



California Regional Water Quality Control Board Central Valley Region

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16 November 2010

Mr. John Bailey
Ramos Oil Company
P.O. Box 401
West Sacramento, CA 95691

NOTICE OF APPLICABILITY OF GENERAL ORDER NO. R5-2008-0149 – RAMOS OIL BULK FUEL FACILITY, ISLETON, IN-SITU REMEDIATION OF PETROLEUM HYDROCARBONS, SACRAMENTO COUNTY

Ramos Oil Company (Ramos; Discharger) submitted a Notice of Intent, dated 30 April 2010, requesting coverage under General Order No. R5-2008-0149, General Waste Discharge Requirements for In-situ Groundwater Remediation at Sites with Volatile Organic Compounds, Nitrogen Compounds, Perchlorate, Pesticides, Semi-Volatile Compounds and/or Petroleum Compounds. Based on information in your submittal, it is our determination that this project meets the required conditions to be approved under the enclosed Order No. 2008-0149. All of the requirements contained in the general order are applicable to your project. You are assigned Order No. R5-2008-0149-21.

Project Location:

The project is in the City of Isleton, in Sacramento County, Latitude 38° 9' 45.05"N, Longitude -121° 36' 44.71"W. Assessor's Parcel No. 157-0011-003-0000.

Project Description:

Operations at the Ramos bulk fuel facility at Highway 160 at First Street in Isleton caused pollution of the soil and groundwater. The primary pollutants of concern in groundwater are total petroleum hydrocarbons in the diesel range (TPHd), methyl tertiary butyl ether (MTBE), and tertiary butyl alcohol (TBA). In 1991, Ramos requested permission from Sacramento County Environmental Management Department (SCEMD) to line the floor of the bulk fuel tank area. SCEMD requested Ramos to obtain soil samples at 1.5 feet below the ground surface (bgs) at 5 locations and at 5.5 feet bgs at 2 locations. Soil samples contained up to 14 parts per million (ppm) gasoline, 5,000 ppm diesel, and 110 ppm oil. Due to the presence of hydrocarbons, SCEMD required further investigation.

In attempts to remediate the petroleum hydrocarbon contamination, Ramos has conducted:

- An ozone sparge pilot test for 2.5 months during 1999; the overall results were inconclusive due to a large influx of hydrocarbons. Ramos also injected Oxygen

California Environmental Protection Agency

Release Compound (ORC®) at 13 locations within the dissolved hydrocarbon plume at this time;

- An air sparge (AS) pilot test; an AS and enhanced biovent groundwater remediation system was installed on the eastern portion of the bulk plant property in fall 2001. In early 2002, microbial solution aspiration was initiated using two on-site horizontal wells; injection was ceased at the direction of the California Regional Water Quality Control Board, Central Valley Region in 2007.
- Phytoremediation; to further enhance remediation of the contaminants, Ramos planted a line of trees in 2002 and 2003 perpendicular and downgradient to the plume to extract polluted groundwater;
- Overpurging using a vacuum truck on wells MW-1 and MW-4 between January 2002 and July 2004. Well MW-8 was also overpurged periodically between January and July 2004. Overpurging activities resulted in the combined extraction of approximately 6,600 gallons of impacted groundwater.
- An 8-hour soil vapor extraction (SVE) test on wells MW-1, MW-2, and MW-4 and an 8-hour ozone sparge bench test between 2003 and 2005 on site groundwater and soil. Based on the test results, RDM Consultants concluded that SVE would not be effective.
- In June 2005, an 8-hour O₃ bench test using groundwater and soil samples collected from the site. Based on the results of the test, Ramos' consultant concluded that full-scale O₃ sparging would not degrade groundwater quality.
- Four individual well SVE tests (using wells SVE-1, B-1, B-2, and B-3), two SVE/AS tests (using wells SVE-1/AS-1 and SVE-1/AS-4), one dual-phase extraction (DPE) test (using well EX-1), one groundwater extraction (GWE) event/pump test (using well EX-1), and one 24-hour groundwater pump test/batch extraction event (using well EX-2) in August 2008. Based on pilot test results, SVE, DPE, and GWE were deemed feasible, while AS showed limited effectiveness during the pilot testing.
- During July through September 2009, a 60-day ozone and hydrogen peroxide injection pilot test to evaluate the effectiveness in this technology to remediate groundwater pollution originating from the site. During the pilot testing, MTBE and TBA concentrations decreased at observation wells located 10 feet from the injection wells, but not at observation wells 15 feet away. The Discharger did not observe any adverse geochemical changes for metals or other inorganic parameters measured during the pilot test.

For this project, the Discharger will install and operate a full-scale ozone and hydrogen peroxide injection system along Second Street perpendicular to the petroleum hydrocarbon plume. This will include the installation of six additional ozone and hydrogen peroxide dual-completion wells in conjunction with groundwater extraction at well EX-2. The Discharger will also be conducting sampling and reporting the results as described in the enclosed Groundwater Monitoring and Reporting Program.

No comments were received on the draft Notice of Applicability and Monitoring and Reporting Program during the 30-day public comment period ending 22 July 2010.

General Information:

1. The project will be operated in accordance with the requirements contained in the General Order and in accordance with the information submitted in the Notice of Intent.

2. The required annual fee (as specified in the annual billing you will receive from the State Water Resources Control Board) shall be submitted until this Notice of Applicability is officially revoked.
3. Injection of materials other than hydrogen peroxide and ozone into the subsurface is prohibited.
4. Failure to abide by the conditions of the General Order could result in an enforcement action as authorized by provisions of the California Water Code.
5. The project will implement the final contingency plan included as part of the Notice of Intent within 30 days of it being triggered.
6. The Discharger shall comply with the attached Monitoring and Reporting Program No. R5-2007-0828 (revised), Order No. R5-2008-0149-001, and any revisions thereto as ordered by the Executive Officer.

If you have any questions regarding this matter, please call Joseph Mello at (916) 464-4661 or contact him at jemello@waterboards.ca.gov.

Frederick S. Ross

PC PAMELA C. CREEDON
Executive Officer

Enclosures

cc: Della Kramer, Regional Water Quality Control Board, Rancho Cordova
Charley Langer, Sacramento County Environmental Management, Sacramento
Christine Brown, North State Environmental, Chico
Sarah Salcedo, Stratus Environmental, Cameron Park
Ron Swepston, Isleton

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2008-0149

WASTE DISCHARGE REQUIREMENTS
GENERAL ORDER FOR
IN-SITU GROUNDWATER REMEDIATION AT SITES WITH VOLATILE ORGANIC
COMPOUNDS, NITROGEN COMPOUNDS, PERCHLORATE, PESTICIDES,
SEMI-VOLATILE COMPOUNDS, HEXAVALENT CHROMIUM
AND/OR PETROLEUM HYDROCARBONS

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Water Board) finds that:

1. Pursuant to Section 13263, subdivision (i) of the California Water Code (CWC), the Regional Water Board may prescribe general waste discharge requirements (WDRs) for discharges produced by similar operations, involving similar types of wastes, and requiring similar treatment standards.
2. Discharges of volatile organic compounds (VOCs), perchlorate, pesticides, semi-volatile compounds, hexavalent chromium and petroleum hydrocarbons have degraded groundwater at numerous sites within the Central Valley Region and cause or threaten to cause pollution or nuisance and adversely affect existing and potential beneficial uses of groundwater resources. Remediation of groundwater at these sites includes the use and application of in-situ biological, chemical, and physical treatments. These processes include oxygen enhancement, chemical oxidation, biostimulation (addition of nutrients and bacteria to enhance biodegradation), bioaugmentation (introducing appropriate bacteria) and groundwater extraction and sometimes treatment, with return of treated groundwater to the area in the aquifer undergoing treatment. The application of the amendments can be done actively with hydraulic control of the treatment zone as the amendments are added to the extracted groundwater and injected upgradient into the treatment area. The application is also done at times in a passive mode where the amendments are injected into the treatment zone and there is no nearby hydraulic control of the treatment zone. Additional details are supplied in the Information Sheet, attached to this Order.
3. Adoption of general WDRs for the these processes would: a) simplify the application process for dischargers, b) prevent regulatory delays to groundwater remediation activities, c) reduce time needed for Regional Water Board staff to prepare and the Regional Water Board to adopt WDRs for common remedial activities in the Central Valley Region, d) enhance protection of surface water quality by eliminating some discharges of treated groundwater to surface water, and e) provide a comparable level of water quality protection to individual, site-specific WDRs.
4. This Order regulates the use and application of in-situ biological, chemical, and physical treatments to clean up waste constituents in groundwater. The dischargers regulated by this Order are more appropriately regulated by general WDRs than individual WDRs because the Regional Water Board regulates many sites using this type of process, the cleanup of these type of sites is of high priority and the issuance of individual WDRs is

time-consuming without providing additional benefit, and the types of treatment used have similar effects that can reasonably be regulated with general WDRs. This Order does not preclude the adoption of individual WDRs where appropriate.

5. The materials that can be used to remediate groundwater pollution at a site in the Central Valley Region under this Order are limited to those listed in the CONDITIONS OF ELIGIBILITY, listed below. This Order is not intended for use and application of other materials to remediate groundwater pollution or for remediation of waste constituents in groundwater other than VOCs, perchlorate, nitrogen compounds (nitrate, ammonia, etc.), some selected pesticides and semi-volatile organic compounds, and petroleum hydrocarbons.
6. The application of any material to groundwater may result in unintended adverse effects to groundwater quality. To comply with this Order, any potential adverse water quality effects that may occur must be localized, of short-term duration, and may not affect existing or potential beneficial uses of groundwater. Groundwater quality will be monitored before and after addition of any materials to verify both the effectiveness of the remediation and that no long-term adverse affect on beneficial uses of groundwater has occurred.
7. The addition of materials to remediate groundwater may require bench-scale and/or small-scale pilot testing prior to design and implementation of full-scale remediation. The addition of amendments to conduct pilot studies is also covered under this Order.

REGULATORY CONSIDERATIONS

8. *The Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins, Fourth Edition* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives (WQOs), contains prohibitions, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Water Resources Control Board (State Water Board). Pursuant to ¶ 13263(a) of the California Water Code (CWC), waste discharge requirements must implement the Basin Plan.
9. The designated beneficial uses of underlying groundwater include, but are not limited to:
 - a. Municipal and domestic water supply (MUN);
 - b. Agricultural water supply (AGR);
 - c. Industrial service supply (IND); and
 - d. Industrial process supply (PRO).
10. The Basin Plan establishes numerical and narrative water quality objectives for surface water and groundwater within the basin, and recognizes that water quality objectives are achieved primarily through the Board's adoption of waste discharge requirements and enforcement orders. Where numerical water quality objectives are listed, these are limits necessary for the reasonable protection of beneficial uses of the water. Where compliance with narrative water quality objectives is required, the Board will, on a case-by-case basis,

adopt numerical limits in orders, which will implement the narrative objectives to protect beneficial uses of the waters of the state. Finding No. 15 lists those numerical limits for compliance with the narrative objectives for this Order.

11. The Basin Plan identifies numerical water quality objectives for waters designated as municipal supply. These are the maximum contaminant levels (MCLs) specified in the following provisions of Title 22, California Code of Regulations: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits) of Section 64449. The Basin Plan's incorporation of these provisions by reference is prospective, and includes future changes to the incorporated provisions as the changes take effect. The Basin Plan recognizes that the Board may apply limits more stringent than MCLs to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses.
12. The Basin Plan contains narrative water quality objectives for chemical constituents, tastes and odors, and toxicity. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants or animals. The chemical constituent objective requires that groundwater shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The tastes and odors objective requires that groundwater shall not contain tastes or odors producing substances in concentrations that cause nuisance or adversely affect beneficial uses.
13. State Water Board Resolution No. 92-49 (hereafter Resolution No. 92-49) requires the Regional Board to require actions for cleanup and abatement of discharges that cause or threaten to cause pollution or nuisance to conform to the provisions of State Water Board Resolution No. 68-16 (hereafter Resolution No. 68-16) and the Basin Plan. Pursuant to Resolution No. 92-49, the Regional Board shall ensure that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or if background levels of water quality cannot be restored, the best water quality which is reasonable and which complies with the Basin Plan including applicable WQOs.
14. Resolution No. 68-16 requires the Board in regulating discharges 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 present and potential beneficial uses, and will not result in water quality less than that described in plans and policies (e.g., quality that exceeds WQOs). Temporal degradation of groundwater may occur at sites subject to this Order within the defined treatment zone due to the amended groundwater injection. The temporary degradation allowed by this Order is consistent with Resolution No. 68-16 since (1) the purpose is to accelerate and enhance remediation of groundwater pollution and such remediation will benefit the people of the State; (2) the discharge facilitates a project to evaluate the effectiveness of cleanup technology in accord with Resolution No. 92-49; (3) the degradation is limited in scope and

duration; (4) best practicable treatment and control, including adequate monitoring and hydraulic control to assure protection of water quality, are required; and (5) the discharge will not cause WQOs to be exceeded beyond the treatment zone and it is expected that increases in concentrations above WQOs caused by the treatment will be reduced over time. A slight residual increase in salts may occur at some sites subject to this Order but will be limited to a maximum 10 percent increase over background and less than the WQO listed below in Finding No. 15. See Groundwater Limitation E.3.

15. This Order addresses water quality as it relates to the chemicals being injected, as well as the byproducts and breakdown products produced by the reactions of the injectants, chemicals being treated and geological materials. Cleanup criteria for groundwater are established in an appropriate enforcement document – Record of Decision, Cleanup and Abatement Order, or Remedial Action Plan and are not discussed further as a part of this Order. As discussed above, chemicals are injected to stimulate reduction in concentrations of the target waste constituent and the target waste constituent may undergo a series of transformations to other constituents as it degrades. The injected chemical itself may leave residuals of its components, as well as cause changes in groundwater chemistry that liberate metals found in the formation materials. Background/baseline concentrations of metals and total dissolved solids will be established pursuant to the attached Monitoring and Reporting Program. The applicable WQOs are the narrative toxicity objective, Primary and Secondary Maximum Contaminant Levels, and the narrative taste and odor objective as found in the Basin Plan. Numerical limits in this Order implement those WQOs. The following Table presents the numerical WQOs for potential waste constituents of concern at the site:

Constituent	WQO	Reference
trichloroethene	0.8 µg/L	California Public Health Goal
tetrachlorethene	0.06 µg/L	California Public Health Goal
vinyl chloride	0.05 µg/L	California Public Health Goal
cis 1,2-dichlorethene	6 µg/L	Primary Maximum Contaminant Level
1,2-dichlorethene	10 µg/L	Primary Maximum Contaminant Level
1,2-dichloroethane	0.4 µg/L	California Public Health Goal
1,1-dichloroethene	6 µg/L	Primary Maximum Contaminant Level
1,1-dichloroethane	3 µg/L	California Public Health Goal
1,2,3-trichloropropane	0.0007µg/L	Draft California Public Health Goal
1,2-dichloropropane	0.5 µg/L	California Public Health Goal
1-chloropropane	280 µg/L	IRIS
propene	28 µg/L	Taste and Odor
iron	300 µg/L	Secondary Maximum Contaminant Level
manganese	50 µg/L	Secondary Maximum Contaminant Level
hexavalent chromium	2 µg/L	Draft PHG
total chromium	50 µg/L	Primary Maximum Contaminant Level
total dissolved solids	450 mg/L	Food and Agricultural Organization
sulfate	250,000 µg/L	Secondary Maximum Contaminant Level
sodium	20,000 µg/L	USEPA Health Advisory
bromate	10 µg/L	Priamry Maximum Contaminant Level
chloride	106,000 µg/L	Agricultural Water Quality Goal – Food and Ag

16. Some amendments used to stimulate degradation of waste constituents in groundwater have a salt component (generally sodium or potassium). Upon completion of the intended degradation process, the salt component remains. The groundwater in the Central Valley is severely degraded by salts and the Regional Board is intent on minimizing the discharge of salts to the groundwater. The use of non salt-containing injectants is preferred, and the Discharger is required to demonstrate that there are no non salt-containing injectant alternatives that will cost-effectively promote the degradation of the target constituent before being allowed to use a salt-containing injectant. See Discharge Specification D.1. Furthermore, the Discharger is required to establish background salt concentrations and monitor the groundwater for changes in salt concentrations during the life of the project. Increases in salt concentrations in ground water are restricted by Groundwater Limitation E.3, below.
17. The action to adopt these Waste Discharge Requirements is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21000, et seq.) (CEQA) because it: (1) authorizes activity that will result in a minor modification to land pursuant to Title 14, California Code of Regulations, Section 15304; (2) consists of an action by a regulatory agency authorizing actions for the protection of the environment pursuant to Title 14, California Code of Regulations, Section 15308; and (3) authorizes minor cleanup actions costing \$1.5 million or less that are taken to prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release of a hazardous waste or substance pursuant to Title 14, California Code of Regulations, Section 15330.
18. The discharge is exempt from the requirements of *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste*, set forth in the Title 27, California Code of Regulations (CCR), section 20005 et seq. (hereafter Title 27), which allows a conditional exemption from some or all of the provisions of Title 27. The exemption, pursuant to Title 27 CCR Section 20090(b), is based on the following:
 - a. The Regional Water Board is issuing waste discharge requirements.
 - b. The discharge is in compliance with the applicable Basin Plan.
 - c. The wastewater does not need to be managed according to Title 22CCR, Division 4.5 and Chapter 11 as a hazardous waste.

Section 20090(d) allows exemption for a project to cleanup a condition of pollution that resulted from an unauthorized discharge of waste based on the following:

- d. The application of amendments to groundwater is at the direction of the Regional Water Board to cleanup and abates conditions of pollution or nuisance resulting from the unauthorized discharge of waste.
- e. Wastes removed from the immediate place of release must be discharged according to the Title 27 regulations; and
- f. The cleanup actions intended to contain wastes at the place of release shall implement the Title 27 regulations to the extent feasible.

19. Section 13267(b) of the California Water Code provides 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 the 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 these 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."

The technical reports required by this Order and the attached Monitoring and Reporting Program are necessary to assure compliance with this Order. The Discharger operates the facility that discharges the waste subject to this Order.

20. The California Department of Water Resources sets standards for the construction and destruction of groundwater wells, as described in *California Well Standards Bulletin No. 74-90* (June 1991) and *Water Well Standards: State of California Bulletin No. 94-81* (December 1981). These standards, and any more stringent standards implemented by the Regional Water Board or adopted by the local county where the site is located pursuant to California Water Code Section 13801 apply to all monitoring and injection wells.
21. Section 3020(b)(2) of the Resource Conservation and Recovery Act (RCRA) states that prior to injection into or above an underground source of drinking water, contaminated groundwater shall be "... treated to substantially reduce hazardous constituents prior to such injection." In a letter dated 10 December 1999, the United States Environmental Protection Agency, Office of Solid Waste and Emergency Response (OSWER) states, "if extracted groundwater is amended at the surface (i.e., "treated") before reinjection, and the subsequent in-situ bioremediation achieves a substantial reduction of hazardous constituents the remedy would satisfy Section 3020(b)(2)." The injection of groundwater within the treatment zone in compliance with this Order, with or without the treatment for the constituents of concern, complies with Section 3020(2)(b) of RCRA.
22. Section 13304.1(b) of the California Water Code requires that the Regional Board shall consult with the affected groundwater management entity, if any, affected public water systems, and the State Department of Public Health prior to setting applicable water quality standards to be achieved at groundwater cleanup sites that are associated with an aquifer that is used as a drinking water source. Prior to issuing a Notice of Applicability under this Order for a specified project, the Regional Board will consult with the appropriate interested agencies.

23. Section 13307.5 of the California Water Code requires specific public participation actions if the site cleanup is being undertaken pursuant to a cleanup and abatement order. When applying this Order to sites subject to a cleanup and abatement order, the required public participation will be adhered to.

Other

24. Pursuant to California Water Code Section 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.
25. All the above and the supplemental data and information and details in the attached Information Sheet, which is incorporated by reference herein, were considered in establishing the following conditions of discharge.
26. The Discharger and interested agencies and persons were notified of the intent to prescribe waste discharge requirements for this discharge and provided with an opportunity for a public hearing and an opportunity to submit written comments.
27. In a public meeting, all comments pertaining to this Order were heard and considered.

IT IS HEREBY ORDERED that, pursuant to Sections 13263 and 13267 of the California Water Code, Dischargers, 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. CONDITIONS OF ELIGIBILITY

1. A discharger may seek coverage under this Order to:
 - a. Add specific amendments directly to groundwater or indirectly through the soil column for the purpose of facilitating in situ remediation of waste constituents. The Discharger must demonstrate the effectiveness of the selected amendment(s), and demonstrate control of side reactions and breakdown products under site conditions.
2. To be covered under this Order, a discharger must provide the following:
 - a. A Notice of Intent (Attachment A), including additional information as required in Attachment B (Report of Waste Discharge);
 - b. A Regional Board approved Work Plan, Work Plan Addendums (if applicable), and/or a Remedial Action Plan or Cleanup Plan which includes application of an amendment that qualifies for coverage under this Order (The approval for the

Work Plan or Remedial Action Plan needs to be dated within 12 months of the date of the Notice of Intent);

- c. A proposed Monitoring and Reporting Program, based on Attachment C, incorporated herein by reference; and
 - d. The first annual fee in accordance with the current version of the California Code of Regulation, Title 23, Division 7, Chapter 9, Waste Discharge Report and Requirements Article 1 fees for a discharge. The check or money order shall be made payable to the "State Water Resources Control Board".
 - e. A Contingency Plan to be implemented to correct unacceptable water quality effects.
3. This Order covers the following actions:
- a. Pilot studies of limited extent and duration:
 - i. When the amendments have previously been demonstrated (previous pilot tests or full-scale operations) to achieve the desired results and side reactions, byproducts, breakdown products, and residuals are understood.
 - ii. When processes to remove byproducts, breakdown products, and residuals are identified and discussed in the Remedial Action Work Plan or Report of Waste Discharge.
 - b. Full-scale applications:
 - i. When it has been demonstrated in a pilot study, or full-scale application at this site or a similar site, that the desired results can be achieved and side reactions, breakdown products, and residuals do not result in long-term adverse water quality effects.
4. Coverage under this Order applies to the following groups of amendments, except as specifically excluded in A5 below, provided the conditions in A1, A2, and A3 are satisfied:
- a. Amendments that create reducing conditions (i.e., amendments that provide carbon, energy, electrons and/or macronutrients). Examples include:
 - i. Zero valent iron
 - ii. Easily degradable carbon sources such as glucose, acetate, citric acid, acetic acid, ethanol, methanol and others
 - iii. Slowly degradable carbon sources such as edible oils, poly-lactate, and other hydrogen release compounds
 - iv. Polysulfides
 - v. Macro nutrients such as nitrate, phosphate, and potassium

- vi. Microorganisms cultured on site materials
 - b. Amendments that create oxidizing conditions (i.e., amendments that provide oxygen or otherwise gain electrons). Examples include:
 - i. Air
 - ii. Oxygen
 - iii. Ozone
 - iv. Potassium or sodium permanganate
 - v. Oxygen release compounds
 - vi. Hydrogen peroxide
 - c. Multiple amendments (includes application of reducing agents or oxidizing agents or both applied concurrently or over time as proposed in an approved Work Plan and the Notice of Intent). Examples include:
 - i. Establishing a reducing zone immediately downgradient of an oxidizing zone to reduce hexavalent chromium that may be produced under oxidizing conditions
 - ii. Providing a slowly degradable carbon source along with polysulfides to precipitate sulfates as metal sulfides.
 - d. Tracer compounds as discussed in Attachment A (Notice of Intent/Report of Waste Discharge).
 - e. Biofouling control agents such as chlorine dioxide, chlorine and bleach.
5. Amendments specifically excluded from coverage under this Order:
- a. Amendments that may cause violent exothermic reactions.

B. NOTIFICATION OF COVERAGE

Project coverage under this Order shall not take effect until the Executive Officer notifies the Discharger in writing, by issuance of a Notice of Applicability which shall be a part of this Order, that coverage has been issued. The Executive Officer will not issue notification of project coverage under this Order prior to providing notice and a 30-day public comment period on the proposed issuance of coverage. Notification of project coverage under this Order shall not be issued if the Executive Officer finds that there may be significant effects on water quality, or finds that significant public controversy has arisen or will likely arise from the issuance of project coverage by this Order and that individual Waste Discharge Requirements should be considered at a regularly scheduled Regional Water Board meeting.

C. DISCHARGE PROHIBITIONS

1. The discharge of any amendment or other materials not specifically regulated by this Order is prohibited. These amendments and materials are those listed in the approved Work Plan required in A.2.b and the Notice of Applicability, as listed above.
2. Creation of a pollution, contamination, or nuisance, as defined by Section 13050 of the California Water Code (CWC), is prohibited.
3. The discharge of amendments or wastes to surface water or surface water drainage courses is prohibited.
4. The discharge of amendments or wastes to land or groundwater in areas other than that proposed for remediation is prohibited.
5. The discharge of amendments to property that is not under the control of the Discharger is prohibited. The "area under the control" of the Discharger is considered to be at the horizontal borders of the waste plume and owned by the Discharger and/or where the Discharger holds an agreement with the property owner for purposes of investigation and remediation.
6. The migration of any byproducts produced as part of the treatment process beyond the boundaries of the property owned or controlled by the discharger or to surface waters is prohibited.

D. DISCHARGE SPECIFICATIONS

1. The Discharger shall not inject any amendments into the aquifer prior to receiving the Notice of Applicability nor prior to the construction of all necessary monitor wells listed in the Monitoring and Reporting Program.
2. The groundwater shall not be amended with materials other than those approved in the Notice of Applicability.
3. The Discharger will minimize the amount of amendments injected to the extent practicable.

E. GROUNDWATER LIMITATIONS

1. The discharge shall not cause the pH of the groundwater at the compliance points, downgradient and outside the treatment zone, to shift outside the range of 6.5 to 8.5.
2. The release, injection, discharge or addition of constituents from a remediation system shall not cause the groundwater at the compliance wells listed in Table 1 of the Monitoring and Reporting Program attached to the Notice of Applicability, and any revisions thereto, to contain concentrations of chemical constituents, including the

amendments and by-products of the in-situ treatment process, in amounts that exceed the Water Quality Objectives listed in Finding No. 15.

3. The release, injection, discharge or addition of constituents from a remediation system shall not cause the groundwater at the compliance wells listed in Table 1 of the Monitoring and Reporting Program attached to the Notice of Applicability, and any revisions thereto, to contain concentrations of metals, total dissolved solids, or electrical conductivity that are more than 20% greater than their respective background concentrations, as established by the Monitoring and Reporting Program attached to the Notice of Applicability, and any revisions thereto.
4. The release, injection, discharge or addition of constituents from a remediation system shall not cause the groundwater to contain taste or odor producing substances that cause nuisance or adversely affect beneficial uses at the compliance monitor points designated in Table 1 of the Monitoring and Reporting Program attached to the Notice of Applicability, and any revisions thereto.

F. PROVISIONS

1. The Discharger shall comply with all applicable Standard Provisions and Reporting Requirements for Waste Discharge Requirements, dated 1 March 1991, which are attached hereto and by reference a part of this Order. This attachment and its individual paragraphs are commonly referenced as Standard Provisions.
2. The Discharger shall comply with the Monitoring and Reporting Program, attached to the Notice of Applicability, and any revisions thereto, as ordered by the Executive Officer.
3. The Discharger may be required to submit technical reports pursuant to California Water Code Section 13267 as directed by the Executive Officer. The technical reports required by this Order are necessary to assure compliance with this Order.
4. All technical reports required herein that involve planning, investigation, evaluation, or design or other work requiring interpretation or proper application of engineering or geologic sciences, shall be prepared by, or under the direction of, persons registered to practice in California pursuant to California Business and Professions Code, sections 6735, 7835 and 7835.1. To demonstrate compliance with Title 16, CCR, Sections 415 and 3065, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.
5. A copy of this Order shall be maintained at the project site and be available at all times to operating personnel.

6. Provisions of this Order are severable. If any provision of these requirements is found invalid, the remainder of this Order shall not be affected.
7. The Discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed by the discharger to achieve compliance with this Order.
8. In the event of a violation of the order, or any material change in the character, location, or volume of the discharge, or if the Discharger is unable to comply with any of the conditions of this Order due to:
 - a. breakdown of any facility or control system or monitoring equipment installed by the Discharger to achieve compliance with this Order;
 - b. migration or application of amendments, pollutants or byproducts outside the specified treatment area;
 - c. accidents caused by human error or negligence; or
 - d. other causes such as acts of nature;

the Discharger shall notify the Regional Water Board by telephone within 24-hours after he or his agents have knowledge of the incident and confirm this notification in writing within two weeks of the telephone notification. The written notification shall include pertinent information explaining reasons for the noncompliance and shall indicate the steps taken to correct the problem and the dates thereof, and the steps being taken to prevent the problem from recurring. The reporting of migration or application of amendments, waste constituents or byproducts outside the specified treatment area shall include an assessment of and schedule for implementation of the contingency plans required in the Notice of Applicability.

9. The Discharger shall report within 48-hours to the Regional Water Board any violation of this Order, and any material change in the character, location, or volume of the discharge.
10. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the discharger, the discharger shall notify the succeeding owner or operator of the following items by letter, in advance of the transfer of ownership or control, a copy of the notice must be forwarded to the Regional Water Board:
 - a. existence of this Order; and
 - b. the status of the discharger's annual fee account
11. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act

causing injury to persons or property, nor protect the discharger from his liability under Federal, State, or Local laws, nor create a vested right for the discharger to continue the waste discharge.

12. Chemical, bacteriological, and bioassay analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health.
13. All reports, Notice of Intent, or other documents required by this Order, and other information requested by the Regional Board shall be signed by a person described below or by a duly authorized representative of that person.
 - a. for a corporation: by a responsible corporate officer such as: (a) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function; (b) any other person who performs similar policy or decision making functions for the corporation; or (c) the manager of one or more manufacturing, production, or operating facilities if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
 - b. Reports required by this Order, other information requested by the Regional Water Board, and Notices of Intent may be signed by a duly authorized representative provided:
 - i. the authorization is made in writing by a person described in paragraph (a) of this provision;
 - ii. the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and
 - iii. the written authorization is submitted to the Regional Water Board prior to or together with any reports, information, or applications signed by the authorized representative.
 - c. Any person signing a document under paragraph (a) or (b) of this provision shall make the following certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine

and imprisonment for knowing violations."

14. The Discharger shall permit authorized staff of the Regional Water Board:
 - a. entry to the project site covered by this Order or in which any required records are kept;
 - b. access to copy any records required to be kept under terms and conditions of this Order;
 - c. inspection of monitoring equipment or records; and
 - d. sampling of any discharge.
15. The Regional Water Board may review this Order periodically and may revise requirements when necessary. In addition, the discharger shall file a report of waste discharge with the Executive Officer at least 120 days before making any material change or proposed change in the character, location, or volume of the discharge.
16. This Order is in effect until terminated by the Executive Officer. Project coverage under this Order may be terminated, by the Executive Officer at any time upon giving reasonable notice to the discharger.

I, Pamela C. Creedon, 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, Central Valley Region, on 11 September 2008.

original signed by:
PAMELA C. CREEDON, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2007-0828 (Revised)
CALIFORNIA WATER CODE SECTION 13267
FOR
RAMOS OIL COMPANY

RAMOS OIL COMPANY FACILITY
HIGHWAY 160 AT FIRST STREET
ISLETON, SACRAMENTO COUNTY

This Order is issued to Ramos Oil Company (Ramos; Discharger). Ramos has operated a bulk fuel facility at Highway 160 and First Street in Isleton, Sacramento County (Site) since 1984.

Operations at the Site have resulted in groundwater polluted with total petroleum hydrocarbons (TPH). Groundwater ranges from about 20 feet below ground surface (bgs) onsite to about six feet bgs south of the Site. This pollution impaired the beneficial use of this water resource. In 2001, Ramos installed an air sparge and enhanced biovent groundwater remediation system at the Site and operated the system from 2001 through 2007. In addition, in 2002 and 2003 Ramos implemented phytoremediation consisting of a line of trees aligned perpendicular to the plume.

This Monitoring and Reporting Program (MRP) is issued pursuant to Section 13267 of the California Water Code and is necessary to delineate groundwater pollutant plumes and determine whether remediation efforts are effective. Existing data and information about the Site show the presence of various chemicals, including TPH, benzene, tertiary butyl alcohol (TBA), and methyl tertiary butyl ether (MTBE) resulting from the Discharger's current and/or past operations. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer.

Prior to construction of any new groundwater monitoring or extraction wells, and prior to destruction of any groundwater monitoring or extraction wells, the Discharger shall submit plans and specifications to the Board for review and approval. Once installed, all new wells shall be added to the monitoring program and shall be sampled and analyzed according to the schedule below.

GROUNDWATER MONITORING

As shown on Figure 1 (Attachment A), there are 16 monitoring wells onsite and offsite, designated MW-1 through MW-16. The groundwater monitoring program for the 16 monitoring wells and any wells installed subsequent to the issuance of this MRP, shall adhere to the following schedule. Monitoring wells with free phase petroleum product or visible sheen shall be monitored, at a minimum, for product thickness and depth to water. The volume of extracted groundwater also shall be provided in quarterly monitoring reports. Sample collection and analysis shall follow standard EPA protocol.

SAMPLING FREQUENCY¹			
	Quarterly	Semi-annually²	Annually²
Wells	MW-8, MW-10, MW-14, MW-15, New Wells	MW-1, MW-2, MW-4, MW-12, MW-13	MW-3, MW-5, MW-6, MW-7, MW-9, MW-11, MW-16

Constituents	EPA Analytical Method	Maximum Practical Quantitation Limit (µg/l)³
Depth to Groundwater	---	---
TPH as gasoline	8015M or 8260B	50
TPH as diesel	8015M	50
Benzene	8020 or 8260B	0.5
Toluene	8020 or 8260B	0.5
Ethylbenzene	8020 or 8260B	0.5
Xylene	8020 or 8260B	0.5
MTBE ⁴	8260B	0.5
TBA ⁴	8260B	5
TAME ⁴	8260B	0.5
1,2-DCA ⁴	8260B	0.5
Ethanol ⁴	8260B	50
Methanol ⁴	8260B	100

¹ All wells shall be monitored quarterly for water levels and the presence and thickness of free product.

² Wells shall be sampled semi-annually during the first and third quarters and annually during the third quarter.

³ For nondetectable results. All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as trace.

⁴ Fuel oxygenates/additives, including MTBE, tertiary butyl alcohol (TBA), tertiary amyl methyl ether (TAME), and 1,2-dichloroethane (1,2-DCA) shall be analyzed in all monitoring wells during two monitoring events in the first and third quarters. Other fuel oxygenates have previously been analyzed and were below detection limits. If results are nondetectable for fuel oxygenates or additives for both sampling events, no further monitoring for oxygenates or additives is required in that well. If a fuel oxygenate or additive is detected, it shall be added to the monitoring program for the well in which it was detected.

Ozone/Hydrogen Peroxide Injection System Monitoring

In addition to the monitoring of the plumes, seven of the wells will be used to monitor the ozone/hydrogen peroxide injection system. Wells MW-7 and MW-13 will be used as background wells; wells MW-6, MW-8, and EX-2 will be used as treatment zone wells; and wells MW-10 and MW-14 will be used as compliance zone wells. The background, treatment zone, and compliance wells will be monitored according to the Monitoring Plan Summary in the Notice of Intent (Attachment B).

REPORTING

When reporting the data, the Discharger shall arrange the information in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this

Order. In addition, the Discharger shall notify the Board within 48 hours of any unscheduled shutdown of any soil vapor and/or groundwater extraction system.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

Quarterly electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30, shall be submitted electronically over the internet to the GeoTracker database system by the **1st day of the second month following the end of each calendar quarter (i.e., by 1 February, 1 May, 1 August, and 1 November)**, until such time as the Executive Officer determines that the reports are no longer necessary.

Quarterly reports shall be submitted to the Board by the **1st day of the second month following the end of each calendar quarter (i.e., by 1 February, 1 May, 1 August, and 1 November)** until such time as the Executive Officer determines that the reports are no longer necessary. Since only four wells are sampled during the second and fourth quarters, only an electronic upload of analytical data (EDFs) and depth to water data (geo_well) to GeoTracker is required. The first and third quarter reports shall include the following minimum information:

- (a) a description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants and groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated;
- (b) field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, etc.;
- (c) groundwater contour maps for all groundwater zones, if applicable;
- (d) isocontour pollutant concentration maps for all groundwater zones, if applicable;
- (e) a table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom;
- (f) a table showing historical lateral and vertical (if applicable) flow directions and gradients;
- (g) cumulative data tables containing the water quality analytical results and depth to groundwater;
- (h) a copy of the laboratory analytical data report;

- (i) if applicable, the status of any ongoing remediation, including cumulative information on the mass of pollutant removed from the subsurface, system operating time, the effectiveness of the remediation system, and any field notes pertaining to the operation and maintenance of the system; and
- (j) if applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions.

An Annual Report shall be submitted to the Board by **1 May** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation, and may be substituted for the first quarter monitoring report. The Annual Report shall contain the following minimum information:

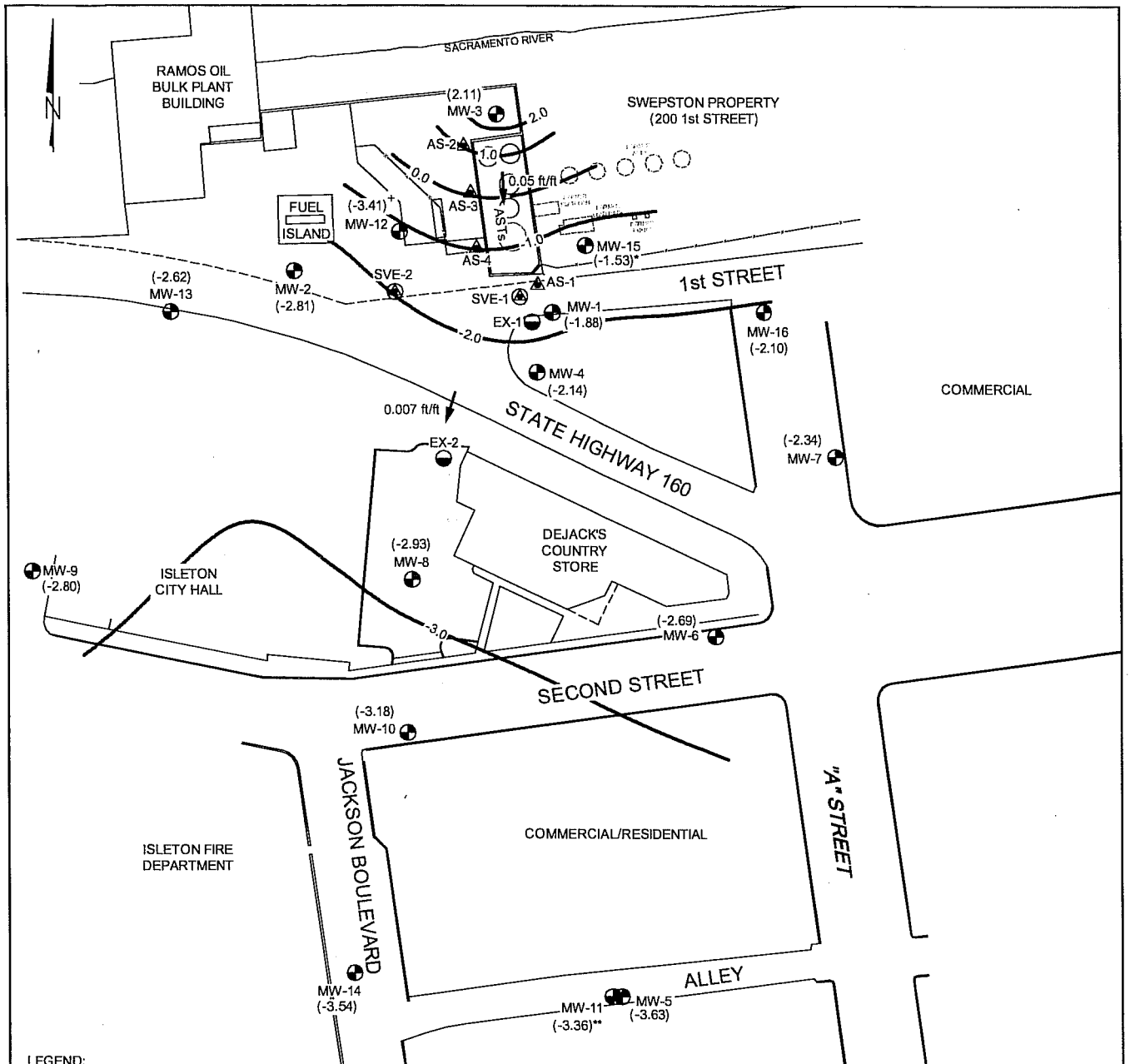
- (a) both tabular and graphical summaries of all data obtained during the year;
- (b) groundwater contour maps and pollutant concentration maps containing all data obtained during the previous year;
- (c) a discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;
- (d) an analysis of whether the pollutant plume is being captured by an extraction system or is continuing to spread;
- (e) a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the pollutants, and plans to improve remediation system effectiveness;
- (f) an identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and
- (g) if desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

The results of any monitoring done more frequently than required at the locations specified in the MRP also shall be reported to the Board. The Discharger shall implement the above monitoring program as of the date of the Order.

Ordered by: Frederick S. Morse
odc PAMELA C. CREEDON, Executive Officer

16 November 2010

(Date)



LEGEND:

- MW-1 MONITORING WELL LOCATION
- ▲ AS-1 APPROXIMATE AIR SPARGING WELL LOCATION
- EX-2 EXTRACTION WELL LOCATION
- ⊙ SVE-1 SOIL VAPOR EXTRACTION WELL LOCATION
- (-1.88) GROUND WATER ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL
- -1.0 --- WATER TABLE CONTOUR IN FEET RELATIVE TO MEAN SEA LEVEL
- ➔ INFERRED DIRECTION OF GROUND WATER FLOW

WELLS MEASURED: 9/08/10

+ DATA FROM THIS WELL APPEARS ANOMALOUS & THEREFORE NOT USED IN CONTOUR CONSTRUCTION

* WATER LEVEL CORRECTED DUE TO PRESENCE OF LIQUID-PHASE HYDROCARBONS (LPH) IN WELL

** WELL MW-11 IS SCREENED IN A DEEPER PORTION OF THE SATURATED ZONE (30'-35' bgs) AND THEREFORE DATA FROM THIS WELL IS NOT USED IN GROUNDWATER ELEVATION CONTOUR CONSTRUCTION.



SCALE

STRATUS
ENVIRONMENTAL, INC.

RAMOS ISLETON BULK PLANT
HIGHWAY 160 & 1st STREET
ISLETON, CALIFORNIA

Attachment
A

PROJECT NO.
2062-0160-01

Monitoring Plan Summary
Ramos Oil Bulk Plant
Highway 160 & 1st Street
Isleton, California

Parameter	Sampling Locations	Frequency	Analytical Method
Field Parameters:			
pH	Background (MW-7 & MW-13)	Bi-monthly	Field Instrument
	Treatment zone (MW-6, MW-8, & EX-2)	Bi-monthly	
	Compliance (MW-10 & MW-14)	Bi-monthly	
Dissolved Oxygen (DO)	Background (MW-7 & MW-13)	Bi-monthly	Field Instrument
	Treatment zone (MW-6, MW-8, & EX-2)	Bi-monthly	
	Compliance (MW-10 & MW-14)	Bi-monthly	
Temperature	Background (MW-7 & MW-13)	Bi-monthly	Field Instrument
	Treatment zone (MW-6, MW-8, & EX-2)	Bi-monthly	
	Compliance (MW-10 & MW-14)	Bi-monthly	
Oxidation Reduction Potential (ORP)	Background (MW-7 & MW-13)	Bi-monthly	Field Instrument
	Treatment zone (MW-6, MW-8, & EX-2)	Bi-monthly	
	Compliance (MW-10 & MW-14)	Bi-monthly	
Specific Conductivity (SC)	Background (MW-7 & MW-13)	Bi-monthly	Field Instrument
	Treatment zone (MW-6, MW-8, & EX-2)	Bi-monthly	
	Compliance (MW-10 & MW-14)	Bi-monthly	
Laboratory Parameters			
Petroleum Hydrocarbons & Oxygenates (TPHd, TPHg, BTEX, MTBE, ETBE, TAME, DIPE, TBA, and acetone)	Background (MW-7 & MW-13)	Quarterly	EPA Method 8015 & 8260
	Treatment zone (MW-6, MW-8, & EX-2)	Quarterly	
	Compliance (MW-10 & MW-14)	Quarterly	
Total Iron & Ferrous Iron	Background (MW-7 & MW-13)	Quarterly	Total Iron by EPA Method 200.7 & Ferrous Iron by SM3500
	Treatment zone (MW-6, MW-8, & EX-2)	Quarterly	
	Compliance (MW-10 & MW-14)	Quarterly	
Total & Dissolved Hexavalent Chromium	Background (MW-7 & MW-13)	Quarterly	EPA Method 218.6
	Treatment zone (MW-6, MW-8, & EX-2)	Quarterly	
	Compliance (MW-10 & MW-14)	Quarterly	
Metals (Total and dissolved calcium, total chromium, total cobalt, total copper, total iron, total lead, total and dissolved manganese, total and dissolved magnesium, total and dissolved nickel, total and dissolved sodium, total and dissolved vanadium, and total zinc)	Background (MW-7 & MW-13)	Semi-annual	EPA Method 200.7
	Treatment zone (MW-6, MW-8, & EX-2)	Semi-annual	
	Compliance (MW-10 & MW-14)	Semi-annual	
Dissolved Ferrous Iron	Background (MW-7 & MW-13)	Semi-annual	SM3500
	Treatment zone (MW-6, MW-8, & EX-2)	Post-remediation	
	Compliance (MW-10 & MW-14)	Semi-annual	
Total Phosphorous, Total Sulfides, & Total Ammonia	Background (MW-7 & MW-13)	Semi-annual	SM4500
	Treatment zone (MW-6, MW-8, & EX-2)	Post-remediation	
	Compliance (MW-10 & MW-14)	Semi-annual	
Nitrate, Orthophosphate, and Sulfates	Background (MW-7 & MW-13)	Semi-annual	EPA Method 300.0
	Treatment zone (MW-6, MW-8, & EX-2)	Post-remediation	
	Compliance (MW-10 & MW-14)	Semi-annual	
Total Organic Carbon	Background (MW-7 & MW-13)	Annual	SM5310
	Treatment zone (MW-6, MW-8, & EX-2)	Post-remediation	
	Compliance (MW-10 & MW-14)	Semi-annual	

Attachment B