California Regional Water Quality Control Board
North Coast Region

MONITORING & REPORTING PROGRAM R1-2004-0046
(Replacing Monitoring & Reporting Program No. 98-6)

FOR

HEWLETT-PACKARD VALLEY SITE
GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
1201 PINER ROAD
SANTA ROSA

Sonoma County

MONITORING

A. RECEIVING WATER MONITORING

The receiving water temperature, pH, and dissolved oxygen shall be monitored monthly during normal daily operation of the groundwater extraction and treatment system to demonstrate compliance with the Receiving Water Limitations contained in (General) Order No. R1-2001-9 NPDES Permit No. CAG911001.

The temperature, pH, and dissolved oxygen concentration in Piner Creek shall be measured at representative upstream and downstream points within 100 feet from the point of discharge. The upstream and downstream temperature, pH and dissolved oxygen concentrations shall be measured within a period not to exceed one hour.

Surface water samples shall be analyzed for volatile organic compounds during the first quarter monitoring event only. Samples shall be collected for laboratory analysis at a representative downstream sampling point within 100 feet from the discharge out-fall pipe. The flow rates during the sampling event for the receiving stream and the treatment system effluent shall be quantified and reported. The receiving water shall be monitored and analyzed in accordance with the schedule presented in Table 1:

TABLE 1 RECEIVING WATER MONITORING SCHEDULE

Constituent	Units	Type of Sample	Sampling Frequency
Temperature	ºC	Field measurement	Monthly
pH		Field measurement	Monthly
Dissolved Oxygen	mg/l	Field measurement	Monthly
Volatile Organic Compounds [1]	µg/l	Grab sample	Annually, first quarter
CTR Priority Pollutants [2]	µg/l	Grab sample	prior to permit renewal [3]

1. Halogenated volatile organic compounds by EPA Method 8021 or equivalent for the compounds listed in ORDER NO. R1-2001- Appendix A.
2. The permittee shall conduct receiving water ambient monitoring (at least once prior to the reissuance its NPDES permit) for priority pollutants for which water quality criteria or objectives apply and for which no effluent limitations have been established, in accordance with Section 1.3 of the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* [http://www.swrcb.ca.gov/iswp],
3. Priority pollutants shall be monitored within one year prior to the Report of Waste Discharge for permit renewal.

B. INFLUENT and EFFLUENT MONITORING

The treatment system influent and effluent shall be monitored and analyzed in accordance with the schedule presented in Table 2:

TABLE 2 INFLUENT and EFFLUENT MONITORING SCHEDULE

Constituent	Units	Type of Sample	Sampling Frequency
Temperature	ºC	Field measurement	Monthly
pH		Field measurement	Monthly
Volatile Organic Compounds[1]	µg/l	Grab sample	Monthly
Effluent Chronic Toxicity Test	TUc [2]	--	Annually
Effluent Flow Rate	gal/min		Monthly Average
Effluent CTR Priority Pollutants [3]	µg/l	Grab sample	prior to permit renewal [4]

1. Halogenated volatile organic compounds by EPA Method 8021 or equivalent for the compounds listed in ORDER NO. R1-2001-9 Appendix A, and fuel oxygenates, including: Methyl tertiary-butyl ether (MtBE), Di-Isopropyl ether (DIPE), Ethyl tertiary-butyl ether (ETBE), Tertiary-amyl methyl ether (TAME), and Tertiary-butyl alcohol (TBA). Fuel oxygenates are to be analyzed using EPA Method 8260
2. TUc = Chronic Toxicity Units, as defined in part D of this Monitoring & Reporting Program.
3. The treatment system effluent shall be monitored (at least once prior to the reissuance its NPDES permit) for priority pollutants for which water quality criteria or objectives apply and for which no effluent limitations have been established, in accordance with Section 1.3 of the Policy for Implementation of Toxics Standards for Enclosed Bays, and Estuaries of California [http://www.swrcb.ca.gov/iswp],
4. Priority pollutants shall be monitored within one year prior to submittal of the Report of Waste Discharge for permit renewal.

C. TOXICITY MONITORING

1. Compliance with Toxicity objective

The permittee shall monitor and evaluate effluent for chronic toxicity in order to demonstrate compliance with the Basin Plan narrative toxicity objective. Compliance with this requirement shall be achieved in accordance with the following:

a) All chronic toxicity monitoring shall be in accordance with the schedule outlined in 2.c of this Monitoring and Reporting Program.
b) Chronic toxicity testing shall be conducted in accordance with the protocols contained in *Short-Term Methods For Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms* and in *Guidelines Establishing Test Procedures for the Analysis of Pollutants; Whole Effluent Toxicity Test Methods; Final Rule* (November 19, 2002). [http://www.epa.gov/OST/WET/disk3/]
c) Chronic toxicity evaluation parameter:
A condition of effluent toxicity is demonstrated when a three-sample median of the latest chronic toxicity test results exceeds 1TU_c.
d) If an effluent chronic toxicity test result exceeds 1 TU_c, then the permittee shall conduct a second chronic toxicity test within ten days of the discovery of toxicity exceedance. If the second chronic toxicity test indicates toxicity in excess of the evaluation parameter, the permittee shall immediately cease the discharge to surface

waters (if applicable) and submit an evaluation to the Regional Water Board on the cause of the toxicity, alternate disposal methods, or treatment system modifications that are proposed to correct the effluent toxicity. The permittee shall correct the toxicity to the satisfaction of the Executive Officer prior to resuming or beginning discharge to surface waters.

2. Annual Chronic Toxicity Monitoring

   a) Sampling: The permittee shall collect 8-hour composite or 24-hour composite samples of effluent for critical life stage toxicity as indicated below. For toxicity tests requiring renewals, 8-hour composite samples collected on consecutive days are required. Grab sampling may be considered on a case-by-case basis by the Executive Officer.

   b) Test Species: Chronic toxicity shall be monitored by using critical life stage test(s) and the most sensitive test specie(s) identified during the screening phase testing conducted for the Report of Waste Discharge for re-issuance of the NPDES permit, in accordance with the protocols referenced in section C.1.b. of this Order. The use of a different test species, in lieu of conducting tests using the required test species may be considered/approved by the Executive Officer on a case-by-case basis upon submittal of the documentation supporting the Permittees' determination that a different species is more sensitive and appropriate. Two test species may be required if test data indicate that there is alternating sensitivity between the two species.

   c) Frequency:

      i. Routine Monitoring: Annually, commencing within one year from the date of Order issuance to permittee, or as necessary.
      ii. Accelerated Monitoring: Additional chronic toxicity tests shall be conducted within 10 days of the discovery of toxicity exceedance. At least two additional chronic toxicity tests shall be conducted within 30 days of the discovery of toxicity exceedance.

   d) Conditions for Routine Monitoring: Annual monitoring reports for chronic toxicity testing shall be submitted no later than 60 calendar days following the anniversary of the permittees coverage under this permit. Toxicity testing may be required subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollution concentrations due to pretreatment, source control, and waste minimization efforts. The Executive Officer may also request additional toxicity testing following significant system modifications or as deemed appropriate or necessary.

   e) Conditions for Accelerated Monitoring: The permittee shall conduct accelerated monitoring (chronic toxicity retest) when a single-sample test result exceeds $1TU_c$. If a three-sample median of the latest results from the follow-up tests are

found to be in compliance with the evaluation parameter, then routine monitoring shall be resumed. However, if the three-sample median of the follow-up tests results continues to exceed TUc, then the permittee shall immediate cease discharge and submit an evaluation report as specified in section C.1.d. of this Order.

f) Methodology: Sample collection, handling and preservation shall be done in accordance with EPA protocols. The test methodology used shall be in accordance with the references cited in this Order, or as approved by the Executive Officer. A concurrent reference toxicant test shall be performed for each test.

g) Dilution Series: The permittee shall conduct tests at 100 percent, 85%, 70%, 50%, and 25%. The "%" represents percent effluent as discharged. Dilution and control waters shall be obtained from an area unaffected by the discharge in the receiving waters. Standard dilution water may be used if the above sources exhibit toxicity or if approved by the Executive Officer.

3. Chronic Toxicity Reporting Requirements

a) Routine Reporting: Toxicity test results for the reporting period shall include, at a minimum, for each test:

i. Sample date(s)
ii. Test initiation date
iii. Test specie(s)
iv. End point values for each dilution (e.g. number of young, growth rate, percent survival)
v. NOEC value(s) in percent effluent
vi. IC15, IC25, IC40, and IC50 values (or EC15, EC25…etc.) in percent effluent
vii. TUc values (100/NOEC, 100/IC25, and 100/EC25)
viii. Mean percent mortality (± standard deviation) after 96 hours in 100% effluent (if applicable)
ix. NOEC and LOEC values for reference toxicant test(s)
x. IC_{50} or EC_{50} value(s) for reference toxicant test(s)
xi. Available water quality measurements for each test (e.g. pH, dissolved oxygen, temperature, conductivity, hardness (as $CaCO_3$), salinity, ammonia)

b) Compliance Summary: The results of the chronic toxicity testing shall be provided in the semi-annual self-monitoring report and shall include a table of historical chronic toxicity data. The information in the table shall include the items listed above under 3.a, item numbers i, iii, v, vi (IC25 or EC25), vii, and viii.

c) After at least four (4) test rounds, the permittee may request the Executive Officer to decrease the required number of test species to one. Such a request may be considered only if toxicity exceeding the TUc values specified in the effluent limitations was never observed using that test specie.

D. DEFINITION OF TERMS

1. Three-sample median: A test sample showing chronic toxicity greater than 1 TU_c represents an exceedance of this parameter, if one of the past two tests also show chronic toxicity greater than 1 TU_c.

2. TU_c (chronic toxicity unit): A TU_c equals 100/NOEL (e.g., If NOEL = 100, then toxicity = 1 TUc). NOEL is the maximum percent test water that causes no observable effects on a test organism.

3. No observed effect level (NOEL) for compliance determination is equal to IC_{25} or EC_{25}. If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

4. Effective concentration (EC) is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC_{25} is the concentration of toxicant (in percent effluent) that causes a response in 25% of the test organisms.

5. Inhibition Concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a non-lethal, non-quantal biological measurement, such as growth. For example, an IC_{25} is the estimated concentration of toxicant that would cause a 25% reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as EPA's Bootstrap Procedure.

6. No observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

E. DIOXIN/FURAN STUDY OF THE EFFLUENT

The *Policy for Implementation of Toxics Standards for Inland Surface Water, Enclosed Bays, and Estuaries of California* includes criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). In addition to this compound, there are many congeners (a compound of the same class or kind) of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) that exhibit toxic effects similar to those of 2,3,7,8-TCDD. The US EPA has published toxic equivalency factors (TEFs) for 17 of the congeners. The TEFs express the relative toxicities of the congeners compared to

2,3,7,8-TCDD (whose TEF is 1.0). The current TEFs for the 17 congeners are shown in the following table.

Congener [a]	Chemical Abstract Service (CAS) Number	TEF [b]
2,3,7,8-TetraCDD	1746-01-6	1.0
1,2,3,7,8-PentaCDD	40321-76-4	1.0
1,2,3,4,7,8-HexaCDD	39227-28-6	0.1
1,2,3,6,7,8-HexaCDD	57653-85-7	0.1
1,2,3,7,8,9-HexaCDD	19408-74-3	0.1
1,2,3,4,6,7,8-HeptaCDD	35822-39-4	0.01
OctaCDD	3268-87-9	0.0001
2,3,7,8-TetraCDF	51207-31-9	0.1
1,2,3,7,8-PentaCDF	57117-41-6	0.05
2,3,4,7,8-PentaCDF	57117-31-4	0.5
1,2,3,4,7,8-HexaCDF	70648-26-9	0.1
1,2,3,6,7,8-HexaCDF	57117-44-9	0.1
1,2,3,7,8,9-HexaCDF	72918-21-9	0.1
2,3,4,6,7,8-HexaCDF	70648-26-9	0.1
1,2,3,4,6,7,8-HeptaCDF	70648-26-9	0.01
1,2,3,4,7,8,9-HeptaCDF	55673-89-7	0.01
OctaCDF	39001-02-0	0.0001

a. It is recommended that all listed CDD and CDF congeners be quantified using EPA method 8280A or 8290.
b. TEF = Toxicity Equivalency Factor
Reference: *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*, March 2, 2000. Page 27.

The permittee must monitor the effluent for the presence of the 17 congeners once during the dry weather and once during wet weather for one year. Following the initial screening submitted with the report of waste discharge, one (1) additional dioxin/furan congener study must be conducted during the next season. For example, if a dry weather study is submitted with the report of waste discharge, a wet weather study must be submitted during the following wet weather season (or vice versa).

The permittee shall submit the analytical results of the effluent monitoring, including the quantifiable limit and the method detection limit, and the measured or estimated concentrations.

In addition, the permittee shall multiply each measured or estimated congener concentration by its respective TEF value (presented in the table above) and report the sum of these values. Based on the monitoring results, the Executive Officer may increase the monitoring requirement to further investigate frequent or significant detection of any congener, as deemed necessary.

F. GROUNDWATER MONITORING

Groundwater analyses shall be conducted in accordance with the following schedule:

TABLE 3 GROUNDWATER MONITORING SCHEDULE

Monitoring well	1st Quarter	3rd Quarter	5 Year Evaluation.
3U	VOC(1)		(2)
5B-U			VOC(1)
5U	VOC(1)	VOC(1)	(2)
5L-ABC	VOC(1)		
7L-BC			VOC(1)
8U	VOC(1)		
8L-C	VOC(1)		
10U	VOC(1)	VOC(1)	
11U			VOC(1)
12U	VOC(1)		
14U	VOC(1)	VOC(1)	
14L-AB	VOC(1)	VOC(1)	
20U			VOC(1)
20L-A	VOC(1)	VOC(1)	
21U-X	VOC(1)	VOC(1)	
22U	VOC(1)		
23U			VOC(1)
25U			VOC(1)
28U			VOC(1)
29L-ABC	VOC(1)	VOC(1)	
31L-ABC	VOC(1)		
33L-ABC			VOC(1)
34L-ABC	VOC(1)		
40L-AB	VOC(1)	VOC(1)	
41U	VOC(1)		
42U			VOC(1)
43L-AB	VOC(1)	VOC(1)	
44U	VOC(1)		
46L-A	VOC(1)	VOC(1)	
47U	VOC(1)		
48L-A	VOC(1)	VOC(1)	
49L-BC			VOC(1)
52U	VOC(1)	VOC(1)	
53L-BC			VOC(1)
60U	VOC(1)	VOC(1)	
60L-A			VOC(1)
61U			VOC(1)
62U	VOC(1)		
64U	VOC(1)		
64L-A			VOC(1)
65U	VOC(1)		
66U	VOC(1)	VOC(1)	

Monitoring well	1st Quarter	3rd Quarter	5 Year Evaluation.
66L-B	VOC(1)	VOC(1)	
67U	VOC(1)		
67L-A			VOC(1)
68L-A	VOC(1)		
69L-A			VOC(1)
69L-B			VOC(1)
70U	VOC(1)		
BD-1U	VOC(1)		(2)
MW-1U	VOC(1)	VOC(1)	
DMW-1D			VOC(1)
DMW-2D			VOC(1)
EW-1	VOC(1)	VOC(1)	(3)
EW-2	VOC(1)	VOC(1)	(3)
EW-3	VOC(1)	VOC(1)	(3)
EW-4	VOC(1)	VOC(1)	(3)
EW-5	VOC(1)	VOC(1)	(3)
EW-6	VOC(1)	VOC(1)	(3)
EW-7	VOC(1)	VOC(1)	(3)
EW-8	VOC(1)	VOC(1)	(3)

(1) Halogenated volatile organic compounds by EPA Method 8021 or equivalent for the compounds listed in Appendix A of this Monitoring and Reporting Program Order

(2) One of the following three listed wells is to be sampled, in order of preference: BD-1U, 3U, or 5U. The sample is to be analyzed for TPH-as Trimsol by EPA Method 8015 Modified, and for metals: Chromium^{+6},copper, and nickel using EPA Methods 218.4, 220.1 and 249.1, respectively or equivalent.

(3) Benzene, toluene, ethylbenzene, xylenes and fuel oxygenates by EPA Method 8260B

G. REPORTING

Semi-annual Monitoring Reports

Monitoring reports shall be submitted to the Regional Water Board semi-annually.

Monitoring reports shall include the following elements:

1. A groundwater elevation contour map shall be submitted for each sampling event and shall include the following:

    a. Location of the facilities;
    b. Location of the monitoring wells;
    c. Location of former underground tanks and other significant site features;
    d. Groundwater flow pattern including the direction of the groundwater gradient.

2. A contamination isogram map shall be submitted for first quarter monitoring event for the most significant pollutant detected during the monitoring events and shall include the following:

    a. Location of the facilities
    b. Location of the monitoring wells; and
    c. Location of former underground tanks and other significant site features;

3. Current and previous analytical results shall be reported in tables which include the following:

    a. sampling point;
    b. date of sample collection;
    c. constituents and analytical results; and
    d. quantification limits employed for non-detect analytical results.

4. Each report shall contain copies of the well purging and sampling field logs; chain of custody documents showing the time and date of collection and person collecting; and signed laboratory sheets including quality control data and explanations of analytical anomalies, if any. These supporting documents may be included as appendices to the report.

In addition, the permittee shall discuss the compliance record and the corrective actions taken or planned, which may be needed to bring the discharge into full compliance with the permit. The data shall be summarized in such manner to illustrate clearly the compliance with waste discharge and reclamation requirements. If the permittee monitors any pollutant more frequently than required by this Permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and report of the data submitted in the discharger monitoring report. During periods of no discharge, the reports shall certify no discharge. All data reporting under this monitoring and reporting program shall conform to the requirements as outlined in the "Reporting Protocols" in Appendix A of Order No. R1-2001-9.

The reports shall be submitted in accordance with the following schedule:

Reporting Period	Due Date
First Semi-annual Report (January through June)	July 31
Second Semi-annual Report (July through December)	January 31

Copies of each monitoring report shall be mailed to: Regional Administrator
U.S. Environmental Protection Agency
Attn: W-5-3
75 Hawthorne Street
San Francisco, CA 94105

Effectiveness Evaluation Report

The discharger shall submit an Effectiveness Evaluation Report for the groundwater extraction system. The purpose of the report is to assess the remedial progress and the ability of the extraction system to achieve water quality objectives in groundwater at the Site. The report must also identify and evaluate other currently available potentially effective technologies to achieve water quality objectives. The report must assess both the cost and the time needed for the existing groundwater extraction system, and for other currently available effective

technologies, to achieve water quality objectives at the site. The report must be submitted no later than December 31, 2008.

Application for Permit Renewal: Report of Waste Discharge

Authorization to discharge under Order No. R1-2001-9 NPDES Permit No CAG911001R expires on June 3, 2009. If the permittee wishes to continue an activity regulated by the permit after the expiration date, the permittee must apply for and obtain authorization by submitting a report of waste discharge. The report must include all information necessary characterize the sources of influent and to demonstrate compliance with the reporting requirements contained in ***Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*** **[http://www.swrcb.ca.gov/iswp]**. The application must be submitted no later than December 3, 2008.

Ordered by _____

Catherine E. Kuhlman
Executive Officer
June 3, 2004

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