
Central Valley Regional Water Quality Control Board

25 July 2014

Mr. Scott Dressler
URS Corporation
1550 Humboldt Road Suite #2
Chico, CA 95928

NOTICE OF APPLICABILITY OF GENERAL ORDER NO. R5-2008-0149-051 – FLAIR CUSTOM CLEANERS/CHICO CENTRAL PLUME, 660 MANGROVE AVENUE, CHICO, BUTTE COUNTY

URS Corporation on behalf of Department of Toxic Substance Control (Discharger) submitted a Notice of Intent, dated 20 February 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. R5-2008-0149. All of the requirements contained in the general order are applicable to your project. You are hereby assigned Order No. R5-2008-0149-051.

Project Location:

The project is in the City of Chico in Butte County, California.
Township 3 North; Range 2 East; Section 26; Assessor's Parcel No. 003-280-038 & 039 & 049.
Latitude 39° 44' N; Longitude 121° 50' W

Project Description:

The Flair Custom Cleaners site is an identified "hot spot" in the approximately 650-acre groundwater and soil pollution area designated by the Department of Toxic Substance Control (DTSC) as the Chico Central Plume. Tetrachloroethylene (PCE) is the pollutant of concern. Several identified dry cleaners are the sources. Flair Custom Cleaners is one of the identified sources and Responsible Parties (RPs) for pollution within the Chico Central Plume. Flair Custom Cleaners used PCE in its dry cleaning operations since 1968. The former operator informed DTSC staff that small amounts of PCE fluid waste were disposed in the sewer or storm drain. DTSC conducted soil gas tests which revealed high concentrations of PCE (+3,000 ppb) over a large soil contamination area surrounding the site. DTSC also found PCE concentrations as high as 998,000 ppb in Flair's sewer lateral. Several nearby municipal and private wells also contain PCE concentrations exceeding the maximum contaminant level (MCL). Groundwater is the only source of drinking water for the City of Chico. PCE contaminant exposure and migration pathway is primarily to groundwater from leaky sewers and manholes. Groundwater contamination includes a shallow sand and gravel zone beneath the site as well as nearby gravel packed private and municipal wells screened in deeper zones. An Imminent or Substantial Endangerment Order was issued to the RP in April 1990. In July 1990, the RP was

found in noncompliance with the order allowing DTSC the option to use state funds to stabilize the site and seek recovery of costs from liable parties.

DTSC and URS Corporation propose to remediate soil and groundwater at the Flair Cleaners site by in-situ chemical oxidation (ISCO) using potassium permanganate injection to treat PCE impacted soils and groundwater within the shallow zone aquifer and shallow/intermediate zone aquitard beneath the Flair Custom Cleaners property.

In June 2007 a *Final Remedial Action Plan* was prepared for the Chico Central Plume project, proposing control of the larger plume by groundwater extraction, and focused source area "hot spot" remediation.

In August 2007 a Remedial Action Workplan was submitted for injection of potassium permanganate to remediate polluted soils and groundwater at the Flair Custom Cleaners site.

In May 2013 the *Chico Central Plume Shallow Zone Aquifer Treatability Study* was prepared. The Treatability study included field testing activities to further delineate PCE impacts in soil and groundwater, field testing activities to evaluate hydraulic properties of the soil and used bench scale tests to determine if ISCO treatment could work on the pollution at the site. Results of the Treatability Study indicated that remediation by injection of potassium permanganate was favorable. The target remediation area is approximately 1,200-square-feet consisting of a shallow zone, with a target remediation zone from 30 to 40 feet below ground surface (bgs), and a deeper zone, with a target remediation zone from 40 to 60 feet bgs. Two injection events will be conducted, spaced approximately two months apart. For each injection event up to six pushes will be conducted in the shallow zone, spaced approximately five feet apart on center; and up to seven pushes will be conducted in the deep zone, spaced approximately eight feet apart on center. The shallow zone injection locations will target an area laterally bounded by MIP-1, MIP-5, and the southern and western border of the injection area (Figure 1-3), while the deep zone injection locations will target the entire extent of the injection area (Figure 3-1). The chemical oxidant selected is potassium permanganate. All quantities of the oxidant will be on a dry weight basis of potassium permanganate, for consistency. The oxidant will be injected at one injection point at a time in the shallow zone, and at four and three injection points simultaneously in the deep zone. Approximately 600 pounds of oxidant and 2,300 gallons of dilution water (50 pounds of oxidant and 190 gallons of water per injection location) will be injected into the shallow zone and approximately 2,140 pounds of oxidant and 16,600 gallons of dilution water (152 pounds of oxidant and 1,184 gallons of water per injection location) will be injected into the deep zone. The oxidant will be injected within the target interval depths in two foot intervals and at a target flowrate of approximately 4 gpm. Due to lithology encountered at the site, it will be necessary to utilize different types of tooling and approaches to successfully inject the oxidant. Two separate boreholes will comprise each shallow injection location and two separate boreholes will also comprise each deep injection location. For each shallow zone injection location, one borehole will be pushed to the interval from 30 to 35 feet bgs equipped with a 2.25-inch inner hose injection tool. Adjacent to that borehole, a second borehole will be pushed to the interval from 35 to 40 feet bgs equipped with a 2.25-inch "jetting" inner hose tool for the purpose of fracturing the formation to inject the oxidant. For each deep zone injection location, one borehole will be pushed to the interval from 40 to 48 feet bgs equipped with a 2.25-inch inner hose injection tool. Adjacent to that borehole, a second borehole will be pushed to the interval from 48 to 60 feet bgs equipped with a 1.5-inch top down injection push rods; it is necessary to use these smaller diameter push rods due to the difficult drilling conditions and their use will presumably enable the rig to reach the desired depth.

Existing monitoring wells installed at the site include FC-MW-2, FC-MW-3, FC-MW-3A, FC-MW-3B, FC-MW-4. DTSC/URS propose to install new monitoring wells FC-MW-5, FC-MW-6, FC-MW-7, FC-MW-8, FC-MW-9 and FC-MW-10 to serve as background wells, treatment zone wells, transition zone wells and down-gradient monitoring wells.

The existing and new wells will be monitored to assess reagent distribution and reaction progress during the ISCO treatment event. Typical compliance wells will not be installed because access for further intrusive work has been denied by the Chico Cemetery. The typical distance of a compliance zone well from the treatment area is 2 years of groundwater travel. At this site, that distance is estimated to be about 80-100 feet. This would put the compliance well in the Chico Cemetery. In lieu of the compliance well, URS performed reagent transport modeling, using the bench scale permanganate natural oxidant demand (PNOD) measured at the site, and aquifer parameters measured during the treatability study. This conservative modeling showed that unreacted permanganate will be utilized within a lateral distance of 100 feet and a vertical distance of 70 feet, indicating that impact beyond the treatment and transition zones is unlikely. Transition zone wells will be closely monitored to ensure the reaction and treatment is proceeding as predicted by the modeling. Concentrations in the transition zone can be used with the predictive model to estimate concentrations at the compliance point. In addition, three existing monitoring wells exist down-gradient of the site; existing shallow zone and intermediate zone monitoring wells (CMW-102A) and (CMW-102B), located approximately 400 feet down-gradient of the treatment zone, and an existing intermediate zone monitoring well (CMW-110B) located about 175 feet down-gradient to cross-gradient of the site. See Figure 1-2. These wells will be used as down-gradient compliance monitoring points to ensure compliance with the general order and to monitor down-gradient effects of the treatment. These wells are located between the treatment area and any identified sensitive receptors in the area.

The Discharger will also be conducting sampling and reporting the results as described in the attached Groundwater Monitoring and Reporting Program (MRP). If the Discharger desires to conduct longer-term in-situ remediation of the groundwater, a revised Notice of Intent must be submitted and a new Notice of Applicability received prior to proceeding with the additional remediation.

No comments were received on the draft Notice of Applicability and Monitoring and Reporting Program during the 30-day public comment period, ending date 18 July 2014.

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 *Notice of Intent, Final Remedial Action Plan* dated 21 June 2007, *Chico Central Plume Shallow Zone Aquifer Treatability Study* dated 15 March 2013, and *Chico Central Plume Shallow Zone Aquifer Treatability Study- In Situ Chemical Oxidation Approach Technical Memorandum* dated May 2013.
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 rescinded.
3. Injection of materials other than potassium permanganate and potable water into the subsurface is prohibited.

24 July 2014

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 will implement the Final Contingency plan as included in the Remedial Action Workplan within 30 days of it being triggered.
6. The Discharger shall comply with the attached Monitoring and Reporting Program, Order No. R5-2008-0149-051, and any revisions thereto as ordered by the Executive Officer.

If you have any questions regarding this matter, please call Grant Stein at (530) 224-4788, or contact him at gstein@waterboards.ca.gov.



(for) Pamela C. Creedon
Executive Officer

GCS:lmw

Attachment: Monitoring and Reporting program Order No. R5-2008-0149-051
Figure 1-2, Figure 1-3, Figure 3-1

cc w/ attachments: Kimiye Touchi, URS Corporation, Sacramento
Peter MacNicholl, Department of Toxic Substances Control, Sacramento
Butte County Department of Environmental Health, Oroville
Duncan Austin, Central Valley Water Board, Rancho Cordova
Division of Water Quality, State Water Resources Board, Sacramento

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008-0149-051

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

FLAIR CUSTOM CLEANERS/CHICO CENTRAL PLUME, CHICO, BUTTE COUNTY

The Flair Custom Cleaners remediation site (Site) is located at 660 Mangrove Avenue in Chico, California (Figure 1-2). The soil and groundwater at the Site has been affected by tetrachloroethene (PCE).

This Monitoring and Reporting Program (MRP) describes requirements for monitoring a groundwater extraction and treatment system. 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, Regional Board 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 grab sample shall be recorded on the sample chain of custody form.

GROUNDWATER MONITORING

As shown on Figures 1-2, 1-3 and 3-1, there are 14 monitor wells, and 2 extraction wells associated with this project. 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 and sample analyses shall be completed by a California State certified laboratory.

The monitoring wells, and/or extraction 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 and Constituent Suite

Well Number¹	Frequency²	Constituent Suite(s)³	Monitoring Objective⁴
CMW-102A, CMW-102B, CMW-110B	Quarterly for one year, semi-annually for one year, then annually thereafter following the second injection	B,D	Compliance ⁴
CMW-102A, CMW-102B, CMW-110B	Semiannually for two years following the second injection	C	Compliance ⁴
FC-MW-3, FC-MW-3A, FC-MW-3B, FC-MW-7, FC-MW-8	Baseline before injection, quarterly for one year following the second injection or two quarters after permanganate in the treatment zone is no longer present, then semiannually for two years following the second injection	A,B,C,D	Treatment Zone ⁵
FC-MW-3, FC-MW-3A, FC-MW-3B, FC-MW-7, FC-MW-8	1 month following the 1 st injection, 1 and 2 months following 2 nd injection	A,D	Treatment Zone ⁵
FC-MW-5, FC-MW-6	Baseline before injection, quarterly for one year following the second injection or two quarters after permanganate in the treatment zone is no longer present, then semiannually for two years following the second injection	A,B,C,D	Transition Zone ⁶
FC-MW-5, FC-MW-6	1 month following the 1 st injection, 1 and 2 months following 2 nd injection	A,D	Transition Zone ⁶
FC-MW-2, FC-MW-9, FC-MW-10	Quarterly until two quarters after permanganate in the treatment zone is no longer present, then semiannually until two years following the second injection	A,B,C,D	Background ⁷
FC-MW-4 and, if pumping, extraction wells CH-W-S-3, CH-W-S-2	Quarterly for one year, semi-annually for one year, then annually thereafter following the second injection	B,D	Miscellaneous Down-Gradient and Cross-Gradient Wells
FC-MW-4 and, if pumping, extraction wells CH-W-S-3, CH-W-S-2	Semiannually for two years following the second injection	C	Miscellaneous Down-Gradient and Cross-Gradient Wells

¹ Well numbers as shown on Figure 1-2, 1-3 and 3-1.

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

³ Constituent suite components listed in Table 2.

⁴ Wells used to determine compliance with groundwater limitations.

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

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

⁷ Wells used to develop background concentrations.

Table 2: Analytical Methods

Constituent	Method¹	Maximum Practical Quantitation Limit (µg/L)²
Suite A		
Permanganate	Visual	n/a
Suite B		
Volatile Organic Compounds ³	EPA 8260B	0.5-10
Suite C		
Total Dissolved Solids	SM 2540C	10,000
Potassium	EPA 6010B	1,000
Hexavalent Chromium	EPA 7199	5
Total chromium, iron, and manganese	EPA 6010B	2-20
Dissolved CAM 17 Metals, iron, and manganese	EPA 6010B/7470A	2-20
Suite D		
Field Sampling Parameters⁴		
Groundwater Elevation	-	n/a
Oxidation-Reduction Potential	-	n/a
Dissolved oxygen	-	n/a
pH	-	n/a
Temperature	-	n/a

- 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 If permanganate is present, volatile organic compound analysis will not be conducted.
⁴ If permanganate is present, field parameter readings such as dissolved oxygen readings will not be collected if necessary to protect instrumentation from damage.

FIELD SAMPLING

In addition to the above sampling and analysis, field sampling and analysis shall be conducted each time a monitor well or extraction 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	uhmos/cm	Grab
Dissolved Oxygen	mg/L	Grab
pH	pH Units (to 0.1 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 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
Amendment(s) Added	pounds per day	Measured

AMENDMENT ANALYSIS

Prior to use, a 1.5 percent solution of the amendment mixed with deionized water shall be analyzed for the constituents listed in Table 5. Documentation of the analysis of the pure amendment will be provided by the supplier in the form of a certificate of analysis for the potassium permanganate lot that will be used at the site.

Table 5: Amendment Analytical Requirements

Constituent	Method¹	Maximum Practical Quantitation Limit (µg/L)²
General Minerals ³		
Hardness, Potassium	calculation	
Metals, Dissolved ⁴	EPA 200.7, 200.8	Various
Total Dissolved Solids	calculation	NA
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 Potassium, chloride, sulfate, nitrate.
⁴ Metals include arsenic, calcium, total chromium, manganese, magnesium, and silica.

ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

The Discharger shall develop background values for concentrations of PCE, dissolved iron, dissolved manganese, arsenic, barium, cadmium, calcium, total chromium, copper, iron, lead, manganese, magnesium, mercury, molybdenum, potassium, nickel, selenium, silica, total dissolved solids and electrical conductivity in groundwater following the procedures found in CCR Section 20415(e)(10). The Discharger shall complete a baseline monitoring event to establish background concentrations prior to implementation of the remediation event.

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. 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 Central Valley Water 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.

Hard copies of quarterly reports shall be submitted to the Regional Board by the **1st day of the second month following the end of each calendar quarter (i.e., by 1 February, 1 May, 1 August, and 1 November)**. Each quarterly 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) a description of amendment analysis and injection activities including quantities of water and amendments injected into the groundwater, along with time period over which the amendments were injected into the aquifer.

An Annual Report shall be submitted to the Regional Board by **1 February (1 November for semi-annual monitoring)** 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 (**or second semi-annual**) 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:

 for
PAMELA C. CREEDON, Executive Officer

July 24, 2014

(Date)