Water Quality Monitoring Plan

Oyster Point Landfill

South San Francisco, California

November 2000

Prepared for:
City of South San Francisco

Prepared by:
Gabewell
with PES Environmental, Inc.

CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

The Oyster Point Landfill is a closed, unlined Class III landfill located along the San Francisco Bay in the City of South San Francisco (City) (Figure 1). The City owns the landfill. The majority of the landfill is open space but a portion of the landfill has been developed and includes a public marina, boat launch, a small yacht club, a boat sales building, and a small office and hotel complex (Figure 2). The San Mateo Harbor District (Harbor District) operates the public marina on the landfill and is responsible for ongoing landfill maintenance. Commercial development is planned for the western portion of the site. Even after the proposed construction, the landfill area will continue to consist primarily of undeveloped open space and paved parking areas.

In anticipation of future development the Regional Water Quality Control Board (RWQCB) issued order No. 00-046 on June 21, 2000 (Order) (Appendix A). The Order imposes new closure and post-closure requirements on the City as part of future development. This Water Quality Monitoring Plan (WQMP) was prepared in compliance with Provision 7 of the Order.

The primary purpose of a water quality monitoring plan is to detect "measurably significant" evidence of leachate migration out of the waste-bearing unit. To achieve this objective, a monitoring program collects samples from monitoring points in the vicinity or downgradient of the waste, in areas where leachate migration would likely be encountered. The samples are analyzed for chemical components of leachate that are not present in surrounding unaffected media, to ensure that presence of a chemical is due to a release of leachate. The resulting chemical data is evaluated, often using statistical techniques, to determine whether the presence of chemicals is "measurably significant" evidence of leachate migration. Periodic inspection of the landfill is also included to detect physical evidence of changing conditions such as leachate buildup or leakage.

The WQMP work scope and implementation schedule have been developed in accordance with the RWQCB Order and the California Code of Regulations (CCR) Title 27. Title 27 promulgates standards for protection of public health and the environment with respect to releases from disposal sites. The WQMP relies on information generated during previous site investigation activities, most notably as presented in the Joint Technical Document (Gabewell with PES, March 2000).

The WQMP is organized as follows:

- Section 2 presents a summary discussion of the site background, landfill history, and site hydrogeological setting.
- Section 3 presents a discussion of the regulatory requirements for the WQMP.
- Section 4 presents a discussion of the proposed detection monitoring program.

- Section 5 describes procedures to be implemented for development of Maximum Acceptable Concentration Limits (MACLs).

- Section 6 describes the Detection Monitoring, Evaluation Monitoring and Corrective Action programs. A Leachate Management Program is also included in this Section

- Appendix A is a copy of RWQCB Order No. 00-046, dated June 21, 2000

- Appendix B is the Sampling and Analysis Plan that will be followed for sample collection and analyses

Related documents prepared in conformance with other provisions of the Order include a Post-Closure Development Standards Report, a Stormwater Pollution Prevention and Monitoring Plan, a Final Closure and Post-Closure Maintenance Plan, and an Emergency Response Contingency Plan.

2.0 BACKGROUND

A comprehensive discussion of historical landfill operations, a discussion of soil gas, leachate, and water sampling, and an evaluation of the water budget are presented in the Joint Technical Document (JTD) dated March 2000 (Gabewell with PES, March 2000). A brief summary of the landfill history and site hydrogeology is presented below.

2.1 Landfill History

Before 1956, the present Oyster Point Landfill location was part of San Francisco Bay. The Oyster Point Landfill originated in 1956 when the South San Francisco Scavenger Company (Scavenger) signed a 15-year contract with the City for rights to operate a tidelands municipal waste dump. Scavenger operated the landfill until 1970, when waste disposal ceased. In addition to municipal solid waste, the landfill accepted and disposed of liquid industrial waste in two sumps, one excavated into waste fill and one into native soil. Waste disposal operations conducted between 1956 and 1970 resulted in the extension of the shoreline approximately 3,000 feet to the east of the pre-landfill shoreline.

About 1962, the City constructed a marina consisting of a small harbor and boat ramp along the northern boundary of the landfill. This construction was followed by additional improvements that included development in 1963 of a waste-filled mole or breakwater.

After landfill operations ceased, landfill closure activities included placement of an engineered compacted clay cover, construction of cut-off trenches to control leachate migration, and construction of a landfill gas migration barrier trench. The City continued to maintain the landfill and marina, including maintenance of the landfill cover and periodic dredging of the marina basins. From 1971 to 1974, operations consisted primarily of operation of the marina and maintenance consisted of remedial measures to control leachate migration from the perimeter of the landfill and to stabilize the south slope of the landfill.

In 1974, the City initiated plans and studies for the expansion of the marina to the east of the mole. Construction of the expanded marina and an associated park began in 1978 and was substantially completed by 1981. The two sections of the marina are now referred to as the "West Basin Marina" and the "East Basin Marina." This work included construction of additional remedial measures to control leachate migration. Construction of the office complex, inn, and other structures occurred in the 1980s. The Harbor District operates the marina.

Future landfill maintenance activities, including improvements to the cap, are described in the September 2000 Gabewell document titled *Final Closure and Post-Closure*

Maintenance Plan, Oyster Point Landfill, South San Francisco, California (Gabewell with HLA, September 2000).

2.2 Landfill Hydrogeology

2.2.1 Geologic Setting

The landfill is located on the western margin of the San Francisco Bay, immediately east of San Bruno Mountain. Bedrock belonging to the Franciscan Formation, primarily sandstone and shale, underlies the landfill. Bedrock is near the surface at the western end of the landfill but lies at depth beneath the eastern end. Alluvial units consisting of medium stiff to hard, green, gray-green, and brown sandy and silty clay and medium dense to dense silt, silty sand, and sand uncomformably overlie the bedrock surface. These alluvial units are absent from beneath the western edge of the landfill, but lap onto the bedrock surface about 300 feet east of the original Bay shoreline. Borings at the eastern end of the landfill penetrate, in aggregate, over 30 feet of these units. The alluvial units are overlain by Bay Mud ranging in thickness from less than 1 foot along the original Bay shoreline to over 90 feet at the eastern end of the landfill. The Bay Mud consists of very soft, dark gray silty clay to clayey silt, with occasional shell fragments and sandy clay zones.

The landfill directly overlies the Bay Mud except at the western end, where the Bay Mud is absent and the landfill waste was placed directly on bedrock or a thin soil veneer over bedrock. The landfill material consists of up to 45 feet of poorly compacted municipal and industrial waste and includes paper, cardboard, organic matter, wood, glass, metal, rocks, concrete, metal cans, bottles, wire, rubber, 55-gallon drums, paints, and other materials. The base of the landfill material has been compressed into, and mixed with, the upper part of the soft Bay Mud.

2.2.2 Landfill Construction Details

Landfilling occurred with minimal engineering controls to prevent leachate generation and migration. Clay dikes of reconditioned Bay Mud were originally used to control the migration of water in and out of the waste fill areas. Engineered improvements and repairs to these dikes were made after landfill operations ceased to control the generation and migration of leachate. These controls include:

- 2- to 3-foot-thick dikes of reconditioned Bay Mud with a design permeability of 10^{-6} cm/sec, installed along the eastern and northernmost perimeter of the landfill, including the mole area. Additional riprap was installed in select locations to control erosion due to wave action.

- 2-foot-thick cement/bentonite cutoff trenches with a design permeability of 10^{-6} cm/sec installed along the beach area in the west basin and along the drainage channel at the property boundary with the Cabot-Cabot & Forbes earthfill
- 2-foot-thick dike of reconditioned Bay Mud with a design permeability of 10^{-6} cm/sec installed along the west basin from the mole to the cement/bentonite trench installed in the beach area
- A minimum 2-foot-thick clay cap of fill and reconditioned Bay Mud with a design permeability of 10^{-5} to 10^{-6} cm/sec
- A methane cutoff trench constructed along the western boundary of the landfill

The majority of the reconditioned Bay Mud used in the construction of the landfill cover and dikes was generated during dredging of the west and east basins.

Stratigraphic logs from borings completed at the landfill confirm that the landfill is capped with brown to gray, dry to moist reconditioned Bay Mud fill that ranges from 1 to 8 feet in thickness. The Bay Mud cover is composed of sand, sand with rocks, silty sand, sandy silt, silty clay, and clayey gravel. Around the periphery of the landfill, berms of reconditioned Bay Mud have been built up to prevent waste and landfill leachate from migrating laterally out of the landfill onto the surrounding area and into the Bay.

2.2.3 Site Hydrogeology

The hydrogeologic units in the vicinity of the site include:

- Franciscan Formation bedrock
- Alluvial units between the bedrock and the Bay Mud
- Bay Mud
- Landfill waste

Franciscan Formation Water-Bearing Zone
Minor amounts of water occur in the Franciscan Formation in joints and fractures in the bedrock. This water is generally high in mineral content. Due to the poor quality of the water and low yield of the formation, the Franciscan Formation is not considered a groundwater resource.

Alluvium Beneath Bay Mud Water-Bearing Zone
Groundwater occurs under confined conditions in the alluvial units between the bedrock and the Bay Mud, with the Bay Mud acting as the confining layer. At the site, this alluvial unit is comprised of fine-grained flowing sands and well-rounded and well-sorted gravels. This hydrologic unit is referred to as the B-zone.

Bay Mud

The Bay Mud forms a low-permeability layer that acts as an aquitard that confines the underlying B-zone units and restricts downward migration of leachate from the overlying landfill. Because of the very low hydraulic conductivity of the Bay Mud and the high total dissolved solids and metals content of the water in it, the Bay Mud is not a useable source of groundwater.

Landfill Water-Bearing Zone

The landfill, referred to as the A-zone, is a water table hydrostratigraphic unit that is contained within the landfill waste by the underlying Bay Mud and by the surrounding dikes and berms composed of Bay Mud that have been built up around the perimeter of the landfill.

2.2.4 Leachate Generation and Flow Direction

Leachate levels within the landfill range from a few to 13 feet above mean low low water. Based on aquifer test results presented in the JTD (Gabewell with PES, March 2000), the landfill is in hydraulic communication with the Bay. The landfill is recharged by infiltration of direct precipitation, inflow from the upland areas along the western margin of the landfill, and cyclical tidal inflow from the Bay.

Tidal effects and the heterogeneous nature of the waste fill complicate the characterization of leachate flow directions. These create temporary changes in flow gradient and variable tidal time lags. In the westernmost end of the landfill, leachate flow directions are generally to the east and do not fluctuate tidally. In the easternmost portion of the landfill, leachate levels are higher than the Bay at mean tide and fluctuate diurnally, suggesting an intermittent outward flow direction around the perimeter of the landfill.

Water budget analysis presented in the JTD (Gabewell with PES, March 2000) indicates that the majority of flow is horizontal migration toward the Bay. There is little to no vertical component of flow through the underlying Bay Mud.

2.3 Beneficial Uses

The beneficial uses of surrounding groundwater and South San Francisco Bay are identified in the RWQCB Order. Groundwater is identified as a potential municipal and domestic water supply, industrial process water supply, and agricultural water supply. The beneficial uses of San Francisco Bay include wildlife and fish habitat, recreation, and fishing.

Previous sampling of leachate and groundwater at the site indicated that shallow and deeper water-bearing zones (A and B zones, respectively) contain brackish water that is unsuitable for use as a potable water source. Leachate within the landfill has been found to also contain concentrations of volatile organic compounds including benzene, chlorobenzene, ethylbenzene, and xylenes.

Concentrations of total dissolved solids (TDS) in samples collected from on-site monitoring wells screened in the perimeter berms (composed of Bay Mud) range from 5,800 milligrams per liter (mg/L) to 20,469 mg/L. The water sample collected from the B zone indicated the deeper water-bearing zone contained TDS at a concentration of 3,170 mg/L. Values above 3,000 mg/L are considered unsuitable by the RWQCB as a source of potable water.

As described, the landfill is in hydraulic communication with the Bay. Volatile organics in leachate could, therefore, affect the beneficial uses of the Bay.

3.0 REGULATORY REQUIREMENTS

This WQMP has been prepared in compliance with CCR Title 27 and Provision 7 of the Order. For reference, a copy of the Order is included as Appendix A. Provision 7 stipulates that the following elements be addressed in the WQMP:

- Points of compliance
- Contaminants of concern
- Maximum allowable concentration limits (MACLs)
- Methods of data validation to determine whether exceedence of a MACL is significant
- Sampling and analysis plan
- Leachate management plan

CCR Title 27, Chapter 3, Subchapter 3, Water Monitoring, Sections 20380 through 20480, describe the purpose and requirements for implementation of Detection Monitoring, Evaluation Monitoring, and Corrective Action Programs at solid waste disposal facilities. Included within the scope of CCR Title 27 are the definition of Points of Compliance, identification of Contaminants of Concern (COCs), and guidelines for selection of monitoring parameters, data collection and validation, and statistical evaluation.

There is no published regulatory guidance addressing the development of maximum acceptable concentration limits or a leachate management plan. The technical approach to development of MACLs is described in Section 5 and relies on a variety of techniques. Leachate management is also described qualitatively in Section 6.

The Oyster Point Landfill is implementing a Detection Monitoring Program. Table 1 is a list of cross-references between Title 27 requirements and the corresponding section of the WQMP.

4.0 DETECTION MONITORING PROGRAM

The purpose of the detection monitoring program is to detect "measurably significant" leachate migration from the waste-bearing unit into surrounding media, including underlying soil and groundwater and nearby surface water. Components of the detection monitoring program include:

- Detection monitoring network
- Points of compliance
- Contaminants of concern and monitoring parameters
- Procedures for data evaluation

The detection monitoring network consists of monitoring points, which include monitoring wells and surface water sampling locations. Points of compliance are monitoring locations where leachate migration from the unit would likely be discovered, and to which numerical concentration limits are applied.

The proposed detection monitoring program for the Oyster Point Landfill Water Quality Monitoring Program is described below. Data evaluation is discussed in Section 5.0.

4.1 Detection Monitoring Network

There are a total of 18 monitoring wells currently installed at the landfill, as shown in Figure 3. These wells will be included in the detection monitoring network and monitored for water elevation and water quality as described below. Table 2 summarizes the construction details of the wells and identifies the lithologic units the wells monitor.

4.2 Points of Compliance

CCR Title 27 and the Order define "point of compliance" as

> "the vertical surface located at the hydraulically downgradient limit of the unit that extends through the uppermost aquifer underlying the unit."

Because the Oyster Point Landfill was constructed on the Bay margin, the definition above is not directly applicable. As described in Section 2, there is little to no vertical groundwater gradient at the landfill. There does exist a variable horizontal gradient between the leachate and the Bay.

Of the 18 monitoring wells present at the site, Wells GW-4a, GW-5a, GW-6a, GW-11a, GW-14a, GW-15a, and GW-16a are installed within the perimeter berms that separate the waste from the Bay. They will be monitored to detect migration from the A-zone to the surrounding receiving water. GW-7a is located in the Cabot, Cabot and Forbes fill and will monitor horizontal migration to the south. Well GW-2b, installed in the alluvial

water-bearing zone beneath the Bay Mud, will be used to monitor the potential vertical migration of leachate to the B zone. These nine wells, along with one surface water sampling location at the ditch along the southern boundary of the site, will be used as the Points of Compliance. The locations of wells used as points of compliance are shown on Figure 3.

4.3 Contaminants of Concern

Title 27 defines "contaminants of concern" as

> "all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the unit."

Groundwater and leachate sampling has been conducted from the monitoring wells and adjacent storm water ditch. Samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), priority pollutant metals and general minerals. Sampling results were compiled and presented in the JTD (Gabewell with PES, March 2000).

Review of the existing data indicates that petroleum hydrocarbons and, to a lesser degree, metals, are present within the leachate. A compilation of analytical results of previous sampling is provided in Tables 3 through 6. Regulatory standards applied for the protection of saltwater biota and human health are presented for reference in Table 7 for comparison.

4.4 Monitoring Parameters

Monitoring parameters are contaminants of concern used to monitor potential leachate migration. To be defensible, these compounds must meet the following criteria:

- Present in waste
- Have established water quality criteria relevant to the beneficial use of the receiving water
- Analysis for the chemical must be a reliable indicator of the presence of leachate
- Laboratory analytical techniques must be able to quantify the compound at or below relevant water quality criteria

Evaluation of previous sampling data indicates that VOCs and SVOCs are present within the leachate (Tables 3 and 4, respectively). Since these compounds are not typically present in a native environment and are not present in the wells outside the landfill, analysis of water samples for the presence of VOCs and SVOCs will provide an accurate indicator of the presence of leachate. Of the VOCs and SVOCs detected, very few have established water quality criteria. However, all of the organics detected are constituents of gasoline or other refined petroleum fuels. The compounds with established criteria

tend to be the aromatic hydrocarbons associated with refined petroleum fuels. Because these aromatic hydrocarbons have greater mobility and toxicity than other VOCs and SVOCs detected at the site, they are considered conservative indicators of leachate migration.

Several metals were detected in leachate samples. However, they were also detected in samples collected from the perimeter berms and background wells. The concentrations of metals are relatively uniform across the site. The concentrations and distribution of these metals are believed to be in part a result of the elevated metals concentrations known to be present in the Franciscan-derived Bay Mud used for daily and final cover and construction of the perimeter berms.

An evaluation of concentrations of toxic chemicals in San Francisco Bay sediments was performed by the RWQCB and described in the May 1998 document titled *Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments*. Table 8 summarizes the range of concentrations of metals in Bay sediments reported in this study. The concentrations in the Bay sediments are higher than established regulatory criteria for metals.

The detection of low concentrations of metals in saline water is problematic. Table 8 shows the detection limits for samples collected from the site. Detection levels for metals in water and leachate samples at the site are high and variable because of matrix interferences (e.g. high chloride concentration). The laboratory cannot achieve detection limits near or below commonly applied water quality goals.

Because of the high background levels of metals in Bay Mud sediments used to construct the cap and perimeter berms and the lack of reliable laboratory analytical techniques for trace metals, analysis for metals is not considered a reliable indicator of the presence of leachate.

The Order requires analysis of samples for chlorinated pesticides and polychlorinated biphenyls (PCBs). Samples collected from monitoring wells during the first year of quarterly sampling will be analyzed for these compounds.

Based on data collected from site monitoring wells and the requirements of the Order, the Detection Monitoring Program parameters will include:

- VOCs
- SVOCs
- Pesticides and PCBs

The proposed sampling schedule and list of analytical parameters are detailed in Table 9.

5.0 DEVELOPMENT OF MAXIMUM ALLOWABLE CONCENTRATION LIMITS

The Detection Monitoring Program will be implemented in part to establish a database that allows data evaluation for the development of maximum acceptable concentration limits (MACLs) for the monitoring parameters.

Evaluation of intra-well and inter-well trends of chemical data at each well will be performed following collection of data over 3 years. Following review of the data, MACLs will be proposed to the RWQCB. The MACLs will take into account established regulatory standards to provide a level of protection for the identified beneficial uses and receptors.

MACLs will be developed that reflect background conditions and that are protective of the beneficial uses of San Francisco Bay and the surrounding groundwater as identified in the Order. Beneficial uses identified by the RWQCB for San Francisco Bay include wildlife and fish habitat, recreation, and fishing. Existing and potential beneficial uses of groundwater in the vicinity of the Oyster Point Landfill, as identified by the RWQCB, include:

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

As discussed in Section 2, water at the site, including underlying groundwater (B zone), contains TDS at concentrations exceeding the potable use standard of 3,000 mg/L. For this reason, groundwater beneath the site is not considered a potential source of municipal, domestic, or agricultural water. Leachate flow directions are primarily horizontal, toward San Francisco Bay, and therefore leachate could affect the beneficial uses of the Bay.

Regulatory standards protective of aquatic organisms and the health of humans who consume these organisms will be used to develop MACLs. These standards include:

- California Regional Water Quality Control Board Region 2 Basin Plan (RWQCB, June 1995)

- 40 Code of Federal Regulations (CFR) Part 131, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California* (US EPA May, 2000)

- Saltwater Ecological Protection Zone, Tier 1 Standards in California Regional Water Quality Control Board, San Francisco Bay Region, Order 95-136

Other regulatory standards may also be incorporated in the evaluation, if appropriate.

As described in Section 4, VOCs and SVOCs will be included as monitoring parameters indicative of potential leachate migration and MACLs will be developed for the detected analytes. The MACLs will be developed to be protective of beneficial uses at the point of discharge to the Bay.

A report presenting the proposed MACLs and rationale for the development of the values will be prepared following 3 years of quarterly monitoring data. This report is scheduled to be submitted to the RWQCB by January 31, 2003.

6.0 MONITORING PROCEDURES AND IMPLEMENTATION SCHEDULE

The Detection Monitoring Program (DMP), as outlined herein, will be implemented to evaluate leachate and groundwater conditions within and at the perimeter of the waste. If a "measurably significant" concentration of a leachate component is detected, validation of that detection will be performed.

The validation procedure will include data quality evaluation and/or resampling of the well or wells where suspect data were observed. If the evaluation procedure confirms the presence of a component of leachate at the monitoring point, an Evaluation Monitoring Program (EMP) will be initiated.

The purpose of the EMP is to assess the source and extent of the release and to collect data necessary to design an appropriate corrective action. If the findings of the Evaluation Monitoring Program warrant a corrective action, a Corrective Action Plan will be submitted to the RWQCB, and upon approval, implemented. These programs are described below.

6.1 Detection Monitoring Program

Data collected the first 3 years of the program will be used to establish MACLs. Monitoring will continue after the establishment of MACLs. Table 9 summarizes the DMP for the Oyster Point Landfill. Figure 4 is a flow chart for the DMP. The DMP will begin in December 2000.

During the first year, groundwater and leachate samples will be collected from all 18 monitoring wells on a quarterly basis. The wells installed within the waste-bearing unit will be sampled to establish an understanding of leachate composition and variability. Background wells, including GW-7a, GW-8c, and GW-9a, will be sampled to establish an understanding of background water quality trends.

After one year of monitoring, the sampling frequency for leachate wells will be reduced to semi-annually. The point of compliance wells located within the perimeter berms (wells GW-4a, GW-5a, GW-6a, GW-11a, GW-14a, GW-15a, and GW-16a), and in the underlying alluvial water-bearing zone (well GW-2b) will continue to be sampled on a quarterly frequency.

Proposed development may require that wells GW-8c and GW-9a be abandoned. These wells will be relocated if necessary. Well abandonment will be performed in accordance with the requirements of the Order. If new wells are installed a Well Installation Report will be completed.

The analytical program includes the following analyses:

- Volatile organic compounds by EPA Method 8260
- Semi-volatile organic compounds by EPA Method 8270
- Pesticides by EPA Method 8081
- Polychlorinated biphenyls (PCBs) by EPA Method 8082

A state-certified laboratory will perform sample analysis. The Sampling and Analysis Plan (SAP) is presented in Appendix B.

Additionally, water levels will be measured monthly to evaluate leachate/water elevation trends.

Following collection of data over the first 3 years of monitoring, evaluation of the acquired data is anticipated to involve a control chart or tolerance interval approach. The limit will be established as the MACL plus an appropriate data variance factor such as the standard deviation (Gibbons, 1994). This approach will allow evaluation of the acquired data against the MACL, which is based on protection of beneficial uses of the receiving water, and also allow for identification of a "measurably significant" exceedence.

If data evaluation indicates an exceedence of the MACL and data quality is within acceptance limits, the well will be resampled within 30 calendar days of the suspected exceedence. The retest samples will be collected following the identical methodology and submitted to the same analytical laboratory as the suspected exceedence for analysis of the parameter that may have been exceeded. If the retest confirms the presence of compound(s) that exceed their respective MACLs, the EMP will be initiated.

6.2 Evaluation Monitoring Program

An Evaluation Monitoring Program (EMP) is warranted whenever visible leachate release is observed or "measurably significant" evidence of a release has been confirmed. The Evaluation Monitoring Program includes the following elements:

- Performance of investigation to assess release from unit
- Continuation of sampling program as for DMP
- Installation of additional monitoring points as appropriate
- Evaluation of other potential sources of detected COC
- Revision of MACLs if appropriate
- Preparation of engineering feasibility study
- Reporting to RWQCB

Once the release from the landfill has been assessed, a corrective action program will be developed. Potential interim and final corrective measures will be evaluated and presented to the RWQCB in an Engineering Feasibility Study (FS). Once the FS has been approved by the RWQCB, the Corrective Action Program will be implemented.

6.3 Corrective Action Program

The purpose of a Corrective Action Program is to implement the corrective measures necessary to return the unit to compliance with water quality standards designed to protect human health and the environment. Corrective measures will be designed to address the specific issue presented (e.g., erosion of cap or perimeter berm allowing leachate to be released). Proposed interim and final corrective measures will be developed following best engineering practices and implemented within the time frame acceptable to the RWQCB. Verification monitoring will be performed to assess the efficacy of the implemented measure, and once compliance with water quality objectives is achieved, the site will return to a Detection Monitoring Program.

6.4 Monitoring Program Reporting

Semi-annual monitoring reports will be prepared and submitted to the RWQCB by July 31 of each year, in accordance with the schedule presented in the Order. The semi-annual monitoring report will summarize the scope and findings of water quality monitoring conducted during the first and second quarter of the year. An annual monitoring report will be prepared that summarizes the findings of the third and fourth quarter sampling and presents an evaluation of the data collected over the entire year. Plots of chemical data over time and hydrographs will be included in the annual monitoring report. The annual monitoring report will be submitted to the RWQCB by January 31 of each year. All monitoring reports will be prepared under the supervision of and be signed by a professional civil engineer, registered geologist or certified engineering geologist.

6.5 Leachate Seep Inspection

The Harbor District will inspect for leachate seeps monthly, beginning January 2001, as part of the Storm Water Pollution Prevention Plan. This will consist of Harbor District personnel walking the perimeter berm at low tide looking for evidence of leachate. The inspection will also include assessment of the berms for erosion, settlement or other visible evidence of damage. The Regional Water Quality Control Board will be notified immediately by telephone or fax if any leachate is observed, or if any damage to the berm indicates an imminent release of leachate. Inspection of the landfill cap is discussed in the Final Closure and Post-Closure Maintenance Plan (Gabewell with HLA, September 2000).

An action plan designed to contain the leachate and repair the waste containment feature will be developed by the City of South San Francisco and presented to the RWQCB. Following RWQCB approval of the action plan, repairs to the waste containment feature will be repaired.

Monitoring of leachate levels will be performed by collecting liquid-elevation measurements monthly. Leachate quality information will be developed over the course of the Detection Monitoring Program.

6.6 Leachate Management Program

Figure 5 is a flow chart of the Leachate Management Program. The Leachate Management Program will consist of the monitoring programs that assess leachate quality, leachate levels, and the evaluation and corrective action programs that will be implemented if a release of leachate occurs. Implementation of these programs will begin on December 2000, with the goal of protecting beneficial uses of the Bay.

7.0 REFERENCES CITED

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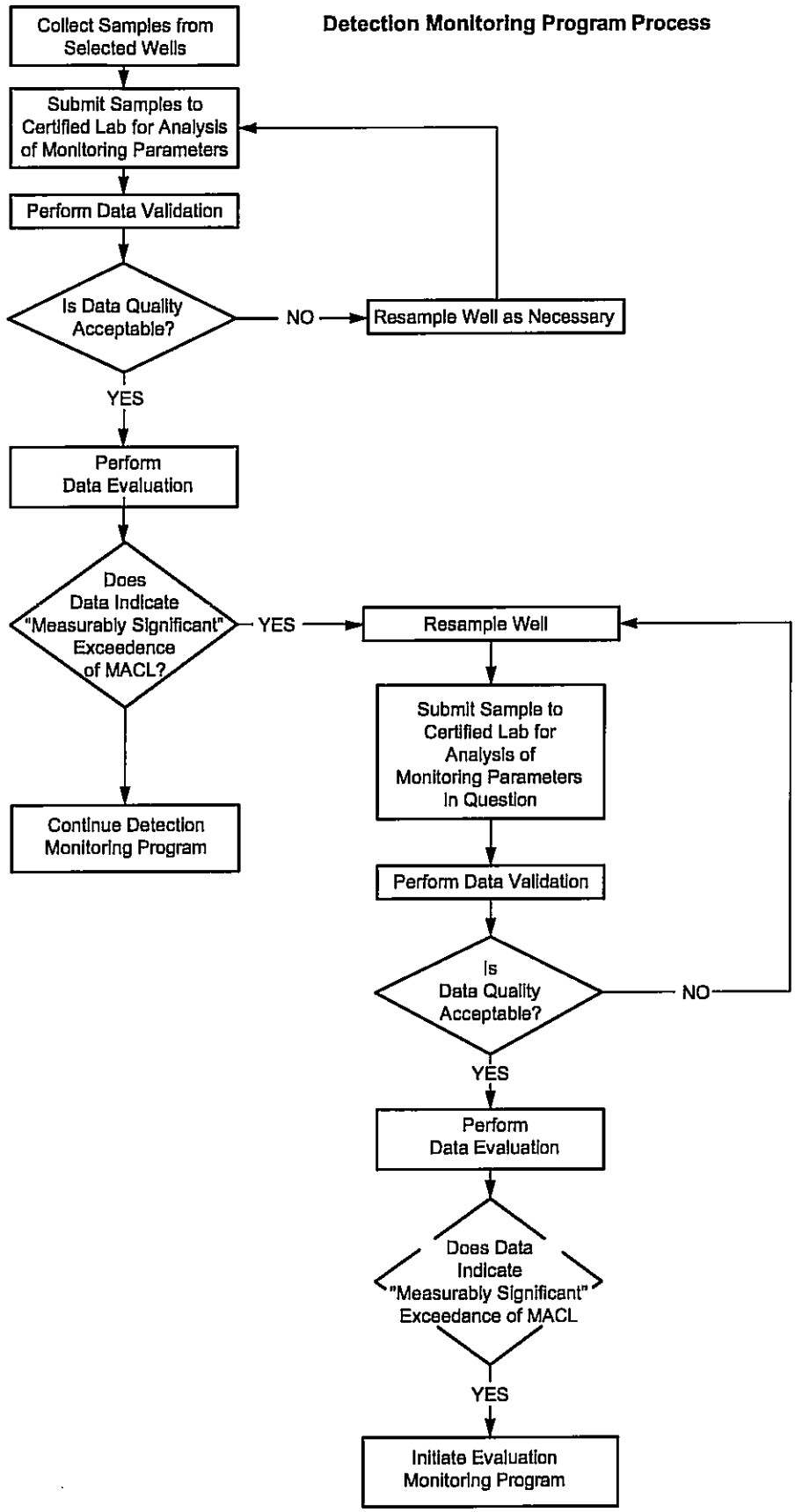
Detection Monitoring Program Process



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Detection Monitoring Program Process
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

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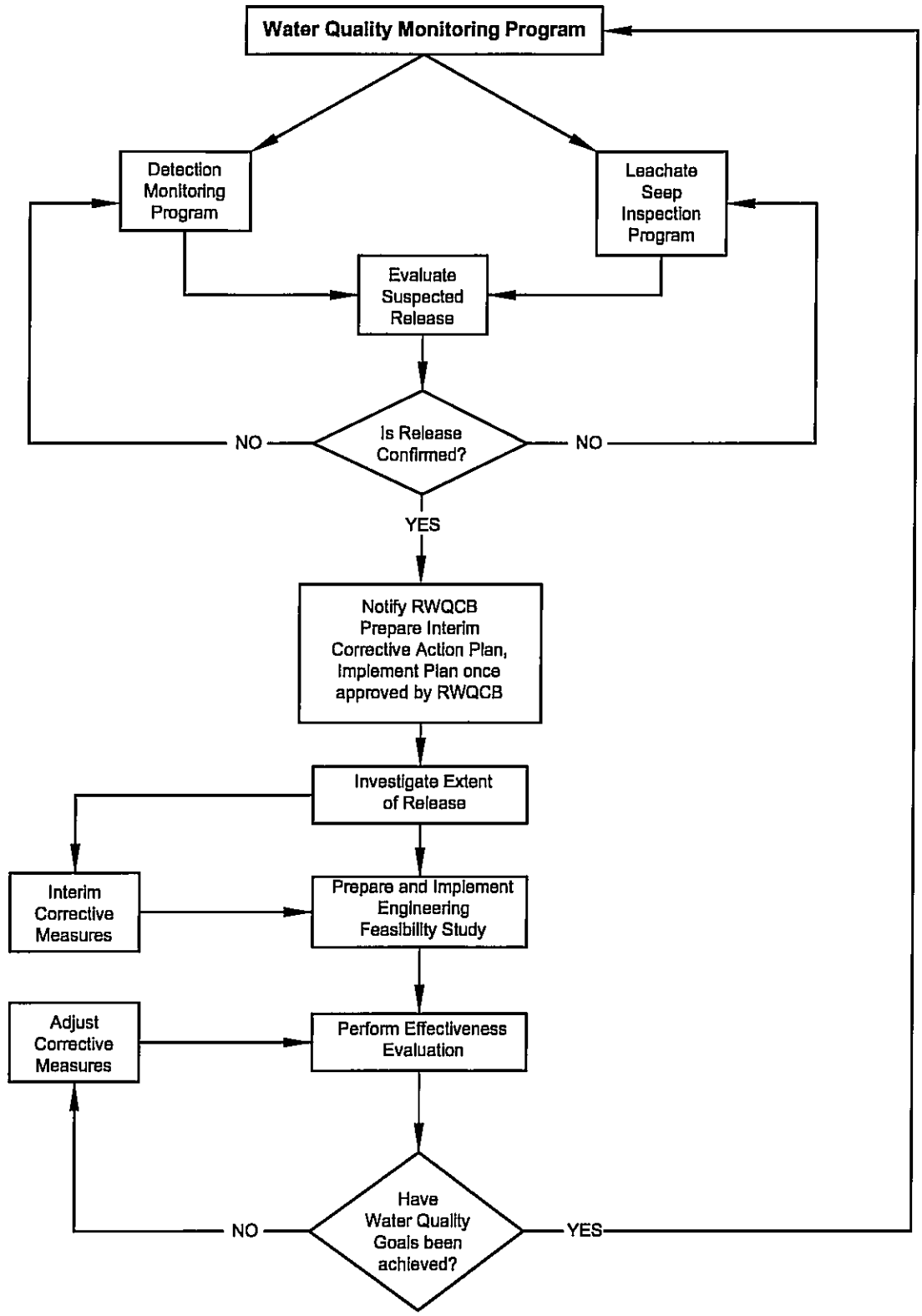

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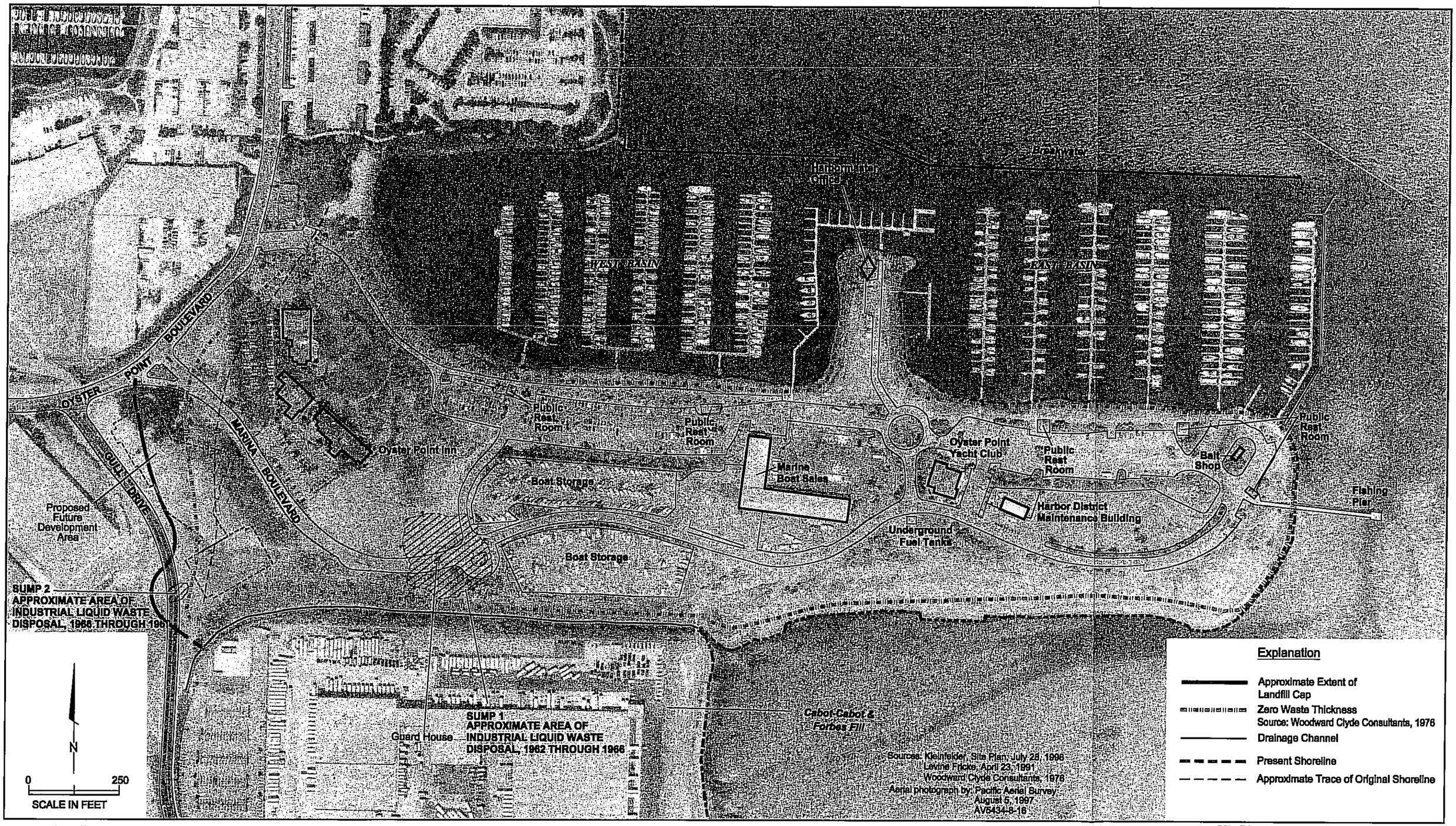

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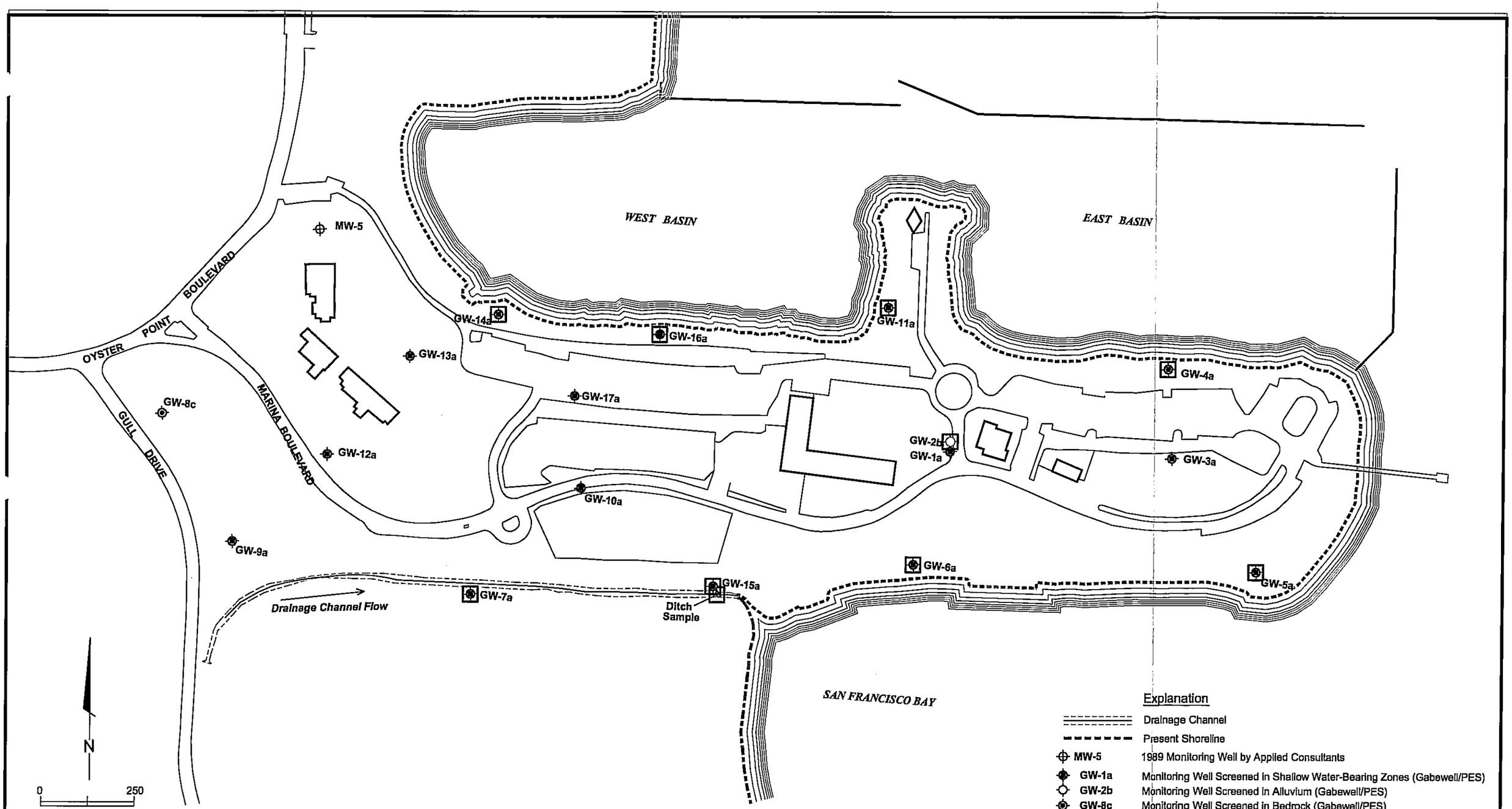
For:
GABEWELL, INC.

650-002-01-004 | 6500201004_womp-02 | SA
JOB NUMBER | DRAWING NUMBER | REVIEWED BY

Site Plan
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Figure **2**

11/00
DATE



Prepared by:
PES Environmental, Inc.
Engineering & Environmental Services
For:
GABEWELL, INC.

650-002-01-004 JOB NUMBER
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Proposed Point of Compliance Sampling Locations
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Figure 3

11/00 DATE

Table 7
Regulatory Standards
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Compound	Water Quality Objectives for Toxic Pollutants (1)	California Toxics Rule Criteria (USEPA) (2)	Saltwater Ecological Protection Zone Tier 1 Standards
Volatile Organic Compounds (ug/L)			
Benzene		71*	71
Toluene		200,000*	5,000
Ethylbenzene		29,000*	43
Total Xylenes			2,200
Chlorobenzene		21,000*	
Isopropylbenzene			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
4- Isopropyltoluene			
1,2-Dichlorobenzne		17,000*	
1,4-Dichlorobenzene		2,600*	
Naphthalene			100
N-Propylbenzene			
Sec-Butylbenzene			
N-Butylbenzene			
Chloroform			470
Semivolatile Organic Compounds (ug/L)			
2,4-Dimethylphenol		2,300*	
Dimethylphthalate		2,900,000*	
Di-N-Butylphthalate		12,000*	
Metals (ug/L)			
Silver	**2.3(a)**	**1.9(b)**	
Arsenic	36(a) 69(b)	36(a) 69(b)	
Barium			
Cobalt			
Chromium	**50(a) 1100(b)**		**50**
Chromium 6	**50(a) 1100(b)**	**50(a) 1100(b)**	
Copper		**3.1(a) 4.8(b)**	
Molybdenum			
Nickel	**7.1(c) 140(d)**	**8.2(a) 74(b) 4,600***	**7.1**
Selenium		71(a) 290(b)	
Vanadium			
Zinc	**58(c) 170(d)**	**81(a) 90(b)**	**58**
Strontium			
Minerals and Water Quality Parameters (mg/L)			
Calcium			
Iron			
Magnesium			
Manganese			
Potassium			
Sodium			
Total Dissolved Solids			
Chloride			
Sulfate			
Specific Conductance (umhos/cm)			

(1) Data taken from California Regional Water Quality Control Board, Water Quality Control Plan, 1995
(2) Data taken from Environmental Protection Agency 40 CFR Part 131, Water Quailty Standards, May 2000
* Human health 30-day average (aquatic organism consumption only)
(a) Continuous Concentration (4-day average)
(b) Maximum Concentration (1-hour average)
(c) 24-hour average
(d) Instantaneous Maximum
ug/L = micrograms per liter
mg/L = miligrams per liter

Table 8
Laboratory Reporting Limits and Background Concentrations of Metals
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Compound	Laboratory Reporting Limits (1)	Background Concentrations in San Francisco Bay Sediments (ug/kg) (2)
Silver	<2 to <7	310 to 580
Arsenic	<2 to <100	13,500 to 15,300
Barium	<100	
Cobalt	<2 to <50	
Chromium	<10	91,400 to 112,000
Chromium 6	<5 to <100	
Copper	<10	31,700 to 68,100
Molybdenum	<20 to <50	
Nickel	<30 to <50	92,900 to 112,000
Selenium	<100	590 to 640
Vanadium	<50 to <100	
Zinc	<20	97,800 to 158,000
Strontium	<5 to <15	

(1) K Prime Inc. reporting limits experienced during previous sampling within seawater/leachate matrix
(2) Staff Report, Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments, RWQCB, May, 1998
ug/L = micrograms per liter
ug/kg = micrograms per kilogram

Table 9
Summary of Proposed Detection Monitoring Program
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Monitoring Point	Unit Monitored	Frequency	Monitoring Parameters
GW-1a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-2b	Alluvium Beneath Landfill	Quarterly Beginning December 2000	VOC's, SVOC's, Pesticides, PCB's
GW-3a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-4a	Perimeter Berm	Quarterly Beginning December 2000	VOC's, SVOC's, Pesticides, PCB's
GW-5a	Perimeter Berm	Quarterly Beginning December 2000	VOC's, SVOC's, Pesticides, PCB's
GW-6a	Perimeter Berm and Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-7a	Shallow Offsite Water-Bearing Zone	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-8c	Shallow Bedrock Water-Bearing Zone	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-9a	Shallow Upgradient Water-Bearing Zone	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-10a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-11a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-12a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-13a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-14a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-15a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
GW-16a	Perimeter Berm	Quarterly Beginning December 2000	VOC's, SVOC's, Pesticides, PCB's
GW-17a	Waste	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's
MW-5	Perimeter Berm	Quarterly Beginning December 2000 Semiannually Beginning December 2001	VOC's, SVOC's, Pesticides, PCB's

Notes:

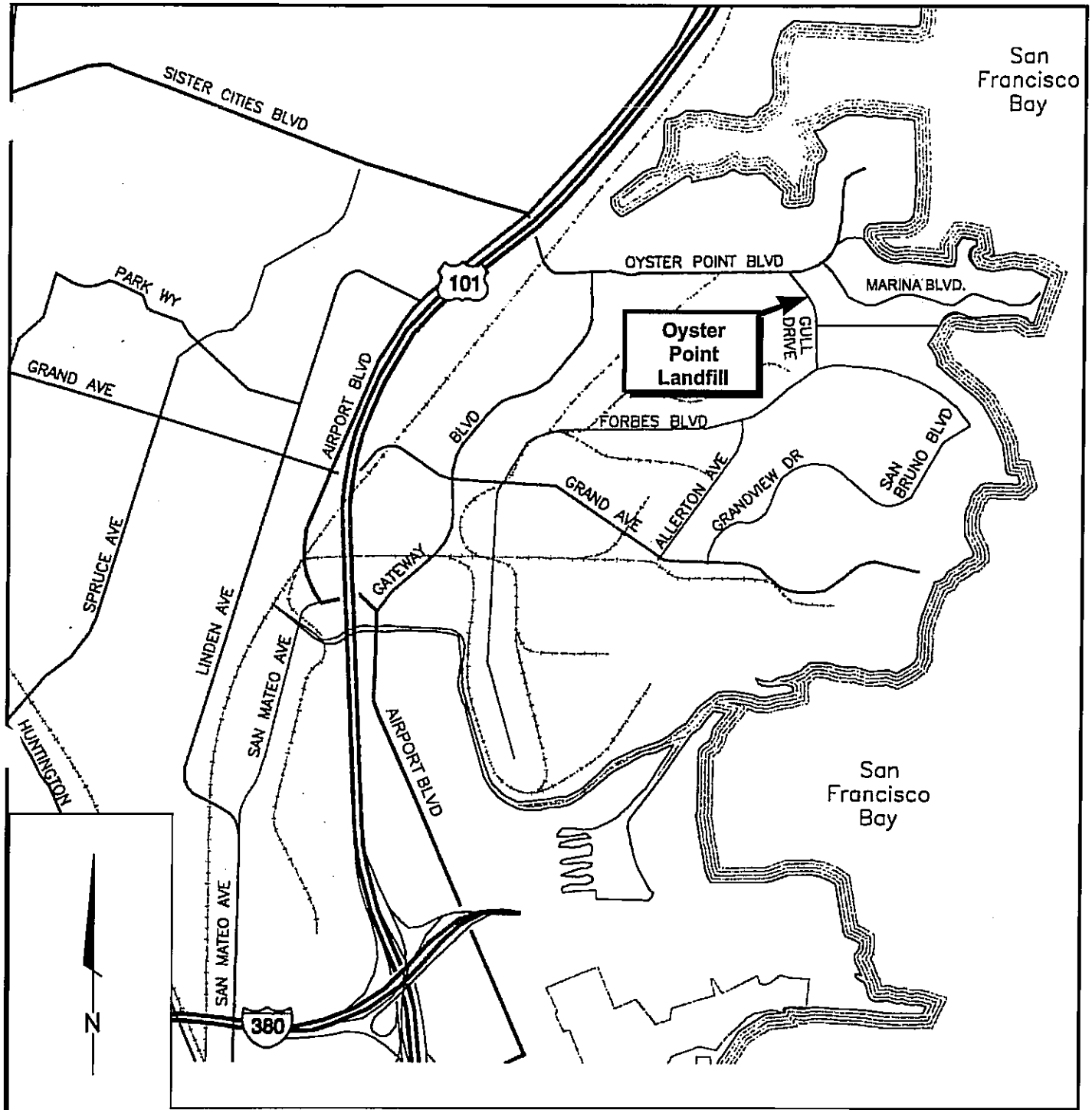
VOC's = Volatile Organic Compounds analyzed by U.S. EPA method 8260

SVOC's = Semi-Volatile Organic Compounds analyzed by U.S. EPA method 8270

Pesticides will be analyzed by U.S. EPA method 8081

PCB's will be analyzed by U.S. EPA method 8082

FIGURES



Reference: Kleinfelder 1998

Prepared by:
PES Environmental, Inc.
Engineering & Environmental Services

For:
GABEWELL, INC.

Site Location Map
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Figure
1

650-002-01-004	6500201010_wqmp-01	SC	11/00
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Table 3
Water Quality Sample Analytical Results - Volatile Organic Compounds
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Wells Screened in Waste

Well I.D.	Date Collected	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
GW-1a	7/21/99	20.6	<10.0	313	573.8	138	14.6	43.8	246	19.4	<10.0	<10	32.4	77	<10	<10	<10	<10
GW-3a	7/21/99	48	1900	566	2770	207	129	130	468	44.8	<40.0	<40	<40	423	<40	<40	<40	<40
GW-10a	7/27/99	46.3	9.58	33.3	56.8	126	13.4	7.38	17.8	39.6	2.7	1.02	5.56	<2.0	6.66	1.56	1.16	<1.00
GW-11a	7/21/99	6.24	0.64	0.66	1.44	28.6	2.83	0.53	<0.500	10.7	0.50	<0.500	3.67	143	1.77	0.57	1.0	<0.500
MW-5*	10/25/99	2.52	<0.500	<0.500	<0.500	23.3	<0.500	<0.500	<0.500	<0.500	1.11	<0.500	5.76	<2.00	<0.500	<0.500	2.78	<0.500
GW-12a	2/7/00	239	<20.0	41.2	<20.0	765	47.2	<20.0	<20.0	93.6	<20.0	<20.0	20.4	174	88.8	<20	<20	<20
GW-13a	2/7/00	22.4	<0.500	0.740	2.77	97.9	1.81	1.47	5.21	8.04	0.520	0.860	5.42	7.74	2.31	1.71	2.10	<0.500
GW-14a	2/7/00	0.640	<0.500	<0.500	<0.500	15.5	<0.500	<0.500	<0.500	<0.500	<0.500	5.28	5.37	<1.000	<0.500	<0.500	<0.500	<0.500
GW-15a	2/7/00	6.32	<0.500	<0.500	1.78	16.9	1.24	<0.500	1.53	2.25	<0.500	<0.500	1.75	64.3	0.94	<0.500	<0.500	<0.500
GW-17a	2/7/00	14.9	<5.00	<5.00	<5.00	34.1	<5.00	<5.00	<5.00	39.3	<5.00	<5.00	<5.00	37.3	<5.00	<5.00	<5.00	<5.00

Wells Screened in Perimeter Berms

Sample Designation	Date Collected	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
GW-4a	7/21/99	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<1.00	<0.500	<0.500	<0.500	<0.500
GW-5a	7/21/99	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<1.00	<0.500	<0.500	<0.500	<0.500
GW-6a	7/21/99	12.3	<1.00	33.5	5.32	27.7	3.52	<1.00	2.46	<1.00	<1.00	<1.00	3.94	79.4	3.0	<1.00	<1.00	<1.00
GW-16a	2/7/00	2.14	79.5	6.41	9.00	4.52	1.55	2.44	7.78	1.67	<0.500	<0.500	<0.500	8.11	2.77	2.25	1.31	<0.500

Well Screened in Alluvium Beneath Bay Mud

Sample Designation	Date Collected	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
GW-2b	7/27/99	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<1.00	<0.500	<0.500	<0.500	24.9

Well Screened in Soil Fill

Sample Designation	Date Collected	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
GW-7a	7/21/99	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<1.00	<0.500	<0.500	<0.500	<0.500

Well Screened in Bedrock

Sample Designation	Date Collected	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
GW-8c	7/27/99	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<1.00	<0.500	<0.500	<0.500	<0.500

Well Screened in Sediments Upgradient of Waste Fill

Sample Designation	Date Collected	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
GW-9a	7/21/99	1.64	<1.00	<1.00	<1.00	44.5	<1.00	<1.00	<1.00	<1.00	4.76	<1.00	5.18	<2.0	<1.00	<1.00	<1.00	<1.00

Sample Designation	Date Collected	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
Surface Water Sample - Ditch	8/11/99	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<1.00	<0.500	<0.500	<0.500	<0.500

	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Chlorobenzene (µg/L)	Isopropylbenzene (µg/L)	1,3,5-Trimethylbenzene (µg/L)	1,2,4-Trimethylbenzene (µg/L)	4- Isopropyltoluene (µg/L)	1,2-Dichlorobenzene (µg/L)	1,3-Dichlorobenzene (µg/L)	1,4-Dichlorobenzene (µg/L)	Naphthalene (µg/L)	N-Propylbenzene (µg/L)	Sec-Butylbenzene (µg/L)	N-Butylbenzene (µg/L)	Chloroform (µg/L)
Saltwater Ecological Protection Zone Tier 1 Standards	71	5,000	43	2,200	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA	470

Notes:

µg/L = micrograms per liter
< = compound not detected at or above the stated laboratory reporting limit
Trip blanks analyzed for volatile organic compounds - all compounds not detected above laboratory reporting limits.
Samples analyzed by EPA Test Method 8260
* Monitoring Well MW-5 installed by Applied Consultants in 1989.

Table 4
Water Quality Sample Analytical Results - Semivolatile Organic Compounds
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Wells Screened in Waste

Sample Designation	Date Collected	Bis (2-Ethylhexyl) Phthalate (µg/L)	Phenanthrene (µg/L)	Acenapthene (µg/L)	Anthracene (µg/L)	Dibenzofuran (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	2-Methylnapthalene (µg/L)	Naphthalene (µg/L)	Nitrobenzene (µg/L)	Pyrene (µg/L)	2,4-Dimethylphenol (µg/L)	Dimethylphthalate (µg/L)	Di-N-Butylphthalate (µg/L)
GW-1a	7/21/99	10.8	7.79	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	25.5	<5.00	<5.00	<5.00	<5.00	<5.00
GW-3a	7/21/99	203	<50	<50	<50	<50	<50	<50	<50	99	<50	<50	<50	<50	<50
GW-10a	7/27/99	<5.00	124	124	19.1	82.9	22.7	84.6	322	1880	19.5	14.3	106	<5.00	<5.00
GW-11a	7/21/99	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50
MW-5*	10/25/99	<11.2	<11.2	<11.2	<11.2	<11.2	<11.2	<11.2	<11.2	<11.2	<11.2	<11.2	<22.4	<11.2	<11.2
GW-12a	2/7/00	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	26.1	<11.8	<11.8	<23.6	<11.8	<11.8
GW-13a	2/7/00	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<11.8	<23.6	<11.8	<11.8
GW-14a	2/7/00	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<26.8	<13.4	<13.4
GW-15a	2/7/00	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	29.6	49.1	<14.0	<14.0	<28.0	<14.0	<14.0
GW-17a	2/7/00	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	<13.4	49.3	<13.4	<13.4	<26.8	<13.4	<13.4

Wells Screened in Perimeter Berms

Sample Designation	Date Collected	Bis (2-Ethylhexyl) Phthalate (µg/L)	Phenanthrene (µg/L)	Acenapthene (µg/L)	Anthracene (µg/L)	Dibenzofuran (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	2-Methylnapthalene (µg/L)	Naphthalene (µg/L)	Nitrobenzene (µg/L)	Pyrene (µg/L)	2,4-Dimethylphenol (µg/L)	Dimethylphthalate (µg/L)	Di-N-Butylphthalate (µg/L)
GW-4a	7/21/99	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
GW-5a	7/21/99	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
GW-6a	7/21/99	<50	<50	<50	<50	<50	<50	<50	<50	<50.0	<50	<50	<50	<50	<50
GW-16a	2/7/00	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	<14.0	114	<14.0	171

Well Screened in Alluvium Beneath Bay Mud

Sample Designation	Date Collected	Bis (2-Ethylhexyl) Phthalate (µg/L)	Phenanthrene (µg/L)	Acenapthene (µg/L)	Anthracene (µg/L)	Dibenzofuran (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	2-Methylnapthalene (µg/L)	Naphthalene (µg/L)	Nitrobenzene (µg/L)	Pyrene (µg/L)	2,4-Dimethylphenol (µg/L)	Dimethylphthalate (µg/L)	Di-N-Butylphthalate (µg/L)
GW-2b	7/27/99	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	5.48	<5.00

Well Screened in Soil Fill

Sample Designation	Date Collected	Bis (2-Ethylhexyl) Phthalate (µg/L)	Phenanthrene (µg/L)	Acenapthene (µg/L)	Anthracene (µg/L)	Dibenzofuran (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	2-Methylnapthalene (µg/L)	Naphthalene (µg/L)	Nitrobenzene (µg/L)	Pyrene (µg/L)	2,4-Dimethylphenol (µg/L)	Dimethylphthalate (µg/L)	Di-N-Butylphthalate (µg/L)
GW-7a	7/21/99	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00

Well Screened in Bedrock

Sample Designation	Date Collected	Bis (2-Ethylhexyl) Phthalate (µg/L)	Phenanthrene (µg/L)	Acenapthene (µg/L)	Anthracene (µg/L)	Dibenzofuran (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	2-Methylnapthalene (µg/L)	Naphthalene (µg/L)	Nitrobenzene (µg/L)	Pyrene (µg/L)	2,4-Dimethylphenol (µg/L)	Dimethylphthalate (µg/L)	Di-N-Butylphthalate (µg/L)
GW-8c	7/27/99	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00

Well Screened in Sediments Upgradient of Waste Fill

Sample Designation	Date Collected	Bis (2-Ethylhexyl) Phthalate (µg/L)	Phenanthrene (µg/L)	Acenapthene (µg/L)	Anthracene (µg/L)	Dibenzofuran (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	2-Methylnapthalene (µg/L)	Naphthalene (µg/L)	Nitrobenzene (µg/L)	Pyrene (µg/L)	2,4-Dimethylphenol (µg/L)	Dimethylphthalate (µg/L)	Di-N-Butylphthalate (µg/L)
GW-9a	7/21/99	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00

Sample Designation	Date Collected	Bis (2-Ethylhexyl) Phthalate (µg/L)	Phenanthrene (µg/L)	Acenapthene (µg/L)	Anthracene (µg/L)	Dibenzofuran (µg/L)	Fluoranthene (µg/L)	Fluorene (µg/L)	2-Methylnapthalene (µg/L)	Naphthalene (µg/L)	Nitrobenzene (µg/L)	Pyrene (µg/L)	2,4-Dimethylphenol (µg/L)	Dimethylphthalate (µg/L)	Di-N-Butylphthalate (µg/L)
Surface Water Sample - Ditch	8/11/99	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00

Notes:
µg/L = micrograms per liter
< = compound not detected at or above the stated laboratory reporting limit
Samples analyzed by EPA Test Method 8270
* Monitoring Well MW-5 installed by Applied Consultants in 1989.

Table 5
Water Quality Sample Analytical Results - Metals
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Wells Screened in Waste

Sample Designation	Date Collected	Ag (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Co (mg/L)	Cr (mg/L)	Cr 6+** (mg/L)	Cu (mg/L)	Hg (mg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Sn (mg/L)	Tl (mg/L)	V (mg/L)	Zn (mg/L)	Sr (mg/L)
GW-1a	7/21/99	<0.007	<0.10	0.237	<0.001	<0.010	0.0452	0.0294	0.228	<0.010	<0.0002	<0.020	0.12	<0.075	<0.06	<0.10	<0.25	<0.100	<0.010	0.0807	0.528
GW-3a	7/21/99	<0.007	<0.10	0.898	<0.001	<0.010	0.736	0.152	0.924	<0.010	0.00035	<0.020	0.305	0.759	<0.06	<0.10	0.344	<0.100	0.011	0.12	0.375
GW-10a	8/19/99	<0.010	<0.10	1.70	<0.010	<0.010	<0.050	0.025	<0.005	<0.010	<0.0002	<0.050	<0.050	<0.100	<0.100	<0.10	<0.500	<0.100	<0.050	0.015	2.61
GW-11a	7/21/99	<0.007	<0.10	1.01	<0.001	<0.010	0.0127	<0.010	0.237	<0.010	<0.0002	<0.020	0.041	<0.075	<0.06	<0.10	<0.25	<0.100	<0.010	0.114	1.62
MW-5*	10/25/99	<0.007	<0.10	0.177	<0.001	<0.010	<0.007	<0.010	<0.005	0.0104	<0.0002	<0.020	<0.030	<0.075	<0.06	<0.10	<0.25	<0.100	<0.010	0.0394	0.669
GW-12a	2/7/00	<0.002	0.008	0.611	<0.002	<0.002	0.0224	0.0863	<0.10	0.00421	<0.0002	0.00916	0.0394	<0.002	<0.002	0.0279	0.00436	<0.002	0.0217	0.0195	1.690
GW-13a	2/7/00	<0.002	0.00506	0.593	<0.002	<0.002	0.00711	0.0679	<0.10	0.00221	<0.0002	0.00326	0.0145	<0.002	0.00232	0.00970	0.00330	<0.002	0.0171	0.0138	1.075
GW-14a	2/7/00	<0.002	<0.002	0.233	<0.002	<0.002	<0.002	0.0616	<0.10	0.00437	<0.0002	<0.002	0.00280	<0.002	<0.002	0.0409	0.00346	<0.002	0.0189	0.00961	2.389
GW-15a	2/7/00	<0.002	0.00690	0.410	<0.002	<0.002	0.00503	0.0821	<0.10	0.0053	<0.0002	0.0155	0.0146	<0.002	<0.002	0.0239	<0.002	<0.002	0.0291	0.0120	1.793
GW-17a	2/7/00	<0.002	0.00665	1.119	<0.002	<0.002	0.0124	0.0783	<0.10	0.00923	<0.0002	0.00719	0.0176	<0.002	<0.002	0.062	<0.002	<0.002	0.0189	0.0194	2.160

Wells Screened in Perimeter Berms

Sample Designation	Date Collected	Ag (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Co (mg/L)	Cr (mg/L)	Cr 6+** (mg/L)	Cu (mg/L)	Hg (mg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Sn (mg/L)	Tl (mg/L)	V (mg/L)	Zn (mg/L)	Sr (mg/L)
GW-4a	7/21/99	<0.007	<0.10	0.359	<0.001	<0.010	<0.007	<0.010	0.0492	<0.010	<0.0002	0.0232	<0.030	<0.075	<0.06	<0.10	<0.25	<0.100	0.0105	0.0327	2.21
GW-5a	7/21/99	<0.007	<0.10	0.0836	<0.001	<0.010	<0.007	<0.010	0.0892	0.0105	<0.0002	<0.020	<0.030	<0.075	<0.06	<0.10	<0.25	<0.100	0.0134	0.0461	1.83
GW-6a	7/21/99	<0.007	<0.10	1.55	<0.001	<0.010	0.018	<0.010	0.436	<0.010	<0.0002	<0.020	0.0633	<0.075	<0.06	<0.10	<0.25	<0.100	<0.010	<0.020	2.26
GW-16a	2/7/00	<0.002	0.00419	0.880	<0.002	<0.002	0.00520	0.0579	<0.10	0.0112	<0.0002	0.102	0.00891	<0.002	<0.002	0.0517	<0.002	<0.002	0.0138	0.0243	3.577

Well Screened in Alluvium Beneath Bay Mud

Sample Designation	Date Collected	Ag (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Co (mg/L)	Cr (mg/L)	Cr 6+** (mg/L)	Cu (mg/L)	Hg (mg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Sn (mg/L)	Tl (mg/L)	V (mg/L)	Zn (mg/L)	Sr (mg/L)
GW-2b	8/19/99	0.0420	<0.10	0.980	<0.0100	<0.0100	<0.0500	<0.0100	NA	<0.0100	<0.000200	<0.0500	<0.0500	<0.100	<0.100	<0.100	<0.500	<0.100	<0.0500	2.10	1.74

Well Screened in Bedrock

Sample Designation	Date Collected	Ag (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Co (mg/L)	Cr (mg/L)	Cr 6+** (mg/L)	Cu (mg/L)	Hg (mg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Sn (mg/L)	Tl (mg/L)	V (mg/L)	Zn (mg/L)	Sr (mg/L)
GW-8c	8/19/99	0.0100	<0.10	<0.100	<0.0100	<0.0100	<0.0500	<0.0100	<0.00500	<0.0100	<0.000200	<0.0500	<0.0500	<0.100	<0.100	<0.100	<0.500	<0.100	<0.0500	0.0310	1.80

Well Screened in Soil Fill

Sample Designation	Date Collected	Ag (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Co (mg/L)	Cr (mg/L)	Cr 6+** (mg/L)	Cu (mg/L)	Hg (mg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Sn (mg/L)	Tl (mg/L)	V (mg/L)	Zn (mg/L)	Sr (mg/L)
GW-7a	7/21/99	<0.007	<0.10	0.052	<0.001	<0.010	0.0195	<0.010	<0.020	<0.010	<0.0002	<0.020	0.211	<0.075	<0.06	<0.10	<0.25	<0.100	<0.010	<0.020	6.34

Table 5
Water Quality Sample Analytical Results - Metals
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Well Screened in Sediments Upgradient of Waste Fill

Sample Designation	Date Collected	Ag (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Co (mg/L)	Cr (mg/L)	Cr 6+** (mg/L)	Cu (mg/L)	Hg (mg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Sn (mg/L)	Tl (mg/L)	V (mg/L)	Zn (mg/L)	Sr (mg/L)
GW-9a	7/21/99	<0.007	<0.10	0.231	<0.001	<0.010	<0.007	<0.010	0.0613	<0.010	<0.0002	<0.020	<0.030	<0.075	<0.06	<0.10	<0.25	<0.100	<0.010	0.959	2.33

Sample Designation	Date Collected	Ag (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	Cd (mg/L)	Co (mg/L)	Cr (mg/L)	Cr 6+** (mg/L)	Cu (mg/L)	Hg (mg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Sn (mg/L)	Tl (mg/L)	V (mg/L)	Zn (mg/L)	Sr (mg/L)
Surface Water Sample - Ditch	8/11/99	<0.007	<0.100	0.0253	<0.001	<0.010	<0.007	<0.010	<0.020	<0.010	<0.0002	<0.020	<0.030	<0.005	NA	<0.100	<0.250	NA	<0.01	0.0898	1.51

	Ag (µg/L)	As (µg/L)	Ba (µg/L)	Be (µg/L)	Cd (µg/L)	Co (µg/L)	Cr (µg/L)	Cr 6+** (µg/L)	Cu (µg/L)	Hg (µg/L)	Mo (µg/L)	Ni (µg/L)	Pb (µg/L)	Sb (µg/L)	Se (µg/L)	Sn (µg/L)	Tl (µg/L)	V (µg/L)	Zn (µg/L)	Sr (µg/L)
Saltwater Ecological Protection Zone Tier 1 Levels	NA	NA	NA	NA	9.3	NA	50	NA	NA	0.025	NA	7.1	5.6	NA	NA	NA	NA	NA	58	NA

Notes:

< = Not detected at or above the specified laboratory reporting limit
mg/L = milligrams per liter
µg/L = micrograms per liter
NA = Not Available

Ag = Silver
As = Arsenic
Ba = Barium
Be = Beryllium
Cd = Cadmium
Co = Cobalt
Cr = Chromium
Cr 6+ = Chromium 6
Cu = Copper
Hg = Mercury
Mo = Molybdenum
Ni = Nickel
Pb = Lead
Sb = Antimony
Se = Selenium
Sn = Tin
Sr = Strontium
Tl = Thallium
V = Vanadium
Zn = Zinc

* MW-5 Installed by Applied Consultants in 1989
** Chromium 6 result is total metal concentration - all other metals are dissolved

Table 6
Water Quality Sample Analytical Results - Minerals and Water Quality Parameters
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Wells Screened in Waste

Sample Designation	Date Collected	Ca** (mg/L)	Fe** (mg/L)	Mg** (mg/L)	Mn** (mg/L)	K** (mg/L)	Na** (mg/L)	pH	TDS (mg/L)	Total Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Hydroxide Alkalinity (mg/L)	Hardness (mg/L)	Chloride (mg/L)	Sulfate (SO4) (mg/L)	Specific Conductance (EC) (µmhos/cm)
GW-1a	7/21/99	36.7	1.63	263	0.102	581	1,580	7.54	6,730	4,330	<20	4,330	<20	1,170	3,070	1.48	12,700
GW-3a	7/21/99	17.1	3.03	649	0.0478	544	2,710	7.77	12,700	12,500	<20	12,500	<20	2,780	5,140	<20	18,600
GW-10a	8/19/99	210	11.0	610	NA	370	4,500	7.08	10,200	2,850	<20	2,850	<20	761	5,540	34.9	18,200
GW-11a	7/21/99	148	3.04	379	0.51	195	2,970	6.88	12,500	2,480	<20	2,480	<20	1,930	6,300	<20	17,100
MW-5*	10/25/99	83.7	<0.5	64.3	0.476	33.3	400	6.87	1,770	878	<20	878	<20	474	507	2.06	3,040
GW-12a	2/7/00	221	13.3	238	0.62	316	1,675	6.78	6,452	2,656	<20	2,656	<20	1,532	3,140	82.8	9,340
GW-13a	2/7/00	119	26.0	142	0.69	116	773	6.79	3,082	1,651	<20	1,651	<20	882	1,098	19.7	4,350
GW-14a	2/7/00	406	48.0	313	0.61	924	1,767	7.32	7,310	1,559	<20	1,559	<20	2,303	3,339	565	8,390
GW-15a	2/7/00	260	83.8	307	2.88	127	2,085	7.01	9,384	2,564	<20	2,564	<20	1,913	4,301	91.8	11,050
GW-17a	2/7/00	200	47.2	560	0.84	349	4,841	6.64	17,466	2,866	<20	2,866	<20	2,805	8,161	30.1	17,280

Wells Screened in Perimeter Berms

Sample Designation	Date Collected	Ca** (mg/L)	Fe** (mg/L)	Mg** (mg/L)	Mn** (mg/L)	K** (mg/L)	Na** (mg/L)	pH	TDS (mg/L)	Total Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Hydroxide Alkalinity (mg/L)	Hardness (mg/L)	Chloride (mg/L)	Sulfate (SO4) (mg/L)	Specific Conductance (EC) (µmhos/cm)
GW-4a	7/21/99	178	<0.5	385	0.151	178	4,410	8.27	17,500	970	<20	970	<20	2,030	8,890	185	20,400
GW-5a	7/21/99	188	<0.5	213	1.21	101	1,320	7.53	5,800	1,930	<20	1,930	<20	1,340	1,610	695	7,310
GW-6a	7/21/99	193	2.12	663	0.334	300	5,130	6.91	19,700	2,690	<20	2,690	<20	1,620	11,800	<100	28,000
GW-16a	2/7/00	348	108	718	2.43	178	5,721	6.73	20,469	1,366	<20	1,366	<20	3,826	9,683	158	18,010

Well Screened in Alluvium Beneath Bay Mud

Sample Designation	Date Collected	Ca** (mg/L)	Fe** (mg/L)	Mg** (mg/L)	Mn** (mg/L)	K** (mg/L)	Na** (mg/L)	pH	TDS (mg/L)	Total Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Hydroxide Alkalinity (mg/L)	Hardness (mg/L)	Chloride (mg/L)	Sulfate (SO4) (mg/L)	Specific Conductance (EC) (µmhos/cm)
GW-2b	8/19/99	140	0.0490	160	NA	15.0	1,200	7.67	3,170	364	<20	364	<20	266	1,530	38.9	5,770

Well Screened in Bedrock

Sample Designation	Date Collected	Ca** (mg/L)	Fe** (mg/L)	Mg** (mg/L)	Mn** (mg/L)	K** (mg/L)	Na** (mg/L)	pH	TDS (mg/L)	Total Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Hydroxide Alkalinity (mg/L)	Hardness (mg/L)	Chloride (mg/L)	Sulfate (SO4) (mg/L)	Specific Conductance (EC) (µmhos/cm)
GW-8c	8/19/99	140	0.290	190	NA	19.0	280	7.37	1,630	536	<20	536	<20	897	630	188	2,820

Well Screened in Soil Fill

Sample Designation	Date Collected	Ca** (mg/L)	Fe** (mg/L)	Mg** (mg/L)	Mn** (mg/L)	K** (mg/L)	Na** (mg/L)	pH	TDS (mg/L)	Total Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Hydroxide Alkalinity (mg/L)	Hardness (mg/L)	Chloride (mg/L)	Sulfate (SO4) (mg/L)	Specific Conductance (EC) (µmhos/cm)
GW-7a	7/21/99	688	<0.5	724	13.9	9.93	1,210	6.84	8,610	660	<20	660	<20	4,700	4,800	956	12,200

Table 6
Water Quality Sample Analytical Results - Minerals and Water Quality Parameters
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Well Screened in Sediments Upradient of Waste Fill

Sample Designation	Date Collected	Ca** (mg/L)	Fe** (mg/L)	Mg** (mg/L)	Mn** (mg/L)	K** (mg/L)	Na** (mg/L)	pH	TDS (mg/L)	Total Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Hydroxide Alkalinity (mg/L)	Hardness (mg/L)	Chloride (mg/L)	Sulfate (SO4) (mg/L)	Specific Conductance (EC) (µmhos/cm)
GW-9a	7/21/99	211	<0.5	70.1	0.844	30.8	171	7.29	1,490	980	<20	980	<20	815	133	289	1,860

Sample Designation	Date Collected	Ca** (mg/L)	Fe** (mg/L)	Mg** (mg/L)	Mn** (mg/L)	K** (mg/L)	Na** (mg/L)	pH	TDS (mg/L)	Total Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Hydroxide Alkalinity (mg/L)	Hardness (mg/L)	Chloride (mg/L)	Sulfate (SO4) (mg/L)	Specific Conductance (EC) (µmhos/cm)
Surface Water Sample - Ditch	8/11/99	116	<0.500	199	0.594	69.9	1640	7.47	5,930	246	<20	246	<20	1,110	3,060	515	9,570

Notes:

< = Not detected at or above the specified laboratory reporting limit
mg/L = milligrams per liter
µmhos/cm = micromhos per centimeter
NA = Not Available
Ca = Calcium
Fe = Iron
*MW-5 Installed by Applied Consultants in 1989
** Total concentrations
Mg = Magnesium
Mn = Manganese
K = Potassium
Na = Sodium
TDS = Total Dissolved Solids

TABLES

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
20380	**Applicability**	2.0
(a)	Regulations apply to owners or operators of facilities that treat, store or dispose of waste at waste management units	
(d)	Regulations apply during the post-closure maintenance period and during any compliance period	
(d)(1)	Regulations will no longer apply if unit has been in compliance with the water standard for 3 consecutive years	
(d)(2)	Regulations will no longer apply if all waste and contaminated materials are removed	
(e)	Engineering alternatives can be allowed by RWQCB	
(e)(1)	Engineered alternative must meet certain criteria including: prescriptive standard cannot be applied at site due to excess cost over alternative; alternative is consistent with performance goal and be equally protective of water quality;	
(e)(2)	Dischargers proposed data procurement and analysis methods achieve programs goals	
(e)(3)	Requires ground water monitoring at least annually	
20385	**Required Programs**	6.0
(a)	Monitoring Programs and their respective triggers	
(a)(1)	Detection Monitoring Program - disharger shall institute a detection monitoring program under 20420 unless:	
(a)(2)	Evaluation Monitoring (trigger #1) - Whenever "measureably significant" evidence of release from a unit is confirmed, discharger shall institute an evaluation monitoring program	
(a)(3)	Evaluation Monitoring (trigger #2) - whenever significant physical evidence of a release is confirmed, the discharger shall institute an evaluation monitoring program	
(a)(4)	Corrective Action - Discharger shall institute a corrective action program when the RWQCB determines that the nature and extent of a release and design of a corrective action program has been satisfactorily completed	
(b)	RWQCB shall specify in WDRs the specific elements of each monitoring and response program	
(c)	Detection Monitoring Program to be performed concurrent with Evaluation Monitoring and Corrective Action Programs	
20390	**Water Quality Protection Standard**	5.0
(a)	For each unit, the RWQCB shall establish a water quality protection standard. The standard shall consist of the list of constituents of concern, the concentration limits, the Point of Compliance, and all Monitoring Points	
(b)	The RWQCB may establish separate water standards if discharger is conducting a Detection Monitoring Program in conjunction with a Corrective Action Program	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
20395	**Constituents of Concern**	4.0
(a)	The RWQCB shall specify in the WDRs the Constituents of Concern to which the Water Standard applies	
(b)	For MSW landfills, the Constituents of Concern shall include all constituents mandated under SWRCB Res. 93-62	
20400	**Concentration Limits**	5.0
(a)	For each Constituent of Concern, the discharger shall propose one of the following for each medium monitored	
(a)(1)	Background Value	
(a)(2)	Value redetermined each time	
(a)(3)	Concentration Limit Greater than Background (CLGB)	
(b)	The RWQCB shall review the proposed concentration limits and shall approve, modify or disapprove each proposed limit	
(b)(1)	The RWQCB shall approve more than one concentration limit if more than one background condition exists	
(b)(2)	The RWQCB shall approve more than one concentration limit if intra-well comparison techniques are used	
(b)(3)	The RWQCB shall approve more than one concentration limit if concentration limits greater than background have been established for a Corrective Action Program	
(c)	For a Corrective Action Program, the RWQCB shall establish a CLGB if it is technologically or economically infeasible to achieve the background value	
(d)	In establishing a CLGB, the RWQCB shall consider the potential adverse affects on groundwater and surface water quality and beneficial uses	
(e)	In no event shall a Concentration Limit Greater Than Background exceed the lowest concentration that the RWQCB finds technologically and economically achievable	
(f)	In evaluating risk, the risk shall be evaluated as if exposure would occur at the Point of Compliance.	
(g)	CLGBs shall include a demonstration that the aggregate risk of hazardous constituents shall not result in excessive exposure to a biological receptor	
(h)	A CLGB can only be applied during Corrective Action or following Corrective Action	
(i)	After a Corrective Action Program has been terminated, each CLGB shall be re-evaluated	
20405	**Monitoring Points and the Point of Compliance**	4.0
(a)	The Point of Compliance is a vertical surface located at the hydraulically downgradient limit of the Unit. For each Unit, the RWQCB shall specify Monitoring Points along the Point of Compliance and shall specify additional Monitoring Points at which the Water Standard shall apply.	
(b)	Point of Compliance at contiguous Units	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
20410	**Compliance Period**	NA
(a)	The RWQCB shall specify the compliance period for each Unit in the WDRs	
(b)	The compliance period begins anew each time the discharger initiates an Evaluation Monitoring Program	
(c)	If the discharger is engaged in a Corrective Action Program at the expiration of a compliance period, the compliance period will be extended until discharger can demonstrate that the Unit has been in compliance with the water standard for 3 consecutive years	
20415	**General Water Quality Monitoring and System Requirements**	4.0, 6.0, Appendix A
(b)(1)	The discharger shall establish a groundwater monitoring system for each unit	
(b)(1)(A)	The monitoring system shall have a sufficient number of background monitoring points installed at appropriate locations	
(b)(1)(B)(1)	For a Detection Monitoring Program, a sufficient number of Monitoring Points to yield ground water samples passing the Point of Compliance to detect a release from the Unit	
(b)(1)(B)(2)	For a Detection Monitoring Program, a sufficient number of Monitoring Points to yield ground water samples to provide the best assurance of the earliest possible detection of a release from the Unit	
(b)(1)(B)(3)	For a Detection Monitoring Program, a sufficient number of Monitoring Points and Background Monitoring Points to yield ground water samples from aquifers not already monitored, to provide the best assurance of the earliest possible detection of a release from the Unit	
(b)(1)(B)(4)	For a Detection Monitoring Program, a sufficient number of Monitoring Points within perched water zones.	
(b)(1)(B)(5)	For a Detection Monitoring Program, a sufficient number of Monitoring Points within zones of highest conductivity.	
(b)(1)(C)(1)	For an Evaluation Monitoring Program, a sufficient number of Monitoring Points to yield ground water samples passing the Point of Compliance to evaluate changes in water quality due to a release from the Unit	
(b)(1)(C)(2)	For an Evaluation Monitoring Program, a sufficient number of Monitoring Points and Background Monitoring Points to yield ground water samples from aquifers not already monitored, to evaluate changes in water quality due to a release from the Unit	
(b)(1)(C)(3)	For an Evaluation Monitoring Program, a sufficient number of Monitoring Points within perched water zones.	
(b)(1)(D)(1)	For a Corrective Action Program, a sufficient number of Monitoring Points to yield ground water samples passing the Point of Compliance to evaluate the effectiveness of the Corrective Action Program	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
(b)(1)(D)(2)	For a Corrective Action Program, a sufficient number of Monitoring Points and Background Monitoring Points to yield ground water samples from aquifers not already monitored, to evaluate the effectiveness of the Corrective Action Program	
(b)(1)(D)(3)	For a Corrective Action Program, a sufficient number of Monitoring Points within perched water zones.	
(b)(2)	The ground water monitoring system may include Background Monitoring Points that are not hydraulically upgradient of the Unit in the discharger demonstrates that the alternate points are representative of background water quality	
(b)(3)	Drillers logs will be submitted to the RWQCB and the Department of Water Resources	
(b)(4)	Monitoring Well Performance Standards	
(c)(1)	The discharger shall establish a surface water monitoring system to monitor each surface water body that could be affected by a release from the unit	
(c)(2)	Each surface water monitoring system shall include:	
(c)(2)(A)	A sufficient number of background monitoring points will be established at each surface water body to yield samples that represent the quality of surface water not affected by a release from the Unit	
(c)(2)(B)	For a Detection Monitoring Program, a sufficient number of monitoring points will be established at each surface water body to yield samples that provide the best assurance of the earliest possible detection of a release from the Unit	
(c)(2)(C)	For an Evaluation Monitoring Program, a sufficient number of monitoring points will be established at each surface water body to yield samples that provide the data to evaluate changes in water quality due to a release from the Unit	
(c)(2)(D)	For a Corrective Action Program, a sufficient number of monitoring points will be established at each surface water body to yield samples that provide the data to evaluate compliance with the Water Standard and evaluate the effectiveness of the Corrective Action Program	
(d)	Unsaturated Zone Monitoring System	
(e)	General Monitoring Requirements	
(e)(1)	Monitoring systems shall be designed and certified by a registered geologist or registered civil engineer	
(e)(2)	All monitoring wells and other borings shall be drilled by a licensed contractor and shall be logged during drilling under the direct supervision of a registered geologist or registered civil engineer	
(e)(4)	The monitoring program shall include consistent sampling and analytical procedures	
(e)(5)	The monitoring program shall include appropriate sampling and analytical methods that accurately measure the concentration of each COC and Monitoring Parameter	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
(e)(6)	The discharger shall collect all data necessary for selecting the appropriate data analysis method and for establishing background values	
(e)(7)	The discharger shall implement data analysis methods in evaluating water quality monitoring data to determine measurably significant evidence of a release from the Unit	
(e)(8)	Allowable data analysis methods include:	
(e)(8)(A)	Parametric ANOVA	
(e)(8)(B)	Nonparametric ANOVA	
(e)(8)(C)	Tolerance Interval	
(e)(8)(D)	Control Chart	
(e)(8)(E)	Other Statistical Methods that meet performance standards for approved statistical methods	
(e)(9)	In cases where the discharger proposes to use non-statistical data analysis methods, the analysis method must be capable of detecting a release from the unit. For other statistical data analysis methods, certain performance standards must be met including:	
(e)(9)(A)	Fit and performance - method must be appropriate for the data distribution	
(e)(9)(B)	Level - If an individual monitoring point comparison procedure is used, the test shall be done at a Type I error rate less than 0.01	
(e)(9)(C)	Control Chart Rate - if a control chart comparison is used, the associated statistical parameter values must be reported in the supporting documentation. The procedure shall only be used if the discharger demonstrates the procedure to be protective of human health and the environment and have a false-positive rate of no less than 1%.	
(e)(9)(D)	Tolerance Interval - Prediction Interval Rate - If used, the levels of confidence and percentage of population used shall be proposed to the RWQCB and included in the supporting technical documentation.	
(e)(9)(E)	Addressing Censored Data - The statistical method shall account for data below the practical quantitation limit	
(e)(9)(F)	Seasonal/Spatial Variability - If necessary, the statistical method shall include procedures to control or correct for seasonal and spacial variability as well as temporal correlation in the data	
(e)(9)(G)	Outliers - Newly acquired background data shall be maintained within the record but shall be excluded from use in statistical comparisons	
(e)(10)	The discharger shall justify the use of a procedure for determining a background value for each COC and monitoring parameter. The discharger shall substantiate one of the following:	
(e)(10)(A)	By reference to historical data	
(e)(10)(B)	By using a formula or procedure	
(e)(12)	Sampling Methods to be used to establish background and used for monitoring are consistent with the following:	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
(e)(12)(A)	Sample size - the number and kinds of samples collected shall be appropriate for the form of data analysis employed	
(e)(12)(B)	Data Collection and Analysis - the sampling method and schedule shall be appropriate for the medium sampled	
(e)(13)	Elevation and Field Parameters shall be determined at each well during groundwater monitoring, including elevation, temperature, electrical conductivity, turbidity and pH	
(e)(14)	The discharger shall graph all analytical data from each monitoring point and shall present the graphs to the RWQCB at least annually	
(e)(15)	The discharger shall determine the ground water flow direction and rate at least quarterly, including times of highest and lowest water elevations within the wells	
(e)(16)	Water quality monitoring data shall be maintained in the facility operating record	
20420	Detection Monitoring Program	
(b)	The discharger shall install water quality monitoring systems that are appropriate for detecting a release from the unit	
(c)	The discharger shall establish a background value for each monitoring parameter and Constituent of Concern	
(d)	The RWQCB shall specify the Water Standard in the WDRs	
(e)	The discharger shall propose a list of monitoring parameters to be analyzed for and a data analysis method to the RWQCB. The list shall include those physical parameters, hazardous constituents, waste constituents and reaction products that provide a reliable indication of a release from the unit. The list of monitoring parameters shall meet the requirements of SWRCB Res. 93-62 (incorporated by reference into 40CFR258.54).	
(f)	The RWQCB shall specify the frequencies for collecting the samples and analyzing the data	
(g)	Monitoring for COCs shall be performed at least once every five years	
(h)	The discharger shall maintain a record of water quality data as measured and in a form necessary for data analysis	
(i)	For each measuring point, the discharger shall determine whether there is "measurably significant" evidence of a release from the Unit for any monitoring parameter or COC	
(i)(1)	In determining "measurably significant" evidence of a release, the discharger shall use the methods pursuant to 20415(e)(7)	
(i)(2)	The discharger shall determine whether there is "measurably significant" evidence of a release within a reasonable period of time following sampling	
(i)(3)	The provisions of this section shall not preclude the RWQCB from making an independent finding that there is "measurably significant" evidence of a release.	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
(j)	If the discharger determines that there is "measurably significant" evidence of a release, the discharger:	
(j)(1)	Shall immediately notify the RWQCB verbally and by certified mail within 7 days. The notification shall identify the monitoring parameters and location of the release	
(j)(2)	Can immediately initiate the verification procedure established per 20415(e)(8)(E)	
(j)(3)	Immediately following detection of a release, discharger shall comply with the requirements of 20420(k)	
(k)	If a verification procedure confirms that there is "measurably significant" evidence of a release or if resampling was not performed, the discharger shall:	
(k)(1)	Non-Statistical COC Scan - Immediately sample all monitoring points at the unit and determine the concentration of all COCs	
(k)(5)	Amended ROWD Proposing EMP - Within 90 days of determining "measurably significant" evidence of a release, submit to the RWQCB an amended report of waste discharge to establish an evaluation monitoring program meeting the provisions of 20425. The report shall include:	
(k)(5)(A)	The maximum concentration of each COC at each monitoring point during the most recent COC sampling event	
(k)(5)(B)	Describe any proposed changes to the monitoring system	
(k)(5)(C)	Describe any proposed additions to the monitoring frequency, sampling and analytical procedures or statistical methods	
(k)(5)(D)	Provide a detailed description of the measures to be taken by the discharger to asses the nature and extent of the release	
(k)(6)	Within 180 days of determining "measurably significant" evidence of a release, submit an engineering feasibility study to the RWQCB for a corrective action program necessary to meet the requirements of 20430. At a minimum, the feasibility study shall contain a detailed description of the corrective action measures that could be taken to achieve background concentrations of all COCs	
(k)(7)	Discharger may demonstrate that a source other than the Unit was the source of the detected compound or that evidence of release is an error in sampling, analysis or statistical evaluation, or a product of natural variation within the media. In making a demonstration pursuant to this subsection, discharger shall:	
(k)(7)(A)	Notify the RWQCB discharger intends to make a demonstration pursuant to this subsection	
(k)(7)(B)	Within 90 days of determining evidence of release, submit a report to the RWQCB demonstrating that a source other than the Unit was responsible for the evidence, or that evidence was due to error in sampling, analysis, evaluation or from natural variation in media	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
(k)(7)(C)	Within 90 days of determining evidence of release, submit an amended ROWD to RWQCB	
(k)(7)(D)	Continue Detection Monitoring Program	
(l)	If discharger determines that there is significant physical evidence of a release, or that detection monitoring program does not satisfy the requirements of this subsection, discharger shall:	
(l)(1)	Notify the RWQCB by certified mail within 7 days	
(l)(2)	Submit an amended ROWD to make any changes to the program within 90 days	
(m)	At any time the RWQCB determines that the detection monitoring program does not satisfy the requirements of this subsection, the RWQCB shall send written notification of such determination. The discharger shall, within 90 days of receipt of such determination, submit an amended ROWD	
20425	**Evaluation Monitoring Program**	6.0
(a)(2)	The evaluation monitoring program shall be used to assess the nature and extent of the release from the Unit	
(b)	The discharger shall collect and analyze all data necessary to assess the release. The assessment shall include determination of spacial distribution and concentration of each COC. Installation of additional monitoring points may be necessary. Discharger shall complete and submit the assessment within 90 days of establishing an evaluation monitoring program.	
(c)	Based on data collected, the discharger shall update and submit the engineering feasibility study to the RWQCB within 90 days of establishing and evaluation monitoring program	
(d)	Based on data collected, and on the engineering feasibility study, the discharger shall submit an amended ROWD to establish a corrective action program and submit the amended ROWD to the RWQCB within 90 days of establishing and evaluation monitoring program	
(d)(1)	The findings of the investigations(s) shall be discussed in a public meeting with the interested and affected parties	
(d)(2)	The revised ROWD shall include:	
(d)(2)(A)	A detailed assessment of the nature and extent of the release	
(d)(2)(B)	A proposed water standard and all data necessary to justify such a limit	
(d)(2)(C)	A detailed description of the proposed corrective measures that will be taken to achieve the water standard	
(d)(2)(D)	A plan for water quality monitoring that will demonstrate the effectiveness of the proposed corrective action	
(e)	The discharger shall continue to monitor ground and surface waters to evaluate changes in water quality following a release from the Unit. The discharger shall:	
(e)(1)	Install water quality monitoring systems that are appropriate. The systems can include all or part of existing systems.	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
(e)(2)	Propose a list of monitoring parameters to the RWQCB. The list shall include all parameters that have been detected and those additional parameters that provide a reliable indication of changes in water quality resulting from any release from the Unit. The RWQCB shall specify the monitoring parameters in the WDRs taking into account:	
(e)(2)(A)	The types, quantities and concentrations of COCs in wastes at the Unit	
(e)(2)(B)	Information that demonstrates a correlation between the monitoring parameters and the COCs	
(e)(2)(C)	The mobility, stability and persistence of COCs and their reaction products	
(e)(2)(D)	The detectability of COCs and monitored parameters	
(e)(2)(E)	The background values and variation of monitored parameters	
(e)(3)	The discharger shall monitor for the monitoring parameters listed in the WDRs and shall use data analysis methods and sample collection frequency that comply with 20415(e) for evaluating changes in water quality due to a release from the unit	
(e)(4)	At least every 5 years, discharger shall monitor for all COCs specified in the WDRs	
(e)(5)	The discharger shall maintain a record of water quality data as measured and in a form necessary for data analysis to evaluate changes in water quality due to a release from the Unit	
(e)(7)	While awaiting final approval of amended ROWD, discharger shall evaluate all water quality data with respect to design criteria of the corrective action. If insufficient, the discharger shall:	
(e)(7)(A)	Notify the RWQCB within 90 days of such determination, and	
(e)(7)(B)	Submit for approval to the RWQCB any appropriate changes to the amended ROWD	
(f)	The discharger may demonstrate that a source other than the Unit caused the evidence of release or that the evidence is an artifact caused by error in sampling, analysis, data evaluation, or by natural variation in groundwater. Upon successful demonstration, the RWQCB shall specify the discharger shall reinstitute a detection monitoring program. In making a demonstration under this section, discharger shall:	
(f)(1)	Notify the RWQCB by certified mail the discharger intends to make this demonstration	
(f)(2)	Submit a report to the RWQCB	
(f)(3)	Submit amended ROWD	
(f)(4)	Continue evaluation monitoring program	
(g)	The RWQCB shall require interim corrective measures where necessary	
(h)	If discharger determines that the evaluation monitoring program does not satisfy the requirements of this section, discharger shall, within 90 days, submit an amended ROWD to make appropriate changes	

Table 1
Title 27, California Code of Regulations
Subchapter 3 - Water Quality Monitoring
Cross-reference List
Water Quality Monitoring Plan
Oyster Point Landfill

27 CCR Section	Content	Corresponding Plan Section
(i)	Any time RWQCB determines the evaluation monitoring program does not satisfy the requirements of this subsection, RWQCB shall send written notification of such determination. Discharger shall, within 90 days, of receipt of such determination, submit an amended ROWD to make appropriate changes	
20430	**Corrective Action Programs**	6.0
(b)	The discharger shall take corrective action to remediate releases from the Unit and ensure compliance with the water standard. The RWQCB shall specify the water standard for corrective action	
(c)	Discharger shall implement corrective actions that ensure the COCs achieve their respective concentration limits throughout the zone affected by the release. Discharger shall take other action approved by RWQCB to prevent noncompliance. The WDRs shall specify the specific measures to be taken.	
(d)	Discharger shall implement a water quality monitoring program to demonstrate the effectiveness of the corrective action program	
(e)	Corrective actions shall be completed within the time limit specified by the RWQCB in the WDRs	
(f)	Corrective measures may be terminated when the discharger demonstrates to the RWQCB that concentrations of all COCs are reduced to below concentration limits throughout entire zone affected by the release	
(g)	After suspending corrective measures, and until the RWQCB has approved the detection monitoring program, the discharger shall complete all other proposed tasks of the corrective measures	
(h)	The discharger shall report at least semi-annually the effectiveness of the corrective actions. The RWQCB may require more frequent reporting.	
(i)	If the discharger determines that the corrective action program does not satisfy the provisions of this section, the discharger shall, within 90 days, submit an amended ROWD to make appropriate changes	
(j)	Any time the RWQCB determines the corrective action program does not satisfy the requirements of this section, the RWQCB shall notify the discharger, who then has 90 days to submit an amended ROWD	

Table 2
Monitoring Well Construction Summary
Water Quality Monitoring Plan
Oyster Point Landfill
South San Francisco, California

Well Designation	Screened Lithology	Borehole Depth (feet bgs)	Bottom Seal Interval (feet bgs)	Screened Interval (feet bgs)	Sandpack Interval (feet bgs)	Sanitary Seal Interval (feet bgs)
GW-1a	waste	25	na	15 - 25	14 - 25	13 - 14
GW-2b	alluvium	140	131 - 140	116 - 131	114.5 - 131	112 - 114.5
GW-3a	waste	40	25 - 40	15 - 25	14 - 25	13 - 14
GW-4a	reworked clayey silt	16	na	6 - 16	5 - 16	4 - 5
GW-5a	reworked clayey silt	34.5	20 - 34.5	10 - 20	9 - 20	8 - 9
GW-6a	waste/reworked clayey silt	25	na	15 - 25	14 - 25	13 - 14
GW-7a	gravel fill	16	13.5 - 16	5.5 - 13.5	4.5 - 13.5	3.5 - 4.5
GW-8c	bedrock	50	45 - 50	35 - 45	32 - 45	30 - 32
GW-9a	gravelly clay	26	na	21 - 26	20 - 26	19 - 20
GW-10a	waste	39.5	37 - 39.5	22 - 37	20 - 37	18 - 20
GW-11a	waste/reworked clayey silt	15	na	5 - 15	4 - 15	3 - 4
GW-12a	waste	35.5	34 - 35.5	23 - 33	21 - 34	19 - 21
GW-13a	waste	30	26 - 30	15 - 25	14 - 26	12 - 14
GW-14a	waste	15	12 - 15	4 - 12	3.5 - 12	2 - 3.5
GW-15a	waste/reworked clayey silt/clayey gravel	20	18 - 20	7 - 17	6.5 - 18	4 - 6.5
GW-16a	silty sand	19.5	10.5 - 19.5	5 - 10	4.5 - 10.5	2.5 - 4.5
GW-17a	waste	31.5	26 - 31.5	10 - 25	8 - 26	6 - 8
MW-5*	waste/sandstone	20	na	16 - 20	15 - 20	nr

Notes:

feet bgs = feet below ground surface
na = not applicable (base of well is bottom of borehole)
Both bottom seal and sanitary seal composed of bentonite
* well MW-5 installed by Applied Consultants in 1989
nr = not reported in well log

Appendix A

RWQCB Order 00-046

California Regional Water Quality Control Board
San Francisco Bay Region

Winston H. Hickox
Secretary for
Environmental
Protection

Internet Address: http://www.swrcb.ca.gov
1515 Clay Street, Suite 1400, Oakland, California 94612
Phone (510) 622-2300 • FAX (510) 622-2460

Gray Davis
Governor

Date: JUN 30 2000
File No. 2179.7061(JSM)

Mr. John Gibbs
Mr. Ken Metcalf
City of South San Francisco City Hall
P.O. Box 711
South San Francisco, CA 94083

Certified Mail No. P 391-503-406
Return Receipt Requested

SUBJECT: Transmittal of Final Order No. 00-046, Updated Site Cleanup Requirements, City of South San Francisco Oyster Point Landfill, South San Francisco, San Mateo County

Dear Messr's Gibbs and Metcalf:

Enclosed is Order No. 00-046, Updated Site Cleanup Requirements, City of South San Francisco Oyster Point Landfill, South San Francisco, San Mateo County. The Order was adopted by the Regional Board in its June 21, 2000 hearing. If you have any questions regarding this matter, please contact me at (510) 622-2401, or by e-mail at jsm@rb2.swrcb.ca.gov.

Sincerely,

Julie S. Menack
Associate Engineering Geologist

Enclosure: Order No. 00-046

cc: Mailing List

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 00-046
UPDATED WASTE DISCHARGE REQUIREMENTS AND RESCISSION OF ORDER NO. 77-19 FOR:

CITY OF SOUTH SAN FRANCISCO OYSTER POINT LANDFILL
SOUTH SAN FRANCISCO, SAN MATEO COUNTY

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

SITE OWNER AND LOCATION

1. The City of South San Francisco, hereafter referred to as the Discharger, owns the Oyster Point Landfill. The site is located adjacent to San Francisco Bay in the City of South San Francisco as shown in **Figure 1**. The site encompasses an area of approximately 57 acres. The site does not have a formal street address and is bounded on the north, east, and south by the San Francisco Bay and on the west by Oyster Point Boulevard and Gull Drive, as shown in **Figure 2**.

PURPOSE OF ORDER UPDATE

2. These Waste Discharge Requirements are updated to incorporate general provisions for anticipated site development and to bring the landfill into compliance with the appropriate portions of Title 27 of the California Code of Regulations (formerly contained in Chapter 15, Title 23), referred to hereinafter as Title 27.

3. The Discharger submitted a Joint Technical Document (JTD) for the site in March 2000 which provided information regarding current site conditions and proposed development. Additional technical information pertinent to design is required by this Order.

SITE DESCRIPTION

4. The Oyster Point Landfill is a closed, unlined Class III landfill. The landfill operated between 1956 and 1970, and was used for the disposal of primarily solid wastes. No waste has been disposed of at the site since 1970. Prior to 1956, the existing Oyster Point Landfill area consisted of tidal marshlands and upland bedrock and soils. Waste disposal operations resulted in the extension of the shoreline approximately 3,000 feet to the east of the pre-landfill shoreline. Consistent with landfill practices at that time, no liner was installed at the site. Instead, the waste materials were placed directly onto the Younger Bay Mud and soils overlying bedrock.

5. Between 1956 and 1970, the Discharger leased the site to the now defunct landfill operator (The South San Francisco Scavenger Company, hereafter called Scavenger). Between 1970 and 1977, the Discharger conducted maintenance activities at the closed landfill. The Discharger operated a marina constructed in 1962 adjacent to a portion of the former landfill. The marina was expanded in 1978. Since 1977, the San Mateo County Harbor District (Harbor District) has managed and maintained the landfill property under a joint powers agreement with the Discharger. The Harbor District operates the municipal marina and a park at the landfill and manages property leases for other facilities located at the landfill.

REGULATORY HISTORY

6. In 1961, the Regional Board first adopted Waste Discharge Requirements (WDR) for the landfill in Resolution 388. The Resolution prohibited the direct disposal of waste to the Bay, and established self-monitoring requirements for the landfill. The resolution required the Discharger and Scavenger to keep wastes from directly contacting Bay water by placing an impermeable dike around the landfill, to eliminate odors associated with the waste disposal operation, and to eliminate turbidity or discoloration of the water in the Bay due to waste disposal.

7. The Board then issued Cease and Desist Order 407 in March 1962. This Order stated that the Discharger and Scavenger had not provided a time schedule that would identify what steps would be taken to comply with Resolution 388.

8. In December 1964, the Board issued Cease and Desist Order 607, addressing the monitoring wells that had been installed on site. The Order stated that the Discharger and Scavenger had not reported data for these wells for the second and third quarter of 1964, that groundwater monitoring wells had been destroyed by burial, and that further discharge of liquid industrial waste must cease until suitable monitoring wells have been provided.

9. In 1967, the Board issued Resolution 67-38, which prescribed requirements regarding the discharge of industrial waste into the landfill and acknowledged the location of a second liquid industrial waste sump. This Resolution stated that groundwater samples collected from wells located near a liquid industrial waste disposal sump revealed that the liquid wastes were impacting these wells.

10. In 1977, the Board issued Order 77-19 to the Discharger and Scavenger, which prescribed waste discharge requirements and a self-monitoring program for the landfill during final closure activities and expansion of the marina. This Order updates and rescinds Order No 77-19.

LANDFILL CONSTRUCTION HISTORY

11. The operation of the landfill conformed to regulations existing in the late 1950s and 1960s. Waste containment was consistent with practices in the industry at that time. Waste disposal design features such as liners, cellular division of waste, and leachate collection systems were not installed. Waste fill was placed directly on the Bay Mud in the eastern portion of the landfill and directly on the soil overlying bedrock in the upland western portion of the landfill.

12. In order to contain the solid waste from contact with waters of the State, Bay Mud berms were constructed around portions of the waste disposal areas in 1961, 1962, and 1964. However, there is no data to suggest that the industrial waste sumps were ever constructed with additional berms or dikes to control the migration of liquid wastes.

13. After landfill operations ceased in 1970, the Discharger and Scavenger conducted various site closure activities. Between 1971 and 1976, the upper surface of the landfill was compacted and a 2-foot layer of low-permeability soil was placed on top of the compacted fill. Additional remedial measures were constructed between 1979 and 1981. They included installation of a 2- to 3-foot thick Bay Mud cap across the site, placement of additional riprap and Bay Mud along the Marina, construction of bentonite-cement trenches between the landfill and the drainage channel and along an approximately 300-foot length of shoreline on the west basin (beach area), and realignment of the drainage channel. In addition, Bay Mud was placed along the southern boundary of the landfill where leachate seepage had been observed. In 1987, a Bay Mud leachate cutoff trench was constructed along the northern landfill boundary, between the mole and beach area. A gas barrier trench consisting of compacted soil (85%) and chlorinated polyethylene (CPE) liner (20 mils thick) was also installed along the western landfill boundary.

SITE WASTE DISPOSAL HISTORY

14. Scavenger began disposal operations at the landfill in 1956. Initially, municipal solid waste was disposed of on the ground and burned. This activity ended in 1957. Scavenger then placed waste directly into the tidelands and used a wire fence to control the discharge of solids into the Bay due to tidal action.

15. Beginning in 1961, the landfill received liquid industrial waste for disposal. The types of liquid waste included paints, thinners, and coagulated solvent sludge. The liquid wastes were placed in a sump (Sump 1) constructed within the waste fill. No records describing the construction of the sump have been found. Liquid industrial wastes were disposed of in this sump from 1961 until 1966. In July 1966, the Discharger discontinued the use of Sump 1 and used Sump 2 until 1967. The total volume of liquid industrial waste received by the landfill in 1965 and 1966 is estimated at 608,351 and 378,680 gallons, respectively.

16. The landfill material consists of up to 45 feet of poorly compacted municipal and industrial waste. Typical waste found within the landfill includes the following: paper, cardboard, organic matter, wood, glass, metal, rocks, concrete, rubber, drums, chemicals, and other materials. The base of the landfill material has been compressed into, and mixed with, the upper part of the Bay Mud. The volume of waste in the landfill is approximately 2.5 million cubic yards and total tonnage of this material is approximately 1.4 million tons.

SITE GEOLOGIC SETTING

17. The site lies on the western shores of San Francisco Bay on reclaimed bay lands and adjacent uplands at the eastern base of San Bruno Mountain. The site itself is a relatively flat lying area with an average elevation of about 20 feet above sea level. Bedrock belonging to the Franciscan Formation, alluvial material, and Bay Mud lie directly beneath the refuse materials. The Franciscan Formation consists primarily of sandstone and shale. Bedrock is near the surface at the western end of the landfill but lies at depth beneath the eastern end. Alluvial units consisting of medium stiff to hard, green, gray-green, and brown sandy and silty clay and medium dense to dense silt, silty sand, and sand unconformably overlie the bedrock surface. These alluvial units are absent from beneath the western edge of the landfill, but lap onto the bedrock surface about 300 feet east of the original Bay shoreline. Borings at the eastern end of the landfill penetrate, in aggregate, over 30 feet of these units. The alluvial units are overlain by Bay Mud ranging in thickness from less than 1 foot along the original Bay shoreline to over 90 feet at the eastern end of the landfill. The Bay Mud consists of very soft to soft, dark gray silty clay to clayey silt, with occasional shell fragments and sandy clay zones.

SITE HYDROGEOLOGIC SETTING

18. The hydrogeologic units in the vicinity of the site include the Franciscan Formation bedrock, the alluvial units between the bedrock and the Bay Mud, the Bay Mud, and the landfill and perimeter berms. The landfill and perimeter berms are a water table hydrostratigraphic unit referred to by others as the A hydrologic zone or A-zone.

19. Groundwater occurs under confined conditions in the alluvial units between the bedrock and the Bay Mud, the Bay Mud acting as the confining layer. These alluvial units may be hydraulically connected to similar units farther to the south that may be equivalent to and in hydraulic connection with the hydrogeologic units from which San Bruno draws a portion of its domestic water supply, approximately 2.5 miles away. This hydrologic unit has been referred to by others as the B hydrologic zone or B-zone. The Bay Mud forms a low-permeability layer that acts as an aquitard that confines the underlying B-zone units

and restricts infiltration of leachate from the overlying landfill. Laboratory permeability tests conducted on two representative samples of Bay Mud indicate vertical conductivities of 1.21×10^{-8} and 1.51×10^{-8} cm/sec. Horizontal conductivities were 9.06×10^{-9} and 1.14×10^{-8}.

20. Water levels within the A-zone range from approximately 2.8 feet to 24 feet below ground surface. Leachate contours indicate a general flow direction from the landfill interior towards San Francisco Bay on the east and on the west.

21. Tidal fluctuations were measured in wells GW-4a, GW-5a, GW-6a, GW-7a, and GW-11a which are located along the perimeter of the landfill but were not measured in wells GW-3a and GW-10a, located along the central axis of the landfill. Therefore, wells along the perimeter of the landfill are in hydraulic connection with San Francisco Bay.

22. The primary sources of recharge to the shallow units are through direct infiltration of precipitation and tidal seepage from the Bay. Street runoff from south of the landfill is channeled to an east-west drainage ditch that traverses a portion of the southern landfill boundary and empties into the Bay. Landfill surface water runoff is collected in six drainage pipes, four that empty into the east-west drainage ditch and two that drain directly to the Bay on the north side of the landfill.

23. At the location of the A-zone and B-Zone groundwater monitoring well pair within the landfill, a consistent vertical gradient has not been observed.

GROUNDWATER CONTAMINATION AND WATER QUALITY

24. Groundwater within the A-zone in both the landfill and perimeter berms has detectable concentrations of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) as well as dissolved metals. Shallow groundwater in the A-zone generally exceeds 3000 mg/l total dissolved solids (TDS) and is not reasonably expected by the Board to supply a public water supply system. Therefore, the A-zone meets the exemption criteria of the State Water Resources Control Board's Sources of Drinking Water Policy (SWRCB Resolution 88-63).

25. Groundwater within the B-zone has detectable concentrations of chloroform and dimethylphthalate. The Discharger has attributed these organic compounds to the addition of potable water to this well during drilling to counter flowing sands. Dissolved metals are also present within the B zone.

26. Groundwater within the Franciscan Formation bedrock outside the landfill does not contain detectable concentrations of VOCs or SVOCs, and dissolved metals and mineral concentrations are low to nondetectable.

27. Groundwater within the gravelly fill materials on the south bank of a drainage ditch that separates the landfill from the Cabot-Cabot & Forbes industrial park does not contain detectable concentrations of VOCs or SVOCs. This indicates that releases of VOCs and SVOCs have not occurred at this location.

CURRENT AND FUTURE LAND USES

28. Present landfill useage consists primarily of open space and commercial uses including the Oyster Point Marina and an office complex located at the western end of the landfill.

29. In 1994, the Discharger adopted the East of 101 Area Plan describing future land use at the landfill site as a mixture of open space and commercial development. Recent proposals include the development of hotel facilities. Commercial development represents a change in post-closure land use of the site.

SITE INVESTIGATIONS

30. Board Resolution 388 included a self-monitoring program requiring the Discharger and Scavenger to monitor groundwater between Sump 1 and the Bay. These wells were buried within the landfill prior to 1964 and their number and location are unknown and therefore they could potentially be vertical conduits.

31. In 1989, Applied Consultants completed a groundwater assessment for development of the Oyster Point Marina Inn site. Applied Consultants installed six groundwater monitoring wells at the site (Wells MW-1 through MW-6).

32. In 1989, Harding Lawson Associates (HLA) conducted a site investigation along Gull Drive to collect geotechnical data for the design and construction of road improvements to facilitate access to businesses along Oyster Point Boulevard. Borings completed by HLA did not encounter municipal or industrial waste.

33. Levine-Fricke conducted a soil boring program in 1991 to determine if landfill wastes were present between the location of a former rod and gun club on the landfill site and the beach area. The borings encountered metallic slag below the ground surface and sandy gravel fill beneath that. The precise location of these borings is not known. However, the gun club on this parcel included an indoor shooting range where firearms

were discharged inside a concrete bunker. According to the Discharger's personnel, the lead shot was recovered and recycled.

34. During construction of improvements to Gull Drive in 1995, wastes associated with Sump 2 were uncovered. The Discharger removed an estimated 4,000 cubic yards of wastes and extended the landfill cover over this area with oversight from the San Mateo County Health Services Agency and the Board. As a result of these activities, the Board requested that a groundwater and leachate monitoring plan be prepared for the site.

35. In 1999 and 2000, Gabewell and PES Environmental conducted investigations of the landfill which included a geophysical investigation to identify the boundaries of Sumps 1 and 2, landfill gas sampling, leachate grab sampling, monitoring well installation and sampling, aquifer testing including slug tests, tidal monitoring, and test pit excavation.

BASIN PLAN

36. The Regional Board adopted a revised Water Quality 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 State Water Resource Control Board and the Office of the Administrative Law approved the revised Basin Plan on July 20 and November 13, respectively, of 1995. A summary of regulatory provisions is contained in Title 23 of the California Code of Regulations at 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 containing high TDS, high background contaminant levels, or those areas with a low-yield. Some groundwater underlying and adjacent to the site qualifies as a potential source of drinking water, though there is no current use of the site's groundwater, nor any anticipated plans for its use.

BENEFICIAL USES

37. The beneficial uses of South 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 groundwater in the vicinity of the Oyster Point Landfill include municipal and domestic water supply, industrial process water supply, industrial service water supply, and agricultural water supply. The site overlies the Visitacion Valley Groundwater Basin. As discussed in Finding 24, groundwater within the A-zone is brackish. Furthermore, there is no historical, current or planned use of the shallow brackish groundwater in the vicinity of the landfill as a source of drinking water. However, the deeper aquifers beneath the site are a potential source of drinking water.

It should be noted that the A zone discharges to San Francisco Bay and has the potential to impact the beneficial uses of San Francisco Bay.

WATER QUALITY PROTECTION STANDARDS

38. Title 27 of the California Code of Regulations requires the RWQCB to establish a Water Quality Protection Standard (WQPS) in Waste Discharge Requirements for each waste management unit covered by that order. The four components of the WQPS are as follows:

a. Montoring Parameters

Title 27 defines Constituents of Concern (COCs) as "all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit". Monitoring parameters (MPs), a subset of the COCs, are typically the most mobile and commonly detected COCs in groundwater at the site and are measured on a more frequent basis than the entire list of COCs. During a corrective action period, monitoring parameters provide a means to evaluate the effectiveness of the corrective action.

b. Concentration Limits

Maximum Allowable Concentration Limits (MACLs) shall be established for each COC. Because it may be technologically and/or economically infeasible to clean up all landfill-related constituents in the groundwater to background concentrations (non-detect for organics), MACLs are developed to protect the beneficial uses of shallow groundwater beneath the landfill (see Finding 37 - Beneficial Uses). The applicable beneficial uses with the most stringent water quality objectives are related to shallow groundwater discharge to surface waters of San Francisco Bay and include uses involving the health of aquatic organism receptors in the bay and humans who consume aquatic organisms from the bay.

c. Point of Compliance

Title 27 defines the Point of Compliance as the "vertical surface located at the hydraulically downgradient limit of the Unit that extends through the uppermost aquifer underlying the Unit." This Order defines that the appropriate Point of Compliance for the landfill is the hydraulically downgradient perimeter of the waste fill area and directly beneath the waste fill area

d. Monitoring Points

Monitoring points, as defined in Title 27, "means a well, device, or location specified in the waste discharge requirements at which monitoring is conducted and at which the water quality protection standard applies". This Order requires that the monitoring points shall be located along the perimeter of the landfill.

MONITORING PROGRAMS

39. **Groundwater Monitoring** – The site contains a network of ten leachate wells (GW-1a, GW-3a, GW-10a, GW-11a, GW-12a, GW-13a, GW-14a, GW-15a, GW-17a, and MW-5), one alluvial unit well underlying the Bay Mud (GW-2b), four wells (GW-4a, GW-5a, GW-6a, and GW-16a) screened in the landfill perimeter containment berm, and two wells (GW-7a and GW-9a) screened in earth fill. One well (GW-8c), screened in the bedrock west of the former shoreline, is located upgradient of the landfill.

40. **Leachate Monitoring** - The leachate program is detailed in the Discharge Monitoring Plan attached to this Order (Attachment A). The Discharger is required to analyze for the monitoring parameters as presented in the attached Discharge Monitoring Program attached to this Order (Attachment A).

41. **Surface Water Monitoring** –Surface water monitoring will be conducted as part of a General Industrial Storm Water Discharge Permit through Industrial and Construction Stormwater Monitoring Plans.

42. **Vadose Zone Monitoring** - Vadose zone monitoring as required by Section 20415, Title 27, is not technically feasible as there is no vadose zone at this site.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

43. The Discharger has completed Mitigated Negative Declarations that were certified complete on September 28, 1998 and March 12, 1999 for two future developments on the Oyster Point Landfill, as described in findings 28 and 30 above. The Mitigated Negative Declarations found that that there is no substantial evidence that the proposed projects, following implementation of the mitigation measures contained in the Negative Declarations, will have a significant effect on the environment. The Board accepts these

environmental documents and finds that this Order protects the water resources associated with the project.

Impacts of geology and soils outlined in the Negative Declarations. The Mitigated Negative Declarations list several potential impacts of geology and soils including the potential for seismic-related ground failure, including liquefaction; construction of the development on a geologic unit or soil that is unstable, or would become unstable as a result of the project and potentially result in on- or off-site landslide; lateral spreading, subsidence, liquefaction, or collapse. The Mitigated Negative Declarations incorporate several mitigation measures by reference to the "Geotechnical Investigation for the Proposed Expansion of the Oyster Point Marina", October 20, 1976, and "Geotechnical Investigation Report proposed Hilton Suites Hotel at Oyster Point Marina", January 7, 1999. The proposed mitigation measures address general facility conditions, foundations, settlement, earthwork, underground utilities, pavements, corrosivity, and site drainage. This WDR addresses the above-mentioned mitigation measures, as well as, soil and geological mitigation measures related to landfill closure and potential post closure construction at the landfill. All remaining mitigation measures are being overseen by the San Mateo County Department of Environmental Health.

Impacts to hydrology and water quality outlined in the Negative Declarations. The Mitigated Negative Declarations lists several potential impacts to water quality including changing absorption rates, drainage patterns, and the amount of surface water runoff. The Mitigated Negative Declarations list several mitigation measures including the statement that the Discharger shall provide a Storm Water Pollution Prevention Plan and an Erosion Control Plan as a part of the building and grading permit process. Pursuant to City Ordinance, storm water pollution control devices and filters shall be installed to prevent pollutants from entering the Discharger's storm drain system at the Bay. If wetlands are affected, the Negative Declarations state that it would be necessary to obtain BCDC and/or U. S. Army Corps of Engineers approval. This WDR requires a Storm Water Pollution Prevention Plan and Erosion Control Plan and therefore addresses these mitigation measures.

Impacts of hazards and hazardous materials outlined in the Negative Declarations. The Mitigated Negative Declarations also list several other potential impacts to water quality including the fact that the proposed development will affect the closure status of the landfill, causing it to fall under the Title 27 postclosure requirements. Additionally, the Mitigated Negative Declarations list several mitigation measures including potential measures that may be necessary depending on the findings of the Sump 1 and Sump 2 investigations. Mitigation measures will be addressed by the documents required by this Order. Any remaining mitigation measures are being overseen by the San Mateo County Department of Environmental Health.

44. The Board has notified the Discharger and interested agencies and persons of its intent to adopt revised, updated Waste Discharge 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.

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

IT IS HEREBY ORDERED that the Discharger, its agents, successors and assigns shall meet the applicable provisions contained in Title 27, 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 relocation of wastes to or from waste management units shall not create a condition of pollution or nuisance as defined in Section 13050 (l) and (m) of the California Water Code. Any relocated waste shall not be placed in or allowed to contact ponded water from any source whatsoever. Wastes shall not be relocated to any location where they can be discharged into waters of the State or of the United States.

2. Leachate and ponded water containing leachate or in contact with waste shall not be discharged to waters of the State or of the United States unless specifically authorized under an NPDES permit.

3. The creation of any new waste management units is prohibited without prior Regional Board approval.

4. The Discharger shall not excavate within or reconfigure any existing waste management unit without prior Regional Board approval.

5. No additional waste shall be deposited or stored at this site.

6. The Discharger, or any future owner or operator of the site, shall not cause the following conditions to exist in waters of the State at any place outside the waste management facility:

    a. Surface Waters

        - Floating, suspended, or deposited macroscopic particulate matter or foam.
        - Bottom deposits or aquatic growths.

- Alteration of temperature, turbidity, or apparent color beyond natural background levels.
- Visible, floating, suspended or deposited oil or other products of petroleum origin.
- Toxic or other deleterious substances to be present 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 degradation of groundwater quality.
- Substantial migration of existing groundwater impacts.

B. SPECIFICATIONS

1. All reports pursuant to this order shall be prepared under the supervision of a California registered civil engineer, California registered geologist or certified engineering geologist.

2. The site shall be protected from any washout or erosion of wastes or cover material and from inundation that could occur as a result of a 100-year, 24-hour precipitation event, or as the result of flooding with a return frequency of 100 years.

3. Surface drainage from tributary areas and internal site drainage from surface or subsurface sources shall not contact or percolate through wastes during the life of the site.

4. The existing containment, drainage, and monitoring systems at the facility, shall be maintained as long as leachate is present and poses a threat to water quality.

5. The Discharger shall assure that the structures which control leachate, surface drainage, erosion and gas are constructed and maintained to withstand conditions generated during the maximum probable earthquake.

6. The final cover system shall be graded and maintained to promote lateral runoff and prevent ponding and infiltration of water.

7. The Discharger shall analyze the samples from the existing groundwater wells as outlined in the Discharge Monitoring Program (Attachment A).

8. In the event of a release of a constituent of concern beyond the Point of Compliance (Section 20405, Title 27), the site begins a Compliance Period (Section 20410, Title 27).

During the Compliance Period, the Discharger shall perform an Evaluation Monitoring Program and a Corrective Action Program.

9. The Discharger shall install any reasonable additional groundwater and leachate monitoring devices required to fulfill the terms of any future Discharge Monitoring Program issued by the Executive Officer.

10. Landfill gases shall be adequately vented, removed from the landfill, or otherwise controlled to minimize the danger of explosion, adverse health effects, nuisance conditions, or the impairment of beneficial uses of water.

11. 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.

12. The Discharger shall provide a minimum of two surveyed permanent monuments near the landfill from which the location and elevation of wastes, containment structures, and monitoring facilities can be determined throughout the operation and post-closure maintenance period. A licensed land surveyor or registered civil engineer shall install these monuments.

13. The Regional Board shall be notified immediately of any failure occurring in the waste management unit. Any failure that threatens the integrity of containment features or the landfill shall be promptly corrected after approval of the method and schedule by the Executive Officer.

14. The Discharger shall comply with all applicable provisions of Title 27 that are not specifically referred to in this Order.

15. The Discharger shall maintain the facility so as to prevent a statistically significant increase in water quality parameters at points of compliance as provided in Section 20407 of Title 27.

16. A cap shall be placed on the landfill that meets the post-closure maintenance requirements for solid waste landfills as detailed in Section 21090 of Title 27.

C. PROVISIONS

1. The Discharger shall comply immediately, or as prescribed by the time schedule below, with all Prohibitions, Specifications and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. The Discharger must also 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, 13267, 13268, 13300, 13301, 13304, 13340, 13350].

2. All technical and monitoring reports required to be submitted pursuant to this Order are being requested pursuant to Section 13267 of the California Water Code. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to Section 13268 of the California Water Code.

3. The Discharger shall submit an **Annual Monitoring Report**, acceptable to the Executive Officer, by January 31 of each year in accordance with the attached Discharge Monitoring Program (Attachment A). The annual report to the Board shall cover the previous calendar year as described in Part A of the Monitoring Program. In addition to the requirements outlined in Attachment A, this report shall also include the following: location and operational condition of all leachate and groundwater monitoring wells; and groundwater and leachate contours for each monitoring event. Additionally, the Discharger shall submit semi-annual monitoring reports, to be submitted no later than July 31 and January 31 of each year; the January 31 semi-annual report may be combined with the annual report.

REPORT DUE DATES:

Annual Report	**January 31 (Each Year)**
Semi-Annual Report	**July 31 and January 31**

4. The Discharger shall submit an **Annual Maintenance Report** to the Board, acceptable to the Executive Officer, detailing the repair and maintenance activities that need to be completed prior to the commencement of the next rainy season. This letter report shall also include a schedule for repair and maintenance activities, and a cost analysis detailing the anticipated expense for all repairs, maintenance and monitoring during the next 12 months. Repair and maintenance estimates shall be based on rainy season inspections conducted throughout the winter as required in the Discharge Monitoring Plan. The report shall also contain a demonstration of the adequacy of the funds needed for the site repair and maintenance.

REPORT DUE DATE: July 31 (Each Year)

5. The Discharger shall submit an **Emergency Response Contingency Plan**, acceptable to the Executive Officer, intended to stop and contain the migration of pollutants to receiving waters as the result of any earthquake generating ground shaking of Richter Magnitude 7 or greater at or within 30 miles of the landfill, excessive rainfall, tidal action, or other significant events. The contingency plan shall describe the containment features, and groundwater monitoring and leachate monitoring facilities potentially impacted by such events. The plan shall also include methods of containment and cleanup of waste exposed or displaced at the site. The plan shall provide for reporting results of the post earthquake inspection to the Board within 72 hours of the occurrence of the earthquake. Immediately after an event causing damage to the landfill structures,

the corrective action plan shall be implemented and the Discharger shall give immediate notification to the Regional Board as well as the Local Enforcement Agency (LEA) of any damage, including corrective actions and cleanup activities, and the environmental impacts of such. The plan shall also include a demonstration of the adequacy of the funds needed for the site contingency actions.

REPORT DUE DATE: **September 21, 2000**

6. The Discharger shall prepare and submit a **Closure/Post-Closure Maintenance Plan,** acceptable to the Executive Officer for the entire landfill, pursuant to Title 27. The plan shall outline activities to be implemented to complete final closure of the landfill, including development of a plan to regrade and repair the landfill cover in compliance with Title 27, sections 20950 to 21200. The plan shall also outline post-closure maintenance activities pursuant to Title 27, Section 21769. The maintenance plan shall be updated to reflect changes in landfill development.

PLAN DUE DATE: **September 21, 2000**
UPDATE DUE DATE: **60 days prior to completion of construction of any new development**

7. The Discharger shall prepare and submit a **Water Quality Monitoring Plan** acceptable to the Executive Officer, for the entire landfill, pursuant to Title 27 and as required by The Self-Monitoring and Reporting Program included as Attachment A to this Order. The plan shall propose points of compliance (POCs), Contaminants of Concern (COCs), Monitoring Parameters (MPs), Maximum Allowable Concentration Limits (MACLs), and the methods for validating data and statically evaluating whether a MACL exceedence at a POC is significant. Approved MACLs shall be attached to the Self-Monitoring and Reporting Program and identified as Table B. The plan shall include a Water Quality Sampling and Analysis Plan (SAP) which gives a complete and detailed description of the physical process for obtaining field information, measurement, and water quality samples. The SAP shall be usable as a stand alone document and shall be provided to each member of the sampling team. The plan shall also include a Leachate Management Plan to contain leachate within the waste management unit. Upon the detection of leachate buildup within the waste unit, a leachate collection, extraction, disposal systems must be installed. The implementation of this plan must establish an inward leachate gradient.

REPORT DUE DATE: **November 21, 2000**

8. The Discharger shall submit a **Post-Closure Development Standards Report,** acceptable to the Executive Officer, with general guidelines to be implemented prior to all future developments. This document shall contain an overview of the design criteria for piles, foundations, caps, etc. that are proposed for all potential developments on the Oyster Point landfill. This document shall include engineering design criteria for activities that would affect the engineering geologic and hydrogeologic properties of the

landfill. For all new development within the landfill, the document shall include assurance that:

- A Title 27 cap shall be placed over the entire landfill prior to development activities;
- The cap integrity shall be maintained during and after construction;
- Any penetrations of the cap, such as from piles, utility pipes, foundations, plants, etc., shall be adequately sealed to prevent infiltration of water;
- All utility lines and right-of-ways shall be placed in an overexcavated trench lined with a minimum of two-feet of clean, low hydraulic conductivity fill such that releases to the landfill are prevented and workers are prevented from being exposed to landfill materials.
- Stormwater run-on and run-off shall be adequately controlled to prevent excessive erosion and damage to the cap. Any applied irrigation water shall likewise be controlled;
- All constructed buildings and utilities shall be built to accommodate the maximum anticipated settlement without being damaged; and
- New construction shall not promote additional standing water on top of the landfill.

REPORT DUE DATE: **November 21, 2000**

9. The Discharger shall prepare and submit a **Development or Redevelopment Proposal,** acceptable to the Executive Officer, for each individual development or redevelopment proposed for the landfill. Each individual proposal shall:

- Describe the project;
- Identify key components of the design that may impact the landfill; and
- Refer to and document components of the design that will comply with the **Post-Closure Development Standards Report.**

REPORT DUE DATE: **120 days prior to commencement of construction**

10. The Discharger 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 the integrity of the landfill cap, waste or leachate containment facilities, 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.

NOTIFICATION DUE DATE: **Immediately upon occurrence**
REPORT DUE DATE: **30 days after initial notification**

11. The Discharger shall file with the Regional Board **Discharge Monitoring Reports** performed according to any Discharge Monitoring Program issued by the Executive Officer.

12. The Discharger shall prepare, submit and implement a **Storm Water Pollution Prevention Plan**, acceptable to the Executive Officer, in accordance with requirements specified in State Water Resources Control Board General Permit for Storm Water Discharges Associated with Industrial Activities (NPDES Permit No. CAS000001).

COMPLIANCE DUE DATE: **September 21, 2000**

13. For each proposed development, 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).

COMPLIANCE DUE DATE: **October 15 of the year construction takes place or prior to starting construction if construction begins between October 15 and May 15**

14. The Discharger shall submit a **Well Installation 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 Discharge Monitoring Program (Attachment A).

COMPLIANCE DUE DATE: **45 days following completion of well installation activities**

15. The Discharger shall maintain a copy of these waste discharge requirements and these requirements shall be available to operating personnel at the facility at all times [CWC Section 13263].

16. This Board considers the property owner and site operator to have continuing responsibility for correcting any problems that arise in the future as a result of the waste discharged or related operations.

17. In the event that the Discharger-owns property adjacent to the landfill is developed into residential dwellings, the Discharger will notify prospective home purchasers of the presence of the landfill.

18. 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 to be kept 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.

19. These requirements do not authorize commission of any act causing injury to the property of another or of the public; do not convey any property rights; do not remove liability under federal, state or local laws; and do not authorize the discharge of wastes.

20. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office. 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]. The request must contain the requesting entity's full legal name, the address and telephone number of the persons responsible for contact with the Board and statement. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code.

21. This Order is subject to Board review and updating, as necessary, to comply with changing State and Federal laws, regulations, policies, or guidelines; changes in the Board's Basin Plan; or changes in the discharge characteristics [CWC Section 13263].

22. 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].

23. 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)].

24. Provisions of these waste discharge requirements are severable. If any provision of these requirements is found invalid, the remainder of these requirements shall not be affected.

25. 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)].

26. Except for a discharge which is in compliance with these waste discharge requirements, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be 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, shall, as soon as (a) that person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the office of Emergency Services of the discharge in accordance with the spill reporting provision of the state toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the State Board or the appropriate Regional Board of the discharge. This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of Section 13271 of the Water Code unless the Discharger is in violation of a prohibition in the applicable water Quality Control Plan [CWC Section 13271(a)].

27. 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].

28. 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.

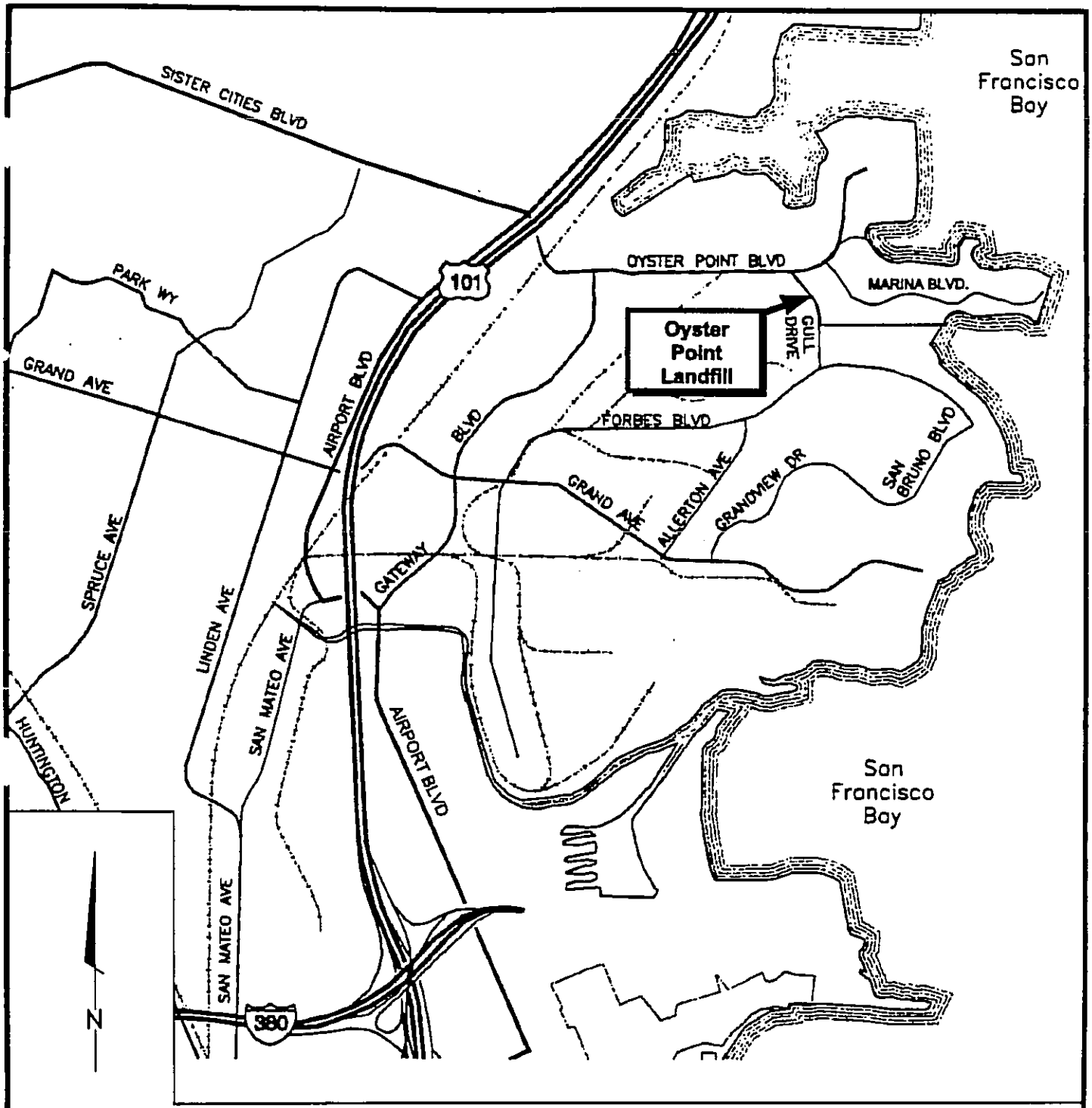
29. This Board's Order No. 77-19 is hereby rescinded.

I, Lawrence P. Kolb, Acting 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 June 21, 2000.

for Lawrence P. Kolb
Acting Executive Officer

Figures: Figure 1 - Site Location Map
Figure 2 - Landfill map

Attachment: Attachment A - Discharge Monitoring Program



Reference: Kleinfelder 1998

Prepared by:
PES Environmental, Inc.
Engineering & Environmental Services
For:
GABEWELL

Site Location Map
Joint Technical Document
Oyster Point Landfill
South San Francisco, California

Figure
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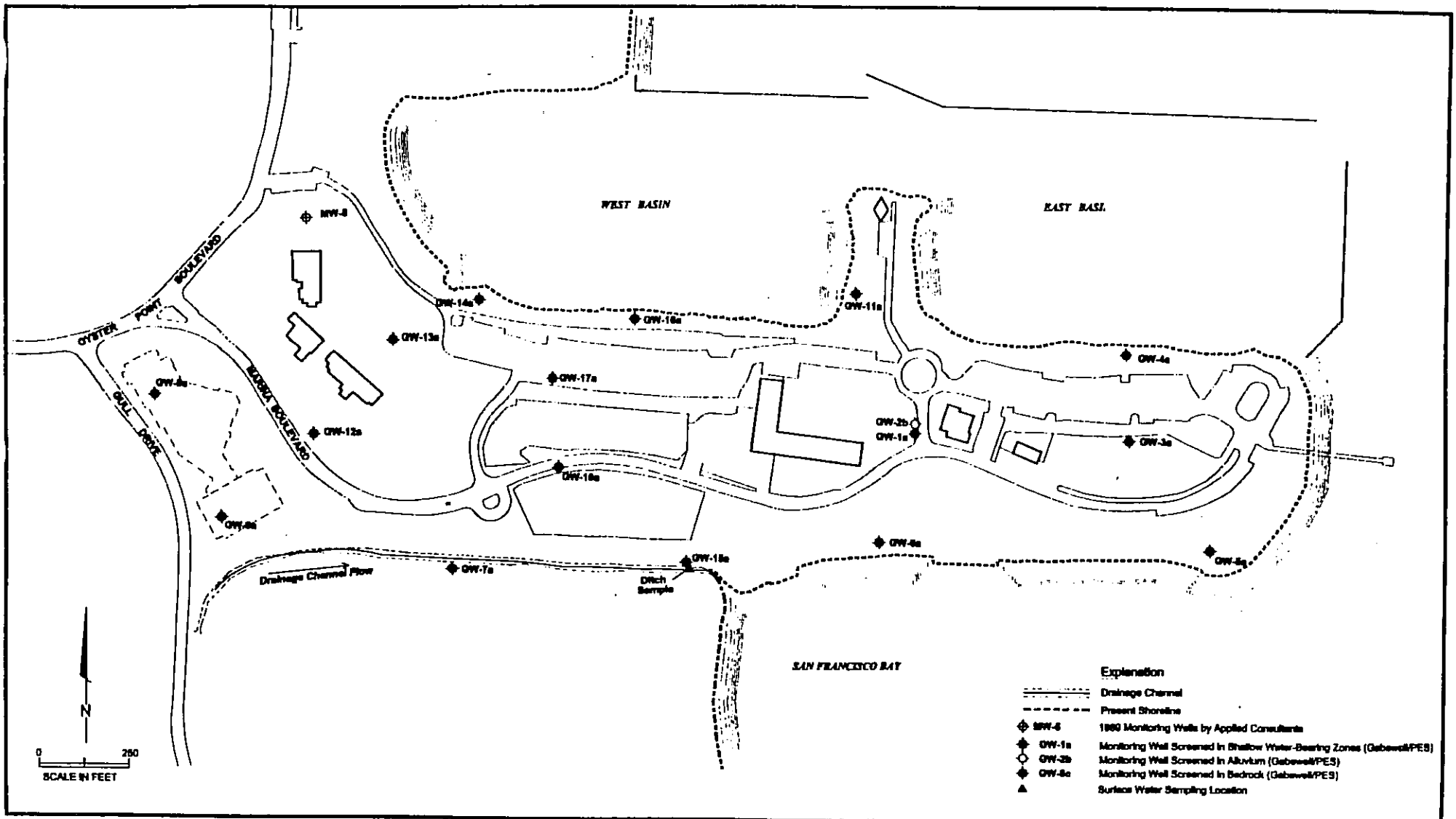

Prepared by
PES Environmental, Inc.
Engineering & Environmental Services
For
GABEWELL

FIGURE 2 LANDFILL MAP

Oyster Point Landfill
South San Francisco, California

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ATTACHMENT A
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

DISCHARGE MONITORING PROGRAM

FOR

OYSTER POINT LANDFILL
CITY OF SOUTH SAN FRANCISCO, SAN MATEO COUNTY

ORDER NO. 00-046

CONSISTS OF

PART A

AND

PART B

PART A

A. GENERAL

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 Discharge Monitoring Program is issued in accordance with Title 27 of the California Code of Regulations.

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 discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of standards of performance, and toxicity standards, (4) to assist the discharger in complying with the requirements of Title 27.

B. SAMPLING AND ANALYTICAL METHODS

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.

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.

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 that actually or potentially receives surface or groundwaters that pass over, through, or under waste materials or contaminated soils. In this case the groundwater beneath and adjacent to the landfill areas, the surface runoff from the site, and the Pacific Ocean are considered receiving waters.

3. Standard observations refer to:

a. Receiving Waters

1) Floating and suspended materials of waste origin: presence or absence, source, and size of affected area.
2) Discoloration and turbidity: description of color, source, and size of affected area.
3) Evidence of odors, presence or absence, characterization, source, and distance of travel from source.
4) Evidence of beneficial use: presence of water associated wildlife.
5) Flow rate
6) Weather conditions: wind direction and estimated velocity, total precipitation during the previous five days and on the day of observation.

b. Perimeter of the waste management unit.

1) Evidence of liquid leaving or entering the waste management unit, estimated size of affected area and flow rate. (Show affected area on map)
2) Evidence of odors, presence or absence, characterization, source, and distance of travel from source.
3) Evidence of erosion and/or daylighted refuse.

c. The waste management unit.

1) Evidence of ponded water at any point on the waste management facility.
2) Evidence of odors, presence or absence, characterization, source, and distance of travel from source.
3) Evidence of erosion, slope or ground movement, and/or daylighted refuse.
4) Adequacy of access road
5) Condition of site drains, silt basin capacity
6) Standard Analysis and measurements are listed on Table A (attached)

D. SAMPLING, ANALYSIS, AND OBSERVATIONS

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

1. Storm drain discharges per Section 20415
2. Groundwater and leachate per Section 20415

and per the general requirements specified in Section 20415(e) of Title 27.

E. RECORDS TO BE MAINTAINED

Written reports shall be maintained by the Discharger 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. Written detection monitoring reports shall be filed by January 31 and July 31 of each year. In addition an annual report shall be filed by January 31 of each year. The reports shall be comprised of 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 Discharger has 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 monitoring report shall include a compliance evaluation summary. The summary shall contain:

1) A graphic description of the velocity and direction of groundwater flow under/around the waste management unit, based upon the past and present water level elevations and pertinent visual observations.

2) 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 pH, temperature conductivity and turbidity testing, well recovery time, and method of disposing of the purge water.

3) 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 map or aerial photograph shall accompany each report showing observation and monitoring station locations.

d. Laboratory statements with the 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.

1) 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.

2) 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 80%; 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.

e. An evaluation of the effectiveness of the leachate monitoring facilities, which includes an evaluation of leachate buildup within the disposal units.

f. A summary and certification of completion of all standard observations for the waste management unit, the perimeter of the waste management unit, and the receiving waters.

2. CONTINGENCY REPORTING

A report shall be made by telephone of any seepage from the disposal area immediately after it is discovered. A written report shall be filed with the Board within five days thereafter. This report shall contain the following information:

1) a map showing the location(s) of discharge if any;
2) approximate flow rate;
3) nature of effects; i.e. all pertinent observations and analyses; and
4) corrective measures underway, proposed, or as specified in the Waste Discharge Requirements.

3. REPORTING

By January 31 of each year the Discharger shall submit an annual report to the Board covering the previous calendar year. The annual report may incorporate the second semi-annual report of the previous year. The annual report shall contain:

a. Tabular and graphical summaries of the monitoring data obtained during the previous year; the report should be accompanied by a computer data disk, tabulating the year's data in Microsoft Excel.

b. A comprehensive discussion of the compliance record, and the corrective actions taken or planned which may be needed to bring the Discharger into full compliance with the waste discharge requirements.

c. A written summary of the groundwater analyses indicating any change in the quality of the groundwater.

d. An evaluation of the effectiveness of the leachate monitoring/control facilities, which includes an evaluation of leachate buildup within the disposal units.

4. WELL LOGS

A boring log and a monitoring well construction log shall be submitted for each new 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 well installation.

Part B

1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS

A. ON-SITE OBSERVATIONS – Observe quarterly, Report Semi-annually

STATION	DESCRIPTION	OBSERVATIONS	FREQUENCY
A-1 to A-'n'	Located on the area as deli-neated by a 500 foot grid network.	Standard observations for the waste management unit.	Quarterly
L-1 thru L-'n'	At each point of discharge. Include a map indicating locations of discharge(s)	Standard Test as outlined in Table A. Grab sample taken from seeps with flow rates exceeding 5 gpm.	Quarterly
P-1 thru P-'n'	Located at equidistant intervals not exceeding 1000 feet around the perimeter of the waste management unit.	Standard observations for the perimeter.	Quarterly
S-1 thru S-'n'	At any point(s) at which seepage is found occurring from the disposal area	Standard test as outlined in Table A (perform analysis) once per seep)	Daily until remedial action is taken and seepage ceases.

B. SURFACE, GROUNDWATER AND LEACHATE MONITORING - Report Semi-annually

i. Surface and Stormwater: Surface water shall be monitored as outlined below and in Table A (Attached). These monitoring points are also shown on Figure 2 (Attached). The results of the additional monitoring conducted as part of the General Permit for stormwater discharge shall be submitted as part of the annual report.

Monitoring Points:

Surface Water	Comply with the requirements of the General Industrial Storm Water Runoff Program

ii. Groundwater: Groundwater samples shall be analyzed as outlined below and in Table A (Attached).

Monitoring Points:

Groundwater	GW-4a, GW-5a, GW-6a, and GW-16a, GW-7a, GW-9a, GW-2b, and GW-8c, and any new wells

iii. Leachate: Leachate samples shall be analyzed as outlined below and in Table A (Attached).

Monitoring Points:

Leachate	GW-1a, GW-3a, GW-10a, GW-11a, GW-12a, GW-13a, GW-14a, GW-15a, GW-17a, and MW-5, and any new wells

C. **FACILITIES MONITORING**

The Discharger shall inspect all facilities to ensure proper and safe operation once per quarter and report semi-annually.

D. Reports shall be due on the following schedule:

First semi-annual report:	**July 31 of each year**
Second semi-annual Report:	**January 31 of each year**
Annual Report:	**Combined with the second semi-annual report, due January 31 of each year**

I, Lawrence P. Kolb, Acting Executive Officer, hereby certify that the foregoing Self-Monitoring 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. 00 - 046.

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.

for Lawrence P. Kolb
Acting Executive Officer

Date Ordered: June 21, 2000

Attachment: Table A - Schedule for Sampling, Measurement, and Analysis

Table A - Discharge Monitoring Plan, List of Analytical Parameters, Surface, Stormwater, Leachate and Groundwater

Parameters	Method*	Frequency
pH	Field	Quarterly** / Semi-Annual
Chloride	300.0	Quarterly** / Semi-Annual
Sulfate	300.0	Quarterly** / Semi-Annual
Total Dissolved Solids	160.1	Quarterly** / Semi-Annual
Ammonia (un-ionized)	350.1	Quarterly** / Semi-Annual
Total organic carbon	415.1	Quarterly** / Semi-Annual
Nitrate	9200	Quarterly** / Semi-Annual
COD	410.2	Quarterly** / Semi-Annual
Electrical conductivity	Field	Quarterly** / Semi-Annual
Volatile Organic Compounds (including MTBE)	8260	Quarterly** / Semi-Annual
Leachate Elevation	Field	Quarterly** / Semi-Annual
Groundwater Elevation	Field	Quarterly** / Semi-Annual
Semivolatile Organic Compounds	8270	Quarterly** / Semi-Annual
Organochlorine Pesticides & PCBs	8080	Quarterly** / Semi-Annual
Antimony	6010	Quarterly** / Semi-Annual
Arsenic	7060	Quarterly** / Semi-Annual
Barium	6010	Quarterly** / Semi-Annual
Beryllium	6010	Quarterly** / Semi-Annual
Cadmium	6010	Quarterly** / Semi-Annual

Chromium	6010	Quarterly** / Semi-Annual
Copper	6010	Quarterly** / Semi-Annual
Lead	7421	Quarterly** / Semi-Annual
Mercury	7470	Quarterly** / Semi-Annual
Nickel	6010	Quarterly** / Semi-Annual
Selenium	7740	Quarterly** / Semi-Annual
Silver	6010	Quarterly** / Semi-Annual
Thallium	7841	Quarterly** / Semi-Annual
Tin	6010	Quarterly** / Semi-Annual
Vanadium	6010	Quarterly** / Semi-Annual
Zinc	6010	Quarterly** / Semi-Annual

Notes:

* Test methods per Methods for Chemical Analysis of Water and Waste, USEPA 600/4/79/029, revised March 1983, or Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods, USEPA SW-846, 3rd edition, November 1986 and revisions.

** Quarterly for the first year; semi-annual thereafter.

Appendix B

Sampling and Analysis Plan

CONTENTS

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared for the Oyster Point Landfill Site in San Mateo County, California, in accordance with Title 27, California Code of Regulations (formerly Title 23, California Code of Regulations Chapter 15, Article 5). The purpose of this SAP is to describe in detail the field, laboratory, and Quality Assurance/Quality Control (QA/QC) methodologies and procedures to be used for the leachate and water quality monitoring programs for the site. Section 2 presents field sampling procedures. Sample custody and field documentation are discussed in Section 3. Groundwater field testing and measurement procedures are presented in Section 4. Section 5 presents field decontamination procedures. Section 6 describes data validation, reduction and reporting. Section 7 presents Quality Control procedures. Section 8 presents methods for evaluating performance of quality assurance procedures and describes system audits. Section 9 presents procedures for QA/QC procedures for assessment of chemical data. Section 10 describes corrective actions and Section 11 contains references.

2.0 SAMPLING PROCEDURES

This section describes the procedures used for groundwater, surface water and leachate sampling.

2.1 Groundwater Sampling Procedures

This section describes the procedures to be followed for taking water level measurements, purging wells, and collecting groundwater samples.

2.1.1 Water-Level Measurements and Well Purging

Prior to groundwater sample collection, the water level in each well will be determined and the volume of standing water in the well will be calculated. A volume of water equal to three to five times the volume of the standing well water will be removed (or until purged dry) using a submersible pump or stainless steel bailer. During purging, the field parameters, temperature, electrical conductance, and pH will be monitored until stable. Stabilization if of these field parameters will be assumed when subsequent measurements vary by no more than the following:

Temperature	=	0.5° Centigrade
Specific conductance	=	10 percent
PH	=	0.2 units

2.1.2 Well Sampling

All measuring and sampling equipment will be decontaminated prior to sample collection from each well. Following purging, groundwater samples will be collected using a stainless steel or Teflon bailer. Samples analyzed for metals will be filtered in the field using a 0.45-micron filter prior to preservation. Samples collected for all other analyses will be transferred directly from the bailer into laboratory supplied sample containers. Sample containers for VOCs will contain zero headspace after being filled and sealed. The following information will be included on a groundwater sampling form or field notebook:

- Sampler's name;
- Ground-water level and total well depth measured prior to sampling;
- Time and date of sample collection;
- Sample location;
- Sample number;
- Volume of each sample container;
- Type of analysis;
- Preservatives;
- Purge volume (calculated and actual) and times of purge;
- Unusual conditions (i.e., color, odor, solids, OVA readings, etc.);
- Field conditions (i.e., weather, air temperature);
- Sampling technique and equipment used;
- Indicator parameter measurements (pH, temperature, electrical conductivity); and
- Other field measurements (alkalinity, turbidity, and dissolved oxygen, as appropriate).

All samples will be packaged and transported as described in section 3.0. All reusable sampling equipment will be decontaminated as described in section 5.0.

2.1.3 Field Filtration of Groundwater Samples.

Field filtration will be conducted on groundwater samples from all monitoring wells to be tested for metals (EPA Methods 6010 and the 7000 series). In the natural groundwater system, water and soil/rock are closely associated with one another, and some solid matter may be carried to the surface during sample collection. The purpose of field filtering of selected groundwater samples is to reduce suspended solids and to minimize contact between acidified water and solids after sample collection. The filtration is performed by physically removing as much colloidal and suspended material from the groundwater as possible prior to storage and analysis.

Groundwater samples will be filtered using the following procedures:

- A pre-filter and a 0.45-micron filter will be connected to the filtration apparatus.
- The apparatus will be flushed with 200 to 300 ml of sample water.
- Filtered samples will be collected in appropriate clean containers.
- If the filters become clogged, they will be disassembled and replaced.
- After use, the filtration apparatus will be disassembled, washed with phosphate-free detergent solution, rinsed with potable water, rinsed with deionized water, and stored in a clean container for subsequent use.

2.2 Surface Water Sampling

Samples from surface waters will be collected by direct submergence of sample bottles or by using a bailer or a Kemmerer-type sampler as described below:

- Place clean sampler bailer into the water and allow the bailer to fill, taking care to not disturb bottom sediments. Sampler cylinder to be flushed for one to two minutes or fill and empty a bailer several times.
- Close the sampler by sending the weighted messenger down the sample line (Kemmerer-type sampler only).
- Lift the sampler bailer to the ground surface and transfer the water samples to sample bottles or field filtration equipment with minimal aeration by carefully pouring or by using a submerged fill technique (e.g., release a spring-loaded valve which allows sample water to exit from the bottom of the sampler through a Teflon tube into the bottom of each vial).
- Filter samples for metals analysis using a 0.45-micron filter, add sample preservatives as appropriate, seal the sample bottles, label appropriately, and place in a cooler.
- Using the remaining sample volume, measure and document pH, specific conductance and temperature.

The following information will be entered in the field log at the time of sampling:

- Sampler's name or initials;
- Time and date of sample collection;
- Station number and location;
- Sample number;
- Indicator parameter measurements (pH, temperature, etc.);
- Depth below water surface from which sample was taken;
- Estimated flow;
- Current weather conditions;
- Evidence of recent precipitation; and
- General field conditions

All surface water samples will be packaged and transported as described in Section 3.0. All reusable sampling equipment will be decontaminated as described in Section 5.0.

2.3 Analytical Methods

A California Certified Laboratory will complete all laboratory testing. Water samples will be tested for volatile organic compounds (EPA Method 8260), semi-volatile organic compounds (EPA Method 8270), pesticides (EPA Method 8081), and PCB's (EPA Method 8082). Table A-1 presents the sample containers, preservation and hold-time information for the monitoring program.

3.0 SAMPLE CUSTODY PROCEDURES

Standard sample custody procedures will be followed through sample collection, transfer and analysis. The purpose of these procedures is to assure that the integrity of samples is maintained during their collection, transportation, and storage prior to analysis. Sample custody is divided into field procedures and laboratory procedures, as described below.

3.1 Field Custody Procedures

Sample quantities, types, and locations will be determined before the actual fieldwork commences. As few people as possible will handle the samples. The field sampler will be responsible for the care and custody of the samples until they are properly transferred. Custody transfer will be documented on the chain of custody form.

3.1.1 Field Documentation

Each Sample will be labeled and sealed properly immediately after collection. Sample identification documents will be carefully prepared so that identification and chain of custody records will be maintained. Forms will be filled out with waterproof ink. The following identification documents will be utilized during the investigation.

- Sample Labels
- Field Investigation Daily Report Log
- Groundwater Sampling Forms
- Surface Water Sampling Forms
- Chain of Custody Forms

3.1.2 Sample Labels

Sample labels are necessary to ensure proper sample identification. Pre-printed sample labels will be provided. The following information will be specified on each label:

- Project name;
- Project number;
- Field identification number or sample identification number;
- Date and time of sample collection;
- Preservative used (if applicable); and
- Analyses required.

3.1.3 Field Investigation Daily Report

A field log will be used to record daily activities as they relate to the progress of the investigation. The field logs will be retained in the project files according to project number for that task. Entries in the field reports will contain the following information:

- Name of author, time and date of entry, weather conditions;
- Location of sampling or measurement activity;
- Names and affiliations of personnel onsite;
- Sample collection or measurement method(s);
- Number and volume of sample(s) taken for each analysis;
- Description of sampling point(s);
- Date and time of collection or measurement;
- Sample identification number(s);
- Sample preservation (if any);
- Sample distribution (e.g., laboratory);
- Field observations during sampling;
- Field measurements (conductivity, temperature, turbidity, and pH);
- Summary of daily activities;
- Equipment onsite;
- Descriptions of deviations from sampling plan;
- Chain-of-custody number, sample destination, and time of pickup;
- Project number;
- Name of sampler(s);
- Sampling methods; and
- Personal protective equipment used.

3.1.4 Groundwater Sample Documentation

The following information will be entered on a Groundwater Sampling Form and/or in a field notebook at the time of sampling:

- Name of sampler;
- Time and date of sample collection;
- Well identification;

- Sample collection or measurement method(s);
- Number and volume of sample(s) taken;
- Purge volume and purge times;
- Sample identification number(s);
- Water-level measurements before sampling;
- Sample preservation;
- QA/QC sample information;
- Sample distribution (e.g., laboratory);
- Field conditions during sampling;
- Water quality parameter measurements (pH, conductivity, turbidity, and temperature); and
- Field instrument identification.

Each sample will be packaged and transported appropriately as described in the following protocol:

- Collect samples in appropriate containers and add preservative as necessary
- Print clearly in waterproof ink on the label the information described above
- Seal and package sample containers as appropriate.
- Fill out field sample log and chain-of-custody form.
- Place samples into thermally insulated coolers chilled to about 4 degrees Celsius using ice or blue ice.
- Include the bottom top two copies of the completed chain-of-custody form inside the cooler. Chain-of-custody forms will be protected from moisture by placing them inside plastic bags taped to the inside of the lid of the cooler.
- Seal the cooler with strapping tape or other appropriate mechanical fastening.
- Fasten custody seals.
- Coolers will be delivered to the analytical laboratory by designated couriers.

3.1.5 Chain-of-Custody Form

Every sample will be listed on a chain-of-custody form. The form will accompany every sample shipment to the analytical laboratory to document sample possession from the time of collection. A carbon copy of the chain-of-custody form will be retained in the project files according to project number. The form will contain the following information:

- Sample identification number;
- Signature of collector (sampler);
- Date and time of collection;
- Site name and project number;
- Sample Matrix;

- Sample container description;
- Analyses requested;
- Special analytical procedures requested;
- Laboratory sample number;
- Remarks (expected interferences, hazards, unusual events at the time of sampling, presence of headspace);
- Preservatives added (if any);
- Filtering (if applicable);
- Destination of samples (laboratory name);
- Signature of persons involved in chain of possession (relinquished by and received by); and
- Date and time of sample receipt.

3.1.6 Sample Transfer and Shipment

When transferring samples, the individuals relinquishing and receiving the samples will sign and date the chain of custody record. Samples will be packaged properly for shipment, including isolating samples thought to have high concentrations, and dispatched to the appropriate laboratory for analysis. Custody seals will not be deemed necessary when the samples will be in continuous possession of technical or laboratory personnel. Custody seals will be used when samples will be shipped via courier services. The chain of custody record will accompany each shipment. The method of shipment, courier name(s), and other pertinent information will be entered in the chain of custody.

3.2 Laboratory Operations and Custody procedures

Procedures used by an equivalent California-certified laboratory may vary from the procedures specified herein as long as they fulfill the objective of maintaining sample integrity and traceability.

The sample custodian at the laboratory accepts custody of delivered samples and verifies the following information:

- All samples are present;
- All samples are in good condition;
- All samples are accompanied by a chain-of-custody form; and
- The sample identification is complete and corresponds to the chain-of-custody form.

If sample integrity is questionable, the sample custodian will immediately notify the laboratory's project administrator, who in turn will notify the sampling project manager. Arrangements can then be made for sample replacements to be shipped to the laboratory,

if necessary. The sample custodian will document the sample condition on the sample custody log and sign the chain-of-custody form.

3.2.1 Logging of Samples

The custodian will then enter the appropriate data into the laboratory sample tracking system. The laboratory custodian will use the sample number on the sample label or assign a unique laboratory number to each sample. The custodian will then transfer the sample(s) to the proper analyst(s) or store the sample(s) in the appropriate secure area.

Laboratory personnel will be responsible for the care and custody of samples from the time they are received until the sample is exhausted. Data sheets and laboratory records will be retained as part of the permanent documentation for a period of at least three years.

3.2.2 Sample Storage

Samples and extracts are retained by the analytical laboratory for up to 30 days after the laboratory reports the data. Unless notified by the program managers, the laboratory in a manner consistent with appropriate government regulations will dispose excess or unused samples.

3.2.3 Analysis of Samples

Analyses of selected samples will be performed by a state-certified analytical laboratory for the analyses specified on the chain of custody. Laboratory quality assurance/quality control procedures will be performed in accordance with their internal QA/QC data validation program. Results of sample analyses will be presented to the sampling project manager no later than three weeks following sample collection. Final laboratory analytical data sheets signed by the laboratory director including the original chain of custody form will be delivered to the sampling project manager.

3.3 Corrections to Documentation

Original data recorded in field logs, chain-of-custody forms, and on other forms will be written in waterproof ink. None of these documents will be destroyed or discarded, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual will make corrections by drawing a line through the error, entering the correct information, and initialing and dating the change. The erroneous information should not be obliterated. If possible, the person who made the entry will correct any subsequent error(s) discovered on a document.

4.0 GROUNDWATER FIELD TESTS AND MEASUREMENTS

Measurements of groundwater conditions will be collected during the various sampling and monitoring activities throughout the SAP. This section describes routine procedures to be followed by personnel performing field measurements. The methods presented are intended to ensure that field measurements are consistent and reproducible when performed by different individuals.

4.1 Water-Level Measurements

Water-level measurements will be made by an electric well sounder. Before obtaining measurement data, field personnel will calibrate the instrument(s) according to the manufacturer's specifications. At each location and/or time interval, a minimum of two measurements will be taken. The most representative of the measurements will be determined by the judgment of the field technician and recorded in the field notebook or on the appropriate field data form. Data will be recorded to the nearest 0.02 to 0.01 foot when using an electric sounder. Water-level measurements will be recorded on: (1) groundwater sampling forms when measurements are made in conjunction with groundwater sampling activities, or (2) on daily field reports when water-level measurements are made independent of sampling activities.

Water-level measurements will be compared to previously obtained measurements from each well. The equipment will be recalibrated and the measurements repeated if large unexplainable discrepancies from previous measurements occur. If available, an alternative instrument will be used to verify the accuracy of the data.

The following protocols will be employed while collecting water-level measurements for the investigation:

Electric Sounder

- A battery-powered sounder may be used for water-level measurements. The sounder will have firmly affixed or permanent marks on the sounder line at regular intervals of five feet one foot or less. A steel measuring tape or a ruler will be used to measure between marked intervals, if necessary.
- All measurements will be made to the nearest hundredth of a foot relative to the surveyed top-of-casing mark. These data will be converted to mean sea level using the surveyed top-of-casing elevation.
- Electrical sounders will be calibrated monthly and after any incident that may affect the accuracy of the sounder. Markings will be checked periodically by physically comparing the spacing with a graduated steel tape.
- Sounders will be kept clean and in working order. The sounder and portions of the cable that are submerged below fluid levels in wells will be cleaned with detergent solution and rinsed with deionized water.

4.2 Conductivity, Temperature, and pH

Specific conductivity, water temperature, and pH measurements will be made during purging and when water samples are collected. A commercial pH meter with a combination electrode will be used for field pH measurements. A conductivity meter will be used for specific conductance measurements. Temperature will be measured using an electronic thermometer, standard thermometers or equivalent temperature meters. Combination instruments capable of measuring two or all three of the parameters may also be used. Water quality parameters will be recorded on: (1) groundwater sampling forms when measurements are made in conjunction with groundwater sampling activities, or (2) on daily field reports when water-level measurements are made independent of sampling activities.

All instruments will be calibrated in accordance with Section 4.3. The values for conductivity standards and pH buffers used in calibration will be recorded daily in the calibration notebook. All probes will be thoroughly cleaned and rinsed with distilled water before and after measurements. Measurements will be made as follows:

- The sample container will be rinsed with sample water before filling.
- Probes will be immediately submerged in the container and once the reading has stabilized, measurements promptly recorded.
- All field measurements will be recorded on the field reports with the sample location and the time and date of measurement.
- After parameters are measured, the container and the probes(s) will be decontaminated by rinsing with distilled water. If the container cannot be cleaned, a new container will be used.

4.3 Field Calibration Procedures

Procedures described in this section pertain to the field calibration of equipment and instrumentation used during the investigation. Included is a description of the procedure or a reference to an applicable standard operating procedure, the calibration frequency, and the calibration standards used.

Electrical Sounder calibration	Check against steel surveyor's tape prior to use.
pH meter calibration:	Calibrate using factory- or laboratory-supplied buffer solutions of pH 4, 7, and 10 which are renewed daily and prior to each use. Apply temperature correction during each measurement, if appropriate.

Electrical conductivity meter calibration:	Calibrated daily or prior to each use using laboratory-supplied standard. Temperature correction applied during measurement, if appropriate.
Mercury thermometer calibration:	Factory calibration once and check at least annually.
Temperature meter and thermostat calibration:	Check weekly against mercury thermometer.

5.0 DECONTAMINATION PROCEDURES

5.1 Equipment Decontamination

To prevent sample contamination, all field equipment will be decontaminated prior to and after use. Decontamination consists of steam cleaning (high pressure, hot water washing) or phosphate-free detergent wash, and distilled, deionized (DI), or potable water rinse, as appropriate. Sampling equipment is decontaminated as follows:

- The exterior surfaces and accessible interior portions of submersible, centrifugal, and positive-displacement pumps will be steam cleaned prior to each use or prior to each sampling round. A detergent solution will be run through the pump and hose internals followed by a potable water rinse.
- Bailers will be discarded, steam cleaned or washed in phosphate-free detergent solution and rinsed twice in distilled or deionized water prior to each use. Rope or string (used with bailers or disposable sampling bottles) will be replaced with new string after each sample is collected.
- Well sounders, transducers, and water quality monitoring probes will be detergent washed and rinsed in distilled, deionized or potable water and wiped clean after each use. Generally, only the wetted end of these devices requires cleaning.

5.2 Disposal procedures

Fluids generated during the investigation will be temporarily stored, sampled and analyzed for constituents detected during the investigation. Based on these results, handling, storage, and disposal will be conducted in accordance with applicable federal and state regulations. Temporary storage of these materials will be in bins, tanks, or 55-gallon drums until analyses are complete and an acceptable means of disposal has been determined. All bins, tanks, or 55-gallon drums will be clearly labeled and stored in a secure location until final disposal is arranged.

If chemical concentrations in water from well development, sampling, and decontamination procedures meet requirements for disposal to the local POTW, it will be disposed under permit to the sanitary sewer, or, if it does not meet POTW requirements, transported to a disposal facility approved to receive such wastes.

6.0 DATA VALIDATION, REDUCTION, AND REPORTING

Data collected during the monitoring program will be appropriately identified, validated and included in the final SAP report. This section presents the guidelines for data validation, reduction, and reporting.

6.1 Field Measurement Data Validation

Senior personnel will perform validation of data obtained from field measurements. Validation of data collected in the field will be performed by checking procedures used in the field and comparing the data to previous measurements. Data that cannot be validated will be so documented.

The following reporting requirements will be followed for field data:

pH: Field measurements will be reported to 0.1 pH units.
Specific Conductance: Field measurements will be reported to two significant figures.
Temperature: Field measurements will be reported to 0.5 degree Celsius.
Water Levels: Measurements will be repeated until at least two are documented to be in agreement to the nearest 0.021 feet.

6.2 Internal Laboratory Analytical Data Validation

The first level of review and consequent data reduction, validation and reporting is performed at the laboratory. These tasks will follow the protocols outlined in the methods presented in the laboratories individual standard operating procedures (SOPs) and QA/QC programs, and guidance from EPA document SW-846 and California Department of Health Services LUFT manual.

To facilitate data validation, the following information will be included in all laboratory reports, as appropriate for the type of analysis:

- Sample Custody;
- Instrument Performance;
- Sample Integrity;
- Parameter Identification and Quantification;
- Precision; and
- Accuracy.

The specific requirements for validation of each of the above items are described below.

6.2.1 Sample Custody

For each sample or lot of samples received, analyzed and reported by a laboratory, the signed copy(s) of the chain-of-custody form(s) will be attached to the report, together with any appropriate comments or observations related to sample quality (e.g., temperature, custody seals, headspace). For each sample analyzed, the laboratory sample and batch numbers will be identified with each report. In addition, for each sample analyzed, the date and time the sample was received, prepared and/or extracted (if appropriate), and analyzed will also be included with each report.

6.2.2 Instrument Performance

For each sample or lot of samples received, analyzed, and reported by the laboratory, the following information will be provided, as appropriate:

- Identification of the instrument and appurtenant equipment in sufficient detail to allow later evaluation of any instrument used for analysis.
- Detection and reporting limits for each parameter for each analysis.
- Raw data for all initial calibration analyses.
- Raw data for all continuing calibration analyses.

6.2.3 Sample Integrity

For each sample or lot of samples received, analyzed, and reported by the laboratory, the laboratory will analyze internal method blank samples on a minimum frequency of one per lot or greater as required by the method, to assess the potential for sample contamination by laboratory operations. All raw data for each blank sample analyzed will also be submitted with each report.

6.2.4 Parameter Identification and Quantification

For each sample or lot of samples received, analyzed, and reported by the laboratory, the laboratory will provide the information listed in EPA guidance document SW-846 (EPA, 1987a). For other analyses, appropriate EPA test methods or standard methods will be used, where applicable, for appropriate documentation of parameter identification and quantification. In general, the laboratories will provide all relevant raw data for each type of analysis necessary to validate parameter identification and quantification.

6.2.5 Precision

For each sample or lot of samples received, analyzed, and reported by the laboratory, the laboratory will analyze on a minimum frequency of one per lot, an internal matrix duplicate samples for each analysis type. The laboratory will also provide all raw data for the duplicate analysis.

6.2.6 Accuracy

For each sample or lot of samples received, analyzed, and reported by the laboratory, the laboratory will analyze, on a minimum frequency of one per lot, internal matrix spike and matrix spike duplicate samples for each analysis type. The sample matrix will be either project specific, or from another project requiring the same analysis. In the event that a sufficient sample volume is not provided to the laboratory, a blank matrix may be spiked (such as deionized water or sodium sulfate) as a substitute. The laboratory, where appropriate, will also use and analyze surrogate spikes for every environmental and QC sample. The laboratory will provide all raw data for the spike sample analyses.

6.3 External Data Validation

Chemical data will be evaluated by the Project QA officer or representative according to the detailed procedures outlined in Section 9.0 to independently validate the laboratory data. The evaluation will also include an inventory of all laboratory deliverables and checking internal and external QC results to see that they are within specified limits. This inventory will include review of the following items:

Holding Times - Holding times are checked against those specified in Table A-1 to determine if a sample was analyzed within the holding time specified for that analytical method. The number of days elapsed between sample collection and sample analysis (or extraction, if applicable) is calculated.

Method Blanks - Method blanks are reviewed to determine that they were prepared and run with the applicable sample batch. Target analytes that were detected in method blanks are tabulated. If holding times are exceeded, sample results will be tagged as estimated ("J"). Gross violations of holding times may result in qualifying the data as unusable ("R").

Equipment Blanks - Equipment blanks are reviewed to assess if the sampling equipment has been properly decontaminated. If any chemicals are found in the equipment blank samples, corresponding results for field samples will be qualitatively assessed for potential problems with data interpretation. Data will not be removed from the database due to chemicals detected in equipment blank samples; however, sample results for compounds detected in the associated equipment blank will be tagged with the letter "Q".

Trip Blanks - Trip blanks are reviewed to assess if samples have been exposed to chemicals during transport. If any chemicals are found in the trip blank samples, corresponding results for field samples will be qualitatively assessed for potential problems with data interpretation. Data will not be removed from the database due to chemicals detected in trip blank samples; however, sample results for compounds detected in the associated trip blank will be tagged with the letter "T".

Surrogate Spike Percent Recoveries (PRs) - Surrogate spike percent recoveries are checked to see if they are within the applicable acceptance limits. Surrogate PRs outside of these applicable limits may result in qualification of the data as estimated ("J").

Matrix Spike/Matrix Spike Duplicate (MS/MSD) PRs - Matrix spike PRs are checked to see if they are within the applicable acceptance limits. MS/MSD RPDs outside of acceptance limits may result in qualification of the data as estimated ("J").

Laboratory Control Sample (LCS) PRs - LCS PRs are checked to see if they are within the analytical laboratories' acceptance limits that are based on historical data. LCS PRs outside of these applicable limits may result in qualification of the data as estimated ("J").

Field Duplicate Relative Percent Differences (RPDs) - Field duplicate pairs are compared to check if the RPDs are within the acceptance limits. If RPDs are above the specified acceptance limits, data for the duplicate pairs may be qualified as estimated ("J") after a review of other QC criteria. If RPDs are grossly above the acceptance limits, the laboratory will be contacted and asked to review their results. If an explanation is not found, the data may need to be tagged as unusable ("R" [EPA, 1988a and 1988b]).

Other criteria that will be used to validate data integrity on a routine basis are listed below:

- Verification of correct sampling procedures.
- Verification of chain-of-custody procedures.

6.4 Data Reporting Requirements

Analyses requested for a sample will be documented on the sample labels and the chain-of-custody form in addition to entry in the field logs. Procedures for the transfer of custody from the field personnel to the laboratory custodian are presented in Section 3.0.

After the sample has entered the laboratory system, data entry from the analysis process is generally automated. Upon completion of the analysis, the data are reviewed and validated. Upon validation, a final report is generated. This report may be in digital format on magnetic tape or disk, and/or in hard copy.

7.0 QUALITY CONTROL CHECKS

Two types of QC checks are employed to evaluate the performance of laboratory analytical procedures: field QC checks and laboratory QC checks. The QC checks represent the controlled samples introduced into the sample analysis stream that are used to assess the accuracy and precision of the chemical analysis program. The QC check samples are introduced or analyzed on the basis of the size of sample lots. A sample lot will consist of no more than 20 samples for either organic and inorganic parameter analysis. On occasion, a sample lot may be slightly less than 20 samples, based on the nature of the field activities.

7.1 Field QC Checks

Field QC checks are control samples that are introduced blind (i.e., numbered, packaged and sealed in a manner identical to other samples) to the laboratory(s) from the field. Two types of samples are used: blanks and duplicates. All QC samples will be given a unique sample number in the field that will not indicate to the laboratory that the sample is a QC check. The two types of field/external QC samples are described below. The matrix- and analysis-specific description and frequency of field/external QC samples is also presented below.

7.1.1 External Blanks

Three types of external blanks (trip, field, and equipment rinsate) will be collected and submitted blind to the laboratory. Blanks will consist of deionized, organic-free water supplied by the laboratory. Trip blanks (prepared by the laboratory) will be submitted with each shipment of water samples at a minimum frequency of one per sampling event and analyzed for VOCs only. Field blanks consist of a sample poured in the field using organic-free water supplied by a laboratory, and a sample of the source water(s) used in decontamination and steam cleaning. At a minimum, one field blank during each sampling event and/or one field blank from each source of water used for decontamination will be poured and collected in the field. When equipment decontamination is necessary, one equipment rinsate sample will be collected from the last rinse of the decontamination process. The "blank" water identified above will be used to fill the equipment or poured over sampling equipment and then placed into the appropriate containers. One equipment blank will be submitted with every 20 samples collected at a minimum.

7.1.2 External Duplicates

In general, for each type of analysis used, field duplicates of water samples will be submitted to each laboratory performing the analysis. One duplicate sample is collected and submitted at a minimum frequency of one per 20 environmental samples or one per day, whichever is greater, per analytical method.

7.2 Laboratory QC Checks

Specific requirements and procedures for laboratory QC will be monitored by the laboratory to ensure that analytical data of known quality are generated. Corrective action will be taken whenever needed. QA staff will examine the QC information provided by the laboratory as a secondary review for all chemical data. Additional QC samples may be generated by the laboratory according to method specifications. Laboratory QC samples include the following components:

7.2.1 Standards

Calibration standards and check standards with known concentrations are prepared in the laboratory from standard solutions obtained from EPA, National Institute of Standards and Technology, or equivalent. These standards will be used in accordance with the requirements of the analytical method.

7.2.2 Internal Blanks

Internal blanks are used to detect system bias introduced in the laboratory. A laboratory pure water (organic-free, distilled) blank is processed through all sample preparation procedures and analyzed as a method blank. A reagent blank can be used in place of the method blank for nonaqueous samples. One blank will be analyzed per lot of samples, or one per day, whichever is more frequent.

7.2.3 Internal Duplicates

A field sample will be split into two portions during laboratory preparation. Each portion is then processed through the remaining analysis steps as a duplicate. Precision information will be provided for evaluation variability in preparation and analysis. One pair of duplicates will be analyzed per lot of samples, or one pair per day, whichever is more frequent.

7.2.4 Internal Spikes

An internal spike (matrix spike) is prepared in the laboratory by adding a known amount of the target analytes into the sample prior to laboratory preparation. These spikes simulate the matrix effect on analyses for field samples. Percent recoveries are calculated

for these target analytes as a measure of the accuracy of the total analytical method. The spiked samples may also be analyzed in duplicate (matrix spike duplicate) for an assessment of the precision of the analytical method. A MS/MSD pair will be analyzed at a general frequency of one per lot (20 samples) or as specified by the method. MSDs will not be required for metals or other inorganic analyses. For each MS/MSD, sufficient sample will be collected in the field (normally triplicate volumes). Spiking levels for MS/MSDs will follow those levels specified by the EPA methods. If method specific levels are unavailable, spiking concentrations will be set at concentrations similar to those detected during the course of the SAP.

7.2.5 Surrogate Spikes

These samples are used to evaluate whether laboratory equipment is operating within the prescribed limits of laboratory quality control and are checked by the laboratory for accuracy and proper chemical identification. Surrogate spikes will be added, as appropriate, for organic analyses to all blanks, standards, and environmental samples.

8.0 PERFORMANCE AND SYSTEM AUDITS

The project QA Officer will monitor and audit the performance of the QA procedures. Both system and performance audits of the field and analytical QC programs will be conducted. System audits involve inspection of equipment for sampling, data gathering, and soil or water treatment to evaluate the effectiveness of the methods and technologies employed. A system audit will be performed in the initial stages of a field activity and on a regularly scheduled basis for the lifetime of the project. Performance audits involve the inspection of field and laboratory activities to verify that the standardized procedures established herein are executed to provide for accurate data generation and conformance to specifications. Any QA questions and/or problems that would necessitate resampling of a well or wells, delay the delivery of a submittal, or delay the completion or implementation of a required task will be promptly reported to the RWQCB.

8.1 Field Activities

To ensure implementation of the procedures and standards established in this SAP, the QA Officer (or designated representative) will perform audits of the project fieldwork. Audits will include, but not be limited to, inspection of field operations and records, laboratory testing and chain-of-custody records, and maintenance of field activity project files. The QA Officer will determine the frequency of system audits of field activities. At a minimum, an audit will be conducted during the initial stage of the field-sampling program, and as appropriate.

A field activities system audit will involve an onsite visit by the QA Officer (or designated representative). The QA Officer will be notified before beginning work in order to schedule a system audit in the early stages of fieldwork so that the resolution of

corrective action will not adversely affect the project schedule nor impact a significant portion of the fieldwork. The field audit schedule will be dependent upon the extent of the field activities.

Field audits may include the following:

- Confirm that proper calibration of testing equipment is performed and recorded on field activity forms.
- Verify collection of field measurements and proper record keeping.
- Verify sample collection, shipping, and chain-of-custody procedures. This will include the inspection of equipment decontamination.
- Verify QA/QC programs of analytical and physical testing laboratories. This may include collecting split samples or submitting blind samples for chemical analysis.
- Periodically inspect field tasks including drilling, monitoring well and soil gas probe installation, and soil gas, soil, and groundwater sampling.
- Verify proper maintenance of records.

During the course of field activities of extended duration, the QA Officer at a regular frequency, and at least every three months depending on project activity will conduct performance audits. The QA Officer, as appropriate, may adjust this frequency. The performance audits are to ensure that the work is progressing in a controlled manner, satisfies data quality requirements, and satisfies all quality requirements as specified in this SAP. Additionally, as part of the performance review, the QA Officer may audit material that is maintained in the SAP data management files.

Corrective action resulting from an audit will be requested through the QA Officer. Requests for corrective action must be resolved to the QA Officer's satisfaction. The method for verification of corrective action and the time period for completion will be stipulated in the QA Officer's audit report. Completion of corrective action will be verified and documented as a QA record. After verification of corrective action is complete, the QA Officer will issue a statement closing the audit.

8.2 Laboratory Activities

Analytical laboratories have their own systems of routine performance and system audits. Internal audit procedures for contracted analytical laboratories are appended to this SAP by reference. If appropriate, an audit of an individual laboratory will be performed to ensure that the selected laboratory is meeting SW-846 QA/QC and analyses requirements.

9.0 PROCEDURES FOR QA/QC ASSESSMENT OF CHEMICAL DATA

This section summarizes QA/QC procedures for assessing the validity of the chemical data derived from the sampling and chemical analysis tasks and the format for presenting the results of the QA/QC evaluations in reports.

The data validation procedures will be used by the Project QA Officer (or designated representative) for assessing duplicate samples and checking blank samples that are submitted blind to the analytical laboratories from the field or generated internally by the laboratories in accordance with this SAP. The purpose of implementing these procedures is to verify that the chemical data generated during the investigation are accurate, precise, complete and comparable, and therefore, representative of site conditions. Detailed discussions of the procedures for the data validation, the format for QC data assessment, and reporting are presented below.

9.1 Assessment of Accuracy, Precision, and Completeness

Chemical data collected during the SAP are validated in terms of accuracy, precision, and completeness for both the analytical laboratory and field sample collection programs. This validation includes a review of RPD, percent recovery, holding times, and other sampling documentation. The primary goal of the program is to evaluate whether the data reported during the investigation is representative of conditions at the site. Internal laboratory statistical analyses of QC samples will be used to validate the analytical procedures used by the laboratory. Comparison of field QC sample results to project QA goals will be used to evaluate the field sampling and handling procedures, as well as the laboratory analytical procedures. If problems arise and the data are found to deviate from data from previous analyses or surrounding conditions, the data will be annotated. Sample re-collection and analysis will only be performed when insufficient data are available to support the decision-making process or when it is necessary to meet QA goals.

The assessment of data validity will be based on the three types of QC samples listed in Section 7.0 (blanks, duplicates, and spikes). The definitions and use of each of these types of samples are as follows:

Blanks - Blanks are intended to evaluate whether the laboratory or field procedures represent a possible source of contamination of the field samples. Four types of blanks will be analyzed during the investigation. Field blanks are QC samples that are prepared in the field by filling sample containers with organic-free water and are submitted blind to the laboratories for appropriate chemical analyses. Trip blanks are QC samples that are filled at the laboratory and are transported with a set of QC samples. Equipment rinsate blanks consists of organic/metal-free water poured through sampling equipment, then into sample containers. Internal laboratory blanks are samples that are

prepared and analyzed internally as part of the individual laboratory-specific QA programs. The results of the blanks will be reported in the SAP report.

Duplicates - Duplicate samples are intended to evaluate data precision. Two types of duplicate samples (field and laboratory) are analyzed during the investigation. Field duplicates are QC samples that are collected in series from the same location using the same sampling method. Both samples are submitted blind to the laboratories for appropriate chemical analyses. Laboratory duplicates are QC samples that represent a single field sample that is thoroughly mixed by the laboratory so that a homogeneous mixture results. The sample is split into two aliquots and analyzed in duplicate. The results of field and laboratory duplicate sampling and analysis will be presented in the SAP report.

Spikes - Spikes are used to evaluate data accuracy. Internal spikes (MS/MSD; surrogates) are QC samples that are prepared and analyzed internally by the laboratory. The internal spike samples are prepared by adding known amounts of specific chemicals to field samples or organic-free water. The results of internal spike sample analyses will be reported in the SAP report.

Because the QA/QC samples described above are generated for analysis both externally in the field for blind submittal and internally by the laboratories, a system of crosschecking has been established that provides independent evaluation of the chemical data on two levels (internally and externally). The procedures for evaluating both the field and laboratory QA/QC data are the same and are presented below for blanks, duplicate, and spike samples.

9.2 Blanks

The evaluation procedure for blanks is a qualitative review of the chemical data reported by the laboratories. The procedure for assessing blank samples will be as follows:

- Tabulate the data from the blank samples.
- Identify any blank samples in which chemicals were detected.
- If no chemicals were detected in any blank samples, the data will be entered into a summary report.
- If chemicals are detected in laboratory blank samples, the concentration of these chemicals and their relationship to the concentration of the same chemicals in associated environmental samples will be evaluated for their impact on data quality. If the level of laboratory blank contamination is severe, the Project QA Officer will notify the laboratory and will review other recent results from blank samples from the laboratory to determine if it was an isolated incident. Depending on the significance of the problem, the Project QA Officer will submit additional blank samples to the laboratory to verify that the problem exists and/or to determine if the problem has been corrected.

- If any chemicals are found in field blank samples, the compound(s), concentration(s), and the field data for that period of time will be qualitatively assessed for potential problems with data interpretation. Data will not be removed from the database whether or not chemicals are detected in field blank samples.

9.3 Duplicates (Precision)

The procedure for assessing precision through the use of field and laboratory duplicates and MS/MSD pairs is as follows:

(1) Tabulate duplicate data and calculate the absolute value difference, average, and relative percent difference (RPD) as shown below for each duplicate pair:

where:

x_1 = concentration for Sample 1 of duplicate
x_2 = concentration for Sample 2 of duplicate
$\bar{x}$ = mean of Samples 1 and 2

RPDs will not be calculated in cases where one analyte of the duplicate pair was reported as non-detected.

(2) Identify duplicates that exceed the project (method) precision goals.

(3) Qualitatively evaluate precision in terms of the degree that data exceed the project goals. If data quality problems arise, the analytical laboratory will be notified for corrective action, as appropriate. Data will not be removed from the database as a result of these procedures. Instead, data will be flagged with appropriate notation.

9.4 Spikes (Accuracy)

The procedures for assessing accuracy through the use of MS/MSD, external and surrogate spike samples are as follows:

(1) Tabulate spike sample data and calculate the percent recovery as shown below for each type of spike sample and spiking compound:

where:

T = total concentration found in spiked sample
X = original concentration in sample prior to spiking
A = actual spike concentration added to sample.

(2) Identify spikes that exceed the project (method) percent recovery (accuracy) goals.

(3) Qualitatively evaluate accuracy in terms of the degree that data exceed the project goals. If the QC goals are exceeded, the laboratory will be notified and the data from that period of time will be evaluated for the compound that exceeds the limits and corrective action will be taken, as appropriate. Data will not be removed from the database as a result of these procedures. Instead, data will be flagged with appropriate notation.

10.0 CORRECTIVE ACTIONS

If any occasions arise that indicate field or laboratory measurement error has occurred, one or more of the corrective actions described below will take place. Noncompliance may either be field or laboratory related and observed during the performance of an activity or an audit. Corrective actions will be identified and implemented on a case-by-case basis by the QA Officer and/or Project Manager and performed under their supervision. The following sections describe the problems that may be encountered in both the field and laboratory and the appropriate corrective actions.

10.1 Field Situations

The need for corrective action will be identified as a result of the field audits previously described as well as by other means (e.g., equipment malfunction). If problems become apparent that are identified as originating in the field, immediate corrective action will take place. If immediate corrective action does not resolve the problem, appropriate personnel will be assigned to investigate and evaluate the cause of the problem. Once a corrective action is implemented, the effectiveness of the action will be verified such that the end result is elimination of the problem.

10.2 Laboratory Situations

The need for corrective action resulting from not meeting QC criteria (precision and accuracy) and/or from QA audits will be initiated by the laboratory QA/QC Manager in consultation with the QA Officer. Corrective action may include, but not be limited to:

- Reanalyzing the sample, if holding time criteria permit;
- Evaluating and amending sampling and analytical procedures;
- Accepting data with an acknowledged level of uncertainty; and
- Resampling and analyzing.

In the event that the above corrective actions are deemed unacceptable, an alternate laboratory will be selected to perform necessary or appropriate verification analyses.

10.3 Immediate Corrective Action

Any equipment and instrument malfunctions will require immediate corrective actions. The laboratory quality control charts are working tools that identify appropriate immediate corrective actions to be taken when a control limit has been exceeded. They provide the framework for uniform actions as part of normal operating procedures. The actions taken should be noted in field or laboratory logbooks, but no other formal documentation is required unless further corrective action is necessary. These on-the-spot corrective actions will be applied daily as necessary.

10.4 Long-Term Corrective Action

The need for long-term corrective action may be identified by standard QC procedures, control charts, and/or performance or system audits. Any quality problem that cannot be solved by immediate corrective action falls into the long-term category.

The essential steps in a corrective action system are:

- Identification and definition of the problem;
- Investigation and determination of the cause of the problem;
- Determination and implementation of a corrective action to eliminate the problem; and
- Verification that the corrective action has eliminated the problem.

Documentation of the problem is important in corrective action. The responsible person may be an analyst, laboratory QA Manager, sampler, the QA Officer, or the Project Manager. In general, the QA Officer will investigate the situation and determine who will be responsible for implementing the corrective action. The QA Officer will verify that the corrective action has been taken, appears effective, and, at appropriate later dates, verify that the problem has been resolved. The QA Officer and the manager for field activities will document the required corrective action. The corrective action will be discussed with the agencies prior to implementation, if the severity of the problem warrants such discussion.

11.0 REFERENCES

U.S. Environmental Protection Agency, 1987a, T*est Methods for Evaluating Solid Waste,* SW-846, first revision, Office of Solid Waste and Emergency Response, Washington, DC.

U.S. Environmental Protection Agency, 1988a, *Documentation Requirements for Data Validation of Non-CLP Laboratory Data for Organic and Inorganic Analyses*, prepared for U.S. EPA Region IX by Ecology and Environment. May.

U.S. Environmental Protection Agency, 1988b, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, OSWER Directive 9355.3-01, Interim Final. October.

Table A-1
Sample Preservation and Hold Times
Sampling and Analysis Plan
Oyster Point Landfill
South San Francisco, California

Analytical Method	Container	# of Containers	Preservation	Hold Time
VOCs by 8260	40 mL VOA vial with Teflon septa	3	4 drops HCl, cool at 4 degrees C	14 days
Pesticides by 8081	1L amber glass with Teflon-lined lid	1	cool at 4 degrees C	7 days extract/ 40 days analysis
PCBs by 8082	1L amber glass with Teflon-lined lid	1	cool at 4 degrees C	7 days extract/ 40 days analysis
SVOCs by 8270	1L amber glass with Teflon-lined lid	1	cool at 4 degrees C	7 days extract/ 40 days analysis

VOCs = Volatile Organic Compounds
PCB = Poly-chlorinated biphenals
SVOCs = Semi-Volatile Organic Compounds
HCl = Hydrochloric Acid
mL = Milliliter
L = Liter
VOA = Volatile Organic Analysis