CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

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ORDER NO. R4-2014-XXXX
FILE NO. 13-141
CI-10008

WASTE DISCHARGE REQUIREMENTS FOR LOS ANGELES UNIFIED SCHOOL DISTRICT ENHANCED BIOREMEDIATION AND IN-SITU CHEMICAL REDUCTION OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER AT LOS ANGELES ACADEMY MIDDLE SCHOOL

TENTATIVE

The California Regional Water Quality Control Board, Los Angeles Region, (hereafter Regional Board) herein finds that:

BACKGROUND

1. Los Angeles Unified School District (LAUSD, hereinafter Discharger) has filed a Report of Waste Discharge on November 4, 2013, for injection of emulsified vegetable oil (SRS-SD®); ferrous iron salt (EHC-L®); sodium bromide (as tracer); calcium polysulfide (CPS); pH buffer, and chlorinated-ethene degrading microbial consortium (hereinafter Consortium) to bioremediate volatile organic compounds (VOCs) in shallow groundwater at the Los Angeles Academy Middle School (LAAMS, Site).

2. The Site encompasses approximately 15 acres located at 644 East 56th Street in Los Angeles, California (Latitude 33.990546 degrees North, Longitude -118.263670 degrees West, see Figure 1). Since 1905, numerous commercial/industrial owners/tenants have occupied various portions of the Site. A number of these companies operated the Site for bulk fuel storage, distribution and retail service. In 1989, the Discharger acquired the entire property, demolished previous structures, and began school construction. The school opened in 1998. The school utilizes all of the acquired property.

3. Environmental investigations and cleanups activities began at the Site in approximately May 1987 and continues to today. Currently, soil and groundwater investigation and cleanup activities at the Site are being conducted under the oversight of the Department of Toxic Substances Control (DTSC).

4. The Site has been divided into three Operable Units (OUs) for administrative purposes: OU 1 is the shallow soil beneath the LAAMS Site between ground surface and 40 feet below ground surface (bgs); OU 2 is the deep soil beneath the LAAMS Site between 40 and 145 feet bgs (the approximate depth of groundwater); and OU 3 is the groundwater beneath the LAAMS Site and groundwater, soil, and soil vapor from the offsite properties

located immediately north of the LAAMS Site (between 56th and 55th Streets, Avalon Boulevard, and a northern extension of Paloma Avenue; Figure 2). The current focus of the investigation and cleanup is on groundwater (OU 3).

5. According to historic remedial investigations (RI) conducted between May 1987 and March 2012, trichloroethene (TCE) releases occurred in the immediate vicinity of the Administrative Building and possibly also near the westerly portion of the Site along Avalon Boulevard. Concentrations of hexavalent chromium (Cr(VI)) and lead have been detected in only a very limited number of soil samples taken at the Site. The concentrations of VOCs, including TCE and tetrachloroethene (PCE), in soil vapor increases with depth across the Site and the highest concentrations of VOCs in soil vapor are located beneath a coarse sand and gravel layer present between 70 and 100 feet bgs. Following the operation of a soil vapor extraction (SVE) system at the Site, DTSC concurred that no further remediation is recommended at this time for soil at the Site.

6. The sources of VOCs, chromium (Cr), hexavalent chromium (Cr(VI)), and arsenic impacts in groundwater at the Site (OU 3) have been investigated and the process of remediation planning and implementation is underway. The primary chemicals of concern (COCs) identified in the groundwater include TCE at concentrations up to 1,400 micrograms per liter (µg/L), Cr at concentrations up to 35,300 µg/L, Cr(VI) at concentrations up to 28,000 µg/L, and arsenic at concentrations up to 31 µg/L.

PROPOSED REMEDIAL ACTIVIES

7. OU 3 remediation planning and implementation is currently being conducted under the oversight of the DTSC. In order to develop the Feasibility Study (FS) for groundwater remediation, Discharger has proposed to complete a pilot study to evaluate the available remedial technologies. A Technical Memorandum titled *Pilot Study Workplan* was submitted to the DTSC on November 12, 2013 and approved by the DTSC in a letter dated November 13, 2013.

8. The remedial approach being considered for the groundwater plume at the Site involves in-situ remediation of the source area where accessible and a reactive barrier along 56th Street to prevent downgradient plume migration.

9. Due to the depth of the water table and the impacted groundwater (approximately 150 feet bgs), the primary approach for in-situ remediation being considered is injection through wells.

10. The DTSC approved the *Pilot Study Workplan* proposed to evaluate two pilot tests. Each pilot test will be completed in two phases.

11. Pilot Test One – Drill and install one injection well (LAAMS-1) and two monitoring wells (MW-29 and MW-30) to a total depth of 180 feet bgs in the vicinity of existing

TENTATIVE

monitoring well MW-8. Phase One of Pilot Test One will involve enhanced bioremediation by injection of emulsified vegetable oil (SRS-SD®) for VOCs biodegradation. Injection well LAAMS-1 will be used to inject and monitor up to 3,000 gallons of 60% SRS-SD® solution, up to 20,000 gallons of potable water, up to 30 pounds of sodium bromide (tracer) diluted to a concentration of 0.1% in SRS-SD® solution, and up to 3,000 gallons of 29% CPS solution. Phase Two of Pilot Test One will involve the injection of up to 30 liters of Consortium with 1 x 10^{11} cells per liter, up to 75,000 gallons of pH buffer solution, and up to 300 gallons of anaerobic chase water. The Consortium (TSI-DC) contains enriched natural species of Dehalococcoides. The proposed injection locations are shown on Figure 2.

12. Pilot Test Two – Drill and install one groundwater injection well (LAAMS-2) and two monitoring wells (MW-31 and MW-32) to a depth of approximately 180 feet bgs in the vicinity of existing monitoring well MW-6. Phase One of Pilot Test Two will involve a combined in-situ chemical reduction (ISCR) and enhanced bioremediation approach by injection of EHC-L® for VOC degradation. Injection well LAAMS-2 will be used to inject and monitor up to 3,000 gallons of 25% EHC-L® solution, up to 20,000 gallons of potable water, and up to 30 pounds of sodium bromide (tracer) diluted to a concentration of 0.1% in EHC-L® solution. Phase Two of Pilot Test Two will involve the injection of up to 30 liters of Consortium with 5 x 10^{10} cells per liter, up to 75,000 gallons of pH buffer solution, and up to 300 gallons of anaerobic chase water. The Consortium (SDC-9) contains enriched natural species of Dehalococcoides. The proposed injection locations are shown on Figure 2.

13. Groundwater generally occurs at a depth of approximately 145 to 150 feet bgs, but can vary substantially between wells located relatively short distances apart. Groundwater flow is generally to the north in the southern portions of the Site and shifting to the northwest in the northern portion of the Site. The horizontal hydraulic gradient varies considerably, generally ranging from 0.0004 to 0.0290 in the southern and northern portions of the Site, respectively.

14. Typical injection flow rates are expected to be 15 to 20 gallons per minute (gpm) with total injection duration of up to 3 days for each test. Typical injection pressures are expected to be in the range of 20 to 40 pounds per square inch (psi) with a maximum not to exceed pressure of 60 psi.

15. The nearest active water supply well is approximately 2,800 feet southeast (up-gradient) of the Site. The well extracts groundwater from a depth greater than 500 feet bgs.

16. In 2012, Discharger began to evaluate alternative remedial methods that could provide offsite mitigation and control of chlorinated VOCs migration in groundwater, and to further reduce VOCs in the source area onsite.

17. Soil samples collected on December 28, 2007 were tested and determined that

TENTATIVE

dehalococcoide microbes were not present onsite and that microbial augmentation would likely be required for bioremediation of chlorinated VOCs to occur.

18. The Discharger proposed to implement control measures if Dehalococcoides ethenogenes are detected in the monitoring point outside the treatment zone (monitoring well MW-7). The control measure will involve stopping further addition of organic substrates to the groundwater. After the control measure has been implemented, it is expected that the remaining organic substrates in the groundwater will naturally break down and allowing the groundwater system to return to aerobic conditions. The bioaugmentation culture requires organic substrates (food sources), VOCs, and anaerobic conditions to survive. Given these growth requirements, the bioaugmentation culture will not survive due to the loss of the food sources and anaerobic conditions.

19. California Water Code (CWC) section 13260 requires any person who discharges waste or proposes to discharge waste that could affect the quality of the waters of the state is required to submit a report of waste discharge. CWC section 13263 authorizes the Regional Board to issue waste discharge requirements that implement the water quality control plan (Basin Plan). The injection of chemicals and/or materials into groundwater is a discharge of waste as defined in section 13050 of the CWC and is subject to CWC sections 13260 and 13263. The discharge of the compounds proposed herein is intended to provide more effective remediation of chlorinated VOC-impacted groundwater and are expected to reduce the anticipated Site cleanup time as compared to pump-and-treat technology.

20. On December 20, 2013, the Regional Board enrolled the Discharger under the general WDRs (WDR Order No. R4-2007-0019) and Monitoring and Reporting Program (MRP) No. CI-10008, which applies to the injection of vegetable oil, EHC-L®, CPS, and tracer that is being used to remediate groundwater at the Site.

21. Because WDR Order No. R4-2007-0019 does not apply to the use of bioaugmentation culture and anaerobic chase water additional waste discharge requirements are necessary to regulate those discharges. Therefore, these site-specific waste discharge requirements apply to the addition of bioaugmentation culture and anaerobic chase water to be used to remediate groundwater at the Site. To address all compounds under one set of WDRs, these site-specific WDRs will also apply to the use of vegetable oil, EHC-L®, CPS, and tracer. Consequently, coverage under the general WDRs terminate upon adoption of these site-specific WDRs.

22. The application of pH buffer, organic substrates, tracer, bioaugmentation culture, and anaerobic chase water to groundwater may result in unintended adverse impacts to groundwater quality, but impacts that may result will be localized, of short-term duration, and will not impact any existing or prospective beneficial uses of groundwater. The addition of pH buffer, organic substrates, tracer, bioaugmentation culture, and anaerobic chase water will improve groundwater conditions by promoting complete degradation of

TENTATIVE

chlorinated VOCs.

23. The discharge of vegetable oil, EHC-L®, CPS, tracer, pH buffer, bioaugmentation culture, and anaerobic chase water is intended to improve water quality by providing more efficient remediation of VOCs impacted groundwater and is expected to significantly reduce groundwater cleanup time and costs. This Order includes requirements to minimize the adverse impacts and to assure protection of waste quality.

APPLICABLE PLANS, POLICIES AND REGULATIONS

24. The Regional Board adopted the Water Quality Control Plan for the Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Basin Plan) on June 13, 1994, which has been amended by various Regional Board resolutions. The Basin Plan (i) designates beneficial uses for surface and groundwater, (ii) establishes narrative and numerical water quality objectives that must be attained or maintained to protect the designated (existing and potential) beneficial uses and conform to the State's antidegradation policy, and (iii) includes implementation provisions, programs, and policies to protect all waters in the Region. In addition, the Basin Plan incorporates (by reference) all applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. The requirements contained in this Order, as they are met, will be in conformance with the Basin Plan.

25. LLAMS is located in the Los Angeles Coastal Plain hydrologic area and overlies the Central Basin subarea. The Basin Plan designates beneficial uses and water quality objectives for the Central Basin as follow:

Groundwater (Central Basin):

Existing: Municipal and Domestic Supply, Industrial Service Supply, Industrial Process Supply, and Agricultural Supply.

26. It is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. This order is consistent with the policy to improve groundwater quality for designated beneficial uses.

27. State Water Resources Control Board (State Water Board) Resolution No. 68-16 (hereafter Resolution No. 68-16 or the "Antidegradation" Policy) requires the Regional Board in regulating the discharge of waste to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Regional Board's policies (e.g., quality that exceeds water quality objectives). Resolution No. 68-16 requires that any discharge that could degrade the waters of the State be regulated to assure use of best

TENTATIVE

practicable treatment or control (BPTC) of the discharge to assure that pollution or nuisance will not occur, and the highest water quality consistent with maximum benefit to the people of the State will be maintained. The activities intended to cleanup polluted groundwater regulated by this Order are consistent with Resolution 68-16. The discharge of vegetable oil, EHC-L®, CPS, tracer, pH buffer, bioaugmentation culture, and anaerobic chase water is intended to improve water quality by providing more efficient remediation of VOCs impacted groundwater and is expected to significantly reduce groundwater cleanup time and costs. This methodology constitutes BPTC in this circumstance. The discharge could result in minor increases in degradation of the groundwater, but such increases will be temporary. The restoration of the groundwater to its beneficial uses is consistent with maximum benefit to the people of the state. This Order includes a monitoring and reporting program to evaluate compliance with the requirements of the Order.

28. Section 13267(b) of the CWC states, in part, that "In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of waters of the state within its region shall furnish under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs of these reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."

29. Section 13267(d) of the CWC states, in part, that "a regional board may require any person, including a person subject to a waste discharge requirements under Section 13263, who is discharging, or who proposes to discharge, wastes or fluid into an injection well, to furnish the state board or regional board with a complete report on the condition and operation of the facility or injection well, or any other information that may be reasonably required to determine whether the injection well could affect the quality of the waters of the state."

30. The technical reports required by this Order No. R4-2014-XXXX and the attached Revised Monitoring and Reporting Program No. CI-10008 are necessary to assure compliance with these waste discharge requirements. The Discharger operates the Site that discharges the waste subject to this Order. The burden, including costs, of providing the technical reports required by this Order bears a reasonable relationship to the need for the reports and the benefits to be obtained from the reports.

CALIFORNIA ENVIRONMENTAL QUALITY ACT AND NOTIFICATION

31. DTSC has assumed the lead agency role for this project under the California Environmental Quality Act (Public Resources Code section 21000 et seq.). DTSC has reviewed the planned activities and determined that they will not have an adverse effect on public health and the environment. DTSC has determined that the proposed pilot study being conducted during investigation/feasibility phase is exempted from CEQA in accordance with title 14, California Code of Regulations, section 15262. The Regional Board is a responsible agency for purposes of CEQA and concurs with DTSC that the proposed pilot study is exempt from CEQA in accordance with title 14, California Code of Regulations, section 15262.

32. On February 19, 2014, the Regional Board has notified the Discharger and interested agencies and persons of the intent to issue WDRs for this discharge, and has provided them with an opportunity to submit written comments for the requirements by March 24, 2014.

33. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge and to the tentative requirements.

34. Any person aggrieved by this action of the Regional Board may petition the State Water Board to review the action in accordance with the CWC section 13320 and CCR, title 23, sections 2050 and following. The State Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Board by 5:00 p.m. on the next business day at P.O. Box 100, Sacramento, California, 95812, within 30 days of the date this Order is adopted. Copies of the law and regulations applicable to filing petitions may be found on the Internet at:
http://www.waterboards.ca.gov/public_notices/petitions/water_quality
or will be provided upon request.

IT IS HEREBY ORDERED that the Discharger, LAUSD, in order to meet the provisions contained in Division 7 of the California Water Code and Regulations adopted there under, shall comply with the following:

A. DISCHARGE LIMITATIONS AND SPECIFICATIONS

1. During the implementation of the proposed discharges, up to 3,000 gallons of 60% SRS-SD® solution, 3,000 gallons of 29% CPS solution, 3,000 gallons of 25% EHC-L® solution, 150,000 gallons of pH buffer solution, 60 pounds of sodium bromide (tracer) diluted to a concentration of 0.1% solution, 60 liters of the Consortium, and 600 gallons of anaerobic chase water will be injected into two injection wells (LAAMS-1 and LAAMS-2) at depths approximately from 150 to 180 feet bgs. The injection volumes shall not exceed the aforementioned volumes.

TENTATIVE

2. The proposed discharge shall not cause the pH of the receiving groundwater at the compliance point, downgradient outside the treatment zone, beyond the range of 6.5 and 8.5.

3. The proposed discharge shall not cause the receiving groundwater at the compliance point, downgradient outside the treatment zone, in excess of 700 milligrams per liter (mg/L) of total dissolved solid, 250 mg/L of sulfate, 150 mg/L of chloride, and 1.0 mg/L of boron or background concentrations established prior to start of injection.

4. Discharge duration for the proposed discharges shall not exceed more than 12 months, unless approved by the Executive Officer.

5. The Discharger proposed to conduct a groundwater sampling and analysis program prior to, during, and after implementation of the proposed discharges to closely monitor groundwater conditions. The Discharger shall monitor the presence of and concentration of injection solution, evaluate flow conditions, and implement mitigation measures if necessary to prevent further migration of waste constituents outside the application area or treatment zone at compliance point(s).

B. DISCHARGE PROHIBITIONS

1. The Discharger shall not cause the SRS-SD®, EHC-L®, CPS, sodium bromide, Consortium, the amendments, and the by-products of the bioremediation process to migrate outside of the treatment area established by the Discharger and approved by the Executive Officer.

2. Discharge of waste classified as 'hazardous', as defined in Section 2521(a) of Title 23, California Code of Regulations, Section 2510 et seq., is prohibited. Discharge of waste classified as 'designated,' as defined in California Water Code Section 13173, in a manner that causes violation of groundwater limitations, is prohibited.

3. The discharges of the amendments and any by-products of the remediation process into any surface water or surface water drainage course are prohibited.

4. The proposed discharge shall not create pollution, contamination, or nuisance as defined by the CWC, section 13050.

5. The proposed discharge shall not cause the receiving groundwater to contain concentrations of chemical substances or their by-products in amounts that adversely affect any designated beneficial use outside the application area or treatment zone at the compliance point(s). If adverse impact occur outside the

TENTATIVE

application area or treatment zone, mitigation measures shall be implemented if necessary. A contingency plan including design, installation, and implementation of mitigation measures shall be submitted to the Regional Board for Executive Officer approval by **May 11, 2014**.

6. The proposed discharge shall not cause the receiving groundwater to contain taste or odor in concentrations that cause nuisance or adversely affect any designated beneficial uses, outside the application area or treatment zone at the compliance point(s).

7. Any discharge of waste at any point other than specifically described in this Order is prohibited and constitutes a violation of this Order.

C. PROVISIONS

1. This Order includes the attached *Standard Provisions Applicable to Waste Discharge Requirements* which are incorporated herein by reference. If there is any conflict between provisions stated herein and the *Standard Provisions Applicable to Waste Discharge Requirements*, the provisions stated herein will prevail.

2. Discharge of wastes to any point other than specifically described in this Order is prohibited.

3. In the event of any change in name, ownership, or control of the Site, the Discharger shall notify this Regional Board in writing and shall notify any succeeding owner or operator of the existence of this Order by a letter, a copy of which shall be forwarded to this Regional Board.

4. A copy of these requirements shall be maintained at an on-site office and be available at all times to operating personnel.

5. The Discharger shall file a report of any material change or proposed change in the character, location or volume of discharge.

6. The Discharger shall notify the Regional Board within 24 hours by telephone of any adverse condition resulting from this discharge or from operations producing this waste discharge, such notifications shall be affirmed in writing within one week from the date of such occurrence.

7. The Regional Board considers the Discharger to have continuing responsibility of correcting any problem that may arise in the future as a result of the proposed discharge.

8. All work must be performed by or under the direction of a registered civil engineer, registered geologist, or certified engineering geologist registered in the State of California. A statement is required in all technical reports that the registered professional in direct responsible charge actually supervised or personally conducted all the work associated with the project.

9. The Discharger shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports as specified in the attached Revised Monitoring and Reporting Program No. CI-10008. Violations of any conditions may result in enforcement action, including Regional Board or Court Order requiring corrective action or imposition of civil monetary liability, or revision, or rescission of the Order.

10. This Order does not relieve the Discharger from the responsibility to obtain other necessary local, state, and federal permits to construct facilities necessary for compliance with this Order; nor does this Order prevent imposition of additional standards, requirements, or conditions by any other regulatory agency.

11. The Discharger shall develop a contingency plan and maintain it on site. The contingency plan shall detail appropriate actions to be taken in order to protect human health and the environment in case of any spill or failure related to the operation or mis-operation of the treatment system.

12. The Discharger shall cleanup and abate the effects of injecting amendment solution as specified in this Order, including extraction of any by-products which adversely affect beneficial uses, and shall provide an alternate water supply source for municipal, domestic or other water use wells that become polluted in exceedance of water quality objectives as a result of the proposed discharge.

13. The WDRs contained in this Order will remain in effect and will be reviewed after five (5) years, but may at any time be reviewed or reopened to address changed circumstances or new information. Should the Discharger wish to continue discharging to groundwater for a period of time in excess of 5 years, the Discharger must file an updated Report of Waste Discharge with the Regional Board no later than 120 days in advance of the fifth-year anniversary date of the Order for consideration of issuance of new or revised waste discharge requirements.

14. In accordance with CWC section 13263(g), these requirements shall not create a vested right to continue to discharge and are subject to rescission or modification. All discharges of waste into waters of the state are privileges, not rights.

15. After notice and opportunity for a hearing, this Order may be terminated or modified for causes including, but not limited, to:

a) Violation of any term or condition contained in this Order;
b) Obtaining this Order by misrepresentation, or failure to disclose all relevant facts; or
c) A change in any condition, or the discovery of any information, that requires either a temporary or permanent reduction or elimination of the authorized discharge.

16. The Regional Board, through its Executive Officer, will modify the Monitoring and Reporting Program, as necessary. The CEQA Initial Study and associated public comment were conducted once as part of the WDR permit application process and will not be required for the expansion or modification of this remediation program.

D. ELECTRONIC SUBMITTAL OF INFORMATION

The Discharger shall comply with the Electronic Submittal of Information (ESI) requirements by submitting all reports required under the WDRs, including groundwater monitoring data in Electronic Data Format, discharge location data, and searchable Portable Document Format of reports and correspondence, to the State Water Resources Control Board GeoTracker database under Global ID WDR100014749.

I, Samuel Unger, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on April 10, 2014.

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Samuel Unger, P. E.
Executive Officer

TENTATIVE