CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. R4-2004-0049

WASTE DISCHARGE REQUIREMENTS
FOR
CONOCOPHILLIPS COMPANY
FORMER 76 STATION NO. 5195
(OZONE INJECTION FOR GROUNDWATER CLEANUP)
(FILE NO. I-11042)

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

PURPOSE OF ORDER

1. The ConocoPhillips Company (hereafter Discharger) owns the former 76 Station No. 5195 (Station) located at 16205 Leffingwell Road, Whittier, California (site) (Figure 1). On December 2, 2002, the Discharger filed with the Regional Board a Report of Waste Discharge for a feasibility test injecting gaseous ozone into the shallow aquifer to remediate the contaminated groundwater at the site.

FACILITY DESCRIPTION

2. The Station was constructed in 1963 and operated as a retail motor vehicle fuel service station until April 2001 when it was closed for business. All structures, underground storage tanks, gasoline pumps and concrete surfaces have been removed. The site is currently vacant and is surrounded by a chain link fence.

3. In June 1997, four Geoprobe soil borings (SP-1 through SP-4) were drilled at the site (Figure 2). Total petroleum hydrocarbons as gasoline (TPH_G), benzene, and methyl tertiary butyl ether (MTBE) were detected in soil samples at concentrations as high as 12,000 milligrams per kilogram (mg/kg), 39 mg/kg, and 33 mg/kg, respectively. Groundwater samples had dissolved TPH_G, benzene, and MTBE concentrations as high as 210,000 micrograms per liter (µg/L), 42,000 µg/L, and 100,000 µg/L, respectively.

4. In October 2002, two 12,000-gallon gasoline underground storage tanks, one 550-gallon underground waste-oil tank, three dispenser islands, product lines, a clarifier and hoist were removed from the site. In addition, a total of 762 tons of contaminated soil were removed.

5. Since July 2000, four on-site groundwater monitoring wells (MW-1, MW-2, MW-3, and MW-7) and six off-site groundwater monitoring wells (MW-4, MW-5, MW-6, MW-8, MW-9, and MW-10) were installed (Figure 2). Quarterly groundwater monitoring results obtained from 1999 to 2003 indicated that TPH_G, benzene, toluene, ethylbenzene, total xylenes (BTEX) and methyl tertiary butyl ether (MTBE) were present in all monitoring wells. According to the Second Quarter 2003 Site Status Report, monitoring well MW-3 contained the highest concentrations of TPH_G (36,000 µg/L), benzene (8,300 µg/L), and MTBE (14,000 µg/L).

6. In May 2002, soil borings (B-1 through B-6) and air sparge wells (AS-1 and AS-2) were drilled onsite. The soil borings were advanced to a depth of 41.5 feet below ground surface (bgs). Borings B-1, B-3, B-4, and B-6 were subsequently converted to vapor extraction wells. Maximum concentrations for TPH_G, benzene, and MTBE detected in the soil were 2,400 mg/kg, 20 mg/kg, and 22 mg/kg, respectively.

7. On June 5, 2002, a vapor extraction test was performed using wells MW-3 and B-6. Laboratory analytical results of vapor samples indicated the presence of up to 3,500 parts per million in volume (ppmv) of volatile fuel hydrocarbons (VFH). In addition, on June 6 and 7, 2002, individual air sparging tests were performed using wells AS-1 and AS-2 as test wells and MW-1, MW-2, MW-3, B-1, B-4 and B-6 as observation wells. No hydrocarbon vapor trends could be determined for the AS-1 test since sparging was unsuccessful. However, significant amounts of hydrocarbon vapor were detected during the sparging test using AS-2.

8. The test results indicated that air sparging alone appears to be ineffective in remediating the groundwater based on the common criteria used to evaluate its success (e.g., groundwater mounding and hydrocarbon vapor increases).

SITE HYDROGEOLOGY

9. The most recent depth to groundwater at the Station (measured on May 14, 2003) ranged from 23.65 feet to 25.45 feet bgs. Groundwater flow direction is to the west-southwest (Figure 2).

10. The site is situated at an elevation of approximately 270 feet above mean sea level within the physiographic province known as the La Habra Piedmont Slope. The La Habra Piedmont Slope consists of several small alluvial fans deposited by streams draining the Puente Hills to the north and includes the La Habra Syncline. More specifically, the site is located in the Whittier Area of the Central (Groundwater) Basin of the Coastal Plain of Los Angeles County. The Whittier Area extends south from the Puente Hills to the Santa Fe Springs-Coyote Hills Uplift and is bounded on the west by the Montebello Forebay and to the east by the Orange County line.

REMEDIATION DESCRIPTION

11. On August 5, 2002, the Discharger submitted a Feasibility Testing Report proposing to conduct a one-month feasibility test using C-Sparge™ to remediate the dissolved-phase petroleum hydrocarbon plume beneath the site. The proposed test was approved by Regional Board staff on January 29, 2003.

12. A total of ten sparge points (CP-1 through CP-10), integral to the C-Sparge™ system, will be installed onsite within and around the dissolved-phase plume (Figure 3). The perforated sparge point is approximately 3 feet in length and the section will be placed at a depth of 37 to 40 feet bgs.

13. The C-Sparge™ system operations will use only microbubbles [10 to 50 micrometers (µm) in diameter] of encapsulated ozone discharged below the water table. During sparging, no groundwater or vapors will be extracted. No other known constituents will be discharged to the subsurface during system operations. Sparging will be performed on a cycled basis with each well cycled on for 5 to 10 minutes. Per manufacturer specifications, the C-Sparge™ system will inject approximately five grams per hour of ozone at a flow rate of 3 to 5 cubic feet per minute (cfm). The concentration of ozone injected into the subsurface during system operations will be approximately 0.59 milligrams per liter (mg/L).

14. The Discharger states that ozone will lose its stability within a few hours to a few days and therefore will not migrate significantly downgradient. In addition, 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 from the reaction encourages bioremediation which consumes the listed by-products and converts them to carbon dioxide (CO_2) and water (H_2O).

15. Prior to initiating the C-Sparge™ technology, groundwater samples will be collected from monitoring wells MW-1 through MW-10 for baseline measurements of depth to groundwater, TPH_G, benzene, toluene, ethylbenzene, xylenes, MTBE, TBA, tertiary amyl methyl ether (TAME), di-isopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), ethanol, dissolved oxygen, and dissolved ferrous iron. These measurements/samples will also be collected bi-weekly during the first month of system operation. Data collected during the first month of system operation will be used to evaluate the C-Sparge™ effectiveness at this site.

APPLICABLE LAWS, PLANS, POLICIES AND REGULATIONS

16. 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 Order implements the plans, policies and provisions of the Regional Board's Basin Plan.

17. The Basin Plan designated beneficial uses and water quality objectives for groundwater within the Central Groundwater Basin which underlies the Station as follows:

    Existing: municipal and domestic supply; industrial service supply; industrial process supply; and agricultural supply.

18. 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.

19. 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 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 the Central Groundwater Basin.

19. This Regional Board has assumed lead-agency role for this project under the California Environmental Quality Act (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, the Regional Board staff prepared a Mitigated Negative Declaration that the project, as mitigated, will not have a significant adverse effect on the environment. The Regional Board is adopting the Mitigated Negative Declaration concurrently with its adoption of this Order.

20. 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.

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 only performed according to the C-Sparge™ system operations described in the August 5, 2002 Feasibility Testing Report.

2. The Discharger shall provide hydraulic controls, if required by the Regional Board Executive Officer (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 the 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 5 cubic foot per minute (cfm). In the event that additional ozone discharge is needed, written approval by the Executive Officer shall be obtained before such discharge is carried out.

B. Discharge Prohibitions

1. The Discharger shall not cause the by-products of the chemical reduction process to migrate offsite.

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 No. CI-8723 which is incorporated herein by reference. If there is any conflict between provisions stated in the Monitoring and Reporting Program No. CI-8723 and the Standard Provisions, those provisions stated in the Monitoring and Reporting Program 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 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-8723 as directed by the Executive Officer. The results of any monitoring done more frequently than required at the site and/or times specified in the Monitoring and Reporting Program 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 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. 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 hydrocarbons-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 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.

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 and 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 use 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 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.

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 March 4, 2009.

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, Dennis A. Dickerson, 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 March 4, 2004.

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Dennis A. Dickerson,
Executive Officer