Linda S. Adams
Acting Agency Secretary

California Regional Water Quality Control Board

Los Angeles Region

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Arnold Schwarzenegger
Governor

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

October 13, 2009

Mr. Patrick Schanen
Deputy Director of Office of Environmental Health and Safety
Los Angeles Unified School District
1055 West 7th Street, 9th Floor
Los Angeles, California 90017

GENERAL WASTE DISCHARGE REQUIREMENTS (ORDER NO. R4-2007-0019), PILOT TEST LEAD TO FULL-SCALE IN-SITU CHEMICAL OXIDATION USING SODIUM PERMANGANATE – PROPOSED SOUTH REGION HIGH SCHOOL NO. 12, LOS ANGELES UNIFIED SCHOOL DISTRICT, 8800 SOUTH SAN PEDRO STREET, LOS ANGELES (FILE NO. 09-134, CI-9543)

Dear Mr. Schanen:

California Regional Water Quality Control Board, Los Angeles Region (Regional Board) staff have completed the review of your application for coverage under General Waste Discharge Requirements (WDR) for the injection of a 10% sodium permanganate ($NaMnO_4$) solution to assess the feasibility of in-situ chemical oxidation (ISCO) to remediate trichloroethylene (TCE)-impacted groundwater at the above referenced site (Site). We have determined that the proposed discharge meets the conditions specified in Regional Board Order No R4-2007-0019, "*Revised General Waste Discharge Requirements for Groundwater Remediation at Petroleum Hydrocarbon Fuel, Volatile Organic Compound and/or Hexavalent Chromium Impacted Sites*," adopted by this Regional Board on March 1, 2007.

The Los Angeles Unified School District (LAUSD) is considering the construction of a new high school designated as the South Region High Scholl No. 12 at the Site. The Site consists of 23 parcels and occupies approximately 15.07 acres. Twenty-two of the parcels are developed with commercial and industrial facilities. The results of site assessments indicate that total petroleum hydrocarbons (TPH), arsenic and lead in shallow soils, and volatile organic compounds (VOCs) in soil and soil gas were the chemicals of concern (COCs) for the Site. The Department of Toxic Substances Control (DTSC) is currently the lead agency overseeing cleanup at the Site.

LAUSD submitted a *Remedial Action Workplan* (RAP), dated October 28, 2008, to DTSC. In the RAP, LAUSD proposed field testing for assessment of design parameters for full-scale implementation of ISCO. LAUSD also proposed to install four injection wells (IW-01 through IW-04) and five monitoring wells (MW-16 through MW-20) for the field testing (Figure 2). DTSC approved the RAP on February 11, 2009. This Regional Board received a *Form 200, Application/Report of Waste Discharge, and General Information Form for Waste Discharge Requirements or NPDES Permit* on June 29, 2009, and documented the "Form 200" complete in a July 23, 2009 letter.

Based on our review of the submitted document, the Regional Board concurs with the injection with the following requirements:

1. Background water quality data from all groundwater monitoring wells at the site, including the four injection wells, are required as identified in the Revised General Waste Discharge Requirement. The data shall include contaminant types, total dissolved solids, sulfates, chlorides, nitrogen (NH_4, NO_3, NO_2), chemical oxygen demand, biological oxygen demand, phosphorus, pH, dissolved metals, nutrients, dissolved oxygen, dissolved carbon dioxide, methane, temperature, iron, and oxidation-reduction potential. The background water quality data shall be analyzed prior to initiation of the proposed injection activities.

Once you have met the above conditions, you may then begin to inject a 10% sodium permanganate solution as proposed. The injection will occur at Latitude 33°57'28"N, Longitude 118°16'04"W at four injection wells (Figure 2).

Enclosed are your Waste Discharge Requirements, consisting of Regional Board Order No. R4-2007-0019 (Series No. 103) and Monitoring and Reporting Program No. CI-9543.

The "Monitoring and Reporting Program" requires you to implement the monitoring program on the effective date of this enrollment under Regional Board Order No. R4-2007-0019. All monitoring reports shall be sent to the Regional Board, ATTN: Information Technology Unit. When submitting monitoring or technical reports to the Regional Board per these requirements, please include a reference to "Compliance File No. CI-9543", which will assure that the reports are directed to the appropriate file and staff. Also, please do not combine other reports with your monitoring reports. Submit each type of report as a separate document.

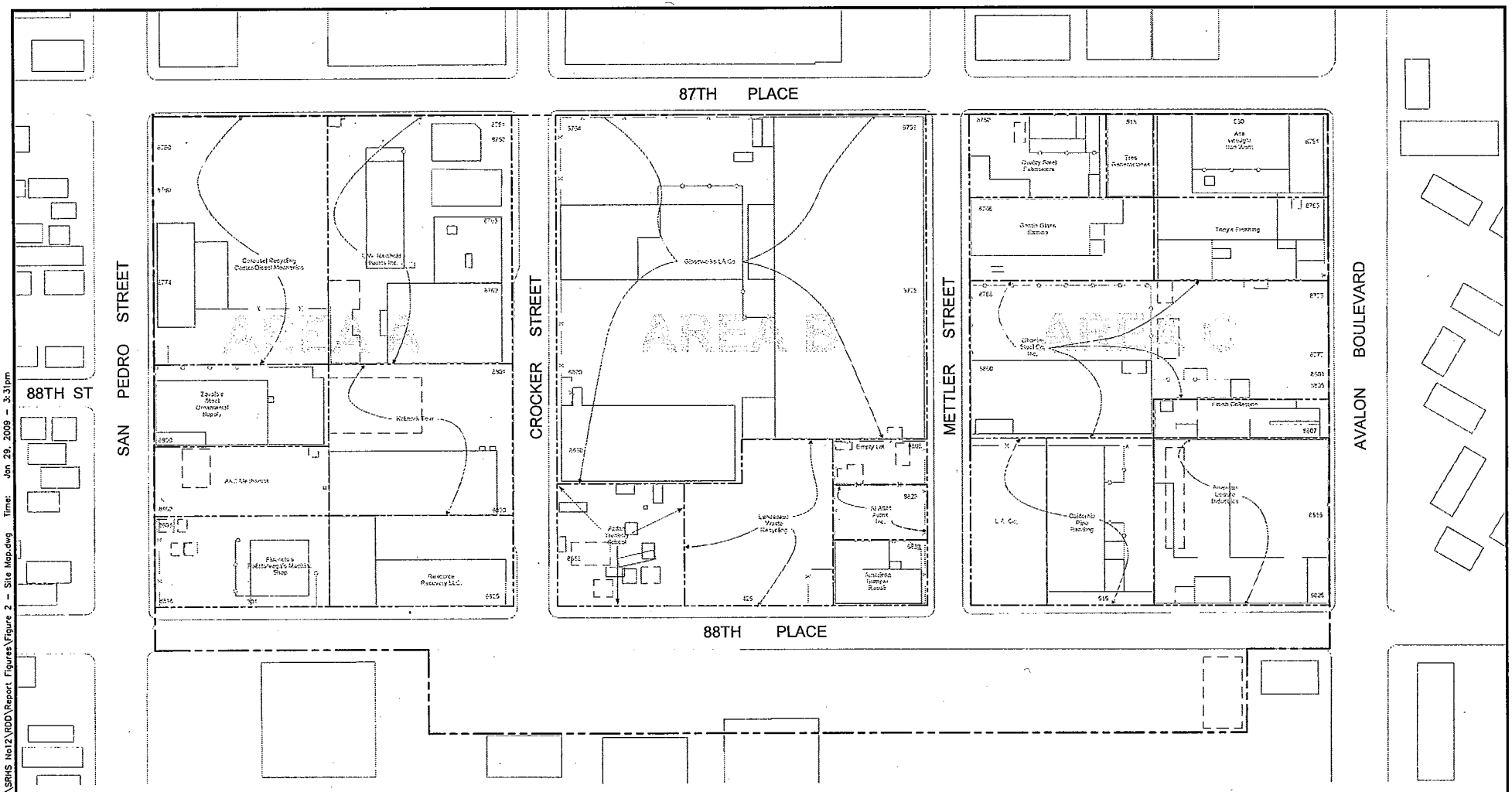
If you have any questions, please contact Dr. Kwang-il Lee at (213) 576-6734 or Ms. Ann Lin at (213) 576-6781.

Sincerely,

Tracy J. Egoscue
Executive Officer

Attachments:
Site Map (Figure 2)
ISCO Field Study Design (Figure 3)

Enclosures:
1) General Waste Discharge Requirements, Order No. R4-2007-0019 and Standard Provisions
2) Monitoring and Reporting Program, CI No. 9543
3) Fact Sheet



LEGEND

- EXISTING STRUCTURES
- FORMER STRUCTURES
- PROPOSED SCHOOL BOUNDARY
- PROPERTY BOUNDARY
- FENCE

NORTH

0 50 100 FEET

SCALE: 1" = 100'

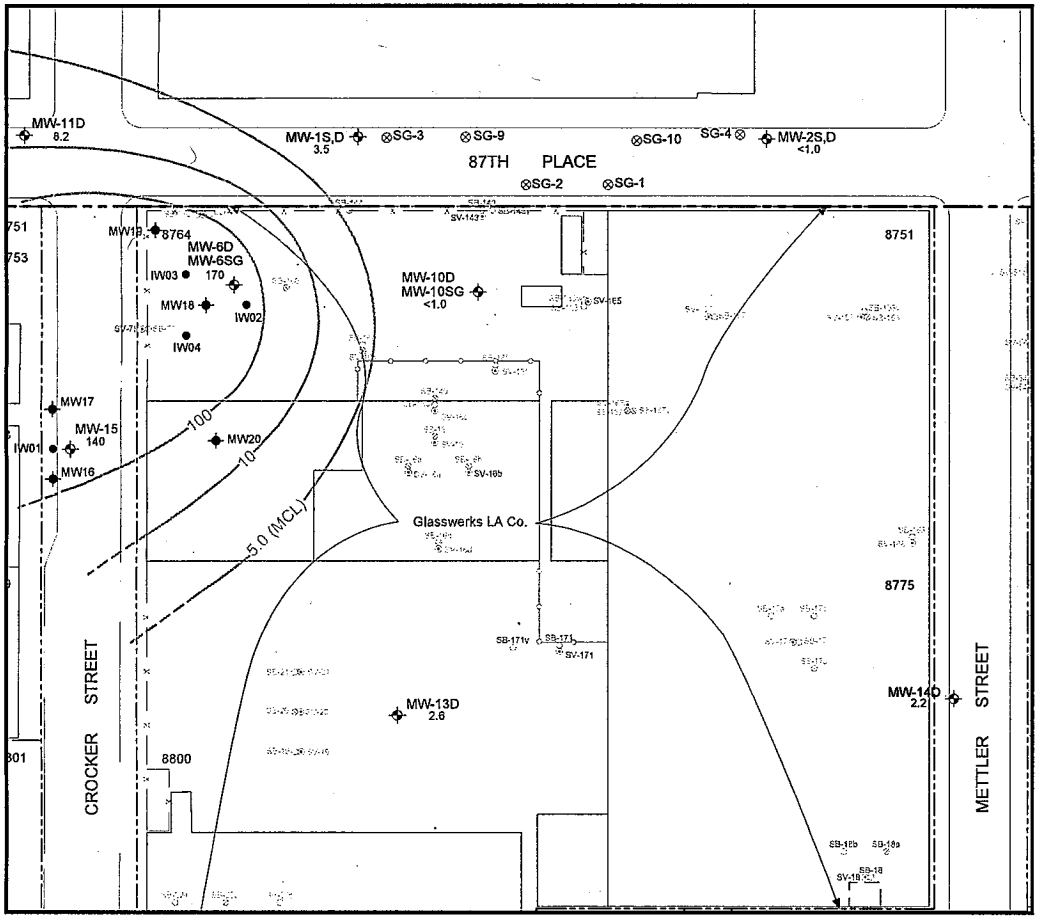
Remedial Design Document

Site Map

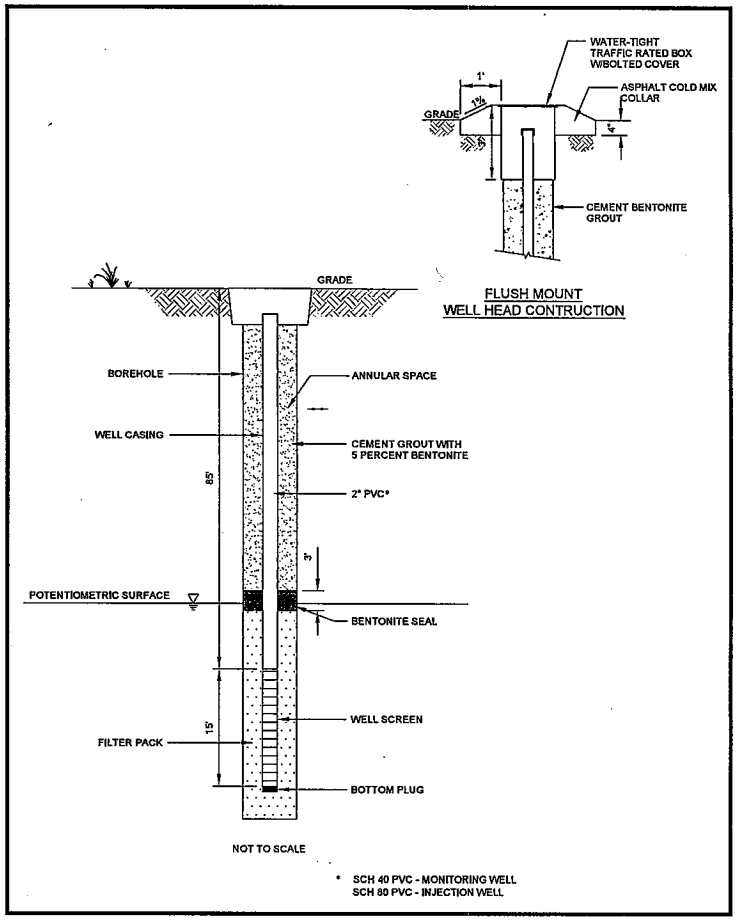
South Region High School No. 12

Date: 12-08	LAUSD	Figure
Project No. 110545	EARTH TECH | AECOM	2

File: L:\work\110545\cad\LAUSD\SRHS No12\RDD\Report Figures\Figure 2 - Site Map.dwg Time: Jan. 29, 2009 - 3:31pm



ISCO INJECTION WELL PLAN



TYPICAL INJECTION/MONITORING WELL CONTRUCTION DIAGRAM

LEGEND

- SG-3 ⊗ — SOIL BORING AND SOIL GAS PROBE LOCATION
- MW-1S,D — MONITORING WELL LOCATIONS (S=SHALLOW; D=DEEP)
- EARTH TECH PEA BORINGS
- IW01 ● — ISCO INJECTION WELL
- MW16 — PROPOSED MONITORING WELL
- 3.5 — TRICHLOROETHENE (TCE) CONCENTRATIONS (µg/L)
- 10 — TCE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- EXISTING STRUCTURES
- FORMER STRUCTURES
- PROPOSED SCHOOL BOUNDARY
- PROPERTY BOUNDARY
- FENCE
- OVERHEAD AWNING

NORTH

0 30 60 FEET

SCALE: 1" = 60'

Remedial Design Document

ISCO Field Study Design

South Region High School No. 12

Date: 12-08	LAUSD	Figure
Project No. 110545	EARTH TECH | AECOM	3

File: L:\work\110545\cad\LAUSD\SRHS No12\RDD\App K ISCO Design\Figure 3 – ISCO Field Study Design.dwg Time: Jan 29, 2009 – 3:48pm

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

MONITORING AND REPORTING PROGRAM NO. CI-9543
FOR
LOS ANGELES UNIFIED SCHOOL DISTRICT - PROPOSED SOUTH REGION HIGH SCHOOL NO.12, 8800 SOUTH SAN PEDRO STREET, LOS ANGELES CALIFORNIA
(ORDER NO. R4-2007-0019) (Series No. 103)
(FILE NO. NO. 09-134)

I. MONITORING AND REPORTING REQUIREMENTS

A. Los Angeles Unified School District (hereinafter Discharger) shall implement this monitoring program on the effective date of this enrollment (October 13, 2009) under Regional Board Order No. R4-2007-0019. The first monitoring report under this program, for October – December 2009, shall be received at the Regional Board by January 15, 2010. Subsequent monitoring reports shall be received at the Regional Board according to the following schedule:

Monitoring Period	Report Due
January – March	April 15
April – June	July 15
July – September	October 15
October – December	January 15
Annual Summary Report	March 1 of each year, beginning in 2010

B. If there is no discharge or injection, during any reporting period, the report shall so state. Monitoring reports must be addressed to the Regional Board, attention: Information Technology Unit.

C. By March 1st of each year, 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.

October 13, 2009

D. The Discharger shall comply with requirements contained in Section G. of Order No. R4-2007-0019 *"Monitoring and Reporting Requirements"* in addition to the aforementioned requirements.

II. SODIUM PERMANGANATE INJECTION MONITORING REQUIREMENTS

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

1. Location map showing injection points used for the sodium permanganate solution.
2. Written and tabular summary defining the quantity of sodium permanganate injected to the groundwater at each point per day in which injection has occurred.
3. Visual inspection at each injection well shall be conducted and recorded during the injection. The quarterly report shall include a summary of the visual inspection.

Within 90 days following the completion of field study of injecting sodium permanganate, the Discharger shall submit the results of the field study to the Regional Board. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the field test, conclusions regarding the effectiveness of the in-situ chemical oxidation (ISCO), and a plan for full-scale implementation of groundwater remediation activities.

III. GROUNDWATER MONITORING PROGRAM DURING FIELD TESTING

The Discharger shall sample monitoring wells MW-6D, MW-11D, MW-16, MW-17, MW-18, MW-19, and MW-20, injection wells IW-1, IW-2, IW-3, and IW-4 to assess the groundwater quality related to the ISCO. Groundwater from the wells noted above shall be monitored for the duration of the remediation in accordance with the following discharge monitoring program:

CONSTITUENT	UNITS	TYPE OF SAMPLE	MINIMUM FREQUENCY OF ANALYSIS
Permanganate	µg/l	grab	• Baseline, prior to injection • One time following the completion of injection • Biweekly for the first month following injection • Monthly for the next 3 months • Quarterly thereafter
Chlorinated Volatile Organic Compounds (EPA Method 8260B)	µg/l	Grab	• Baseline, prior to injection • One time following the completion of injection • Monthly for the next 3 months • Quarterly thereafter

pH	pH units	grab	• Baseline, prior to injection • One time following the completion of injection • Biweekly for the first month following injection • Monthly for the next 3 months • Quarterly thereafter
Temperature	°F/°C	grab	• Baseline, prior to injection • One time following the completion of injection • Biweekly for the first month following injection • Monthly for the next 3 months • Quarterly thereafter
Dissolved Oxygen	µg/l	grab	• Baseline, prior to injection • One time following the completion of injection • Biweekly for the first month following injection • Monthly for the next 3 months • Quarterly thereafter
Oxidation-reduction potential	millivolts	grab	• Baseline, prior to injection • One time following the completion of injection • Biweekly for the first month following injection • Monthly for the next 3 months • Quarterly thereafter
Total Organic Carbon (EPA Method 9060 Modified)	µg/l	grab	• Baseline, prior to injection • One time following the completion of injection • Monthly for the first 3 months following the injection • Quarterly thereafter
Total dissolved solids and Total suspended solids	mg/l	grab	• Baseline, prior to injection • One time following the completion of injection • Monthly for the first 3 months following the injection • Quarterly thereafter
Specific Conductance	µmhos/cm	grab	• Baseline, prior to injection • One time following the completion of injection • Monthly for the first 3 months following the injection • Quarterly thereafter
Turbidity	NTU	grab	• Baseline, prior to injection • One time following the

			completion of injection • Monthly for the first 3 months following the injection • Quarterly thereafter
Groundwater Elevation	Feet, above mean see level (msl) and below ground surface (bgs)	In situ	• Baseline, prior to injection • One time following the completion of injection • Monthly for the first 3 months following the injection • Quarterly thereafter
Major Anions (bromide, chloride, sulfate, nitrate, nitrite, O-phosphate, and sulfide)	µg/l	grab	• Baseline, prior to injection • Monthly for the first 3 months following the injection • Quarterly thereafter
Major Cations (barium, calcium, magnesium, manganese, potassium and sodium)	µg/l	grab	• Baseline, prior to injection • Monthly for the first 3 months following the injection • Quarterly thereafter
Metals in Priority pollutant scan as listed in attachment A, plus hexavalent chromium	µg/L	grab	• Baseline, prior to injection • Monthly for the first 3 months following the injection [1] • Quarterly thereafter [1]

1. The monitoring is required only for the metal detected during the baseline monitoring.

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. Observation of groundwater levels, recorded to 0.01 feet mean sea level and groundwater flow direction for **all** site monitoring wells.

IV. 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)"

V. 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.

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: _____ Date: October 13, 2009

Tracy J. Egoscue
Executive Officer

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
320 West 4th Street, Suite 200, Los Angeles, California 90013

FACT SHEET
WASTE DISCHARGE REQUIREMENTS FOR PROPOSED SOUTH REGION HIGH SCHOOL NO.12, 8800 SAN PEDRO STREET LOS ANGELES, CALIFORNIA

IN-SITU CHEMICAL OXIDATION USING SODIUM PERMANGANATE

ORDER NO. R4-2007-0019 (SERIES NO. 103)
CI-9543, FILE NO. 09-134

FACILITY ADDRESS
8800 South San Pedro Street
Los Angeles, CA 90003

FACILITY MAILING ADDRESS
Mr. Patrick Schanen
Office of Environmental Health and Safety
Los Angeles Unified School District
1055 West 7TH Street, 9TH Floor
Los Angeles, CA 90017

PROJECT DESCRIPTION

The Los Angeles Unified School District (LAUSD) is to construct a new high school designated as the South Region High School No. 12 (Site) located at 8800 South San Pedro Street in Los Angeles. The Site consists of 23 properties and occupies approximately 15.07 acres. The Site involves the development of approximately 293,647 square feet of school facilities.

The Department of Toxic Substances Control (DTSC) is the lead agency overseeing site investigation and cleanup for the Site. The results of historical site assessments indicate that total petroleum hydrocarbon (TPH), arsenic and lead in shallow soils, and volatile organic compounds (VOCs) in soil and soil gas are the chemicals of concern (COCs) for the Site. LAUSD submitted a Remedial Action Plan (RAP) to DTSC. The RAP selected excavation, soil vapor extraction and treatment (SVE), and in situ chemical oxidation (ISCO) for the Site cleanup. DTSC approved the RAP in a letter dated February 11, 2009.

The uppermost aquifer under the Site is the Exposition Aquifer, which occurs in the Lakewood Formation from approximately 30 to 120 feet bgs in the Site vicinity. Regional groundwater occurs at a depth of approximately 67 to 85 feet bgs, with a southeast to northwest flow direction. Based on the interpreted groundwater contours, the direction of groundwater flow at the Site is to the northwest, at an average gradient of approximately 0.01 ft/ft. The water table for shallow perched groundwater zones occurs in depths from 27 feet to 39 feet below the top of casing. The groundwater at the Site is impacted with chlorinated VOCs, primarily by trichloroethylene (TCE), in Area B and Area C. Deep groundwater contamination appears to be limited to the northwest portion of Area B in the vicinity of existing monitoring well MW-6D and extends towards the northwest.

VOLUME AND DESCRIPTION OF INJECTION

Discharger proposes ISCO using 10 percent (%) sodium permanganate ($NaMnO_4$) solution for remediation of TCE-impacted groundwater at the site. The sodium permanganate will react with TCE, breaking chemical bounds and producing innocuous substances such as carbon dioxide and water. Field testing will be performed for assessment of design parameters for full-scale implementation of ISCO. The field testing will include installation of four injection wells (IW01 through IW04) and five monitoring wells (MW16 through MW20), and monitoring at two existing monitoring wells (MW-6D and MW-11D). Well MW-11D provides an assessment of the northern extent of the TCE plume and potential response to injection to be performed at the Site.

The reagent injection volume and mass have been estimated based on achieving a radius of influence (ROI) of 15 feet. The injection wells are placed to ensure that testing occurs in the vicinity of monitoring wells with TCE concentrations greater than 100 µg/L in the deep groundwater bearing zone at the Site. The monitoring wells are placed in the vicinity of proposed injection wells at distance ranging from 5 feet to more than 30 feet for adequate assessment of the radius of influence of injected chemical oxidant. Both injection and monitoring wells will be screened below the groundwater table from approximately 85 to 100 feet bgs.

Approximately 2,800 gallons of 10 % by weight sodium permanganate solution (total permanganate weight approximately 3220 pounds) will be injected into each of the four injection wells; the injection will occur at Latitude 33°57'28"N, Longitude 118°16'04"W.

It should be noted that reagent injection concentration may be modified based on the results of the bench-scale study to ensure that total oxygen demand estimated for the subsurface is satisfied, so that the injected volume of reagent will provide sufficient mass of permanganate into the subsurface.