

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

**ORDER NO. R4-2004-0179
WASTE DISCHARGE REQUIREMENTS
FOR
CONOCOPHILLIPS COMPANY
(76 STATION No. 6907)
(OZONE INJECTION FOR GROUNDWATER CLEANUP)
(FILE NO. R-11066)**

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

PURPOSE OF ORDER

1. The ConocoPhillips Company (hereinafter Discharger) owns and operates a gasoline service station commonly known as 76 Station No. 6907 (Station) located at 11025 East Washington Boulevard, Whittier, California. The Station is located at the intersection of Norwalk Boulevard and Washington Boulevard (Figure 1) at 118°04'16" latitude and 33°58'07" longitude. The Station has been in operation since 1983. The surrounding land uses are a mixture of commercial and residential.
2. On March 1, 2004, the Discharger filed a Report of Waste Discharge for injecting gaseous ozone into the shallow aquifer to remediate the contaminated groundwater at the site.

FACILITY DESCRIPTION

3. The Station maintains one 10,000-gallon diesel and two 12,000-gallon gasoline underground storage tanks (USTs) with associated dispensers and product. During a leak detection investigation in September 1993, eight hand-auger borings (HA-1 through HA-8) were drilled in the vicinity of the product lines and dispenser islands, and eight hollow-stem auger borings (B-1 through B-8) were drilled in the vicinity of the gasoline and diesel USTs. Three of the borings were converted to groundwater monitoring wells (MW-1 through MW-3) (Figure 2). Total petroleum hydrocarbons as gasoline (TPHg) concentrations in soil samples collected from the site indicated a maximum concentration of 8,400 milligrams per kilogram (mg/Kg) and benzene concentration indicated 32 mg/Kg of benzene.
4. Since February 1998, additional assessment activities, including construction of monitoring wells (MW-4 through MW-7, MW-9 through MW-14, MW-1D through MW-6D, MW-8D, and MW-10D), were conducted at the site. The maximum hydrocarbon concentrations detected in soil samples were 35,300 mg/Kg of TPHg, 16,000 mg/Kg total petroleum hydrocarbons as diesel (TPHd), 47 mg/Kg of benzene, and 76 mg/Kg of methyl tertiary butyl ether (MTBE).

September 10, 2004

5. Groundwater samples collected from September 28, 1993 to February 26, 2004 indicated that the maximum hydrocarbon concentrations were 140,000 micrograms per liter ($\mu\text{g/L}$) of TPHg (MW-9), 17,000 $\mu\text{g/L}$ of benzene (MW-9), 31,000 $\mu\text{g/L}$ of toluene (MW-9), 4,000 $\mu\text{g/L}$ of ethyl-benzene (MW-9), 27,000 $\mu\text{g/L}$ of xylenes (MW-9), 70,000 $\mu\text{g/L}$ of MTBE (MW-12), 52,000 $\mu\text{g/L}$ of tertiary butyl alcohol (TBA) (MW-12).

SITE HYDROGEOLOGY

6. The site is located approximately 0.5 miles east of the San Gabriel River at an elevation of approximately 160 feet above mean sea level and within the San Gabriel River flood plain of the Montebello Forebay Area.
7. Two distinct soil types (low-permeable and high-permeable) are present within the water bearing sediments beneath the site. The Generally low-permeable soils are present in the horizon from approximately 10 to 40 feet below ground (fbg) and high-permeable soils are present in the horizon from approximately 40 to 62.5 fbg. The depth to the groundwater ranges from 21 to 44 fbg. The groundwater gradient is directed toward the west-southwest.

FEASIBILITY TESTING ACTIVITIES

8. In October 2002, vapor extraction tests were conducted using vapor wells VW-1 through VW-4 and the shallow onsite monitoring wells. The test results were used to assess the potential remedial alternatives for the site and to develop a remedial action plan (RAP). The Discharger submitted to the Regional Board a RAP dated January 10, 2003. In the RAP the Discharger proposed to use C-Sparge™ technology for remediation of dissolved-phase fuel constituents in groundwater present in the deep groundwater and soil vapor extraction (SVE) to remediate hydrocarbons in soil and shallow groundwater zone. Ten C-Sparge™ injection wells (CS-1 through CS-10) were proposed to remediate hydrocarbon-impacted groundwater in the deeper groundwater zone at the site. The RAP was approved by the Regional Board in a letter dated April 28, 2003.

REMEDATION DESCRIPTION

9. The Discharger proposes to install and operate a C-Sparge™ system to remediate hydrocarbon-impacted groundwater in the deep groundwater zone at the site. The C-Sparge™ technology combines low-flow [3 to 5 cubic feet per minute (cfm)] air sparging with ozonation to oxidize petroleum hydrocarbons into benign byproducts, carbon dioxide and water. Ozone is generated onsite using a control panel with a built-in compressor and ozone generator. Using perforated sparge points, microbubbles [10 to 50 micrometer (μm)] of encapsulated ozone are introduced below the water table, where the oxidation reactions take place. Ten C-Sparge™ injection wells will be installed onsite within the dissolved-phase plume in the deep groundwater zone (Figure 2). The C-Sparge™ injection wells will be located at approximately 55 feet below ground (fbg) and will be screened from approximately 52.5 to 55 fbg. During sparging, no groundwater or vapors will be extracted. Sparging will be performed on a cycled basis.

9. Ozone will chemically react with hydrocarbons in the immediate vicinity of each injection point to form intermediate by-products of various smaller chain hydrocarbons and oxygenates. The following table shows the laboratory-isolated breakdown by-products that could be produced during the ozone oxidation process with the hydrocarbons:

Constituent	Breakdown Products
TPH	acetate, butyrate, formate, propionate
BTEX	Carboxylic acids
MTBE	TBA (tertiary butyl alcohol), TBF (tertiary butyl formate), formate, oxygen, hydrogen peroxide
ETBE	TBA, TBF, acetate, oxygen, hydrogen peroxide
TBA	Formaldehyde, acetate, carbon dioxide, water

Finally, the residual oxygen formed from the initial ozone reduction reaction encourages bioremediation which consumes the listed by-products and converts them to carbon dioxide and water, thereby completing process.

10. Prior to initiating the C-Sparge™ technology, baseline samples will be collected from monitoring wells MW-1, MW-1D, MW-2, MW-2D, MW-3, MW-3D, MW-4, MW-4D, MW-5, MW-5D, MW-6, MW-6D, MW-7, MW-8D, MW-9, MW-10, MW-10D, MW-11, MW-12, MW-13, and MW-14 and analyzed for the following parameters: TPHg; total petroleum hydrocarbons as diesel (TPHd); BTEX; MTBE; TBA; tertiary amyl methyl ether (TAME); di-isopropyl ether (DIPE); ethyl tertiary butyl ether (ETBE), ethanol; dissolved oxygen (DO); oxidation-reduction potential, total chromium, chromium six, and dissolved ferrous iron. After the ozone injections, groundwater samples will be collected bi-weekly during the first month of system operation and analyzed according to a groundwater monitoring program required by the Regional Board. Data collected during the testing period will be used to evaluate the C-Sparge™ effectiveness at this site. Measurements will also be taken to determine depth to groundwater in each of the wells.

APPLICABLE LAWS, PLANS, POLICIES AND REGULATIONS

11. On June 13, 1994, the Regional Board adopted a revised *Water Quality Control Plan for Coastal Watersheds of Los Angeles and Ventura Counties* (Basin Plan) which was amended on January 27, 1997 by Regional Board Resolution No. 97-02. The Basin Plan (i) designates beneficial uses for surface waters and groundwater, (ii) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State anti-degradation policy (*Statement of Policy with Respect to Maintaining High Quality Waters in California*, State Water Resources Control Board (State Board) Resolution No. 68-16, October 28, 1968), and (iii) describes implementation programs to protect all waters in the Region. In addition, the Basin Plan incorporates by reference applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. The Regional Board prepared the 1994 update of the Basin Plan to be consistent with previously

adopted State and Regional Board plans and policies. This project implements the plans, policies and provisions of the Regional Board's Basin Plan.

12. The Basin Plan designates beneficial uses and water quality objectives for groundwater within the Central Basin as follows:

Existing: municipal and domestic supply; industrial service supply; industrial process supply, and agricultural supply.
13. The requirements contained in this Order are based on the *Basin Plan*, and, as they are met, will be in conformance with the goals of the aforementioned water quality control plans and will protect and maintain existing beneficial uses of the groundwater.
14. The permitted discharge is consistent with the anti-degradation provisions of State Board Resolution No. 68-16 (Anti-degradation Policy). The discharge may result in some localized temporary exceedance of background concentrations of dissolved oxygen, dissolved ferrous iron, total dissolved solids, sulfate, chloride, and boron. However, 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 groundwater within the Central Basin of the Los Angeles Coastal Plain.
15. This Regional Board has assumed lead-agency role for this project under the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et seq.) 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, Regional Board staff prepared a Mitigated Negative Declaration that the project, as mitigated, will not have a significant adverse effect on the environment.
16. 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.
17. Pursuant to California Water Code section 13320, any aggrieved party may seek review of this Order by filing a petition with the State Board. A petition must be received by the State Water Resources Control Board, P.O. Box 100, Sacramento, California, 95812, within 30 days of the date this Order is adopted.

IT IS HEREBY ORDERED that the Discharger, ConocoPhillips 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 ozone into the groundwater shall be performed only in accordance with the C-Sparge™ system operations described in the January 10, 2003 Remedial Action Plan.
2. The Discharger shall provide hydraulic controls, if required by the Executive Officer, that provide full and complete containment of any released materials or by-products of chemical processes for the duration of the C-Sparge™ system operations.
3. During C-Sparge™ system operations, the discharge volume of ozone shall be approximately five grams per hour of ozone at a flow rate of 3 to 6 cubic foot per minute (cfm). In the event that additional ozone discharge is needed or additional injection locations are needed, written approval by the Executive Officer shall be obtained before such discharge is carried out.

B. Discharge Prohibitions

1. The Discharger shall not allow the by-products of the chemical reduction process to migrate beyond the plume.
2. The Discharger shall not cause the groundwater outside of the remediation area to exceed the background concentrations of total dissolved solids, sulfate, chloride, and boron established prior to the start of the C-Sparge™ system operations.
3. The discharge of ozone or any by-products into any surface water or surface water drainage course is prohibited.
4. 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.
5. The Discharger shall not cause the groundwater to contain concentrations of chemical constituents, including ozone and its by-products, in amounts that may adversely affect municipal, domestic, industrial or agricultural uses.

C. Provisions

1. This Order includes the attached Monitoring and Reporting Program (MRP) No. CI-8840 which is incorporated herein by reference. If there is any conflict between provisions stated in the MRP and the Standard Provisions, those provisions stated in the MRP prevail.
2. A copy of this Order shall be maintained at an on-site office and be available at all times to operating personnel.
3. In the event of any change in name, ownership, or control of this facility, the Discharger shall notify this 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 this 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 MRP No. CI-8840 as directed by the Executive Officer. The results of any monitoring done more frequently than required at the location and/or times specified in the MRP shall also be reported to the Regional Board.
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 to any point other than specifically described in this Order, or as approved by the Executive Officer, 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. The Discharger shall submit quarterly Summary Reports detailing the results of the C-Sparge™ system operations. The report should include an evaluation of the effectiveness of using ozone to remediate petroleum hydrocarbon impacted groundwater at the site, the impact of any by-products on the receiving groundwater quality, and any other effects the in-situ treatment may have caused.
11. 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 Professions 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.

12. The application of ozone to groundwater may result in unintended adverse impacts to groundwater quality. Any potential adverse water quality impacts that may result shall be localized or short-term duration, and shall not impact any existing or prospective uses of groundwater. Groundwater quality shall be monitored before addition of ozone, during treatment, and after treatment is completed to verify no long-term adverse impact to water quality.
13. The Discharger shall cleanup and abate the effects of injecting ozone, 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 supply wells that become contaminated in exceedance of water quality objectives as a result of using ozone.
14. These requirements do not exempt the Discharger from compliance with any other laws, regulations, or ordinances, which may be applicable. They leave unaffected any further restraints on the site that may be contained in other statutes of and/or required by other agencies.
15. 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.
16. 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.
17. 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 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.
18. 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.
19. 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. Expiration Date:

This Order expires on December 13, 2008.

The Discharger must file a Report of Waste Discharge in accordance with sections 13260 and 13264 of the California Water Code not later than 180 days in advance of such date as application for issuance of new waste discharge requirements.

I, Jonathan Bishop, 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 December 13, 2004.

Jonathan S. Bishop,
Executive Officer