

BAY PROTECTION AND TOXIC CLEANUP PROGRAM
CANDIDATE TOXIC HOT SPOTS
SAN FRANCISCO BAY REGION

STATUS OF REGULATORY ACTIONS
November 7, 2002

Candidate Hot Spot	Hydrologic Basin	Post-BPTCP Site Investigation Work	Board or Other Regulatory Action
Peyton Slough	Suisun Bay	Yes	Order No. 01-094
Castro Cove	San Pablo Bay	Yes	13267 Letter, June 10, 1998 Workplan Approval, Sept. 16, 1998
Stege Marsh	San Francisco Bay, Central	Yes	Order Nos.01-101 and 01-102
Point Potrero/Richmond Harbor	San Francisco Bay, Central	Yes, Feasibility Study Completed	DTSC-led effort; site was adjacent to existing Superfund Cleanup and incorporated into RI/FS
Mission Creek, SF	San Francisco Bay, Central	Yes	?? (still searching for the letters)
Islais Creek, SF	San Francisco Bay, Central	Yes	?? (still searching for the letters)
Pacific Drydock Storm Drain, Oakland Inner Harbor	San Francisco Bay, Central	No	
Fruitvale Storm Drain, Oakland Inner Harbor	San Francisco Bay, Central	No	
San Leandro Bay	San Francisco Bay, Central	No	
Central Basin, SF	San Francisco Bay, Central	Yes	?? (still searching for the letters)

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

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

ORDER NO. 01-101

SITE CLEANUP REQUIREMENTS FOR:

**ZENECA INC.
1415 SOUTH 47th STREET
RICHMOND, CONTRA COSTA COUNTY**

**MEADE STREET OPERABLE UNIT
SUBUNIT 1**

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

SITE LOCATION AND OWNER

1. Site location: The Zeneca Inc. (Zeneca) site is located at 1200 and 1415 South 47th Street in Richmond, south of Interstate 580, and along the San Francisco Bay shoreline in Richmond, California (refer to Figure 1). The site is bound by industrial areas to the north, east, and west, and by open space and Eastern Stege Marsh to the south. To the south of the site is East Bay Regional Park District's Bay Trail. The Zeneca site, and the adjacent University of California Richmond Field Station (UCRFS) site, and portions of the adjacent Eastern and Western Stege Marsh comprise the area designated as the Meade Street Operable Unit (refer to Figure 2).
2. Site owner: The Zeneca site was formerly owned by the Stauffer Chemical Company (Stauffer), which utilized the site to manufacture industrial and agricultural chemicals. Sulfuric acid was manufactured from approximately 1897 to 1970. Several smaller companies occupied parcels at the site prior to and during Stauffer's ownership of the land. Stauffer acquired all of the parcels on which these companies operated by 1949. After 1985, Stauffer was acquired and divested by a number of companies, the last being, Zeneca's predecessor company, ICI Americas, which acquired the site in 1987. Zeneca is liable for releases originating at the site by it or its predecessors in interest and is hereinafter named as the discharger.

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PURPOSE OF ORDER

3. Site Cleanup Requirements: This order prescribes Site Cleanup Requirements (SCRs) for Subunit 1 of the Meade Street Operable Unit, which consists of the Zeneca site and a portion of the adjacent Stege Marsh. The order includes general provisions and tasks necessary to contain and remediate soil and groundwater pollution at the site and is being issued pursuant to Section 13304 of the California Water Code.
4. Implementation of remedial measures: This order requires additional technical evaluation and implementation of the remedial measures proposed for Subunit 1 of MSOU, including the uplands area and areas adjacent to Eastern Stege Marsh, and requires that the impacts to Eastern Stege Marsh be addressed. The discharger submitted a Conceptual Remediation and Risk Management Plan (CRRMP) on November 15, 2000 which proposes site screening criteria, evaluates exposure of human and ecological receptors to impacted soil and groundwater at the site, and proposes remedial actions and risk management practices to eliminate or significantly reduce the potential for exposure of human or ecological receptors to impacted soil and groundwater.
5. Coordinated cleanup: This order, in conjunction with Site Cleanup Requirements for the adjacent University of California Richmond Field Station (UCRFS) site, located immediately to the west, comprise a coordinated plan which addresses impacts to upland areas and wetland areas of both the Zeneca site and the UCRFS site.

SITE HISTORY

6. Site use: The site was first developed in 1897 when Stauffer built a plant for the manufacture of sulfuric acid. Additional facilities were added by Stauffer and others to manufacture nitric acid, phosphate fertilizer, carbon disulfide, aluminum sulfate, ferric sulfate, titanium trichloride, and a number of herbicides, insecticides, and fungicides. Activated carbon gas masks were also produced on-site. Zeneca ceased using pyrite ore in the production of sulfuric acid in 1962 and ceased production of sulfuric acid altogether in 1970. Zeneca ceased production of agricultural products in 1997. The Western Research Center (WRC) portion of the site is currently used by Zeneca for research, office space, and open space, while the remaining areas are largely unoccupied, the former manufacturing facilities having been largely demolished.
7. Pyrite cinders: From approximately 1919 to 1962, pyrite ores were roasted at the southwestern portion of the former Plant Area. The ores contained primarily

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pyrite (FeS_2), and lesser amounts of chalcopyrite (CuFeS_2), sphalerite (ZnS), and magnetite (Fe_3O_4). Various other metals, such as arsenic and lead, are also commonly associated with pyrite ore. After processing, spent pyrite ore (pyrite cinders) was placed as fill, primarily within the southern portions of the Plant Area and the unimproved uplands and marsh areas. Pyrite cinders were also deposited in areas of the adjacent UC Richmond Field Station site.

8. Surface impoundment: An Ag-Yard pond was constructed in 1972 and was closed in 1991. The pond was a lined impoundment that covered 3,429 square feet and was up to 9 feet deep. The pond contained surface runoff from the agricultural chemical processing area and received wastewater generated by a groundwater interception trench and a recovery well. Wastewater was transported from the pond to an on-site wastewater treatment system after treatment and was discharged to a municipal sanitary sewer.

REGULATORY STATUS

9. Site Cleanup Requirements, Order 91-010, required closure of the Ag-Yard pond and groundwater monitoring. Order No. 92-055 rescinded Order No. 91-010 based upon the submittal of a report certifying closure of the Ag-Yard pond.

OPERABLE UNITS AND DISCHARGERS NAMED

10. Operable Unit/Subunit structure: The area containing the Zeneca and the adjacent UCRFS sites and their groundwater pollution plumes is referred to as the Meade Street Operable Unit (MSOU). The MSOU has been subdivided into two subunits: Subunit 1 consists of the area of the Zeneca site and the adjacent portion of Eastern Stege Marsh; Subunit 2 consists of the UCRFS site and the adjacent portion of Western Stege Marsh. The boundaries of Subunit 2 are shown in Figure 2. Subunit 2 is further subdivided into Subunits 2A and 2B. Subunit 2A consists of the cinder fill area located in the southeastern portion of the upland area of the site and the eastern portion of the Western Stege Marsh. Subunit 2B consists of the remainder of the upland portion of the UCRFS site and the western portion of Western Stege Marsh.
11. Discharger named: Zeneca (or its predecessors in interest), a confirmed source of pollution within Subunit 1 of MSOU, is the discharger named responsible for addressing pollution in Subunit 1. Zeneca is wholly responsible for addressing pollution in Subunit 1 and complying with the requirements of this Order.
12. Future modification of order: As additional information is generated in the MSOU and its subunits, the Board may modify the dischargers named in this order.

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SITE DESCRIPTION

13. General layout of site: Subunit 1 of the MSOU comprises approximately 86 acres and is relatively flat. The site consists of three main areas: the former Plant Area, the Western Research Center (WRC), and the unimproved upland and marsh areas extending south of the former plant area and extending to the Bay Trail embankment. (refer to Figure 2).
14. Plant Area: The Plant Area, consisting of approximately 31 acres, is located on the western and central portions of Subunit 1. Existing structures in the area of the former manufacturing plant include above-ground storage tanks, office buildings, maintenance buildings, warehouses, research laboratories, and greenhouses. Also located within the Plant Area are the closed agricultural pond and an associated interception trench, cinder fill areas, and a wastewater treatment system.
15. Western Research Center: The Western Research Center (WRC), consisting of approximately 20 acres, is located on the northern portion of Subunit 1. Existing structures in the WRC include laboratories, greenhouses, offices, storage buildings, and rail lines.
16. Unimproved upland and Eastern Stege Marsh: The unimproved uplands and marshland areas south of the Plant Area and north of the Bay Trail consists of approximately 35 acres. The area includes the eastern portion of Stege Marsh, two freshwater lagoons, four surge ponds, and cinder landfill areas. Stege Marsh is an intertidal salt marsh bounded by embankments on all sides. The lagoons are freshwater ponds vegetated by willows and cattails, and were formerly utilized by Zeneca as evaporation ponds. The four surge ponds, which drain to Eastern Stege Marsh, are lined and utilized by Zeneca for wastewater and stormwater management.

SITE GEOLOGIC AND HYDROGEOLOGIC SETTING

17. General geology: The Subunit 1 site geology consists primarily of alluvial sediments that were deposited at the site from the Berkeley Hills, located east and northeast of the facility. The hydrogeologic evaluations indicate that the sediments in the upper 80 to 100 feet beneath the facility can be subdivided into four units: fill, Bay Sediments, Quaternary Alluvium, and Yerba Buena mud. Fill material consists of pyrite cinders utilized from the sulfuric acid production process, alum mud, and construction debris, and ranges from zero to approximately 15 feet thick, with deeper cinders in localized areas of the site. Fill is generally thicker in the southern part of the facility adjacent to the San Francisco Bay. Bay Sediments are in the southern portion of the site, south of the

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historical San Francisco Bay shoreline. The sediments are primarily composed by fine-grained silty sand with smaller amounts of mud and peat, and range from approximately 5 feet to 9 feet thick. Beneath the Bay Sediments lie Quaternary Alluvium, which consists of interbedded gravel, sand, silt, and clay units. The Quaternary Alluvium ranges from approximately 3 to 11 feet thick. Within the Quaternary Alluvium are upper and lower water bearing units; an aquitard has not been consistently observed between the units. The lowermost layer observed is the Yerba Buena Mud. The Yerba Buena Mud is laterally extensive and is approximately 40-50 feet thick. The top of the Yerba Buena Mud is present at depths of approximately 25-30 feet below ground surface in the northern portion of the site, and at approximately 35-45 below groundwater surface in the southern portion of the site.

18. Hydrogeology: Two hydrogeologic units have been identified at the site: the water-bearing sand and gravel in the Upper Horizon, and the water bearing sand and gravel in the Lower Horizon. The Upper Horizon is typically found ranging from approximately 10 to 20 feet below ground surface. The sand and gravel units in the Upper Horizon appears to be mostly continuous laterally across the site. The Lower Horizon is encountered above the Yerba Buena Mud at depths ranging from approximately 25 to 40 feet below ground surface. The sand and gravel units in the Lower Horizon vary in thickness from less than 2 feet thick to 8 feet thick. Groundwater within the Upper Horizon and the Lower Horizon generally flows south to southwesterly toward the Bay, and has a relatively low gradient. The groundwater deeper than approximately 25 feet below ground surface is considered a potential drinking water source. The primary sources of recharge to the shallow groundwater units are through direct infiltration of on-site precipitation and in upgradient areas, and tidal seepage from the Bay.

SOIL AND GROUNDWATER CONTAMINATION

19. Releases at Zeneca site: Extensive sampling was conducted on-site in order to evaluate soil and groundwater impacts associated with operations on-site. The sampling and site history data indicate that the most significant soil and groundwater contamination at the site was caused by releases at the Western Research Center (primarily south of East Montgomery Street) and the former Plant Area, and from the use of pyrite cinders as fill material. The most significant chemical concentrations detected in soil and groundwater reflect historic site and chemical use and storage practices.
20. Soil in Uplands Area: Investigations indicate that some of the pyrite cinders used as fill in Subunit 1 have oxidized, resulting in pH levels as low as 3.3 in soil. Investigations also indicate elevated concentrations of metals in soil, including

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arsenic (maximum 1,700 ppm; mean 33 ppm) and lead (maximum 18,000 ppm; mean 205 ppm). Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) were detected in soil on-site, including benzene (maximum 1.7 ppm; mean .28 ppm), toluene (maximum 1,800 ppm; mean 12 ppm) and benzopyrene (maximum 6 ppm; mean 0.9 ppm). Pesticides detected in soil on-site include DDD (maximum 2,800 ppm; mean 27 ppm), DDT (maximum 2,100 ppm; mean 14 ppm), and toxaphene (maximum 230 ppm; mean 31 ppm).

21. Groundwater in Uplands Area: Groundwater sampling indicates that oxidation of pyrite cinders has resulted in pH levels in groundwater as low as 3.2. The low pH conditions have caused metals to leach from pyrite cinders. Elevated metals concentrations in groundwater include: arsenic (maximum 45,000 ppb; mean 148 ppb), copper (maximum 380,000 ppb; mean 4,164 ppb), mercury (maximum 8.7 ppb; mean 23 ppb), nickel (maximum 5,400 ppb; mean 455 ppb), selenium (maximum 880 ppb; mean 15 ppb), and zinc (maximum 280,000 ppb; mean 9,426 ppb). Elevated VOCs detected in groundwater include: 1, 1, 2, 2-tetrachloroethane (maximum 120 ppb; mean 59 ppb), 1, 1-dichlorobenzene (maximum 4,800 ppb; mean 127 ppb), carbon disulfide (maximum 1,800,000 ppb; mean 29,245 ppb), chlorobenzene (maximum 75,000; 667 ppb mean), chloroform (maximum 3,400 ppb; mean 97 ppb), cis-1,2-dichloroethene (maximum 880 ppb; mean 76), tetrachloroethene (maximum 540 ppb; mean 83 ppb), trichloroethene (maximum 4,900 ppb; mean 188 ppb), and vinyl chloride (maximum 54 ppb; mean 2.7 ppb). Pesticides detected in groundwater include: DDD (maximum 63 ppb; mean 2 ppb), DDT (maximum 19 ppb; mean 0.95 ppb), cycloate (maximum 760 ppb; mean 11 ppb), molinate (maximum 6,300 ppb; mean 78 ppb), and metamsodium (maximum 480,000 ppb; mean 8,012).
22. Stege Marsh impacts: A portion of Stege Marsh within Subunit 1 has been impacted by releases on Subunit 1 and the placement of pyrite cinders as fill in the adjacent Western Research Area, Plant Area, and the undeveloped upland and marsh areas. The benthic community of the marsh has been significantly impaired by the low pH conditions, metals, PCBs and pesticides detected in sediment samples. Metals include: arsenic (maximum 771 ppm; mean 186 ppm), copper (maximum 5390 ppm; mean 542 ppm), lead (maximum 818 ppm; 165 ppm), mercury (maximum 72.5 ppm; mean 9 ppm), nickel (maximum 115 ppm; mean 51 ppm), silver (maximum 26 ppm; mean 1.75ppm), and zinc (maximum 6,210 ppm; mean 1,318 ppm). Pesticides detected in marsh sediment include: DDD (maximum 1.8 ppm; mean 0.29 ppm), DDT (maximum 0.54 ppm; mean 0.25 ppm), and PCBs (maximum 0.8 ppm; mean 0.22 ppm). The chemicals detected in Stege Marsh reflect historic site and chemical use and may reflect additional sources beyond the area of Subunit 1.

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23. Impacts at UCRFS site from use of Zeneca's pyrite cinders as fill: The adjacent University of California Richmond Field Station (UCRFS) site has been significantly impacted by the use of pyrite cinders previously generated at the Zeneca site and used as fill at the UCRFS site. The thickness of the cinder fill at the UCRFS site is up to 15 feet thick. As observed at the Zeneca site, oxidation of sulfur associated with spent cinders has resulted in low pH conditions and elevated metals in soil and groundwater at the UCRFS site and in the adjacent Stege Marsh. The UCRFS site has also been impacted by releases associated with historic operations at the UCRFS site.
24. Remediation of Upland Area: Zeneca's November 15, 2000 Conceptual Remediation and Risk Management Plan (CRRMP) proposes remedial measures for addressing soil, sediment, and groundwater pollution in the Upland Area of Subunit 1. The report identifies Chemicals of Potential Concern (COPCs) and identifies potential human and ecological receptors and exposure pathways in the Upland Area. The CRRMP also proposes cleanup levels (Site Specific Target Levels (SSTLs, for VOCs based on protection of indoor onsite workers) and evaluates remedial measures for achieving the cleanup levels. Remedial measures proposed for the Upland Area of the site include localized excavation, groundwater extraction and treatment, installation of a partial site cap, neutralization of cinders and groundwater, installation of a biologically active permeable barrier, and restoration of freshwater lagoons. Long term soil management plans, site maintenance plans, and deed restrictions are also proposed. Similar remedial measures are currently being considered for addressing cinders in Subunit 2A and other areas of the Zeneca site either in-place or after consolidation on Subunit 1. Other alternatives evaluated included groundwater extraction and treatment and excavation and offsite disposal of cinders and affected soil. The alternatives were compared on the basis of potential effectiveness and reliability, practicality of implementation, and cost effectiveness. Staff conditionally approved the CRRMP on April 4, 2001. One of the conditions of approval was that additional remedial investigation sampling data which defines the full extent of the soil and groundwater impacts at the site would be submitted.
25. Risk assessment for Upland Area: COCs detected in soil and groundwater include carcinogenic and non-carcinogenic compounds at levels which may affect human and ecological receptors if unmitigated. In order to prevent unacceptable levels of exposure to human and ecologic receptors, an assessment of the uplands area of the site was performed in order to identify pathways of exposure assuming future commercial/industrial site use, and to establish SSTLs protective of human receptors. Potentially complete exposure scenarios for human receptors include direct dermal contact, ingestion of impacted soil or groundwater, and inhalation of

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air-born particulates or VOCs.

For comparison, the Board considers the following risks to be acceptable at remediation sites: a hazard index of 1.0 or less for non-carcinogens, and an excess cancer risk of 10^{-5} or less for carcinogens.

Due to excessive risk that will be present in the uplands area of the site pending full remediation, institutional constraints are appropriate to limit on-site exposure to acceptable levels. Institutional constraints include a deed restriction that notifies future owners of subsurface contamination, and requires best management practices for preventing unacceptable levels of exposure to subsurface contamination, including prohibition of the use of shallow groundwater beneath the site as a source of drinking water until cleanup standards are met.

26. Pending remediation of Eastern Stege Marsh: Although it is expected that the remedial measures for the uplands area of Subunit 1 will reduce the flux of contamination from the uplands area into Eastern Stege Marsh, a risk assessment needs to be conducted and remedial measures need to be proposed and implemented specifically for the marsh areas of Subunit 1. Remedial measures for the Eastern Stege Marsh are required in Task 3.a through 3.f of this order. The remedial measures must reduce the potential for ecological and human exposure to chemicals in the marsh and enhance the existing tidal marsh habitat.
27. Basis for Cleanup Standards
 - a. State Board Resolution No. 68-16: State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest levels of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives. The previously-cited cleanup plan indicates that restoration of water quality to background levels is not necessary to protect beneficial use of groundwater at the site and potential site receptors. This order and its requirements are consistent with Resolution No. 68-16.
 - b. State Board Resolution No. 92-49: State Board Resolution No. 92-49, "Policies and procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This order and its requirements are consistent with the provisions of

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Resolution No. 92-49 as amended.

- c. Board Resolution 89-39: Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high TDS, low yield, or naturally-high contaminant levels. Based on site investigations, groundwater within the upper aquifer zone is brackish and is therefore not considered a potential source of drinking water. However, the deeper aquifers beneath the site are not brackish and are therefore considered a potential source of drinking water.
- d. Beneficial uses as specified in the Basin Plan: The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin Plan (Basin Plan) on June 21, 1995. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in Title 23, California Code of Regulations, Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters.

The beneficial uses of San Francisco Bay include:

- a. wildlife habitat;
- b. navigation;
- c. water contact recreation;
- d. non-contact water recreation;
- e. commercial and sport fishing;
- f. preservation of rare and endangered species;
- g. estuarine habitat;
- h. fish migration;
- i. fish habitat;
- j. industrial service supply; and
- k. shellfish harvesting.

The existing and potential beneficial uses for Stege Marsh include:

- a. estuarine habitat
- b. preservation of rare and endangered species
- c. water contact recreation
- d. noncontact water recreation
- e. fish spawning
- f. wildlife habitat

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The existing and potential beneficial uses for groundwater in the vicinity of Subunit 1 include:

- a. municipal and domestic water supply
 - b. industrial process water supply
 - c. industrial service water supply
 - d. agricultural water supply
 - e. freshwater replenishment to surface water
- e. Site Specific Target Levels: In the Conceptual Remediation and Risk Management Plan (CCRMP), Site Specific Target Levels (SSTLs) were developed for volatile chemicals of concern in the Uplands Area of the site, as described in Findings 24 and 25. It was determined in the CCRMP that soil and groundwater concentrations at or below SSTLs would not present a hazard to potential human receptors within the Upland Area of the site. SSTLs have not yet been developed for Stege Marsh.
- f. Soil, groundwater, and marshland cleanup standards: The soil and groundwater cleanup standards for the Upland Areas of the site are the SSTLs, modified industrial PRGs, and ERMs identified in the CRRMP. Cleanup to these levels and mitigation or elimination of exposure pathways through proposed remedial measures is protective of beneficial uses of groundwater and will result in acceptable residual risk to potential human and ecological receptors in the Upland Area. Cleanup standards for Eastern Stege Marsh will be established upon completion of the applicable tasks of this Order.
- g. Future Changes to Cleanup Standards: The goal of this remedial action is to restore the beneficial uses of groundwater underlying and adjacent to the site. Results of cleanup at other sites suggest that full restoration of beneficial uses to groundwater as a result of active remediation at this site may not be possible. If full restoration of beneficial uses is not technologically nor economically achievable within a reasonable period of time, then the discharger may request modification of the cleanup standards or establishment of a containment zone, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Board may decide that further cleanup action should be taken. Cleanup standards will also be reassessed if residential land use is proposed for the Upland Area in the future and as warranted by additional site data.

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MONITORING PROGRAMS

28. Groundwater Monitoring – 22 groundwater monitoring wells are located throughout the site (H-10, H-14, H-24, H-29, H-31, H-32, H-36, H-37, H-40, H-41, H-42, H-46, H-47, H-48, H-50, H-57, H-58, H-60, H-66, H-77, H-78, and H-80). Monitoring wells are necessary to monitor the effectiveness of remedial measures. Submittal of a revised groundwater monitoring plan is required in Task 4.a of this Order.
29. Surface Water Monitoring – Surface water monitoring is necessary to evaluate the conditions within Stege Marsh and the effectiveness of remedial measures. Submittal of a surface water monitoring plan is required in Task 4.a of this Order. Surface water monitoring will also be conducted as part of a General Industrial Storm Water Discharge Permit through Industrial and Construction Stormwater Monitoring Plans (NPDES Permit Nos. CAS000001 and CAS000002, respectively).
30. CEQA exemption: This order for Site Cleanup Requirements is exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321, Title 14 of the California Code of Regulations.
31. Other plans and permits: The discharger is required to implement a soil management plan and to comply with NPDES Industrial and Construction Activity Storm Water permits and a stormwater pollution prevention plan.
32. Public notice: The Board has notified the discharger and interested agencies and persons of its intent to adopt Site Cleanup Requirements for the discharger and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
33. Board hearing: 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 (or its agents, successors and assigns) shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner which will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.

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2. Further significant migration of wastes or hazardous substances through subsurface transport to waters of the State, and migration of wastes or hazardous substances at levels which may affect human or ecological receptors, is prohibited.
3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of wastes or hazardous substances are prohibited.

B. CLEANUP PLAN AND CLEANUP STANDARDS

1. Implement Cleanup Plan: The discharger shall implement the cleanup plan for the Upland Area of the site described in findings 24 and 25.
2. Groundwater Cleanup Standards for Upland Area: Groundwater SSTLs shall be met for volatile chemicals, metals, pesticides, and pH for groundwater shall be between 6.0 and 8.5 in all wells identified in the Self-Monitoring Program and any additional wells necessary to monitor the site. Groundwater pollution shall be reduced to levels protective of potential off-site receptors.
3. Soil Cleanup Standards for Upland Area: Concentrations of volatile chemicals in soil shall be reduced to concentrations below the SSTLs as described in Finding 25. Areas where soil contains concentrations of metals exceeding the EPA Region 9 industrial PRG or where neutralized cinders are placed will be capped as described in Finding 24 and 25. Soil pollution shall be reduced to levels protective of potential off-site receptors.
4. Cleanup Standards for Stege Marsh: Soil, sediment, surface water, and groundwater cleanup standards for Eastern Stege Marsh will be established upon completion of the appropriate tasks below.

C. TASKS

CINDERS IMPACTS IN UPLAND AREA OF SUBUNIT 1

- 1.a. **RESULTS OF SOIL AND GROUNDWATER NEUTRALIZATION
PILOT TESTS AND METALS TREATMENT TESTS AND
REMEDIAL DESIGN DETAILS**

COMPLIANCE DATE: January 31, 2002

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The discharger shall submit a technical report, acceptable to the Executive Officer, which provides the results of additional bench scale and field analyses described in the Conceptual Remediation and Risk Management Plan dated November 15, 2000, and the Treatability Study dated December 8, 2000. The report shall include the results of additional treatability studies, soil leachate tests, and field injection tests necessary to complete the design of remedial measures for soil and groundwater pollution associated with cinder fill in MSOU Subunit 1. The report shall also include design details of the remedial measures, including design criteria, construction details, and procedures and schedule for implementation.

**1.b REMEDIAL DESIGN DETAILS FOR THE BIOLOGICALLY
ACTIVE PERMEABLE BARRIER**

COMPLIANCE DATE: August 28, 2002

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides the remedial design for the biologically active permeable barrier proposed in the CRRRMP described in Finding 24. The report shall include detailed design criteria, construction details, and procedures and schedule for implementation of the remedial measures. Additional remedial measures, if necessary, shall also be described.

**1.c. IMPLEMENTATION OF SOIL AND GROUNDWATER
REMEDIAL MEASURES**

COMPLIANCE DATE: October 31, 2003

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the remedial measures for addressing soil and groundwater pollution associated with cinder fill in MSOU Subunit 1, as described in the technical reports described in Tasks 1.a and 1.b. The report shall describe any variances between the remedial design specified in the technical report described in Provision 1.b and the remedial measures actually implemented.

**1.d. WORKPLAN FOR EVALUATING REMEDIAL ACTION
EFFECTIVENESS**

COMPLIANCE DATE: January 31, 2004

The discharger shall submit a workplan, acceptable to the Executive Officer, which proposes methods to evaluate the effectiveness of remedial actions addressing pyrite cinders in the Upland Areas of MSOU Subunit 1.

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The workplan shall evaluate the current field conditions and the groundwater and surface water monitoring program, and recommend new groundwater monitoring wells, surface water sampling locations, or other confirmation sampling locations. The workplan shall provide for collection and analyses of data sufficient to evaluate remedial action effectiveness 1 year and 3 years after implementation.

1.e. **1-YEAR EVALUATION OF REMEDIAL ACTION
EFFECTIVENESS**

COMPLIANCE DATE: January 31, 2005

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the workplan specified in Task 1.d. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

1.f. **3-YEAR EVALUATION OF REMEDIAL ACTION
EFFECTIVENESS**

**COMPLIANCE DATE: January 31, 2007 and every 3 years
thereafter**

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 1.d, as necessary to address soil and groundwater pollution within MSOU Subunit 1. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

NON-CINDERS IMPACTS IN UPLAND AREA OF SUBUNIT 1

2.a. **REMEDIAL INVESTIGATIONS SUMMARY AND PROPOSAL
FOR ADDITIONAL REMEDIAL INVESTIGATIONS**

COMPLIANCE DATE: November 30, 2001

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides a summary and update of all soil and groundwater data for non-cinder impacts to the uplands area of MSOU Subunit 1. The report shall expand upon the findings and conclusions of the Phase II

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Investigation and the Phase II Investigation Addendum (dated May 31, 2000 and October 25, 2000 respectively) by summarizing and evaluating all previous site data and recently collected site data. Additional soil and/or groundwater sampling shall be proposed, if necessary, in order to completely define the extent of pollution in MSOU Subunit 1.

2.b. IMPLEMENTATION OF HOTSPOT REMEDIATION

COMPLIANCE DATE: April 30, 2002

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of interim remedial measures addressing the most significant non-cinder related soil and groundwater pollution in the Uplands Area of MSOU Subunit 1. The report shall specify soil and groundwater sampling and monitoring implemented to define lateral and vertical extent of the hotspots.

2.c. RESULTS OF ADDITIONAL REMEDIAL INVESTIGATIONS

COMPLIANCE DATE: July, 31, 2002

The discharger shall submit a technical report, if necessary, acceptable to the Executive Officer, which documents any additional soil and/or groundwater investigation necessary to completely define the extent of pollution in MSOU Subunit 1, as described in the technical report specified in Task 2.a.

2.d. REVISED REMEDIAL ACTION PLAN

COMPLIANCE DATE: September 30, 2002

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides revisions to the December 8, 2000 Conceptual Remedial and Risk Management Plan and its amendments, as necessary per the findings in technical report described in Task 2.c and an evaluation of the effectiveness of hotspot remedial measures implemented as documented in Task 2.b. The report shall include detailed design criteria, construction details, and procedures and schedule for implementation of the remedial measures.

2.e. IMPLEMENTATION OF REMEDIAL ACTION PLAN

COMPLIANCE DATE: June 30, 2003

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the remedial measures for addressing soil and groundwater pollution in MSOU Subunit 1, as described in the technical report described in Task 2.d. The report shall describe any variances between the remedial design specified in the technical report described in Provision 2.d and the remedial measures actually implemented.

**2.f. WORKPLAN FOR EVALUATING REMEDIAL ACTION
EFFECTIVENESS**

COMPLIANCE DATE: August 31, 2003

The discharger shall submit a workplan, acceptable to the Executive Officer, which proposes methods to evaluate the effectiveness of remedial actions implemented within MSOU Subunit 1. The report shall evaluate the current field conditions and the groundwater and surface water monitoring program, and recommend new groundwater monitoring wells, surface water sampling locations, or other confirmation sampling locations. The report shall provide for collection and analyses of data sufficient to evaluate remedial action effectiveness 1 year and 3 years after implementation.

**2.g. 1-YEAR EVALUATION OF REMEDIAL ACTION
EFFECTIVENESS**

COMPLIANCE DATE: August 31, 2004

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 2.f, as necessary to address noncinder-associated soil and groundwater pollution within MSOU subunit 1. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

**2. h. 3-YEAR EVALUATION OF REMEDIAL ACTION
EFFECTIVENESS**

COMPLIANCE DATE: August 31, 2006 and every 3 years thereafter

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 2.f, as necessary to address noncinder-associated soil and

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groundwater pollution within MSOU subunit 1. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

EASTERN STEGE MARSH AREA OF SUBUNIT 1

3a. HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

COMPLIANCE DATE: February 28, 2002

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents the results of the risk assessment for Eastern Stege Marsh. The risk assessment must present Tier 2 site-specific target levels for human health and ecological receptors that have been identified at the site. Both direct toxicity and bioaccumulative impacts must be evaluated and considered in the development of the ecological SSTLs. Based on the results of the risk assessment, areas of concern must be identified and presented in the report.

3.b. CONCEPTUAL REMEDIAL ACTION PLAN

COMPLIANCE DATE: July 31, 2002

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides a conceptual remedial action plan for addressing sediment, pore water, and surface water contamination within Stege Marsh. The conceptual remedial measures shall be protective of water quality and human and ecological receptors. A site conceptual model shall be provided in the technical report. The report shall also consider all existing sampling data for the marshland and propose additional sampling if necessary.

3.c. REMEDIAL ACTION PLAN DESIGN DETAILS AND RISK MANAGEMENT PLAN

COMPLIANCE DATE: March 31, 2003

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides design details of remedial measures for Stege Marsh, as described in Task 3.b. The report shall include detailed design criteria, construction details, and procedures and schedule for implementation of the remedial measures.

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

3.d. IMPLEMENTATION OF REMEDIAL ACTION PLAN

COMPLIANCE DATE: March 31, 2004

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the remedial measures for addressing pollution within Stege Marsh, as proposed in Task 3.b. The report shall describe any variances between the remedial design specified in the technical report described in Task 3.b (Remedial Action Plan) and the remedial measures actually implemented.

3.e. WORKPLAN FOR EVALUATING REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: April 30, 2004

The discharger shall submit a technical report, acceptable to the Executive Officer, which proposes methods to evaluate the effectiveness of remedial actions implemented within Stege Marsh in MSOU Subunit 1. The report shall evaluate the current field conditions and the existing monitoring program, and recommend new surface water and sediment confirmation sampling locations. The report shall provide for collection and analyses of data sufficient to evaluate remedial action effectiveness 1 year and 3 years after implementation.

3.f. 1-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: April 30, 2005

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 3.d, as necessary to address pollution within Stege Marsh in MSOU subunit 1. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

3.g. 3-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: April 30, 2007 and every 3 years thereafter

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 3.d, as necessary to address pollution within Stege Marsh in MSOU subunit 1. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

MONITORING REPORTS

4.a. REVISED WATER QUALITY MONITORING PLAN

COMPLIANCE DATE: October 31, 2001

The dischargers shall submit a technical report, acceptable to the Executive Officer, which proposes water quality monitoring necessary to monitor the extent of groundwater and surface water contamination and evaluate the effectiveness of site cleanup. The workplan shall specify at a minimum, well location, well construction, surface water locations, sampling methods, and quality assurance controls. The discharger shall propose sampling frequency, methodology, and parameters, and laboratory analytical methods.

4.b. WELL INSTALLATION REPORT

COMPLIANCE DATE: 45 days following completion of well installation activities

The discharger shall submit a technical report, acceptable to the Executive Officer, that provides well construction details, geologic boring logs, and well development logs for all new wells installed as part of the present or future Self Monitoring Program (Attachment A).

SITE MAINTANENCE

5.a. CHANGE IN SITE CONDITIONS

NOTIFICATION DUE DATE: Immediately upon occurrence

REPORTING DUE DATE: 30 days after initial notification

Except as provided for in the soil management plan for future construction activities, the discharger shall immediately notify the Board of any flooding, ponding, settlement, equipment failure, slope failure, exposure of

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waste, or other change in site conditions that could impair the integrity of the site cap and/or drainage control structures and shall immediately make repairs. Within 30 days, the discharger shall prepare and submit a technical report, acceptable to the Executive Officer, documenting the corrective measures taken.

5.b. STORMWATER CONTROL PLANS

COMPLIANCE DATE: October 15 of the year of construction or prior to construction if commencing between October 15 and May 15

For each proposed development greater than 1 acre in size, the discharger shall submit a Notice of Intent to the State Water Resources Control Board, prepare and submit a Storm Water Pollution Prevention Plan acceptable to the Executive Officer, and implement Best Management Practices (BMPs) for the control of storm water, in accordance with requirements specified in the State Water Resources Control Board General Permit for Storm Water Discharges Associated with Construction Activities (NPDES Permit No. CAS000002).

SITE DEVELOPMENT

6.a. DRAFT DEED RESTRICTION

COMPLIANCE DATE: December 31, 2002

The discharger shall submit a draft deed restriction, acceptable to the Executive Officer, which prevents and minimizes activities at the site which may exacerbate water quality impacts or which may result in exposure of human or ecological receptors to soil and/or groundwater contamination above appropriate risk levels at the site. The deed restriction must also provide a mechanism for the appropriate notification of on-site utility, maintenance, or construction workers of environmental hazards and prevent the use of significantly impacted soil and groundwater, except in accordance with the soils management plans prepared by the discharger.

6.b. RECORDING OF DEED RESTRICTION

COMPLIANCE DATE: March 31, 2003

Site Cleanup Requirements for
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The discharger shall submit documentation showing that an approved deed restriction, resulting from Task 6.a. was recorded as final.

6.c. POST- REMEDIATION DEVELOPMENT DESIGN

COMPLIANCE DATE: 120 days prior to commencement of construction

The discharger or subsequent owner shall prepare and submit a technical report, acceptable to the Executive Officer, for any significant development or redevelopment project proposed for Subunit 1. The technical report shall describe the project, identify key components of the design that may impact Subunit 1, and specify how the components are consistent with maintaining the site cap and preventing water quality impacts.

6.d. CHANGES TO POST- REMEDIATION DEVELOPMENT DESIGN

COMPLIANCE DATE: 120 days prior to commencement of construction

The discharger or subsequent owner shall prepare and submit a technical report, acceptable to the Executive Officer, describing proposed changes to site development or redevelopment projects for Subunit 1. The technical report shall describe the project, identify key changes to the design which may impact the Subunit 1, and specify how the changes are consistent with maintaining the integrity of the site cap and preventing water quality impacts.

7. FINANCIAL ASSURANCE INSTRUMENT

COMPLIANCE DATE: October 31, 2001

The discharger shall obtain and maintain a Financial Assurance Instrument or provide a corporate guarantee, acceptable to the Executive Officer, which provides coverage of costs of meeting the Tasks of this Order. For the purpose of establishing the fund amount, the discharger shall assume a monitoring and maintenance period of 20 years after implementation of remedial actions. However, the monitoring and maintenance period shall extend as long as the water quality in Subunit 1 is threatened.

D. PROVISIONS

1. Contractor/consultant qualifications: All hydrogeological plans, specifications, technical reports and documents shall be signed by or

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

stamped with the seal of a State registered geologist, registered engineer, registered hydrogeologist, or certified engineering geologist.

2. Lab qualifications: All samples shall be analyzed by a State certified laboratory or laboratory accepted by the Regional Board using approved EPA methods for the type of analysis to be performed. All laboratories or the consultant shall be required to maintain quality assurance/quality control records for Regional Board review.
3. Good operation and maintenance (O&M): The Discharger shall maintain in good working order, and operate in the normal standard of care, any facility or control system installed to achieve compliance with the requirements of this Order.
4. Document distribution: Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions and Provisions of this Order shall also be provided to (a) the non-lead discharger for the specific provision or activity. The Executive Officer may modify this distribution list as needed.
5. Delayed compliance: If the discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the discharger shall promptly notify the Executive Officer and the Board may consider revisions to this Order.
6. Access to site and records: The discharger shall permit the Regional Board or its authorized representative, upon presentation of credentials:
 - a. Immediate entry upon the premises on which wastes are located or in which any required records are kept.
 - b. Access to copy any records required under the terms and conditions of this order.
 - c. Inspection of any treatment equipment, monitoring equipment, or monitoring methods required by this order or by any other California State Agency.
 - d. Sampling of any discharge or groundwater governed by this order.
7. Reporting of changed owner or operator: The discharger shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.
8. Reporting of hazardous substance release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State,

Site Cleanup Requirements for
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the discharger shall report such discharge to the Regional Board by calling (510) 622-2343 during regular office hours (Monday through Friday, 8:00 am to 5:00 pm). A written report shall be filed with the Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, schedule of corrective actions planned, and persons/agencies notified. This reporting is in addition to reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

9. Reporting and correction of non-compliance: The discharger shall report any noncompliance that may endanger public health or the environment. Any such information shall be provided orally to the Executive officer within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours [CWC Sections 13263 and 13267].
10. Cost recovery: The Discharger shall be liable, pursuant to Section 13304 of the California Water Code, to the Board for all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial actions, required by this Order. If the Dischargers addressed by this Order are enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to procedures established in that program. Any disputes raised by discharger(s) over the reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures of that program.
11. Periodic SCR review: The Board will review this Order periodically and may revise it when necessary. The discharger may request revisions and upon review the Executive Officer may recommend that the Board revise these requirements.
12. Self Monitoring Program: The discharger shall comply with the Self

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

Monitoring Plan as attached to this Order and as may be amended by the
Executive Officer.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full,
complete, and correct copy of an Order adopted by the California Regional Water Quality
Control Board, San Francisco Bay Region, on September 19, 2001.

Loretta K. Barsamian
Executive Officer

Figures: Figure 1 - Site Location Map
 Figure 2 - Subunit 1, MSOU

Attachment: Self Monitoring Plan

FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY
SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED
TO IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE
SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR
INJUNCTIVE RELIEF OR CIVIL CRIMINAL LIABILITY

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

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

SELF-MONITORING PROGRAM FOR:

ZENECA, INC.

**1415 SOUTH 47th STREET
RICHMOND
CONTRA COSTA COUNTY**

**MEADE STREET OPERABLE UNIT
SUBUNIT 1**

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

1. **Authority and Purpose:** The Board requests the technical reports required in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Board Order No. 01-101 (site cleanup requirements).
2. **Groundwater and Surface Water Monitoring:** The discharger shall measure groundwater elevations quarterly in all monitoring wells, and shall collect and analyze representative samples of groundwater and surface water according to the following table: (Groundwater monitoring wells and surface water sample locations are to be proposed by the discharger in accordance with Task 4.c of this Order.)

Well # or Station #	Sampling Frequency	Analyses	Well # or Station #	Sampling Frequency	Analyses
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP

TBP: To Be Proposed by Discharger per Task 4.c

The discharger shall sample any new monitoring or extraction wells quarterly and analyze groundwater samples for the same constituents as shown in the above table. The discharger may propose changes in the above table; any proposed changes are subject to Executive Officer approval.

3. **Quarterly Monitoring Reports:** The discharger shall submit quarterly monitoring reports to the Board no later than 30 days following the end of the quarter (e.g. report for first quarter of the year due April 30). The first required quarterly monitoring report shall be due on January 31, 2002. Additional quarterly reports shall comply with the following schedule.

Quarter	Months Covered	Report Due Date
First Quarter	January, February, March	April 30 th
Second Quarter	April, May, June	July 31 st
Third Quarter	July, August, September	October 30 th
Fourth Quarter	October, November, December	January 31 st

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

Each quarterly report shall include:

- a. **Transmittal Letter:** The transmittal letter shall identify and discuss any violations of the Order and/or the Self-Monitoring Program during the reporting period and actions taken or planned to correct the problem. A detailed description of the violation and the actions taken or planned to correct the violation shall be further described in the body of the monitoring report. The letter shall be signed by the discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.
 - b. **Groundwater Elevations:** Groundwater elevation data shall be presented in tabular form, and a groundwater elevation map shall be prepared for each monitored water-bearing zone. Historical groundwater elevations shall be included in the fourth quarterly report each year.
 - c. **Groundwater Analyses:** Groundwater sampling data shall be presented in tabular form, and an isoconcentration map should be prepared for one or more key contaminants for each monitored water-bearing zone, as appropriate. The report shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. Historical groundwater sampling results shall be included in the fourth quarterly report each year. The report shall describe any significant increases in contaminant concentrations since the last report, and any measures proposed to address the increases. Supporting data, such as lab data sheets, need not be included (however, see record keeping - below).
 - d. **Groundwater Extraction:** If applicable, the report shall include groundwater extraction results in tabular form, for each extraction well and for the site as a whole, expressed in gallons per minute and total groundwater volume for the quarter. The report shall also include contaminant removal results, from groundwater extraction wells and from other remediation systems (e.g. soil vapor extraction), expressed in units of chemical mass per day and mass for the quarter. Historical mass removal results shall be included in the fourth quarterly report each year.
 - e. **Status Report:** The quarterly report shall describe relevant work completed during the reporting period (e.g. site investigation, interim remedial measures) and work planned for the following quarter.
4. **Violation Reports:** If the discharger violates requirements in the Site Cleanup Requirements, then the discharger shall notify the Board office by telephone as

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 1

soon as practicable once the discharger has knowledge of the violation. Board staff may, depending on violation severity, require the discharger to submit a separate technical report on the violation within five working days of telephone notification.

5. **Other Reports:** The discharger shall notify the Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to cause further migration of contaminants or which would provide new opportunities for site investigation.
6. **Record Keeping:** The discharger or his/her agent shall retain data generated for the above reports, including lab results and QA/QC data, for a minimum of six years after origination and shall make them available to the Board upon request.
7. **SMP Revisions:** Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on his/her own initiative or at the request of the discharger. Prior to making SMP revisions, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.

I, Loretta K. Barsamian, Executive Officer, hereby certify that this Self-Monitoring Program was adopted by the Board on September 19, 2001.

Loretta K. Barsamian
Executive Officer

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

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

ORDER NO. 01-102

SITE CLEANUP REQUIREMENTS FOR:

**UNIVERSITY OF CALIFORNIA BERKELEY
ZENECA INC.**

**UNIVERSITY OF CALIFORNIA RICHMOND FIELD STATION
1301 SOUTH 46th STREET
RICHMOND, CONTRA COSTA COUNTY**

**MEADE STREET OPERABLE UNIT
SUBUNIT 2**

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

SITE LOCATION AND OWNER

1. Site location: The University of California Richmond Field Station (UCRFS) site is located at 1301 South 46th Street in Richmond, south of Interstate 580, and along the San Francisco Bay shoreline in Richmond, California (refer to Figure 1). The site is bound by industrial areas to the north, east, and west. To the south of the site is the East Bay Regional Park District's Bay Trail. The site consists of approximately 100 acres and is used for academic research and activities by the University. The UCRFS site, the adjacent Zeneca, Inc. (Zeneca) site, and portions of the adjacent Stege Marsh comprise the area designated as the Meade Street Operable Unit (refer to Figure 2).
2. Site owner: Portions of the UCRFS site were formerly owned by the California Cap Company, which produced blasting caps on the eastern portion of the site. In 1950, the site was acquired by University of California Berkeley (UC Berkeley). The site is utilized by UC Berkeley for academic and research programs administered by the College of Engineering, the Forest Products Lab, and other departments. As current owner of the site, UC Berkeley is responsible for releases originating at the site and is hereinafter named as a discharger. Zeneca, which is the current owner of the adjoining property that was the source of pyrite cinders used as fill at the site, is also named as a discharger. UC

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

Berkeley and Zeneca are collectively referred to hereinafter as the dischargers.

PURPOSE OF ORDER

3. Site Cleanup Requirements: This order prescribes Site Cleanup Requirements (SCRs) for Subunit 2 of the Meade Street Operable Unit, which consists of the UCRFS site including a portion of the adjacent Western Stege Marsh. The order includes general provisions and tasks necessary to contain and remediate soil and groundwater pollution at the site and is being issued pursuant to Section 13304 of the California Water Code.
4. Implementation of remedial measures: This order requires additional site investigation and implementation of remedial measures for Subunit 2 of MSOU, which consists of the upland portion of the UCRFS site and the adjacent Western Stege Marsh. The dischargers are required to submit conceptual remediation and risk management plans which propose site screening criteria, and risk assessments which evaluate exposure of human and ecological receptors to impacted soil and groundwater at the site and propose remedial actions and risk management practices to eliminate or significantly reduce the potential for exposure of human or ecological receptors to impacted soil and groundwater at the site.
5. Coordinated cleanup: This order, in conjunction with Site Cleanup Requirements for the adjacent Zeneca site, located immediately to the east, comprise a coordinated plan which addresses impacts to upland areas and wetland areas of both the UCRFS site and the Zeneca site.

SITE DESCRIPTION

6. Upland area: The site comprises approximately 100 acres and is relatively flat. The site consists of two main areas: the upland area on the northern portion of the site, and Western Stege Marsh at the southern portion of the site. The uplands area consists of buildings and various ornamental trees, shrubs, and lawn areas. Most of the current and historic site development is located on the eastern portion of the upland area. A sea wall and fill areas are also located in the southern portion of the upland area.
7. Western Stege Marsh: The adjacent Western Stege Marsh consists of approximately 10 acres. The inner portion of Western Stege Marsh (inner marsh) is bounded to the south by the East Bay Regional Park District's paved Bay Trail. Meeker Slough flows through the western portion of the inner marsh. The inner marsh is vegetated primarily with saltgrass, pickleweed, cordgrass, and reed.

SITE HISTORY

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

8. Explosives manufacturing: In approximately 1870, various companies began producing chemicals and explosives on the property. The California Cap Company acquired the site in 1877 and established several facilities for the manufacture of explosives. California Cap Company's operations on-site included production of mercury fulminate, blasting caps, and shells. California Cap Company also had facilities for testing and storing explosives. Production of explosives ceased in 1948 prior to UC Berkeley's purchase of the property in 1950. California Cap Company removed all production facilities and attempted to remove hazardous materials at the site.
9. UC Berkeley use: During the 1950's, UC Berkeley erected a number of new buildings in the upland area to accommodate research programs, including administration buildings and the Forest Products Laboratory where wood preservatives were tested. Current facilities at the UCRFS site include the Forest Products Laboratory, research facilities for seismic engineering, fire testing, hydraulic modeling, soil mechanics, sanitary engineering, environmental health, and library storage facilities.
10. Pyrite cinders: Stauffer Chemical Company generated pyrite cinders as a byproduct of their sulfuric acid manufacturing operations from approximately 1919 through 1962. Sometime during this period, pyrite cinders were deposited on the southeast portion of the UCRFS site and the adjacent portion of Western Stege Marsh. Cinders were also placed directly into Stege Marsh in the vicinity of a seawall, breakwater, and a pier. Pyrite ore contains primarily pyrite (FeS_2), and lesser amounts of chalcopyrite (CuFeS_2), sphalerite (ZnS), and magnetite (Fe_3O_4). Various other metals such as arsenic and lead, and inorganics are also commonly associated with pyrite ore utilized by Stauffer. UC Berkeley constructed roads, utilities, and research ponds on, or using the pyrite cinders that were deposited in this area.

REGULATORY STATUS

11. No previous SCRs were adopted for the site.

OPERABLE UNITS AND DISCHARGERS NAMED

12. Operable Unit/subunit structure: The area containing the UCRFS site and the adjacent Zeneca sites and their groundwater pollution plumes is referred to as the Meade Street Operable Unit (MSOU). The MSOU has been subdivided into two subunits: Subunit 1 consists of the area of the Zeneca site and the adjacent portion of Eastern Stege Marsh; Subunit 2 consists of the UCRFS site and the adjacent portion of Western Stege Marsh. The subunit boundaries are shown in Figure 2. Subunit 2 is further subdivided into Subunits 2A and 2B. Subunit 2A consists of the cinder fill area located in the southeastern portion of the upland area of the site and the eastern portion of the Western Stege Marsh. Subunit 2B consists of the remainder of the upland portion of the UCRFS site and the western portion of Western Stege Marsh.

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

13. Dischargers named: Zeneca and University of California Berkeley, as the sources of pollution in Subunit 2A of MSOU, are both named dischargers responsible for addressing pollution within Subunit 2A. University of California Berkeley, as the source of pollution within the area of Subunit 2B of MSOU, is the discharger named responsible for addressing pollution within Subunit 2B. Zeneca and University of California Berkeley are wholly responsible for addressing pollution in the subunit(s) to which they are named and complying with the requirements of this Orders.
14. Future modification of order: As additional information is generated in the MSOU and its subunits, the Board may modify the dischargers named in this order.

SITE GEOLOGIC AND HYDROGEOLOGIC SETTING

14. General geology: The Subunit 2 site geology consists primarily of alluvial sediments that were deposited at the site from the Berkeley Hills, located east and northeast of the facility. The hydrogeologic evaluations indicate that the sediments in the upper 80 to 100 feet beneath the facility can be subdivided into four units: fill, Bay Sediments, Quaternary Alluvium, and Yerba Buena mud. Fill material consists of clean soil, concrete, and cinders, a byproduct of sulfuric acid production at the adjacent Zeneca site, and ranges from zero to approximately 15 feet thick. Fill is generally thicker in the southern part of the facility adjacent to the San Francisco Bay. Bay sediments are in the southern portion of the site, south of the San Francisco Bay shoreline. Bay sediments are primarily composed by fine-grained silty sand with smaller amounts of mud and peat, and range from approximately 5 feet to 9 feet thick. Beneath the Bay Sediments lie Quaternary Alluvium, which consists of interbedded gravel, sand, silt, and clay units. The Quaternary Alluvium ranges from approximately 3 to 11 feet thick. Within the Quaternary Alluvium are upper and lower water bearing units; an aquitard has not been consistently observed between the units. The lowermost layer observed is the Yerba Buena Mud. The Yerba Buena Mud is laterally extensive and is approximately 40-50 feet thick. The top of the Yerba Buena Mud is present at depths of approximately 25-30 feet below ground surface in the northern portion of the site, and at approximately 35-45 feet below groundwater surface in the southern portion of the site.
15. Hydrogeology: Two hydrogeologic units have been identified at the site: the water-bearing sand and gravel in the Upper Horizon, and the water bearing sand and gravel in the Lower Horizon. The Upper Horizon is typically found ranging from approximately 10 to 20 feet below ground surface, and the sand and gravel units in the Upper Horizon appears to be mostly continuous laterally across the site. The Lower Horizon is encountered above the Yerba Buena Mud at depths ranging from approximately 25 to 40 feet below ground surface. The sand and gravel units in the Lower Horizon vary in

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

thickness from less than 2 feet thick to 8 feet thick. Groundwater within the Upper Horizon and the Lower Horizon generally flows southwesterly toward the Bay, and has a relatively low gradient. The groundwater deeper than approximately 25 feet below ground surface is considered a potential drinking water source. The primary sources of recharge to the shallow groundwater units are through direct infiltration of on-site precipitation in upgradient areas, and tidal seepage from the Bay.

SOIL AND GROUNDWATER CONTAMINATION

16. Releases in UCRFS site: Extensive sampling was conducted on-site in order to evaluate soil and groundwater impacts associated with operations on-site. The sampling and site history data indicate that significant soil and groundwater contamination at the site was caused by releases at sources on the southern portion of the uplands areas, including the California Cap facilities associated with the production of mercury fulminate used to make blasting caps for detonating explosives. The data also indicate that the soil and groundwater on the southeast portion of the site has been significantly impacted by pyrite cinders. Pyrite cinders have also been found in small isolated pockets in other areas of the upland portion of the site. However, these isolated pockets of pyrite cinders have not significantly impacted soil and groundwater. The chemicals detected in soil and groundwater reflect historic site and chemical use and storage practices and may reflect off-site releases.
17. Soil in uplands area: Investigations show that some of the pyrite cinders primarily in the southeastern portion of the site have oxidized, resulting in pH levels as low as 3.4 in soil. Investigations also indicate elevated concentrations of metals in soil, including arsenic (160 ppm maximum, 44 ppm mean), lead (850 ppm maximum, 60 ppm mean), copper (4,600 ppm maximum, 508 ppm mean), and mercury (5,300 ppm maximum, 49 ppm mean). Pesticides detected in soil include DDT (380 ppb maximum, 53 ppb mean), and DDD (1,600 ppb maximum, 50 ppb mean). PCBs were also detected in sediment within the western storm drain at concentrations up to 42 ppm.
18. Groundwater in uplands area: Sampling indicates that groundwater has been significantly impacted by operations at the site. Elevated metals and inorganics concentrations in groundwater include: arsenic (17 ppb maximum, 4 ppb mean), copper (4,100 ppb maximum, 148 ppb mean), mercury (5.9 ppb maximum, 0.5 ppb mean), nickel (470 ppb maximum, 56 ppb mean), selenium (10 ppb maximum, 4 ppb mean), and zinc (12,000 ppb maximum, 1033 ppb mean). Pesticides detected along the eastern property boundary in groundwater include DDT (1.5 ppb maximum, <0.1 ppb mean) and endrin (1.8 ppb maximum, <0.1 ppb mean). PCBs were also detected in groundwater (1.3 ppb maximum, 0.52 ppb mean).

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19. Western Stege Marsh impacts: Western Stege Marsh has been impacted by releases on Subunit 2 and the placement of pyrite cinders in the uplands area and into the marsh areas. The benthic community of the marsh has been significantly impaired by the low pH conditions, metals, PCBs, and pesticides detected in sediment samples. The pH of the marsh water has been measured as low as 2.2. Metals in sediment include: arsenic (1,200 ppm maximum, 226 ppm mean), copper (22,000 ppm maximum, 815 ppm mean), lead (800 ppm maximum, 147 ppm mean), mercury (430 ppm maximum, 16 ppm mean), nickel (140 ppm maximum, 52 ppm mean), and zinc (8,800 ppm maximum, 903 ppm mean). Pesticides detected in marsh sediment include: DDD (1,600 ppb maximum, 25 ppb mean), DDT (380 ppb maximum, 39 ppb mean), and DDE (620 ppb maximum, 6 ppb mean). PCBs were also detected in the marsh at levels of up to 1,600 ppm. Water samples obtained from Western Stege Marsh include elevated concentrations of metals and inorganics and pesticides, including: arsenic (260 ppb maximum, 46 ppb mean), copper (30,000 ppb maximum, 3,030 ppb mean), mercury (5.9 ppb maximum, 0.19 ppb mean), nickel (1,200 ppb maximum, 153 ppb mean), zinc (55,000 ppb maximum, 7,217 ppb mean), and DDT (1.5 ppb maximum, <0.1 ppb mean). PCBs were also detected in water at levels up to 0.8 ppb.
20. Impacts at the adjacent Zeneca site from use of pyrite cinders as fill: The adjacent Zeneca site has also been significantly impacted by the use of pyrite cinders as fill. The thickness of the cinder fill at the Zeneca site is up to 15 feet thick. As observed at the UCRFS site, oxidation of sulfur associated with cinders has resulted in low pH conditions and elevated metals in soil and groundwater at the Zeneca site and in the adjacent Eastern Stege Marsh.
21. Impacts at Zeneca site from other on-site Zeneca sources: The Zeneca site has also been impacted by releases associated with other historic on-site operations. Other operations at the Zeneca include the research and production of pesticides and fertilizers. Releases associated with Zeneca on-site operations have impacted soil and groundwater at the Zeneca site with metals, VOCs, SVOCs, and pesticides.
22. Basis for Cleanup Standards
 - a. State Board Resolution 68-16: State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest levels of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives. The previously-cited cleanup plan indicates that restoration of water quality to background levels is not

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necessary to protect beneficial use of groundwater at the site and potential site receptors. This order and its requirements are consistent with Resolution No. 68-16.

- b. State Board Resolution 92-49: State Board Resolution No. 92-49, "Policies and procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This order and its requirements are consistent with the provisions of Resolution No. 92-49 as amended.
- c. Board Resolution 89-39: Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high TDS, low yield, or naturally-high contaminant levels. Based on site investigations, groundwater within the upper aquifer zone is brackish and is therefore not considered a potential source of drinking water. However, the deeper aquifers beneath the site are not brackish and are therefore considered a potential source of drinking water.
- d. Beneficial uses as specified by the Basin Plan: The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin Plan (Basin Plan) on June 21, 1995. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in Title 23, California Code of Regulations, Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters.

The beneficial uses of San Francisco Bay include:

- a. wildlife habitat;
- b. navigation;
- c. water contact recreation;
- d. non-contact water recreation;
- e. commercial and sport fishing;
- f. preservation of rare and endangered species;
- g. estuarine habitat;
- h. fish migration;
- i. fish habitat;
- j. industrial service supply; and
- k. shellfish harvesting.

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The existing and potential beneficial uses for Stege Marsh include:

- a. estuarine habitat
- b. preservation of rare and endangered species
- c. water contact recreation
- d. non-contact water recreation
- e. fish spawning
- f. wildlife habitat

The existing and potential beneficial uses for groundwater in the vicinity of Subunit 2 include:

- a. municipal and domestic water supply
 - b. industrial process water supply
 - c. industrial service water supply
 - d. agricultural water supply
 - e. freshwater replenishment to surface water
- e. Future Changes to Cleanup Standards: The goal of this remedial action is to restore the beneficial uses of groundwater underlying and adjacent to the site. Results of cleanup at other sites suggest that full restoration of beneficial uses to groundwater as a result of active remediation at this site may not be possible. If full restoration of beneficial uses is not technologically nor economically achievable within a reasonable period of time, then the discharger may request modification of the cleanup standards or establishment of a containment zone, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Board may decide that further cleanup action should be taken. Cleanup standards will also be reassessed if residential land use is proposed for the Upland Area in the future and as warranted by additional site data.

MONITORING PROGRAMS

23. Groundwater Monitoring – Only one groundwater monitoring well is located on the site (MW-1). Submittal of workplans for the installation and monitoring of additional wells is a requirement of Tasks 2.b and 4.c of this order. Additional wells at the site are necessary to more completely characterize groundwater conditions and to monitor the effectiveness of remedial measures.
24. Surface Water Monitoring – Surface water monitoring is necessary to evaluate the conditions within Stege Marsh and the effectiveness of remedial measures. Submittal of surface water monitoring plans is required in Tasks 3.b and 5.a of this order.

Site Cleanup Requirements for
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25. CEQA exemption: This order for Site Cleanup Requirements is exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321, Title 14 of the California Code of Regulations.
26. Other plans and permits: The dischargers are required to implement a soil management plan and to comply with NPDES Industrial and Construction Activity Storm Water permits, and a stormwater pollution prevention plan.
27. Public notice: The Board has notified the dischargers and interested agencies and persons of its intent to adopt revised, updated Site Cleanup Requirements for the dischargers and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
28. Board hearing: 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 dischargers, their agents, successors and assigns shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner which will significantly degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.
2. Further significant migration of wastes or hazardous substances through subsurface transport to waters of the State, and migration of wastes or hazardous substances at levels which may affect human or ecological receptors, is prohibited.
3. Activities associated with subsurface investigation, cleanup in a manner causing significant adverse migration of wastes or hazardous substances is prohibited.

B. TASKS

As described in Finding 13 of this Order, both Zeneca and UC Berkeley are dischargers responsible for addressing pollution within Subunit 2A, and UC Berkeley is the discharger responsible for addressing pollution within Subunit 2B. Thus, Zeneca and UC Berkeley are the dischargers responsible for completing Tasks B.1, B.2, B.3, B.6, B.7, B.8, and B.9. UC Berkeley is the discharger responsible for completing Tasks B.4 and B.5.

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1. HUMAN HEALTH RISK ASSESSMENT FOR SUBUNIT 2, INCLUDING AREAS 2A AND 2B

COMPLIANCE DATE: October 31, 2001

The dischargers shall submit a technical report, acceptable to the Executive Officer, which documents the results of the risk assessment for both the upland portion as well as the entire portion of Western Stege Marsh (both Subunits 2A and 2B). The risk assessment must present Tier 2 site-specific target levels for human health and ecological receptors that have been identified at the site. Both direct toxicity and bioaccumulative impacts must be evaluated and considered in the development of the ecological SSTLs. Based on the results of the risk assessment, areas of concern must be identified and presented in the report.

UPLAND AREA OF SUBUNIT 2A

2.a. RESULTS OF ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION

COMPLIANCE DATE: October 31, 2001

The dischargers shall submit a technical report, acceptable to the Executive Officer, which provides the results of soil and groundwater investigations performed since the Field Sampling and Analysis results submitted in December 2000. If necessary, the report shall propose additional soil and/or groundwater sampling in order completely define the extent of pollution in Subunit 2A.

2b. GROUNDWATER SAMPLING AND ANALYSES MONITORING PLAN

COMPLIANCE DATE: October 31, 2001

The dischargers shall submit a technical report, acceptable to the Executive Officer, which proposes installation of groundwater wells necessary to monitor the extent of groundwater contamination and evaluate the effectiveness of site cleanup in MSOU Subunit 2A. The workplan shall specify at a minimum, well location, well construction, sampling methods, and quality assurance controls. The discharger shall propose sampling frequency, methodology, and parameters, and laboratory analytical methods.

2.c. CONCEPTUAL REMEDIAL ACTION PLAN

COMPLIANCE DATE: December 15, 2001

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The dischargers shall submit a technical report, acceptable to the Executive Officer, which provides a conceptual remedial action plan for addressing soil and groundwater pollution within the upland portion of Subunit 2A. The conceptual remedial measures shall be protective of water quality and human and ecological receptors. A site conceptual model shall be provided in the technical report. The report shall also consider all existing sampling data for the marshland and propose additional sampling if necessary.

2.d. **REMEDIAL DESIGN DETAILS FOR SOIL AND GROUNDWATER
NEUTRALIZATION AND METALS TREATMENT**

COMPLIANCE DATE: January 31, 2002

The dischargers shall submit a technical report, acceptable to the Executive Officer, which provides the remedial design for addressing metal and metalloid pollution and acidic conditions in soil and groundwater in the upland portion of MSOU Subunit 2A. The report shall take into consideration cleanup methodologies considered in the upland portion of MSOU Subunit 1, and provide for coordinated cleanup within MSOU. The report shall include detailed design criteria, construction details, and procedures and a schedule for implementation of the remedial measures, and a Residual Risk Management Plan to address any residual risks post remediation.

2.e. **IMPLEMENTATION OF SOIL AND GROUNDWATER REMEDIAL
MEASURES**

COMPLIANCE DATE: OCTOBER 31, 2003

The dischargers shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the remedial measures for addressing soil and groundwater pollution associated with cinder fill in the upland portion of MSOU Subunit 2A, as described in the technical report described in Task 2.d. The report shall describe any variances between the remedial design specified in the technical report described in Task 2.d and the remedial measures actually implemented.

2.f. **WORKPLAN FOR EVALUATING REMEDIAL ACTION
EFFECTIVENESS**

COMPLIANCE DATE: January 31, 2004

The dischargers shall submit a workplan, acceptable to the Executive Officer,

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which proposes methods to evaluate the effectiveness of remedial actions implemented within the upland area of MSOU Subunit 2A. The report shall evaluate the current field conditions and the groundwater and surface water monitoring program, and recommend new groundwater monitoring wells, surface water sampling locations, or other confirmation sampling locations. The report shall provide for collection and analyses of data sufficient to evaluate remedial action effectiveness 1 year and 3 years after implementation.

2.g. 1-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: January 31, 2005

The dischargers shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical workplan specified in Task 2.f, as necessary to address soil and groundwater pollution within the upland portion of MSOU Subunit 2A. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

2.h. 3-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: January 31, 2007 and every 3 years thereafter

The dischargers shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical workplan specified in Task 2.f, as necessary to address soil and groundwater pollution within the upland area of MSOU Subunit 12A. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

WESTERN STEGE MARSH AREA OF SUBUNIT 2A

3.a. RESULTS OF ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION

COMPLIANCE DATE: October 31, 2001

The dischargers shall submit a technical report, acceptable to the Executive Officer, which provides the results of soil and groundwater investigations performed since the Field Sampling and Analysis results submitted in December 2000. If necessary, the report shall propose additional soil and/or groundwater

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sampling in order completely define the extent of pollution in the area of Western Stege Marsh in MSOU 2A.

3.b. **SAMPLING AND ANALYSES MONITORING PLAN**

COMPLIANCE DATE: October 31, 2001

The dischargers shall submit a technical report, acceptable to the Executive Officer, which proposes any additional surface water and sediment sampling necessary to monitor the extent of contamination within the Stege Marsh area of Subunit 2A. The workplan shall specify at a minimum, sample location, sampling methods, and quality assurance controls. The workplan shall specify at a minimum, sample locations, sampling methods, and quality assurance controls. The discharger shall propose sampling frequency, methodology, and parameters, and laboratory analytical methods.

3.c. **CONCEPTUAL REMEDIAL ACTION PLAN**

COMPLIANCE DATE: July 31, 2002

The dischargers shall submit a technical report, acceptable to the Executive Officer, which provides a conceptual remedial action plan for addressing soil and groundwater pollution within the upland portion of Subunit 2A. The conceptual remedial measures shall be protective of water quality and human and ecological receptors. A site conceptual model shall be provided in the technical report. The report shall also consider all existing sampling data for the marshland and propose additional sampling if necessary.

3.d. **REMEDIAL DESIGN DETAILS FOR SOIL AND GROUNDWATER
NEUTRALIZATION AND METALS TREATMENT**

COMPLIANCE DATE: March 31, 2003

The dischargers shall submit a technical report, acceptable to the Executive Officer, which provides the remedial design for addressing metal and metalloid pollutants and acidic conditions in soil and groundwater in the Stege Marsh area of MSOU Subunit 2A. The report shall take into consideration cleanup methodologies considered in the Stege Marsh portion of MSOU Subunit 1, and provide for coordinated cleanup within MSOU. The report shall include detailed design criteria, construction details, and procedures and a schedule for implementation of the remedial measures, and a Residual Risk Management Plan to address any residual risks post remediation.

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3.e. IMPLEMENTATION OF REMEDIAL MEASURES

COMPLIANCE DATE: OCTOBER 31, 2003

The dischargers shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the remedial measures for addressing pollution within the Stege Marsh area of MSOU Subunit 2A, as described in the technical report described in Task 3.d. The report shall describe any variances between the remedial design specified in the technical report described in Task 3.d and the remedial measures actually implemented.

3.f. WORKPLAN FOR EVALUATING REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: April 30, 2004

The dischargers shall submit a workplan, acceptable to the Executive Officer, which proposes methods to evaluate the effectiveness of remedial actions implemented within the Stege Marsh area of MSOU Subunit 2A. The report shall evaluate the current field conditions in the marshland and recommend new surface and sediment sampling locations, or other confirmation sampling locations. The report shall provide for collection and analyses of data sufficient to evaluate remedial action effectiveness 1 year and 3 years after implementation.

3.g. 1-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: April 30, 2005

The dischargers shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical workplan specified in Task 3.f, as necessary to address pollution within the Stege Marsh area of MSOU Subunit 2A. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

3.h. 3-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS

COMPLIANCE DATE: April 30, 2007 and every 3 years thereafter

The dischargers shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical workplan specified in Task 3.f, as necessary to address pollution within the Stege Marsh area of MSOU Subunit 2A. The report shall provide the results of the remedial action evaluation,

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and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

UPLAND AREA OF SUBUNIT 2B

4.a. WORKPLAN FOR ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION AND GROUNDWATER SAMPLING AND ANALYSES PLAN

COMPLIANCE DATE: December 15, 2001

The discharger shall submit a technical report, acceptable to the Executive Officer, which proposes additional soil and groundwater sampling necessary to completely define the extent of pollution in the upland portion of Subunit 2B associated with on-site activities. The report should also propose installation of groundwater wells necessary to monitor the extent of groundwater contamination and evaluate the effectiveness of site cleanup in the upland portion of Subunit 2B. The workplan shall specify at a minimum, well location, well construction, sampling methods, and quality assurance controls.

4.b. RESULTS OF ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION

COMPLIANCE DATE: July 31, 2002

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides the results of investigations implemented as described in the technical report required in Task 4.a. If necessary, the report shall propose additional soil and/or groundwater sampling in order to completely define the extent of pollution in the upland portion of Subunit 2B.

4.c. REMEDIAL ACTION PLAN

COMPLIANCE DATE: January 31, 2003

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides a remedial action plan for the upland portion of Subunit 2B. The report shall include detailed design criteria, construction details, and procedures and schedule for implementation of the remedial measures, as well as a residual Risk Management Plan for pollutants that may remain on-site post remediation.

4.d. IMPLEMENTATION OF REMEDIAL ACTION PLAN

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COMPLIANCE DATE: September 30, 2003

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the remedial measures for addressing soil and groundwater pollution in the upland area of Subunit 2B, as described in the technical report described in Task 4.c. The report shall describe any variances between the remedial design specified in the technical report described in Task 4.d and the remedial measures actually implemented.

4.e. **WORKPLAN FOR EVALUATING REMEDIAL ACTION EFFECTIVENESS**

COMPLIANCE DATE: December 31, 2003

The discharger shall submit a workplan, acceptable to the Executive Officer, which proposes methods to evaluate the effectiveness of remedial actions implemented within the upland area of Subunit 2B. The report shall evaluate the current field conditions and the groundwater and surface water monitoring program, and recommend new groundwater monitoring wells, surface water sampling locations, or other confirmation sampling locations. The report shall provide for collection and analyses of data sufficient to evaluate remedial action effectiveness 1 year and 3 years after implementation.

4.f. **1-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS**

COMPLIANCE DATE: January 31, 2005

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 4.e, as necessary to address noncinder-associated soil and groundwater pollution within Subunit 2. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

4.g. **3-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS**

COMPLIANCE DATE: January 31, 2007 and every 3 years thereafter

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 4.e., as necessary to address noncinder-associated soil and groundwater

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pollution within Subunit 2. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

STEGE MARSH AREA OF SUBUNIT 2B

5.a. SAMPLING AND ANALYSES MONITORING PLAN

COMPLIANCE DATE: December 15, 2001

The discharger shall submit a technical report, acceptable to the Executive Officer, which proposes any additional surface water and sediment sampling necessary to monitor the extent of contamination within the Stege Marsh area of Subunit 2A. The workplan shall specify at a minimum, sample location, sampling methods, and quality assurance controls. The workplan shall specify at a minimum, sample locations, sampling methods, and quality assurance controls. The discharger shall propose sampling frequency, methodology, and parameters, and laboratory analytical methods.

5.b. CONCEPTUAL REMEDIAL ACTION PLAN

COMPLIANCE DATE: July 31, 2002

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides a conceptual remedial action plan for addressing sediment, pore water, and surface water contamination within the Western Stege Marsh area of Subunit 2B. The conceptual remedial measures shall be protective of water quality and potential human and ecological receptors. A site conceptual model shall be provided in the technical report. The report shall also consider all existing sampling data for the marshland and propose additional sampling if necessary.

5.c. REMEDIAL ACTION PLAN

COMPLIANCE DATE: February 28, 2003

The discharger shall submit a technical report, acceptable to the Executive Officer, which provides design details of remedial measures for the Western Stege Marsh area of Subunit 2B, as described in Task 5.b. The report shall include detailed design criteria, construction details, and procedures and schedule for

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implementation of the remedial measures.

5.d. **IMPLEMENTATION OF REMEDIAL ACTION PLAN**

COMPLIANCE DATE: March 31, 2004

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the remedial measures for addressing pollution within the Western Stege Marsh area of Subunit 2B, as proposed in Provision 5.c. The report shall describe any variances between the remedial design specified in the technical report described in Task 5.c and the remedial measures actually implemented.

5.e. **WORKPLAN FOR EVALUATING REMEDIAL ACTION EFFECTIVENESS**

COMPLIANCE DATE: April 30, 2004

The discharger shall submit a workplan, acceptable to the Executive Officer, which proposes methods to evaluate the effectiveness of remedial actions implemented within Western Stege Marsh area of Subunit 2B. The report shall evaluate the current field conditions and the existing monitoring program, and recommend new confirmation sampling locations. The report shall provide for collection and analyses of data sufficient to evaluate remedial action effectiveness 1 year and 3 years after implementation.

5.f. **1-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS**

COMPLIANCE DATE: April 30, 2005

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in Task 5.d, as necessary to address pollution within Western Stege Marsh area of Subunit 2B. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

5.g. **3-YEAR EVALUATION OF REMEDIAL ACTION EFFECTIVENESS**

COMPLIANCE DATE: April 30, 2007 and every 3 years thereafter

The discharger shall submit a technical report, acceptable to the Executive Officer, which documents implementation of the technical report specified in

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Task 5.d, as necessary to address pollution within the Western Stege Marsh area of Subunit 2B. The report shall provide the results of the remedial action evaluation, and if necessary, propose modifications to improve the existing remedial measures or evaluation and implementation of alternative remedial measures.

MONITORING REPORT

6.a. WELL INSTALLATION REPORT

COMPLIANCE DATE: 45 days following completion of well installation activities

The discharger shall submit a technical report, acceptable to the Executive Officer, that provides well construction details, geologic boring logs, and well development logs for all new wells installed as part of the present or future Self Monitoring Program (Attachment A).

SITE MAINTANENCE

7.a. CHANGE IN SITE CONDITIONS

NOTIFICATION DUE DATE: Immediately upon occurrence

REPORTING DUE DATE: 30 days after initial notification

The dischargers shall immediately notify the Board of any flooding, ponding, settlement, equipment failure, slope failure, exposure of waste, or other change in site conditions that could impair water quality and shall immediately make repairs. Within 30 days, the dischargers shall prepare and submit a technical report, acceptable to the Executive Officer, documenting the corrective measures taken.

7.b. STORMWATER CONTROL PLANS

COMPLIANCE DATE: October 15 of the year of construction or prior to construction if commencing between October 15 and May 15

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For each proposed development greater than 1 acre in size, the dischargers shall submit a Notice of Intent to the State Water Resources Control Board, prepare and submit a Storm Water Pollution Prevention Plan acceptable to the Executive Officer, and implement Best Management Practices (BMPs) for the control of storm water, in accordance with requirements specified in the State Water Resources Control Board General Permit for Storm Water Discharges Associated with Construction Activities (NPDES Permit No. CAS000002).

SITE DEVELOPMENT

8.a. DRAFT DEED RESTRICTION

COMPLIANCE DATE: December 31, 2003

The dischargers shall submit a draft deed restriction, acceptable to the Executive Officer, which prevents and minimizes activities at the site which may exacerbate water quality impacts or which may result in exposure of human or ecological receptors to soil and/or groundwater contamination at the site. The deed restriction must provide a mechanism for the appropriate notification of on-site workers of environmental hazards and prevent the use of significantly impacted soil and groundwater.

8.b. RECORDING OF DEED RESTRICTION

COMPLIANCE DATE: March 31, 2004

The dischargers shall submit documentation showing that an approved deed restriction, resulting from Provision 8.a. was recorded as final.

D. PROVISIONS

1. Contractor/consultant qualifications: All hydrogeological plans, specifications, technical reports and documents shall be signed by or stamped with the seal of a State registered geologist, registered engineer, registered hydrogeologist, or certified engineering geologist.
2. Lab qualifications: All samples shall be analyzed by a State certified laboratory or laboratory accepted by the Regional Board using approved EPA methods for the type of analysis to be performed. All laboratories or the consultant shall be

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required to maintain quality assurance/quality control records for Regional Board review.

3. Good operation and maintenance (O&M): The Dischargers shall maintain in good working order, and operate in the normal standard of care, any facility or control system installed to achieve compliance with the requirements of this Order.
4. Document distribution: Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions and Provisions of this Order shall also be provided to (a) the non-lead discharger for the specific provision or activity. The Executive Officer may modify this distribution list as needed.
5. Delayed compliance: If the dischargers are delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the dischargers shall promptly notify the Executive Officer and the Board may consider revisions to this Order.
6. Access to site and records: The dischargers shall permit the Regional Board or its authorized representative, upon presentation of credentials:
 - a. Immediate entry upon the premises on which wastes are located or in which any required records are kept.
 - b. Access to copy any records required under the terms and conditions of this order.
 - c. Inspection of any treatment equipment, monitoring equipment, or monitoring methods required by this order or by any other California State Agency.
 - d. Sampling of any discharge or groundwater governed by this order.
7. Reporting of changed owner or operator: The dischargers shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.
8. Reporting of hazardous substance release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the dischargers shall report such discharge to the Regional Board by calling (510) 622-2343 during regular office hours (Monday through Friday, 8:00 am to 5:00 pm). A written report shall be filed with the Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, schedule of corrective actions

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

planned, and persons/agencies notified. This reporting is in addition to reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

9. Reporting and correction of non-compliance: The dischargers shall report any noncompliance that may endanger public health or the environment. Any such information shall be provided orally to the Executive officer within 24 hours from the time the dischargers become aware of the circumstances. A written submission shall also be provided within five days of the time the dischargers become aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours [CWC Sections 13263 and 13267].
10. Cost recovery: The Dischargers shall be liable, pursuant to Section 13304 of the California Water Code, to the Board for all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial actions, required by this Order. If the Dischargers addressed by this Order are enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to procedures established in that program. Any disputes raised by dischargers over the reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures of that program.
11. Periodic SCR review: The Board will review this Order periodically and may revise it when necessary. The dischargers may request revisions and upon review the Executive Officer may recommend that the Board revise these requirements.
12. Self Monitoring Program: The dischargers shall comply with the Self Monitoring Plan as attached to this Order and as may be amended by the Executive Officer.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on September 19, 2001.

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

Loretta K. Barsamian
Executive Officer

Figures: Figure 1 - Site Location Map
 Figure 2 - Subunit 2, UCRFS site

Attachment A: Self Monitoring Plan

FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT
YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO IMPOSITION
OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR
13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR
CIVIL CRIMINAL LIABILITY

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

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

SELF-MONITORING PROGRAM FOR:

**UNIVERSITY OF CALIFORNIA BERKELEY
ZENECA, INC.**

**UNIVERSITY OF CALIFORNIA RICHMOND FIELD STATION
1301 SOUTH 46th STREET
RICHMOND
CONTRA COSTA COUNTY**

**MEADE STREET OPERABLE UNIT
SUBUNIT 2**

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

1. **Authority and Purpose:** The Board requests the technical reports required in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Board Order No.01-102 (site cleanup requirements).
2. **Groundwater and Surface Water Monitoring:** The dischargers shall measure groundwater elevations quarterly in all monitoring wells, and shall collect and analyze representative samples of groundwater and surface water according to the following table: (Groundwater monitoring wells and surface water sample locations are to be proposed by the dischargers in accordance with Task 2.b, 3b, 4.c, and 5.a of this Order.)

Well # or Station #	Sampling Frequency	Analyses	Well # or Station #	Sampling Frequency	Analyses
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP

TBP: To Be Proposed by Discharger per Task 2.b, 3.b, 4.c, and 5.a

The dischargers shall sample any new monitoring or extraction wells quarterly and analyze groundwater samples for the same constituents as shown in the above table. The discharger may propose changes in the above table; any proposed changes are subject to Executive Officer approval.

3. **Quarterly Monitoring Reports:** The dischargers shall submit quarterly monitoring reports to the Board no later than 30 days following the end of the quarter (e.g. report for first quarter of the year due April 30). The first required quarterly monitoring report shall be due on January 31, 2002. Additional quarterly reports shall comply with the following schedule.

Quarter	Months Covered	Report Due Date
First Quarter	January, February, March	April 30 th
Second Quarter	April, May, June	July 31 st
Third Quarter	July, August, September	October 30 th
Fourth Quarter	October, November, December	January 31 st

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

Each quarterly report shall include:

- a. **Transmittal Letter:** The transmittal letter shall identify and discuss any violations of the Order and/or the Self-Monitoring Program during the reporting period and actions taken or planned to correct the problem. A detailed description of the violation and the actions taken or planned to correct the violation shall be further described in the body of the monitoring report. The letter shall be signed by the discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.
 - b. **Groundwater Elevations:** Groundwater elevation data shall be presented in tabular form, and a groundwater elevation map shall be prepared for each monitored water-bearing zone. Historical groundwater elevations shall be included in the fourth quarterly report each year.
 - c. **Groundwater Analyses:** Groundwater sampling data shall be presented in tabular form, and an isoconcentration map should be prepared for one or more key contaminants for each monitored water-bearing zone, as appropriate. The report shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. Historical groundwater sampling results shall be included in the fourth quarterly report each year. The report shall describe any significant increases in contaminant concentrations since the last report, and any measures proposed to address the increases. Supporting data, such as lab data sheets, need not be included (however, see record keeping - below).
 - d. **Groundwater Extraction:** If applicable, the report shall include groundwater extraction results in tabular form, for each extraction well and for the site as a whole, expressed in gallons per minute and total groundwater volume for the quarter. The report shall also include contaminant removal results, from groundwater extraction wells and from other remediation systems (e.g. soil vapor extraction), expressed in units of chemical mass per day and mass for the quarter. Historical mass removal results shall be included in the fourth quarterly report each year.
 - e. **Status Report:** The quarterly report shall describe relevant work completed during the reporting period (e.g. site investigation, interim remedial measures) and work planned for the following quarter.
4. **Violation Reports:** If the dischargers violate requirements in the Site Cleanup Requirements, then the discharger shall notify the Board office by telephone as soon as practicable once the discharger has knowledge of the violation. Board staff may,

Site Cleanup Requirements for
Meade Street Operable Unit, Subunit 2

depending on violation severity, require the discharger to submit a separate technical report on the violation within five working days of telephone notification.

5. **Other Reports:** The discharger shall notify the Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to cause further migration of contaminants or which would provide new opportunities for site investigation.
6. **Record Keeping:** The dischargers or their agents shall retain data generated for the above reports, including lab results and QA/QC data, for a minimum of six years after origination and shall make them available to the Board upon request.
7. **SMP Revisions:** Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on his/her own initiative or at the request of the dischargers. Prior to making SMP revisions, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.

I, Loretta K. Barsamian, Executive Officer, hereby certify that this Self-Monitoring Program was adopted by the Board on September 19, 2001.

Loretta K. Barsamian
Executive Officer

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

**ORDER NO. 01-094
SITE CLEANUP REQUIREMENTS FOR:**

**RHODIA INC.
MARTINEZ FACILITY
PEYTON SLOUGH PROJECT**

for the property located at

**100 MOCOCO ROAD
MARTINEZ
CONTRA COSTA COUNTY**

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

1. **Site Location:** Rhodia Inc. manufactures various strengths and grades of sulfuric acid and oleum at their Martinez facility located at 100 Mococo Road in Martinez. The approximately 114-acre plant site (hereinafter called the Facility) is located adjacent to the Carquinez Strait and the south end of the Benecia Bridge, at the end of Mococo Road (Figure 1). Peyton Slough is located along the eastern boarder of the site, and extends approximately 5,550 feet from Waterfront Road to the Carquinez Strait. Peyton Slough is surrounded by marshlands along its eastern bank, and extends southward under Waterfront Road to the McNabney Marsh (formerly called the Shell Salt Marsh). The majority of the wetlands adjacent to the Slough and the Carquinez Strait are owned by the State of California, and administered by the States Lands Commission.
2. **Purpose of Order:** The purpose of this order is to adopt cleanup requirements for sediment contamination in and adjacent to Peyton Slough.
3. **Named Dischargers:** Rhodia Inc. is named as a discharger due to their ownership of the Martinez facility. If additional information is submitted indicating that other parties caused or permitted any waste to be discharged on the site where it entered or could have entered waters of the state, the Board will consider adding those parties' names to this order.
4. **Site History:** From the turn of the century to 1958, the Mountain Copper Company (MOCOCO) operated a copper smelter at the site. Over the years, large piles of mineral processing and beneficiation wastes (primary copper smelting slag and "cinders" from the roasting of pyrite ores used for leaching metals) were accumulated onsite. Some of the roasted cinders and slag were deposited into Peyton Slough where they remain today.

In 1968, Stauffer Chemical Company assumed ownership of the Facility and began construction of the current acid plant. In 1988, Rhone-Poulenc, Inc. acquired Stauffer, thereby acquiring the property and the operations that comprise the Facility. In 1998, Rhodia was created as a separate, independent corporation by Rhone-Poulenc, and the property and the operations that comprise the Facility were transferred to Rhodia, Inc.

The Slough, particularly the northern segment, has been the subject of several environmental investigations to evaluate metals concentrations in soil and sediment. Based on the results of previous studies conducted at the Site, the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) Bay Protection Toxic Cleanup Program has identified the Slough as one of the "toxic hot spots" within the San Francisco Bay Area (RWQCB, 1997).

Currently, an ongoing multi-agency restoration project is being conducted in the adjacent McNabney Marsh. One phase of the project completed in 1998, consisted of the construction of a new tide gate that is designed to allow the southern flow of salt water from Peyton Slough into the McNabney Marsh. However, due to the elevated levels of metals in the slough, and the potential to transport metal contaminated sediments from the slough into the McNabney Marsh, it has been determined that the tide gate will not function as designed until Peyton Slough is remediated.

5. **Regulatory Status:** The site is subject to the following Board orders:
 - Waste Discharge Requirements Order No. 97-121, adopted October 15, 1997
 - NPDES Permit Order No. 93-060 in June 1993. The permit was amended by Order No. 96-033 in March 1996.
6. **Site Hydrogeology:** The Facility is located in California's east-central Coast Range geomorphic province. The majority of the higher portions of the Facility reside on an artificially graded hill composed of Cretaceous and Paleocene shale and sandstone. Topographic lows at the Facility are composed of flat-lying Quaternary Bay Muds, sands and peats of the Sacramento/San Joaquin fluvial-deltaic depositional system. The developed areas of the topographically low-lying ground was variously filled or otherwise covered with mining wastes composed of cinders and slag that has been classified as Class B mining waste. Cinders and slag had previously been piled at the site where this material sank into the Bay-Mud sequence and remains buried.

The Facility is located in the McNabney Marsh/Peyton Slough Groundwater Basin, immediately to the west and adjacent to the mouth, or lowermost end, of the Ygnacio Valley Groundwater Basin. To the west of the McNabney Marsh/Peyton Slough Groundwater Basin is the Alhambra Valley Groundwater Basin. Groundwater within these basins is primarily stored in recent and older alluvium. Groundwater also occurs, through under different conditions, in the consolidated Cretaceous and Tertiary rocks that surround and underlies the groundwater basins.

The majority of the Facility is located just above sea level, with the shallow groundwater found zero to twelve feet below the low-lying areas. Groundwater flow within the Facility is predominantly controlled by topography, flowing from topographic highs to topographic low areas. According to the City of Martinez Water Utilities Department there are no drinking water wells located within a one-mile radius of the site.

The site contains three hydrostratigraphic units that include the following:

- **The water table unit:** The unit comprises the shallowest saturated zone beneath the site. The unit is most pronounced in the southern portion of the site. The unit is comprised of fill, Bay Muds and peats. Along the south eastern edge of the manufacturing site, groundwater flows toward Peyton Slough. Proceeding north, groundwater flow is toward Sump S-29, sump S-24 and it's the collection drain that is parallel and adjacent to the Carquinez Strait, and then at the northeast end of the manufacturing site, groundwater flow is toward sump S-28 and possibly Peyton Slough.
 - **The bedrock unit:** Groundwater within the unit flows to the southeast beneath the southern half of the site and north towards the Carquinez Strait for the northern half of the site. The unit is encountered in consolidated and/or cemented material that underlies unconsolidated sediments and outcrops at the site. Portions of the unit are confined while other portions are unconfined.
 - **The lower intermediate/peat unit:** The unit is irregularly distributed in the alluvium beneath the low-lying portions of the site. This unit is particularly prevalent beneath and adjacent to the former evaporation ponds. The unit comprises lenses of peat and peaty sands or mud deep within the alluvium of the site.
7. **Remedial Investigations:** In 1997 the statewide Bay Protection and Toxic Cleanup Program identified the Peyton Slough as a "Toxic Hotspot". Analytical results indicate that Peyton Slough sediments have been impacted by high levels of metals such as; copper at 7,800 mg/kg, and zinc at 6,000 mg/kg. Toxicity to aquatic organisms was found to be associated with the high levels of metals found in the slough sediments. Other Peyton Slough investigations conducted in 1986, 1991, 1998, 1999, and 2000 have reported copper as high as 452,000 mg/kg and zinc as high as 88,300 mg/kg. For reference, Title 22 of the California Code of Regulations lists the Total Threshold Limit Concentration (TTLC) of copper at 2,500 mg/kg and zinc at 5,000 mg/kg.

The embankments of Peyton Slough maintenance dredge disposal piles located on top of the slough embankments, and exploratory trenches located immediately adjacent to the western bank of the Peyton Slough were sampled. The embankment samples reported copper as high as 1,300 mg/kg and zinc as high as 3,200 mg/kg. The dredge spoil piles results reported copper as high as 5,900 mg/kg and zinc as high as 3,800 mg/kg.

The discharger excavated several exploratory trenches along the western bank of the slough. The trench results indicated that cinder/slag waste was found buried adjacent to the slough. Soil samples collected from the trenches detected copper as high as 20,000 mg/kg and zinc as high as 5,600 mg/kg. Acidic soils with a pH as low as 2.6 were also reported. Water samples collected from the trenches detected copper as high as 120 mg/l, zinc as high as 850 mg/l, and a pH as low as 3.5. The exploratory trench investigations indicated that groundwater may be hydraulically connected to Peyton Slough, and is therefore a potential source of contamination to the Slough.

8. **Adjacent Sites:** Several properties that are located adjacent to Peyton Slough are affected by the slough's contamination or may be affected by the cleanup activities for the slough. The McNabney Salt Marsh has a tide gate controlled tidal connection to Peyton Slough. The McNabney Marsh is currently part of a multi-agency restoration project that has been delayed due to concerns regarding the transport of contaminants from the slough into the McNabney Marsh during incoming tides.

Other adjacent sites that may be affected by slough remediation include the Mt. View Sanitary District which discharges treated wastewater to the upper reach of Peyton Slough, the State Lands Commission which owns a portion of the land on which contaminants reside, and Shore Terminal which is an adjacent property owner located east of the slough.

9. **Interim Remedial Measures:** Interim remedial measures for Peyton Slough contamination have not been proposed or initiated.
10. **Feasibility Study:** The discharger submitted a Feasibility Study dated March 2, 2001. The report screened and compiled nine remedial action alternatives. Of the nine alternatives screened two alternatives emerged as the preferred alternatives. The first remedial alternative consists of:
- mechanical dredging of Peyton Slough to a depth of three feet;
 - disposal of the contaminated sediments to an appropriated disposal site;
 - capping the residual slough contaminants with an approximately three foot thick engineered cap system; and
 - implementing institutional controls for the residual contamination.

The second remedial alternative consists of:

- a full re-alignment of Peyton Slough that consists of excavating a new slough alignment east of the existing slough alignment;
- capping the contaminated sediments and backfilling the current contaminated slough alignment with soil excavated from the new alignment;
- removal of the current tide gate and replacement with a new tide gate in the new slough alignment;
- restoration of the marsh impacted by implementation of the alternative; and
- implementing institutional controls for the residual contamination.

The alternatives were screened against seven criteria as required by USEPA guidance. These criteria include: protection of human health and the environment, compliance with remedial action objectives, short and long-term effectiveness and performance, reductions in toxicity and contaminant mobility, implementability, cost, and regulatory and community acceptance. Although both remedial options meet the seven criteria needed for acceptance, after additional review, the discharger has determined that the second alternative is preferable for several reasons. The new slough will be constructed in a clean portion of the marsh and therefore will guarantee that the slough will be clean and free of site pollutants. This alternative does not impose any restrictions on future maintenance and/or enhancement dredging by the Mosquito Abatement District. Since the new slough alignment will be constructed in a clean area, there will be no disturbance of sediments containing contaminants. The new slough alignment could then increase water flow into the

upper reaches of the McNabney Marsh without restrictions.

If the existing slough is dredged and capped, restrictions will be required to protect the integrity of the cap and to prevent the exposure of the contaminants that remain in place under the cap. The Trust will not be able to widen the slough without disturbing the cap. Future maintenance dredging will be more complicated due to the restrictions that will be necessary to protect the cap. Furthermore, due to the proximity of the cinder/slag wastes to the existing slough, it may be difficult to prevent the migration of contaminants into the slough via groundwater transport. By building the new slough, the existing slough can be designed as a hydraulic barrier to prevent contaminants from reaching the new slough and other critical habitat where exposure can occur. Therefore, the second alternative, has been selected as the preferred alternative and the discharger will move forward to implement this remedial action alternative to reduce the risks at the site to acceptable levels.

11. **Cleanup Plan:** The goal of the Peyton Slough remedial action is to restore the beneficial uses of Peyton Slough. While the final cleanup plan for the site has not been prepared, initial discussions with other regulatory agencies have indicated a preference toward the second remedial alternative. Staff concludes that any remedial alternative that is selected must address the hydraulic connection of groundwater from the site to the current slough.

12. **Basis for Cleanup Standards**

- a. **General:** State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives. This order and its requirements are consistent with Resolution No. 68-16.

State Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This order and its requirements are consistent with the provisions of Resolution No. 92-49, as amended.

- b. **Beneficial Uses:** The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on June 21, 1995. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in Title 23, California Code of Regulations, Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters.

Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high TDS, low yield, or naturally-high contaminant levels. Groundwater underlying and adjacent to the site has never been a potential source of drinking water due to a naturally high concentration of sodium chloride. In the Water Table Hydrostratigraphic Unit (alluvial aquifer) groundwater contains a high concentration of sodium chloride resulting from natural salt water intrusion. In the Bedrock Hydrostratigraphic Unit, a portion of a syncline open to the north, dissolved salts are indicative of both salt water intrusion and the presence of connate waters.

13. **Basin Plan:** The Basin Plan designates the following potential beneficial uses of the adjacent Ygnacio Valley Groundwater Basin which is near the site include :

- Municipal and domestic water supply
- Industrial process water supply
- Industrial service water supply
- Agricultural water supply

Due to the high total dissolved solids (TDS) in the groundwater underlying the site adjacent to Peyton Slough, the groundwater is not considered a source of drinking water as specified under the "Sources of Drinking Water Policy 88-63."

The existing and potential beneficial uses of Peyton Slough as a tributary to the Carquinez Strait include:

- Ocean, Commercial, and Sport Fishing
- Industrial process supply or service supply
- Water contact and non-contact recreation
- Wildlife habitat
- Fish migration and spawning
- Navigation
- Estuarine habitat
- Preservation of rare and endangered species

14. **Reuse or Disposal of Extracted Groundwater:** Board Resolution No. 88-160 allows discharges of extracted, treated groundwater from site cleanups to surface waters only if it has been demonstrated that neither reclamation nor discharge to the sanitary sewer is technically and economically feasible.
15. **Basis for 13304 Order:** The discharger has caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance.
16. **Cost Recovery:** Pursuant to California Water Code Section 13304, the discharger is hereby notified that the Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the 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.

17. **CEQA:** This action is an order to enforce the laws and regulations administered by the Board. As such, this action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines. Depending on the final remedial action selected for Peyton Slough, CEQA documentation may ultimately be required for the project. This Order requires the discharger to address and resolve all CEQA compliance issues as part of the cleanup plan task defined in Task No. 3.
18. **Notification:** The Board has notified the discharger and all interested agencies and persons of its intent under California Water Code Section 13304 to prescribe site cleanup requirements for the discharge, and has provided them with an opportunity to submit their written comments.
19. **Public Hearing:** The Board, at a public meeting, heard and considered all comments pertaining to this discharge.

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

A. PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner, which will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.
2. Further significant migration of wastes or hazardous substances 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 wastes or hazardous substances are prohibited.

B. CLEANUP PLAN AND CLEANUP STANDARDS

1. **Implement Cleanup Plan:** The discharger shall submit and implement the cleanup plan as required by Task 3.
2. **Groundwater Cleanup Standards:** The discharger shall propose groundwater cleanup standards for all Peyton Slough perimeter compliance wells pursuant to Task 2.
3. **Soil/Sediment Cleanup Standards:** Soil/sediment cleanup standards shall be proposed by the discharger pursuant to Task 2

4. **Economic and Technical Feasibility of Cleanup:** The discharger shall evaluate the economic and technical feasibility of removal of all contaminants within the slough sediments and dredge spoil piles located immediately adjacent to the Slough associated with the discharge and respective cleanup as required by Task 3.
5. **Risk Assessment:** The discharger shall address the human health and environmental risk associated with any post-cleanup residual contamination as required by Task 2.

C. TASKS

1. **Expanded Groundwater Monitoring Plan and Well Installation Schedule**
The discharger shall submit an Expanded Groundwater Monitoring Plan and Well Installation Schedule, acceptable to the Executive Officer, to address and monitor groundwater along the banks of the existing and/or new proposed alignment of Peyton Slough. (It should be noted, if the dredge and cap alternative is selected instead of the new slough alignment, then monitoring along the new alignment will not be required.) New wells shall be proposed and initially monitored at a quarterly frequency as described in the attached Self-Monitoring Program. The new wells together with selected existing monitoring wells adjacent to the slough will be used to establish points of compliance and trigger levels.

Monitoring Plan Compliance Date: August 15, 2001

Documentation of Monitoring Well Installation Compliance: November 15, 2001

First Quarterly Report Compliance Date: April 30, 2002 (for the first quarter 2002)

2. **Risk Assessment and Groundwater Evaluation to Establish Groundwater and Soil/Sediment Cleanup Standards:** The discharger shall prepare a Risk Assessment, acceptable to the Executive Officer, that addresses the human health and environmental risk associated with the existing Slough conditions as well as any post cleanup residual groundwater and/or soil/sediment contamination that remains in place. The results of the risk assessment will be used to identify areas of concern (AOCs) that must be either actively remediated or managed in place to reduce risks and exposure to acceptable levels. The AOCs identified will be addressed under Task 3. The discharger shall also evaluate groundwater conditions adjacent to the existing and new slough to establish points of compliance and groundwater levels that may trigger additional actions. Based on the results of the risk assessment and groundwater hydrogeological evaluation, the discharger shall propose groundwater and soil/sediment cleanup standards, acceptable to the Executive Officer, for all Peyton Slough perimeter compliance wells, and residual contaminated soil/sediment that may remain in place after implementation of the Cleanup Plan (Task 3). It should be noted that the compliance monitoring points will be dependent upon the final remedial alternative selected. The discharger's proposed standards shall be based on the protection of human and ecological health, and be protective of the waters of the State and the beneficial uses of waters as defined in this Order.

Compliance Date: December 15, 2001

3. Remedial Design Report and Implementation Schedule

The discharger shall submit a Cleanup Plan and Schedule, acceptable to the Executive Officer. The plan and schedule shall include or address, but shall not necessarily be limited to the following: evaluation of the economic and technical feasibility of removal of all contaminants within the existing Slough sediments and the dredge spoil piles located immediately adjacent to the Slough; grading maps, engineered drawings, compliance with other agency requirements, compliance with CEQA, issues regarding the Contra Costa County Mosquito Abatement District's tide gate, restoration of impacted habitat, institutional controls, human health and ecological risk assessments, disposal of soil/sediment material, disposal and handling of potentially contaminated water, cap designs, and heavy equipment to be used.

Compliance Date: March 15, 2002

4. Groundwater Cleanup Plan and Schedule to Implement Cleanup Plan

The discharger shall submit a Groundwater Cleanup Plan and Schedule, acceptable to the Executive Officer, to be implemented in the event contaminated groundwater (as identified from Task 1) above acceptable trigger levels (as defined in Task 2) is confirmed to be discharging from the Facility offsite to the new or existing alignment of Peyton Slough depending on the remedial alternative implemented. A discharge will be confirmed by four consecutive quarters of groundwater concentrations within an individual compliance well in excess of the trigger levels. If a discharge is confirmed, then the discharger must evaluate whether an exceedance within the surface water body has occurred, and if so take appropriate action to contain or reduce the discharge to within acceptable levels.

Conceptual Groundwater Remedial Action Plan and Schedule Compliance Date: Submit within 120-Days From Confirmed Release.

5. Documentation of Remediation of Peyton Slough

Submit a technical report, acceptable to the Executive Officer, documenting the completion of all remedial activities associated with the cleanup of Peyton Slough. The report shall document compliance with all requirements of this order. All physical remediation work must be completed by December 31, 2002.

Physical Remediation Work Completion Compliance Date: December 31, 2002

Documentation Report Compliance Date: April 15, 2003

6. Proposed Institutional Constraints: Submit a technical report, acceptable to the Executive Officer, documenting procedures to be used by the discharger to prevent or minimize human exposure to soil and groundwater contamination within the existing alignment after implementation of the Cleanup Plan (Task 2 and 4).

Compliance Date: May 15, 2003

7. Implementation of Institutional Constraints: Submit a technical report, acceptable to the Executive Officer, documenting that the proposed constraints have been implemented.

Compliance Date: July 15, 2003

8. **Five-Year Status Report:** Submit a technical report, acceptable to the Executive Officer, evaluating the effectiveness of the approved cleanup plan (Task 2). The report shall include:
- a. Summary of effectiveness in controlling contaminant migration and protecting human health and the environment
 - b. Comparison of contaminant concentration trends with cleanup standards
 - c. Comparison of anticipated versus actual costs of cleanup activities
 - d. Summary of additional investigations (including results) and significant modifications to any remediation systems
 - e. Additional remedial actions proposed to meet cleanup standards including time schedule. If cleanup standards have not been met and are not projected to be met within a reasonable time, the report shall assess the technical practicability of meeting cleanup standards and may propose an alternative cleanup strategy.
- Compliance Date: April 15, 2008**
9. **Delayed Compliance:** If the discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the discharger shall promptly notify the Executive Officer and the Board may consider revision to this Order or administration of monetary civil liabilities against the discharger for failure to comply with a Board Order.

D. PROVISIONS

1. **No Nuisance:** The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code Section 13050(m).
2. **Good O&M:** 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.
3. **Cost Recovery:** The discharger shall be liable, pursuant to California Water Code Section 13304, to the Board for all reasonable costs actually incurred by the 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. If the site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the discharger over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.
4. **Access to Site and Records:** In accordance with California Water Code Section 13267(c), the discharger shall permit the Board or its authorized representative:
 - a. Entry upon premises in which any pollution source exists, 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 requirements of this Order.
 - c. Inspection of any monitoring or remediation facilities installed 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.
5. **Self-Monitoring Program:** The discharger shall comply with the Self-Monitoring Program as attached to this Order and as may be amended by the Executive Officer.
6. **Contractor / Consultant Qualifications:** All technical documents shall be signed by and stamped with the seal of a California registered geologist, a California certified engineering geologist, or a California registered civil engineer.
7. **Lab Qualifications:** All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g. temperature).
8. **Document Distribution:** Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:
- a. City of Martinez – (as required for project permits)
 - b. Contra Costa County Mosquito Abatement District
 - c. Mt. View Sanitary District

The Executive Officer may modify this distribution list as needed.

9. **Reporting of Changed Owner or Operator:** The discharger shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.
10. **Reporting of Hazardous Substance Release:** If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the discharger shall report such discharge to the Regional Board by calling (510) 622-2300

during regular office hours (Monday through Friday, 8:00 to 5:00).

A written report shall be filed with the Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, schedule of corrective actions planned, and persons/agencies notified.

This reporting is in addition to reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

11. **Periodic SCR Review:** The Board will review this Order periodically and may revise it when necessary.

I, Loretta K. Barsamian, 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 August 15, 2001.

Loretta K. Barsamian

Executive Officer

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FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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Attachments:
Figure 1- Site Map
Self-Monitoring Program

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

SELF-MONITORING PROGRAM FOR:

**RHODIA INC.
MARTINEZ FACILITY
PEYTON SLOUGH PROJECT**

for the property located at

**100 MOCOCO ROAD
MARTINEZ
CONTRA COSTA COUNTY**

1. **Authority and Purpose:** The Board requests the technical reports required in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Board Order No. 01-094 (site cleanup requirements).
2. **Monitoring:** The discharger shall measure groundwater elevations quarterly in all monitoring wells, and shall collect and analyze representative samples of groundwater according to the following table: (Wells and analytical methods are to be proposed by the discharger in accordance with Task 1 of this Order.)

Well #	Sampling Frequency	Analyses	Well #	Sampling Frequency	Analyses
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP
TBP	quarterly	TBP	TBP	quarterly	TBP

TBP: To Be Proposed by Discharger per Task 1

The discharger shall sample any new monitoring or extraction wells quarterly and analyze groundwater samples for the same constituents as shown in the above table. The discharger may propose changes in the above table; any proposed changes are subject to Executive Officer approval.

3. **Quarterly Monitoring Reports:** The discharger shall submit quarterly monitoring reports to the Board no later than 30 days following the end of the quarter (e.g. report for first quarter of the year due April 30). The first required quarterly monitoring report shall be due on February 28, 2002. Additional quarterly reports shall comply with the following schedule.

Quarter	Months Covered	Report Due Date
First Quarter	January, February, March	May 30 th
Second Quarter	April, May, June	August 30 th
Third Quarter	July, August, September	November 30 th
Fourth Quarter	October, November, December	February 28 th

Each quarterly reports shall include:

- a. **Transmittal Letter:** The transmittal letter shall identify and discuss any violations of the Order and/or the Self-Monitoring Program during the reporting period and actions taken or planned to correct the problem. A detailed description of the violation and the actions taken or planned to correct the violation shall be further described in the body of the monitoring report. The letter shall be signed by the discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.
 - b. **Groundwater Elevations:** Groundwater elevation data shall be presented in tabular form, and a groundwater elevation map shall be prepared for each monitored water-bearing zone. Historical groundwater elevations shall be included in the fourth quarterly report each year.
 - c. **Groundwater Analyses:** Groundwater sampling data shall be presented in tabular form, and an isoconcentration map should be prepared for one or more key contaminants for each monitored water-bearing zone, as appropriate. The report shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. Historical groundwater sampling results shall be included in the fourth quarterly report each year. The report shall describe any significant increases in contaminant concentrations since the last report, and any measures proposed to address the increases. Supporting data, such as lab data sheets, need not be included (however, see record keeping - below).
 - d. **Groundwater Extraction:** If applicable, the report shall include groundwater extraction results in tabular form, for each extraction well and for the site as a whole, expressed in gallons per minute and total groundwater volume for the quarter. The report shall also include contaminant removal results, from groundwater extraction wells and from other remediation systems (e.g. soil vapor extraction), expressed in units of chemical mass per day and mass for the quarter. Historical mass removal results shall be included in the fourth quarterly report each year.
 - e. **Status Report:** The quarterly report shall describe relevant work completed during the reporting period (e.g. site investigation, interim remedial measures) and work planned for the following quarter.
4. **Violation Reports:** If the discharger violates requirements in the Site Cleanup Requirements, then the discharger shall notify the Board office by telephone as soon as practicable once the discharger has knowledge of the violation. Board staff may, depending on violation severity, require the discharger to submit a separate technical report on the violation within five working days of telephone notification.
 5. **Other Reports:** The discharger shall notify the Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to

cause further migration of contaminants or which would provide new opportunities for site investigation.

6. **Record Keeping:** The discharger or his/her agent shall retain data generated for the above reports, including lab results and QA/QC data, for a minimum of six years after origination and shall make them available to the Board upon request.
7. **SMP Revisions:** Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on his/her own initiative or at the request of the discharger. Prior to making SMP revisions, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.

I, Loretta K. Barsamian, Executive Officer, hereby certify that this Self-Monitoring Program was adopted by the Board on August 15, 2001.

Loretta K. Barsamian
Executive Officer

**Cal/EPA**

San Francisco Bay
Regional Water
Quality Control
Board

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Oakland, CA 94612
(510) 286-1255
FAX (510) 286-1380

Marty A. Gilles, Manager
Environmental and Safety Division
Chevron Products Co.
P.O. Box 1272
Richmond, CA 94802-0272

Attention: Mr. Don Kinkela

Date:
File No. 2119.1044G(EAC)



Pete Wilson
Governor

SUBJECT: Request for Castro Cove Sediment Characterization Work Plan

Dear Ms. Gilles:

This letter discusses the next steps in determining whether and to what degree remediation of contaminated sediments in Castro Cove is needed.

As discussed with Don Kinkela of your staff in a meeting on April 28, 1997, Castro Cove has been identified as a candidate toxic hot spot pursuant to California Water Code Sections 13390 – 13396.5, otherwise known as the Bay Protection and Toxic Cleanup Program (BPTCP). Based on the volume of petroleum products processed at the refinery since the turn of the century and the presence of petroleum-related contaminants in the sediments, staff have determined that the Chevron Refinery is a likely source of sediment contamination in Castro Cove.

As mandated by the BPTCP, Regional Board staff have prepared a Proposed Regional Toxic Hot Spot Cleanup Plan (December, 1997) that includes the specific regional definition of a toxic hot spot and the criteria used to rank sites as "high priority" for listing purposes. Castro Cove has been listed as a candidate toxic hot spot because it has exhibited recurrent high toxicity associated with high chemical concentrations and bioaccumulation of pollutants in test organisms exposed to the sediments. Several studies conducted since 1987 have shown high levels of polynuclear aromatic hydrocarbons (PAHs, up to 227,800 µg/kg) in the sediment in the southwest portion of Castro Cove in the area where the refinery's historic NPDES outfall was located. Significant toxicity has been observed in several species of amphipods and in sea urchin and bivalve mollusc development tests on multiple occasions in the southwest portion of the cove. A sample location in the northeastern portion of the cove has also shown significant toxicity to test organisms during two different studies. On three separate occasions from 1988 to 1990, the State Mussel Watch Program deployed mussels in Castro Cove near the mouth of Castro Creek. PAHs were measured at increasingly elevated concentrations (up to 44,210 µg/kg) in mussel tissue during the three years of this study. More detailed descriptions of and references for the studies mentioned above and other reasons for listing Castro Cove as a candidate toxic hot spot are

contained on pages 53 to 64 of the Proposed Regional Toxic Hot Spot Cleanup Plan.

In addition to listing and describing candidate toxic hot spots, the Proposed Regional Toxic Hot Spot Cleanup Plan also contains a preliminary assessment of the actions required to remedy or restore these sites as required by Water Code Section 13394. The first action described is the preparation of a sampling and analysis plan to delineate the horizontal and vertical extent of sediment contamination. Although past sampling events have shown significant aquatic toxicity associated with high concentrations of contaminants in the southwest portion of the cove, it is unknown to what extent this relationship holds true for the rest of the cove. The data from past studies is very limited in terms of areal coverage of sampling locations and the types of chemical analyses performed. **We request, therefore, that Chevron submit a work plan and schedule, acceptable to the Executive Officer, for the characterization of sediment contamination in Castro Cove due to sources from the refinery. In the interest of moving forward with the investigation during the 1998 dry season, we request that the plan be submitted to this office no later than August 31, 1998.**

In order for the plan to be acceptable to the Executive Officer, it must include the rationale for each sampling and analytical method proposed. Staff consider the following information essential to an adequate sediment characterization in Castro Cove.

1. A delineation of sediment contaminant gradients originating from suspected refinery-related source areas. An effort should be made to identify and investigate potential refinery-related sources of sediment contamination in addition to the historic NPDES outfall, e.g., ship channel dredge dumping sites, offshore areas where accidental releases have been documented or observed, historic storm water discharge points into Castro Cove such as the first pass of #1 Oxidation Pond, and waste management units near the shoreline that could have released pollutants into the cove. The investigation should include the lower reach of Castro Creek as well as the cove itself.
2. An evaluation of the effects of the bioavailable layer of sediment on aquatic organisms by means of toxicity and chemistry testing of surficial sediments, to a depth of 5 cm. Components of this evaluation should include:
 - a. Analysis of all samples for total petroleum hydrocarbons (TPH), PAHs, Hg, Se, and As. In addition, at least ten percent of all samples should be analyzed for an extended suite of contaminants including organochlorine pesticides, PCBs and priority pollutant metals not listed above;
 - b. Toxicity testing performed concurrently with analytical chemistry on surface sediment samples to correlate toxic effects to aquatic

organisms with chemical causative agents in the sediment. Sediment grain size, total organic carbon, unionized ammonia, and hydrogen sulfide concentrations should be measured to differentiate pollutant effects from natural factors;

- c. For quality assurance, ten percent of all samples should be split with a secondary laboratory approved by Board staff for concurrent analysis.
3. A characterization of the vertical extent of sediment contamination and an estimation of the degree of mixing of surficial sediment with deeper layers. The objective is to demonstrate whether natural capping or re-suspension of contaminants is occurring. This study should include the analyses listed in 2. (a) and (c), above. To demonstrate the degree of vertical mixing, Chevron will need to provide evidence of sediment deposition and/or erosion using existing bathymetric data, radioisotope dating of core samples, or other approved methods.
4. A field-study evaluation of the potential for bioaccumulation and biomagnification of contaminants in the sediment.

We appreciate your continued cooperation in this matter. Please note that this is a request for a technical report pursuant to California Water Code Section 13267. If you have any questions, please contact Elizabeth Christian at (510) 286-3980.

Sincerely,

Loretta K. Barsamian
Executive Officer



Peter M. Rooney
Secretary for
Environmental
Protection



Pete Wilson
Governor

Date:
File No. 2119.1044G(EAC)

Marty A. Gilles, Manager
Environmental and Safety Division
Chevron Products Co.
P.O. Box 1272
Richmond, CA 94802-0272

Attention: Mr. Don Kinkela

SUBJECT: Conditional Approval of *Sediment Characterization and Ecological Risk Assessment Workplan for Castro Cove*

Dear Ms. Gilles:

Based on our review of the subject document, the meeting on September 8, 1998 with your staff and consultants, and in the interest of completing fieldwork before the onset of the wet season, we conditionally approve the workplan. We appreciate Chevron's efforts in meeting with us and presenting the rationale for its approach to sediment characterization in Castro Cove. The following table summarizes the information requested in our June 10, 1998 letter, Chevron's response in the workplan, and the conditions necessary for approval of the workplan.

Requested Tasks	Chevron's Response in Workplan	Conditions Necessary for Approval
1. Delineation of sediment contaminant gradients from refinery-related sources	Collection of 9 surficial sediment samples along Castro Creek channel and perimeter of cove	For lateral delineation, staff will accept no less than 4 additional surface samples located approximately as follows: one sample bisecting a transect between sample locations DM-2 and DM-8, one sample bisecting a transect between DM-3 and DM-7, one sample bisecting a transect between DM-6 and DM-7, and one sample bisecting a transect between DM-7 and DM-8.

Requested Tasks	Chevron's Response in Workplan	Conditions Necessary for Approval
2. Evaluation of effects of sediment on aquatic organisms using concurrent toxicity and chemistry testing	<p><u>Tier 1:</u> Collection of 9 surficial sediment samples for chemical analysis</p> <p><u>Tier 2:</u> Toxicity testing may be performed based on results of Tier 1 (exceedance of ecological benchmarks)</p> <p>* TPH was omitted from the list of requested analytes</p>	<p>Staff will accept the phased approach to chemical and toxicity testing, but may require toxicity testing in the spring based on physical evidence of contamination (presence of oily residue, sludge, or tar) in addition to measurements of individual chemicals taken this fall. The intent is to detect toxicity resulting from the physical properties of the oily material itself or chemical mixtures contained in it for which there are no screening-level ecological benchmarks.</p> <p>* TPH analysis must be performed on all samples as originally requested (Chevron may elect to compare duplicate samples with and without silica gel cleanup)</p>
3. Characterization of the vertical extent of contamination, including sediment deposition/erosion potentials	<p><u>Tier 1:</u> 1989 and new bathymetric surveys and use of existing vertical sediment data</p> <p><u>Tier 2:</u> Additional collection of sediment chemistry at depth, as needed</p> <p>* existing vertical sediment data (Entrix, 1988) is extremely limited- only 4 locations sampled and reporting limits for PAHs were generally higher than ecological benchmarks indicating frequently observed adverse effects (ERMs)</p>	<p>Staff will accept the workplan on the condition that 6-ft core samples are taken at no less than four locations including the following: DM-1 and DM-9 where high levels of PAHs have been detected in the past, at the center of the transect between DM-2 and DM-8, and in the vicinity of DM-7. One set of cores from each location should be chemically analyzed at 1 ft intervals and another set should be physically logged in the field for lithology, stratigraphy, and visual evidence of contamination by a certified geologist. Another condition for approval of the workplan is that Chevron perform additional core sampling and either radioisotope dating or some other method of estimating sediment deposition/erosion rates this coming spring in addition to collecting bathymetric data this fall. Results from just two bathymetric sampling events alone will not provide enough data to assess the rate of sediment deposition/erosion and potential for vertical mixing and resuspension of contaminants in Castro Cove.</p>
4. Field evaluation of potential for bioaccumulation/ biomagnification in sediments	<p><u>Tier 1:</u> Qualitative evaluation of bioaccumulation potential</p> <p><u>Tier 2:</u> Field data collection, as appropriate</p>	<p>The condition for approval is that Chevron perform a field evaluation in the spring</p>

One of staff's major concerns in this investigation is determining whether contaminant

hot spots are located in erosional or depositional areas and whether contamination below the top 5 cm could be a continuing source of toxicity due to vertical mixing and resuspension. I must emphasize that staff cannot make decisions on the extent of cleanup necessary until Chevron provides information that relates patterns of sediment deposition and erosion in the cove with the vertical contaminant profile.

Please contact Ms. Elizabeth Christian of my staff at (510) 622-2335 if you have questions concerning this letter.

Sincerely,

Richard K. McMurtry, Chief
Groundwater Protection and
Waste Containment Division