

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 98-059

WASTE DISCHARGE REQUIREMENTS FOR CORRECTIVE ACTION AND RESCISSION
OF ORDERS 87-064 AND 87-158 FOR:

THE DOW CHEMICAL COMPANY
PITTSBURG FACILITY
CONTRA COSTA COUNTY

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

SITE DESCRIPTION

1. The Dow Chemical Company (hereinafter called Dow or the discharger) operates a facility located at the end of Loveridge Road in the city of Pittsburg 35 miles northeast of San Francisco, California (Figure 1). The site is bounded by New York Slough on the north, the Pittsburg-Antioch Highway on the south, Loveridge Road on the west, and residential, commercial, and park lands to the east. The site occupies about 993 acres of which approximately 235 are a wetland preserve.

Currently the "industrial" or "active" portion of the site contains chemical manufacturing facilities, one active nonhazardous solid waste landfill, a groundwater treatment plant and a number of inactive or closed disposal units. The Dow plant formerly manufactured chlorine, sodium hydroxide, hydrogen, and chlorinated solvents including tetrachloroethene and carbon tetrachloride. Presently latex, agricultural chemicals, fumigants, fungicides, and hollow fibers are manufactured. In addition, the facility conducts chemical development research, treats raw water, and generates steam and electrical power.

PURPOSE

2. This Order contains requirements for facility-wide corrective action for groundwater containing elevated levels of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). It also requires that Dow perform final closure for two waste management units containing hazardous solid waste and/or contaminated soil.

Other significant requirements address the continued operation and closure design of the nonhazardous Northeast Landfill and postclosure maintenance and monitoring of several closed hazardous and nonhazardous waste management units in accordance with appropriate state and federal regulations.

REGULATORY STATUS

3. The Dow Pittsburg facility is currently regulated by the Board under Waste Discharge Requirements (WDR) Orders No. 87-064, 87-158, and 97-123; and NPDES permit CA0004910 (WDR Order No. 94-147), and Cease and Desist Order 94-148. A Corrective Action Schedule of Compliance is contained in the Hazardous Waste Facility Permit (EPA ID Number: CAD 076 528 678) issued by the Department of Toxic Substances Control (DTSC).

This Board is serving as the lead state agency to implement and enforce corrective action at the Dow facility pursuant to Health and Safety Code Section 25204.6(b).

4. The purpose of this Order is to cause a cessation of groundwater discharge to New York Slough from the area within the capture zone of the perimeter extraction system.
5. In July 1997, waste disposal to land regulations formerly contained in Chapter 15, Title 23 of the California Code of Regulations were re-codified. Those regulations pertaining to hazardous waste remain in Title 23 (23CCR) while regulations pertaining to nonhazardous waste have been integrated into Title 27 (27CCR). Throughout this Order, references to California regulations governing discharges of waste to land will be made to 27CCR where 23CCR requirements are the same. Title 23 will be referenced only where no equivalent requirements for disposal of hazardous waste are identified in Title 27.

SITE HYDROGEOLOGY

6. The Dow Pittsburg facility is located in the Pittsburg groundwater basin that extends from the hills south of the facility the western portion of the Sacramento-San Joaquin River delta in the north, and from the vicinity of Bay Point in the west to the City of Antioch in the east. The basin is filled with unconsolidated fluvial and alluvial sediments deposited in the Sacramento-San Joaquin River delta and in alluvial fans formed by streams draining the hills south of the facility. Groundwater at the Dow facility is encountered at depths varying from approximately 2 to 13 feet below ground surface (bgs).

The subsurface has been divided into three aquifer intervals generally composed of sand and silty sand. The aquifer intervals are referred to as the water table interval (approximately 2 to 25 feet bgs), the mid-depth interval (30 to 75 feet bgs), and the deep interval (80 to 130 feet bgs). Regionally and at the site, a clay interval is found from approximately 130 to as much as 800 feet bgs. In the southern portion of the facility, generally south of 3rd Street, the mid and deep intervals are not separated by a clay layer and are composed mostly of sand. North of 2nd Street, along New York Slough, the aquifer intervals are separated by clay layers. The aquifer intervals in the north are thinner and consistently finer-grained than those in the southern part of the facility.

GROUNDWATER CHARACTERISTICS

Summary of Groundwater Contamination

7. Organic Compounds: Tetrachloroethene and carbon tetrachloride, along with other volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), have been detected at elevated concentrations in groundwater at various locations under the Dow facility both in the interior of the site and near the perimeter adjacent to New York Slough. The highest concentrations near the perimeter occur in mid-depth extraction wells near Bundesen Bay, a 2.5-acre embayment connected to New York Slough (Figure 2). In this area, total VOC concentrations in excess of 200,000 µg/l have been measured in groundwater. Higher concentrations have been measured further inland in the central process area of the facility.

Ranges of Concentrations of Selected Constituents in Bundenen Bay Area Extraction Wells

| Constituent | Range of Concentrations (µg/l) | Maximum Contaminant Level (State Drinking water Standard) (µg/l) |
|--------------------------|-----------------------------------|--|
| 1,2-Dichloroethane | 38 to 5,000 | 0.5 |
| 1,2-Dichloropropane | 30 to 24,000 | 5.0 |
| Carbon Tetrachloride | 32 to 140,000 | 0.5 |
| Chlorobenzene | 99 to 600 | 70 |
| Chloroform | 100 to 51,000 | 100 |
| cis-1,2-Dichloroethene | 60 to 40,000 | 6.0 |
| Methylene Chloride | 37 to 180,000 | 5.0 |
| Tetrachloroethene | 190 to 41,000 | 5.0 |
| Toluene | 40 to 19,000 | 1,000 |
| trans-1,2-Dichloroethene | 300 to 2,000 | 10 |
| Trichloroethene | 11 to 43,000 | 5.0 |
| Vinyl Chloride | 140 to 20,000 | 0.5 |

Several VOCs were detected in surface water grab samples taken at three locations in Bundesen Bay (SE corner, SW corner, and mouth) during two sampling events in 1988 and 1997. Surface water grab samples taken in 1997 at three locations in New York Slough close to the shoreline of the Dow facility and at the mouth of the Kirker Creek Remnant Channel had non-detectable concentrations of VOCs at a reporting limit of 1µg/l.

**Concentrations of Selected VOCs in Surface Water Grab Samples
In Bundesen Bay in 1988 and 1997**

| Constituent | SW Corner 1988 / 1997 (µg/l) | SE Corner 1988/1997 (µg/l) | Mouth 1988/1997 (µg/l) |
|----------------------|---|---|---------------------------------------|
| Carbon tetrachloride | 1240 / 360 | 15.5 / 38 | 93.6 / 16 |
| Chloroform | 30 / 140 | ND(0.5) / 8.8 | 9.7 / 4.0 |
| Methylene chloride | 60 / 110 | ND(0.5) / 20 | 4.9 / 7.8 |
| Tetrachloroethene | 300 / 220 | 3.8 / 23 | 44 / 10 |
| Trichloroethene | 520 / 47 | 3.8 / 7.5 | 27.6 / 3.5 |
| Vinyl chloride | ND(10) / 10 | ND(0.5) / 1.5 | ND(0.5) / ND(1.0) |

ND = Not detected

() = Reporting Limit

Metals: Metals in groundwater are not of general concern at the Dow facility with the exception of nickel and copper. Extracted groundwater from the Dow facility has contained concentrations of nickel exceeding the NPDES permit limit since 1991. When a renewed NPDES permit was issued in 1994 with new nickel and copper effluent limits of 65 µg/l and 37 µg/l, respectively, it appeared that Dow would be immediately out of compliance if it discharged treated groundwater through its deep water outfall. A 1997 pilot study of Dow's groundwater treatment plant demonstrated that copper was effectively removed from extracted groundwater in the carbon adsorption process. Copper was not detected in treatment plant effluent at a detection limit of 15 µg/l. Nickel, however, is not removed through current treatment processes. Dow plans to segregate extracted groundwater with high nickel concentrations and either discharge it to the local POTW or recycle it on-site.

CORRECTIVE ACTION

8. Regulatory Framework

In 1986 the Environmental Protection Agency (EPA) prepared a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) report that identified 25 Solid Waste Management Units (SWMUs) at the Dow Pittsburg facility. In June 1987, the Board issued Waste Discharge Requirements (WDR) Order No. 87-064 that addressed the SWMUs of potential concern in the RFA report and included a groundwater self-monitoring program. The WDR required that Dow submit and implement a plan to characterize all identified areas of potential concern for water quality and, if necessary,

evaluate alternatives for remediation of these areas. Dow has submitted various reports addressing RWQCB requirements for SWMU investigations, waste characterization and mobility studies and SWMU closure plans. Much of the site investigation work is summarized in a twelve volume Remedial Feasibility Investigation and Corrective Action Program report submitted in December 1988.

In 1989 the EPA issued a 3008(h) Administrative Order under RCRA authority requiring Dow to 1) determine the nature and extent of any releases of hazardous wastes or hazardous constituents from the facility, and 2) to identify and evaluate alternatives for corrective action necessary to prevent or mitigate any migration of hazardous wastes or hazardous constituents from the facility. In August 1997, EPA issued written notice that it had terminated the 3008(h) Administrative Order and that the requirements of the Order had been incorporated into the Hazardous Waste Facility Permit issued by DTSC in August 1996. The Hazardous Waste Facility Permit in turn references Section 25204.6 of the California Health and Safety Code which grants the lead authority to the RWQCB to implement and enforce the corrective action requirements of Article 6, Chapter 14, Division 4.5, Title 22 of the California Code of Regulations. Currently the RWQCB, with assistance from DTSC specialists upon request, is the sole agency overseeing corrective action at the Dow Pittsburg facility.

9. **Northeast Landfill**

The Northeast Landfill is the only currently active SWMU at the Dow facility. It is bounded by New York Slough to the north, Third Street to the south, J Street to the west, and the Kirker Creek Remnant Channel to the east (Figure 2). The landfill spans approximately 15 acres and has been in use since the 1930's. Materials currently and historically disposed of in the landfill include inert wastes such as concrete rubble, brick, wood, miscellaneous construction debris and excavation dirt, asphalt paving, and brine mud. Historically, garbage and other miscellaneous refuse were disposed of in the landfill during the 1950s and 1960s. Antioch Harbor dredge bottoms were reportedly placed in the landfill in the 1970s. Much of the asphalt and concrete is recycled, limiting the deposit of construction materials to about 100 cubic yards per year. The brine mud, a waste product of the on-site Brine Plant, is currently disposed of in the Northeast Landfill at an approximate rate of 125 cubic yards per year. The Brine Plant produces a concentrated commercial brine solution and condensate used as boiler feed at an on-site power plant. Feed to the Brine Plant consists of extracted groundwater treated to remove VOCs and SVOCs, treated storm water runoff that has contacted chemical process units, plus various maintenance and scrubber waters that have been treated in the site's wastewater processing units. The brine mud waste has a moisture content of 45%, and a pH of about 11. Dow estimates 40,000 cubic yards of remaining capacity are left and plans to continue operation indefinitely. Dow has installed a French drain extraction system around the perimeter of the landfill in response to requirements in WDR 87-064 for compliance with the state's general construction standards for landfill containment structures.

10. **SWMU Closures/Current Status**

The following table summarizes closure activities and source control work that have taken place since WDR 87-064 was adopted.

| SWMU | Action Required | Status |
|--|--------------------------|--|
| Former Solar Evaporation Ponds (Monofill) | Post-Closure Maintenance | The six surface impoundments were closed between 1988 and 1990 according to a closure plan approved jointly by DTSC and RWQCB. Ponds E and F were clean-closed by transferring excavated soils to Ponds A, B, C, and D. Closure of Ponds A-D involved solidification of residual liquids and sludges, construction of a crib lock wall and RCRA cap, and construction of a hydraulic containment system (French drain and extraction wells) to intercept groundwater at the perimeter of the unit. |
| Central Landfill | Post-Closure Maintenance | Closure performed simultaneously with closure of adjacent Solar Evap. Ponds (shares hydraulic containment system). Capped with low-permeability clay. Cap graded and vegetated 10/97 to comply with Title 27 post-closure requirements for erosion control and prevention of ponding. |
| Hexachlorobenzene Disposal Trench | Completion of Closure | Final cover to be installed over existing soil cover as part of final corrective action. This unit is described further in Finding 12(b). |
| Former Outfall Pond | Completion of Closure | Final corrective action measures to be taken in pond and adjacent open area. This unit is described further in Finding 12 (c). |
| Inactive Hazardous Waste Disposal Area | None | Closed in 1960's. Area is covered with asphalt. Will be hydraulically contained by extraction well system. |
| Inactive Former Municipal Landfills (Northwestern and North Central) | None | Contain mostly construction waste, but dates of disposal, volume, and type of wastes disposed of are not documented. Operations ceased long before landfill regulations were adopted. Will be hydraulically contained by extraction well system. |
| Former Brine Process Ponds | None | Sediment was removed, the ponds were backfilled with clean soil, and a concrete slab was constructed over the backfilled ponds. |
| Former Chemical Research Disposal Trench | None | Not a significant source of groundwater contamination. Partially covered by a concrete-diked tank farm and buildings. |
| Former Sym-Tet Fire Water Impounding Basin | None | Sludge and soil below the lined basin were removed, and the basin was backfilled and covered with a 6-inch-deep road base. |

| SWMU | Action Required | Status |
|--|-------------------------------------|---|
| Former Latex Coagulation Ponds and Latex Firewater Reservoir | None | Sludge and visibly contaminated soil were excavated and the ponds were backfilled with clean soil. |
| Inactive Ethyl Corporation Property (900/1000 Block) | Hydraulic Containment | Ethyl Corp. stored chemicals used to manufacture tetraethyl lead in this area prior to Dow's purchase of the property in 1982. Approx. 70% of area is covered with asphalt pavement. Groundwater extraction wells have been installed to contain an isolated VOC plume. Lead has not been detected in groundwater since 1992. |
| Storm Sewer System | Maintenance /Retrofitting as Needed | Ongoing program to retrofit old pipelines to prevent infiltration of groundwater contaminants into sewer system. |
| Former Drum Storage Area | None | Closed. No evidence of spills or releases. |
| Rail Car Washing Area | None | Closed. No evidence of releases. |

Interim Measures

11. In the interim until the final facility-wide corrective action plan is fully implemented, Dow will perform groundwater extraction focusing on mass removal of VOCs in groundwater in the Bundesen Bay area to the extent that neither the hydraulic nor the VOC removal capacity of the existing groundwater treatment system is exceeded. The Bundesen Bay area was chosen for interim corrective action due to the relatively high concentrations of VOCs in close proximity to surface water. Dow explored various options for disposal of treated groundwater generated during this interim action, including on-site recycling, discharge to the local POTW, NPDES discharge to surface water and injection. None of the options is singularly capable of handling the various quantities and composition of extracted groundwater. In October 1997, the Board adopted Order No. 97-123 which permits injection of treated groundwater upgradient of the extraction wells in an area where the existing groundwater is already highly impacted by VOCs. Since adoption of 97-123, Dow has indicated that injection will not be used as a primary method of water management, but will be retained as a back-up option should the primary options (on-site recycling in the Brine Plant and discharge to the POTW) become unavailable.

Interim Groundwater Treatment System

The current treatment system consists of an air-stripper followed by a 340,000-gallon feed tank and three 20,000-pound steam-regenerated carbon beds operated in series. The three carbon beds operate until concentrations of organic compounds exiting the third bed approach the concentration limits for injected groundwater established in Order 97-123.

At this time, the primary bed is regenerated while untreated groundwater is stored in the treatment system feed tank. The volume of the feed tank is the limiting factor in the hydraulic capacity of the treatment system. Accounting for a working volume between 15% and 85% of feed tank capacity requires that a continuous groundwater extraction flow of no more than 150 gpm be maintained to avoid overfilling the tank during primary bed regeneration. Dow determined that a maximum regeneration cycle frequency of once per week was acceptable based on logistical, mechanical, and personnel limitations.

Approximately 50 gpm must be pumped from the hydraulic control system surrounding the former Class I solar evaporation ponds (Monofill) to comply with post-closure requirements for that unit. In order to ensure that the hydraulic capacity of the groundwater treatment plant is not exceeded, the maximum feasible extraction rate from Bundesen Bay area extraction wells is limited to 100 gpm for the interim operation period until construction of a larger treatment plant is complete.

12. **Final Corrective Action Remedy**

The requirements for facility-wide corrective action in this Order are based on quarterly groundwater monitoring data and information gathered during extensive site investigations conducted over the past 10 years. During 1997, at the request of RWQCB staff, Dow performed additional work to fill data gaps in the characterization of hydrogeologic parameters and chemical impacts to groundwater, surface water, and sediment. Products of the data gaps investigations used to support the selection of the final corrective action remedy include: 1) a groundwater flow model that evaluates the effect of pumping along the slough frontage to prevent the discharge of contaminants into the slough, 2) a screening level ecological risk assessment for sediments, and 3) a pilot operation of the existing groundwater treatment plant using groundwater extracted near Bundesen Bay and from the Monofill French drain.

The final corrective action remedy has three components: a) Hydraulic containment at the northern perimeter of the facility, b) Final closure for the Hexachlorobenzene Trench, and c) Final closure for the Former Outfall Pond and adjacent contaminated soils.

a) **Perimeter Hydraulic Containment**

According to groundwater flow modeling performed by Dow's consultants, hydraulic containment at the slough frontage, Bundesen Bay and the Kirker Creek Remnant Channel can be attained by extracting groundwater at a rate of 480 gpm from the water table, mid-depth, and deep intervals. In addition to extracting the 480 gpm of groundwater at the three areas mentioned above, Dow has also proposed to extract approximately 85 gpm from the Monofill French drain system, 85 gpm from the Northeast Landfill French drain system, and 30 gpm from the 900/1000 Block Area. During the start-up period, Dow will frequently measure groundwater elevations in upgradient and downgradient wells near the line of extraction to determine if containment is achieved or to evaluate whether adjustments need to be made to achieve containment.

Such measurements will continue until the pumping regime is optimized, containment is achieved, and water levels have reached steady state.

Water Management: Dow is evaluating various options for managing extracted groundwater. The method proposed by Dow in the Corrective Action Plan involves separating the extracted groundwater into two streams: one containing nickel above the NPDES permit limit of 65 µg/l, and the other containing nickel at concentrations below this limit. Both streams would be treated to remove VOCs, SVOCs and copper. Dow estimates the high-nickel stream to be much smaller than the low-nickel stream (an estimated flow of 100 to 200 gpm out of 700 gpm total) based on mathematical flow modeling for hydraulic containment using existing and proposed extraction wells. Groundwater from wells that have nickel concentrations generally exceeding the NPDES limit will be sent to the existing groundwater treatment plant, which is currently used for interim corrective action. The treated groundwater will then be discharged through a combination of options including discharge to the local POTW (Delta Diablo Sanitation District), discharge to the on-site Brine Plant and, if needed, injection into the groundwater aquifer as permitted in WDR 97-123. The nickel concentration in the effluent from this treatment system would be below the required concentration limits for these three treatment options. The remaining groundwater with low nickel concentrations will be sent to a new treatment plant that removes organic compounds with a nitrogen stripper and activated carbon adsorption units similar to those in the existing treatment plant. The treated water from this stream will then be discharged to New York Slough under the existing NPDES permit. This Order requires hydraulic containment but does not specify the methods for managing the extracted groundwater.

b) Final Cover Installation for the Hexachlorobenzene Trench

The Hexachlorobenzene Trench is located in the central eastern portion of the Dow facility about 1,400 feet south of New York Slough and 600 feet west of the Kirker Creek Remnant Channel. Excavation of the trench, which is approximately 10 feet wide, 10 feet deep and 250 feet long began in the late 1950s to early 1960s. Disposal operations ceased in the early 1970s and the trench was covered with approximately five feet of soil. The trench was double-lined with a chemically resistant synthetic membrane estimated to be about 15 mils thick. The waste material disposed of in the trench, commonly called hex tars, consists of stillbottoms from tanks used in the manufacture of chlorinated solvents. These solid residues contain primarily hexachlorobenzene with lesser concentrations of hexachlorobutadiene and hexachloroethane.

HCB is relatively insoluble and tends to adsorb to organic carbon in the soil. The velocity of the shallow groundwater in the vicinity of the Hex Trench was estimated to be about three feet per year. At this rate, the migration of chemical constituents from the trench to the Kirker Creek Remnant Channel will take about 200 years. Since sorption processes would retard the migration of HCB relative to groundwater and increase the estimated migration rate even further, HCB emanating from the Hex Trench is unlikely to pose any risk to ecological receptors. Dow has proposed installing a low-permeability cover over the trench to minimize the potential for ecological exposure to the HCB. Capping the trench will prevent exposure to burrowing animals, it will prevent erosion of soil, and it will minimize infiltration of surface water into the trench. In addition, this Order requires the installation and monitoring of additional shallow monitoring wells between the trench and the Kirker Creek Remnant Channel to monitor the effectiveness of the cover and provide early warning of any releases from the trench to groundwater that could potentially impact the channel.

c) Final Closure for the Former Outfall Pond Area

The Former Outfall Pond is located in the northwest corner of the Dow facility just south of the levee separating the facility from New York Slough. In the past, the pond received storm water runoff, cooling water runoff, inorganic waste streams, wastewater from purification processes, and organic chemical runoff from incidental storm water contact with buildings and equipment. The pond discharged directly to New York Slough under an NPDES permit until 1990 when Dow constructed another treatment system and sealed-off the outfall from the pond. Currently, the pond occupies about three acres and contains only rainwater from direct precipitation and run-off from the open space immediately adjacent to it. Until 1969, the sediment that accumulated on the pond floor was routinely dredged and deposited in the marshy area adjacent to and east of the pond.

SVOCs, VOCs, and mercury have been detected in pond sediments during past investigations. In 1997 at the request of Board staff, Dow collected and analyzed surface water and sediment samples from the pond to determine whether exposure to mercury or other constituents in the sediments would cause unacceptable risk to ecological receptors. All of the surface sediment samples contained elevated levels of mercury ranging in concentration from 5.8 mg/kg to 81 mg/kg. Dow subsequently sampled surface soil in the open area east of and adjacent to the pond and found that nine out of nineteen soil samples contained total mercury exceeding the California hazardous waste threshold concentration. Dow responded by proposing to construct a low-hydraulic conductivity, erosion-resistant cover over the entire area to prevent exposure to human and ecological

receptors. This Order requires Dow to submit a final closure plan that evaluates the effectiveness, feasibility, and cost of several alternatives for closure that will be protective of human health and the environment.

13. **Evaluation of Corrective Action Program**

The determination of the effectiveness of the Corrective Action program will be based upon groundwater and surface water chemical monitoring results. The program may be revised based on the degree to which groundwater monitoring demonstrates adequate containment and reduction of chemical groundwater contamination during implementation of Corrective Action. The RWQCB will establish concentration limits as defined in 27CCR, Section 20400 based on evaluation of groundwater contaminant levels over time and the considerations identified in 27CCR, Section 20400(d). Final concentration limits will be established prior to determining whether Corrective Action has been successfully implemented.

BASIN PLAN

14. 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 23CCR 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters.

BENEFICIAL USES

15. The Basin Plan provides that "Unless otherwise designated by the Regional Board, all groundwaters are considered suitable or potentially suitable for municipal or domestic water supply. In making any exceptions, the Regional Board will consider the criteria referenced in Regional Board Resolution No. 89-39, 'Sources of Drinking Water' where: ...The total dissolved solids exceed 3,000 mg/l (5,000 μ S/cm electrical conductivity) and it is not reasonably expected by the Regional Board that the groundwater could supply a public water system."
16. The conditions in the areas of the site regulated by this Order satisfy the Basin Plan exception criteria cited in Finding 15. Therefore, the groundwater in these areas as described below is not considered suitable for municipal or domestic water supply.

The areas of the site regulated by this Order consist of those areas wherein lie existing and proposed extraction and injection wells. These areas are all located within the Dow facility north of the Atchison Topeka and Santa Fe Railway line.

The groundwater beneath the Dow site north of the Atchison Topeka and Santa Fe Railway line has TDS/electrical conductivity that is significantly higher than the 3000 mg/l (5000 μ S/cm) levels considered as maximums for suitability for municipal or domestic water supply. Furthermore, it is not reasonable to expect that the groundwater could supply a public water system because significant pumping of the aquifer is likely to result in saltwater intrusion that would further degrade water quality. There is evidence that past pumping of the aquifer in the early 1900s resulted in increased salinity.

17. The potential beneficial uses of groundwater underlying the site are:
 - (i) Industrial process and service water supply
 - (ii) Discharge to surface water (New York Slough)

18. The northern portion of the Dow facility is bounded by New York Slough. New York Slough is located within the San Francisco Bay/Delta system between Suisun Bay to the west and the confluence of the Sacramento and San Joaquin Rivers to the east. Contra Costa Water District maintains a drinking water intake at Mallard Slough four miles west of the Dow facility. The Mallard Slough intake is used to augment the main supply primarily during winter and spring months when the salinity is low. The existing and potential beneficial uses of New York Slough and contiguous waters are:
 - (i) Industrial service and process supply
 - (ii) Municipal water supply
 - (iii) Water contact and non-contact recreation
 - (iv) Wildlife habitat
 - (v) Commercial and sport fishing
 - (vi) Fish migration and spawning
 - (vii) Navigation
 - (viii) Estuarine habitat
 - (ix) Preservation of rare and endangered species

CEQA

19. This action is categorically exempt from the provisions of the California Environmental Quality Act pursuant to Section 15301, Title 14, of the California Code of Regulations.

NOTICE AND MEETING

20. The Board has notified the discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge, and has provided them with an opportunity to submit their written comments.

The Board, at a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED that the Dow Chemical Company, their agents, successors and assigns shall meet the applicable provisions contained in 27CCR, Division 2, Subdivision 1 of the California Code of Regulations and Division 7 of the California Water Code, and shall comply with the following:

A. PROHIBITIONS

1. The treatment, storage and discharge of treated groundwater shall not create a nuisance as defined in Section 13050(m) of the California Water Code, nor degrade the quality of the groundwater in the aquifers to which it is injected.
2. There shall be no bypass or overflow of untreated or inadequately treated waste groundwater to waters of the state from the Dow's wastewater collection, treatment, or distribution facilities.
3. The discharger shall not cause the following conditions to exist in waters of the State at any place outside the extraction well capture zone:
 - a. Surface Waters
 - Floating, suspended, or deposited macroscopic particulate matter or foam.
 - Bottom deposits or aquatic growth.
 - Turbidity, apparent color, or water levels beyond natural background levels.
 - Visible, floating, suspended or deposited oil or other products of petroleum origin.
 - Toxic or other deleterious substances in concentrations or quantities which may cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

b. Groundwater

Further significant migration of pollutants through subsurface transport to waters of the State is prohibited.

B. SPECIFICATIONS

1. All reports submitted pursuant to this Order shall be prepared under the supervision of and signed by a California registered engineer, registered geologist, or certified engineering geologist.
2. The site shall be protected from any washout or erosion of wastes or covering material and from inundation which could occur as a result of a 100 year, 24 hour precipitation event.
3. The discharger shall maintain all devices or designed features, installed in accordance with this Order such that they continue to operate as intended without interruption except as a result of failures that could not have been reasonably foreseen or prevented by the discharger.
4. The discharger shall conduct monitoring activities according to the Self-Monitoring and Reporting Program attached to this Order and as may be amended by the Executive Officer to verify the effectiveness of groundwater containment and/or closure systems.
5. At any time, the discharger may file a written request (including supporting documentation) with the Executive Officer, proposing modifications to the attached Self-Monitoring and Reporting Program. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the Self-Monitoring and Reporting Program.
6. The discharger shall notify the Board at least six months prior to beginning any final closure activities for the Northeast Landfill.
7. The discharger shall comply with all applicable provisions of 27CCR that are not specifically referred to in this Order.
8. The discharger shall maintain hydraulic containment in the perimeter groundwater extraction system upon completion of the initial start-up period. Thereafter, the hydraulic containment system shall continue to operate as intended without interruption except for limited periods of maintenance and repair. Compliance shall be demonstrated with potentiometric water elevation contour maps, submitted pursuant to the Self-Monitoring and Reporting Program attached to this Order, which graphically demonstrate maintenance of an inward hydraulic gradient into the extraction system.

C. PROVISIONS

1. The discharger shall submit two Semiannual Self-Monitoring and Reporting Program Reports, one for the winter/spring (wet) season, and one for the summer/fall (dry) season. The reporting period for each semiannual report is six months: winter/spring semester = January 1 to June 30; summer/fall semester = July 1 to December 31. The discharger shall also submit an Annual Self-Monitoring and Reporting Program Summary Report covering the previous monitoring year. The annual summary report can be combined with the summer/fall report. The semiannual self-monitoring reports shall be filed no later than 60 days after the end of the reporting period.

ANNUAL SUMMARY REPORT DUE DATE EACH YEAR: March 1
SEMIANNUAL REPORT DUE DATE EACH YEAR: August 31

2. **HEXACHLOROBENZENE TRENCH FINAL COVER INSTALLATION PLAN**

Dow shall submit a detailed plan, acceptable to the Executive Officer, for construction and maintenance of a final cover over the Hexachlorobenzene Trench. The cover design shall include a low-hydraulic-conductivity layer and an erosion-resistant layer that meet all applicable provisions of 23CCR, Division 3, Chapter 15. Also included shall be a plan for installation and monitoring of at least two additional shallow monitoring wells located between existing well 501A near the trench and wells 118 A and 503A near the Kirker Creek Remnant Channel. After installation, these wells will be added to the Self-Monitoring and Reporting Program accompanying this Order.

COMPLIANCE DATE: July 31, 1998

3. **HEXACHLOROBENZENE TRENCH FINAL COVER DOCUMENTATION OF COMPLETION REPORT**

Dow shall submit a report, acceptable to the Executive Officer, certifying that installation of a final cover over the Hexachlorobenzene Trench has been completed in accordance with an approved installation plan and all other applicable requirements of this Order. The report shall include as-built drawings of the installed cover and documentation that the low hydraulic conductivity layer has a permeability of 1×10^{-7} cm/s or less. The report shall also contain proof of institutional controls in place at the facility to prevent excavation in the area of the Hexachlorobenzene Trench.

COMPLIANCE DATE: December 31, 1998

4. **FORMER OUTFALL POND AREA FINAL CLOSURE PLAN**

Dow shall submit a detailed plan, acceptable to the Executive Officer, for final closure of the Former Outfall Pond and mercury-contaminated soil in adjacent open space bounded by the Levee Road to the north, 1st Street to the south, the Levee Road and "A" Street to the west, and the storm water retention basin to the east. Alternatives for closure must be protective of both human and ecological receptors. Alternatives may include, but not necessarily be limited to, capping in-place with downgradient groundwater monitoring, or excavation and off-site disposal. The plan should evaluate each alternative in terms of effectiveness, feasibility, and cost, and identify the preferred alternative based on these criteria. Any proposed cover design must include a low-hydraulic-conductivity layer and an erosion-resistant layer that meet all applicable provisions of 23CCR, Division 3, Chapter 15.

COMPLIANCE DATE: February 28, 1999

5. **FORMER OUTFALL POND AREA FINAL CLOSURE DOCUMENTATION OF COMPLETION REPORT**

Dow shall submit a report, acceptable to the Executive Officer, certifying that implementation of final closure for the Former Outfall Pond sediment and adjacent mercury-contaminated soils has been completed in accordance with an approved closure plan and all other applicable requirements of this Order. The report shall include as-built drawings of any permanently installed structures or corrective action measures. The report shall also contain proof of institutional controls in place at the facility to prevent excavation in the area of the Former Outfall Pond.

COMPLIANCE DATE: December 31, 1999

6. **PRELIMINARY CLOSURE AND POST-CLOSURE MAINTENANCE PLAN FOR NORTHEAST LANDFILL**

Dow shall submit a preliminary plan, acceptable to the Executive Officer, for closure construction and post-closure maintenance of the Northeast Landfill. The plan shall provide for compliance with standards for waste containment and precipitation and drainage controls as promulgated in Article 4 (Section 20310 et seq.), and the monitoring program requirements in Article 5 (Section 20380 et seq.) of 27CCR, Chapter 3 throughout the closure period and post-closure maintenance period.

COMPLIANCE DATE: December 31, 1998

7. **GROUNDWATER AND SURFACE WATER SAMPLING AND ANALYSIS PLAN FOR CORRECTIVE ACTION MONITORING**

Dow shall submit a Water Quality Sampling and Analysis Plan (SAP), acceptable to the Executive Officer, which gives a complete and detailed description of the physical process of obtaining field information, measurements, and water quality samples. The SAP should be useable as a stand-alone document and a copy of the current SAP must be available to each member of the sampling team. The SAP must contain sufficient detail for a sampler with limited experience to understand and follow and to ensure that sampling will be conducted in the same manner by different samplers.

COMPLIANCE DATE: October 31, 1998

8. **WELL INSTALLATION REPORT**

Dow shall submit a 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 attached Groundwater Corrective Action Self Monitoring Program (attachment A).

COMPLIANCE DATE: 45 days following completion of well installation activities

9. **FINANCIAL ASSURANCE INSTRUMENT**

Dow shall submit a report, acceptable to the Executive Officer, which assures financial responsibility for closure and post-closure maintenance of existing waste management units and completion of corrective action according to the *Corrective Action Plan for the Pittsburg Facility of the Dow Chemical Company* dated September 19, 1997. Dow shall adjust the cost no less frequently than every five years to account for inflation and any changes in facility design, construction, or operation. For purposes of planning Dow shall assume a post-closure period of at least 30 years. However, the post-closure maintenance and corrective action periods shall extend as long as contaminants in groundwater pose a threat to water quality.

COMPLIANCE DATE: December 31, 1998, and every five years thereafter

10. **CERTIFICATION OF INSTALLATION AND IMPLEMENTATION OF FINAL CORRECTIVE ACTION GROUNDWATER EXTRACTION AND TREATMENT SYSTEM**

Dow shall submit a report, acceptable to the Executive Officer, documenting completion of construction and commencement of full-scale operation of the groundwater extraction and treatment system as proposed in Section 2 of *Corrective Action Plan for the Pittsburgh Facility of the Dow Chemical Company* dated September 19, 1997.

COMPLIANCE DATE: March 31, 2000

11. **QUARTERLY PROGRESS REPORT ON START-UP PERIOD**

Dow shall submit a report, acceptable to the Executive Officer, documenting the performance of the groundwater extraction and treatment system during the start-up period. The report shall include, at a minimum, the following information:

- i. Progress in design and construction of the groundwater treatment plant and collection /distribution system;
- ii. Volume of water pumped and treated on a monthly basis and identity of extraction wells pumped during reporting period;
- iii. Degree of hydraulic containment achieved;
- iv. Reasons for down time, if any;
- v. Corrective actions taken to improve performance, if any;
- vi. Plans for upgrades or changes in the next reporting period, if any.

COMPLIANCE DATES: The last day of the month following the end of the previous quarter, i.e., April 30, July 31, October 31, and January 31 until completion of the start-up period has been approved by the Executive Officer – Note: the start-up period will be considered complete when Dow demonstrates that the perimeter groundwater extraction system is capable of maintaining continuous hydraulic containment

12. **Duty to Comply:** The discharger must comply with all conditions of these waste discharge requirements. Violations may result in enforcement actions, including Regional Board orders or court orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of these waste discharge requirements by the Regional Board. (CWC Section 13261, 13263, 13265, 13268, 13300, 13301, 13304, 13340, 13350).

13. **General Prohibition:** Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code (CWC). (H & SC Section 5411, CWC Section 13263)

14. **Availability:** A copy of these waste discharge requirements shall be maintained at the discharge facility and be available at all times to operating personnel. (CWC Section 132631)

15. **Change In Ownership:** The discharger must notify the Executive Officer, in writing at least 30 days in advance of any proposed transfer of this Order's responsibility and coverage to a new discharger. The notice must include a written agreement between the existing and new discharger containing a specific date for the transfer of this order's responsibility and coverage between the current discharger and the new discharger. This agreement shall include an acknowledgment that the existing discharger is liable for violations up to the transfer date and that the new discharger is liable from the transfer date on. [CWC Sections 13267 and 13263]

16. **Change in Discharge:** In the event of a material change in the character, location, or volume of a discharge, the discharger shall file with this Regional Board a new Report of Waste Discharge. [CWC Section 13260(c)]. A material change includes, but is not limited to, the following:
 - (a) Addition of a major industrial waste discharge to discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the waste.
 - (b) Significant change in disposal method, e.g., change from a land disposal to a direct discharge to water, or change in the method of treatment which would significantly alter the characteristics of the waste.
 - (c) Significant change in the disposal area, e.g., moving the discharge to another drainage area, to a different water body, or to a disposal area significantly removed from the original area potentially causing different water quality or nuisance problems.
 - (d) Increase in flow beyond that specified in the waste discharge requirements.
 - (e) Increase in area or depth to be used for solid waste disposal beyond that specified in the waste discharge requirements [CCR Title 23 Section 2210]

17. **Revision:** These waste discharge requirements are subject to review and revision by the Regional Board. [CCR Section 132631]
18. **Termination:** Where the discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Board, it shall promptly submit such facts or information. [CWC Sections 13260 and 13267]
19. **Vested Rights:** This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, do not protect the discharger from his liability under Federal, State or local laws, nor do they create a vested right for the discharger to continue the waste discharge. [CWC Section 13263(g)]
20. **Severability:** Provisions of these waste discharge requirements are severable. If any provisions of these requirements are found invalid, the remainder of these requirements shall not be affected. [CWC 9213]
21. **Operation and Maintenance:** The discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this order. [CWC Section 13263(f)]
22. **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) 286-1255 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.

23. **Entry and Inspection:** The discharger shall allow the Regional Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:
- (a) Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this order;
 - (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this order;
 - (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
 - (d) Sample or monitor at reasonable times, for the purposes of assuring compliance with this order or as otherwise authorized by the California Water Code, any substances or parameters at any location. [CWC Section 13267]
24. **Monitoring Devices:** All monitoring instruments and devices used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices. Annually, the discharger shall submit to the Executive Officer a written statement signed by a registered professional engineer certifying that all flow measurement devices have been calibrated and will reliably achieve the accuracy required.
25. **Analytical Methods:** Unless otherwise permitted by the Regional Board Executive officer, all analyses shall be conducted at a laboratory certified for such analyses by the State Department of Health Services. The Regional Board Executive Officer may allow use of an uncertified laboratory under exceptional circumstances, such as when the closest laboratory to the monitoring location is outside the State boundaries and therefore not subject to certification. All analyses shall be required to be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" [40 CFR Part 136] promulgated by the U.S. Environmental Protection Agency. [CCR Title 23, Section 2230]
26. **Treatment:** In an enforcement action, it shall not be a defense for the discharger that it would have been necessary to halt or to reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of

the treatment facility, the discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced, or is lost. [CWC Section 13263(f)]

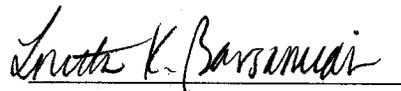
27. **Discharges To Navigable Waters:** Any person discharging or proposing to discharge to navigable waters from a point source (except for discharge of dredged or fill material subject to Section 404 of the Clean Water Act and discharge subject to a general NPDES permit) must file an NPDES permit application with the Regional Board. [CCR Title 2 Section 223571]

28. **Endangerment of Health or the Environment:** The discharger shall report any noncompliance that may endanger 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. The following occurrences must be reported to the Executive Officer within 24 hours;
 - (a) Any bypass from any portion of the treatment facility.
 - (b) Any discharge of treated or untreated wastewater resulting from sewer line breaks, obstruction, surcharge or any other circumstances.
 - (c) Any treatment plant upset which causes the effluent limitation of this Order to be exceeded. [CWC Sections 13263 and 13267]

29. **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. RWQCB - San Francisco Bay Region
 - b. Cal/EPA Department of Toxic Substances ControlThe Executive Officer may modify this distribution list as needed.

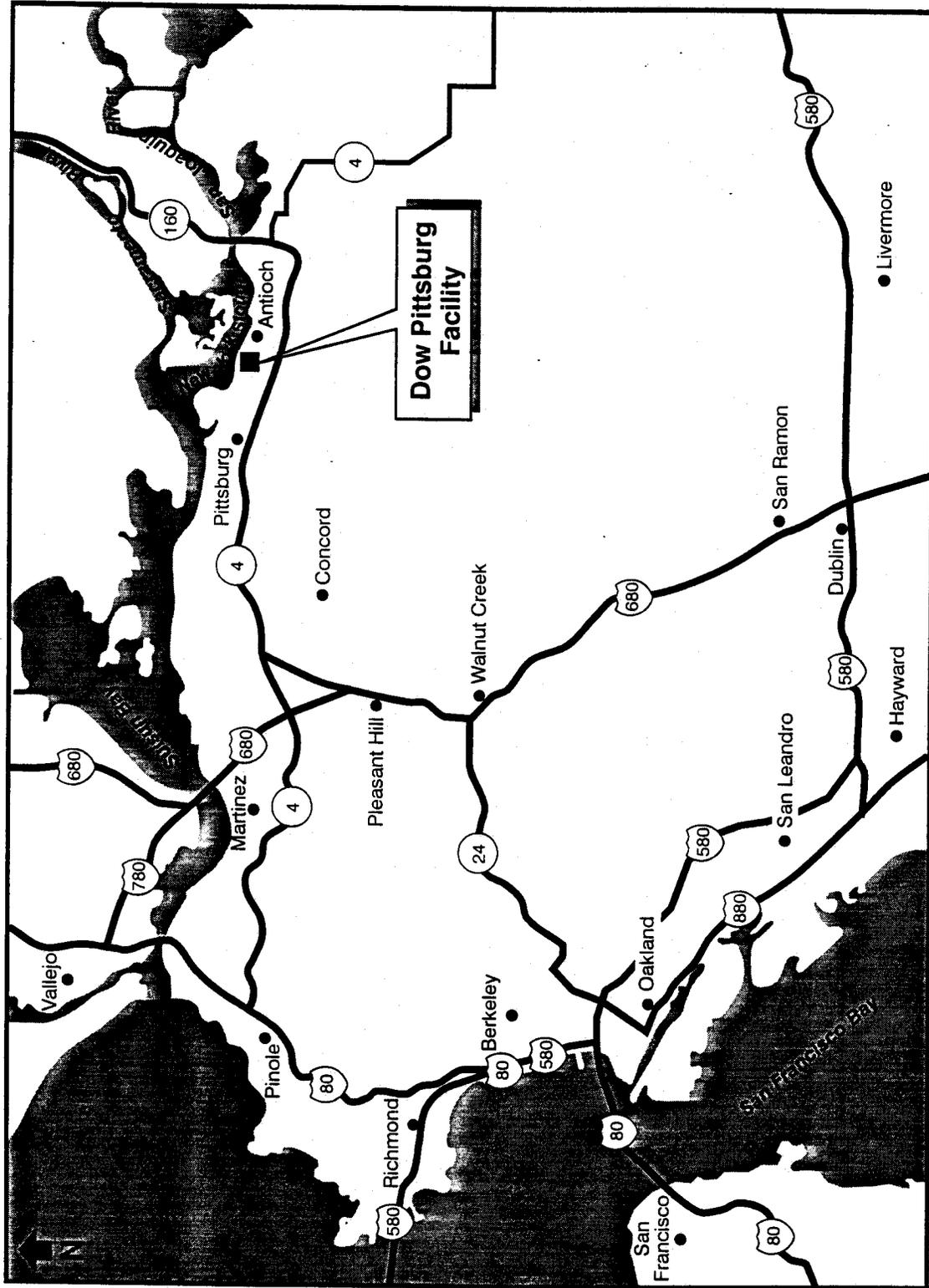
30. This Order supersedes WDRs 87-064 and 87-158. Orders 87-064 and 87-158 are hereby rescinded.

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 June 17, 1998.

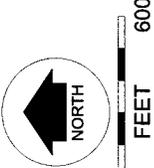
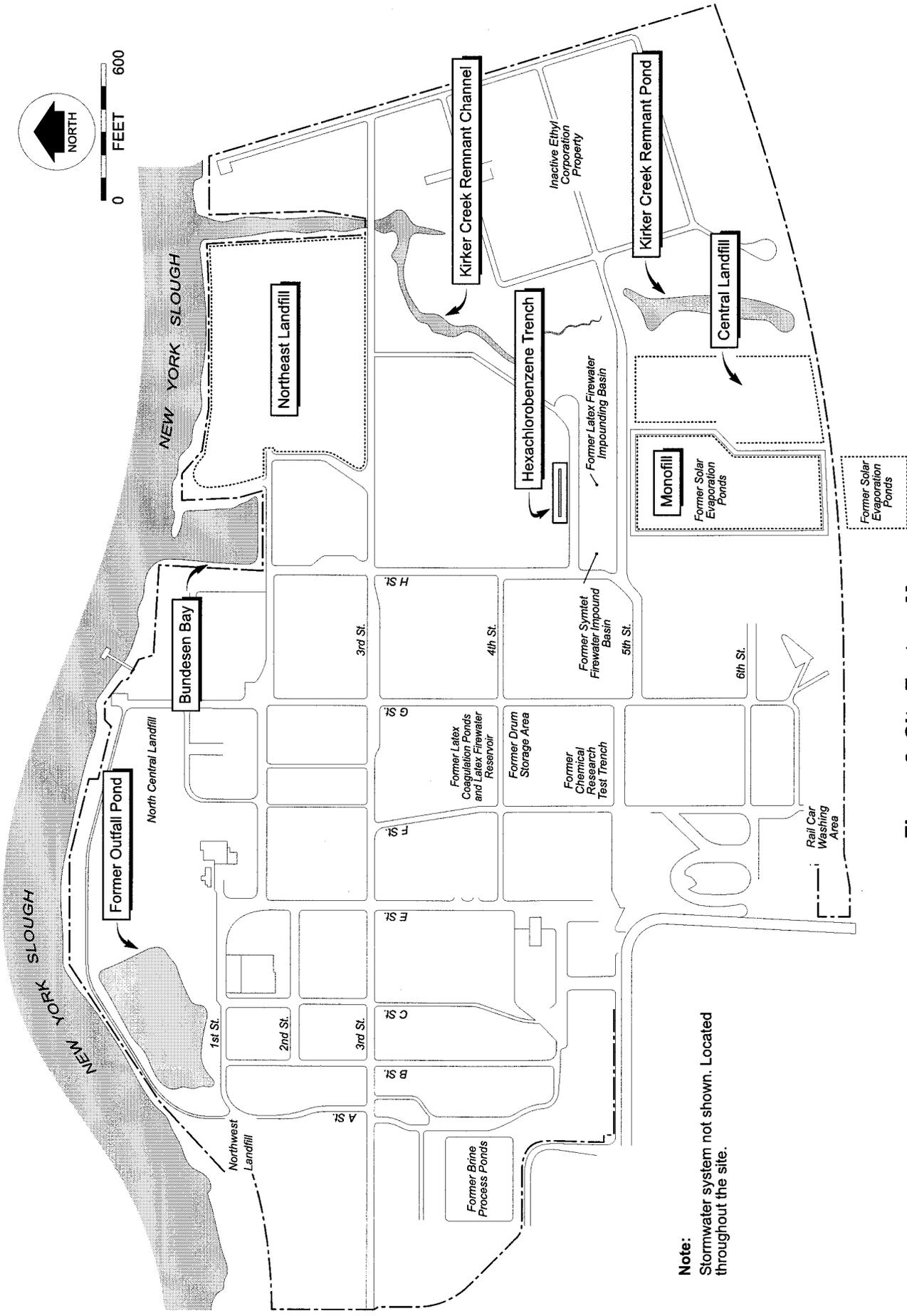


Loretta K. Barsamian
Executive Officer

Attachments: Figure 1 - Site Location Map
Figure 2 - Site Feature Map
Figure 3 - Extraction System Map

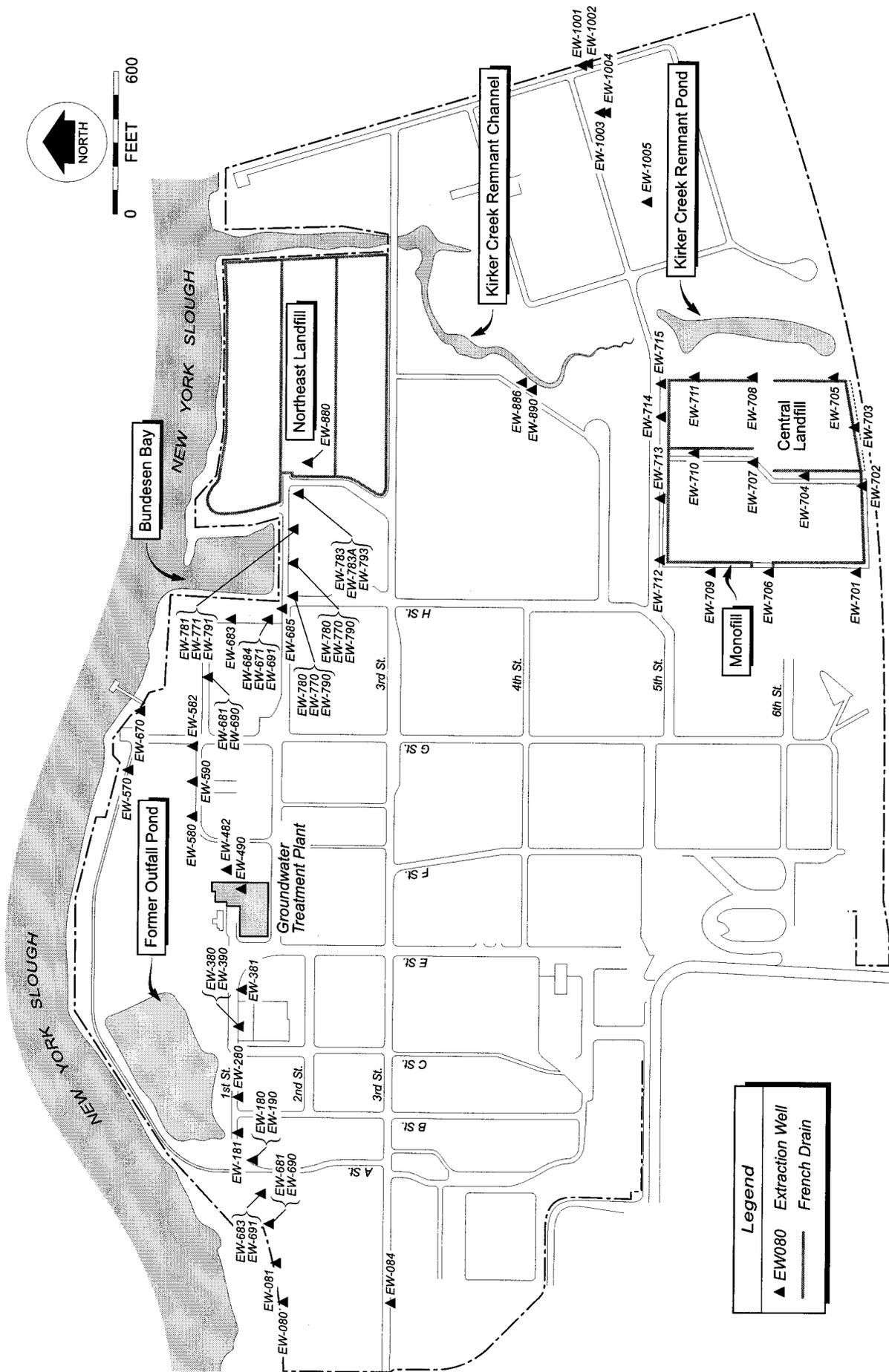


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|---|
| State of California Regional Water Quality Control Board San Francisco Bay Region |
| Figure 1: Site Location Map The Dow Chemical Company Pittsburg CA Facility |



Note: Stormwater system not shown. Located throughout the site.

**Figure 2. Site Feature Map
The Dow Chemical Company**



**Figure 3. Groundwater Extraction System
The Dow Chemical Company**

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

GROUNDWATER CORRECTIVE ACTION
SELF-MONITORING AND REPORTING PROGRAM

FOR

DOW CHEMICAL COMPANY
PITTSBURG FACILITY
RICHMOND MANUFACTURING FACILITY

CONTRA COSTA COUNTY

ORDER NO. 98-059

A. GENERAL

1. Reporting responsibilities of waste dischargers are specified in Sections 13225(a), 13267(b), 13383, and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16. This Self-Monitoring Program is issued in accordance with Provision 1 of Regional Board Order No. 98-059.
2. The principal purposes of a discharge monitoring program are: (1) to document compliance with waste discharge requirements and prohibitions established by the Board, (2) to facilitate self-policing by the waste dischargers in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of standards of performance, pretreatment and toxicity standards, and 4) to assist the dischargers in complying with the requirements of the California Code of Regulations.

B. SAMPLING AND ANALYTICAL METHODS

1. Sample collection, storage, and analyses shall be performed according to the most recent version of EPA Standard Methods and in accordance with an approved sampling and analysis plan.
2. Water and waste analysis shall be performed by a laboratory approved for these analyses by the State of California. The director of the laboratory whose name appears on the certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Regional Board.
3. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

C. DEFINITION OF TERMS

1. A grab sample is a discrete sample collected at any time.
2. Receiving waters refers to any surface or groundwater which actually or potentially receives surface or groundwater which passes over, through, or under waste materials or contaminated soils. In this case the groundwater beneath and adjacent to the facility, the surface runoff from the site, adjacent wetlands, New York Slough, Bundesen Bay, and the Kirker Creek Remnant Channel are considered receiving waters.
3. Standard observations refer to:

- a. Receiving Waters
 - i. Floating and suspended materials of waste origin: presence or absence, source, and size of affected area
 - ii. Discoloration and turbidity: description of color, source, and size of affected area
 - iii. Evidence of odors, presence or absence, characterization, source, and distance of travel from source

- b. Perimeters of the waste management units consisting of the former Solar Evaporation Ponds (Monofill), Central Landfill, and Northeast Landfill
 - i. Evidence of liquid leaving or entering the waste management units, estimated size of affected area and flow rate. (Show affected area on map)
 - ii. Evidence of odors, presence or absence, characterization, source, and distance of travel from source
 - iii. Evidence of erosion and/or daylighted waste

- c. The waste management units listed in C.3(b)
 - i. Evidence of ponded water at any point
 - ii. Evidence of odors, presence or absence, characterization, source, and distance of travel from source
 - iii. Evidence of erosion and/or daylighted waste

D. SAMPLING, ANALYSIS, AND OBSERVATIONS

The discharger is required to perform sampling, analyses, and observations in the following media:

1. Groundwater per 23CCR, Section 2550.7(b), and 27CCR, Section 20415(b), and
2. Surface water per 23CCR, Section 2550.7(c), and 27CCR, Section 20415(c),

and per the non-statistical portions of the general requirements specified in 23CCR, Section 2550.7(e) and 27CCR, Section 20415(e).

E. RECORDS TO BE MAINTAINED

Written reports shall be maintained by the dischargers or laboratory, and shall be retained for a minimum of five years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Board. Such records shall show the following for each sample:

1. Identity of sample and sample station number.
2. Date and time of sampling.
3. Date and time that analyses are started and completed, and name of the personnel performing the analyses.
4. Complete procedure used, including method of preserving the sample, and the identity and volumes of reagents used.
5. Calculation of results.
6. Results of analyses, and detection limits for each analysis.

F. REPORTS TO BE FILED WITH THE BOARD

1. The discharger shall submit two Semiannual Self-Monitoring and Reporting Program Reports, one for the winter/spring (wet) season, and one for the summer/fall (dry) season. The reporting period for each semiannual report is six months: winter/spring semester = January 1 to June 30; summer/fall semester = July 1 to December 31. **The submittal deadlines for the summer/fall and winter/spring semiannual reports are March 1 and August 31, respectively.** The discharger shall also submit an Annual Self-Monitoring and Reporting Program Summary Report covering the previous monitoring year. The annual summary report can be combined with the summer/fall report. The semiannual reports shall include, but are not limited to the following:

a. Letter of Transmittal

A letter transmitting the essential points in each report should accompany each report. Such a letter shall include a discussion of **any requirement** violations found during the last report period, and actions taken or planned for correcting the violations. If the Dischargers have previously submitted a detailed time schedule for correcting requirement violations, a reference to the correspondence transmitting such schedule will be satisfactory. If no violations have occurred in the last report period this shall be stated in the letter of transmittal. Monitoring reports and the letter transmitting the monitoring reports shall be signed by a principal executive officer at the level of vice president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates. The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true, complete, and correct.

- b. Each semiannual monitoring report shall include a compliance evaluation summary. The summary shall contain:
 - i. A graphic description of the elevation, velocity, and direction of

groundwater flow under/around the facility, based upon the past and present water level elevations and pertinent visual observations (data to be collected quarterly).

- ii. The method and time of water level measurement, the type of pump used for purging, pump placement in the well; method of purging, pumping rate, equipment and methods used to monitor field pH, temperature, and conductivity during purging, calibration of the field equipment, results of the field pH, temperature, conductivity and turbidity observations, well recovery time or rate (as applicable), and method of disposing of the purge water. Stabilization of field parameters may not be applicable for wells with extremely slow recovery. In place of tabulating field data, field sampling logs can be included as an appendix to the monitoring report.
 - iii. A written discussion of the groundwater analyses indicating any change in the quality or characteristics of the groundwater.
 - iv. Type of pump used, pump placement for sampling, a detailed description of the sampling procedure; number and description of equipment, field and travel blanks; number and description of duplicate samples; type of sample containers and preservatives used, the date and time of sampling, the name and qualifications of the person actually taking the samples, and any other observations.
- c. A comprehensive discussion of the compliance record and status, as well as any corrective actions taken or planned which may be needed to bring the Discharger into full compliance with the Waste Discharge Requirements and 23CCR, Chapter 15 or 27CCR, Chapter 3.
 - d. A map or aerial photograph shall accompany each report showing observation and monitoring station locations.
 - e. Laboratory statements of results of analyses specified in Part B must be included in each report. The director of the laboratory whose name appears on the laboratory certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Board.
 - i. The methods of analyses and detection limits must be appropriate for the expected concentrations. Specific methods of analyses must be identified. If methods other than EPA approved methods or Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer prior to use.
 - ii. In addition to the results of the analyses, laboratory quality assurance/quality control (QA/QC) information must be included in the monitoring report. The laboratory QA/QC information should include the

method, equipment and analytical detection limits; the recovery rates; an explanation for any recovery rate that is less than the recovery acceptance limits specified in the USEPA method procedures or the laboratory's acceptance limits, if they are more stringent than those in the USEPA method procedures; the results of equipment and method blanks; the results of spiked and surrogate samples; the frequency of quality control analysis; and the name and qualifications of the person(s) performing the analyses.

- f. A summary and certification of completion of all standard observations for the waste management units, the perimeters of the waste management units, and the receiving waters.
- g. The Annual Monitoring Report shall be submitted to the Board covering the previous monitoring year. The Report shall include, but is not limited to, the following:
- i. A graphical presentation of the analytical data [23CCR, Chapter 15, Article 5, §2505.7(e)(14)]. For each monitoring point, submit in graphical format the laboratory analytical data for all samples taken. Each graph shall plot the concentration of one or more constituents over time for a given monitoring point, at a scale appropriate to show trends or variations in water quality;
 - ii. A tabular summary of all the monitoring data obtained during the previous year. The report should be accompanied by a 3¹/₂ inch computer data disk, MS-DOS ASCII format, tabulating the year's data;
 - iii. A comprehensive discussion of the compliance record, and the corrective actions taken or planned which may be needed to bring the dischargers into full compliance with the waste discharge requirements;
 - iv. A map showing the area, if any, in which filling of the Northeast Landfill has been completed during the previous calendar year;
 - v. A written summary of the groundwater analyses indicating any change in the quality of the groundwater; and
 - vi. An evaluation of the effectiveness of the Solar Evaporation Pond leachate monitoring/ control system, which includes an evaluation of leachate buildup within the disposal units, a summary of leachate volumes removed from the units, and a discussion of the leachate disposal methods utilized.

2. Contingency Reporting

- a. The Discharger shall report by telephone concerning **any seepage** from the surface of the disposal area immediately after it is discovered. A written report shall be filed with the Board within seven days, containing at least the following information:
- i. A map showing the location(s) of seepage;
 - ii. An estimate of the flow rate;
 - iii. A description of the nature of the discharge (e.g., all pertinent observations and analyses); and
 - iv. Corrective measures underway or proposed.

3. Well Logs

A boring log and a monitoring well construction log shall be submitted for each sampling well established for this monitoring program, as well as a report of inspection or certification that each well has been constructed in accordance with the construction standards of the Department of Water Resources. These shall be submitted within 45 days after the completion of well installation activities.

PART B: MONITORING AND OBSERVATION SCHEDULE

1. ON-SITE OBSERVATIONS

The Monofill, the Central Landfill, and the Northeast Landfill shall be monitored according to the following; with results reported semiannually.

| STATION | DESCRIPTION | OBSERVATIONS | FREQUENCY |
|----------------------------|--|--|---|
| V-1 thru V-'n' | Located on the waste disposal area as delineated by a 500 foot grid network. | Standard observations for the waste management unit. | Weekly observations (Nov. thru April), monthly observations (May thru Oct.) report semiannually. |
| P-1 thru P-'n' (perimeter) | Located at equidistant intervals not exceeding 1000 feet around the perimeter of the facility. | Standard observations for the perimeter. | Weekly observations (Nov. thru April), monthly observations (May thru Oct.), report semiannually. |

A map showing the visual and perimeter compliance points (V and P stations) shall be submitted by the discharger along with the semiannual monitoring reports.

2. SEEPAGE MONITORING

Seepage monitoring stations include any point at which seepage is found occurring from the disposal area. The waste management unit perimeters of the Monofill, the Central Landfill, and the Northeast Landfill shall be monitored according to the following; with results reported semiannually.

| STATION | DESCRIPTION | OBSERVATIONS | FREQUENCY |
|----------------|---|---|--|
| S-1 thru S-'n' | At any point(s) at which seepage is found occurring from the disposal area. | Standard observation for the perimeter and grab sample for analysis of Table 1 constituents | Daily until remedial action is taken and seepage ceases. |

3. WASTE MONITORING – Observe as Needed, Report Semiannually

The Discharger shall record the total volume of each load of brine mud waste disposed of in the Northeastern Landfill during the reporting period and the remaining landfill capacity.

4. CHEMICAL CONSTITUENT MONITORING

The discharger shall sample the monitoring points shown on Figure 1 for the analytical parameters at the frequency listed in Table 1. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of the Sampling and Analysis Plan.

Table 1: Sampling and Analysis Schedule for Surface Water and Groundwater Chemical Parameter Monitoring

| Name | Frequency | Rationale | Analysis/EPA Method |
|--|------------|-------------------------------------|------------------------|
| Surface Water Sampling Locations (Bundesen Bay) | | | |
| BB-01 (SW corner) | Quarterly | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| BB-02 (SE corner) | Quarterly | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| BB-03 (mouth) | Quarterly | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| Water Table Interval | | | |
| 114A | Annual | Downgradient of CLF; Interior | VOCs, SVOCs/8260, 8270 |
| 117A | Annual | Downgradient of Monofill; Interior | VOCs, SVOCs/8260, 8270 |
| 202A | Semiannual | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| 204A | Semiannual | Downgradient of Former Outfall Pond | Mercury/7470 |
| 206A** | Semiannual | Western Property Boundary | VOCs, SVOCs/8260, 8270 |
| 306A | Semiannual | Downgradient of Former Outfall Pond | Mercury/7470 |
| 406A | Semiannual | Adjacent to Bundesen Bay | VOCs, SVOCs/8260, 8270 |
| 503A | Semiannual | Adjacent to Kirker Creek Channel | VOCs, SVOCs/8260, 8270 |
| 601A | Semiannual | Downgradient of NELF; Perimeter | VOCs, SVOCs/8260, 8270 |
| 603A | Semiannual | Downgradient of NELF; Perimeter | VOCs, SVOCs/8260, 8270 |
| 803A** | Semiannual | Downgradient of Former Outfall Pond | Mercury/7470 |
| 805A** | Semiannual | Downgradient of Former Outfall Pond | Mercury/7470 |
| Mid-Depth Interval | | | |
| 114B1 | Annual | Downgradient of CLF; Interior | VOCs, SVOCs/8260, 8270 |
| 116B1 | Annual | Downgradient of Monofill | VOCs, SVOCs/8260, 8270 |
| 202B1 | Semiannual | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| 206B** | Semiannual | Western Property Boundary | VOCs SVOCs/8260, 8270 |
| 306B** | Semiannual | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| 422B** | Annual | Interior | VOCs, SVOCs/8260, 8270 |
| 406B1 | Semiannual | Adjacent to Bundesen Bay | VOCs, SVOCs/8260, 8270 |
| 503B** | Semiannual | Adjacent to Kirker Creek Channel | VOCs, SVOCs/8260, 8270 |
| 507B1 | Annual | Downgradient of Monofill; Interior | VOCs, SVOCs/8260, 8270 |
| 601B1 | Semiannual | Downgradient of NELF | VOCs, SVOCs/8260, 8270 |
| 603B1 | Semiannual | Downgradient of NELF | VOCs, SVOCs/8260, 8270 |
| 804B** | Semiannual | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| 903B1 | Semiannual | Downgradient of 900/1000 Block | VOCs, SVOCs/8260, 8270 |
| 904B1 | Semiannual | Downgradient of 900/1000 Block | VOCs, SVOCs/8260, 8270 |
| Deep Interval | | | |
| 115C | Annual | Downgradient of Monofill; Interior | VOCs, SVOCs/8260, 8270 |
| 202C | Semiannual | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |

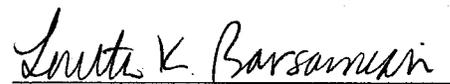
| Name | Frequency | Rationale | Analysis/EPA Method |
|--------|------------|------------------------------------|------------------------|
| 206C** | Semiannual | Western Property Boundary | VOCs, SVOCs/8260, 8270 |
| 308C** | Semiannual | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| 406C | Semiannual | Adjacent to Bundesen Bay | VOCs, SVOCs/8260, 8270 |
| 422C** | Annual | Interior | VOCs, SVOCs/8260, 8270 |
| 503C** | Semiannual | Adjacent to Kirker Creek Channel | VOCs, SVOCs/8260, 8270 |
| 507C | Annual | Downgradient of Monofill; Interior | VOCs, SVOCs/8260, 8270 |
| 601C | Semiannual | Downgradient of NELF | VOCs, SVOCs/8260, 8270 |
| 804C** | Semiannual | Downgradient of Extraction System | VOCs, SVOCs/8260, 8270 |
| 611C** | Annual | Downgradient of Monofill; Interior | VOCs, SVOCs/8260, 8270 |

- ** = Proposed monitoring well
- CLF = Central Landfill
- NELF = Northeast Landfill
- SE = Southeast
- SVOCs = semivolatile organic compounds
- SW = Southwest
- VOCs = volatile organic compounds

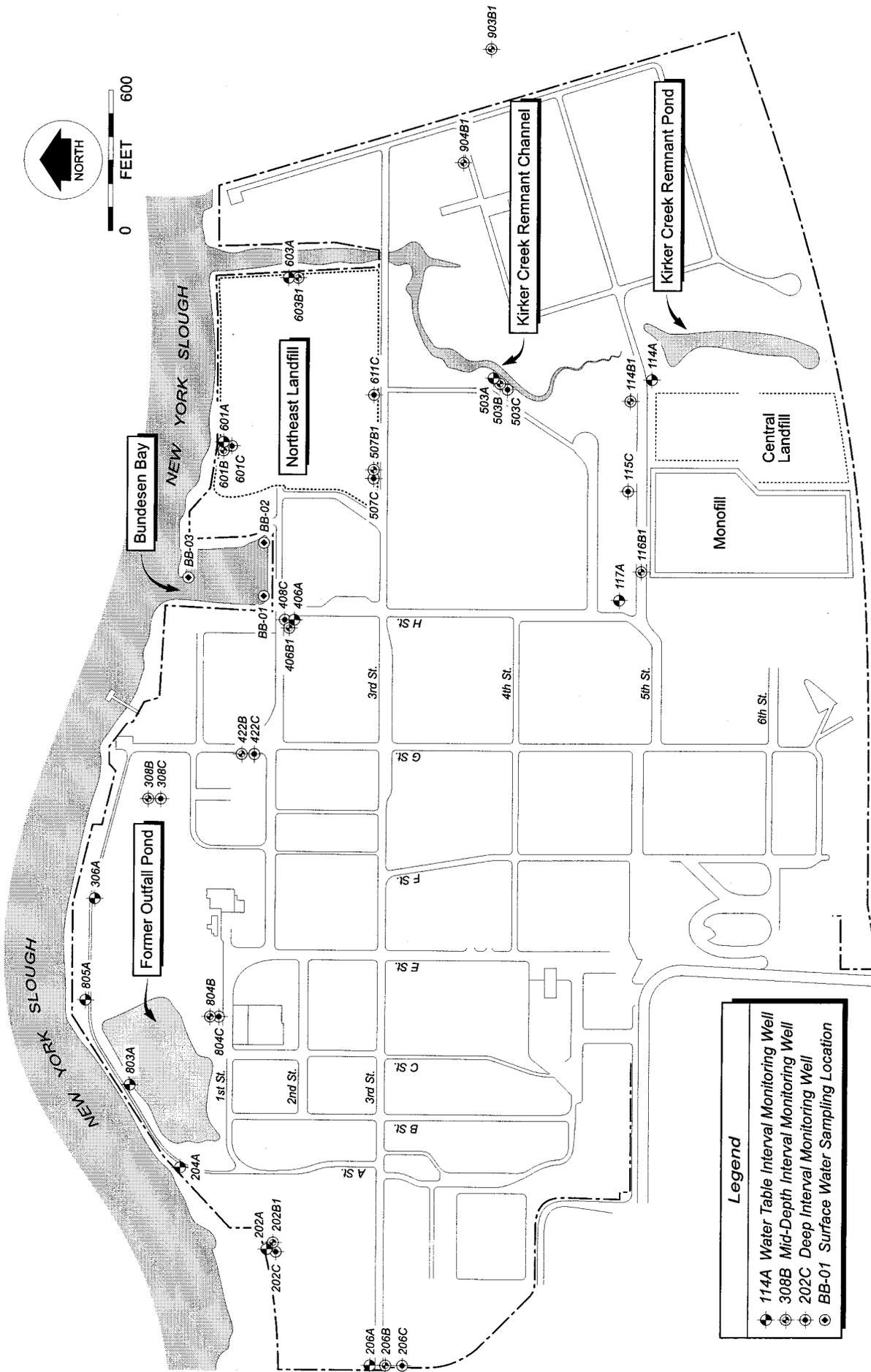
I, Loretta K. Barsamian, Executive Officer, hereby certify that the foregoing Self-Monitoring and Reporting Program:

1. Has been developed in accordance with the procedures set forth in this Board's Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in this Board's Order No. 98-059.
2. Is effective on the date shown below.
3. May be reviewed or modified at any time subsequent to the effective date, upon written notice from the Executive Officer.

Date Ordered: June 17, 1998


Loretta K. Barsamian
Executive Officer

Attachment: Figure 1 – Monitoring Well Location Map



**Figure 1. Monitoring Well Location Map
The Dow Chemical Company**