

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
ORDER NO.
WASTE DISCHARGE REQUIREMENTS R5-2004-0015
FOR
COTTONWOOD INVESTORS, INC.
COTTONWOOD PLAZA
ENHANCED BIOREMEDIATION PUMP AND TREAT SYSTEM
YOLO COUNTY

The California Regional Water Quality Control Board, Central Valley Region (hereafter Regional Board), finds that:

1. Cottonwood Investors, Inc. (hereafter Discharger) submitted a Report of Waste Discharge on 5 August 2003 and supplemental information on 24 September 2003 for an enhanced bioremediation pump and treat system. The Discharger owns the property at 628 Cottonwood Street in Woodland, Assessor's Parcel Number 65-055-006 (hereafter referred to as Site), at Section 31, T10N, R2E, MDB&M and holds the deed of trust and assignment of rents for the property. The general location of the facility is shown on Attachment A, which is attached hereto and made part of this Order by reference.
2. Site groundwater monitoring is performed as required by Monitoring and Reporting Program (MRP) No. 5-01-824. Currently, the Site has five on-site monitoring wells, 11 off-site monitoring wells, and one off-site extraction well. Groundwater beneath the Site is polluted with volatile organic compounds (VOCs) due to poor handling of dry cleaning equipment chemicals. Groundwater has contained tetrachloroethene (PCE) up to 61,000 micrograms per liter ($\mu\text{g/l}$), trichloroethene (TCE) up to 7 $\mu\text{g/l}$, chloroform (CF) up to 13 $\mu\text{g/l}$, and vinyl chloride (VC) up to 22 $\mu\text{g/l}$. Cis-1,2-dichloroethene (cis-1,2-DCE) and 1,4-dichlorobenzene (1,4-DCB) have been detected in soil vapor, but not groundwater. The highest recent concentration of PCE is 540 $\mu\text{g/l}$.
3. On 13 August 2003, the Regional Board's Executive Officer issued Cleanup and Abatement Order (CAO) No. R5-2003-0712, which updated CAO No. 97-700.
4. There are two identified groundwater bearing zones. First encountered groundwater at the Site is about 30 feet below ground surface (bgs). A second water bearing zone is about 75 feet bgs. Most of the mass of VOC pollution is in the shallow water bearing zone. The highest concentrations of PCE are in off-site monitoring wells MW-8, MW-14, MW-15, and recovery well RW-1. Well locations are shown on Attachment B, which is attached hereto and made part of this Order by reference.
5. On 1 June 2001, the Discharger injected 4.5 gallons of molasses into temporary injection well IN-1 upgradient of monitoring well MW-8 as a pilot study to determine if molasses injection was a viable remedial alternative and if so, the appropriate molasses injection dosing rates. Analytical results collected from MW-8 just prior to the molasses injection showed PCE at 1,100 $\mu\text{g/l}$. One month after molasses injection, PCE decreased to 620 $\mu\text{g/l}$ in MW-8. In July 2002, the Discharger performed pump tests to evaluate the use of pump and treat in conjunction with the molasses injection to remediate polluted groundwater.

6. Results of the 2001 molasses injection pilot study showed that the current aerobic conditions at the site could be changed to anaerobic conditions with the addition of molasses and that under anaerobic conditions PCE will degrade by reductive dechlorination. During reductive dechlorination, anaerobic microorganisms substitute hydrogen for chlorine on the organic compound. The chlorine is the electron acceptor and carbon is the main electron donor. PCE is reduced to TCE, then cis-1,2-DCE, then VC, then ethylene. Injecting molasses will stimulate growth of indigenous anaerobic microorganisms by providing a carbon substrate, therefore accelerating the reductive dechlorination process. PCE and TCE degrade best under anaerobic conditions, but cis-1,2-DCE and VC degrade best under aerobic conditions. Despite this, cis-1,2-DCE and VC should still be reduced by the indigenous microorganisms once the PCE and TCE are reduced because it will be the next available source for the anaerobic microorganisms to substitute hydrogen for chlorine.
7. The Discharger proposes to extract groundwater from extraction well RW-1, which is screened in the shallow water bearing zone, at about 20 gallons per minute (gpm). RW-1 is in the center of the PCE plume, and based on the pump test, the proposed extraction rate should capture the entire plume. The extracted groundwater will be piped to the treatment compound near MW-4 and treated with four carbon canisters connected in two parallel series. After carbon treatment, the water will be amended with food grade molasses and then reinjected back into MW-4 at about 20 gpm. The treatment area extends from MW-4 about 430 feet downgradient (north) to extraction well RW-1. Extracting groundwater at the downgradient end of the treatment area along with the natural groundwater flow direction, will pull the amended groundwater through the treatment area and provide hydraulic control for complete containment of the molasses within the treatment area. The Discharger will continue the extraction of groundwater and discharge of treated groundwater amended with molasses until the VOCs in groundwater have been reduced below cleanup goals or the system is no longer effective at reducing VOC concentrations.
8. The Discharger proposes to amend the treated groundwater with enough molasses to raise the carbohydrate level in the resulting mixture, as measured by total organic carbon analyses, to 10 milligrams per liter (mg/l). The pilot study results shows that 10 mg/l of total organic carbon has the capability to consume all oxygen in the groundwater so that reductive dechlorination will begin. The actual amount of PCE consumed is dependent on the bacterial population. Based on calculations from the 2001 molasses injection pilot study, 10 mg/l of total organic carbon should be sufficient for the bacteria to oxidize about 5 mg/l of VOC pollution. As concentrations in the extracted water change, the amount of molasses added will change so that a sufficient amount of total organic carbon is being added to the subsurface.
9. The Discharger will monitor extraction well RW-1, injection well MW-4, and monitoring wells MW-1, MW-2, MW-5, MW-8, MW-10, and MW-14 as specified in the attached MRP No. R5-2004-0015, which includes sampling two weeks prior to startup to determine baseline levels, 24 hours after startup, one week after startup, one month after startup, then monthly for the next five months, and quarterly thereafter.

10. With the addition of molasses, there is the potential to reduce naturally occurring elements or compounds, such as metals and sulfate. For example, sulfate could be reduced to hydrogen sulfide. Therefore, the Discharger will sample the monitoring wells for metals and other naturally occurring compounds to determine if reduction of metals and other compounds is occurring and to monitor the rate of reduction to prevent creating new site pollutants.
11. In the event that metal or sulfide concentrations exceed 20 percent of baseline concentrations in MW-14, the Discharger will collect a confirmation sample within 7 days. If the exceedence is confirmed, the Discharger will stop amending the treated groundwater with molasses until analytical results return to baseline levels, but continue to pump, treat and reinject the groundwater. If the metal and/or sulfide concentrations persist in MW-14 six months after the molasses amendment has ceased, the Discharger, upon written approval from the Executive Officer, will inject air or hydrogen peroxide into groundwater monitoring wells MW-1 and MW-8 to change the subsurface condition to aerobic which will cease the reduction of the metals and other compounds.
12. Because some pollutants degrade better under aerobic conditions, a secondary contingency plan also is needed. In the event that PCE and/or PCE breakdown products, including but not limited to TCE, cis-1,2-DCE, and VC, show no reduction in concentrations over any period of six months of monitoring in RW-1, the Discharger, upon written approval of the Executive Officer may increase the amount of molasses added to the treated groundwater. The Discharger may only increase the amount of molasses added so that the resulting total organic carbon concentration does not exceed 15 mg/l. If the concentrations of PCE and/or PCE breakdown products persist after six months of the increased dosage of molasses, the Discharger will stop adding molasses, continue to pump, treat, and reinject the groundwater, and upon written approval from the Executive Officer, will inject air or hydrogen peroxide into groundwater monitoring wells MW-1 and MW-8 to change the subsurface condition to aerobic which will allow for continued degradation of the VOC pollution.
13. The injection of chemicals into waters of the State is subject to regulation under the California Water Code. This Order authorizes the Discharger to discharge treated groundwater amended with molasses into groundwater subject to specific discharge requirements.
14. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition*, (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Water Resources Control Board (State Board). Pursuant to Section 13263(a) of the California Water Code, waste discharge requirements must implement the Basin Plan.
15. Surface water drainage is to the Sacramento River within the legal boundaries of the Sacramento – San Joaquin Delta. The beneficial uses of the Sacramento – San Joaquin Delta are municipal

and domestic supply; agricultural supply; industrial process and service supply; water contact recreation; noncontact water recreation; warm and cold freshwater habitat; migration of warm and cold freshwater species; spawning of warm freshwater species; wildlife habitat; and navigation.

16. The beneficial uses of underlying groundwater are municipal and domestic, agricultural, and industrial service and process water supply.
17. Surrounding land uses are residential and commercial.
18. State Board Resolution No. 68-16 (hereafter Resolution 68-16 or the “Antidegradation Policy”) requires the Regional Board in regulating discharges to maintain high quality waters of the state until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in plans and policies (e.g., quality that violates water quality objectives). Temporal degradation of groundwater at this site due to the discharge of treated groundwater amended with molasses may occur. The temporary degradation allowed by this Order is consistent with Resolution 68-16 since (1) the purpose is to accelerate and enhance remediation of unacceptable concentrations of several waste constituents and such remediation will benefit the people of the state; (2) best practicable treatment and control, including adequate monitoring and contingency plans to assure protection of water quality, are required; and (3) the discharge will not cause water quality objectives to be exceeded beyond the treatment area or project duration, as defined in Finding 7.
19. Section 13267(b) of California Water Code provides that:

In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.

The technical reports required by this Order and the attached MRP No. R5-2004-0015 are necessary to assure compliance with these waste discharge requirements. The Discharger owns the property that contains the former facility that discharged the waste subject to this Order.

20. The California Department of Water Resources sets standards for the construction and destruction of groundwater wells, as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 74-81* (December 1981).

These standards, and any more stringent standards adopted by the State or County pursuant to California Water Code Section 13801, apply to all monitoring wells.

21. Issuance of this Order is an action to assure the restoration of the environment and is, therefore, exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21000, et seq.), in accordance with Section 15308 and 15330, Title 14, California Code of Regulations (CCR).
22. This discharge is exempt from the requirements of *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste*, as set forth in Title 27, CCR, Section 20005, et seq., (hereafter Title 27). The exemption pursuant to Section 20090(b), is based on the following:
 - a. The Board is issuing waste discharge requirements,
 - b. The discharge complies with the Basin Plan, and
 - c. The wastewater does not need to be managed according to Title 22 CCR, Division 4.5, and Chapter 11, as a hazardous waste.

Section 20090(d) allows exemption for a project to clean up a condition of pollution that resulted from an unauthorized release of waste based on the following:

- d. The cleanup and abatement action is under the direction of a public agency;
 - e. Wastes removed from the immediate place of release will be discharged according to the Title 27 regulations; and
 - f. The remedial actions intended to contain wastes at the place of release shall implement the Title 27 regulations to the extent feasible.
23. Pursuant to California Water Code Section 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.
24. All the above and the supplemental data and information and details in the attached Information Sheet, which is incorporated by reference herein, were considered in establishing the following conditions of discharge.
25. The Discharger and interested agencies and persons were notified of intent to prescribe waste discharge requirements for this discharge and provided with an opportunity for a public hearing and an opportunity to submit written views and recommendations.
26. In a public meeting, all comments pertaining to the discharger were heard and considered.

IT IS HEREBY ORDERED that pursuant to Sections 13263 and 13267 of the California Water Code, Cottonwood Investors, Inc., its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall

comply with the following while conducting the above-described enhanced bioremediation pump and treat system:

[Note: Other prohibitions, conditions, definitions, and some methods of determining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated 1 March 1991, incorporated herein.]

A. Discharge Prohibitions

1. Discharge of wastes to surface waters or surface water drainage courses is prohibited.
2. Unless authorized by the Executive Officer as described in Findings #11 and #12, the discharge of other than treated groundwater amended with molasses (hereafter referred to as amended groundwater) into groundwater is prohibited.
3. Discharge of waste classified as 'hazardous' under Section 2521 of Title 23, CCR, or as 'designated' under Section 13173 of California Water Code is prohibited.
4. Discharge of amended groundwater at a location or in a manner different from that described in Finding Nos. 7, 8, 11, and 12 is prohibited.

B. Discharge Specifications

1. The Discharger shall provide hydraulic control that provides full and complete containment within the treatment area of any groundwater pollutants, amendments, and breakdown products of the in situ treatment process during and after discharge of any amended groundwater. The Discharger shall continue to provide hydraulic control while discharge and cleanup are ongoing.
2. No waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of the Effluent and/or Groundwater Limitations.
3. Discharge of amended groundwater shall be limited to the project scope as described in Findings 7, 8, 11, and 12.

C. Effluent Limitations

1. The amended groundwater shall not have a pH of less than 6.5 or greater than 8.5.
2. The discharge of amended groundwater in excess of the following limits is prohibited:

<u>Constituent</u>	<u>Units</u>	<u>30-Day Average</u>	<u>Daily Maximum</u>	<u>Maximum Detection Limit¹</u>
PCE	µg/l	0.5	1.0	0.5
CF	µg/l	0.5	1.0	0.5
TCE	µg/l	0.5	1.0	0.5
cis-1,2-DCE	µg/l	0.5	1.0	0.5
VC	µg/l	0.5	1.0	0.5
1,4-DCB	µg/l	0.5	1.0	0.5

¹ For nondetectable detection results

3. If the target constituents are detected above the 30-day average concentration limits, the Discharger shall obtain a confirmation sample within 24 hours of receiving the results and cease discharging until the analytical results of confirmation samples are below the limits above. If the exceedance is confirmed, the Discharger shall shut down the system and replace activated carbon units, and retest within 72 hours of restarting the system.

D. Groundwater Limitations

1. During remedial activities, the Discharger shall not cause more than a 20 percent increase above the baseline concentration of metals, total dissolved solids, and/or sulfide downgradient of the treatment area. Compliance shall be measured in monitoring well MW-14.
2. When the remedial activities are completed, the amendments and byproducts shall not exceed baseline levels.

E. Provisions

1. The Discharger shall notify Board staff a minimum of one week prior to the startup of the enhanced bioremediation pump and treat system.
2. The Discharger shall comply with the attached MRP No. R5-2004-0015, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.
3. The Discharger shall comply with the “Standard Provisions and Reporting Requirements for Waste Discharge Requirements,” dated 1 March 1991, which are attached hereto and by reference a part of this Order. This attachment and its individual paragraphs are commonly referenced as “Standard Provision(s).”
4. All of the following reports shall be submitted pursuant to Section 13267 of the California Water Code. All technical reports required herein that involve planning, investigation,

evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1. To demonstrate compliance with sections 415 and 3065 of Title 16, CCR, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.

- a. The Discharger shall submit a Startup Report due no later than **60 days** after startup of the enhanced bioremediation pump and treat system. The Startup Report shall include a description of system installation, baseline concentrations, and results of the first month of operation.
5. If groundwater samples from monitoring well MW-14 contain metals or sulfide in concentrations exceeding 20 percent of baseline concentrations in MW-14, the Discharger shall immediately notify Regional Board staff of the exceedance(s) and obtain a confirmation sample within **7 days** of receiving the results. Within **48 hours** of receiving the confirmation sample results, the Discharger shall notify Regional Board staff of the results followed by written notification within **7 days**.
6. If groundwater samples from monitoring well RW-1 show that PCE and/or PCE breakdown products show no or very low reduction in concentrations over any period of six months of monitoring, the Discharger may propose to increase the dosage of molasses as long as the resulting total organic carbon concentration does not exceed 15 mg/l. The Discharger may only increase the amount of molasses upon receiving written approval from the Executive Officer. If the increased dosage of molasses does not begin reducing VOC concentrations within six months, the Discharger shall stop adding molasses, continue to pump, treat, and reinject the groundwater, and upon written approval from the Executive Officer, will inject air or hydrogen peroxide into groundwater monitoring wells MW-1 and MW-8.
7. **Within 30 days** of confirming an exceedance as described in Provision E.5, the Discharger shall implement the contingency plan as described in Finding 11.
8. **Within 30 days** of determining that VOC concentrations are not decreasing and/or concurrence that the increased dosage of molasses is not reducing VOC concentrations as described in Provision E.6, the Discharger shall implement the contingency plan as described in Finding 12.
9. The Discharger shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Board or court order requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

10. The Discharger shall maintain records of all monitoring information including all calibration and maintenance records, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of three years from the date of the sample, measurement, or report. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer.
11. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control that are installed or used by the Discharger to achieve compliance with this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are to be installed by the Discharger only when necessary to achieve compliance with the conditions of this Order.
12. The Discharger shall report any non-compliance, and/or accidental spill or release of liquid or material verbally to the Regional Board within 24 hours of the spill or release, and follow-up the verbal notification with written documentation of the spill or release within 14 calendar days of the incident.
13. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.
14. As described in the Standard Provisions, the Discharger shall report promptly to the Regional Board any material change or proposed change in the character, location, or volume of the discharge.
15. While this Order is in effect, and prior to any change in ownership of the site or management of this operation, the Discharger shall transmit a copy of this Order to the succeeding Owner/Operator, and forward a copy of the transmittal letter and proof of transmittal to the Board.
16. The Regional Board will review this Order periodically and will revise requirements when necessary.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 29 January 2004.

Original signed by

THOMAS R. PINKOS, Executive Officer

Attachments

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
 CENTRAL VALLEY REGION
 MONITORING AND REPORTING PROGRAM NO. R5-2004-0015
 FOR
 COTTONWOOD INVESTORS, INC.
 COTTONWOOD PLAZA
 ENHANCED BIOREMEDIATION PUMP AND TREAT SYSTEM
 YOLO COUNTY

This Monitoring and Reporting Program (MRP) incorporates requirements for monitoring the progress of the enhanced bioremediation pump and treat system. This MRP is issued pursuant to California Water Code Section 13267. Cottonwood Investors, Inc. (hereafter Discharger) is required to comply with this MRP. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. In addition to this MRP, groundwater sampling and reporting outlined in MRP No. 5-01-824 is still required.

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.

REMEDICATION MONITORING

As shown on Attachment B and listed below, there are 13 shallow zone monitoring wells, three deep monitoring wells, and one extraction well. Monitoring well MW-4 will be used as an injection well for the amended groundwater.

Extraction Well	RW-1
Injection Well	MW-4
Shallow zone monitoring wells	MW-1, MW-2, MW-3, MW-6, MW-7, MW-8, MW-10, MW-13, MW-14, MW-15, MW-16, and MW-17
Deep zone monitoring wells	MW-5, MW-11, and MW-12

The groundwater monitoring program for MW-1, MW-2, MW-4, MW-5, MW-8, MW-10, MW-14, and RW-1 shall follow the schedule in Table 1. Sample collection and analysis shall follow standard EPA protocol and be completed by a California State certified laboratory.

Field measured parameters shall be recorded every time these wells are sampled. The field measured parameters to be recorded are:

<u>Constituents</u>	<u>Units</u>
Electrical conductivity	µmhos/cm
pH	pH units
Oxidation-reduction potential	millivolts
Dissolved oxygen	mg/l
Temperature	°F/°C
Groundwater elevation	Feet and hundredths, mean sea level

All 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.

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 MRP shall also be reported to the Regional Board. In addition, the Discharger shall notify the Board within 24 hours of any unscheduled shutdown of the enhanced bioremediation pump and treat system.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

A. Monthly Operation Reports

The Discharger shall submit to the Regional Board monthly operation reports by the 1st day of the second month following sampling (i.e., the January Report is due by 1 March). These operation reports shall contain a summary of the results of monitoring, including effluent and injection well flow rates, volume of treated water, pressure readings, and water levels, operation and maintenance activities for that month, and a summary of any shutdown and/or spill events that occur that month.

B. Quarterly Monitoring Reports

Quarterly reports shall be submitted to the Regional Board on the **1st day of the second month following the end of each calendar quarter (i.e., by 1 February, 1 May, 1 August, and 1 November)**. The reports shall be submitted separately from the quarterly monitoring reports required by MRP No. 5-01-819. 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. 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 bioremediation pump and treat 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; and
6. A discussion of any data gaps, potential deficiencies/redundancies in the monitoring system or reporting program.

C. Annual Report

An Annual Report shall be submitted to the Regional Board by **1 February** of each year. This report shall contain an evaluation of the effectiveness and progress of the 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 groundwater treatment system, including a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the contaminants and whether the contaminant plume is being captured by the extraction system or is continuing to spread, as well as a forecast of the flows anticipated in the next year;
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 as of the date of the Order.

Original signed by

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

(Date)

Table 1
Monitoring Frequency
Cottonwood Investors, Inc.
Cottonwood Plaza
Enhanced Bioremediation Pump and Treat System
Yolo County

CONSTITUENT	UNITS	ANALYTICAL METHOD	SAMPLING FREQUENCY	REPORTING FREQUENCY
Baseline and Startup Monitoring of MW-1, MW-2, MW-4, MW-5, MW-8, MW-10, MW-14, and RW-1				
Volatile Organic Compounds ¹	mg/l	8260B	A	Monthly
General Analytical Parameters ²	mg/l	various	A	Monthly
Metals ³	mg/l	6000/7000	A	Monthly
Monthly Average Daily Flow	gpd	--	A	Monthly
Contingency Monitoring of MW-14				
Volatile Organic Compounds ¹	mg/l	8260B	A	Quarterly
General Analytical Parameters ²	mg/l	various	A	Quarterly
Metals ³	mg/l	6000/7000	A	Quarterly
Groundwater Monitoring of MW-1, MW-2, MW-5, MW-8, and MW-10				
Volatile Organic Compounds ¹	mg/l	8260B	A	Semi-annual ⁴
General Analytical Parameters ²	mg/l	various	A	Semi-annual ⁴
Metals ³	mg/l	6000/7000	A	Semi-annual ⁴
Influent Monitoring of RW-1⁵				
Volatile Organic Compounds ¹	mg/l	8260B	Monthly	Monthly
Metals ³	mg/l	6000/7000	Quarterly	Quarterly
Monthly Average Daily Flow	gpd	--	Monthly	Monthly
Effluent Monitoring measured between carbon units				
Volatile Organic Compounds ¹	mg/l	8260B	Monthly	Monthly
Effluent Monitoring measured between carbon units and molasses amendment				
Volatile Organic Compounds ¹	ug/l	8260B	Monthly	Monthly
General Analytical Parameters	various	various	Monthly	Monthly
Total Volume of Water Treated	gallons	--	Monthly	Monthly
Flow Rate at Time of Sampling	gpm	--	Monthly	Monthly
Average Flow Rate (since last sampling)	gpm	--	Monthly	Monthly
Injection Monitoring of MW-4				
Total Volume of Water Injected	gallons	--	Monthly	Monthly
Injection Rate at Time of Sampling	gpm	--	Monthly	Monthly
Average Injection Rate (since last sampling)	gpm	--	Monthly	Monthly
Pressure at Time of Sampling	psig	--	Monthly	Monthly
Water Level	0.01 feet msl	--	Monthly	Monthly

Key:

- A Samples shall be collected two weeks prior to startup of the system, 24 hours after startup, one week after startup, one month after startup, and then monthly for the next five months.
- 1 Volatile organic compound analysis shall include ethylene.
- 2 General analytical parameters include total dissolved solids, total organic carbon, chloride, alkalinity, dissolved oxygen, sulfate, sulfide, and ferrous iron.
- 3 Metals include antimony, arsenic, beryllium, cadmium, trivalent and hexavalent chromium, cobalt, lead, mercury, molybdenum, nickel, selenium, silver, thallium, and vanadium.
- 4 Semi-annual samples shall be collected during the first and third calendar quarters.
- 5 Influent monitoring of RW-1 shall begin after the Baseline and Startup Monitoring.
- NA Not applicable
- msl mean sea level
- mg/l milligrams per liter
- ug/l micrograms per liter

INFORMATION SHEET

ORDER NO. R5-2004-0015
COTTONWOOD INVESTORS, INC.
COTTONWOOD PLAZA
ENHANCED BIOREMEDIATION PUMP AND TREAT SYSTEM
YOLO COUNTY

Cottonwood Investors, Inc. owns the property at 628 Cottonwood Street in Woodland (Site), which was formerly leased to a dry cleaning facility. Operations at the Site have resulted in tetrachlorethene (PCE), trichloroethene, chloroform, and vinyl chloride pollution in groundwater. There are two identified groundwater bearing zones. First encountered groundwater at the Site is about 30 feet below ground surface (bgs). A second water bearing zone is about 75 feet bgs. Most of the mass of volatile organic compound pollution is in the shallow water bearing zone.

The proposed system will extract groundwater from off-site extraction well RW-1, screened in the shallow water bearing zone in the center of the volatile organic compound plume, at about 20 gallons per minute. The extracted groundwater will be piped backed on-site and treated with activated carbon. Molasses will then be added and the amended groundwater will be discharged into on-site monitoring well MW-4. The treatment area extends from MW-4 about 430 feet downgradient (north) to extraction well RW-1. The downgradient extraction and natural groundwater flow will pull the treated groundwater through the treatment area. There is plume capture in the treatment area to ensure that water quality objectives will not be exceeded beyond the treatment area.

In the event that metal or sulfide concentrations exceed 20 percent of baseline concentrations in MW-14 or PCE and/or PCE breakdown products show no reduction in concentrations over any period of six months of monitoring in RW-1, the Discharger will implement a contingency plan. If metal or sulfide concentrations increase above 20 percent, the Discharger will stop amending the treated groundwater with molasses. If concentrations persist, the Discharger will inject air or hydrogen peroxide into groundwater monitoring wells MW-1 and MW-8 to change the subsurface condition to aerobic, which will cease the reduction of the metals and other compounds. If PCE and/or PCE breakdown products show no reduction over any six month period of monitoring, the Discharger may add additional molasses. If the additional molasses does not show to have increased the reduction of PCE and/or PCE breakdown products, the Discharger will stop amending the treated groundwater with molasses. If concentrations persist, the Discharger will inject air or hydrogen peroxide into groundwater monitoring wells MW-1 and MW-8 to change the subsurface condition to aerobic, which will allow continued degradation of volatile organic compound pollution.

This remedial process allows microorganisms to degrade volatile organic compound pollution to ethylene and chloride.

DLL 12/30/03