

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

SITE CLEANUP ORDER NUMBER 91-164

SITE CLEANUP REQUIREMENTS FOR:

**FMC CORPORATION - GROUND SYSTEMS DIVISION
FOR THE PROPERTY LOCATED AT:**

**328 WEST BROKAW ROAD
SANTA CLARA
SANTA CLARA COUNTY**

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. **SITE DESCRIPTION** FMC Corporation - Ground Systems Division (FMC) presently owns and occupies facilities located on an approximately forty acre site collectively referred to as 328 West Brokaw Road, Santa Clara, Santa Clara County (the Site, Figures 1 and 2). The Site is bounded by the Southern Pacific Transportation Company railroad right of way and railroad maintenance yard to the south, West Brokaw Road to the west, Coleman Avenue to the north, and the city boundaries of Santa Clara and San Jose to the east.
2. **SITE HISTORY** The Site was purchased by FMC in 1953. Prior use was primarily for agricultural purposes. FMC constructed manufacturing facilities on the Site in 1963 and since that time has used the Site essentially for manufacturing military tracked vehicles, including assembly and painting operations.
3. **REGULATORY STATUS** FMC (hereinafter referred to as a discharger) is considered to be a discharger because of its' ownership, occupancy and use of the Site from 1953 to present, during which time, releases of chemicals have occurred. These chemicals have impacted the soil and groundwater beneath the Site.
4. **HYDROGEOLOGY** Sediments at the Site include marine clays, fluvial coarse channel deposits, and interbedded layers of silts and clays. A continuous 5 foot thick sequence of dark silty clay exists immediately beneath the Site, underlain by a 10 to 35 foot thick variegated of discontinuous silty clays, silty sands and gravels.

The first-encountered water bearing zone, the A-level aquifer 25 to 35 feet below the ground surface, is in the interbedded layers of silty clay, sand, and gravel that extends downward to a depth of about 36 to 53 feet below ground surface. The second-encountered water-bearing zone, the B-level aquifer, is

a continuous channel sequence of silty clay to sandy silt with interbedded layers of moderately graded fine grained sands and pebbly gravels. The B-level aquifer exists beneath the Site from 47 to greater than 100 feet below the ground surface and is separated from the A-level aquifer by a 5 to 15 feet thick continuous sequence of silty clay.

The groundwater flow direction in the A- and B-level aquifers is generally to the north and northwest (Figure 3). Fluctuations have been observed in A-level groundwater table and have been reflected as rising water levels during the past year. Aquifers which serve as drinking water supplies exist regionally at depths from 300 to 900 feet below ground surface in the vicinity of the Site. Numerous wells nearby are used for groundwater monitoring, industrial, irrigation and municipal supply. Three municipal wells operated by the City of Santa Clara are located within a 1000 foot radius of the Site, the oldest well constructed in 1960.

5. SOIL AND GROUNDWATER INVESTIGATIONS Subsurface soil investigations initiated by the discharger in 1989 included 10 soil borings and 9 monitoring wells at various locations on site. A soil vapor survey was performed in April, 1990 with 74 soil vapor extraction points sampled for VOCs. Based on these findings, an additional 49 soil borings and 16 monitoring wells were completed in 1990 to further assess the extent of potentially impacted soil in the vicinity of the Site (Figure 4).

VOC-impacted soil was found to have concentrations as high as 46,000 parts per billion (ppb) for trichloroethene (TCE), 330 ppb for toluene, 39 ppb for tetrachloroethene, 30 ppb for 1,1-dichloroethane, and 290 ppb for 1,1,1-trichloroethane (1,1,1-TCA). Total petroleum hydrocarbon concentrations in the soil were detected as high as 29,000 ppm (Figure 5).

In addition to its soil investigations, the discharger has also conducted additional site groundwater investigations with a total of 25 groundwater monitoring wells installed onsite.

Chemicals in the A-level aquifer have been detected at concentrations as high as 10,000 ppb for TCE, 300 ppb for 1,1,1-TCA and, 1,1,1-TCA has been detected in the deeper B-level aquifer at a maximum concentration of 19 ppb (Figure 6).

The discharger submitted a letter report dated May 31, 1990 entitled, "Preliminary Environmental Assessment Findings, 328 W. Brokaw Road, FMC Corporation - Ground Systems Division, Santa Clara, Santa Clara County, California". This report summarized all environmental assessment work performed by the discharger from 1989 through April 1990.

6. **SCOPE OF THIS ORDER** This Order contains tasks for further site investigation, for possible interim remedial measures and for implementation and evaluation of final remedial actions. These tasks are necessary to alleviate the threat to the environment posed by impacted soil and groundwater, and to provide a substantive technical basis for designing and evaluating the effectiveness of final remedial alternatives.
7. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986. The Basin Plan contains water quality objectives and beneficial uses for South San Francisco Bay and contiguous surface and groundwaters.
8. The existing and potential beneficial uses of the nearby Guadalupe River include:
 - a. Navigation
 - b. Water contact recreation
 - c. Commercial and sport fishing
 - d. Warm fresh water habitat
 - e. Area of special biological significance
 - f. Fish migration
9. The existing and potential beneficial uses of the groundwater underlying and adjacent to the Site include:
 - a. Industrial process water supply
 - b. Industrial service water supply
 - c. Municipal and Domestic water supply
 - d. Agricultural water supply.
10. The discharger has caused or permitted, and threatens to cause or permit waste to be discharged or deposited where it is or probably will be discharged to waters of the State and create or threaten to create a condition of pollution or nuisance.
11. This action is an Order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.
12. The Board has notified the discharger and interested agencies and persons of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharger and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
13. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that the discharger shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.
2. Further significant migration of pollutants through subsurface transport to waters of the State is prohibited.
3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of pollutants are prohibited.
4. The storage, handling, treatment or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.

B. SPECIFICATIONS

1. The discharger shall conduct site investigations and monitoring activities as needed to further define the current local hydrogeologic conditions, and the lateral and vertical extent of impacted soil and groundwater. Should monitoring results show evidence of plume migration, additional characterization of the extent of impacted soil and groundwater may be required.
2. The cleanup goal for source-area soil is 1 ppm for total VOCs. Alternative cleanup goals may be proposed based on site specific data. If higher levels of VOCs are proposed, the discharger must demonstrate that cleanup of total VOCs to 1 ppm is infeasible, that alternate levels will not threaten the quality of waters of the State, and that human health and the environment are protected. Additionally, if any chemical constituents regulated under this Order (or their degradation products), are left in the soil above proposed cleanup levels, a program of continued groundwater monitoring may be required. Final cleanup goals for source-area soils will be approved by the Board.
3. Final cleanup goals for impacted groundwater, onsite and offsite, shall be in accordance with State Water Resources Control Board Resolution No. 68-16, "Statement

of Policy with Respect to Maintaining High Quality of Waters in California." Proposed final cleanup levels shall be based on a feasibility study of remedial alternatives that compares cost, effectiveness and time to achieve proposed cleanup goals. Cleanup levels shall also have the goal of reducing mobility, toxicity and volume of pollutants. Final cleanup levels shall be approved by the Board.

4. If groundwater treatment is necessary and if extraction and treatment is considered as an alternative, the feasibility of water reuse, re-injection and disposal to the sanitary sewer must be evaluated. Based on the Board Resolution 88-160, the discharger shall optimize, with a goal of 100%, the reclamation or reuse of groundwater extracted as a result of cleanup activities. The discharger shall not be found in violation of this Order if documented factors beyond the discharger's control prevent the discharger from attaining this goal, provided the discharger has made a good faith effort to attain this goal. If reuse or re-injection is part of a proposed alternative, an application for Waste Discharge Requirements may be required. If discharge to waters of the State is part of a proposed alternative, an application for an National Pollutant Discharge Elimination System (NPDES) permit must be completed and submitted, and must include the evaluation of the feasibility of water re-use, re-injection and disposal to the sanitary sewer.

C. PROVISIONS

1. The discharger shall comply with the Prohibitions and Specifications above, in accordance with the following time schedule and tasks:

TASKS AND COMPLETION DATES

a. TASK: PREPARATION OF ADMINISTRATIVE CONTROL WORK PLANS AND REPORTS

1) Quarterly Groundwater Sampling and Analysis Plan Submit a technical report acceptable to the Executive Officer that develops a quarterly groundwater monitoring sampling and analysis program. The proposed monitoring plan shall, as a minimum, contain the following: identification and location of wells to be sampled; frequency of water level measurements and water quality sampling; analytical methods; sampling procedures, chain of custody and Quality Assurance/Quality

Control procedures to be used; and cumulative water level and cumulative water quality analysis results in a tabulated format. The plan shall use EPA 8240 open scan and EPA tests for priority pollutant metals initially for all new wells, and once annually thereafter, and once for all existing wells in the monitoring system. Thereafter, on a quarterly basis, other EPA tests may be used, as appropriate for the constituents detected. Upon approval by the Executive Officer, the monitoring program will be implemented and reports submitted in accordance with Provisions C.4.b. and C.8.

2) Site Use History The discharger shall submit a Site Use History Report which shall include, as a minimum, the following information and descriptions of conditions on and adjacent to the site as necessary to evaluate potential responsible parties as follows: past ownership status; descriptions of original site construction including locations of sumps, pits and effluent lines; manufacturing processes; product delivery and storage locations; a chemical use history; and, locations of facilities used for disposal, treatment, transfer and storage of waste products.

3) Site Safety and Health Plan and a Quality Assurance Project Plan The discharger shall also provide a Site Safety and Health Plan (SSHP) and a Quality Assurance Project Plan (QAPP) that follow CERCLA guidance documents for format and content.

COMPLETION DATE: January 31, 1992

b. **TASK: ADDITIONAL SOIL AND GROUNDWATER POLLUTION CHARACTERIZATION WORKPLAN**

Submit a work plan acceptable to the Executive Officer that develops and proposes further characterizations of the vertical and horizontal extent of site soil and groundwater pollution. The workplan shall include, but not be limited to, identification of methods for soil sampling and analysis; groundwater sampling and analysis of the A- and B-level aquifers; an evaluation of any potential offsite migration of pollutant plumes; proposal of activities necessary to determine the hydraulic properties of the A- and B- level aquifers, and; if necessary, preparation of a revised Quarterly Groundwater Sampling and Analysis Plan, including any new or proposed additional groundwater monitoring wells.

COMPLETION DATE: February 29, 1992

c. TASK: INTERIM REMEDIAL ALTERNATIVES REPORT

Submit a technical report acceptable to the Executive Officer which evaluates and, if appropriate, proposes interim remedial alternatives and, if applicable, develops and proposes a schedule for implementation of any preferred interim remedial alternative(s). The time schedule shall specify a date for submission of a technical report documenting the implementation of any selected interim remedial action(s). Evaluation of proposed interim remedial alternatives shall include the following: the removal and/or cleanup of impacted soils; alternative hydraulic or other control systems to contain and to initiate cleanup of impacted groundwater, and; pilot or treatability studies relative to possible final remedial measures.

If extraction of groundwater is an element of a proposed interim remedial action, this report shall also evaluate groundwater re-use pursuant to Board Resolution 88-160 to include feasibility of discharge to a Publicly Owned Treatment Works (POTW), re-injection or re-use of the extracted groundwater. If discharge to surface waters is proposed as a part of an interim remedial measure, the report should include a completed NPDES permit application.

COMPLETION DATE: June 30, 1992

d. TASK: REMEDIAL INVESTIGATION REPORT

Submit a technical report acceptable to the Executive Officer which documents and presents the results of the work proposed and accepted under Task C.1.b. The report shall also incorporate relevant data and information obtained from all prior Site investigations. As a minimum, the report shall discuss results including: hydrogeologic conditions; results from soil vapor surveys; vertical and horizontal extent of soil and groundwater pollution; the extent to which soil conditions at, near, and/or beneath the Site, may have contributed or may be contributing to groundwater pollution; the potential of onsite wells or nearby wells that may be threatened by a migrating offsite pollution plume(s) to act as conduits for vertical migration of pollutants; and, if such exist, any additional data or investigative measures needed to complete the remedial investigation, with a proposed schedule for obtaining such additional data.

COMPLETION DATE: May 31, 1993

e. TASK: FINAL REMEDIAL ALTERNATIVES REPORT

Submit a technical report acceptable to the Executive Officer of the Board that proposes final cleanup objectives and actions pursuant to Specifications B.2. and B.3. for all areas of the Site where the soil and groundwater have been impacted. This report shall include: a summary of results of the remedial investigations; a feasibility study evaluating alternative final remedial measures, and; the recommended measures necessary to achieve proposed final cleanup objectives.

COMPLETION DATE: November 30, 1993

f. TASK: FINAL REMEDIATION IMPLEMENTATION PLAN

Following receipt of written approval from the Board on the proposed cleanup objectives and preferred remedial alternative(s) submitted under Provision C.1.e., submit a workplan and task and time schedule for implementation of final remedial measure(s). The time schedule shall include a date for submittal of a technical report documenting the implementation of the final remedial measure(s).

This report shall also include a completed NPDES permit application if groundwater extraction is proposed as a final remedial action and if the remedial alternative proposes to discharge to surface waters. The application shall include an evaluation of water reuse pursuant to Specification B.4.

COMPLETION DATE: 120 days following receipt of written approval from the Board on the proposed cleanup objectives and preferred remedial alternative submitted under Provision C.1.e.

g. TASK: FIVE YEAR STATUS REPORT

Submit a technical report acceptable to the Executive Officer containing the following: the results of any additional investigative work completed; an evaluation of the effectiveness of installed final cleanup measures; additional measures to achieve final cleanup objectives and goals, if necessary; a comparison of previously estimated costs with actual costs incurred and a revised projection if necessary to achieve final cleanup goals and objectives; the tasks and time schedule necessary to implement any additional final cleanup measures; recommended measures for reducing Board oversight activities; description of the reuse of extracted groundwater,

if any, and; evaluation and documentation of the removal and/or cleanup of impacted soils and groundwater.

If final cleanup objectives have not been achieved through the implementation of the approved soil and groundwater remediation plans, this report shall also contain an evaluation addressing whether it is technically feasible to achieve these objectives with the approved remedial measures, and, if not, contain a proposal for alternate procedures to do so.

COMPLETION DATE: November 30, 1996

2. The submittal of technical reports evaluating final remedial measures will include a projection of the cost, effectiveness, benefits, and impact on public health, welfare, and environment of each alternative measure. The remedial investigation and feasibility study shall consider the guidance provided by Subpart F of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300); Section 25356.1 (c) of the California Health and Safety Code; US EPA "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", October, 1988 or any superseding CERCLA guidance documents with reference to Remedial Investigation, Feasibility Studies and Removal or Remediation Actions; and the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California."
3. Pursuant to Section 13304 of the Water Code, the discharger is hereby notified that the Regional Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Regional Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. Upon receipt of a billing statement for such costs, the discharger shall reimburse the Regional Board.
4. If the discharger is delayed, interrupted or prevented from meeting one or more of the completion dates specified in this Order, the discharger shall promptly notify the Executive Officer.
5. The discharger shall submit acceptable reports on compliance with the requirements of this Order and acceptable periodic activity reports that contain descriptions and results of work performed. These reports are to be submitted according to a program prescribed by this Order, and may be submitted concurrently with quarterly and annual or other reports, and as outlined below.

a. **ON A MONTHLY BASIS**, technical reports on the status of compliance with this Order shall be submitted to the Executive Officer, commencing with the month of December, 1991 and due on the last day of each month. Each report may be in a letter format covering the previous month and shall include, but is not limited to, the following:

- 1) Summary of work completed since submittal of the previous report, and work projected to be completed by the time of the next report.
- 2) Identification of any obstacles which may threaten compliance with the schedule of this Order and what actions are being taken to overcome these obstacles.
- 3) Written notification which clarifies the reasons for non-compliance with any requirement of this Order, and proposals for specific measures and schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order.

After the report of December, 1992, due on January, 31, 1993, status compliance reports shall revert to a quarterly schedule and will be due on the last day of the month following the calendar quarter.

b. **ON A QUARTERLY BASIS**, following implementation of a groundwater monitoring program as approved by the Executive Officer, technical reports on compliance with the groundwater monitoring requirements of this Order shall be submitted to the Executive Officer according to the schedule below, commencing with the first calendar quarter following such implementation and covering the previous quarter. The quarterly reports shall include, but need not be limited to, the following information:

SCHEDULE FOR QUARTERLY REPORT SUBMITTAL

Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Period	Jan-Mar	April-June	July-Sept	Oct-Dec
Due Date	April 30	July 31	October 31	January 31

- 1) Tabulated and cumulative analytical results of quarterly groundwater quality sampling analyses for all monitoring wells specified in the monitoring program and updated groundwater plume maps based on these results.
- 2) Updated potentiometric surface maps, based on the most recent quarterly water level measurements for all affected water bearing zones.
- 3) Updated well construction details for any additional wells that have been installed during the quarter along with an updated quarterly sampling schedule to be placed in the SAP for all wells no later than one quarter after approved changes occur.
- 4) If groundwater extraction is a part of an interim or final cleanup program, include a cumulative tabulation of volume of extracted groundwater, quarterly analyses results for all groundwater extraction wells, and pounds of chemicals removed.
- 5) Updated or revised reference diagrams including geologic cross-sections and appropriately scaled and detailed base maps showing the location of all monitoring wells and extraction wells, and identifying adjacent facilities and structures.
- 6) Identification and notification of non-compliance with groundwater monitoring requirements of this Order, as described in Provisions C.4.a.2) and C.4.a.3).

c. ON AN ANNUAL BASIS, technical reports on the progress of compliance with all requirements of this Order and covering the previous year shall be submitted to the Executive Officer, commencing on January 31, 1993. Annual reports may include monthly and quarterly reports due concurrently. The progress reports shall include, but need not be limited to, progress on Site investigations and remedial actions, operation of final remedial actions and/or systems, and the feasibility of meeting groundwater and soil cleanup goals.

6. All hydrogeological plans, specifications, reports, and documents shall be signed by or stamped with the seal of a registered geologist or professional engineer, or a certified engineering geologist .
7. All samples shall be analyzed by a State of California EPA, Department of Toxic Substances Control (Formerly DHS) certified laboratory or laboratories accepted by the Board using approved EPA methods for the specified analysis to be performed. All laboratories shall maintain Quality Assurance/Quality Control records for Board review.

8. The discharger shall maintain in good working order, and operate, as efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order.
9. a. Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be provided to the following agencies:
 1. Regional Water Quality Control Board (Steven Ritchie)
 2. Santa Clara Valley Water District (Tom Iwamura)b. The discharger shall provide copies of cover letters, title page, table of contents and executive summaries of above compliance reports - except for the annual progress reports and the report of remedial alternatives and proposal of final cleanup standards and actions - which shall be submitted in full to the following agencies:
 1. Santa Clara County Health Department (Lee Esquibel)
 2. City of Santa Clara Fire Department (David Parker)
 3. California EPA, Dept. of Toxic Substances Control (Howard Hatayama)
10. The discharger shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:
 - a. Entry upon premises in which any pollution sources exist, or may potentially exist, or in which any required records are kept, which are relevant to this Order.
 - b. Access to copy any records required to be kept under the terms and conditions of this Order.
 - c. Inspection of any monitoring equipment or methodology implemented in response to this Order.
 - d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.
11. The discharger shall file a report on any changes in site occupancy and ownership associated with the facility described in this Order.
12. If any hazardous substance is discharged in or on any waters of the state, or discharged and deposited where it is, or probably will be discharged in or on any waters of the state, the discharger shall report such discharge to this Board, at (415) 464-1255 on weekdays during office hours from 8 a.m. to

5 p.m., and to the Office of Emergency Services at (800) 852-7550 during non-business hours. A written report shall be filed with the Board within five (5) working days and shall contain information relative to: the nature of waste or pollutant; quantity involved; duration of incident; cause of spill; Spill Prevention Control and Countermeasure Plan (SPCC) in effect, if any; estimated size of affected area; nature of effect; corrective measures that have been taken or planned; and a schedule of these activities, and persons/agencies notified.

13. The Board will review this Order periodically and may revise the requirements when necessary.

I, Steven R. Ritchie, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 20, 1991.



Steven R. Ritchie
Executive Officer