alluvium and the other set (7 wells) will be screened in the Saugus. In the work area, alluvium injection wells will be screened from approximately 20 to 50 feet below ground surface (bgs), and Saugus injection wells will be screened from approximately 55 to 70 feet bgs. The wells will be spaced approximately 50 feet apart.

Recent groundwater depth data indicate that all Site wells screened in alluvium are dry. Therefore, injection into the alluvium will not be attempted now. The accompanying Revised Monitoring and Reporting Program (MRP) applies to Saugus wells only. In March 2018, groundwater in the Saugus occurred approximately 60 feet below grade and flowed to the northwest. The PRZ will be oriented perpendicular to groundwater flow. With the expected 25-foot radius of influence, the full-scale, Saugus PRZ will be approximately 180 feet long, 90 feet wide, and 20 feet thick.

At each of the seven Saugus wells hydraulic fracturing will be used to enhance Saugus horizontal permeability. At each well the screened interval from 55 to 70 feet bgs will receive approximately 3,000 gallons of silica-sand propant slurry. The slurry will consist of a suspension of silica-sand and polysaccharide in water, mixed with a solution of sodium hydroxide and boric acid (< 5 liters total of 30% boric acid salt in water, by weight), and a solution of potassium carbonate and sodium hydroxide in methanol.

After fracturing the first Saugus well, a permeability test will be performed to evaluate the effectiveness of the fracturing. The test will consist of injecting approximately 3,000 gallons of dyed (200 µg/L fluorescein dye) potable water into the well, while monitoring groundwater for the dye in other existing wells. Injection pressure during the test will be maintained below 30 pounds per square inch (psi). The test is expected to last no more than 1 day.

If the results of the permeability enhancement test confirm the expected permeability improvement, the six remaining Saugus locations will be drilled and fractured, and wells installed. After Saugus fracturing, approximately 3,100 gallons of 4% EVO suspension by volume, and approximately 1.3 to 2.6 gallons of DHC culture (Shaw's SDC-9, or SiREM's KB-1), followed by 100 gallons of anoxic water will be injected at each Saugus well.

Active injection for hydraulic fracturing is expected to take 10 to 14 days for all seven wells. This excludes a 6-day pause in fracturing during the permeability enhancement test and related activities. During fracturing, injection rates and pressures are expected to remain below 20 gallons per minute (gpm) and 200 psi. Injection of the EVO and DHC is expected to take 2 to 3 days, with injection rates and pressures remaining below 5 gpm and 35 psi. Multiple (10 or fewer) EVO and DHC injection events may be required. The maximum total injection volume for 10 EVO and DHC injection events is expected to be less than 12,000 gallons.

A groundwater monitoring program will be implemented to detect and evaluate impacts associated with the PRZ activities. In addition to using existing downgradient Saugus well 75-MW-30B for groundwater monitoring, two downgradient wells, one treatment-zone well, and two upgradient wells will be installed. The well locations, groundwater sampling and reporting frequencies, and analytical requirements are provided in the revised Monitoring and Reporting Program (MRP) No. CI-9986 (attached).

Regional Board staff has completed review of your September 6, 2017, *Amendment to Existing Waste Discharge Requirements (WDR) Permit*, and supplemental information provided following telephone conversations and email correspondence, and have determined that the proposed discharge meets the conditions specified in General WDR Order No. R4-2014-0187.

You shall implement revised MRP No. CI-9986 (attached) with a maximum combined discharge (injection) volume of 20,000 gallons. Should changes to the discharge be needed, revised engineering calculations and drawings, showing the changes, must be filed with the Regional Board a minimum of 30 days prior to the planned implementation date of the changes. The Discharger must receive approval from the Regional Board for such changes prior to implementation.

Enclosed is your revised Monitoring and Reporting Program No. CI-9986. The proposed discharge shall not cause the mineral constituents of the receiving groundwater at the compliance point, downgradient outside the application area, in excess of applicable limits (Bouquet and San Francisquito Basin of the Eastern Santa Clara Groundwater Basin) given in Attachment B of General WDRs Order No. R4-2014-0187. The applicable limits (groundwater quality objectives) are 700 milligrams per liter (mg/L) total dissolved solids, 250 mg/L sulfate, 100 mg/L chloride, and 1.0 mg/L boron.

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 WDR100026593.

Please see Electronic Submittal for GeoTracker Users, dated December 12, 2011 at:
http://www.waterboards.ca.gov/losangeles/resources/Paperless/Paperless%20Office%20for%20GT%20Users.pdf

To avoid paying future annual fees, please submit a written request for termination of your enrollment under the general permit in a separate letter, when your project has been completed and the permit is no longer needed. Be aware that the annual fee covers the fiscal year billing period beginning July 1 and ending June 30, the following year. You will pay the full annual fee if your request for termination is made after the beginning of the new fiscal year beginning July 1.

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

Sincerely,

Deborah J. Smith
Executive Officer

Attachment: Monitoring and Reporting Program No. CI-9986

cc: Mr. Jose Diaz, Department of Toxic Substances Control, Chatsworth
Ms. S. Sible Tekce, CDM Smith
Mr. Zoom Nguyen, CDM Smith

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

REVISED MONITORING AND REPORTING PROGRAM NO. CI-9986
FOR NORTHERN ALLUVIUM AREA OF OPERABLE UNIT 7
FORMER BERMITE FACILITY
22116 SOLEDAD CANYON ROAD
SANTA CLARITA, CA

ENROLLMENT UNDER REGIONAL BOARD
ORDER NO. R4-2014-0187 (SERIES NO. 047)
FILE NO. 13-092

I. REPORTING REQUIREMENTS

A. Whittaker Corporation (hereinafter Discharger) shall implement this revised Monitoring and Reporting Program (MRP) in the Saugus Formation (Saugus) of the Northern Alluvium Area of Operable Unit 7, at 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 (**August 21, 2018**) under Regional Board Order No. R4-2014-0187. The first monitoring report under this monitoring program is due by October 30, 2018.

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

Reporting Period	Report Due
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 hydraulic fracturing fluids, emulsified vegetable oil substrate (EVO) or *Dehalococcoides* sp. (DHC) during any reporting period, the report shall so state.

C. By January 31st of each year, beginning January 30, 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, or planned, 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 (WDRs). 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 Order No. R4-2014-0187 "*Monitoring and Reporting Requirements*" in addition to the aforementioned requirements.

II. PERMEABLE REACTIVE ZONE (PRZ) MONITORING REQUIREMENTS

The quarterly reports shall contain the following information regarding the PRZ activities:

1. Location map showing injection and and monitoring well locations

2. Written summary including:

   - For each location, the fracture fluid Injection interval, and monitoring well construction (material, casing length, screen length, etc)
   - Volume of fracturing fluid, EVO, and DHC injected at each location, and the associated flowrates and pressures
   - Photographs of injection and monitoring areas during and immediately following injection
   - Description of any daylighting of injected materials, and steps taken to control and prevent daylighting

3 During injection, daily visual inspections at the injection equipment and each injection point shall be conducted. The quarterly report shall include a summary of the visual inspections.

III. GROUNDWATER MONITORING PROGRAM

A groundwater monitoring program shall be designed to detect and evaluate impacts associated with the PRZ activities. The monitoring program shall assess: (i) performance of the PRZ by sampling monitoring wells located within the anticipated pilot study area of influence and (ii) potential downgradient impacts associated with the PRZ activities by sampling downgradient performance monitoring wells. Given these monitoring objectives, the following groundwater wells, shown on Figure 2, shall be included in the monitoring program:

Upgradient monitoring wells:	Two wells to be installed in the Saugus
Treatment zone well:	One well to be installed in the Saugus
Downgradient monitoring wells:	Existing well 75-MW-30B, and two wells to be installed in the Saugus

The following shall constitute the Monitoring and Reporting Program for groundwater monitoring wells identified above. Table 1, below, identifies the constituents that shall be analyzed during the baseline sampling event prior to injection of fracture fluids, EVO, or DHC, and subsequent groundwater monitoring events during the monitoring period for the purpose of evaluating the effectiveness of the injections. The locations of the monitoring wells are shown on Figure 2. These sampling stations shall not be changed and any proposed change of monitoring locations shall be identified and approved by the Regional Board Executive Officer (Executive Officer) prior to their use.

TABLE 1 – GROUNDWATER MONITORING CONSTITUENTS

CONSTITUENT	UNITS [1]	TYPE OF SAMPLE	MINIMUM FREQUENCY OF ANALYSIS
Water Temperature[2]	°C	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Specific Conductance[2]	µS/cm	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Dissolved Oxygen[2]	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
pH[2]	pH units	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Oxidation-Reduction Potential[2]	mV	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Volatile Organic Compounds	µg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Perchlorate	µg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Chloride	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Nitrate	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter

Sulfate	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Dissolved Gases (ethene, ethane, methane)	µg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Sulfide	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Total Organic Carbon	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Alkalinity	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Total Dissolved Solids	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Boron	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Ferrous Iron	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter
Dehalococcoides species	mg/L	Grab	Baseline, weekly for 4 weeks following initial fracture fluid injection, monthly for 2 months thereafter, and quarterly thereafter

[1] mg/L: milligrams per liter; µg/L: micrograms per liter; µS/cm: microsiemens per centimeter; mV: milivolts; °C: degree Celsius.
[2] Field instruments may be used to test for this constituent.

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

a. Well identification, date, and time of sampling;
b. Sampler identification, and laboratory identification;
c. Quarterly observation of groundwater levels, recorded to 0.01 feet mean sea level and groundwater flow direction.

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 reduced or parameters and locations dropped by the Executive Officer at the Discharger's request and if the request is backed by submitted statistical monitoring data trends.

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 WDR100026593.

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: _____

Deborah J. Smith
Executive Officer

Date: August 21, 2018


Legend
Operable Unit Boundary
PRZ Area
Newhall Ranch Road
Valencia Boulevard
Bouquet Canyon Road
Cinema Drive
Magic Mountain Parkway
Soledad Canyon Road
PRZ Area
Golden Triangle Road
Hope Canyon Road
Bermite Road
Former Bermite Facility
N
1,000
0
1,000
Feet
Former Bermite Facility
Full-Scale ISRD PRZ Design
Site Vicinity Map
CDM Smith
Figure 1

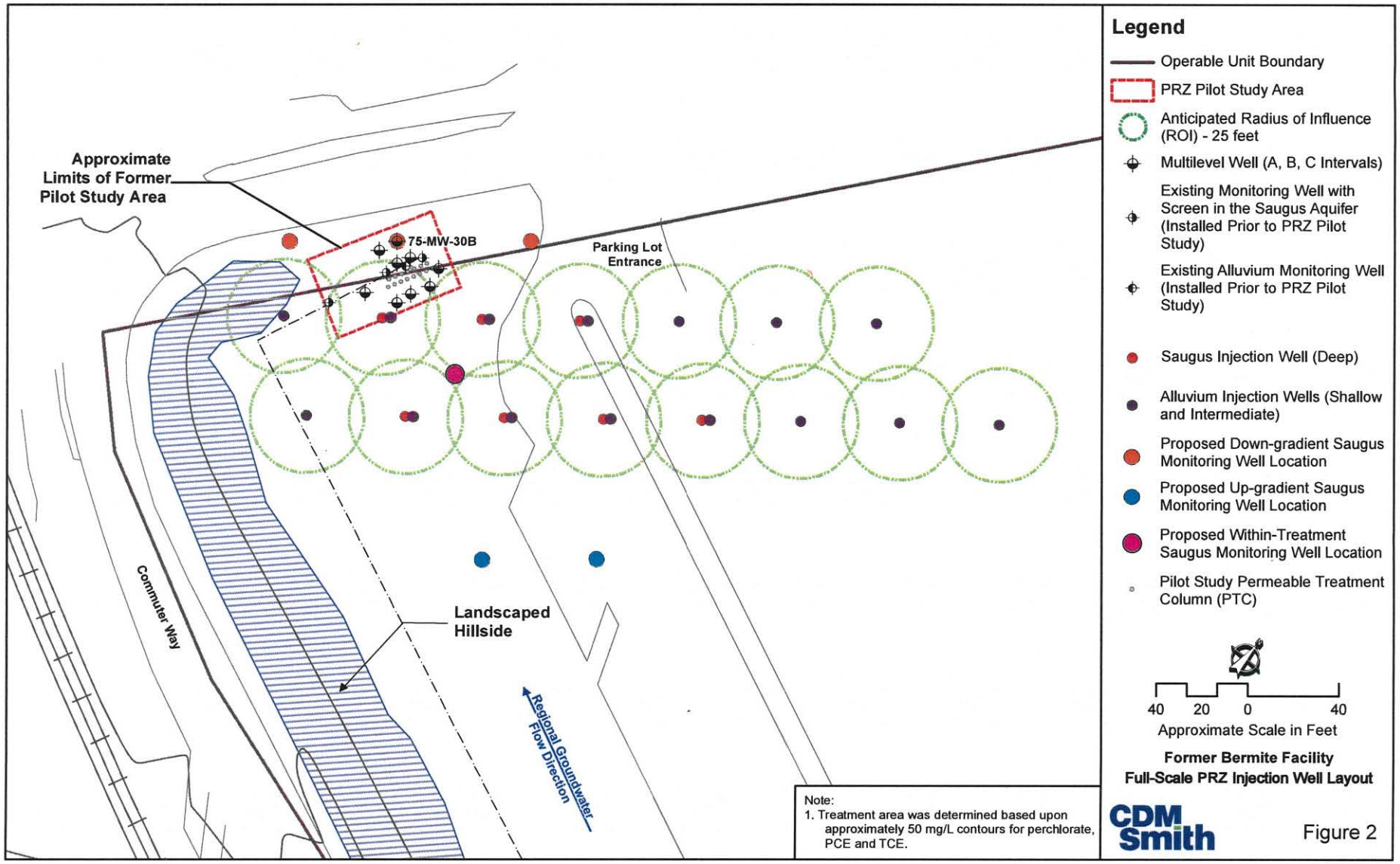
Approximate Limits of Former Pilot Study Area
75-MW-30B
Parking Lot Entrance
Commuter Way
Landscaped Hillside
Regional Groundwater Flow Direction
Note:
1. Treatment area was determined based upon approximately 50 mg/L contours for perchlorate, PCE and TCE.
Legend
Operable Unit Boundary
PRZ Pilot Study Area
Anticipated Radius of Influence (ROI) - 25 feet
Multilevel Well (A, B, C Intervals)
Existing Monitoring Well with Screen in the Saugus Aquifer (Installed Prior to PRZ Pilot Study)
Existing Alluvium Monitoring Well (Installed Prior to PRZ Pilot Study)
Saugus Injection Well (Deep)
Alluvium Injection Wells (Shallow and Intermediate)
Proposed Down-gradient Saugus Monitoring Well Location
Proposed Up-gradient Saugus Monitoring Well Location
Proposed Within-Treatment Saugus Monitoring Well Location
Pilot Study Permeable Treatment Column (PTC)
40 20 0 40
Approximate Scale in Feet
Former Bermite Facility
Full-Scale PRZ Injection Well Layout
CDM Smith

Figure 2