CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2008-0047
GROUNDWATER REMEDIATION
WASTE DISCHARGE REQUIREMENTS

FOR
FORMER BALTIMORE AIRCOIL COMPANY FACILITY, INC.
TRACK FOUR, INC.,
A WHOLLY OWNED SUBSIDIARY OF AMSTED INDUSTRIES INC.,
AND
A FORMER OWNER, MERCK & CO., INC.,
MERCED COUNTY

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

1. The 40.5-acre former Baltimore Aircoil Company (BAC) facility is located at 3058 Beachwood Drive, two miles northwest of Merced (see site location map as Attachment A). The former BAC facility was used from 1961 to 1994 for cooling tower fabrication. In 1969, a pressure wood treatment system was installed at the facility that used treatment solutions containing arsenic, copper, and chromium. During the operations of the wood treatment system, waste treatment solution was discharged to soils and groundwater at the facility, creating a condition of pollution or nuisance.

2. In 1975, BAC, then a subsidiary of Merck & Co., Inc. (Merck), purchased the cooling tower fabrication operation. Merck sold BAC to Amsted Industries, Inc. (Amsted), in 1985. Amsted ceased cooling tower manufacturing operations and closed the facility in February 1994. BAC, Amsted, and Merck are hereafter collectively referred to as the Discharger.

3. Chromium is the primary constituent of concern at the facility. A chromium groundwater plume currently extends in groundwater from the facility to about 800 feet to the southwest, and to about a 1,000 feet to the northwest. Total chromium concentrations are highest in the onsite well MW-8, with recent detections as high as 9,800 micrograms per liter (ug/l).

4. Geology at the facility consists of Older Alluvium underlain by a topmost clay unit of the Upper Turlock Lake Formation. Sediments of the Older Alluvium are present from about zero to 90 feet below ground surface (bgs). These sediments consist of inter-bedded alluvial deposits, which are composed of clay, silty clay, silt, silty sand, and gravelly sand. Iron-silica-cemented layers form thin, discontinuous hardpan locally within the upper 40 feet bgs and below 55 feet bgs. A shallow aquifer lies within the Older Alluvium from about 40 to 50 feet bgs to about 90 feet bgs. The shallow aquifer consists of two water-bearing units; an upper sand unit and a lower sand unit, separated by a silt/hardpan interval located from about 55 to 80 feet bgs.

5. Soil and groundwater remediation activities at the facility have included (a) excavation and off-site disposal soils from the primary wood treatment area that contained the highest

concentrations of arsenic and chromium; (b) excavation and off-site disposal of arsenic and chromium-impacted soils from a storm water retention basin located on the south side of the facility; (c) installation and operation of a 300 gallon-per-minute (gpm) groundwater extraction and treatment system (GETS), which began operation in 1994; and (d) installation and operation of a soil flushing system beneath the primary wood treatment area.

6. In September 2000, the Regional Water Board issued a Cleanup & Abatement Order for the former BAC facility that required (1) continued operation and maintenance of the GETS; (2) maintenance of hydraulic control over the chromium plume; and (3) additional soil and groundwater investigation to further define the extent of pollution at the facility. To date, about 3,000 tons of contaminated soil have been removed from the facility, and about 5,400 pounds of chromium have been removed from groundwater.

7. The groundwater extraction and treatment system is currently extracting about 42 gpm from nine of 14 extraction wells, both onsite and off-site. The groundwater extraction wells operate at pumping rates varying from one to 20 gpm depending on effective capture of the groundwater contamination plume. The extracted groundwater is treated at an onsite plant that uses flocculation tanks to precipitate out chromium, arsenic, and other dissolved solids. Treated groundwater is pumped into an onsite infiltration gallery.

8. In December 2006, a groundwater treatment pilot study was performed at the site to evaluate the effectiveness of in situ chemical and biological reduction as a means to address the mobile chromium pollution. The study involved the injection of chemical amendments (methanol and ethanol) into groundwater to stimulate chemical and biological processes for the permanent reduction of chromium to its insoluble form (Chromium III). The study, which concluded in June 2007, successfully demonstrated the efficacy of in situ chromium reduction as implemented at the facility. The use of this treatment method could greatly accelerate the clean up of chromium in groundwater when compared to using the groundwater pump and treat system that is currently operating at the site. This Order authorizes the implementation of full-scale in situ groundwater treatment for chromium.

Full-Scale In situ Treatment Implementation

9. A successful field demonstration was conducted at two onsite areas. In both areas, groundwater was extracted from a down-gradient extraction well. The groundwater was then combined with methanol or ethanol solutions (chemical amendments) and injected into up-gradient wells. This extraction/injection method was used to created groundwater recirculation cells that enhanced amendment delivery and formed chromium-reducing in situ reactive zones. The field demonstration showed that injecting dilute concentrations of either methanol or ethanol resulted in effective cleanup of chromium-impacted groundwater.

10. The full-scale in situ treatment remedy is to be implemented in phases. The first phase will involve installation of about 24 amendment injection wells at about 120-foot intervals, and in locations that target the source and toe areas of the plume. The second phase will

involve installation of about 13 amendment injection wells at the same intervals, and in locations that target the central plume area. The third phase is an optional phase that may involve installation of additional injection wells for the delivery of amendment to areas within the central plume that require more treatment. The layout of the amendment delivery system is shown in Attachment B.

11. During full-scale in situ treatment implementation, groundwater will be monitored for hexavalent chromium, total chromium, arsenic, total dissolved solids, and total organic carbon by laboratory analysis. Iron and sulfate will be monitored if ferrous sulfate is used as an amendment during the full-scale treatment implementation. Electrical conductivity, 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 semiannual intervals after injection until this monitoring is no longer deemed necessary (in accordance with the attached MRP No. R5-2008-0047).

12. The designated water quality compliance wells for the full-scale in situ groundwater remedy are MW-14, MW-15, MW-60, MW-61, and a new monitoring well to be installed about 350 feet east of MW-61. These wells, the locations of which are shown in Attachment B, roughly define the down-gradient boundaries of the groundwater treatment zone.

13. Background groundwater concentrations for key parameters were established using data from up-gradient monitoring wells. The established background values are:

Constituent	Units	Concentration
Arsenic	ug/l	4
Chromium (total)	ug/l	6
Chromium (hexavalent)	ug/l	2.84
Copper	ug/l	6
Total Dissolved Solids	mg/l	500

The Discharger will perform additional monitoring to establish background concentrations for dissolved oxygen, oxidation-reduction potential, total organic carbon, iron, manganese, and sulfate. The background concentrations will be subject to Regional Water Board staff review, and established as specified in Section V of the attached Monitoring and Reporting Program (MRP) No. R5-2008-0047. Pursuant to Provision D.2, this MRP is a part of this Order.

14. The Discharger will continue to pump groundwater using the existing extraction system to maintain hydraulic capture of the chromium plume associated with the site.

Basin Plan, Beneficial Uses, and Regulatory Considerations

15. *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.

16. The Basin Plan designates the beneficial uses of the groundwater underlying the former BAC facility as municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply.

17. The Basin Plan establishes numerical and narrative WQOs for surface and groundwater within the basin, and recognizes that WQOs are achieved primarily through the Regional Water 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 Regional Water 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.

18. 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 Regional Water Board may apply limits more stringent than MCLs to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses.

19. 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. State Board Resolution No. 92-49 (hereafter Resolution No. 92-49) requires the Regional Water 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 Water 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.

20. Section 13241 of the Water Code requires the Regional Water Board to consider various factors, including economic considerations, when adopting WQOs into its Basin Plan.

Water Code Section 13263 requires the Regional Water Board to address the factors in Section 13241 in adopting waste discharge requirements. The State Board, however, has held that a Regional Water 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.

21. Resolution No. 68-16 requires the Regional Water 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**.**

22. 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 amendments, chemicals being treated and geological materials. 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 or cause changes in groundwater chemistry that liberate metals found in the formation materials. Background/baseline concentrations of metals and total dissolved solids have been established or will be established pursuant to the attached MRP No. R5-2008-0047. 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 that may be byproducts of the full-scale groundwater treatment:

Constituent	**WQO (ug/l)**	**Reference**
Arsenic	4*	CA public health goal (PHG)
Copper	170	CA public health goal
Iron	300	CA secondary MCL
Total Dissolved Solids	450,000	CA agricultural water quality goal
Sulfate	250,000	CA secondary MCL

* This is the established background concentration.

23. Section 13267(b) of California Water Code provides that: "In conducting an investigation specified in subdivision (a), the Regional Water 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 Water 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 Water 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. R5-2008-0047 are necessary to assure compliance with these waste discharge requirements.

24. 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.

25. 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).

26. 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 Water 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.

27. 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 re-injection, 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 complies with Section 3020(2)(b) of RCRA.31.

28. The injection of ethanol, methanol, and ferrous sulfate into the groundwater is a discharge of waste as defined by the California Water Code.

29. 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

30. The Regional Water 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.

31. The Regional Water 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.

32. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, that the Discharger, 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. 10 is prohibited.

4. The discharge of materials into groundwater is prohibited, except for the following: ethanol; methanol; ferrous sulfate; Regional Water Board-approved chemicals to control bio-fouling or to act as tracers for chemical amendments; and water.

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 in situ 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 amendment(s) 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 under going cleanup to be degraded by the treatment amendments listed in Discharge Prohibition A.4.

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 12 to contain concentrations of chemical constituents (i.e., the amendments and by-products of the in situ treament process, including arsenic, manganese, nitrate, total dissolved solids, and total organic carbon[and iron and sulfate if ferrous sulfate is used as an amendment]) in amounts that exceed 10 percent above the background concentration or the WQOs listed in Finding 13, whichever is lower.

3. Within one year 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 13, nor exceed more than 10 percent greater than their respective background concentrations.

D. Provisions:

1. The Discharger shall notify the Regional Water Board a minimum of two weeks prior to the start of full-scale injection of chemical amendments.

2. The Discharger shall comply with the attached MRP No. R5-2008-0047, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

3. The Discharger shall obtain Regional Water Board approval prior to implementing Phase II and Phase III of the full-scale in situ groundwater treatment remedy (see Finding 10 for a description of the implementation process). This is to ensure that the treatment remedy is not causing adverse water quality impacts. If such impacts occur, the treatment remedy will be postponed until the impacts are remediated.

4. The Discharger shall operate the existing groundwater extraction system to control the chromium plume until system shutdown is approved by the Executive Officer.

5. The Discharger shall provide an alternate water supply source for any municipal, domestic or other water use, if affected by the Discharger's wastes.

6. 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)."

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 Water Board or court order requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

8. 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 chemical amendment injection, the Discharger shall notify the Regional Water 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 clean up and abate these effects, including extraction of any byproducts.

9. Prior to any modifications at the site that would result in material change in the quality or quantity of the chemical amendments, 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 Water Board for review. This Order may be revised prior to implementation of any modifications.

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. 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 Water Board.

12. The Discharger shall allow the Regional Water Board, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

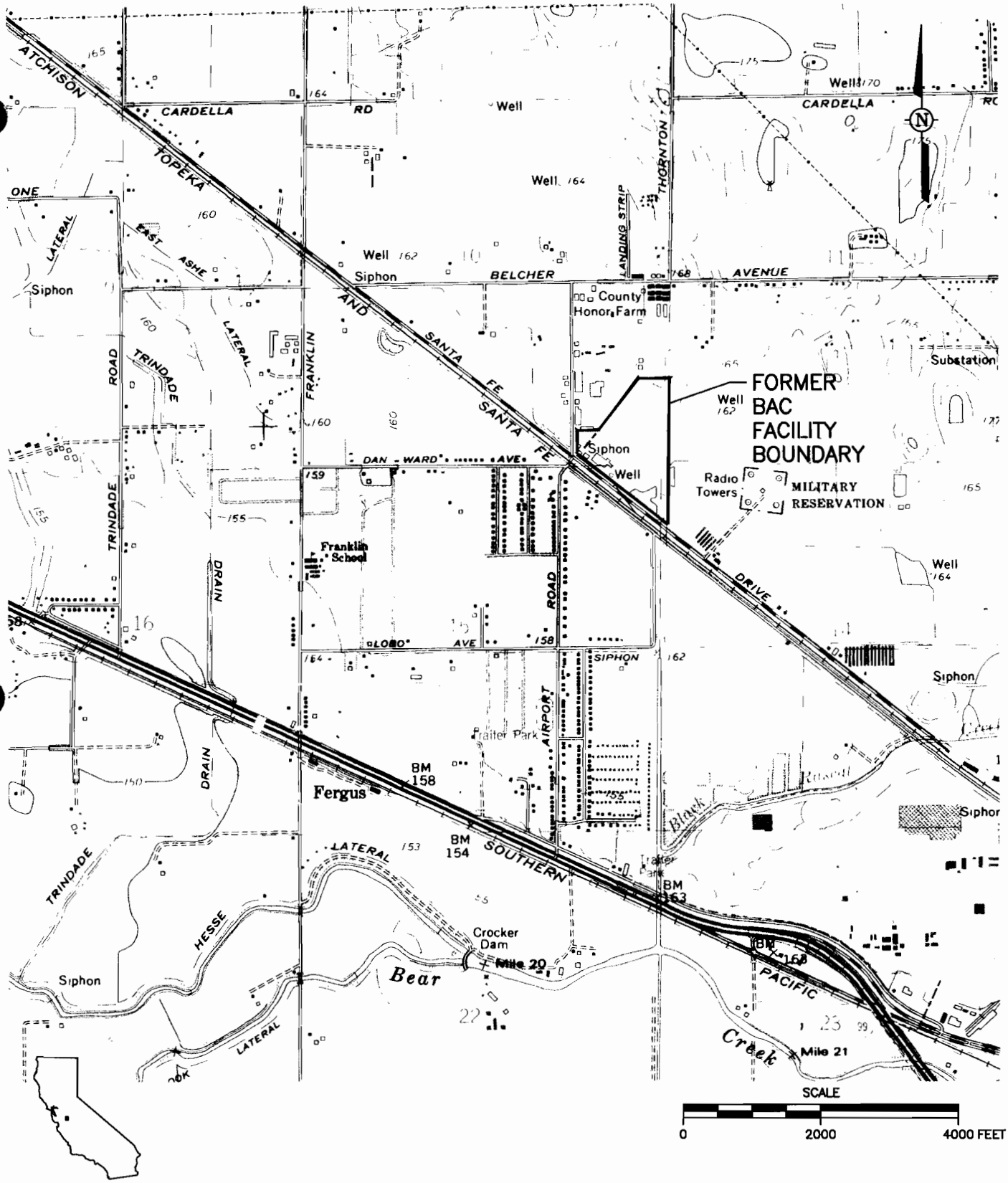
    a. Enter upon the premises regulated by the Regional Water Board, or the place where records must be kept under the conditions of this Order;
    b. Have access to and copy, at reasonable times, any records that shall be kept under the conditions of this Order;
    c. Inspect at reasonable times any 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.

13. A copy of this Order shall be kept at the discharger facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

14. The Regional Water Board may review this Order periodically and may 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 14 March 2008.

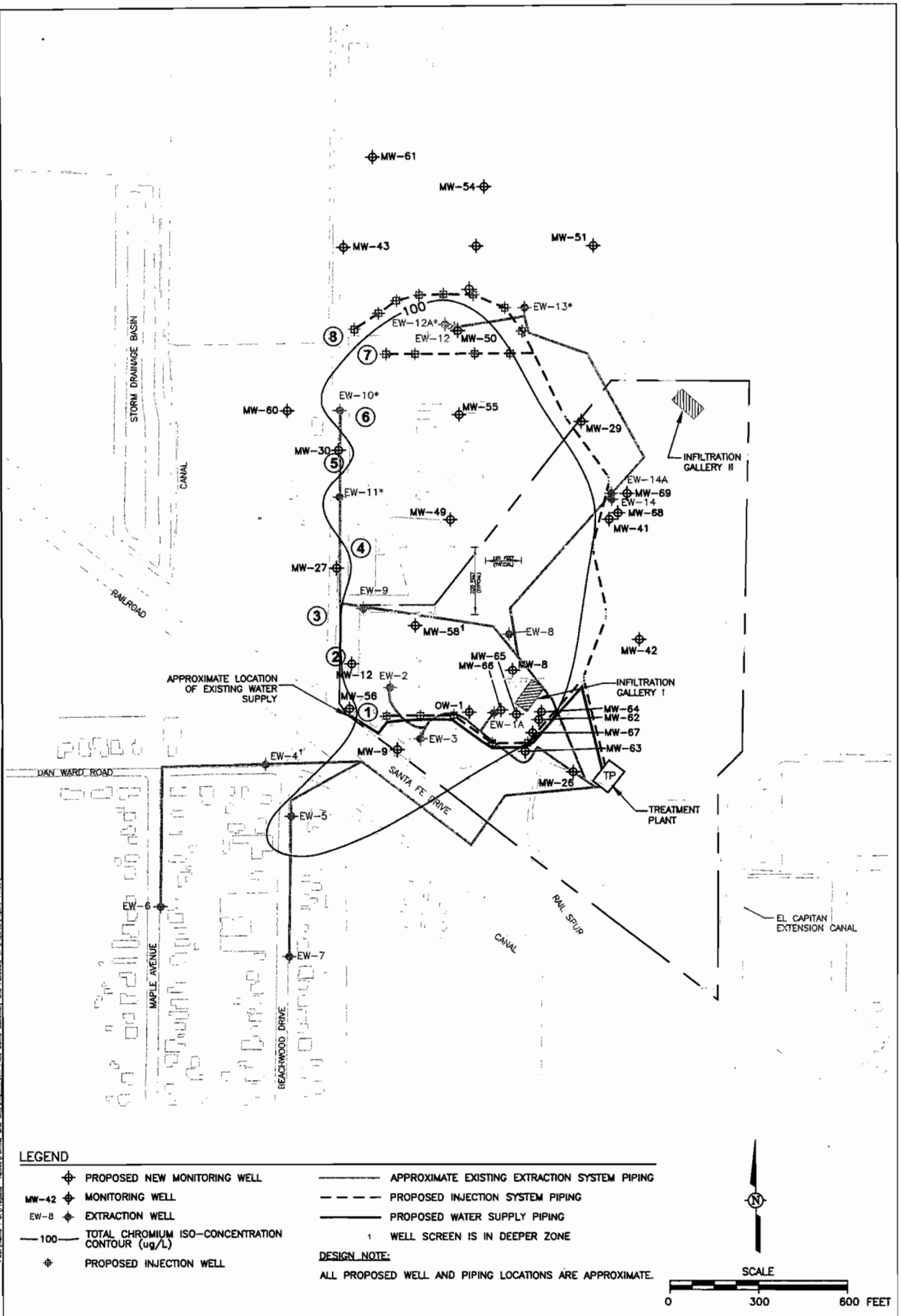
_____
PAMELA C. CREEDON, Executive Officer



Reference: U.S.G.S. 7.5-minute Quadrangle "Atwater, California", 1960 photorevised 1987.

	ATTACHMENT A	**SITE LOCATION MAP** **IN SITU GROUNDWATER REMEDIATION** **FULL-SCALE WORK PLAN AND FIELD DEMONSTRATION SUMMARY** FORMER BAC FACILITY MERCED, CALIFORNIA	Figure 1

Date\Time : Wed, 10-[illegible] 2007 – 12:15pm
Path\Name : G:\Projects\Active\Former BAC Site\Reports\GW Field Demo Summary and Full Scale WP\Figures\Fig 1.ai



LEGEND

- PROPOSED NEW MONITORING WELL
- MW-42 MONITORING WELL
- EW-8 EXTRACTION WELL
- 100 TOTAL CHROMIUM ISO-CONCENTRATION CONTOUR (ug/L)
- PROPOSED INJECTION WELL
- APPROXIMATE EXISTING EXTRACTION SYSTEM PIPING
- PROPOSED INJECTION SYSTEM PIPING
- PROPOSED WATER SUPPLY PIPING
- 1 WELL SCREEN IS IN DEEPER ZONE

DESIGN NOTE:

ALL PROPOSED WELL AND PIPING LOCATIONS ARE APPROXIMATE.

N

SCALE

0 300 600 FEET

	ATTACHMENT B	**PROPOSED FULL-SCALE IN SITU GROUNDWATER TREATMENT SYSTEM MONITORING WELLS IN SITU GROUNDWATER REMEDIATION FULL-SCALE WORK PLAN AND FIELD DEMONSTRATION SUMMARY** FORMER BAC FACILITY MERCED, CALIFORNIA	

Date\Time Thu, 11 Oct 2007 - 12:19pm
Path\Name - c:\Projects - Active\Former BAC Site\Reports\GW Field Demo Summary and FullScale WP\Figures\Figure 11.dwg
Acad Version - R17.0s (LMS Tech)
User Name - mchiu

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008- 0047
CALIFORNIA WATER CODE SECTION 13267

FOR

FORMER BALTIMORE AIRCOIL COMPANY FACILITY, INC.,
TRACK FOUR, INC.,
A WHOLLY OWNED SUBSIDIARY OF AMSTED INDUSTRIES INC.,
AND
A FORMER OWNER, MERCK & CO., INC.,
GROUNDWATER REMEDIATION
MERCED 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 Water Board) pursuant to California Water Code Section 13267. Former facility owners Track Four, Inc., and Merck & Co., Inc., (hereafter collectively referred to as the Discharger) are required to comply with this MRP, which contains the minimum monitoring and reporting requirements necessary to determine compliance with Waste Discharge Requirements Order No. R5-2008-0047. 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 Water Board.

The following MRP is designed to determine the effectiveness of the full-scale in situ groundwater remediation effort at the former Baltimore Aircoil Company (BAC) facility, the fieldwork for which is scheduled to commence in early 2008. The facility has a groundwater extraction and treatment system that has been operating since 1994. A separate MRP, Order No. R5-2007-0830, specifies comprehensive long-term facility monitoring that goes beyond the scope of the subject MRP.

Prior to construction of any new groundwater monitoring or extraction wells, the Discharger shall submit plans and specifications to the Regional Water 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 micro-purging 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 micro-purging 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 UPON INITIATION OF FULL-SCALE IN SITU TREATMENT REMEDY

The Discharger has proposed full-scale in situ groundwater treatment to achieve site-specific groundwater cleanup goals in a shorter time frame than that projected under the current groundwater extraction and treatment program. The full-scale in situ treatment remedy includes injecting chemical amendments into groundwater within the chromium plume associated with the former BAC facility. The Order for this MRP provides Regional Water Board approval for the full-scale in situ treatment remedy. Groundwater monitoring associated with this remedy is specified below.

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

The currently existing monitoring network will primarily be used for monitoring the progress of the full-scale in situ groundwater treatment. However, three new wells will be installed at the former BAC facility to augment the existing well network. The approximate locations of these new wells are shown in Attachment B of the Order for this MRP.

The following wells shall be monitored semiannually beginning when amendment injection commences and continuing until Order No. R5-2008-0047 is rescinded: OW-1, EW-5, MW-8, MW-9, MW-12, MW-26, MW-27, MW-29, MW-30, MW-41, MW-42, MW-43, MW-49, MW-50, MW-51, MW-54, MW-55, MW-56, MW-58, MW-60, MW-61, MW-62, MW-63, MW-64, MW-65, MW-66, MW-67, MW-68, and MW-69.

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:

Parameter[1]	Method[2]	Unit	Maximum Detection Limit[3]
Hexavalent Chromium	EPA 7199	ug/l	0.2 ug/l
Total Chromium	EPA 200.8	ug/l	3 ug/l
Arsenic	EPA 200.8	ug/l	2 ug/l
Iron[4]	EPA 200.8	ug/l	5 ug/l
Manganese	EPA 200.8	ug/l	2 ug/l
Nitrate	EPA 300.0	ug/l	0.5 mg/l
Sulfate[4]	EPA 300.0	ug/l	1 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	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 Some of these parameters are also required under Order No. R5-2007-0830; they also appear here to ensure inclusion of results in the reports required by the subject MRP.

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

3 For non-detectable results

4 Sample collection and analysis for these parameters are only required if ferrous sulfate is used as an amendment.

II. 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.

III. AMENDMENT ANALYSIS

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

Parameter	Method[1]	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 groundwater at the estimated concentration that will be injected during the full-scale in situ treatment.

IV. 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 groundwater samples collected during each groundwater monitoring event.

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 semiannual groundwater monitoring reports.

V. ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

Pursuant to Finding 13 of the Waste Discharge Requirements for this MRP, the Discharger shall develop background values for concentrations of dissolved oxygen, oxidation-reduction potential, iron, manganese, nitrate, sulfate, and total organic carbon 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 May 2008**.

VI. 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 Water 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.

Semiannual reports shall be submitted to the Regional Water Board by the Discharger to assess long-term effects of injected amendments on aquifer geochemistry until such time as the Executive Officer determines that the reports are no longer necessary. Semiannual monitoring shall be conducted in the second and fourth quarters of the calendar year, with monitoring reports due to the Regional Water Board by **1 August** and **1 February**. 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 aquifer;
8. Water level and water quality hydrographs showing historical data for each well; and
9. Any proposed changes in the extraction well network with justification for the change.
10. 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.
11. A comparison of water quality results for the compliance wells designated in Finding 13 with background concentrations established for the former BAC facility, including a discussion of compliance with Groundwater Limitation C.2 of the Order for this MRP.

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

Ordered by:

_____
PAMELA C. CREEDON, Executive Officer

_____
Date