CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
ORDER NO. R4-2011-XXXX
WASTE DISCHARGE REQUIREMENTS
FOR
ROBERTSHAW CONTROLS COMPANY
3000 EAST IMPERIAL HIGHWAY
(ENHANCED IN-SITU BIOREMEDIATION AND ZERO VALENT IRON INJECTION FOR GROUNDWATER CLEANUP)
(FILE NO. 10-068)

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

PURPOSE OF ORDER

1. Robertshaw Controls Company (RCC, Discharger), is performing a site characterization and remediation (on behalf of 3000 East Imperial LLC who owns the former Regent Officeworks, Inc. manufacturing facility) at 3000 East Imperial Highway, Lynwood, California (site). On May 28, 2010, the Discharger filed with the Regional Board a Report of Waste Discharge for a groundwater remediation by Enhanced In Situ Bioremediation (EISB) and In Situ Chemical Reduction (ISCR) program. The groundwater remediation program will consist of the injection of i) emulsified vegetable oil (EVO); ii) the injection of a bioaugmentation culture (a non-pathogenic, naturally-derived microbial culture e.g., KB-1™ or SDC-9™); and iii) emulsified zero valent iron (ZVI).[1]

FACILITY DESCRIPTION

2. The 4.2 acre rectangular site was first developed in the 1930s by Grayson Heat Controls and was used for the manufacture of heating control devices.

3. Grayson was acquired by RCC during the late 1930s and continued operations until 1955 when Whittaker Corporation acquired the site.

4. Whittaker reportedly manufactured aircraft parts at the site until approximately 1963, when the site was sold to the Kanowsky family.

5. Allied Industrial Components and Allied Upholstery reportedly operated at the site when the Kanowsky family owned the site from 1963 to 1970. In 1970 the property was sold to Gold Realty Company who owned the property until 2004 when it was sold to Lynwood Imperial, LLC. The current property owner, 3000 East Imperial LLC purchased the property in 2006.

6. Allied Upholstery operated at the site from approximately 1964 until 1981. K&K Office Furniture was the primary operator of the site from 1985 through 2000. Regent Officeworks, Inc. purchased K&K in 2004 and continued to operate the site as a furniture manufacturing facility until March 2007.

[1] The emulsified vegetable oil and zero valent iron are approved for injection under General WDR R4-2005-0030.

7. From the early 1980s until the site was demolished in 2007, approximately 90% of the site was covered by buildings. The site was most recently occupied in 2006 by a furniture manufacturing facility operated by Regent Officeworks and consisted of a manufacturing building which was approximately 116,000 square feet (SF), a maintenance shed comprised of approximately 600 SF, and a lumber storage and hazardous materials storage shed comprised of approximately 1,600 SF. The site is currently used for temporary surface parking and a water tower remains in the southeastern corner.

8. Numerous site characterization investigations were performed at the site between 1996 and 2010. The soil, soil vapor and groundwater investigations indicate that the nine (9) former underground storage tanks (USTs) which were removed in 2009, were the primary source of environmental impacts at the site.

9. The nine (9) USTs were installed in the western portion of the site. The tops of the USTs were approximately 3 feet below ground surface (bgs). The three 1,000-gallon, two 750-gallon, and four 550-gallon USTs were removed from the site in 2009.

10. The following constituents of concern (COCs) have been identified in groundwater: tetrachloroethene (PCE, up to 0.170 mg/L), trichloroethene (TCE up to 410 mg/L), cis-1,2-dichloroethene (c-DCE, up to 46 mg/L), trans-1,2-dichloroethene (trans-DCE, up to 3.3 mg/L), 1,1,2-trichloroethane (1,1,2-TCA, up to 0.0025 mg/L), 1,2-dichloroethane (1,2-DCA, up to 0.37 mg/L), 1,2,4-trimethylbenzene (1,2,4-TMB, up to 0.46 mg/L), naphthalene (up to 0.001 mg/L), benzene (up to 7.1 mg/L), toluene (up to 28 mg/L), xylenes (up to 2.1 mg/L), and lead (up to 0.12 mg/L).

11. TCE is the most prevalent and most highly concentrated COC at the site. TCE and its degradation products are therefore the primary focus of the remedial activities proposed, as approved by the Department of Toxic Substances Control (DTSC).

12. Two separate plumes are evident at the site, one from the western portion of the site and one from the central/eastern portion of the site. The western plume has significantly higher concentrations of COCs and extends further off-site towards the south than the eastern plume. While groundwater data indicate non-aqueous phase liquids (NAPL) may be present in the western plume near the former USTs, only low concentrations of COCs were detected in the eastern plume.

13. Vertically, impacted groundwater extends from approximately 35 feet bgs to approximately 60 feet bgs in the western plume and from approximately 30 feet bgs to approximately 55 feet bgs in the eastern plume.

14. A bench scale treatability test conducted using site soil and groundwater indicates that EISB is feasible at the site, but only if a microbial culture is added (bioaugmented). In the treatability test, TCE and daughter products were effectively and completely degraded to ethene in the presence of an added electron donor, EVO, and a microbial culture containing Dehalococcoides ethenogenes (DHE).

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SITE HYDROGEOLOGY

15. Depth to first groundwater at the site ranges from approximately 25 to 35 feet bgs. Groundwater flow direction is to the west-southwest in the eastern portion of the site and transitions to the south-southwest in the western portions of the site and south of the site.

16. The site is situated at an elevation of approximately 90 feet above mean sea level within the Los Angeles Coastal Plain Central Basin. The Bellflower Aquiclude, the first water bearing unit contains limited perched groundwater supplies and is composed of relatively fine-grained deposits that restrict the vertical movement of groundwater. Beneath the Bellflower lies the Holocene Age Gaspur Aquifer, the shallowest regional aquifer and first encountered at approximately 60 feet bgs in the project area. The Exposition and Gardena Aquifers (Lakewood Formation) are reportedly encountered at approximately 130 and 330 feet bgs, respectively, in the project area followed by the Hollydale, Jefferson, Lynwood, Silverado, and Sunnyside Aquifers (San Pedro Formation). The Jefferson aquifer is reported to be absent in the project area. The aquifers are generally separated by fine-grained aquitard units.

REMEDIATION DESCRIPTION

17. The Discharger intends to conduct a one to two years groundwater remediation program utilizing EISB to promote reductive dechlorination of TCE and the daughter products while ISCR, utilizing ZVI, will be used in addition to EISB to treat higher concentration areas to aggressively reduce volatile organic compounds (VOCs) mass.

18. Up to 400 injection points will be advanced for the groundwater remediation program. Injections will be performed using direct push technologies to treat from first groundwater to approximately 60 feet bgs.

19. For EISB remediation, a solution containing a carbon source and bioaugmentation culture will be added to groundwater to create a reducing environment (i.e., anaerobic) in which specific microorganisms, notably bacteria of the genus *Dehalococcoides*, can grow and biodegrade the chlorinated VOCs. The activity of these microorganisms will be used to remediate the designated treatment areas (as specified in the Response Plan approved by DTSC). The proposed carbon source is on the list of approved electron donors. The EVO contains soybean oil, sodium lactate and food grade emulsifiers. The addition of the amendment solution (electron donor and bioaugmentation culture along with potable water) to the subsurface soil and/or Bellflower aquiclude groundwater will be performed in a manner to target the treatment zones designated for remediation. Potable water will be used to dilute and inject the EVO to achieve up to 1% oil concentration of the soil's estimated pore volume.

20. The electron donors will be consumed by a wide variety of microorganisms and their persistence in the subsurface varies depending on the initial concentration injected. The bioaugmentation culture is an anaerobic consortium that requires a constant food source (electron donor) and chlorinated ethenes (e.g., TCE) to survive. Once the electron donor or chlorinated ethenes are consumed, the

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population of the bioaugmentation culture will diminish substantially. Neither the electron donor nor the bioaugmentation culture is able to move faster than the ambient groundwater velocity. The nature of the subsurface materials at the site, mostly silty sands and clays, will allow groundwater to flow at a very slow speed of less than 6 feet/year. This low groundwater flow rate also helps to limit the distribution of the amendments in the subsurface. If non-aqueous phase liquid (NAPL) is present, ISCR will be implemented by injecting emulsified ZVI to chemically reduce chlorinated VOCs to ethene.

21. The Discharger states that the rate and extent of intrinsic degradation of TCE and c-DCE in site groundwater is limited by the lack of nutrients (e.g. electron donors) and the absence of suitable strains of bacteria capable of promoting complete reductive dechlorination of chlorinated ethene compounds to ethene at the site. Indigenous bacteria present at the site appear to be capable of partial dechlorination of TCE to c-DCE with the addition of EVO as the electron donor. Complete dechlorination of TCE and c-DCE through vinyl chloride (VC) to ethene was achieved with the addition of EVO as the electron donor and the bioaugmentation culture.

22. The Discharger proposes to monitor downgradient groundwater quality to assess the migration of the amendment solution as shown in Figure 1. If the bioaugmentation culture migrates beyond the targeted treatment area, it will continue to remediate chlorinated solvents in downgradient groundwater. The EVO will degrade over time in the subsurface as it is used by the native microbial population. The EVO is anticipated to be entirely consumed within approximately 2 years after the injection event. Based on average groundwater flow velocities of less than 6 feet per year, the EVO is not anticipated to migrate significantly from the target treatment area. The bioaugmentation culture is naturally occurring in the subsurface. The augmentation process serves to boost the concentration of microbes in the subsurface to increase VOC degradation rates. Microbial populations will decline to background concentrations in areas without sufficient EVO to support the augmented microbial population. Any injection of an amendment solution into the groundwater is a discharge of waste as defined by the California Water Code. However, the discharge of the amendment solution and ZVI (if necessary) is intended to improve groundwater quality and provide more effective remediation of chlorinated VOC-impacted groundwater and is expected to significantly reduce the site cleanup time as compared to pump-and-treat technology or EISB without addition of a bioaugmentation culture.

23. The application of electron donor, bioaugmentation culture and ZVI to groundwater may result in temporary adverse impacts to groundwater quality, but these adverse impacts that may result will be localized, transient, and will not impair any existing or prospective uses of groundwater. The localized and transient adverse impacts include a short term increase in VC concentrations as TCE is reductively dechlorinated through c-DCE and VC to ethene. However, the bioaugmentation culture will continue to dechlorinate the VC to ethene.

24. Prior to initiating the EISB and ISCR technologies, groundwater samples will be collected from monitoring wells MW-3, MW-4, MW-5, MW-15, MW-19A, MW-19B, MW-20A, MW-20B, MW-21A, and MW-21B for baseline measurements of depth to groundwater, VOCs, total dissolved solids (TDS), calcium, magnesium,

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potassium, sodium, chloride, nitrate (as N), sulfate, bicarbonate, dissolved oxygen, oxidation reduction potential, specific conductance, pH, and temperature. These monitoring wells also will be sampled once every two months for the first six months after donor and culture injection, quarterly for the next six months, and semi-annually for the next year.

APPLICABLE LAWS, PLANS, POLICIES AND REGULATIONS

25. The Regional Board adopted a revised Water Quality Control Plan (*Basin Plan*) for the Los Angeles Region on June 13, 1994. The Plan contains beneficial uses and water quality objectives for the Los Angeles Coastal Plain Central Basin. The requirements contained in this Order, as they are met, will be in conformance with the goals of the Plan.

26. The Los Angeles Coastal Plain Central Basin is designated for beneficial uses including municipal and domestic water supply (MUN), industrial service supply (IND), industrial process supply (PROC), and agricultural supply (AGR).

27. The water quality objectives in the Los Angeles Coastal Plain Central Basin are 700 mg/L for TDS, 250 mg/L for sulfate, 150 mg/L for chloride, and 1.0 mg/L for boron.

28. The permitted discharge is consistent with the anti-degradation provisions of State Water Resources Control Board Resolution No. 68-16 (Anti-degradation Policy). The discharge may result in some localized temporary exceedances of background concentrations of total organic carbon, iron, and total dissolved solids. However, after the injection of amendment solution, these parameters are not anticipated to exceed the primary or secondary standards. Moreover, any parameter change resulting from the discharge:

    a. will be consistent with maximum benefit to the people of the State,

    b. will not unreasonably affect present and anticipated beneficial uses of such waters, and

    c. will not result in water quality less than that prescribed in the Water Quality Control Plan for the Los Angeles Groundwater Basin.

29. The DTSC has assumed lead-agency role for this project under the California Land Reuse and Revitalization Act (CLRRA) of 2004 and has conducted an Initial Study in accordance with section 15063 of the “State CEQA Guidelines” at California Code of Regulations, title 14, section 15000 et seq. Based upon the Initial Study, the DTSC staff prepared a Negative Declaration dated June 9, 2011 that the project will not have a significant adverse effect on the environment.

30. The Regional Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for this discharge and has provided them with an opportunity to submit their written views and recommendations. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge and to the tentative requirements.

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IT IS HEREBY ORDERED that the Discharger, Robertshaw Controls Company, in order to meet the provisions contained in Division 7 of the California Water Code and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Specifications

1. The discharge (injection) of electron donor/carbon source, bioaugmentation cultures, and ZVI into the groundwater shall be only performed according to the methods specified in the Report of Waste Discharge package submitted to the Regional Board on May 28, 2010.
2. During this remediation the injection volume for the application of EISB, consisting of potable water, electron donor and bioaugmentation culture shall not exceed 1.7 million gallons.
3. The amendment solution shall be limited to potable water, electron donor, and bioaugmentation cultures. The amendments will consist of a mixture of water with one or more of the following: emulsified oil which contains soybean oil, sodium lactate and food grade emulsifiers (maximum concentration of up to 1% oil). In addition, bioaugmentation cultures (e.g., KB-1™ or SDC-9™) will be introduced into the groundwater shortly after the addition of electron donor (approximately 1.5 liters per injection point).
4. In the event that additional injections (in excess of the 1.7 million gallons specified herein) are needed, written notice shall be provided by the Discharger for the Executive Officer's approval before additional injections are carried out.

B. Discharge Prohibitions

1. The discharge of the amendment solution or any by-products into any surface water or surface water drainage course is prohibited.
2. The Discharger shall not cause the groundwater to contain taste, color, or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses outside the treatment area.
3. The Discharger shall not cause the groundwater to contain concentrations of chemical constituents, including electron donor, bioaugmentation culture, and ZVI in amounts that may adversely affect MUN, IND, PROC or AGR beneficial uses.

C. Provisions

1. The Discharger shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports as specified in the attached Monitoring and Reporting Program No. CI-9687. Violations of any conditions may result in enforcement action, including Regional Board or Court Order requiring corrective action, imposition of civil monetary liability, or revision or termination of the Order.
2. A copy of this Order shall be available at all times to operating personnel.

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

4. The Discharger shall file with the Regional Board technical reports on self-monitoring work performed according to the detailed specifications contained in Monitoring and Reporting Program No. CI-9687 as directed by the Executive Officer.

5. In accordance with section 13260(c) of the California Water Code, the Discharger shall file a report of any material change or proposed change in the character, location, or volume of the discharge.

6. Discharge of wastes to any point other than specifically described in this Order is prohibited and constitutes a violation thereof.

7. 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.

8. The Discharger shall notify Regional Board staff by telephone within 24 hours, followed by written notification within one week, in the event it is unable to comply with any of the conditions of this Order due to:

   a) Breakdown of equipment;

   b) Accident caused by human error or negligence, or other causes such as acts of nature; and

   c) Site construction or development operations.

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

10. All work must be performed by or under the direction of a California registered civil engineer, registered geologist, or certified engineering geologist, as provided in sections 6762, 7850, and 7842, respectively, of the California Business and Professional Code. A statement is required in all technical submittals that the registered professional in direct responsible charge actually supervised or personally conducted all the work associated with the project.

11. The Discharger shall cleanup and abate the effects of injecting, EVO, ZVI and/or the bioaugmentation culture, including extraction of any by-products which adversely affect beneficial uses.

12. These requirements do not exempt the Discharger from compliance with any other laws, regulations, or ordinances, which may be applicable. They do not legalize the waste treatment facility, and they leave unaffected any further restraints on the site that may be contained in other statutes and/or required by other agencies.

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13. This Order does not relieve the Discharger from 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.

14. The Discharger shall furnish, within a reasonable time, any information the Regional Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The Discharger shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order.

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

    a) Violation of any term or condition contained in this Order;

    b) Obtaining this Order by intentional misrepresentation, or failure to disclose all relevant facts;

    c) A change in any condition that requires either a temporary or permanent reduction or elimination of authorized discharge.

16. This Order may be terminated by the Regional Board upon written request by the Discharger.

17. In accordance with California Water Code 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 the waters of the State are privileges, not rights.

18. The discharger shall allow the Regional Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

    (a) Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

    (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

    (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

    (d) Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order, or as otherwise authorized by the California Water Code, any substances or parameters at any location. [CWC Section 13267]

D. WDR Review Date:

This Order is scheduled for review on September 1, 2016.

The Discharger must file a Report of Waste Discharge in accordance with sections 13263(e) of the California Water Code not later than 120 days in

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advance of such date as application for renewal of new waste discharge requirements.

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 September 1, 2011.

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Samuel Unger, P.E.
Executive Officer

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