CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
MONITORING AND REPORTING PROGRAM NO. R5-2006-___
FOR
CHEVRON CORPORATION AND
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
CHEVRON FORMER BAKERSFIELD REFINERY
AND WAIT TANK YARD GROUNDWATER CLEANUP
KERN COUNTY

This monitoring and reporting program (MRP) incorporates requirements for monitoring of the nutrient injection system process and groundwater. This MRP is issued by the Executive Officer of the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) pursuant to California Water Code Section 13267. The Discharger is required to comply with this MRP and shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. Groundwater sampling and reporting associated with the existing monitoring well network at the Site is not currently regulated by an MRP. The existing groundwater monitoring schedule is incorporated into this MRP, modified as necessary to implement nutrient injection monitoring. Central Valley Water Board staff shall approve specific sample station locations prior to implementation of sampling activities.

Prior to construction of any new groundwater monitoring or extraction wells, the Discharger shall submit plans and specifications to the Central Valley Water 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.

All samples shall be representative of the volume and the nature of the discharge and matrix of the sampled medium. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

NUTRIENT INJECTION SYSTEM AND GROUNDWATER MONITORING

A. LABORATORY ANALYSES

Monitoring of the nutrient injection system shall consist of groundwater samples collected from the following well groups:

Upgradient Wells:	MW-16 and MW-29
Treatment Area Wells:	MW-21 and MW-34
Downgradient Wells:	MW-18, MW-31, MW-35, MW-42, MW-44, MW-51A/B/C, MW-52, and MW-55AR/B

Please note that well MW-31 is being monitored; however, the results from this well may be qualified, as previous analytical data from this well have shown it to return non-representative results for local groundwater quality conditions. These wells shall be monitored (at a minimum) for the following constituents at the schedule shown. These analyses shall be completed by a State certified laboratory.

Constituents	EPA Analytical Method	Reporting Limit	Sample Frequency[4]	Reporting Frequency
BTEX[1]	8021B	0.5 µg/l	Semi-Ann	Semi-Ann
TPH (gasoline)	8021B	50 µg/l	Semi-Ann	Semi-Ann
TPH (diesel)	8015B	50 µg/l	Semi-Ann	Semi-Ann
Nitrate (as N)	300.0	0.1 mg/l	Quarterly	Quarterly
Nitrite (as NO_2)	353.2	0.065 mg/l	Quarterly	Quarterly
Ammonia (as NH_3)	350.1	0.03 mg/l	Quarterly	Quarterly
Total Kjeldahl Nitrogen	351.2	0.2 mg/l	Quarterly	Quarterly
Total Phosphate	365.4	0.15 mg/l	Quarterly	Quarterly
Orthophosphate	365.1	0.02 mg/l	Quarterly	Quarterly
Hydrocarbon Degrading Bacteria	SM 9215	10 cfu/ml	Quarterly	Quarterly
Total Alkalinity (as $CaCO_3$)	310.1	20 mg/l	Semi-Ann	Semi-Ann
Total Organic Carbon	415.1	1 mg/l	Semi-Ann	Semi-Ann
Major Cations[2]	6010B	mg/l	Semi-Ann	Semi-Ann
Major Anions[3]	300.0	mg/l	Semi-Ann	Semi-Ann
Total Dissolved Solids	160.1	10 mg/l	Semi-Ann	Semi-Ann

[1] Benzene, toluene, ethylbenzene, and xylenes
[2] Including calcium, sodium, potassium, magnesium, iron, and manganese (standard reporting limit varies)
[3] Including bicarbonate, chloride and sulfate (standard reporting limit varies)
[4] For monitoring wells west of Manor Street, monitoring will continue quarterly for ammonia, nitrate, nitrite, TKN, phosphate, and orthophosphate until these constituents are no longer present at concentrations exceeding 80 percent of their respective WQOs (for four successive quarters). For monitoring wells east of Manor Street, monitoring will continue quarterly for ammonia, nitrate, nitrite, TKN, phosphate, and orthophosphate until these constituents are no longer present at concentrations exceeding their respective WQOs (for four successive quarters).

B. FIELD MEASURED PARAMETERS

Monitoring of the nutrient injection system shall include field-measured parameters taken from groundwater samples from:

Upgradient Wells:	MW-16 and MW-29
Treatment Area Wells:	MW-21 and MW-34
Downgradient Wells:	MW-18, MW-31, MW-35, MW-42, MW-44, MW-51A/B/C, MW-52, and MW-55AR/B

Field testing instruments (such as those used to test ORP and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;

3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are provided with the appropriate monitoring report.

These wells shall be monitored (at a minimum) for the following constituents at the schedule shown.

Constituents	Units	Type of Sample	Monitoring Frequency[1]	Reporting Frequency
Specific Conductivity	µmhos/cm	Grab	Quarterly	Quarterly
pH	pH units	Grab	Quarterly	Quarterly
Oxidation-reduction potential	millivolts	Grab	Quarterly	Quarterly
Dissolved Oxygen	mg/l	Grab	Quarterly	Quarterly
Temperature	ºF/ºC	Grab	Quarterly	Quarterly
Liquid Hydrocarbon Thickness	Feet	Grab	Quarterly	Quarterly
Ground Water Elevation[2]	Feet, MSL	Grab	Quarterly	Quarterly

[1] For monitoring wells west of Manor Street, monitoring will continue quarterly until ammonia, nitrate, nitrite, TKN, phosphate, and orthophosphate are no longer present at concentrations exceeding 80 percent of their respective WQOs (for four successive quarters). For monitoring wells east of Manor Street, monitoring will continue quarterly for ammonia, nitrate, nitrite, TKN, phosphate, and orthophosphate until these constituents are no longer present at concentrations exceeding their respective WQOs (for four successive quarters).

[2] Measured every time a well is sampled.

C. NUTRIENT INJECTION SYSTEM MONITORING

Monitoring of the nutrient injection system shall include the following parameters taken from sampling/monitoring points within the physical nutrient injection system:

Parameter	Units	Type of Sample	Monitoring Frequency	Reporting Frequency
Injected Air Flow Rate[1]	SCFM	Metered	Continuous	Quarterly
Ammonia Concentration[1]	ppmv	Grab	Semi-monthly	Quarterly
TEP Concentration[1,4]	ppmv	Grab	Semi-monthly[4]	Quarterly
Flow Rates (at sparge wells)	SCFM	Meter	Monthly	Quarterly
Injection Pressure (at sparge wells)	PSI	Meter	Monthly	Quarterly
Flow Rates (at ex. wells)[2]	SCFM	Meter	Monthly	Quarterly
Vacuum (at ex. wells)[2]	PSI	Meter	Monthly	Quarterly
Various Constituents[3] (at ex. wells)[2]	ppmv	Grab	Monthly	Quarterly

[1] Monitored at injected air header before air flow is split to individual wells.

[2] Measured at vapor extraction wells near air sparge wells used for nutrient injection.

[3] Vapor phase constituents should include BTEX, TPH(gasoline), oxygen, carbon dioxide, methane, TEP, and ammonia.

[4] TEP concentration monitoring frequency will revert to once per month after the initial three months of injection.

The remaining groundwater monitoring wells at the Site are not currently under a monitoring and reporting program. As such, the monitoring schedule outlined below has been developed to closely approximate the Discharger's existing voluntary monitoring program.

A. LABORATORY ANALYSES

Monitoring of the groundwater not directly involved in the nutrient injection system shall consist of groundwater samples collected from the following wells:

MW-7	MW-11	MW-13	MW-14	MW-17[1]
MW-19[1]	MW-20[1]	MW-25	MW-27	MW-30
MW-37[1]	MW-38	MW-48[1]	MW-53[1]	

[1] Sampled for groundwater intrinsic bioremediation parameters during the fourth quarter.

These wells shall be monitored (at a minimum) for the following constituents at the schedule shown. These analyses shall be completed by a State certified laboratory.

Constituents	EPA Analytical Method	Reporting Limit	Sample Frequency[2]	Reporting Frequency
BTEX[1]	8021B	0.5 µg/l	Semi-Ann.	Semi-Ann.
TPH (gasoline)	8021B	50 µg/l	Semi-Ann.	Semi-Ann.
TPH (diesel)	8015B	50 µg/l	Semi-Ann.	Semi-Ann.

[1] Benzene, toluene, ethylbenzene, and xylenes.
[2] Sampled during the second and fourth quarters.

When fourth quarter groundwater intrinsic bioremediation sampling of the wells designated above occurs, these additional parameters shall be monitored:

Constituents	EPA Analytical Method	Reporting Limit	Sample Frequency	Reporting Frequency
Nitrate (as N)	300.0	0.1 mg/l	Annually	Annually
Total Alkalinity (as $CaCO_3$)	310.1	20 mg/l	Annually	Annually
Total Organic Carbon	415.1	1 mg/l	Annually	Annually
Major Cations[3]	6010B	mg/l	Annually	Annually
Major Anions[4]	300.0	mg/l	Annually	Annually
Total Dissolved Solids	160.1	10 mg/l	Annually	Annually

[3] Including calcium, sodium, potassium, magnesium, iron, and manganese (standard reporting limit varies)
[4] Including chloride and sulfate (standard reporting limit varies)

B. FIELD MEASURED PARAMETERS

Monitoring of the groundwater not directly involved in the nutrient injection system shall consist of the following groundwater parameters measured at each well listed in Section A above:

Type of Constituents	Monitoring Units	Reporting Sample	Frequency	Frequency
Specific Conductivity	µmhos/cm	Grab	Semi-Ann.	Semi-Ann.
pH	pH units	Grab	Semi-Ann.	Semi-Ann.
Oxidation-reduction potential	millivolts	Grab	Semi-Ann.	Semi-Ann.
Dissolved Oxygen	mg/l	Grab	Semi-Ann.	Semi-Ann.
Temperature	ºF/ºC	Grab	Semi-Ann.	Semi-Ann.
Liquid Hydrocarbon Thickness	Feet	Grab	Semi-Ann.	Semi-Ann.
Ground Water Elevation[1]	Feet, MSL	Grab	Quarterly	Quarterly

[1] Measured every time a well is sampled.

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type, and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall be reported to the Central Valley Water Board.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

A. Quarterly and Semi-Annual Monitoring Reports

Quarterly and semi-annual reports shall be submitted to the Central Valley Water Board by the **15th day of the second month following the end of each calendar quarter (i.e., by 15 February, 15 May, 15 August, and 15 November**). Quarterly reporting shall continue for Nutrient Injection System And Groundwater Monitoring until:

1. Ammonia, nitrate, nitrite, TKN, phosphate, and orthophosphate are no longer present at concentrations exceeding 80 percent of their respective WQOs (for four successive quarters) in wells west of Manor Street, or

2. Ammonia, nitrate, nitrite, TKN, phosphate, and orthophosphate are no longer present at concentrations exceeding their respective WQOs (for four successive quarters) in wells east of Manor Street.

At a minimum, the reports shall include:

1. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for the groundwater monitoring. The narrative shall be sufficiently detailed to verify compliance with the WDR, this MRP, and the Standard Provisions and Reporting Requirements. The narrative shall be supported by field logs for each well documenting depth to groundwater; parameters measured before, during, and after purging; calculation of casing volume; total volume of water purged, etc.;

2. An assessment of ammonia and TEP dosing, by-products, and results of all sampling;

3. Copies of all laboratory analytical report(s);

4. A calibration log verifying regular calibration of any field monitoring instruments (e.g., DO, pH, EC meters) used to obtain data;

5. Piezometric and contour maps for DO concentrations and Hydrocarbon Degrading Bacteria counts for each quarterly sampling event, for all areas potentially affected by the nutrient injection system;

6. Cumulative data tables containing the water quality analytical results and depth to groundwater.

7. An evaluation of the effectiveness of the nutrient injection in remediating petroleum hydrocarbons in groundwater.

B. Annual Report

An annual report shall be submitted to the Central Valley Water Board by **15 February** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation, and may be submitted with the fourth quarter monitoring report. The annual report shall contain the following minimum information:

1. Tabular and graphical summaries of all data collected during the previous year;

2. Groundwater contour maps and contaminant concentration maps containing all data obtained during the previous year;

3. Data for monitoring and analysis performed on an annual basis;

4. A discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;

5. An evaluation of the performance of the nutrient injection system, including a description of all remedial activities conducted during the year, an analysis of its effectiveness in destroying the contaminants and whether the contaminant plume is being destroyed or is continuing to spread;

6. A discussion of compliance and the corrective action taken, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements; and

7. A discussion of any data gaps, potential deficiencies/redundancies in the monitoring system or reporting program and the anticipated date for completion of cleanup activities.

A letter transmitting the self-monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by: _____
PAMELA C. CREEDON, Executive Officer

_____
(Date)

BEM: 6/29/06