

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2004-0017
WASTE DISCHARGE REQUIREMENTS

FOR
MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
FORMER WINTON FACILITY
ENHANCED BIOREMEDIATION PROJECT
MERCED COUNTY

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

1. Miller Springs Remediation Management Company, Inc. (Discharger) submitted a Report of Waste Discharge on 29 January 2003 and supplemental information on 13 February, 24 March, and 17 October 2003 for an enhanced bioremediation project. The Discharger owns the former retail fertilizer distribution site at 6245 Winton Way (APN 147-0180-0008; N37° 22' 41" W120° 36' 55"; T6N, R12E, S26, MDB&M) in Winton. The general location of the project site is shown on Attachment A, which is attached hereto and made part of this Order by reference.
2. The Occidental Chemical Corporation operated a retail fertilizer distribution facility at this site from about 1971 to 1982. The J.R. Simplot Company operated the same type of business at this site from 1982 through 1992. The site has been vacant since 1992, and the Discharger purchased the site in 2000. The Discharger is a subsidiary of Occidental Chemical Corporation. The Discharger is responsible for environmental management of Occidental Chemical Corporation holdings and has taken the lead in investigating and remediating this site.
3. Shallow groundwater beneath the site contains elevated concentrations of nitrate, 1,2-dichloropropane (1,2-DCP) and 1,2,3-trichloropropane (1,2,3-TCP). The lateral and vertical extent of the groundwater plume is defined. Groundwater in the eastern (upgradient) portion of the site contains 1,2-DCP at about 1 ug/l, and 1,2,3-TCP ranging from 9 to 25 ug/l. Groundwater contains nitrate (as nitrogen) ranging from about 10 to 90 mg/l, which is found mainly in the western portion of the site. Constituent concentrations vary seasonally. The Discharger has removed soil containing elevated concentrations of nitrogen and operated a soil vapor extraction and treatment system to remove 1,2-DCP and 1,2,3-TCP from the vadose zone.
4. The Discharger regularly monitors ten monitoring wells and four remediation wells pursuant to Monitoring and Reporting Program (MRP) No. R5-2002-0828. This monitoring will continue during the enhanced bioremediation project. Groundwater is about 70 feet below ground surface (bgs), and the groundwater surface elevation can rise as much as seven feet due to seasonal recharge. Groundwater flows consistently westward. Groundwater monitoring wells and remediation wells are shown on Attachment B, which is attached to and made part of this Order by reference.
5. The Discharger completed a pilot study to remediate nitrate in groundwater in which about 300 pounds of carbon in the form of corn syrup were introduced into four remediation wells in December 2000, and an additional 400 pounds introduced in February 2001.

6. The enhanced biodegradation process depends upon stimulating growth of a consortium of indigenous microbes by providing a source of carbon which is supplied by the corn syrup or table sugar. Microbes obtain energy by removing an electron from a compound (oxidizing it), and by depositing the electron onto another compound (reducing it). Different amounts of energy can be obtained from different compounds. The first compounds to be utilized as electron acceptors are those that provide the most energy, conferring a competitive advantage to these organisms. Aerobic microbes will be the first to consume corn syrup or table sugar, using oxygen until it is depleted, since oxygen provides the most energy. After oxygen is depleted, a succession of anaerobic microbes become dominant, oxidizing the corn syrup or table sugar and reducing the specific compounds upon which their metabolism depends. In general, nitrate is the next compound in sequence to be reduced, then iron, then sulfate, and if present, chlorinated organic compounds.
7. The waste products of anaerobic metabolism (the reduced compounds), such as carbon dioxide, methane, hydrogen sulfide, reduced iron, and ammonium, in turn become electron sources for other microbes, and the previously oxidized compounds become electron acceptors. This is the basis of geochemical cycling of nutrients. As the carbon provided by the corn syrup or table sugar is exhausted, the system slowly returns to the initial conditions. Some gaseous products, such as nitrogen gas, methane, and carbon dioxide, may migrate into the soil column before being consumed in the aquifer, and are subject to microbial degradation within the soil column.
8. During the pilot study, nitrate concentrations dropped to levels below detection within three months, but the concentration of ammonium increased 100-fold during this time period. By February 2002, the ammonium completely converted to nitrate for a net reduction in nitrate relative to the starting conditions. Pilot studies conducted at other sites have shown that lower concentrations of carbon injected into the subsurface produce lesser amounts of ammonium. During the pilot study, concentrations of iron and manganese increased, and pH decreased. Iron and pH returned to baseline conditions within one year of introducing carbon, and manganese returned to baseline within two years. Sulfate concentrations did not change significantly throughout the pilot study. In addition to these indicators of biological activity, dissolved organic carbon and alkalinity are expected to temporarily increase as corn syrup or table sugar becomes available and as microbial activity increases. Dissolved organic carbon and alkalinity are expected to decline as corn syrup or table sugar is consumed. During the pilot study, the reaction zone extended about 50 feet downgradient of the injection area.
9. The Discharger proposes to implement this full-scale enhanced bioremediation in two phases. The objectives of Phase I are to evaluate the efficacy of the corn syrup or table sugar quantity and frequency of application to degrade nitrate and minimize ammonium generation; to correlate concentration changes of dissolved organic carbon to changes in other biological indicators; and to evaluate the time frame to degrade nitrate and corn syrup or table sugar amendments. In Phase II, the extent of the remediation will be expanded to treat the remainder of the nitrate plume. These Waste Discharge Requirements (WDRs) will be revised prior to implementation of Phase II.
10. Phase I includes installing two new remediation wells and injecting up to 80 pounds of corn syrup or table sugar (measured as glucose equivalents) into groundwater at each of five remediation wells, RW-1, RW-2, RW-3, RW-5, and RW-6, as shown on Attachment B. Based on the pilot study results, the treatment area is expected to extend 50 feet from each remediation well.

11. Upon Executive Officer approval, the Discharger may inject up to two supplemental applications of corn syrup or table sugar up to, but not exceeding, 80 pounds into each of these wells when ammonium and dissolved iron concentrations decrease to within 20 percent of baseline conditions in the individual wells. After these additional injections, when ammonium and dissolved iron concentrations in the remediation wells decline to baseline conditions or less, then the Discharger will prepare an evaluation report, a Phase II work plan, and a Report of Waste Discharge for revised WDRs.
12. The quantity of corn syrup or table sugar injected during Phase I is calculated to be sufficient to remove oxygen and degrade the mass of nitrate in groundwater in an estimated 30-foot radius from each injection well to a saturated thickness of five feet. The Discharger estimates that 0.9 grams of glucose is needed for each gram of oxygen, and 0.6 grams of glucose is needed for each gram of nitrate (as nitrate). The initial 80 pounds proposed includes an additional 20 percent to account for intrinsic carbon demand at this site.
13. During Phase I, groundwater samples will be collected bimonthly (every other month) and analyzed for the parameters outlined in the attached MRP No. R5-2004-0017. In addition, the Discharger will collect baseline samples from the five remediation wells, and monitoring wells W-2, W-8, W-9, and W-10, prior to implementing Phase I to determine initial concentrations of alkalinity, iron, manganese, ammonium, and dissolved organic carbon. The Discharger will propose baseline concentrations of these constituents within 60 days after injection, in accordance with Provision D.4.a.
14. In the event that concentrations of ammonium or dissolved organic carbon exceed approved baseline concentrations by more than 20 percent in monitoring wells W-2, W-8, W-9, or W-10, the Discharger will collect a confirmation sample. If the exceedance is confirmed, the Discharger will commence monthly monitoring of the well(s) exhibiting an exceedance. Two samples will be collected monthly for two consecutive months so there are enough data to establish a trend. If the levels, based on the concentration trend, are more than 20 percent above baseline levels, the Discharger will implement the contingency plan. The contingency plan includes providing a work plan to aerate the groundwater through injection points which will be positioned to accelerate the conversion of ammonium to nitrate and to accelerate the degradation of any remaining corn syrup or table sugar. The position of the injection points will vary depending upon where an exceedance is identified and the proximate upgradient remediation well.
15. The enhanced bioremediation project will conclude when concentrations of ammonium, dissolved iron, dissolved manganese and dissolved organic carbon return to baseline concentrations.
16. The injection of chemicals into waters of the State is subject to regulation under the California Water Code. This Order authorizes the Discharger to inject corn syrup or table sugar into groundwater subject to specific discharge requirements.
17. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (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.

18. Surface water drainage is into the Merced River, which drains to the San Joaquin River. The beneficial uses of the Merced River between McSwain Reservoir and the San Joaquin River are municipal and domestic supply; agricultural stock watering supply; industrial process and service supply; power generation; water contact recreation; noncontact water recreation; warm and cold freshwater habitat; migration of warm and cold freshwater species; spawning of warm and cold freshwater species; and wildlife habitat. The beneficial uses of the San Joaquin River between the mouth of the Merced River and Vernalis are municipal and domestic supply; agricultural irrigation and stock watering supply; industrial process supply; water contact recreation; noncontact water recreation; warm freshwater habitat; migration of warm and cold freshwater species; spawning of warm freshwater species; and wildlife habitat.
19. The beneficial uses of the underlying groundwater are municipal and domestic supply, agricultural supply, industrial service supply, and industrial process supply.
20. Surrounding land uses are residential, commercial, and industrial.
21. 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 exceeds water quality objectives). Temporal degradation of groundwater at this site due to the corn syrup injection 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 a waste and such remediation will benefit the people of the state; (2) the discharge is limited in scope and duration; (3) best practicable treatment and control, including adequate monitoring and contingency plans to assure protection of water quality, are required; and (4) the injection will not cause water quality objectives to be exceeded beyond the treatment area or the duration of the project as described in Finding Nos. 10, 11, and 15.
22. 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. R5-2004-0017 are necessary to assure compliance with these waste discharge requirements. The Discharger owns the facility that discharges the waste subject to this Order.

23. 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 94-81* (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 and remediation wells.
24. 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).
25. 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). 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:
 - a. The cleanup and abatement action is under the direction of a public agency;
 - b. Wastes removed from the immediate place of release will be discharged according to the Title 27 regulations; and
 - c. The remedial actions intended to contain wastes at the place of release shall implement the Title 27 regulations to the extent feasible.
26. 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.
27. 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.
28. 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.
29. In a public meeting, all comments pertaining to the discharger were heard and considered.

IT IS HEREBY ORDERED that pursuant to Sections 13267 and 13263 of the California Water Code, Miller Springs Remediation Management 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 project:

[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. The injection of other than corn syrup or table sugar into groundwater is prohibited.
3. Discharge of waste classified as 'hazardous' under Section 2521, Chapter 15 of Division 3 of Title 23, CCR, or as 'designated', as defined in Section 13173 of California Water Code is prohibited.
4. The discharge of corn syrup or table sugar at any location or in a manner different from that described in Finding Nos. 10 and 11 is prohibited.

B. Discharge Specifications

1. 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 Groundwater Limitations.
2. Discharge of carbon in the form of corn syrup or table sugar shall be limited to the project scope defined in Finding Nos. 10 and 11.

C. Groundwater Limitations

1. During the enhanced bioremediation project, ammonium and dissolved organic carbon shall not exceed by more than 20 percent their respective baseline concentrations in monitoring wells W-2, W-8, W-9, or W-10.
2. Effective upon completion of the enhanced bioremediation project, dissolved organic carbon, ammonium, dissolved iron, dissolved manganese, and alkalinity shall not exceed baseline concentrations in remediation wells RW-1, RW-2, RW-3, RW-5, and RW-6, and monitoring wells W-2, W-8, W-9, W-10, and W-12.

D. Provisions

1. The Discharger shall notify the Regional Board a minimum of one week prior to the start of Phase I injection of corn syrup or table sugar.
2. The Discharger shall comply with the attached MRP No. R5-2004-0017, 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. Within **60 days** of injecting corn syrup or table sugar, the Discharger shall submit an Implementation Report that shall include a description of field activities, remediation well installation, quantities, location, form and method of corn syrup or table sugar injection, a table of groundwater elevations, and a table of proposed baseline concentrations using an approved EPA statistical method, including the rationale used to develop the concentrations.
 - b. Within **14 months** of initially injecting corn syrup or table sugar for Phase I, and prior to any additional corn syrup or table sugar injection, the Discharger shall submit a Phase I progress report that shall include groundwater remediation monitoring data, results achieved, and recommendations.
 - c. Within **26 months** of initially introducing corn syrup or table sugar for Phase I, the Discharger shall submit a Phase I Evaluation Report that shall include groundwater remediation monitoring data, a record of and discussion of the carbon quantities introduced as corn syrup or table sugar, results achieved, and recommendations. If a change in the discharge location or quantity is proposed, then the Discharger shall provide a work plan for Phase II and a Report of Waste Discharge requesting a revision of these WDRs.

5. If a groundwater sample from one or more of the monitoring wells W-2, W-8, W-9, or W-10 contain ammonium or dissolved organic carbon exceeding 20 percent above baseline conditions, the Discharger shall notify Regional Board staff of the exceedance and obtain a confirmation sample within **7 days** of receiving the results. If the confirmation sample results confirm exceeding 20 percent above baseline conditions, immediately upon receiving the confirmation sample results, the Discharger shall stop all corn syrup or table sugar injections and notify Regional Board staff of the results. The Discharger shall obtain additional samples at **30 days** and at **60 days** following receipt of the confirmation sample and transmit the results to Board staff within **7 days** of receipt.
6. **Within 30 days** of confirming an exceedance as described in Provisions D.5, the Discharger shall provide a work plan to implement the contingency plan as described in Finding 14. Within **7 days** after Executive Officer approval of the work plan, the Discharger shall implement the work plan and within **90 days** shall submit a Contingency Plan Implementation Report.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.

12. 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 30 January 2004.

THOMAS R. PINKOS, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2004-0017
FOR
MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
FORMER WINTON FACILITY
ENHANCED BIOREMEDIATION PROJECT
MERCED COUNTY

This Monitoring and Reporting Program (MRP) incorporates requirements for monitoring the progress of the enhanced bioremediation project. This MRP is issued pursuant to California Water Code Section 13267. Miller Springs Remediation Management, Inc. (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. R5-2002-0828 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.

ENHANCED BIOREMEDIATION MONITORING

As shown on Attachment B, there are 11 monitoring wells, four remediation wells, and two proposed remediation wells. Of these, five monitoring wells (W-2, W-8, W-9, W-10, and W-12) and five remediation wells (RW-1, RW-2, RW-3, RW-5, and RW-6) are associated with remediation monitoring. The groundwater monitoring program for these 10 wells and any remediation wells installed subsequent to the issuance of this MRP shall follow the schedule below. These analyses shall be completed by a State certified laboratory and shall follow standard EPA protocol. The first sampling event shall occur prior to the carbon injection. Groundwater samples from remediation and monitoring wells shall be analyzed for the following constituents according to the schedule below:

A. LABORATORY MEASURED PARAMETERS

Constituents	EPA Method	Maximum Detection Limit¹	Frequency
Alkalinity	SM 2320B	10 mg/L	Bi-Monthly ²
Ammonium	350.1	0.5 mg/L	Bi-Monthly ²
Dissolved Organic Carbon	415, 9060, or SM 5310	1 mg/L	Bi-Monthly ²
Iron (dissolved)	200, 6010, 6020	0.05 mg/L	Bi-Monthly ²
Nitrate (as nitrogen)	353.2	0.1 mg/L	Bi-Monthly ²
Manganese (dissolved)	200, 6010, or 6020	0.05 mg/L	Bi-Monthly ²
Total Dissolved Solids	160.1, or SM 2540	5 mg/L	Bi-Monthly ²

¹ For non-detectable results

² Every other month

B. FIELD MEASURED PARAMETERS

Monitoring of the enhanced bioremediation project shall include field measured parameters to be performed at each monitored well at each monitoring event. The field measured parameters to be recorded are listed in the following table.

<u>Constituents</u>	<u>Units</u>
Depth to Groundwater	0.01 ft
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

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.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

A. Bi-monthly Monitoring Reports

Bimonthly reports shall be submitted to the Board by the **1st day of the second month following the end of each bi-monthly period (i.e., the February-March report is due by 1 May)**. 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, or lack thereof, 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); and
3. Cumulative data tables containing the water quality analytical results and depth to groundwater.

B. Semi-Annual Report

Semi- annual reports shall be submitted to the Board by **1 May** and **1 November** of each year. These reports shall contain an evaluation of the effectiveness and progress of the remediation, and may be submitted with the corresponding bi-monthly monitoring report. Each semi-annual report shall contain the following minimum information:

1. Tabular summaries of all enhanced bioremediation data collected;
2. Graphical summaries of remedial progress, including nitrate, ammonium, iron, manganese, TDS, and dissolved organic carbon concentration changes with time;
3. An evaluation of the performance of the enhanced bioremediation project and an analysis of the effectiveness in destroying the pollutants;
4. 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
5. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program.

A letter transmitting the 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.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

(Date)

INFORMATION SHEET

ORDER NO. R5-2004-0017

MILLER SPRINGS REMEDIATION MANAGEMENT, INC.,
FORMER WINTON FACILITY, ENHANCED BIOREMEDIATION PROJECT
MERCED COUNTY

Miller Springs Remediation Management, Inc. (Miller Springs) is investigating and remediating agricultural chemical pollutants at 6245 Winton Way in Winton. In the past the retail agricultural chemical distribution facility had been operated by J.R. Simplot Winton and Occidental Chemical Company.

Groundwater contains elevated concentrations of nitrate, 1,2-dichloropropane (1,2-DCP), and 1,2,3-trichloropropane (1,2,3-TCP). The Discharger is remediating 1,2-DCP and 1,2,3-TCP using soil vapor extraction. These compounds are contained in the eastern portion of the site, and nitrate is in the downgradient side of the site in the western portion.

Miller Springs proposes to treat nitrate insitu in groundwater using enhanced biodegradation stimulated by the addition of carbon in the form of corn syrup. In 2000 and 2001, Miller Springs conducted a pilot test using corn syrup to degrade nitrate in groundwater. The proposed enhanced bioremediation project builds on the results of the pilot test and is proposed to take place in two phases. The first phase will test sequential applications of corn syrup or table sugar in five remediation wells. The second phase will expand the treatment to full-scale and will require revision of these WDRs.

This enhanced biodegradation project relies on various species of indigenous microorganisms to lower the oxygen concentration in groundwater and reduce nitrate to nitrogen gas. The addition of carbon is necessary to provide cellular material for microorganism growth. Aerobic microorganisms that obtain energy by oxidizing carbon (sugar) and reducing oxygen are dominant until the oxygen in groundwater is sufficiently depleted to enable anaerobic organisms to thrive. The microorganisms that reduce nitrate will be dominant as long as oxygen remains low, and carbon and nitrate are present. Other microorganisms present but not dominant reduce ferric oxides to ferrous iron, and manganese oxides to dissolved manganese. When the added carbon is consumed, aerobic conditions gradually return, ferrous iron and dissolved manganese are oxidized, and groundwater chemistry returns to conditions preceding the addition of carbon. When nitrate is converted to nitrogen gas and dissipated in the vadose zone, it is not anticipated to return to the groundwater system.

As a contingency plan, if the ammonium or dissolved organic carbon is confirmed in any downgradient monitoring well, the Discharger will provide a work plan to aerate the affected area. Introducing oxygen to the groundwater will accelerate the microbiological consumption of the introduced corn syrup and convert ammonium to nitrate.