

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2007-xxxx  
FOR  
THE UNITED STATES AIR FORCE  
BEALE AIR FORCE BASE  
ENHANCED IN-SITU BIOREMEDIATION OF VOLATILE ORGANIC CONSTITUENTS  
AT SITE 31  
YUBA COUNTY

This Monitoring and Reporting Program (MRP) incorporates requirements for monitoring the progress of an enhanced in-situ bioremediation (EISB) project using sodium lactate, emulsified oil or cheese whey as an amendment to treat groundwater pollution at Site 31 at Beale Air Force Base. Waste Discharge Requirements Order R5-2007-xxxx (Order) covers the activities for the EISB system for Site 31. This MRP may need to be updated if the Discharger violates the Order. If the Regional Water Board finds that the Order has been violated, the Discharger is required to implement a Contingency Plan, which includes expanding and operating the EISB in an active mode as described in the Order. The EISB may include the use of KB-1™ a proprietary non-pathogenic microbial community that is an enrichment derived from naturally occurring bacteria found in soil and groundwater. The MRP would be revised to include additional monitoring parameters and, if necessary, additional monitoring wells to evaluate the effectiveness of corrective action. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer.

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.

Compliance with this Monitoring and Reporting Program, and with the companion Standard Provisions and Reporting Requirements, is ordered by Waste Discharge Requirements Order No R5-2007-XXXX. Failure to comply with this Program, or with the Standard Provisions and Reporting Requirements dated 1 March 1991, constitutes noncompliance with the WDRs and with the Water Code, which can result in further enforcement actions as allowed in the Water Code

#### **A. REPORTING**

The Discharger shall report monitoring data and information as required in this Monitoring and Reporting Program and as required in the Standard Provisions and Reporting Requirements. Reports, which do not comply with the required format will be **REJECTED** and the Discharger shall be deemed to be in noncompliance with the WDRs.

Groundwater monitoring data collected in accordance with this MRP shall be included with technical reports required by the Order. That is, available Quarterly and Semi-annual Groundwater monitoring data, shall be submitted with the **Baseline Summary**

**Report and the Implementation/ Evaluation Report** required by Order No. R5-2007-XXXX. Thereafter, the Discharger is required to submit semi-annual groundwater monitoring reports due on 15 March and 15 September of each calendar year following implementation of the EISB system. 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 WDRs, 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. Copies of all laboratory analytical report(s);
3. Cumulative data tables containing the water quality analytical results and depth to groundwater;
4. An evaluation of the performance of the EISB system including an analysis of its effectiveness in destroying the pollutants;
5. A discussion of compliance and the corrective action taken, if any, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements;
6. A discussion of any data gaps, potential deficiencies/redundancies in the monitoring system or reporting program;
7. Figures depicting concentrations of pollutants of concern in groundwater as measured in groundwater and monitor and extraction wells; and,
8. Figures depicting groundwater elevation contours in feet mean sea level.

## **B. REQUIRED MONITORING REPORTS AND SUBMITTAL DATES**

### **1. Semiannual Groundwater Monitoring Reports**

All Semi-annual monitoring reports shall include all water quality data and observations collected during the reporting period and submitted per the **Reporting Due Dates** found in Section B.3 of this Monitoring and Reporting Program. At a minimum the sampling and data collection in Section C or Tables 1 and 2 of this Monitoring and Reporting Program and Waste Discharge Requirements shall be reported. The Semi-annual monitoring reports should incorporate available sampling data from other monitoring wells that are in proximity with the Site 31 area and are not specifically monitored under this program.

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 by the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

**2. Response to a Release (Corrective Action Work Plan)**

If the Discharger determines that the baseline concentrations have been exceeded in any compliance monitoring wells for any constituent of concern or monitoring parameter listed in the Tables 1 and 2, the Discharger shall immediately notify the Regional Board verbally as to the Monitoring Point(s) and constituent(s) or parameter(s) involved, shall provide written notification by certified mail within seven days of such determination. If the Discharger confirms that baseline concentrations have been exceeded in any of the compliance monitoring wells and it has been determined by Regional Board staff that the EISB system is not providing adequate remediation of VOCs or the amendments and/or by products are migrating outside of the transition zone, the Discharger shall submit a Corrective Action Work Plan required in Provision D.4 of Order No. R5-2007-XXXX for approval by the Executive Officer and implement response actions as required.

**3. Submittal Dates Semiannual Groundwater Monitoring Reports**

<b>Reporting Type</b>	<b>Sampling Frequency and Data Reported</b>	<b>Reporting Period</b>	<b>Report Date Due</b>
Semi-annual	Quarterly, Semi-annual, Annual	<b>1 August – 31 January</b> <b>1 February – 31 July</b>	<b>15 March</b> <b>15 September</b>

**C. GROUNDWATER MONITORING**

Monitoring of the EISB system shall consist of collecting groundwater samples from monitoring wells designated as treatment zone, transition zone and compliance monitoring wells. The treatment zone monitoring wells are as follows: 31C014MW, 31C016MW, 31C017MW, 31C019MW, 31C021MW, 31C023MW, 31C025MW, 31C027MW, 31C029MW 31C003MW 31C032MW, 31C033MW, 31C034MW, 31C035MW, 31M003MW, 31R001MW, 31R004BMW and 31U001AMW. The transition zone monitoring wells are as follows: 31C005AMW, 31M002MW, 31C005BMW and 31C002BMW. The compliance monitoring wells are as follows: 31U003BMW, 31M001MW, 31C008BMW, 31C010AMW, 31C006AMW and 31R003MW.

### Baseline Sampling

In order to obtain an accurate representation of baseline groundwater conditions at Site 31 groundwater monitoring wells in the treatment and transition zones and the compliance monitoring wells, shall be sampled according to Table 1.

<b>Table 1 – Baseline Groundwater Monitoring</b>		
<u>Parameters</u>	<u>Units</u>	<u>Frequency</u>
<u>Field Parameters</u>		
Temperature	°C	once <sup>1</sup>
Specific Conductance	µmhos/cm	once
ORP	millivolts	once
pH	pH number	once
<u>Monitoring Parameters</u>		
Total Dissolved Solids <sup>2</sup>	mg/L	once
Volatile Organic Compounds <sup>3</sup>	µg/L	once
Dissolved Iron <sup>4</sup>	mg/L	once
Dissolved Manganese <sup>5</sup>	mg/L	once
Dissolved Organic Carbon <sup>6</sup>	mg/L	once
Sulfate <sup>7</sup>	mg/L	once
Dissolved Hydrogen Gases (ethane, ethane and methane) <sup>8</sup>	mg/L	once
Volatile Fatty Acids (lactic, acetic and propionic acids) <sup>9</sup>	mg/L	once
Sodium <sup>10</sup>	mg/L	once

<sup>1</sup> Samples shall be collected once prior to injection of sodium lactate, at least one week prior to injection.

<sup>2</sup> Total Dissolved Solids by EPA Method 160.2, or equivalent.

<sup>3</sup> Volatile Organic Compounds by EPA Method 8260, or equivalent, with a Practical Quantitation Limit no greater than 0.5 µg/L.

<sup>4</sup> Dissolved Iron by EPA Method 6010B, or equivalent, with a Practical Quantitation Limit no greater than 10 µg/L.

<sup>5</sup> Dissolved Manganese by EPA Method 6010B, or equivalent, with a Practical Quantitation Limit no greater than 10 µg/L.

<sup>6</sup> Dissolved Organic Carbon EPA Method SW 9060, or equivalent.

<sup>7</sup> Sulfate by EPA Method 9056, or equivalent, with a Practical Quantitation Limit no greater than 5 µg/L.

<sup>8</sup> Dissolved Hydrogen Gases (ethane, ethane and methane) by method RSK-175

<sup>9</sup> Volatile Fatty Acids (lactic, acetic and propionic acids) by method E 300.0M

<sup>10</sup> Sodium by EPA Method 200.7, or equivalent, with a Practical Quantitation Limit no greater than 1000 µg/L

### General System Groundwater Monitoring

Monitoring well samples shall be analyzed according to Table 2 during the EISB project. The following EISB treatment area monitoring wells 31C014MW, 31C016MW, 31C017MW, 31C019MW, 31C021MW, 31C023MW, 31C025MW, 31C027MW, 31C029MW 31C003MW 31C032MW, 31C033MW, 31C034MW, 31C035MW, 31M003MW, 31R001MW, 31R004BMW, 31U001AMW, 31C005AMW, 31M002MW, 31C005BMW and 31C002BMW and, compliance monitoring wells 31U003BMW, 31M001MW, 31C008BMW, 31C010AMW, 31R003MW and 31C006AMW should be sampled as described below.

<b>Table 2 – EISB System Groundwater Monitoring</b>		
<u>Parameters</u>	<u>Units</u>	<u>Frequency</u>
<u>Field Parameters</u>		
Temperature	°C	a,b,c
Specific Conductance	µmhos/cm	a,b,c
ORP	millivolts	a,b,c
pH	pH number	a,b,c
Groundwater Elevation	ft and hundredths.-MSL	a,b,c
Dissolved Oxygen	mg/L	a,b,c
<u>Monitoring Parameters</u>		
Total Dissolved Solids <sup>1</sup>	mg/L	a,b,c
Dissolved Iron <sup>2</sup>	mg/L	a,b,c
Volatile Organic Compounds <sup>3</sup>	µg/L	a,b,c
		a,b,c
Dissolved Organic Carbon <sup>4</sup>	mg/L	a,b
Dissolved Manganese <sup>5</sup>	mg/L	a,b,c
Sulfate <sup>6</sup>	mg/L	a,b
Dissolved Hydrogen Gases (ethane, ethane and methane) <sup>7</sup>	mg/L	a,b
Volatile Fatty Acids (lactic , acetic and propionic acids) <sup>8</sup>	mg/L	a,b,c
Sodium	µg/L	a,b,c

<sup>a</sup> Treatment zone monitoring wells: 31C014MW, 31C016MW, 31C017MW, 31C019MW, 31C021MW, 31C023MW, 31C025MW, 31C027MW, 31C029MW 31C003MW 31C032MW, 31C033MW, 31C034MW, 31C035MW, 31M003MW, 31R001MW, 31R004BMW and 31U001AMW. Monitoring wells 31C014MW, 31C016MW, 31C017MW, 31C019MW, 31C021MW, 31C023MW, 31C025MW, 31C027MW and 31C029MW are extraction wells which will be sampled quarterly for the parameters listed in Table 2. Monitoring wells 31C003MW 31C032MW, 31C033MW, 31C034MW, 31C035MW, 31M003MW, 31R001MW, 31R004BMW and 31U001AMW to be sampled semi-annually for parameters listed in Table 2.

<sup>b</sup> Transition zone monitoring wells: 31C005AMW, 31M002MW , 31C005BMW and 31C002BMW

will be sampled semi-annually for the parameters listed in Table 2.

<sup>c</sup> Compliance monitoring wells: 31U003BMW, 31M001MW, 31C008BMW, 31C010AMW, 31C006AMW and 31R003MW. Monitoring wells 31C006AMW, 31C008BMW, 31C010AMW and 31U003BMW will be sampled semi-annually for the parameters listed in Table 2. Monitoring well 31M001MW will be sampled annually for the parameters listed in Table 2 and monitoring well 31U003BMW will be sampled quarterly for the parameters listed in Table 2.

<sup>1</sup> Total Dissolved Solids by EPA Method 160, or equivalent.

<sup>2</sup> Dissolved Iron by EPA Method 6010B or equivalent with a Practical Quantitation Limit no greater than 0.5 µg/L

<sup>3</sup> Volatile Organic Compounds by EPA Method 8260, or equivalent, with a Practical Quantitation Limit no greater than 0.5 µg/L.

<sup>4</sup> Dissolved Organic Carbon by EPA Method SW9060 or equivalent.

<sup>5</sup> Dissolved Manganese by EPA Method 6010B, or equivalent, with a Practical Quantitation Limit no greater than 10 µg/L.

<sup>6</sup> Sulfate by EPA Method 9056 or equivalent with a Practical Quantitation Limit no greater than 5 µg/L.

<sup>7</sup> Dissolved Hydrogen Gases (ethane, ethane and methane) by method RSK-175.

<sup>8</sup> Volatile Fatty Acids (lactic , acetic and propionic acids) by method E 300.0M

<sup>10</sup> Sodium by EPA Method 200.7, or equivalent, with a Practical Quantitation Limit no greater than 1000 µg/L

Field testing instruments (such as those used to test oxidation-reduction potential 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 field 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.

The Discharger shall implement the above monitoring program as of the date of the Order.

Ordered by: \_\_\_\_\_  
PAMELA C. CREEDON, Executive Officer

RRR:4/6/07