

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2007-0126
WASTE DISCHARGE REQUIREMENTS

FOR
SPX CORPORATION
MARLEY COOLING TOWER COMPANY STOCKTON FACILITY
GROUNDWATER REMEDIATION
SAN JOAQUIN COUNTY

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

1. The Marley Cooling Tower Company (hereafter 'Marley'), a wholly owned subsidiary of SPX Corporation (hereafter collectively referred to as Discharger) submitted a request to revise existing Waste Discharge Requirements (WDRs; Order No. R5-2003-0100), dated 3 November 2006, for full-scale in-situ treatment of groundwater containing chromium at Marley's former Stockton facility. After reviewing Marley's request, Regional Board staff determined that new WDRs are required because (1) the existing WDRs were intended to address an in-situ pilot study that had been completed; and (2) significant changes to the groundwater monitoring program are necessary to address implementation of full-scale in-situ treatment. These WDRs are intended to cover the full-scale in-situ groundwater treatment and subsequent long-term groundwater monitoring at the site.
2. The Discharger owns and previously operated a cooling tower fabrication plant at 150 N. Sinclair Avenue in the East Stockton Area in San Joaquin County (site). As part of the fabrication operations, the Discharger operated a wood preservation process utilizing solutions containing copper, chromium and arsenic. Wood preserving was discontinued at the site in January 1991; however past operational practices left waste constituents in soils and groundwater underlying the site. Site soils contain elevated levels of copper, chromium, and arsenic; groundwater contains elevated concentrations of chromium.
3. The project site is located in County Section 32, T2N, R7E, MDB&M. The site location is shown in Attachment A, a site plan is shown in Attachment B, incorporated herein and made parts of this Order.
4. A groundwater pilot study was initiated in June 2003 at the site to evaluate the effectiveness of in-situ reduction as a means to address mobile chromium (Cr VI) in the subsurface. The pilot study was conducted under Order No. R5-2003-0100. The Department of Toxic Substances Control (DTSC) is the lead agency for the site clean up. In June 2007, DTSC issued a final remedial action plan (RAP) amendment that concluded that the pilot study successfully demonstrated the efficacy of in-situ Cr VI reduction, and authorized the full-scale implementation of the in-situ treatment at the site. The use of this treatment method is expected to clean up the groundwater in about three years rather than the currently estimated 17-year clean up time for the existing pump and treat system.
5. A sequence of alluvial sediments underlying the MCTC facility from the water table (approximately 60 ft below ground surface (bgs) to depths of at least 450 bgs) comprises one

aquifer. This aquifer is characterized by discontinuous lenses of sand, gravelly sand, clayey silt, silty clay, and clay. The aquifer can be divided into four hydrostratigraphic subunits: (a) the shallow zone (water table to 80 ft bgs), (b) the 100 ft zone (approximately 80 to 120 ft bgs), (c) the intermediate zone (approximately 120 feet to depths ranging from 170 to 200 bgs) and, (d) the deep zone extending from below 200 ft bgs to approximately 450 ft bgs. Groundwater generally flows in a southern direction in all zones. Groundwater velocity ranges from about 0.5 to 2.3 feet per day depending on the different zones.

6. The soil and groundwater remediation activities to date at the site have included (a) excavation and off-site disposal of soils containing arsenic exceeding the recommended action levels from ditches and commercial and residential properties, (b) replacement of the synthetic liner in the bottom of the retort pit with an upgraded liner, (c) installation and operation of a retort fluid capture system and a leak detection system, (d) installation and operation of a 500 gallon per minute (gpm) groundwater extraction and treatment system since 1992 (interim system started in 1987), (e) installation and operation of a soil flushing system since 1997; and (f) implementation of a pilot study for in-situ groundwater treatment.
7. Groundwater is currently extracting about 450 gpm from 13 of 19 extraction wells on and off-site. The groundwater extraction wells operate at pumping rates varying from 10-90 gpm depending on effective capture of the groundwater contamination plume. The groundwater treatment system consists of a treatment plant with an electrochemical unit operating in parallel to an ion exchange unit that removes chromium from the extracted water. Treated water up to 0.94 million gallons per day (mgd) is discharged to the Stockton Diverting Canal, a tributary to the Calaveras River, under an National Pollution Discharge Elimination System (NPDES) Permit No. CA0081787, Waste Discharge Requirements (WDR) No. R5-2003-0030, and Groundwater Monitoring and Reporting Program (MRP) No. R5-2003-0030.
8. Groundwater monitoring results from October 2006 show that the total chromium concentrations are highest in well S-2 at a concentration of 4,900 micrograms per liter ($\mu\text{g/l}$). The groundwater cleanup level for total chromium for the MCTC site, as set forth in the "Final Remedial Action Plan Approval Record" (dated June 1990), is the maximum contaminant level (MCL), which is currently 50 $\mu\text{g/l}$.
9. Preliminary background groundwater quality of key parameters was established using data from sampling of an up-gradient monitoring well in March 2003. The preliminary background values are:

Constituent	Units	Concentration Range
Chromium (total)	ug/l	3 to 9
Arsenic	ug/l	2 to 5
Copper	ug/l	2 to 4
Iron	ug/l	33 to 132
Manganese	ug/l	Non-detect to 20
Total Dissolved Solids	mg/l	185-450
Nitrate (as nitrogen)	mg/l	12 to 41
Sulfate	mg/l	13 to 26

The Discharger intends to (a) conduct sampling of other monitoring wells, including MW-7, MW-201, MW-202, MW-210, MW-302, MW-304, and MW-401, to obtain additional information on background groundwater quality, and (b) submit the collected information for Regional Board staff review for consideration as background ranges. The background concentrations will be established as required in Section VI of the attached Monitoring and Reporting Program No. R5-2007-0126.

Full-Scale In-situ Treatment Implementation

10. The full-scale in-situ treatment remedy is being implemented based on the successful completion of a pilot study at the site. The pilot study consisted of two phases. Phase I involved injection of a calcium polysulfide and ethanol solution (a.k.a., reductant solution or groundwater amendments) and subsequent groundwater monitoring at six temporary monitoring wells. Five discrete vertical intervals were tested to determine the most efficient interval for injection. Phase II involved additional temporary monitoring well installation, well development, baseline well sampling, injection of groundwater amendments, and subsequent groundwater monitoring. The primary goal of Phase II was to determine the most effective mixture of amendment components.
11. The proposed full-scale in-situ groundwater treatment remedy involves injecting amendments to create ten reactive barriers throughout the groundwater plume from approximately 55 to 85 feet bgs for shallow impacts and between 55 and 115 feet bgs for deep impacts. Amendments will also be injected along a grid configuration within the northern property using both shallow and deep injection intervals. The full-scale in-situ treatment remedy is expected to take about three years to implement to completion. The reactive barrier locations are shown in Attachment C.
12. The Discharger submitted chemical analyses of the calcium polysulfide mixture and ethanol solution. Metals and minerals were not present at detectable levels in either the calcium polysulfide mixture or the ethanol solution.
13. During full-scale in-situ treatment implementation, groundwater will be monitored for hexavalent chromium (Cr VI), total Cr, arsenic (As), iron (Fe), manganese (Mn), nitrate (NO₃), sulfate (SO₄), total dissolved solids (TDS), and total organic carbon by laboratory analysis. Dissolved oxygen, electrical conductivity, oxidation/reduction potential, pH and water level will be measured in the field. Monitoring specific to the full-scale treatment implementation will begin prior to amendment injection, and will continue at periodic intervals after injection until it is no longer deemed necessary. A separate long-term monitoring program will begin after the full-scale treatment is complete to monitor potential long-term geochemical changes.
14. The injection of calcium polysulfide and ethanol into the groundwater is a discharge of waste as defined by the California Water Code.
15. Based on the Discharger's experience at similar sites and the pilot studies, short-term increases in sulfate and TDS concentrations may occur as calcium polysulfide is oxidized. Sulfate and TDS concentrations are expected to decrease to pre-injection concentrations over time.
16. The designated water quality compliance wells for the full-scale in-situ groundwater treatment are MW-7, MW-201, MW-202, MW-210, MW-302, MW-304, and MW-401. These wells define the boundary of the groundwater treatment zone.

17. The Discharger has proposed a contingency plan that includes pumping of groundwater using the existing extraction and treatment system. The Discharger will maintain hydraulic capture of the In-situ treatment zone using the existing extraction system.

Basin Plan, Beneficial Uses, and Regulatory Considerations

18. *The Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins, Fourth Edition*, (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives (WQOs), 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 (CWC), waste discharge requirements must implement the Basin Plan.
19. The Basin Plan designates the beneficial uses of the underlying groundwater as municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply.
20. The Basin Plan establishes numerical and narrative WQOs for surface and groundwater within the basin, and recognizes that WQOs are achieved primarily through the Board's adoption of waste discharge requirements and enforcement orders. Where numerical WQOs are listed, these are limits necessary for the reasonable protection of beneficial uses of the water. Where compliance with narrative WQOs is required, the Board will, on a case-by-case basis, adopt numerical limitations in orders, which will implement the narrative objectives to protect beneficial uses of the waters of the state.
21. The Basin Plan identifies numerical WQOs for waters designated as municipal supply. These are the maximum contaminant levels (MCLs) specified in the following provisions of Title 22, California Code of Regulations: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits) of Section 64449. The Basin Plan's incorporation of these provisions by reference is prospective, and includes future changes to the incorporated provisions as the changes take effect. The Basin Plan recognizes that the Board may apply limits more stringent than MCLs to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses.
22. The Basin Plan contains narrative WQOs for chemical constituents, tastes and odors, and toxicity. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in humans, plants or animals. The chemical constituent objective requires that groundwater shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The tastes and odors objective requires that groundwater shall not contain tastes or odors producing substances in concentrations that cause nuisance or adversely affect beneficial uses. 22. State Board Resolution No. 92-49 (hereafter Resolution No. 92-49) requires the Regional Board to require actions for cleanup and abatement of discharges that cause or threaten to cause pollution or nuisance to conform to the provisions of State Board Resolution No. 68-16 (hereafter Resolution No. 68-16) and the Basin Plan. Pursuant to Resolution No. 92-49, the Regional Board shall ensure that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or if background levels of water quality cannot be restored, the best water quality which is reasonable and which complies with the Basin Plan including applicable WQOs.

23. Section 13241 of the Water Code requires the Regional Board to consider various factors, including economic considerations, when adopting WQOs into its Basin Plan. Water Code Section 13263 requires the Regional Board to address the factors in Section 13241 in adopting waste discharge requirements. The State Board, however, has held that a Regional Board need not specifically address the Section 13241 factors when implementing existing WQOs in waste discharge requirements because the factors were already considered in adopting WQOs. These waste discharge requirements implement adopted WQOs. Therefore, no additional analysis of Section 13241 factors is required.
24. Resolution No. 68-16 requires the 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 present and potential beneficial uses, and will not result in water quality less than that described in plans and policies (e.g., quality that exceeds WQOs). Temporal degradation of groundwater may occur at this site within the defined treatment zone due to the injection of the amendments and resulting reactions. The temporary degradation allowed by this Order is consistent with Resolution No. 68-16 since (1) the purpose is to accelerate and enhance remediation of groundwater pollution and such remediation will benefit the people of the State; (2) the discharge facilitates a project to evaluate the effectiveness of cleanup technology in accord with Resolution No. 92-49; (3) the degradation is limited in scope and duration; (4) best practicable treatment and control, including adequate monitoring and hydraulic control to assure protection of water quality, are required; and (5) the discharge will not cause WQOs to be exceeded beyond the treatment zone. A slight residual increase in TDS may occur, but will be limited to concentrations defined in the Groundwater Limitations of this Order.
25. These waste discharge requirements deal with water quality as it relates to the chemicals being injected, as well as the byproducts and breakdown products produced by the reactions of the injectants, chemicals being treated and geological materials. Cleanup criteria for groundwater are established in the Remedial Action Plan and are not discussed further as a part of this order. As discussed above, chemicals are injected to stimulate reduction in concentrations of the target pollutants the target pollutant may undergo a series of transformations to other pollutants as it degrades. The injected chemical itself may leave residuals of its components, as well as, cause changes in groundwater chemistry that liberates metals found in the formation materials. Background/baseline concentrations of metals and total dissolved solids will be established pursuant to the attached Monitoring and Reporting Program. The applicable WQOs are the narrative toxicity objective, Primary and Secondary Maximum Contaminant Levels, and the taste and odor objective as found in the Basin Plan. Numerical limits in this Order implement those Objectives. The following are the numerical WQOs for potential pollutants of concern at the site:

Constituent	WQO (ug/l)	Reference
Total Chromium	50	CA primary maximum contaminant level (MCL)
Arsenic	10	USEPA primary MCL
Copper	170	CA public health goal
Iron	300	CA secondary MCL
Manganese	50	CA secondary MCL
Total Dissolved Solids	450,000	CA agricultural water quality goal
Nitrate (as nitrogen)	10,000	CA public health goal
Sulfate	250,000	CA secondary MCL

26. 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 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 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 Regional 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 Monitoring and Reporting Program No. R5-2007-0126 are necessary to assure compliance with these waste discharge requirements.
27. The California Department of Water Resources sets standards for the construction and destruction of groundwater wells (hereafter DWR Well Standards), 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 Discharger or county pursuant to CWC Section 13801, apply to all extraction and monitoring wells.
28. 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).
29. 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, Division 2, Subdivision 1, Section 20005, et seq., (hereafter Title 27). The exemption pursuant to Section 20090(b), is based on the following:
 - a. The Regional Board is issuing waste discharge requirements,
 - b. The requirements implement 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 cleanup a condition of pollution that resulted from an unauthorized release of waste based on the following:

- d. The discharge of amendments to groundwater is at the direction of the Regional Water Board to cleanup and abate conditions of pollution or nuisance resulting from the unauthorized release of pollutants.
- 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.

30. Section 3020(b)(2) of the Resource Conservation and Recovery Act (RCRA) states that prior to injection into or above an underground source of drinking water, contaminated groundwater shall be "...treated to substantially reduce hazardous constituents prior to such injection." In a letter dated 10 December 1999, the United States Environmental Protection Agency, Office of Solid Waste and Emergency Response (OSWER) states, "if extracted groundwater is amended at the surface (i.e., "treated") before reinjection, and the subsequent in-situ bioremediation achieves a substantial reduction of hazardous constituents the remedy would satisfy Section 3020(b)(2)." Therefore, the injection of groundwater within the treatment zone, with or without the treatment for VOCs, complies with Section 3020(2)(b) of RCRA.31.
31. 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.

Public Notice

32. The Regional Board considered all the above and the supplemental information and details in the attached Information Sheet, which is incorporated by reference herein, in establishing the following conditions of discharge.
33. The Regional Board has notified the Discharger and interested persons of its intent to prescribe waste discharge requirements for this discharge, and has provided them with an opportunity to submit their written views and comments.
34. 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.
35. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, that Order No. R5-2003-100 is rescinded and that SPX Corporation, Marley Cooling Tower Company, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted there under, shall comply with the following:

[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. Discharge of waste classified as 'hazardous' under Section 2521, Chapter 15 of Title 23 or 'designated', as defined in Section 13173 of California Water Code is prohibited.
3. The discharge of waste at any location or in a manner different from that described in Finding No. 11 is prohibited.

4. The discharge of materials other than calcium polysulfide, ethanol, and water into the groundwater is prohibited.
5. Creation of a pollution, contamination, or nuisance, as defined by Section 13050 of the California Water Code (CWC), is prohibited.

B. Discharge Specifications

1. The Discharger shall not cause the permeability of the aquifer, either inside or outside of the calcium polysulfide/ethanol treatment area, to be affected to such a degree that the Discharger is unable to effectively operate extraction wells for the purpose of containing the calcium polysulfide, and ethanol or its byproducts.
2. The Discharger will limit the injection of amendments to the extent practicable.
3. The discharge shall not cause the high quality groundwater unaffected by the current plume undergoing cleanup to be degraded by the constituents identified herein.

C. Groundwater Limitations:

1. The Discharger shall not cause the groundwater to contain taste and odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses.
2. The discharge shall not cause the groundwater at the compliance wells listed in Finding No. 16 to contain concentrations of chemical constituents (i.e., the amendments and by-products of the in-situ treatment process, including metals, total dissolved solids, and electrical conductivity) in amounts that exceed 30 percent above the background concentration or the WQOs listed in Finding No. 25, whichever is lower. However, if background concentrations exceed WQOs, then the discharge shall not cause the groundwater at the compliance wells to contain chemical constituents in amounts that exceed 10 percent above background concentrations.
3. Within six months of the conclusion of the in-situ treatment, the Discharger shall not cause the groundwater to contain concentrations of chemical constituents, including the injected substance, and any breakdown products or by-products of the in-situ treatment process, in amounts that adversely affect beneficial uses, exceed the Water Quality Objectives listed in Finding No. 25, nor exceed more than 30% greater than their respective background concentrations. However, if background concentrations exceed WQOs, then the discharge shall not cause the groundwater to contain chemical constituents in amounts that exceed 10 percent above background concentrations.

D. Provisions:

1. The Discharger shall notify the Regional Board a minimum of two weeks prior to the start of full-scale injection of calcium polysulfide/ethanol.

2. The Discharger shall provide an alternate water supply source for any municipal, domestic or other water use, if affected by the Discharger's wastes.
3. The Discharger shall comply with the attached MRP No. R5-2007-0126, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.
4. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements," dated 1 March 1991, which are by reference, a part of this Order. This attachment and its individual paragraphs are commonly referenced as "Standard Provision(s)."
5. 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.
6. Should the evaluation of the implementation data for the full-scale groundwater treatment reveal adverse effects on groundwater quality at the points of compliance due to calcium polysulfide/ethanol injection, the Discharger shall notify the Regional Board within 24 hours, followed by a written summary within two weeks. Within 60-days following notification, the Discharger shall submit a corrective action plan, including a time schedule for implementation, for Executive Officer approval. The corrective action plan shall detail how the Discharger will shall clean up and abate these effects, including extraction of any byproducts.
7. Prior to any modifications at the site that would result in material change in the quality or quantity of the calcium polysulfide or ethanol, or any material change in the character, location, or volume of the discharge, the Discharger shall report all pertinent information in a Report of Waste Discharge to the Regional Board for review. This Order may be revised prior to implementation of any modifications.
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. 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 Regional Board.
10. The Discharger shall allow the Regional Board, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:
 - a. Enter upon the premises regulated by the Regional Board, or the place where records must be kept under the conditions of this Order;

- b. Have access to and copy, at reasonable times, any records that shall be kept under the conditions of this Order;
 - c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
 - d. Sample or monitor, at reasonable times, for the purpose of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at this Site.
11. 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.
12. The Regional Board will review this Order periodically and will revise requirements when necessary.

I, PAMELA C. CREEDON, 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 13 September 2007.

PAMELA C. CREEDON, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2007- 0126
CALIFORNIA WATER CODE SECTION 13267

FOR
SPX CORPORATION
MARLEY COOLING TOWER COMPANY STOCKTON FACILITY
GROUNDWATER REMEDIATION
SAN JOAQUIN COUNTY

This monitoring and reporting program (MRP) is issued by the Executive Officer of the California Regional Water Quality Control Board, Central Valley Region (Regional Board) pursuant to California Water Code Section 13267. The Marley Cooling Tower Company (MCTC), a wholly owned subsidiary of SPX Corporation (hereafter collectively referred to as Discharger) is required to comply with this MRP, which contains the minimum monitoring and reporting requirements necessary to determine compliance with Waste Discharge Requirements Order No. R5-2007-0126.

The following MRP is designed to delineate and monitor the extent of groundwater contaminant plumes to determine whether remediation efforts are effective. The MCTC facility has a groundwater extraction and treatment system that has been operating for several years. This system provides hydraulic control of the contamination plumes. A more aggressive remediation effort involving in-situ chemical treatment is planned in the near future. This MRP has groundwater monitoring elements for both remediation efforts. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is approved in writing by Executive Officer of the Regional Board.

Prior to construction of any new groundwater monitoring or extraction wells, the Discharger shall submit plans and specifications to the Regional Board for review and approval. Once installed, all new wells shall be added to the monitoring program and shall be sampled and analyzed according to the schedule provided herein.

All monitoring wells shall be purged using micropurging methodology with the use of dedicated bladder pumps in all monitoring wells, as necessary. This approach will increase consistency in sample collection, and produce analytical results that are more representative of actual groundwater conditions. Selected parameters including pH, conductivity, turbidity, and temperature of the pump discharge water shall be monitored during micropurging until they have stabilized. Solid and liquid wastes, principally water resulting from equipment decontamination, well development, formation water generated during drilling, and purge or sampling water, shall be collected and disposed of pursuant to applicable requirements.

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.

I. GROUNDWATER MONITORING

The Discharger has constructed and operates 73 monitoring wells both within its property and on adjoining properties as shown in Attachment B of the WDRs for this MRP. These wells monitor groundwater in shallow, intermediate, and deep zones, as well as a 100-foot sand zone. Based on the current groundwater flow direction being southerly to westerly, wells MW-209, -210, and -401 monitor the up-gradient side of the total chromium plume in shallow groundwater; Wells MW-201, -303, -304 monitor the down-gradient extent of the shallow plume. The highest recent¹ chromium detection in shallow groundwater was 7,100 micrograms per liter (ug/l), which occurred in the onsite Well S-2. The chromium plume extends about 3,000 horizontal feet (roughly from MW-210 to MW-304), with about 1,200 feet of the plume extending offsite on the down-gradient side. Well data from the edge of the plume indicate that average background concentrations for total chromium are less than 5 ug/l.

The chromium plume in the intermediate groundwater zone has a horizontal area similar to the shallow plume. The highest recent chromium detection in the intermediate groundwater was 4,300 ug/l in the onsite Well I-7. Chromium contamination in the 100-foot sand zone and the deep groundwater zone appears to be less significant, with maximum recent detections of 11 ug/l and 137 ug/l, respectively.

The Discharger operates 24 on- and off-site extraction wells (these also serve as monitoring wells) and may install and operate additional extraction wells as necessary to capture the 50 ug/l chromium plumes. Additional extraction and monitoring wells shall be installed based on the results of the annual monitoring reports provided during ongoing remediation.

A. Monitoring Wells and Sampling Schedule

Groundwater elevations shall be measured quarterly except for the domestic, irrigation, and municipal water supply wells (i.e., Wells 5116D, Columbini [Col.] No. 1, Col. No. 2, Cuneo, Col. No. 3, CWS-20, CWS-35, CWS-52, and CWS-62). Groundwater elevations shall be reported in feet above mean sea level, with depths to groundwater measured to the nearest 0.01 foot. The quarterly monitoring events shall occur during January, April, July and October of each year.

Groundwater samples shall be collected from select wells on a semiannual, annual, or biannual basis. Groundwater samples collected semiannually shall be collected during the April and October monitoring events. Groundwater samples collected annually shall be collected during the April monitoring event. Groundwater samples collected biannually shall be collected every

¹ From the April/July 2006 semiannual Groundwater Monitoring Report, Dudek Engineering & Environmental, October 2006

other April. The following wells shall be monitored semiannually: MW-301, MW-303, S-2, S-7, S-8, S-9, EW-1, S-6, I-11, I-10, I-2, I-3, I-5, I-7, I-8, I-9, D-1, D-2, 5116D, Col. No. 1, Col. No. 2, Cuneo, Col. No. 3, CWS-20, CWS-35, CWS-52, and CWS-62. In addition, any new monitoring wells installed shall be monitored semiannually.

The following wells shall be monitored annually: EW-2, EW-3, EW-4, EW-5, MW-101, MW-102, MW-103, MW-105, MW-106, MW-107, MW-201, MW-206, MW-207, MW-208, MW-209, MW-300, MW-304, MW-5, MW-6, MW-8, MW-9, MW-310, MW-411, MW-212, MW-320, MW-322, MW-325, MW-4, MW-445, MW-446, I-4, I-6, and MW-465.

The following wells shall be monitored biannually: MT-1, MT-2, MT-3, MT-4, MT-5, MT-6, MT-7, MT-8, MT-9, MW-202, MW-203, MW-400, MW-401, MW-7, MW-410, S-3, S-4, MW-2, MW-211, MW-323, MW-326, MW-327, MW-328, MW-421, MW-422, MW-423, MW-425, MW-426, MW-428, MW-431, MW-432, MW-433, MW-434, MW-435, MW-437, MW-438, MW-440, MW-442, MW-443, MW-464, and MW-468.

B. Laboratory and Field Analysis

All samples shall be grab samples. Samples from the above wells shall be analyzed pursuant to the following table:

Parameter	Method ¹	Unit	Maximum Detection Limit ²
Chromium	EPA 6010B	ug/l	5 ug/l
Total Dissolved Solids	EPA 160.1	mg/l	--
Electrical Conductivity	Field Meter	umhos/cm	--
PH	Field Meter	pH units	--
Temperature	Field Meter	°Celsius	--
Extraction Rate ³	Field Meter	GPM	--
Purge Rate ⁴	Field Meter	GPM	--
Turbidity	Field Meter	NTU	--
Total Gallons Purged ⁴	Field Meter	Gallons	--
Water Level	Field Meter	ft MSL	--

1. If necessary, equivalent analytical methods may be used. The Discharger shall provide written justification.

2. For non-detectable results

3. This applies only to extraction wells

4. This applies only to monitoring wells

II. GROUNDWATER MONITORING UPON INITIATION OF REDUCTANT SOLUTION INJECTION (FULL-SCALE IN-SITU TREATMENT)

The Remedial Action Plan² (RAP) for the MCTC site proposed measures to achieve site-specific groundwater cleanup goals in a shorter time frame than the current extraction and treatment program. These measures include injecting reductant solution (a.k.a., groundwater amendment) along a grid configuration within the northern property using both shallow and deep injection intervals. This section requires more frequent groundwater monitoring to occur during amendment injection. The groundwater monitoring described in this section supercedes that described in Section I for those wells being used to monitor the in-situ groundwater treatment process.

A. Groundwater Monitoring for Full-Scale In-situ Treatment - Wells and Sampling Schedule

Pursuant to the RAP, the currently existing monitoring network will primarily be used for monitoring the progress of the full-scale in-situ treatment. However, six new wells will be installed at the site to augment the existing well network. Two wells will be installed at the north property, three wells on the south property, and one well midway between MW-301 and MW-303.

Because of the limited areas of impact caused by amendment injection, there is no need to monitor the entire MCTC site when injections are occurring only in part of the site. For this reason, the MCTC site will be divided into two amendment injection areas. When amendment injection is occurring north of the Stockton terminal and eastern rail spur, the following wells shall be monitored quarterly: MW-1, MW-2, MW-7, MW-8, MW-101, MW-102, MW-104, MW-105, MW-106, MW-207, MW-208, MW-213, MW-300, MW-323, MW-361, and any new monitoring wells installed north of the Stockton terminal and eastern rail spur.

When amendment injection is occurring south of the Stockton terminal and eastern rail spur, the following wells shall be monitored quarterly: MW-9, MW-201, MW-204, MW-205, MW-301, MW-303, MW-304, MW-310, MW-321, MW-322, MW-324, MW-325, and any new monitoring wells installed south of the Stockton terminal and eastern rail spur.

B. Groundwater Monitoring for Full-Scale In-situ Treatment - Laboratory and Field Analysis

All groundwater samples shall be grab samples. Samples from the wells used for groundwater monitoring during full-scale in-situ treatment shall be analyzed pursuant to the following table:

² Final Remedial Action Plan Amendment, Former Marley Cooling Tower Company, Stockton, California, MWH, June 2007

Parameter	Method¹	Unit	Maximum Detection Limit²
Hexavalent Chromium	EPA 7196A	ug/l	5 ug/l
Chromium	EPA 6010B	ug/l	5 ug/l
Arsenic	EPA 200.8	ug/l	5 ug/l
Iron	EPA 200.8	ug/l	20 ug/l
Manganese	EPA 200.8	ug/l	2 ug/l
Nitrate	EPA 300.0	ug/l	0.5 mg/l
Sulfate	EPA 300.0	ug/l	0.5 mg/l
Total Dissolved Solids	EPA 160.1	Mg/l	10 mg/l
Total Organic Carbon	EPA 415.1	Mg/l	2 mg/l
Dissolved Oxygen ¹	Field Meter	Mg/l	--
Electrical Conductivity	Field Meter	Umhos/cm	--
Oxidation/Reduction Potential	Field Meter	Millivolts	--
PH	Field Meter	pH units	--
Water Level	Field Meter	ft MSL	

1. If necessary, equivalent analytical methods may be used. The Discharger shall provide written justification.

2. For non-detectable results

III. AMENDMENT DISCHARGE MONITORING

The Discharger shall monitor daily the discharge of water and amendments that are injected into the groundwater. This monitoring shall include, at a minimum, recording of injected water and amendment volumes in gallons per day, and monitoring of amendment(s) added and biocides added (if any) in kilograms per day. Each amendment addition shall be recorded individually, along with information regarding the time over which the amendment was injected into the aquifer.

IV. AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the following parameters:

Parameter	Method¹	Maximum Detection Limit (ug/l)
Volatile Organic Compounds	EPA 8020 or 8260B	0.5
Semi-volatile Organic Compounds	EPA 8270	5.0
General Minerals ²	Various	Various
Metals, Total & Dissolved ³	EPA 200.7, 200.8	Various
Total Dissolved Solids	EPA 160.1	10,000
PH	Field Meter	NA
Electrical Conductivity	Field Meter	NA

¹ Or an equivalent EPA method that achieves the maximum detection limit;

² Alkalinity, bicarbonate, potassium, chloride, sulfate, total hardness, nitrate, nitrite, and ammonia;

³ Metals include arsenic, barium, cadmium, calcium, total chromium, copper, iron, lead, manganese, magnesium, mercury, molybdenum, nickel, selenium and silica.

The analysis shall be done on the pure amendment and on the mixture of the amendment and municipal supply or treated effluent water at the estimated concentration that would be injected during the full-scale in-situ treatment.

V. QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) shall be performed to ensure precision and accuracy for groundwater sampling activities. Minimum QA/QC requirements are as follows:

A. Duplicate Samples

One duplicate groundwater sample shall be collected for every ten primary groundwater samples collected during each groundwater monitoring event. At least one duplicate groundwater sample shall be collected from one of the domestic, irrigation, or CWS wells and analyzed for hexavalent chromium.

B. Chain-of-Custody Forms

Completed chain-of-custody forms shall be provided with the final laboratory reports.

C. Field Meters

Field testing instruments shall be used by an operator trained in proper use and maintenance of the instruments. All field instruments shall be calibrated prior to each monitoring event. In addition, field parameter instruments shall be serviced or calibrated by the manufacturer at the recommended frequency. Field calibration reports shall be included in the semi-annual groundwater monitoring reports.

VI. ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

Pursuant to Finding 9 of the Waste Discharge Requirements for this MRP, the Discharger shall develop background values for concentrations of dissolved arsenic, chromium, copper, iron, manganese, total dissolved solids, electrical conductivity, nitrate, and sulfate in groundwater following the procedures found in the California Code of Regulations Section 20415(e)(10). The Discharger shall submit a proposal to develop the background concentrations by **16 November 2007**.

VII. REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., influent, effluent, groundwater, etc.), 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 Monitoring and Reporting Program shall also be reported to the Regional Board.

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

A. Semiannual Reports

Semiannual reports shall be submitted to the Board by the Discharger to monitor long-term groundwater trends and to assess long-term effects of injected substances on aquifer geochemistry until such time as the Executive Officer determines that the reports are no longer necessary. The first semiannual groundwater monitoring report for each year, which will include data collected in January and April, will be submitted to the Regional Board by **1 August**. This report shall include analytical results for groundwater samples collected on a quarterly, semiannual, annual, and biannual basis.

The second semiannual groundwater monitoring report for each year, which will include data collected in July and October, will be submitted to the Regional Board by **1 February** of the following year. This report shall include analytical results for groundwater samples collected on a quarterly and semiannual basis.

Each semiannual report shall include the following minimum information:

1. Depths-to-water measurements and corresponding groundwater elevations for all monitoring wells and extraction wells, extraction rates and total volume extracted from each active extraction well, and groundwater analytical results for all wells sampled. This data shall be presented in tabular format;

2. Copies of all final laboratory analytical reports, including QA/QC (electronic copies are encouraged and preferred);
3. Field logs containing, at a minimum, water quality parameters measured before, during, and after well purging, method of purging, depth of water, volume of water purged, etc.;
4. A calibration log verifying calibration of any field monitoring instrument (e.g., pH, temperature, electrical conductivity, and turbidity meters) used to measure parameters during well purging;
5. Groundwater elevation contour maps for all groundwater zones, including estimated direction flow;
6. Calculated hydraulic gradients and estimated average linear velocities for all groundwater zones;
7. Isoconcentration maps for total dissolved chromium for the shallow and intermediate zones in the January thru June semiannual groundwater monitoring report;
8. Isoconcentration maps for total dissolved chromium for the intermediate zone in the July thru December semiannual groundwater monitoring report;
9. Water level and water quality hydrographs showing historical data for each well; and
10. Any proposed changes in the extraction well network with justification for the change.
11. If applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions.

B. Annual Groundwater Evaluation Report

The July thru December semiannual groundwater monitoring report shall also serve as an annual groundwater evaluation report. This report shall include a summary of the groundwater quality beneath the site; a hydraulic capture analysis; an evaluation of cleanup progress; a discussion of any data gaps and potential deficiencies in the monitoring system; a review of the treatment system performance; and any recommendations to potentially accelerate site cleanup progress or any modifications to enhance cleanup. The annual evaluation report shall additionally contain the following minimum information:

1. A summary of treatment system operation and maintenance performed, including inspections, repairs, and equipment replacement (if applicable);
2. The reasons for and duration of all interruptions in the operation of the remedial well field and treatment system, and actions planned or taken to correct and prevent interruptions, if applicable;

3. A discussion of the long-term trends in the concentrations of chromium detected in the groundwater;
4. 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.
5. A discussion of compliance with the monthly waste discharge requirements;
6. A discussion of any data gaps, potential deficiencies/redundancies in the monitoring system or reporting program, and;
7. An analysis of whether the injected plume, and any breakdown or byproducts is being captured by an extraction system or is continuing to spread;
8. If applicable, a proposal and rationale for any revisions to monitoring frequency or the list of analytes.
9. Any recommendations to enhance cleanup.

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 (if applicable), 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 results of any monitoring done more frequently than required at the locations specified in the MRP also shall be reported to the Board. The Discharger shall implement the above monitoring program as of the date of the Order.

Ordered by:

PAMELA C. CREEDON, Executive Officer

Date