

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

**ORDER NO. R4-2004-0178
WASTE DISCHARGE REQUIREMENTS
FOR
CONOCOPHILLIPS COMPANY
(76 STATION No. 0971)
(OZONE INJECTION FOR GROUNDWATER CLEANUP)
(FILE NO. I-10978)**

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. 0971 (Station) located at 427 North Crescent Drive, Beverly Hills, California. The Station is located at the intersection of North Crescent Drive and Santa Monica Boulevard (Figure 1) at 118°23'59" latitude and 34°04'19" longitude. The Station has been in operation since the early 1960s. The surrounding land use is commercial.
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 500-gallon waste-oil, one 10,000-gallon diesel, and two 12,000-gallon gasoline underground storage tanks (USTs) with associated dispensers and petroleum product. During the construction of a building on the adjacent property in April 1981, petroleum hydrocarbons were detected. Subsequently site characterization activities were conducted in 1981 at the Station. The site characterization activities included the installation of 26 monitoring wells located around the perimeter of the site, on the adjacent property, and in Crescent Drive and Brighton Way. Two to three inches of liquid phase hydrocarbons (LPH) were detected on monitoring wells located on the adjacent property. Groundwater pumping activities were conducted at the site for 22 days after the installation of the 26 wells. Approximately 3.104 million gallons of groundwater and 330 to 550 gallons of LPH were removed from the subsurface. In September 1988 four additional onsite-monitoring wells were installed. A maximum total petroleum hydrocarbon as gasoline (TPHg) concentration of 120 milligrams per kilogram (mg/Kg) was detected in the soil sample collected from Boring BC-2 at approximately 40 feet below ground (fbg). A maximum dissolved-phase TPHg concentration of 480 microgram per liter (µg/L) was detected in the groundwater sample collected from monitoring well BC-2.

September 14, 2004

4. In December 1990, the waste oil UST was excavated and removed from the site. A maximum total recoverable petroleum hydrocarbon (TRPH) concentration of 28,000 mg/Kg was detected in the soil sample collected from the sidewall of the excavation at approximately eight fbg.
5. Since July 1993, additional assessment activities, including construction of monitoring wells MW-28 through MW-32, MW-8A through MW-10A, and MW-21A, hand-auger borings HA1 through HA9, and borings B-1 through B-7, were conducted at the site. The maximum hydrocarbon concentrations detected in soil samples were 2,600 mg/Kg of TPHg, 6,400 mg/Kg total petroleum hydrocarbons as diesel (TPHd), 3.6 mg/Kg of benzene, and 6.6 mg/Kg of methyl tertiary butyl ether (MTBE).
6. Groundwater samples collected from September 28, 1993 to March 19, 2004 indicated that the maximum hydrocarbon concentrations were 130,000 µg/L of TPHg (MW-1), 21,000 µg/L of TPHd (MW-2), 2,200 µg/L of benzene (MW-2), 390 µg/L of toluene (MW-28), 6,000 µg/L of ethyl-benzene (MW-2), 22,500 µg/L of xylenes (MW-2), 43,000 µg/L of MTBE (MW-10A), 840 µg/L of tertiary butyl alcohol (TBA).

SITE HYDROGEOLOGY

7. The southeast rise of Santa Monica Mountains begins approximately 1.2 miles northwest of the site. The site is located at an elevation of approximately 255 feet above sea level and the local topography slopes gently to the southeast.
8. The major hydrogeologic units present beneath the site are the Exposition and Gage Aquifers. The Exposition Aquifer consists of as many as three sand and gravel layers separated in some areas by discontinuous clay and silt lenses. The Exposition Aquifer is believed to be present at a depth of approximately 80 fbg and is approximately 25 feet thick. Approximately 25 feet of relatively impermeable silts and clays separate the Gage Aquifer from the Exposition Aquifer. The Gage Aquifer is believed to be present at a depth of approximately 130 fbg and is approximately 75 feet thick. The depth to the shallow groundwater ranges from 37 to 44 fbg. The groundwater gradient is directed toward the southeast (Figure 2).

FEASIBILITY TESTING ACTIVITIES

9. In May 2003, vapor extraction tests were conducted using vapor wells BC-1, MW-1A, MW-28, and OW-23A. 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 October 15, 2003. In the RAP the Discharger proposed to use C-Sparge™ technology injecting gaseous ozone for remediation of dissolved-phase fuel constituents in groundwater and soil vapor extraction (SVE) to remediate hydrocarbons in soil. Seven C-Sparge™ injection wells (CS-1 through CS-7) were proposed to remediate hydrocarbon-impacted groundwater at the site. The RAP was

conditionally approved by the Regional Board in a letter dated November 6, 2003. The ozone-injection technology was approved only on a pilot basis. If the pilot test is determined to be successful and a full-scale treatment system is proposed for the site cleanup, the Discharger is required to submit a final RAP to the Regional Board for review and approval by the Regional Board Executive Officer (Executive Officer). Upon approval of the final RAP, the monitoring and Reporting Program may be revised to incorporate the approved full-scale treatment plan.

REMEDIATION DESCRIPTION

10. The Discharger proposes to install and operate a C-Sparge™ system to remediate hydrocarbon-impacted groundwater 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. Seven C-Sparge™ injection wells will be installed in the vicinity of the gasoline USTs and eastern portion of the site (Figure 3). The C-Sparge™ injection wells will be located at approximately 60 fbg and will be screened from approximately 57.5 to 60 fbg. During sparging, no groundwater or vapors will be extracted. Sparging will be performed on a cycled basis.

11. 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.

12. Prior to initiating the C-Sparge™ technology, baseline samples will be collected from monitoring wells BC-2, BC-3, MW-8A, MW-9A, MW-10A, MW-11, MW-21A, MW-26, MW-28, MW-31, and MW-32 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

13. 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.
14. The Basin Plan designates beneficial uses and water quality objectives for groundwater within the Hollywood Basin as follows:

Existing: municipal and domestic supply; industrial service supply; industrial process supply, and agricultural supply.
15. 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.
16. 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 Hollywood Basin of the Los Angeles Coastal Plain.

17. 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.
18. 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.
19. 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 October 15, 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-8841 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. In the event the Discharger submits a final RAP for a full-scale cleanup and obtains an approval by the Executive Officer, this Order shall be effective for the full scale remediation upon revision of the MRP to incorporate the full-scale treatment plan
3. A copy of this Order shall be maintained at an on-site office and be available at all times to operating personnel.
4. 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.
5. 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-8841 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.
6. 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.
7. 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.
8. 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.

9. 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.
10. 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.
11. 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.
12. 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.
13. 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.
14. 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.
15. 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 statues of and/or required by other agencies.
16. 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.

17. 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.
18. 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.
19. 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.
20. 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