

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

**REVISED MONITORING AND REPORTING PROGRAM NO. CI-9178
FOR
FORMER NORTHROP GRUMMAN SYSTEMS CORPORATION
(EAST COMPLEX FACILITY IN HAWTHORNE, CALIFORNIA)
PILOT TESTS TO EVALUATE IN-SITU BIOREMEDIATION OF
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**

(FILE NO. 06-089)

The Northrop Grumman Systems Corporation (Discharger) shall implement this revised monitoring and reporting program on the effective date of WDR Order No. R4-2009-0072.

I. GROUNDWATER MONITORING PROGRAM

It is anticipated that the pilot test will be initiated in the fourth quarter of 2009. Figure 1 shows the location of the Site. Table 1 lists the wells proposed in the PTA1 area which is the primary test location. Table 1A lists the wells proposed in the PTA2 area which is the backup pilot test location.

The required constituents to be analyzed and the monitoring schedule for all monitoring wells for the pilot test are shown below in Table 2.

Table 1. Pilot Test Location – PTA 1

Monitoring Wells Location	Well Number	Well Status
Bellflower Horizon Zone A ^a (screen from 40-60 feet below ground surface, ft. bgs)	P1-MW-01R	Performance Evaluation Well
	P1-BIO-11	Performance Evaluation Well
	P1-BIO-13	Performance Evaluation Well
	P1-BIO-22	Down Gradient Monitoring Well
Bellflower Horizon Zone B (screen from 80-90 ft. bgs)	P1-MW-01B	Cross Gradient Monitoring Well
	P1-BIO-7	Up Gradient Monitoring Well
	P1-BIO-8	Injection Well
	P1-BIO-9	Cross Gradient Monitoring Well
	P1-BIO-10	Performance Evaluation Well
	P1-BIO-12	Performance Evaluation Well
	P1-BIO-14	Extraction Well
P1-BIO-15	Down Gradient Monitoring Well	

^a - Horizon A Performance Wells are analyzed only if tracer is observed following initial injection

Table 1A. Pilot Test Location – PTA2

Monitoring Wells Location	Well Number	Well Status
Bellflower Horizon Zone A ^a (screen from 40-60 ft. bgs)	P1-BIO-19	Performance Evaluation Well
	P1-BIO-22	Performance Evaluation Well
	P1-BIO-25	Performance Evaluation Well
	P1-BIO-27	Down Gradient Monitoring Well
Bellflower Horizon Zone B (screen from 80-90 ft. bgs)	P1-BIO-16	Up Gradient Monitoring Well
	P1-BIO-17	Injection Well
	P1-BIO-18	Performance Evaluation Well
	P1-BIO-20	Across Gradient Monitoring Well
	P1-BIO-21	Across Gradient Monitoring Well
	P1-BIO-23	Performance Evaluation Well
	P1-BIO-24	Extraction Well
	P1-BIO-26	Down Gradient Monitoring Well

Table 2. Monitoring and Reporting Frequency

CONSTITUENT	UNITS	TYPE OF SAMPLE	MINIMUM FREQUENCY OF ANALYSIS ^b
Total Daily Injections	Liters	Measurement	Per injection
Tracer	Present or absence	Visual	Quarterly
Groundwater Elevation	Feet below ground surface (bgs)	In situ	Baseline, quarterly
Dissolved Oxygen	mg/l	Grab	Baseline, quarterly
pH	pH units	Grab	Baseline, quarterly
Oxidation-Reduction Potential	Millivolts	Grab	Baseline, quarterly
Temperature	Degrees C	Grab	Baseline, quarterly
Specific Conductance	µS/cm	Grab	Baseline, quarterly
Turbidity	NTU	Grab	Baseline, quarterly
Chlorinated Volatile Organic Compounds	µg/l	Grab	Baseline, quarterly
Total Organic Carbon and Volatile Fatty Acids	mg/l	Grab	Baseline, quarterly
Dehalococcoides ethenogenes culture	presence or absence	Grab	Baseline, quarterly
Dissolved Metals (Manganese, Iron and Arsenic) and Anions (sulfate, nitrate, nitrite and chloride) and Total Sulfides	mg/l	Grab	Baseline, quarterly
Dissolved Hydrocarbon Gases (ethane, ethene, and methane)	mg/l	Grab	Baseline, quarterly

^b See Tables 3 and 4 for detail monitoring frequency for each area.

Table 3. Detail Monitoring Frequency for PTA1

Preceding event	Well Install/ Development	Post Injection of Electron Donor & Tracer			Post Injection of Electron Donor & Culture		
		Quarterly for one quarter event	Quarterly for one quarter event	Quarterly for one quarter event	Quarterly ⁵ for 3 quarter events	Quarterly ⁵ for 3 quarter events	Quarterly ⁵ for 3 quarter events
Wells proposed in PTA-1	P1-MW-01B, P1-MW-01R, P1-BIO-7 through P1-BIO-15, P1-MW-22	P1-MW-01R, P1-BIO-11, P1-BIO-13	P1-BIO-10, P1-BIO-12, P1-BIO-14 ²	P1-MW-01B, P1-BIO-7, P1-BIO-9, P1-BIO-15, P1-MW-22	P1-MW-01R, P1-BIO-11, P1-BIO-13	P1-BIO-10, P1-BIO-12, P1-BIO-14 ²	P1-MW-01B, P1-BIO-7, P1-BIO-9, P1-BIO-15, P1-MW-22
Field Parameters ¹	X	X	X	X	X	X	X
Tracer		X	X	X	X	X	X
VOCs	X	X ³	X	X	X ³	X	X
Dissolved Hydrocarbon Gases (DHG)- ethene, ethane, methane	X					X	
Chloride	X		X			X	
Nitrite as N, Nitrate as N, Sulfate, Sulfide	X		X			X	
Iron (II) and Manganese (Dissolved)	X	X ³	X			X	
Arsenic (Dissolved)	X		X	X		X	X
Total Organic Carbon	X	X ³	X	X	X ³	X	X
Volatile Fatty Acids (VFAs)- lactate, acetate, propionate	X ⁴		X			X	
Dehalo- coccooides culture	X ⁴					X	

Notes:

1. Field Parameters include pH, dissolved oxygen, Oxidation-Reduction Potential, specific conductance, turbidity and temperature
2. Extraction Well is P1-BIO-14
3. Only analyze if tracer is observed
4. Analyze Horizon B performance wells, P1-BIO-10, P1-BIO-12, extraction well P1-BIO-14 and injection well P1-BIO-8
5. Groundwater monitoring may be extended beyond the third quarterly event upon Executive Officer's approval. Revision of the MRP is not required.

Table 4. Detail Monitoring Frequency for PTA2

Preceding event	Well Install/ Development	Post Injection of Electron Donor & Tracer			Post Injection of Electron Donor & Culture		
		Quarterly for one quarter event	Quarterly for one quarter event	Quarterly for one quarter event	Quarterly ⁵ for 3 quarter events	Quarterly ⁵ for 3 quarter events	Quarterly ⁵ for 3 quarter events
Wells proposed in PTA-1	P1-BIO-16 through P1-BIO-27	P1-BIO-19, P1-BIO-22, P1-BIO-25	P1-BIO-18, P1-BIO-23, P1-BIO-24 ²	P1-BIO-16, P1-BIO-20, P1-BIO-21, P1-BIO-26, P1-BIO-27	P1-BIO-19, P1-BIO-22, P1-BIO-25	P1-BIO-18, P1-BIO-23, P1-BIO-24 ²	P1-BIO-16, P1-BIO-20, P1-BIO-21, P1-BIO-26, P1-BIO-27
Field Parameters ¹	X	X	X	X	X	X	X
Tracer		X	X	X	X	X	X
VOCs	X	X ³	X	X	X ³	X	X
Dissolved Hydrocarbon Gases (DHG)- ethene, ethane, methane	X					X	
Chloride	X		X			X	
Nitrite as N, Nitrate as N, Sulfate, Sulfide	X		X			X	
Iron (II) and Manganese (Dissolved)	X	X ³	X			X	
Arsenic (Dissolved)	X		X	X		X	X
Total Organic Carbon	X	X ³	X	X	X ³	X	X
Volatile Fatty Acids (VFAs)- lactate, acetate, propionate	X ⁴		X			X	
Dehalo- coccooides culture	X ⁴					X	

Notes:

1. Field Parameters include pH, dissolved oxygen, Oxidation-Reduction Potential, specific conductance, turbidity and temperature
2. Extraction Well is P1-BIO-24
3. Only analyze if tracer is observed
4. Analyze Horizon B performance wells, P1-BIO-18, P1-BIO-23, extraction well P1-BIO-24 and injection well P1-BIO-17
5. Groundwater monitoring may be extended beyond the third quarterly event upon Executive Officer's approval. Revision of the MRP is not required.

All groundwater monitoring reports must include, at minimum, the following:

- a. Well identification, date and time of sampling;
- b. Sampler identification, and laboratory identification; and
- c. Semi-annual observation of groundwater levels, recorded to 0.01 feet relative to mean sea level, and groundwater flow direction.

II. AMENDMENT INJECTION MONITORING REQUIREMENTS

The reports shall contain the following information regarding injection activities:

1. Depths of injection points;
2. Depths of screened intervals;
3. Quantity and concentrations of amendment injected per injection point;
4. Dates injected; and
5. Total amount of amendment injected.

III. REPORTING REQUIREMENTS

The first monitoring report under this Program is due by **October 15, 2009**.

The Discharger is required to submit quarterly reports including a preliminary report containing baseline data, plus quarterly reports. The groundwater monitoring wells shall be gauged and sampled, and results shall be reported to the Regional Water Quality Control Board (Regional Board) under the Monitoring and Reporting Program for the Waste Discharge Requirements.

The Discharger shall submit Reports detailing the results of the remediation. The reports shall include, at a minimum, an evaluation of the effectiveness of using the amendment and KB-1™ solution to remediate VOC-contaminated 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. The Discharger is required to submit the following reports pursuant to their respective due dates.

<u>Reporting Period</u>	<u>Report Due</u>
January – March	April 15
April – June	July 15
July – September	October 15
October – December	January 15

If there is no discharge or injection during any reporting period, the report shall so state. Monitoring reports must be addressed to the Regional Board, Attention: Information Technology Unit.

Whenever wastes associated with the discharge under this Order, are transported to a different disposal site, the following shall be reported in the monitoring report: type and quantity of wastes; name and address of the hauler (or method of transport if other than by hauling); and location of the final point(s) of disposal.

IV. CERTIFICATION STATEMENT

Each report shall contain the following completed declaration:

"I certify under penalty of law that this document, including all attachments and supplemental information, was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated 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 a fine and imprisonment.

Executed on the _____ day of _____ at _____.

(Signature)

(Title)"

V. MONITORING FREQUENCIES

Specifications in this monitoring program are subject to periodic revisions. Monitoring requirements may be modified or revised by the Executive Officer based on review of monitoring data submitted pursuant to this Order. Monitoring frequencies may be adjusted to a less frequent basis or parameters and locations dropped by the Executive Officer if the Discharger makes a request and the request is backed by statistical trends of monitoring data submitted.

These records and reports are public documents and shall be made available for inspection during normal business hours at the office of the California Regional Water Quality Control Board, Los Angeles Region.

Ordered by:



Tracy J. Egoscue
Executive Officer

Date:

6/23/09