

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

**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 monitoring and reporting program on the effective date of this Order.

**I. GROUNDWATER MONITORING PROGRAM**

It is anticipated that the pilot test will be initiated in the fourth quarter of 2006. Figure 1 shows the location of the Site. Injection wells (PIBIO-25 through PIBIO-34) and groundwater monitoring wells at the Site are shown in Figure 2A for the primary pilot test location. Injection wells (PIBIO-13 through PIBIO-22) and groundwater monitoring wells at the Site are shown in Figure 2B for the backup pilot test location.

Baseline sampling will take place prior to injection. Upon completion of the injection of the emulsified oil, samples will be taken from the monitoring wells and will be analyzed for field parameters (oxidation-reduction potential, dissolved oxygen, pH, specific conductance, temperature, turbidity and groundwater elevation), chlorinated volatile organic compounds (VOCs), total organic carbon (TOC) and volatile fatty acids (VFAs) for process monitoring purposes and to provide post-injection baselines.

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

Table 1. For Injection Wells PIBIO-25 through PIBIO-34

<b>Monitoring Wells Location</b>	<b>Well Number</b>	<b>Well Status</b>
Bellflower Horizon Zone A* (screen from 50-65 ft. bgs)	PIBIO-37	Up gradient monitoring well
	PIBIO-35	Across gradient monitoring well
	PIMW-07	Across gradient monitoring well
	PIBIO-39	Down gradient monitoring well
	PIBIO-41	Down gradient monitoring well
	PIBIO-43	Down gradient monitoring well
	PIBIO-45	Down gradient monitoring well
Bellflower Horizon Zone B* (screen from 70-85 ft. bgs)	PIBIO-38	Up gradient monitoring well
	PIBIO-36	Across gradient monitoring well
	PIBIO-47	Across gradient monitoring well
	PIBIO-40	Down gradient monitoring well
	PIBIO-42	Down gradient monitoring well
	PIBIO-44	Down gradient monitoring well
	PIBIO-46	Down gradient monitoring well

\* - See Figure 3

Table 2. Injection Wells PIBIO-13 through PIBIO-22

Monitoring Wells Location	Well Number	Well Status
Bellflower Horizon Zone A* (screen from 50-65 ft. bgs)	PIBIO-23	Up gradient monitoring well
	PIBIO-12	Across gradient monitoring well
	PIBIO-2	Across gradient monitoring well
	PIBIO-7	Down gradient monitoring well
	PIBIO-8	Down gradient monitoring well
	PIMW-19	Down gradient monitoring well
	PIBIO-4	Down gradient monitoring well
Bellflower Horizon Zone B* (screen from 70-85 ft. bgs)	PIBIO-24	Up gradient monitoring well
	PIBIO-11	Across gradient monitoring well
	PIBIO-3	Across gradient monitoring well
	PIBIO-9	Down gradient monitoring well
	PIBIO-10	Down gradient monitoring well
	PIBIO-5	Down gradient monitoring well
	PIBIO-6	Down gradient monitoring well

\* - See Figure 3

CONSTITUENT	UNITS	TYPE OF SAMPLE	MINIMUM FREQUENCY OF ANALYSIS
Total Daily Injections	Liters	Measurement	Per injection
Groundwater Elevation	Feet below ground surface (bgs)	In situ	Baseline, post injection, quarterly
Dissolved Oxygen	mg/l	Grab	Baseline, post injection, quarterly
Oxidation-Reduction Potential	Millivolts	Grab	Baseline, post injection, quarterly
pH	pH units	Grab	Baseline, post injection, quarterly
Temperature	Degrees C	Grab	Baseline, post injection, quarterly
Specific Conductance	µS/cm	Grab	Baseline, post injection, quarterly
Turbidity	NTU	Grab	Baseline, post injection, quarterly
Chlorinated Volatile Organic Compounds (EPA Method 8260B)	µg/l	Grab	Baseline, post injection, quarterly
Total Organic Carbon (EPA Method 9060 Modified) and Volatile Fatty Acids	mg/l	Grab	Baseline, post injection, quarterly
Dehalococcoides ethenogenes culture	presence or absence	Grab	Baseline, quarterly
Total Metals	mg/l	Grab	Baseline, quarterly
Dissolved Metals (Manganese, Iron and Arsenic) and Anions (sulfate, nitrate, nitrite and chloride) and Total Sulfides	mg/l	Grab	Baseline, quarterly <sup>(1)</sup>
Dissolved Hydrocarbon Gases (ethane, ethane, and methane)	mg/l	Grab	Baseline, quarterly

<sup>1</sup> Continue quarterly basis only for those metals that are detected in baseline, 1<sup>st</sup> and 2<sup>nd</sup> quarterly events.

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 mean sea level and groundwater flow direction.

## II. AMENDMENT INJECTION MONITORING REQUIREMENTS

The reports shall contain the following information regarding injection activities:

1. Depth of injection points;
2. Quantity of amendment injected per injection point;
3. Dates injected; and
4. Total amount of amendment injected.

## III. REPORTING REQUIREMENTS

The first monitoring report under this Program is due by January 15, 2007.

The Discharger is required to submit a preliminary report including baseline and oil injection data, plus quarterly reports. The groundwater monitoring wells will be gauged and sampled, and results will 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 should 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: \_\_\_\_\_  
Jonathan S. Bishop  
Executive Officer

Date: September 14, 2006