
Central Valley Regional Water Quality Control Board

April 14, 2015

Mr. Kevin Garon, Senior Project Director
The Chemours Company FC, LLC
6342 Fairview Road, Suite 200
Charlotte, North Carolina 28210

NOTICE OF APPLICABILITY OF GENERAL ORDER NO. R5-2008-0149, PLUME 3 IN-SITU REMEDIATION – CHEMOURS OAKLEY SITE, 6000 BRIDGEHEAD ROAD, OAKLEY, CONTRA COSTA COUNTY

The Chemours Company FC, LLC (Discharger), formerly under the name E.I. du Pont de Nemours and Company (DuPont), submitted a completed Notice of Intent, dated November 11, 2014, requesting coverage under General Order No. R5-2008-0149, General Waste Discharge Requirements for In-situ Groundwater Remediation at Sites with Volatile Organic Compounds, Nitrogen Compounds, Perchlorate, Pesticides, Semi-Volatile Compounds and/or Petroleum Compounds. Based on information in your submittal, it is our determination that this project meets the required conditions to be approved under Order No. 2008-0149. All of the requirements contained in the general order are applicable to your project. You are assigned Order No. R5-2008-0149-057.

Project Location:

The project is in Contra Costa County, Township 2N, Range 2E, Section 15, Mount Diablo Baseline & Meridian. Assessor's Parcels No. 037-020-010 and No. 037-020-022; Latitude 38°00'41" N, Longitude 121°44'29".

Project Description:

The project, formerly referred to as the DuPont Oakley Site, was owned and operated by DuPont. DuPont is transitioning its performance chemicals business into a separate company in two steps. In the first stage (effective February 1, 2015), DuPont's performance chemical business will be renamed The Chemours Company FC, LLC (Chemours), but it will remain a wholly-owned DuPont subsidiary. In the second stage of the transition, planned for July 1, 2015, Chemours will become and begin operating as an independent entity with no ties to DuPont. Because the activities covered by this Notice of Applicability will be conducted by Chemours, the project will be referred to as the Chemours Oakley Site.

Historical operations at the Chemours Oakley Site titanium dioxide manufacturing area caused pollution of the soil and groundwater in what is referred to as Plume 3. The primary pollutants of concern in Plume 3 are tetrachloroethene (PCE), PCE daughter products (trichloroethene, cis-

1,2-dichloroethene, and vinyl chloride), and arsenic. The site cleanup is being overseen by the Department of Toxic Substances Control (DTSC).

In November 2013, DuPont conducted a field pilot test to evaluate the effectiveness of enhanced in-situ bioremediation with bioaugmentation in treating PCE and its daughter products in Plume 3 under a Revised Notice of Applicability R5-2008-0149-020. The pilot test included adding emulsified vegetable oil, pH buffer, and sodium lactate mixed with site groundwater into two excavations that extended into shallow groundwater at the site. Groundwater monitoring associated with the pilot test is ongoing under Revised Monitoring and Reporting Program Order No. R5-2008-0149-020.

The Plume 3 Pilot Test was conducted at the location of two soil excavations that extended to the site Surficial Aquifer. The Surficial Aquifer is unconfined, composed of fine-grained sand typically from 5 to 20 feet thick and is present at the ground surface in the primary former manufacturing areas. Underlying the Surficial Aquifer is an aquitard consisting of finer grained units generally 10 to 20 feet thick across most of the site. The Upper Aquifer, which underlies the aquitard, is typically composed of sand, silty sand, and gravelly sands ranging from 15 to 30 feet thick.

Chemours is proposing to conduct full-scale in-situ remediation of the Plume 3 Upper Aquifer. The full-scale applications will include the same amendments that were used in the pilot test including emulsified vegetable oil as a slow-release source of organic carbon and molecular hydrogen for anaerobic reductive de-chlorination, and sodium lactate to condition the aquifer by rapidly reducing the native electron acceptors in the treatment zone prior to the slow degradation of the vegetable oil. Chemours will also inject pH buffer to maintain neutral pH conditions and a bioaugmentation culture that will consist of an anaerobic microbial population which includes *Dehalococcoides Ethenogenes* that can completely de-chlorinate PCE and its daughter products. It is estimated that the injected materials will last 3 to 4 years after which at least one additional injection event would need to be conducted to maintain anaerobic conditions to complete the treatment objectives.

To implement the in-situ remediation in the Plume 3 Upper Aquifer, Chemours will install injection wells to target the high concentration areas as shown on Figure 4-1, attached as part of the Monitoring and Reporting Program. Injection wells include 28 pairs of vertical wells with screens extending from approximately 20 to 30 feet and 35 to 45 feet below ground surface for each well pair. One pair of horizontal wells will also be installed in Treatment Area A with screens constructed at depths of approximately 28 and 41 feet. Both horizontal well screens will extend approximately 440 feet in length. A number of new and existing monitoring wells will be used for monitoring the implementation. The injection process will consist of extraction of groundwater from other vertical wells or the other horizontal well, amendment in line with the substrates, and reinjection into the targeted vertical well or horizontal well.

Overall, the total substrate volumes during an Upper Aquifer injection event include up to 350,000 gallons of extracted makeup groundwater, 37,000 gallons of Newmans Zone® Emulsified Vegetable Oil (which includes sodium lactate), 13,000 gallons of Neutral Zone® pH Buffer, and 38,000 gallons of recirculation water. Once anaerobic conditions are established, DuPont will add up to 105 liters of bioaugmentation culture mixed with up to 31,000 liters of extracted groundwater and 5,000 liters of recirculation water.

No new injections are planned for the Plume 3 Pilot Test areas in the Surficial Aquifer. However, full-scale in-situ remediation of the Surficial Aquifer using new injection wells is anticipated in the

future. At this time, the design is conceptual and has not been reviewed or approved by DTSC. The intended implementation of the full-scale Plume 3 Surficial Aquifer remedy will encompass the pilot test area as well as the monitoring wells used for the pilot test performance monitoring. Injection wells will be used in the same way as planned for the Upper Aquifer to inject the same substrates. An additional type of substrate, sweet dairy whey, may also be added to more quickly stimulate biodegradation in the Surficial Aquifer, if it is approved by DTSC and the Water Board. Sweet dairy whey is a food-grade product that consists primarily of milk sugar (lactose), milk protein, and a small amount of milk fat. The volumes injected in the Surficial Aquifer will also differ from those in the Upper Aquifer because of the different conditions of the Surficial Aquifer. A conceptual layout including injection and monitoring wells in the Monitoring and Reporting Program is included on the attached Figure 3-1. Since the full-scale injections in the Surficial Aquifer will be substantially similar to the proposed injections in the Upper Aquifer and encompass the Pilot Test area covered under NOA R5-2008-0149-020, this NOA is intended to cover the current proposed Upper Aquifer injection plan and future Surficial Aquifer injections. R5-2008-0149-020 will also be rescinded, and the ongoing monitoring associated with the previous completed injections will be included in the Monitoring and Reporting Program associated with this NOA.

The Discharger circulated a fact sheet describing the project. No comments were received in the 30-day comment period. The Discharger will be conducting sampling and reporting the results as described in the attached Monitoring and Reporting Program.

General Information:

1. The project will be operated in accordance with the requirements contained in the General Order and in accordance with the information submitted in the completed Notice of Intent.
2. The required annual fee (as specified in the annual billing you will receive from the State Water Resources Control Board) shall be submitted until this Notice of Applicability is officially revoked.
3. Placement of materials other than previously extracted groundwater, emulsified vegetable oil, sodium lactate, whey (if approved), pH buffer, and bioaugmentation cultures into the subsurface is prohibited.
4. Failure to abide by the conditions of the General Order could result in an enforcement action as authorized by provisions of the California Water Code.
5. The Discharger shall comply with the attached revised Monitoring and Reporting Program, Order No. R5-2008-0149-057, and any revisions thereto as ordered by the Executive Officer.

If you have any questions regarding this matter, please call Nathan Casebeer at (916) 464-4665.

ORIGINAL SIGNED BY DUNCAN AUSTIN FOR

PAMELA C. CREEDON
Executive Officer

Attachment

cc: Ms. Della Kramer, Regional Water Quality Control Board, Rancho Cordova
Ms. Carolyn Tatoian-Cain, Department of Toxic Substances Control, Sacramento
Ms. Linda McGlochlin Wolff, Parsons, Walnut Creek
Mr. Bob Deaver, The Chemours Company FC, LLC, Oakley

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008-0149-057

FOR
IN-SITU GROUNDWATER REMEDIATION AT SITES WITH VOLATILE ORGANIC
COMPOUNDS, NITROGEN COMPOUNDS, PERCHLORATE, PESTICIDES,
SEMI-VOLATILE COMPOUNDS AND/OR PETROLEUM HYDROCARBONS

PLUME 3 IN-SITU REMEDIATION
CHEMOURS OAKLEY SITE
6000 BRIDGEHEAD ROAD
OAKLEY, CONTRA COSTA COUNTY

This Monitoring and Reporting Program (MRP) describes requirements for monitoring in-situ groundwater remediation. This MRP is issued pursuant to Water Code Section 13267. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. As appropriate, California Regional Water Quality Control Board, Central Valley Region staff shall approve specific sample station locations prior to implementation of sampling activities.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each sample shall be recorded on the sample chain of custody form.

GROUNDWATER MONITORING

Monitoring wells associated with the in-situ remediation are shown on Figures 3-1 (Surficial Aquifer) and 4-1 (Upper Aquifer) and listed in Table 1 below. The groundwater monitoring program for these wells and any treatment system wells installed subsequent to the issuance of this MRP, shall follow the schedule below. Sample collection and analysis shall follow standard EPA protocol.

The monitor wells shall be sampled according to the schedule in Table 1 and the samples analyzed by the methods in Table 2, as follows:

Table 1: Sampling Frequency

Upper Aquifer		
Well Number ¹	Frequency ^{2,3}	Monitoring Objective
P3MNA-02,-03	Quarterly for one year then annually thereafter	Compliance ⁴
P3EISB-01,-02,-03,-04,-05,-06,-07,-08,-09	Quarterly for one year then annually thereafter	Treatment Zone ⁵
P3MNA-01	Quarterly for one year then annually thereafter	Transition Zone ⁶
MW-104	Quarterly for one year then annually thereafter	Background ⁷
Surficial Aquifer		
Well Number ¹	Frequency ^{2,3}	Monitoring Objective
PS3-MW-02 ⁸ , LF-33	Quarterly for one year then annually thereafter	Compliance ⁴
LF-34R ⁸ , TMW-SG-38, TMW-SG-46	Quarterly for one year then annually thereafter	Treatment Zone ⁵
TMW-SG-42 ⁸ , TMW-SG-43R	Quarterly for one year then annually thereafter	Transition Zone ⁶
TMW-SG-35 ⁸ , TMW-SG-45 ⁸	Quarterly for one year then annually thereafter	Background ⁷

¹ Well numbers as shown on Figure 4-1 (Upper Aquifer) and Figure 3-1 (Surficial Aquifer).

² i.e., weekly, monthly, quarterly, annually, other.

³ Constituent suite components listed in Table 2.

⁴ Wells used to determine compliance with water groundwater limitations. Monitoring more frequently may be requested depending on results in treatment and transition zone wells. While location P3MNA-03 is relatively close to the treatment area and, as such, may be effected by geochemical changes related to the injected substrate, it will not be impacted by injected substrates.

⁵ Wells sampled to evaluate in-situ bioremediation progress inside the treatment zone.

⁶ Wells sampled to evaluate migration of pollutants within the treatment zone.

⁷ Wells used to develop background concentrations.

⁸ Wells will be monitored annually because they have already been sampled quarterly for one year during a pilot study, or because quarterly sampling is not necessary.

Table 2: Analytical Methods

Constituent	Method ¹	Maximum Practical Quantitation Limit (µg/L) ²
Volatile Organic Compounds	EPA 8260B	0.5
Methane, Ethane, Ethene	RSK-175	0.1
Chloride, Sulfate	EPA 300.1	200
Metals ³	EPA 6010	10
Dissolved Organic Carbon	EPA 9060M	300
Ferrous Iron	Hach Method 8146	100
Sulfide	Hach Method 8131	30

Constituent	Method ¹	Maximum Practical Quantitation Limit (µg/L) ²
Carbon Dioxide	Hach Method 8205	10,000
Alkalinity	Hach Method 8203	10,000
Total Dissolved Solids	EPA 160.1	10,000

¹ Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

² All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as an estimated value.

³ Dissolved metals include arsenic, lead, iron, and manganese.

⁴ SOP = standard operating procedure.

FIELD SAMPLING

In addition to the above sampling and analysis, field sampling and analysis shall be conducted each time a monitoring well is sampled. The sampling and analysis of field parameters shall be as specified in Table 3.

Table 3: Field Sampling Requirements

Parameters	Units	Type of Sample
Groundwater Elevation	Feet, Mean Sea Level	Measurement
Oxidation-Reduction Potential	Millivolts	Grab
Electrical Conductivity	µmhos /cm	Grab
Dissolved Oxygen	mg/L	Grab
pH	pH Units (to 0.1 units)	Grab
Temperature	Degrees Celsius	Grab
Turbidity	Nephelometric Turbidity Units	Grab

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in item (b) of the "Reporting" section of this MRP.

DISCHARGE MONITORING

The Discharger shall monitor daily during injection events the discharge of water and amendments that are injected into the groundwater according to the requirements specified in Table 4. Each amendment addition shall be recorded individually, along with information regarding the time period over which the amendment was injected into the aquifer.

Table 4: Discharge Monitoring Requirements

Parameters	Units	Type of Sample
Injected Volume	gallons per day	Meter or Measured
Amendment(s) Added	kilograms per day	Measured

AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the constituents listed in Table 5. The analysis should be done on the pure amendment and/or on a mixture of the amendment(s) and deionized water at the estimated concentration that would be injected during the remediation project.

Table 5: Amendment Analytical Requirements

Constituent	Method ¹	Maximum Practical Quantitation Limit (ug/L) ²
Volatile Organic Compounds	EPA 8020 or 8260B	0.5
General Minerals ³	Various	Various
Metals, Total and Dissolved ⁴	EPA 200.7, 200.8	Various
Total Dissolved Solids	EPA 160.1	10,000
pH	meter	NA
Electrical Conductivity	meter	NA

¹ Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

² All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported, and reported as an estimated value.

³ Alkalinity, bicarbonate, potassium, chloride, sulfate, total hardness, nitrate, nitrite, ammonia.

⁴ Metals include arsenic, barium, cadmium, calcium, total chromium, copper, iron, lead, manganese, magnesium, mercury, molybdenum, nickel, selenium and silica.

ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

The Discharger shall develop background values for concentrations of dissolved iron, dissolved manganese, total dissolved solids and electrical conductivity in groundwater using historic site data and following the procedures found in CCR Section 20415(e) (10). The Discharger shall collect baseline concentrations of Table 2 and Table 3 constituents from Table 1 Upper Aquifer monitoring wells prior to the start of the Upper Aquifer injection.

REPORTING

When reporting the data, the Discharger shall arrange the information in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. In addition, the Discharger shall notify the Regional Board within 48 hours of any unscheduled shutdown of any soil vapor and/or groundwater extraction system. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Regional Board.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

The Discharger shall submit quarterly electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The quarterly reports shall be submitted electronically over the internet to the Geotracker database system by the 1st day of the second month following the end of each calendar quarter by **1 February, 1 May, 1 August, and 1 November** until such time as the Executive Officer determines that the reports are no longer necessary.

Each quarterly or semi-annual report shall include the following minimum information:

- (a) a description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants and groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated;
- (b) field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, etc.;
- (c) groundwater contour maps for all groundwater zones, if applicable;
- (d) pollutant concentration maps for all groundwater zones, if applicable;

- (e) a table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom;
- (f) a table showing historical lateral and vertical (if applicable) flow directions and gradients;
- (g) cumulative data tables containing the water quality analytical results and depth to groundwater;
- (h) a copy of the laboratory analytical data report, which may be submitted in an electronic format;
- (i) the status of any ongoing remediation, including an estimate of the cumulative mass of pollutant removed from the subsurface, system operating time, the effectiveness of the remediation system, and any field notes pertaining to the operation and maintenance of the system; and
- (j) if applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions.

An Annual Report shall be submitted to the Regional Board by **1 February** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation, and may be substituted for the fourth quarter monitoring report. The Annual Report shall contain the following minimum information:

- (a) both tabular and graphical summaries of all data obtained during the year;
- (b) groundwater contour maps and pollutant concentration maps containing all data obtained during the previous year;
- (c) a discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;
- (d) an analysis of whether the pollutant plume is being effectively treated;
- (e) a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the pollutants, and plans to improve remediation system effectiveness;
- (f) an identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and

(g) if desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by:

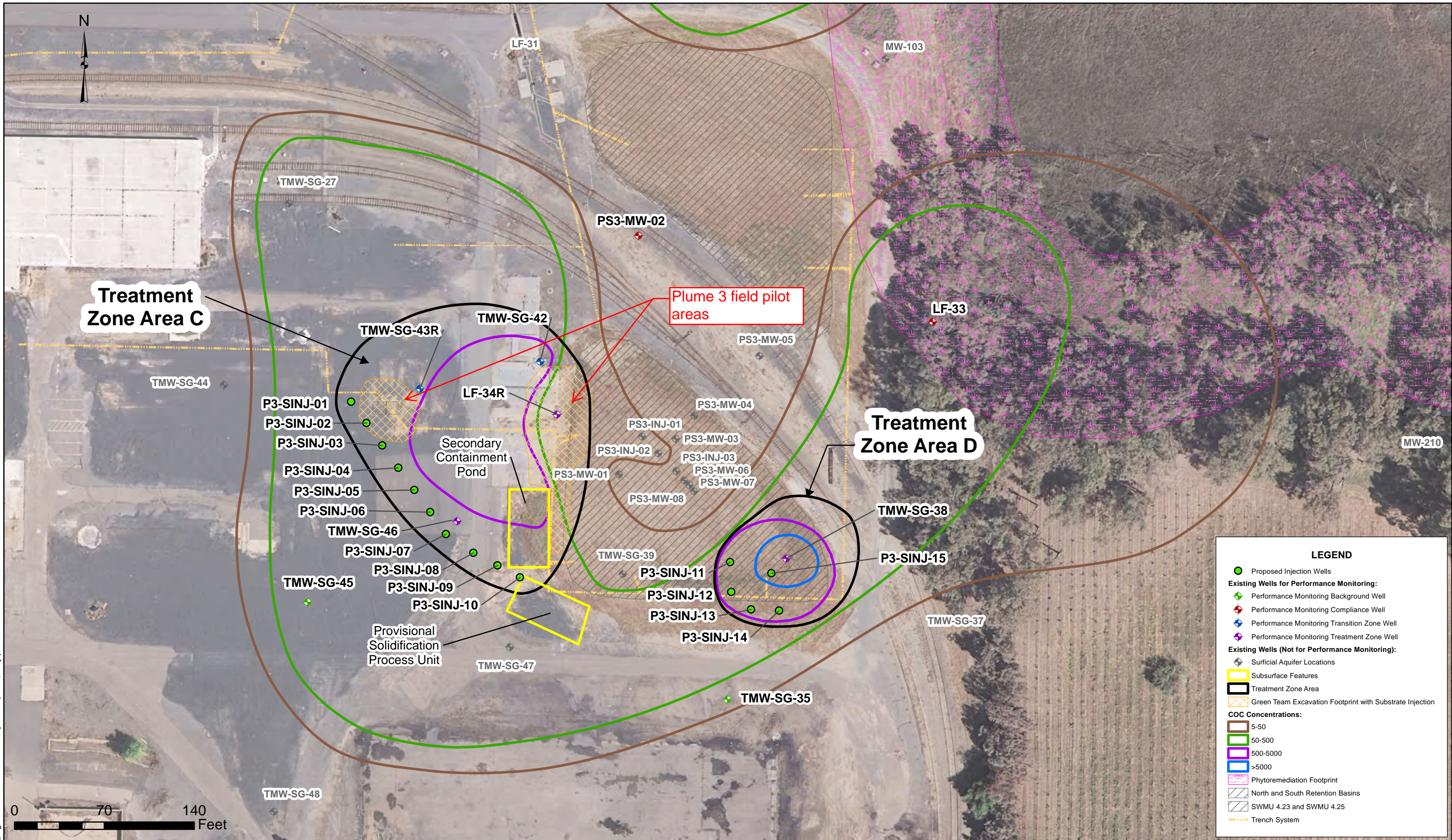
ORIGINAL SIGNED BY DUNCAN AUSTIN FOR

PAMELA C. CREEDON, Executive Officer

4/15/2015

(Date)

Path: F:\GIS\Oakley\Project_Figures\Plume 3 Surficial Aq CMIP (2014, Dey)\PLUME 3 SURF AQ CMIP 2014.mxd



LEGEND

- Proposed Injection Wells
- Existing Wells for Performance Monitoring:
 - Performance Monitoring Background Well
 - Performance Monitoring Compliance Well
 - Performance Monitoring Transition Zone Well
 - Performance Monitoring Treatment Zone Well
- Existing Wells (Not for Performance Monitoring):
 - Surficial Aquifer Locations
- Subsurface Features
 - Subsurface Features
 - Treatment Zone Area
 - Green Team Excavation Footprint with Substrate Injection
- COC Concentrations:
 - 5-50
 - 50-500
 - 500-5000
 - >5000
- Phytoremediation Footprint
 - Phytoremediation Footprint
- North and South Retention Basins
 - North and South Retention Basins
 - SWMU 4.23 and SWMU 4.25
- Trench System
 - Trench System

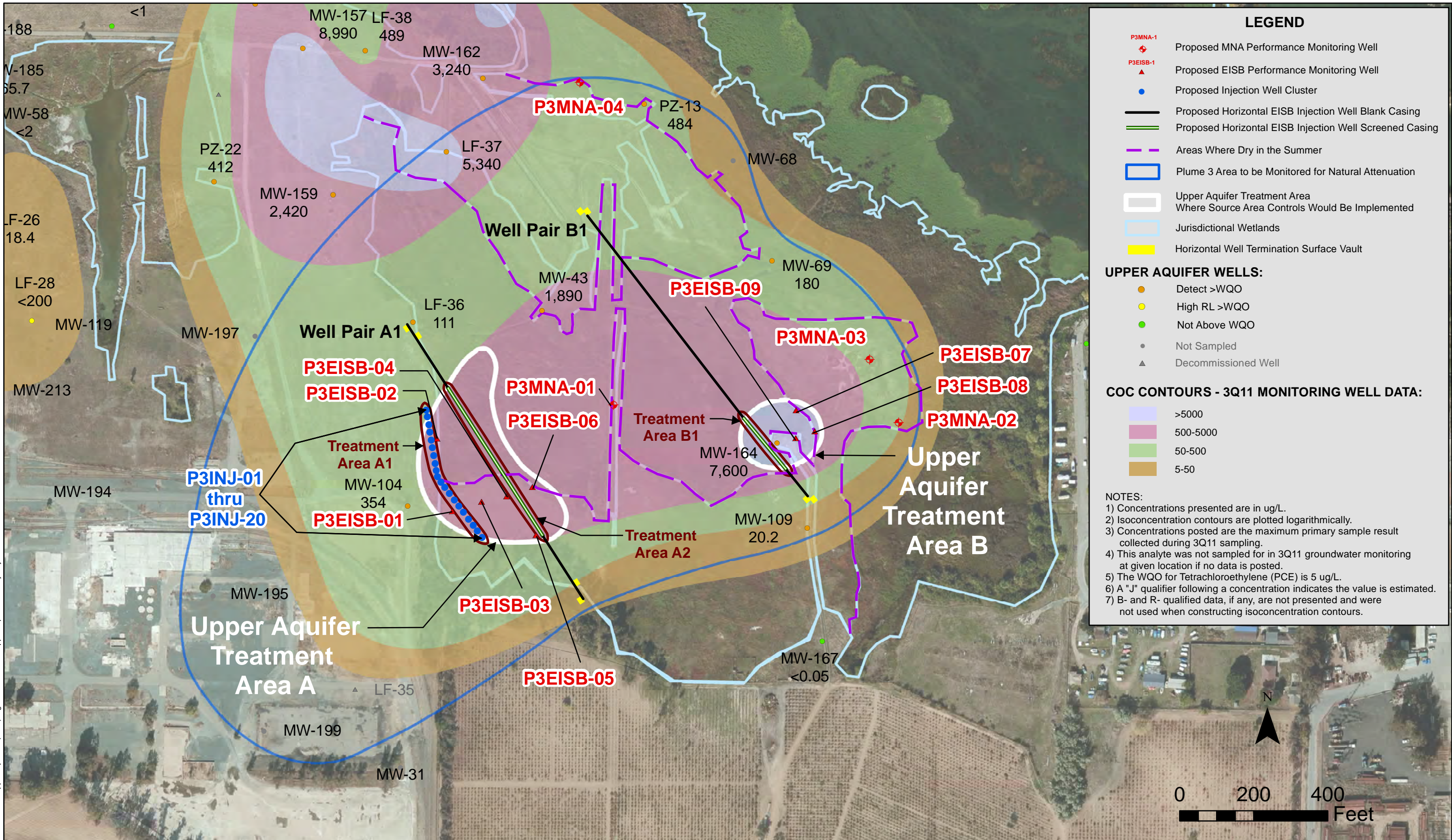
PARSONS
 Parsons Environment & Infrastructure

2121 North California Boulevard
 Suite 500
 Walnut Creek, California 94596

Title:

Proposed Substrate Injection and Performance Monitoring Well Locations
 Plume 3 Surficial Aquifer CMIP
 DuPont Oakley Site

Drawn/Approved: RAH/	File Project Number: 448654
Date: 11/18/2014	Figure Number: 3-1
Revised:	
File Name: PLUME 3 SURF AQ CMIP 2014	



LEGEND

- ◆ P3MNA-1 Proposed MNA Performance Monitoring Well
- ▲ P3EISB-1 Proposed EISB Performance Monitoring Well
- Proposed Injection Well Cluster
- Proposed Horizontal EISB Injection Well Blank Casing
- Proposed Horizontal EISB Injection Well Screened Casing
- - - Areas Where Dry in the Summer
- Plume 3 Area to be Monitored for Natural Attenuation
- Upper Aquifer Treatment Area Where Source Area Controls Would Be Implemented
- Jurisdictional Wetlands
- Horizontal Well Termination Surface Vault

UPPER AQUIFER WELLS:

- Detect >WQO
- High RL >WQO
- Not Above WQO
- Not Sampled
- ▲ Decommissioned Well

COC CONTOURS - 3Q11 MONITORING WELL DATA:

- >5000
- 500-5000
- 50-500
- 5-50

NOTES:

- 1) Concentrations presented are in ug/L.
- 2) Isoconcentration contours are plotted logarithmically.
- 3) Concentrations posted are the maximum primary sample result collected during 3Q11 sampling.
- 4) This analyte was not sampled for in 3Q11 groundwater monitoring at given location if no data is posted.
- 5) The WQO for Tetrachloroethylene (PCE) is 5 ug/L.
- 6) A "J" qualifier following a concentration indicates the value is estimated.
- 7) B- and R- qualified data, if any, are not presented and were not used when constructing isoconcentration contours.

Path: S:\GIS\Oakley\Project_Figures\Plume 3 Upper Aq CMP (2012)\Figure 4-1 Plume 3 Upper Aquifer Remedy Layout.mxd

PARSONS
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2121 North California Boulevard
Suite 500
Walnut Creek, California 94596

Title: Plume 3 Upper Aquifer Remedy Layout Plume 3 Upper Aquifer Corrective Measures Implementation Plan DuPont Oakley Site	Drawn/Approved: RAH/	File Project Number: 445790/504442
	Date: 9/24/2013	Figure Number: 4-1
	Revised:	
File Name: Figure 4-1 Plume 3 Upper Aquifer Remedy Layout		